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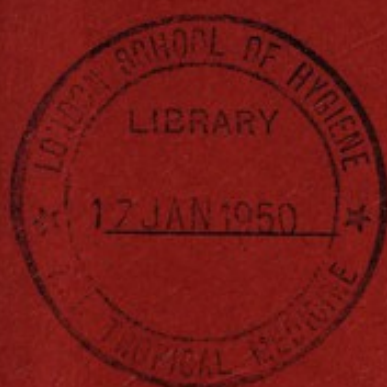
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ZANZIBAR PROTECTORATE

Medical and Sanitary Report
for the
Year ended 31st December, 1948



Price: One Shilling



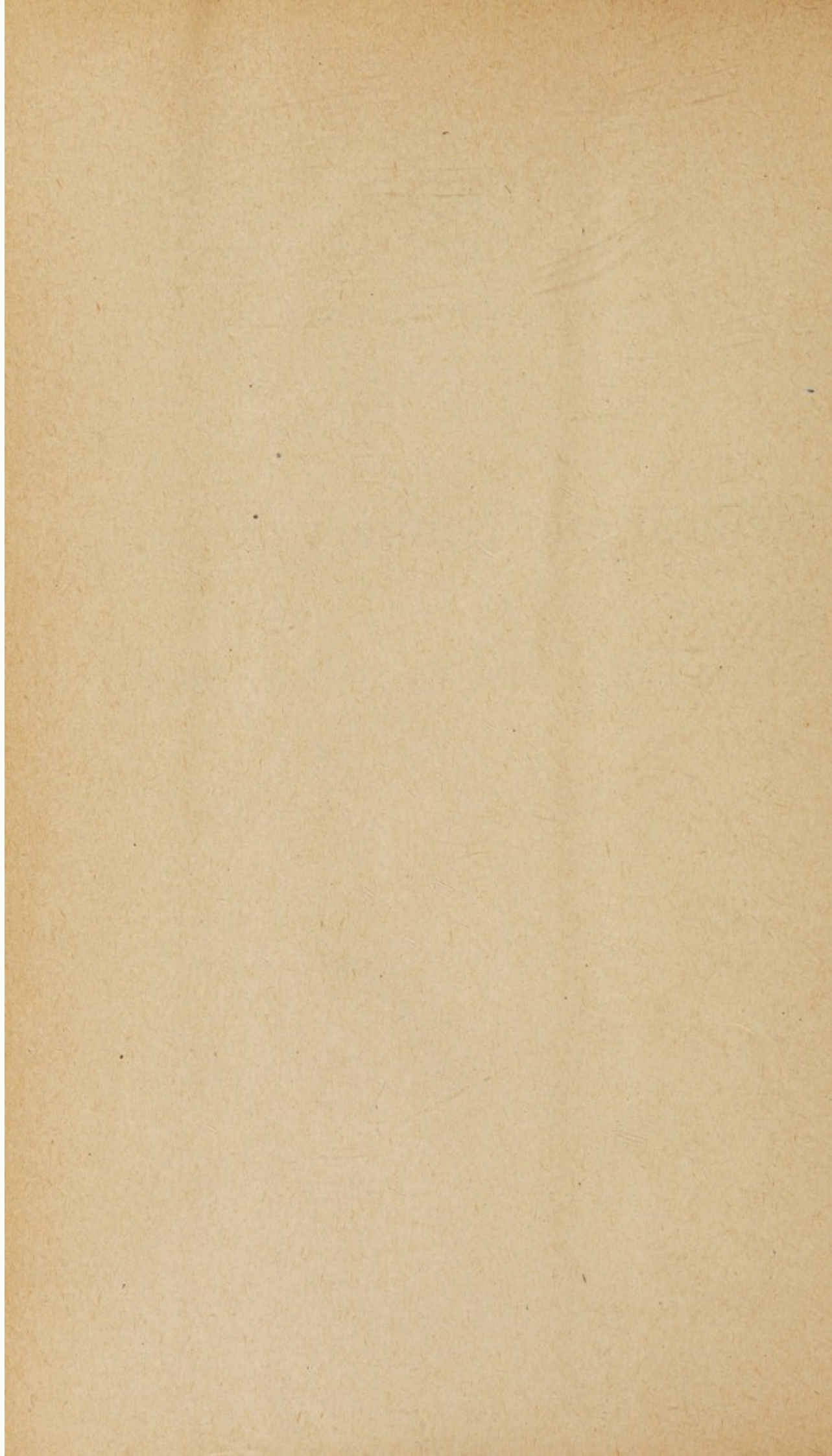


ZANZIBAR PROTECTORATE

Medical and Sanitary Report

for the

Year ended 31st December, 1948



OFFICE OF THE
SENIOR MEDICAL OFFICER-IN-CHARGE,
HEALTH DEPARTMENT,
ZANZIBAR.

30th April, 1949.

SIR,

I have the honour to submit for the information of His Excellency the British Resident and for transmission to the Right Honourable the Secretary of State, the Medical Report on the Health and Sanitary conditions of the Zanzibar Protectorate for the year 1948.

I have the honour to be,

Sir,

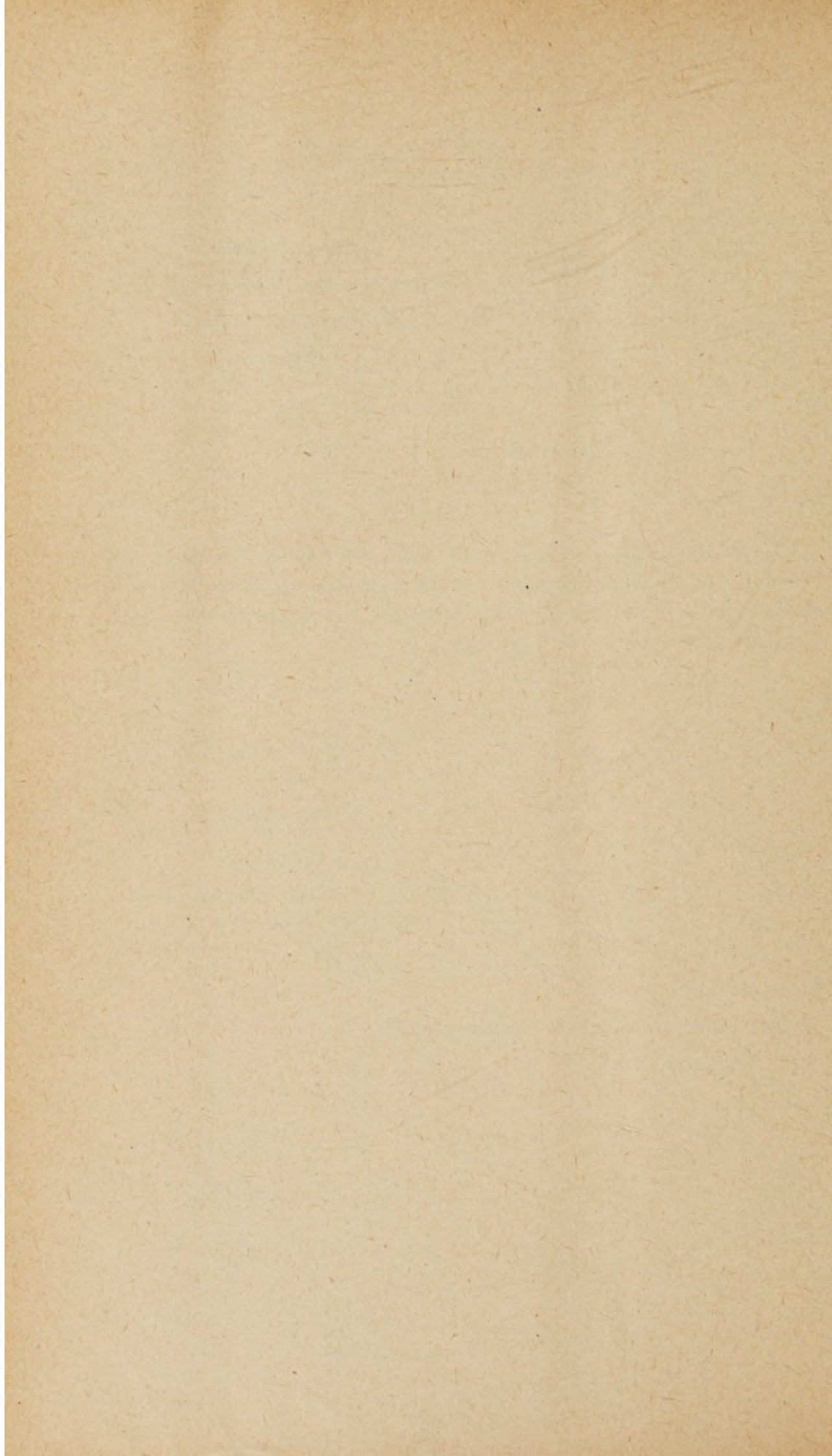
Your obedient servant,

G. P. MERSON,
*Acting Senior Medical Officer-in-Charge,
Health Department*

THE HONOURABLE

THE CHIEF SECRETARY TO THE GOVERNMENT,

ZANZIBAR



ZANZIBAR PROTECTORATE

Medical and Sanitary Report

for the year ended

31st December, 1948

ERRATA—1947 Annual Report page 3: Senility *should read* 100 instead of 158; Pneumonia *should read* 34 instead of 13; Tuberculosis *should read* 57 instead of 24.

SECTION I.—ADMINISTRATION: GENERAL REVIEW

STAFF

During the year Dr. J. C. St. George Earl, Senior Medical Officer, proceeded on leave prior to retirement. In August, Dr. C. E. Roberts, O.B.E., Specialist Officer, proceeded to the United Kingdom on urgent private affairs and later sent in his resignation. Dr. E. J. E. Webb, Medical Officer, also resigned from the service owing to the ill-health of his wife. In addition to these Dr. G. T. Balean, Medical Officer, proceeded on vacation leave in October, 1948, and Dr. W. M. Lewis, Woman Medical Officer was transferred to Uganda in April, 1948. Amongst the nursing sisters three resigned and three went on vacation leave. Two new appointments of nursing sisters, Miss I. Smails and Miss M. S. Murdoch, were made during the year. Owing to retirements, resignations and leave arrangements the remaining staff of medical officers had to carry out additional duties of Senior Medical Officer in Charge and Specialist Officer respectively in addition to their own duties. In Pemba in place of two medical officers one only was available since September. Assistance for the Nursing Service had to be obtained locally from nursing sisters who had resigned.

The Dental Surgeon was away on leave until September and the Assistant Dental Surgeon carried out his duties. On arrival of the Dental Surgeon the Assistant Dental Surgeon went to the United Kingdom on study leave.

The Senior Sub-Assistant Surgeon retired at the end of November and a new lady assistant medical officer arrived in the Protectorate.

The Sanitary Superintendent, Mr. E. H. Lavers, returned from leave at the end of July.

The construction of the new Mental Hospital was nearing completion and the post of the Superintendent of Mental Hospital was filled early in January, 1948.

TRAINING OF NON-EUROPEAN PERSONNEL

The European Sanitary Inspector, Teacher, continued with the training of the class of sanitary inspectors. Twelve sanitary inspectors appeared for the Royal Sanitary Institute examination in August. The Joint East African Board of examination conducted the examination in Zanzibar and six candidates were successful.

The training of nurses, attendants, and midwives continued during the year. In December twelve nurses sat for the final examination of which nine were successful.

HOSPITALS

The work of the hospitals was maintained. The number of in-patients was 7,067 compared with 7,257 in 1947.

DISPENSARIES

In Pemba, Mzambaraoni Dispensary was built to replace the existing building and was completed at the end of the year.

MATANGATWANI DISPENSARY

No maintenance was carried out during the year. The Development Authority is proceeding with the erection of a rural dispensary, rural dispensary attendant's house and sanitary inspector's house at Konde, all of the standard pattern, to replace that at Matangatwani and it is anticipated that these buildings will be ready for occupation in 1949.

MATERNITY AND CHILD WELFARE

These services were satisfactorily maintained. There were 508 confinements in Government Hospitals compared with 417 in 1947.

SCHOOL MEDICAL AND DENTAL SERVICE

The school medical service was maintained, but owing to the shortage of staff examination was restricted to fewer grant-aided schools. Under-nourishment, enlargement of the spleen and skin diseases were common. Paludrine, cod liver oil and iron were given to the children regularly, but it is too early to record its results. The school dental services was maintained as in 1947.

COLONIAL DEVELOPMENT AND WELFARE ACT

The Mental Hospital was completed but was not ready for occupation till the end of the year.

AWARDS

The award of the Brilliant Star (fourth class) to the Specialist Officer, Dr. C. E. Roberts, O.B.E., is recorded with pleasure.

SECTION II.—PUBLIC HEALTH

The total number of patients seen at hospitals and dispensaries during the five years was as follows:—

	1944	1945	1946	1947	1948
New cases	98,003	114,951	125,557	131,955	138,939
In-patients	5,854	6,246	6,643	7,257	6,819
Total attendances	351,581	409,127	430,331	525,473	454,236
Deaths in hospitals	386	420	504	482	376

The principal causes of deaths were—

Tuberculosis	...	...	...	...	14
Dysentery	...	...	...	...	12
Pneumonia	...	...	...	...	49
Diseases of blood and blood forming organs	...	...	...	...	27
Diseases of the skin, cellular tissue, bones and organs of locomotion	...	...	...	...	50
Ancylostomiasis	...	...	...	...	16
Malaria	...	...	...	...	25

GENERAL DISEASES

The cases referred to in the following review of the returns of sickness, include only those treated by medical officers or assistant medical officers.

1. *Epidemic, endemic and infectious diseases.*—There were 26,368 cases with 85 deaths in hospital.

2. *General diseases.*—2,919 cases were reported.

3. *Diseases of the nervous system and organs of sense.*—There were 6,137 cases in this group. Diseases of the eye numbered 4,245 and 37 were cases of trachoma.

4. *Affections of the circulatory system.*—270 cases were recorded. 131 persons suffering from heart disease, 26 of whom died, were treated in hospital.

5. *Affections of the respiratory system.*—10,361 cases were treated. 909 cases of pneumonia with 49 deaths were treated in hospital.

6. *Affections of the digestive system.*—There were 11,764 cases in this group.

7. *Diseases of the genito-urinary system.*—1,914 cases of non-venereal diseases of the genito-urinary system were reported.

8. *Puerperal state and diseases of infancy.*—456 cases were treated.

9. *Affections of the skin, cellular tissue and the organs of locomotion.*—20,418 cases were recorded.

10. *Affections produced by external causes.*—There were 9,073 cases.

COMMUNICAL DISEASES

(A) INSECT-BORNE

Malaria.—11,742 cases were reported of which 9,455 were unclassified. 733 cases with 25 deaths were treated in Government hospitals.

(B) INFECTIOUS DISEASES

Plague.—Although there has been no case of this disease for many years active steps are taken to prevent the introduction and spread of plague. Careful attention is given to accumulation of rat attracting materials, and many improvements are made during the reconstruction and building of godowns and other buildings.

In order to ascertain whether plague is present among the rat population in the town the Health Department carry out the regular trapping of rats. Under the present system traps are deposited on premises in all areas of the town, and gradually every house or hut is visited. Daily reports are made by the rat trappers, and all rats caught are produced for inspection and identification.

Daily tests are made by the Laboratory to discover if any plague bacilli are present, and in the event of this being found, immediate action would be taken to deal with the threatened outbreak.

During the year, 9,863 rats were trapped giving an average of nearly 0.17 rat per house trapped.

Small-pox.—No cases occurred during 1948.

Vaccinations are performed daily at the Health Office, Zanzibar, and in Pemba, mainly in connection with passengers leaving the Protectorate by sea and air. Only the International Certificates are issued.

The schools have also been visited for the vaccination of new entrants.

All arrivals on ships and planes who cannot produce valid vaccination certificates are vaccinated.

Owing to parents failing to have their children vaccinated within six months of birth it was found necessary to issue a warning to the public that legal action would be taken.

The following vaccinations were performed during the year:—

Zanzibar	...	...	...	12,139
Ships and dhows	...	...	...	1,367
Zanzibar Island	...	...	...	13,506
Pemba	...	...	...	647
Total number of vaccinations	...	...	...	14,153

Tuberculosis.—250 cases attended Government hospitals, there were 108 in-patients and 14 deaths.

Leprosy.—There have been no changes in accommodation at Welezo and Makondeni as reported last year. The following patients were treated at the two settlements:—

	Welezo		Makondeni	
Remaining on 31st December, 1947	47	...	...	57
Admitted during 1948	...	...	11	...
Discharged	...	...	7	...
Died	...	...	4	...
Remaining on 31st December, 1948	47	...	...	51

Walezo

There are sixty-two houses for patients at Welezo. These patients who are capable of working are employed by the Mission and paid a salary. Other activities by these lepers are cultivation and the keeping of poultry.

Makondeni

There have been no changes in accommodation at Makondeni during the year. Accommodation exists for 92 lepers. There are 51 resident at present.

One hospital orderly is in charge. He is provided with free quarters and a special allowance of Shs. 20 per month is paid to him.

In addition the following posts are found from amongst the lepers and paid by Government:—

Sweepers and cleaners	...	6	Sheha and grave digger	...	1
Dresser	...	1	Water carrier	...	1
Cook	...	1	Wood chopper	...	1
Dhobie	...	1	Market boy	...	1
Gardener	...	1	Cowherd (locally engaged)	...	1

As far as possible inmates are detailed for these duties in relation so that all may have the opportunity of earning extra money.

In general the inmates are un-cooperative and have little social sense and even the prospect of wages is not an incentive to work.

The five cows and a bull purchased in 1947 have proved a great success. Eight calves have been born of which one has since died. The milk supplied is appreciated by the lepers.

No further planting has been carried out this year. The District Agricultural Officer, Pemba, inspected all trees planted in 1947 and is satisfied with their progress. The settlement is visited weekly by the District Medical Officer, Pemba, and more frequently should it be necessary.

VITAL STATISTICS

Population.—As returned by the 1948 census is 265,872. Final report is not yet published

Births and deaths.—A total of 4,218 births and 2,643 deaths were recorded in Zanzibar and 2,828 births and 2,078 deaths registered in Pemba. Birth rate 26.5 per thousand. Death rate 17.8 per thousand.

Infantile mortality.—423 deaths of children one year old were registered. Infantile mortality rate 60 per thousand live births.

Still-births.—63 still-births were registered. Still-birth rate 9 per thousand births.

Maternal mortality.—25 maternal deaths were registered. Maternal mortality rate 5 per thousand.

ZANZIBAR PROTECTORATE

HYGIENE AND SANITATION

Mosquito Control

Inspection of premises:

		Zanzibar Township	Protective belt outside township
Europeans	...	7,182	244
Indian	...	113,183	675
Arab	...	67,234	1,994
African	...	217,384	37,074
Others	...	35,995	—
Vacant houses	...	8,797	3,897
Mosques and temples	...	6,265	1,130
		<hr/> 456,040	<hr/> 45,014

Other Inspections:

Sullage and cesspits	...	153,880	15,826
Drains	...	16,713	4,377
Gully traps	...	53,631	811
Roof gutterings	...	3,042	471
Borrow pits	...	192	8,374
Swamps	...	180	1,757
Crab holes	...	79,267	14,733
Anti-malarial drains	...	2,464	3,478
Dhows on beach	...	191	2,190
Boats	...	2,279	636
Wells and water-holes	...	1,280	8,635
Pools	...	3,119	5,731
Gardens	...	10,725	2,615
Graveyards	...	7,001	1,930
Open lands	...	14,805	11,227
Trees	...	7,306	74,209
Mosquito traps	...	117	—
		<hr/> 355,592	<hr/> 157,000

Breeding places found:

Anopheles	...	284	333
Aedes	...	2,080	263
Culex	...	838	197
		<hr/> 3,202	<hr/> 793

Adult mosquitoes caught in control stations:

Anopheles	...	39	214
Aedes	...	140	710
Culex	...	5,781	1,959
		<hr/> 5,960	<hr/> 2,883
Aedes Index (per cent)	...	0.42	0.41

Action taken:

	Zanzibar Township	Protective belt outside township
Notices for abatement served	1,942	31
Prosecutions for failure to abate	6	—
Earth drains or ditches cleaned and graded (linear feet)	2,010	1,041,806
New concrete anti-malarial drains laid (linear feet)	2,104	226
New earth drains made	567	1,900
Low-lying land raised (square yards) ...	12,838	—

Number of oilings of the following:—

Drains	484	596
Tanks	18	66
Cesspits	27,311	500
Sullage-pits	3,328	180
Swamps and pools	856	1,114
Pools or excavations filled in	82	—
Holes in trees filled in	8	209
Crab holes oiled and filled in	6,976	14,733
Crab holes found containing larvæ	3,054	—
Dead crabs found after being poisoned ...	1,415	—
Spraying of swamps, pools and rice fields with paris green	—	354
Eaves and gutters removed or re-aligned ...	2	—
Water tanks rendered mosquito-proof ...	1	—
Bush and undergrowth cleared (sq. yds.) ...	3,068,464	3,047,806
Shells, coconut husks, tins, etc., removed ...	20,211	139,312
D.D.T. Briquettes used in cesspits	9,638	—
Wells provided with mosquito eating fish ...	12	—
Disused wells filled in	8	—
Premises sprayed with D.D.T. Solution ...	414	—

There was no increase in the number of *Anopheles* and *Aedes* breeding places found in the township, but the number of *Culex* breeding places increased by 80 per cent. The number of adult *culex* caught shows that control measures were successful.

There was a considerable reduction in the infestation of mosquitoes in dwelling houses by spraying with D.D.T. This will not be continued during 1949 as funds have not been allocated for this purpose. Public buildings such as hospitals, prisons, markets, etc., will continue to be sprayed with D.D.T.

ZANZIBAR PRISONS—YEARLY TOTALS OF ADULT MOSQUITO CATCHES

	FIRST OFFENDERS BLOCK			
	Wet days	Rainfall	Anopheles	Culex
1946	...	52.35	1,375	2
1947	...	73.11	80	...
1948	...	75.01	13	...
				Aedes
				1,467
				752
				524

ADULT MOSQUITOES CAUGHT IN SIX CONTROL STATIONS, ZANZIBAR TOWNSHIP

Year	(1) N. E. Boundary			(2) N. Boundary			(3) S. Boundary			(4) W. Boundary			(5) S. E. Boundary			(6) Central		
	Anopheles		Culex	Anopheles		Aedes	Anopheles		Aedes	Anopheles		Aedes	Anopheles		Aedes	Anopheles		Aedes
1943	...	10	197	...	...	...	225	159	3	237	...	...	138	...	17	109	...	...
1944	...	5	104	...	...	3	80	51	1	248	...	...	157	...	7	94	...	...
1945	...	5	94	...	...	...	49	...	1	240	...	...	102	...	4	106	...	...
1946	...	8	100	...	...	15	36	6	42	127	...	...	72	2	11	48	...	...
1947	...	1	84	4	4	14	57	...	56	151	...	3	49	...	8	47	...	...
1948	...	4	138	...	1	178	...	2	36	93	...	5	32	...	4	65	...	...

MALARIA IN EUROPEANS

Malaria (i.e. Parasites present in the blood):

IN-PATIENTS					
1943	1944	1945	1946	1947	1948
66	73	55	27	22	13
OUT-PATIENTS					
99	90	64	41	38	33

INFECTIOUS DISEASES

The following table is a comparison of the infectious diseases notified in 1946, 1947 and 1948.

			1946	1947	1948
Chicken pox	...	...	102	195	44
Diphtheria	...	...	2	5	7
Dysentery-Amoebic	...	...	87	83	69
Dysentery-Bacillary	...	...	23	15	38
Erysipelas	...	...	—	—	1
German Measles	...	...	13	7	9
Measles	...	...	7	77	52
Mumps	...	...	16	2	4
Puerperal Sepsis	...	...	—	1	1
Relapsing Fever	...	...	53	3	1
Tetanus	...	...	—	—	2
Tuberculosis	...	...	101	120	125
Typhoid Fever	...	...	8	9	13
Typhus Fever	...	...	—	—	1
Undulant Fever	...	...	—	—	1
Whooping Cough	...	...	6	46	24

Disinfection:

Number of hospital wards disinfected with formalin	...	46
Number of premises disinfected with formalin	...	30

Treated in Thresh steam disinfector—

Mattresses	...	242	Blankets	...	117
Pillows	...	394	Clothing	...	18

Treated in Clayton disinfector by Sulphur dioxide—

Mattresses	...	15	Mosquito nets	...	8
Pillows	...	28			

Disinfected with formalin—

Mattresses	...	74	Blankets	...	40
Pillows	...	151			

LICENSED PREMISES

The standard of all licensed premises has shown a slow and gradual improvement due to annual inspection before licensing is sanctioned by the Health Office. The Municipal Officer has co-operated in this and the close control may have resulted in a small loss of revenue to Government.

SEWAGE DISPOSAL AND DRAINAGE IMPROVEMENTS IN SANITATION IN
PRIVATE HOUSES

Progress has been slow for many years owing to the lack of materials, but now that more materials are being imported it is hoped that the general policy of installing water flushing closets in place of pit latrines will proceed.

Nine septic tanks were constructed by private owners, and 22 W.C. pans installed. 774 feet of 4-inch glazed earthenware drain pipes were laid, and 269 feet of 4-inch iron soil pipes and 290 feet of 3-inch iron waste pipes were fixed.

Public Drainage.—The following new drains were laid in Zanzibar in 1948:—

- (1) 700 feet of 4-inch sewer extension at Vuga and Baghani.
- (2) 75 feet of 4-inch sewer extension at Mlandege.
- (3) 1,600 feet of 4-inch drains at new Mental Hospital.
- (4) 70 feet of 6-inch drains at Civic Centre.
- (5) 40 feet of 4-inch drains at Livingstone House.
- (6) 200 feet of 4-inch drains at Saateni pumping station.

PORT AND AERODROME HEALTH WORK

During the year 1948, the following is the record of these departments:—

Number of ships which called	...	...	365
„ dhows which called	...	...	1,662
„ aircraft which landed	...	...	3,160
„ immigrants who arrived by sea	27,626		
„ emigrants who left by sea	...	27,948	
„ immigrants who arrived by air	9,536		
„ emigrants who left by air	...	9,219	
„ vaccinations carried out on ships and dhows	...	...	1,367

QUARANTINE STATION

The station was maintained during the year. Twenty-seven contacts of typhoid ex s.s. *Toscana* were detained under observation on the station.

“*Toscana*” Incident.—Report appears as an appendix to this report.

IMMUNISATION AGAINST YELLOW FEVER

During 1948, 2,756 people were immunised against yellow fever. Yellow fever certificates issued were in accordance with the International Sanitary Convention.

FLY PREVENTION

Number of fly traps used:			
Zanzibar Rural Districts	...	29	
Zanzibar Town	...	54	
Pemba	...	28	
Number of wires used:			
Zanzibar Town	...	268	
Number of fly breeding places detected 83.			

HOUSING AND TOWN PLANNING, ZANZIBAR TOWNSHIP

Inspections and recommendations were made in connection with the following applications made to the Joint Building Authority.

STONE BUILDINGS

<i>Applications with Plans:</i>	1947	1948
Erection of new buildings	8	15
Major alterations and additions including drainage to existing buildings	102	104
<i>Applications without Plans:</i>		
Alterations and additions	221	132
Permits refused	5	8
Notices served for unauthorized work	24	9
Notices served for dangerous structure	97	102

NATIVE-TYPE BUILDINGS

Erection of new huts	320	166
Reconstruction and extension of existing huts	372	584
Repairs to existing huts	751	634
Notices served for unauthorised work	—	23
Notices served for demolition	—	12

RUINOUS OR INSANITARY HUTS DEMOLISHED

Stone town	11	9
Ngambo	123	114

As a large proportion of the applications are made as a direct result of sanitary notices and technical advice given to the owners the satisfactory performance of this work involves the District Sanitary Inspectors in continuous visits of inspection.

FOODSTUFFS IN RELATION TO HEALTH AND DISEASE

All licensed premises dealing with food such as eating houses, bake-houses, milk shops, etc., and markets were regularly inspected, and the necessary improvements effected where it was found necessary. 132 notices were served calling for cleansing and limewashing of walls, provision of tables with approved tops, clean aprons for employees and drainage.

Licensed hawkers of food were kept under strict observation, and all their utensils had to be approved by the Health Office staff before use.

147 samples of milk were taken for analysis from the town dairies, and 61 from the milk vendors from the rural districts. In addition 21,359 lactometer tests were made at milk depot, where milk brought from the rural districts is presented for inspection before sale.

Prosecutions for selling milk below the legal standard were undertaken in 40 cases (5 from town dairies and 35 from rural milk vendors).

The following is a list of some of the foodstuffs found unfit for human consumption and condemned:—

	lb.		lb.
Fresh fruit ...	1,224	Potatoes ...	16,428
Dried fruit ...	480	Oats rolled ...	9,405
Meat ...	71	Vegetables ...	220
Fish ...	242	Raspberry syrup ...	46
Onions ...	137,613	Maize meal ...	100
Pickled onions ...	22	Rice ...	63

The meat and fish sections of the central markets were twice sprayed with D.D.T. solution during the year, and resulted in a considerable reduction of flies.

In view of the loss of valuable food caused by insect infestation whilst grain is stored in godowns, a scheme was introduced for the treatment of all godowns with insecticides; the owners having to pay the actual cost of materials and labour involved. Only two owners availed themselves of this service, with the result that the grain stored in the untreated godowns continued to become so seriously infested that large quantities were rendered unfit for human consumption.

DERATISATION OF SHIPS

Deratisation exemption certificates were issued, after inspections to the following ships: s.s. *Frenulina*, (twice), s.s. *Kilwa*, s.s. *Sofala*, H.H.S. *Al-Said*, M.V. *Durenda*.

The following ship was treated with sulphur dioxide clayton system:— H.H.S. *Al-Hathera*.

SCAVENGING, REFUSE REMOVAL AND DISPOSAL

In order to facilitate the collection of refuse in the African location of the town empty colas drums were placed in various areas, but many were removed by the residents for other purposes. Now the drums are being punctured to prevent thefts, and the number will be increased during 1949.

During the general strike in September the work of scavenging and refuse removal was carried out by prisoners assisted by volunteers from members of the Indian community and Boy Scouts.

The quantities of refuse removed during the year from the six sanitary districts of Zanzibar township are as follows:—

		Cartloads
"A"	Sanitary District	... 17,648
"B"	" "	... 22,389
"C"	" "	... 17,569
"D"	" "	... 27,676
"E"	" "	... 29,120
"F"	" "	... 6,225
Total		... 120,627

With the exception of the refuse burnt at the refuse destructor, refuse was used for raising the level of low-lying areas by controlled dumping as follows:—

	Cartloads
Tidal basin near Wireless Station	... 51,211
Tidal creek at Hollis Road	... 42,839
Tidal land at Saateni	... 9,659
Kikwajuni old stone quarry	... 11,032
Burnt at refuse destructor	... 3,252
Funguni Creek	... 2,634
Total	... 120,627

PUBLIC HEALTH WORK IN RURAL DISTRICTS

Makunduchi District.—In January a learner sanitary inspector was posted to this district, where by means of inspections and talks to the people he prepared the way for more healthy conditions. He also worked in conjunction with the Mass Education unit in the area.

In November a newly qualified sanitary inspector went to the district and the learner returned to Zanzibar for further studies with a view to sitting for the next Royal Sanitary Institute examination.

Mkokotoni District.—In November, a newly qualified sanitary inspector was posted to this district.

Chwaka District.—Owing to the shortage of suitable housing accommodation it was not possible to post a sanitary inspector in this district. As soon as quarters are arranged he will proceed to take up the duties in this area.

General.—A programme of work has been drawn up for the three rural sanitary inspectors comprising refuse disposal, mosquito control, investigation of infectious diseases, survey of water supplies, latrines, milk supply, food inspection and housing improvements.

SCHOOL MEDICAL AND DENTAL SERVICE

In view of the limited staff available school medical and dental service had to be restricted to fewer schools than the previous year.

In grading the state of nutrition, attention was given to posture, muscle tone and superficial abdominal fat. Posture was uniformly bad throughout the schools, and in measuring heights a great deal of trouble was taken to push stomachs and chins in and get chests out and knees straight before the height was taken. Somatometric methods of grading could not be applied since in rural schools only the year of birth is known and even this, in many cases, is subject to doubt. The Kundsén Schiøtz sign of the dorsal median furrow and profile posture was so universally positive that it was not applied. Specific tests of malnutrition could not be applied owing to lack of the necessary equipment. The fallacies involved in the present system of grading are fully recognized and the only point in favour is that only one observer was involved.

Particular attention was given during the examination to signs of vitamin deficiency but no attempt was made to diagnose individual deficiencies, since there appears to be a general deficiency of all the vitamins which could only be remedied by properly balancing the diet. It is interesting that no case of scrotal dermatitis was found although this was particularly sought.

In Zanzibar 51 per cent of the boys and 42 per cent of the girls were reported to be satisfactorily nourished. In Pemba 12 per cent at Wete, 38 per cent at Chake Chake, and 37 per cent at Mkoani were properly fed.

Paludrine, Codliver Oil and Ferrous Sulphate

(1) Up till 1947, one meal a day had been supplied to school children during the school year. At the beginning of the current year it was decided to provide paludrine, cod liver oil and ferrous sulphate in an attempt to improve the health of the school children.

(2) Supplies of each drug became available at different times during the school year. Paludrine 100 mg. three times a week was started in February. Every boy was given his tablet by the school teacher who saw that he swallowed it.

(3) Later ferrous sulphate tablets became available and all boys were given two tablets daily for the five-day week during the remainder of the school year.

(4) Half way through the year cod-liver oil became available and after a trial at Makunduchi school it was found to be satisfactorily given by means of a medical syringe, the teacher injecting 3 c.c. into each boy's mouth on three days of the week. Sufficient syringes were obtained and the general issue of cod-liver oil to school children started in September.

(5) It is too early to judge the success of the above measures. Enquiries from school teachers have revealed that there is less absenteeism due to fever than formerly. Some of the teachers say that their pupils are complaining of increased hunger as a result, they say, of taking ferrous sulphate. There are very few complaints of gastric irritation and vomiting following these tablets. This is scarcely to be wondered at, since most of the boys arrive at the school fasting. There have been no objections or refusal to take cod-liver oil.

The school dental service has not received the same attention as in 1947 owing to the absence of staff.

<i>School Medical Service</i>					
	1944	1945	1946	1947	1948
Examined	1,447	2,811	246	2,987	2,847
<i>School Dental Service</i>					
	1944	1945	1946	1947	1948
Examined	3,080	2,927	3,476	4,213	4,133
Treated	2,289	1,528	—	—	—
Required treatment	—	—	1,176	1,803	1,814

Nutrition.—A total of 1,013 patients were treated for nutritional diseases.

PEMBA

Anti-Malarial Measures.—During the year 531 linear feet concrete drain and 428 linear feet earth drain were laid; 660,263 square yards of bush cleared and 2,479 trees (*Pterocarpus*) were planted.

Mosquito Control.—The following numbers of mosquitoes were caught in control stations: *Anopheles* 277, *Culex* 4,508, *Aedes* 1,569.

Sewage Disposal and Drainage.—Seven new W.Cs. were constructed and 816 linear feet of earthenware pipe drains were laid. Six septic tanks constructed and seven emptied.

Scavenging.—24,175 cartloads of refuse were removed.

Infectious Diseases. There was a mild epidemic of measles throughout Pemba.

Vaccinations.—647 vaccinations were performed.

Immunisation against Yellow Fever.—During 1948, 250 people were inoculated against yellow fever.

Inspection of foodstuffs.—The following were condemned: Maize 18,040 lb., Fish 314 lb.

Housing.—

Total number of building applications	...	297
To build huts	...	87
To build stone buildings	...	9
To repair huts	...	145
To repair stone buildings	...	42
Demolitions	...	21

AMBULANCE SERVICE ZANZIBAR

During the year 1,195 patients were collected from the rural districts by ambulance and brought to the hospital for treatment. This work involved a total mileage of 13,246.

REPORT OF THE DENTAL SURGEON

Some of the activities of the Dental Department have had to be curtailed owing to the fact that for eleven months of the year there was only the Dental Surgeon or the Assistant Dental Surgeon in the Protectorate and for a period of three weeks from the end of August the Protectorate was without the Dental Surgeon and the Assistant Dental Surgeon.

A representative of the Dental Department visited Pemba Island twice during the year totalling 37 days.

The following is an approximate summary of some of the work carried out by the department during the year:—

	<i>Attendances</i>	<i>Extractions</i>	<i>Fillings</i>	<i>Scalings</i>
Officials and families	678	101	330	59
Native out-patients	5,380	6,472	—	—
Schools	709	333	428	21
Non-Officials	514	206	168	27

MATERNITY AND CHILD WELFARE.

	1944		1945		1946		1947		1948	
	New cases	Re-Attendances	New cases	Re-Attendances	New cases	Re-Attendances	New cases	Re-Attendances	New cases	Re-Attendances
General cases	4,733	22,347	7,945	28,262	11,327	34,190	11,900	34,214	12,644	38,646
Ante-natal	207	739	326	838	415	1,112	485	1,599	396	1,338
Infant Welfare	255	1,718	232	...	283	940	248	1,125	364	1,036
Total	5,195	24,804	8,503	29,100	12,025	36,242	12,633	36,938	13,404	41,020
<i>Zanzibar Rural Clinics:</i>										
Mkokotoni	491	1,071	800	1,389	1,031	2,480	1,096	4,568	1,480	5,320
Mwera	143	558	289	1,446	277	1,064	244	1,037	855	2,658
Salem	275	1,324	490	2,319	533	2,508	688	3,035	594	1,617
Total	909	2,953	1,579	5,154	1,841	6,052	2,028	8,640	2,839	9,605
<i>Zanzibar Maternity Hospital:</i>										
Total confinements...	153	...	299	...	248	...	299	...	344	...
<i>Pemba Wete Clinic:</i>										
Ante-natal cases	91	397	156	175	105	493	123	516	136	554
Infant Welfare	154	802	104	402	...	...	84	450	151	313
Total	245	1,199	260	577	105	493	270	966	287	867
<i>Pemba Chake Chake Clinic:</i>										
Out-patients	2,825	14,529	3,275	14,617	3,627	12,739	2,917	7,848	3,565	7,317
Ante-natal cases	69	425	66	397	90	499	62	129	68	223
Infant Welfare	115	240	82	1,275	214	1,571	224	749	224	1,049
Total	3,009	15,894	3,421	16,289	3,931	14,809	3,203	8,726	3,857	8,589
<i>Wete Maternity Hospital:</i>										
Total confinements...	62	...	96	...	74	...	68	...	109	...
<i>Chake Chake Hospital:</i>										
Total confinements...	54	...	63	...	57	...	50	...	55	...

ANALYSIS OF MATERNITY CASES

Maternity Hospital, Zanzibar

Total confinements	...	...	344
Forceps deliveries	...	...	13
Craniotomy	...	...	1
Cæsarian section	...	...	1
Maternal deaths	...	...	5
Infant deaths	...	...	13
Premature deaths	...	...	15
Still born	...	...	7
Twins	...	...	9
Triplets	...	...	2

Wete

Total confinements	...	...	109
Normal deliveries	...	...	93
Forceps deliveries	...	...	1
Cæsarian sections	...	...	2
Abnormal Presentations	...	...	3
Craniotomy	...	...	—
Eclampsia	...	...	—
Maternal deaths	...	...	2
Infant deaths	...	...	1
Still-births	...	...	4
Multiple pregnancies	...	...	1

Chake Chake

Total confinements	...	...	55
Normal deliveries	...	...	48
Forceps deliveries	...	...	2
Cæsarian sections	...	...	—
Abnormal presentations	...	...	4
Craniotomy	...	...	—
Eclampsia	...	...	—
Maternal deaths	...	...	—
Infant deaths	...	...	—
Still births	...	...	—
Multiple Pregnancies	...	...	1

EYE CLINIC

The Pathologist was in charge of the Eye Clinic during the year.

The following cases were treated:—

New cases	...	...	3,418
Re-attendances	...	...	19,507
Total	...	...	22,925

Fifty-two major and 69 minor operations were carried out. 583 candidates for Government employment were examined.

LABORATORY

Zanzibar

1. The Pathologist conducted the duties of Acting Senior Medical Officer-in-Charge, Medical and Sanitary Services, from August.

2. The total number of examinations performed was 26,096.

3. *Training.* One Learner Laboratory Attendant resigned and replaced by another making a total of three in training.

4. *Typhoid.*—Number of blood cultures for *bact. typhosum* show a considerable increase of 46.7 per cent as against 7.4 per cent of positive isolation in 1947 which is due mainly to passengers ex s.s. *Toscana* (s.s. *Toscana* 36.3 per cent and local 10.4 per cent).

5. *Malaria.*—The number of positive blood films shows a negligible increase over 1946. The comparative figures are—

	1946	1947	1948
P. falciparum ...	1,309	1,861	1,502
P. Vivax ...	423	700	525
P. Malaria ...	54	100	44
Undefined malaria ...	188	339	198
	<u>1,974</u>	<u>3,000</u>	<u>2,269</u>

6. The demand for the crude liver extract shows a slight increase and 87 litres were prepared in the Laboratory during the year, as compared with 80 litres in 1947.

7. Sterilised saline solution was supplied to the Health Office for use in yellow fever inoculations.

8. The work of the Laboratory is summarised briefly as follows:—

Parasitological examinations ...	15,007
Bacteriological ...	5,329
Serological ...	1,912
Histological ...	52
Medico-legal ...	12
Post-mortem ...	36
General (blood, bio-chemical, etc.) ...	3,734
Special (Ascheim Zondek, veterinary) ...	14
Total ...	<u>26,096</u>

Pemba—Wete

The total number of examinations performed was 5,971.

Blood films ...	2,628
Fæcal examinations ...	586
General ...	2,583
Bacteriological ...	174
	<u>5,971</u>

Pemba—Chake Chake

The total number of examinations performed was 1,860.

Blood films ...	841
Fæcal examinations ...	346
General ...	663
Bacteriological ...	10
	<u>1,860</u>

PRISON AND OTHER INSTITUTIONS

(a) Prisons

Zanzibar.—There were 806 new cases and 2,611 re-attendances at the prison infirmary and 233 prisoners were admitted to hospital. 130 cases of malaria occurred. 9 cases of amoebic dysentery were recorded.

	No. of persons admitted	Daily average in prison	Daily average on sick list
Zanzibar	... 1,032	... 239.60	... 18.41
Pemba	... 1,278	... 97.76	... 1.63

(b) Mental Hospital

Work on the new Mental Hospital progressed slowly and the buildings were completed at the end of the year, but the hospital could not be occupied as the electrical and sanitary fittings were not completed. It is hoped to move into the new buildings early next year.

Remaining on 31st December, 1947	...	80
Admitted	...	44
Discharged	...	30
Deaths	...	9
Remaining on 31st December, 1948	...	85

(c) Walezo Institution

	Pauper Infirmary	Tuberculosis Asylum
Remaining on 31st December, 1947	... 164	... 19
Admitted	... 192	... 70
Discharged	... 128	... 36
Died	... 74	... 43
Remaining on 31st December, 1948	... 154	... 10

RETURN OF WALEZO POOR HOUSE—1948

Remaining at the end of December, 1947	... 230
Admitted during the year	... 273
Total number of deaths	... 121
Remaining at the end of December, 1948	... 211

	*In-patients	Out-patients	Deaths
Tuberculosis of the respiratory system	70	71	43
Leprosy	11	11	4
Syphilis	—	312	—
Gonorrhoea	—	198	—
Malaria Unclassified	—	611	—
Yaws	—	363	—
Ankylostomiasis	—	1,344	—
Rheumatic Conditions	—	393	—
Other diseases of nervous system	—	27	—
Other diseases of eye and annexa	—	89	—
Diseases of the ear and mastoid sinuses	—	57	—
Heart diseases	—	72	—
Bronchitis	—	570	—
Broncho Pneumonia	2	4	—
Other diseases of digestive system	—	611	—
Diseases of the skin, cellular tissue, bone and organs of locomotion	6	699	—
Senility	183	206	74
Total	273	5,638	121
Re-attendances	11,971		

*Previously included in Tables I and II.

FINANCE

(a) Expenditure, Health Department

	£
Personal Emoluments	41,016
Other Charges, General Stores	2,005
Drugs, Dental and Surgical Requisites	7,671
Maintenance of Patients	13,666
Sanitation Labour	2,548
Miscellaneous Services	11,304
Total ...	78,210

(b) Expenditure, Municipality

	£
Personal Emoluments	3,789
Other Charges, Equipment and Stores	123
Sanitation Labour	8,709
Total ...	12,621

(c) Revenue

	£
Hospital Fees and Sale of Drugs	4,336
Dental Fees	333
Contribution from dependencies towards Quarantine Station	1,512
Total ...	6,181

LEGISLATION AFFECTING THE PUBLIC HEALTH ENACTED DURING THE YEAR

Public Health Decree (Cap. 60):

The Public Health (Amendment) Decree, 1948

“Demolition of Unfit Buildings”.

The Public Health (Amendment) Rules, 1948.

Dangerous Drugs Decree (Cap. 64):

The Dangerous Drugs Order, 1948.

Druggists Decree (Cap. 65):

Penicillin Decree No. 4 of 1948.

Druggists (Amendment) Decree No. 24 of 1948.

The Mental Patients Decree, 1947:

The Mental Patients Rules, 1948.

TABLES I AND II.

Return of Diseases and Deaths for the Year 1948.

This table includes only those diseases which were diagnosed in hospitals under the charge of a medical officer or assistant medical officer.

DISEASES	Remaining in Hospital at end of Dec. 1947	Yearly Admissions	Total Cases Treated	Total Deaths	Remaining in Hospital on 31st Dec. 1948	All Cases including both In and Out Patients	Total Cases Treated in 1947
1. Enteric Group—							
(a) Typhoid fever ...	3	21	24	2	1	37	25
(b) Paratyphoid fever ...	...	...	...	...	...	...	1
2. Typhus fever ...	...	1	1	1	...	1	2
3. Relapsing fever ...	...	...	...	...	...	...	14
4. Undulant fever ...	...	...	...	...	...	...	...
5. Smallpox ...	...	...	...	...	...	...	...
6. Measles ...	5	61	66	1	2	213	210
7. Scarlet fever ...	...	...	...	...	...	...	1
8. Whooping cough ...	...	...	...	...	...	92	106
9. Diphtheria ...	...	4	4	...	...	5	8
10. Influenza—							
(a) With respiratory complications ...	...	4	4	...	...	1,454	6
(b) Without respiratory complications ...	...	3	3	...	...	138	716
11. Cholera ...	...	...	...	...	...	...	...
12. Dysentery—							
(a) Amœbic ...	1	63	64	6	2	89	121
(b) Bacillary ...	1	26	27	3	...	74	37
(c) Unclassified ...	...	23	23	3	1	88	105
13. Plague—							
(a) Bubonic ...	...	...	...	...	...	...	...
(b) Pneumonic ...	...	...	...	...	...	...	...
(c) Septicæmic ...	...	...	...	...	...	...	...
14. Acute poliomyelitis ...	...	...	...	...	...	...	...
15. Encephalitis lethargica ...	...	1	1	...	...	1	...
16. Cerebro-spinal fever ...	...	2	2	2	...	2	1
17. Rabies ...	...	...	...	...	...	...	...
18. Tetanus ...	...	16	16	6	...	18	20
19. Tuberculosis of the respiratory system ...	5	95	100	13	4	232	320
20. Other tuberculous diseases ...	...	8	8	1	1	18	40
21. Leprosy ...	...	2	2	...	...	23	74
22. Venereal diseases—							
(a) Syphilis ...	6	47	53	4	...	568	663
(b) Gonorrhœa ...	1	88	89	...	3	1,264	1,056
(c) Other venereal diseases ...	1	47	48	...	...	69	89
23. Yellow fever ...	...	...	...	...	...	...	...
24. Malaria—							
(a) Benign tertian ...	...	48	48	...	1	352	657
(b) Subtertian ...	14	336	350	12	5	1,903	2,536
(c) Quartan ...	...	5	5	...	...	32	35
(d) Unclassified ...	1	329	330	13	5	9,455	6,939
25. Blackwater fever ...	...	5	5	...	1	6	...
26. Kala-azar ...	...	...	...	...	...	...	...
27. Trypanosomiasis ...	...	...	...	...	...	...	...
28. Yaws ...	8	62	70	...	1	3,608	3,408
29. Other protozoal diseases ...	...	...	...	...	...	2	17
30. Ancylostomiasis ...	4	156	160	16	6	5,575	5,054
31. Schistosomiasis ...	3	30	33	...	1	569	397
32. Other helminthic diseases ...	...	4	4	...	...	69	47
Carried forward ...	53	1,487	1,540	83	34	25,957	22,735

TABLES I AND II.—(Contd.)

DISEASES	Remaining in Hospital at end of Dec. 1947	Yearly Admissions	Total Cases Treated	Total Deaths	Remaining in Hospital on 31st Dec. 1948	All Cases including both In and Out Patients	Total Cases Treated in 1947
Brought forward ...	53	1,487	1,540	83	34	25,957	22,735
33. Other infectious and/or parasitic diseases ...	2	93	95	2	1	411	384
34. Cancer and other tumours							
(a) Malignant ...	2	27	29	3	...	42	97
(b) Non-malignant ...	2	33	35	3	1	132	160
(c) Undetermined ...	...	3	3	...	...	6	2
35. Rheumatic conditions ...	...	19	19	...	...	427	587
36. Diabetes ...	1	24	25	...	...	60	53
37. Scurvy ...	...	...	...	...	...	...	...
38. Beri-beri ...	...	3	3	...	...	4	5
39. Pellagra ...	1	1	2	...	...	3	17
40. Other diseases—							
(a) Nutritional ...	2	78	80	14	2	652	828
(b) Endocrine glands and general ...	...	49	49	3	...	361	109
41. Diseases of the blood and blood forming organs ...	5	111	116	27	4	1,232	727
42. Acute and chronic poisoning ...	...	...	...	...	...	...	11
43. Cerebral hæmorrhage ...	...	1	1	1	...	2	6
44. Other diseases of the nervous system ...	2	43	45	9	4	671	451
45. Trachoma ...	...	3	3	...	1	37	16
46. Other diseases of the eye and annæa ...	4	146	150	...	4	4,245	3,050
47. Diseases of the ear and mastoid sinus ...	1	29	30	...	...	1,182	1,210
48. Diseases of the circulatory system—							
(a) Heart diseases ...	4	78	82	25	4	131	221
(b) Other circulatory diseases ...	...	23	23	1	...	139	270
49. Bronchitis ...	2	117	119	3	9	3,189	4,061
50. Pneumonia—							
(a) Broncho-pneumonia ...	2	92	94	9	3	137	111
(b) Lobar-pneumonia ...	11	466	477	39	10	699	623
(c) Otherwise defined ...	...	28	28	1	...	73	68
51. Other diseases of the respiratory system ...	3	107	110	10	4	6,263	4,303
52. Diarrhœa and enteritis—							
(a) Under two years of age ...	1	3	4	...	...	115	124
(b) Over two years of age ...	2	51	53	4	1	687	850
53. Appendicitis ...	...	4	4	...	...	12	38
54. Hernia and intestinal obstruction ...	15	284	299	20	11	762	986
55. Cirrhosis of the liver ...	...	7	7	1	1	10	7
56. Other diseases of the liver and biliary passages ...	1	17	18	4	1	93	357
57. Other diseases of the digestive system ...	5	192	197	10	3	10,085	7,944
58. Nephritis (all forms)—							
(a) Acute ...	...	6	6	2	...	9	45
(b) Chronic ...	...	12	12	2	...	32	25
Carried forward ...	121	3,637	3,758	276	98	57,860	50,481

TABLES I AND II.—(Contd.)

DISEASES	Remaining in Hospital at end of Dec., 1947	Yearly Admissions	Total Cases Treated	Total Deaths	Remaining in Hospital on 31st Dec. 1948	All Cases including both In and Out Patients	Total Cases Treated in 1947
Brought forward ...	121	3,637	3,758	276	98	57,860	50,481
59. Other non-venereal diseases of the genito-urinary system ...	9	302	311	7	5	1,873	2,164
60. Diseases of pregnancy, childbirth and the puerperal state—	...	...	...	...	...	...	2
(a) Abortion ...	1	67	68	...	2	103	79
(b) Ectopic gestation ...	...	1	1	1	...	1	01
(c) Toxæmias of pregnancy ...	1	7	8	...	...	156	41
(d) Other conditions of the puerperal state...	2	170	172	7	2	196	88
61. Diseases of the skin, cellular tissue, bones and organs of locomotion ...	85	1,622	1,707	50	89	20,418	18,902
62. Congenital malformations and diseases of early infancy—							
(a) Congenital debility (children under 1 yr.) ...	...	2	2	...	...	13	11
(b) Premature birth ...	...	1	1	1	...	1	...
(c) Injury at birth ...	...	...	...	...	...	...	...
(d) Others ...	...	1	1	...	...	2	4
63. Senility ...	1	29	30	10	...	233	1,348
64. External causes—							
(a) Suicide ...	...	...	...	...	...	...	...
(b) Other forms of violence ...	23	507	530	21	24	7,851	6,448
65. Ill-defined causes ...	3	117	120	3	22	1,222	2,230
66. Ante-natal and child welfare consultations ...	2	356	358	...	...	1,609	1,326
Total ...	248	6,819	7,067	376	242	91,538	83,125

Appendix I

"TOSCANA" INCIDENT

On the 24th August, the following cable was received by the Port Health Officer, Zanzibar, from the Port Health Officer, Mombasa:—

"s.s. *Toscana* arriving morning 25th August. Has disembarked one body post-mortem appearances typhoid. One case disembarked typhoid. Three suspects seriously ill disembarked. Many cases unexplained fever still on board. Am sending ship for quarantine and necessary action."

The s.s. *Toscana* arrived at the quarantine anchorage on the 25th August, 1948, and was immediately boarded by the Medical Officer of Health, the Sanitary Supervisor and the Port Sanitary Inspector. They met the Captain, the Chief Officer and the ship's doctor, together with a passenger, Dr. Duffield, who has been assisting in the care of the sick.

The ship's doctor reported that Miss Doreen Fozard had died on the 24th August, at Mombasa, after having been sick for most of the voyage. She belonged to Liverpool and had travelled across Europe to join the ship at Venice. After two days at sea, she became ill with a temperature and was cared for by her relatives. They did not ask the doctor to see her until three days before she died, (i.e. 21st August), when typhoid fever was thought to be the likely diagnosis. The body was taken ashore at Mombasa for a post-mortem examination, where the condition of the internal organs indicated typhoid fever.

The Health Authorities at Mombasa inspected the ship and took samples of the water on board, saw the other sick patients and instructed the Captain to proceed to Zanzibar for quarantine. Before leaving Mombasa, four relatives of the deceased, all of whom were suffering from fever, were landed, together with five other passengers also suffering from undiagnosed fever. Eight first class and sixteen third class passengers were permitted to embark at that port, although the ship was being put into quarantine. No treatment of the ship's water was advised at Mombasa. (Supplies of water had been taken on board at Trieste, Venice, Brindisi, Port Said and Massawa). The passengers joined the ship at Venice where many of them had stayed up to a week, waiting for the ship.

The following is the itinerary of the s.s. *Toscana*, but the dates should be regarded as approximate only as there is some reason to think that they are inaccurate:—

Port			Arrival	Departure	
Trieste	...	...	1.8.48	...	1.8.48
Venice	...	...	6.8.48	...	6.8.48
Brindisi	...	...	9.8.48	...	10.8.48
Port Said	...	...	10.8.48	...	10.8.48
Suez	...	...	14.8.48	...	15.8.48
Massawa	...	...	21.8.48	...	21.8.48
Mogadisha	...	...	22.8.48	...	22.8.48
Mombasa	...	...	24.8.48	...	24.8.48

During the voyage, three days after leaving Venice, 80 per cent of the passengers were taken ill with symptoms suggestive of gastro-enteritis. This continued as far as the Red Sea, where conditions deteriorated owing to the heat. The Port Medical Officer (Zanzibar) was informed that vomits were not cleaned up, and the floors of the third class lavatories were not washed, nor were the latrines properly cleaned. There was no issue of soap to the passengers. While the ship was in the Red Sea, Miss Catherine Pool died and death was certified as being due to heat stroke.

The Port Medical Officer (Zanzibar) made an examination of the sick passengers, after his interview with the Captain. They were all located in the third class accommodation, some being in cabins and others in dormitories for 40 to 60 people. The cabins were cramped and badly ventilated, and the dormitories were in a bad condition, with dirty floors and insufficient ventilation. The bunks were arranged in tiers, one above the other and the patients, when seen, were without sheets. There was a bad smell in the dormitories, the cause of which was not determined but the Port Medical Officer thought that it was due to over-crowding and the dirty habits of the occupants. Instructions were issued for the immediate chlorination of the ship's water supply, which was done.

The sick passengers, about thirty in all, who were examined, all complained of much the same symptoms, namely fever with headache and backache, and it was decided there and then to take the four worst patients ashore to Zanzibar Hospital in order to make a proper investigation into the illness and obtain a definite diagnosis. Two patients were admitted to Hospital at approximately 13.00 hours and two more at 14.30 hours, the delay being due to the position of the ship in the quarantine anchorage, which is approximately three miles off shore.

On the same day (25th August) the Port Medical Officer returned to the ship at 16.00 hours, together with a Laboratory Assistant and six blood cultures were taken from patients showing the highest temperature and who had only recently developed fever. Other samples of blood were taken from patients, who had been ill for longer periods, for Widal agglutination tests.

On the morning of the 26th August, the Port Medical Officer again visited the ship and it was reported to him that Mr. Frank Cragg had been found dead in his bunk. He gave instructions for the body to be taken ashore for a post mortem examination (and made the necessary arrangements for its transport. The Agent was on board at the time and the departure of the vessel was discussed with the Captain. The latter wished to proceed to Beira, as he had a larger number of passengers destined for that port. It was pointed out to him that it was very unlikely that Beira could handle an outbreak of infectious disease, such as he had on board his ship, and that he should sail direct to Durban. After considerable discussion, a cable was drafted and sent to Port Health, Durban, enquiring whether they would accept the vessel, and giving details of the number of passengers (701) and crew (200) on board.

Before leaving the ship the Port Medical Officer again visited the sick and found that there were a considerable number of new cases since the previous day. Such cases were difficult to discover, since they would not report sick and said they were well—only lying down.

In the afternoon of the 26th, the Pathologist made a post-mortem examination of the body which had been brought ashore and reported that death was due to congestive heart failure. In view of the epidemic on board, he made extensive bacteriological cultures from the internal organs but no typhoid or other pathogenic organisms were subsequently isolated. The body was buried in the European Cemetery that evening.

On the morning of the 27th August a report was received from the Pathologist stating that *Bacterium Typhosum* had been isolated from all the six blood cultures which were taken on the 25th, thus confirming the diagnosis which had been reached on clinical grounds.

Thereupon the Acting Senior Medical Officer-in-charge and the Medical Officer of Health accompanied by Dr. J. Mellor Evans of the Tanganyika Medical Service (who happened to be in Zanzibar in connection with the Sanitary Inspectors examination) proceeded on board the s.s. *Toscana*, together with Mr. McQueen of Messrs. Smith, Mackenzie & Co., Ltd., the ship's Agents.

The Senior Medical Officer-in-charge informed the Captain that he was at liberty to sail his ship to any port he chose and at any time he wished, and that the decision on these matters rested with himself alone. He was also informed that a reply had been received from the Port Health Authorities in Durban that they were willing to accept the *Toscana*. He was, therefore, in the interests of his passengers, very strongly advised to sail direct to Durban with as little loss of time as possible, avoiding Beira on the way there.

As a number of the passengers on the ship were by now seriously ill, an offer was made to the Captain to take into the Infectious Diseases Hospital the twenty worst cases, and their immediate contacts (i.e. relatives) would be accommodated on the Quarantine Island. It was suggested that when one member of a family was taken into hospital, one other member should be quarantined and that the rest of the family should proceed to Durban. (At the time this offer was made it was realised that a proportion, possibly the majority, of those quarantined would require to be transferred to hospital later). It was agreed that disembarkation of the sick would begin early on the morning of the 28th, and that the ship would sail as soon as this was completed. Thereupon the Senior Medical Officer and his party left the ship in order to proceed with the arrangements for the reception of the sick the following day.

During the day of the 28th August, twenty-six patients were disembarked without incident and transferred to the Infectious Diseases Hospital on the outskirts of Zanzibar (Mianzini), making a total of thirty with the four previously admitted to Zanzibar Hospital. Twenty-seven contacts were landed on Quarantine Island where arrangements had been made for their reception, and in the evening, at 16.30 hours the s.s. *Toscana* left the Quarantine anchorage on her voyage southwards, having still on board, so far as was known, sixteen cases of fever.

Appendix II

The Italian ship *Toscana* sailed from Venice early in August bound for Durban. An epidemic of Typhoid Fever occurred on board, some cases being landed at Mombasa when the diagnosis was confirmed by culture and in one case by autopsy.

Thirty of the worst remaining cases were landed at Zanzibar together with 25 relatives who were isolated at the Quarantine Station and of 7 whom contracted the disease.

The total number of cases and the overall mortality is not known, and this report deals only with the clinical features of 32 cases which were admitted to Gulioni Hospital, Zanzibar.

Most of these patients had suffered from a severe attack of gastro-enteritis shortly after leaving Venice, since when they had eaten little through fear of repeating the experience.

As the ship's movements were accurately known it was possible in every case to fix the exact date of onset of symptoms, and these dates are used when calculating the length of fever.

Of the 26 cases admitted to hospital on the 28th August, 1948, the majority had been ill for 6 days, while 2 had been ill for two weeks during which time, although ostensibly in bed, many had been obliged to get up to attend to their own needs.

From the 29th to the 31st August, 6 cases were admitted from the quarantine station.

The cases consisted of 16 men, from 16 to 70 years old (average 28.7), 8 women, from 19 to 50 years old (average 32), and 8 children from 5 to 13 years old (average 8.6).

Three of the adults had T.A.B. inoculation on July 17th, 1948, 1 in March, 1947 and 2 in 1943.

CLINICAL FEATURES

Onset: (1) Adults.—In 18 cases (75 per cent) the onset was insidious, and in the remaining 6 cases abrupt with rigors in 3, diarrhoea in 2, and fainting in 1 case.

(2) Children.—In 4 cases (50 per cent) the onset was abrupt with rigors, diarrhoea and epistaxis, and in the remaining 4 insidious.

The symptomology conformed in most cases with the classical description of the disease.

Headache, anorexia, lassitude and dirty mouth being the commonest symptom during the first week, insomnia the next commonest and 15 patients (46 per cent) complained of troublesome dreams. Constipation was mentioned as a prominent early symptom in 10 cases, diarrhoea in 6. During the course of the disease, however, severe diarrhoea and abdominal pain occurred in 15 cases, constipation only in 10.

Cough occurred in 9 cases, marked deafness in 8, while epistaxis was only seen or complained of in 5 cases and 4 of these were children.

The most constant physical sign was rose spots which appeared in 28 cases usually between the 8th and 12th day but occasionally seen as early as the 5th day and as late as the 19th. The spleen was palpable in only 17 cases and the liver was felt for a few days in 4 children and 1 adult.

Duguet's ulceration was seen in 8 cases, sordes on the lips in 4.

Signs of bronchitis were heard in 9 cases.

The duration of continuous fever in adults ranged from 15 to 37 days, an average of 25 days. In children from 14 to 21, an average of 16.3 days. 7 adults and 4 children had relatively mild symptoms and remained bright and well throughout the illness. Two of these adults had been recently inoculated and it was noted that the remaining five were among the 6 adults whose illness had an abrupt onset; the same applied to the 4 children.

With the exception of the 2 who had been recently inoculated, however, these mild cases had a continuous fever of slightly more than average duration.

Marked prostration occurred in 11 cases (9 adults and 2 children) of which 6 were mildly disorientated, and 5 had delirium with double incontinence lasting a week or more.

Three cases relapsed after the temperature had been normal for 8 or 9 days. Brief symptomless pyrexial episodes lasting 3 to 4 days with re-appearance of the spleen in one patient occurred in 3 cases. Of these, 2 were mother and son and the third was the brother of one of the cases who relapsed.

Recrudescence of the fever the day after it became normal and lasting 10 days or more occurred in 4 cases.

COMPLICATION

Hæmorrhage occurred in 2 cases. In one there was a single hæmorrhage on the 15th day, in the other 2 separate hæmorrhages on the 10th to 17th day. In neither cases was the loss of blood severe.

In one case a large intestinal slough was passed on the 12th day.

There was one case of parotitis which did not suppurate, 2 cases of bronchopneumonia and one encephalitis. One patient died of circulatory failure on the 22nd day.

Owing to shortage of staff and equipment, full Laboratory investigations could not be carried out in all cases. Diagnosis was confirmed by blood culture in 24 and in all but 2 of the remainder. Stool and urine cultures were positive. Serial widal reactions were done in 2 of the cases with recrudescence of fever.

Seventeen white cell counts were performed, the average count being 5,370 cells per cu.mm. 5 counts were above 6,000, one being 13,400 but no

reason was found for these counts being higher than usual. The Lymphocytes averaged 20 per cent, the Mononuclears 2.5 per cent and the Neutrophils 77.5 per cent. Eosinophils were absent from all counts except 1 in which they constituted 0.5 per cent.

TREATMENT

Diet.—Three scales of diet were drawn up—

- A. All fluid yielding approximately 1,000 C.
- B. Two-hourly feeds including eggs, mashed potatoes, butter, custards, etc., yielding approximately 1,600 C.
- C. Two-hourly feeds as in B with bread, steamed fish, etc., yielding 2,300 C.

Patients were encouraged to go on to the highest diet which they could take without discomfort, but 20 patients either started on A diet, or finding B diet too much for them had to be put on A diet after a few days. Only 7 patients were able to take C diet from the outset.

SYMPTOMATIC TREATMENT

Constipation was relieved by simple enemata every other day.

Diarrhoea was at first treated with starch and opium enemata, and Pulv. Cretæ opii, but a few cases who received Sulphaguanidine reacted so well that this was given as routine treatment in every case in which diarrhoea was a troublesome symptom. Where it was accompanied by abdominal pain 10 gms. of Sodium Chloride daily was found of definite value.

Oil of Cinnamon and Turpentine stupes were relatively ineffective.

Morphia was required in some cases of severe headache and insomnia.

Six cases received Vitamin C 222 mgm. twice daily by intravenous injection for 10 days.

Specific Treatment.—Eight cases were treated with Penicillin and Sulphathiazole in the dosage recommended by McSweeney, i.e. Penicillin 200,000 units twice hourly, and Sulphathiazole 1 gm. thrice hourly for 4 days.

In 6 of these cases treatment was started as soon as possible after their admission to hospital, but in no case earlier than the 8th day of disease.

The remaining two cases were treated during the fourth week.

CASE HISTORIES

Case 1, J.L., aged 17.—Gradual outset with headache, constipation and listlessness, went to bed 5 days later and was admitted to Hospital on the 7th day. 4 days later he was prostrated, deaf, very flushed with a rapid pulse and respirations. For 9 days in hospital his temperature was constantly between 104 and 105°F. 6 days after admission he lapsed into restless delirium with double incontinence. Rhonchi were heard in his chest.

The Blood Culture was positive, and the white count 4,000, 81 per cent Neutrophils.

Diarrhœa was controlled by Sulphaguanidine, and he received Penicillin and Sulphathiazole for 1 week starting 4 days after admission.

Circulatory collapse occurred on the 15th day in hospital, temporary improvement followed Coramine and Strychnine, but he died on the following day of circulatory failure.

Case 2, Mr. F. B., aged 41.—Although looking and feeling well throughout his illness this patient was pyrexial for 37 days.

Blood Culture positive; white cells 3,200, Neutrophils 69.5 per cent. The first indication of any unusual circumstance in this case, occurring on the 12th day of his illness, was a telephone message from the Bank Manager to say that *F.B.* had sent him a message requesting the numbers of the £10,000 notes for which he had cashed a cheque on the previous day. The patient confirmed that he had sent such a message and said that the notes had been stolen. During the second and third week he continued to have delusions, usually of a grandiose nature, i.e. "I have a world monopoly of Buick cars, when I am better, doctor, you shall have some".

Delusions were common in those who were very ill but this patient presented such a robust appearance and punctuated excellent and lucid accounts of his symptoms with flights of the wildest fantasy that enquiries were made about his mental state before his illness. There was no history of previous psychosis.

He made a complete recovery and retained a vivid memory of his delusions.

Case 3, Mr. H. C., aged 70.—This patient was in bed from the onset of symptoms and was admitted on the 4th day. His pyrexia lasted for 18 days, but the temperature never rose above 102°F.

He was mildly delirious for 1 week and remembered nothing of his admission to hospital. Blood Culture positive white counts 6,200, Neutrophils 66 per cent.

He was found to have well developed Aortic Stenosis with slight regurgitation and gave a history of being invalided for V.D.H. in 1916.

He made a remarkable recovery for a man of his age.

Case 4, Mr. A. L., aged 26.—This patient resembled case 2 in that he had prolonged fever, while remaining bright and well, and retaining excellent appetite.

The Blood Culture, at first negative, became positive during a recrudescence, and the widal was positive in increasing titres at the same time.

A copy of his chart is included as it is of such unusual form.

Case 5, Mrs. F., aged 50.—After admission her temperature fell to normal and she was presumed not to be suffering from Typhoid. The Blood Culture was positive while her temperature was normal. However, 6 days after admission her temperature rose steeply and she had a fairly severe attack lasting 21 days.

Case 6, Mrs. S., aged 30.—Admitted on the 8th day, having been up all the time. Blood Culture positive, white cells 4,000, Polymorphs 85 per cent, Lymphocytes 10.5 per cent. The temperature climbed slowly to 105°F. after 6 days in hospital, and she then lapsed into restless delirium with double incontinence, and remained thus for 1 week. At the end of this time her temperature became normal, but rose again after 10 days. On the 18th day she had a circulatory collapse from which she recovered. When her temperature became normal she remained restless and disorientated, continuing to have mild delusions.

Re-examination of her C.N.S. revealed increased tone and reflexes in both legs with very marked ankle clonus. The abdominal reflexes had been absent throughout, but the Planter Responses were extensor. She also had tremors of her hands. The Fundi were normal and no other abnormal signs were found. Examination of the C.S.F. showed a slight increase in Lymphocytes (20 per mm.).

She was reported to have had four brief attacks of unconsciousness resembling Petiti Mal, which she had never had before her illness.

Her convalescence was prolonged, but she was discharged 6 weeks later after all signs had disappeared. She remained somewhat listless.

Case 7, Mrs. W., aged 39.—Had T.A.B. in London on 10/7/48. Admitted on 28/8/48, on the 4th day, after being in bed from the outset. Gradual onset with headache, dry mouth, malaise, and slight diarrhoea. On 30/9/48 Blood Culture positive. White count 7,200, Neutrophils 86 per cent, Lymphocytes 14 per cent.

The spleen was palpable from the 8th until the 14th day and rose spots present from the 9th to 16th day. The abdominal reflexes were absent during the 2nd and 3rd weeks.

On the 8th day (1/9/48) she had a marked malar flush, tender, distended abdomen and was deaf and drowsy.

Diarrhoea failed to respond to the usual methods, and on 5/9/48 she was put on Sulphaguanidine, 3 gms. four hourly after an initial dose of 6 gms., and sodium chloride 10 gms. daily. Within 48 hours the diarrhoea was well controlled and her abdomen much more comfortable.

She remained drowsy and prostrated until the 13/9/48, when she made very rapid progress. Until that date she had been unable to take solid food.

She was allowed up on the 30/9/48, and discharged on the 8/10/48. This case is of interest, illustrating a severe attack of typhoid occurring in a patient who had been inoculated 6 weeks before.

Case 8, Miss I.D., aged 28.—Had T.A.B. on the 10/7/48, in Stockholm. Admitted on the 20/8/48. Blood Culture positive. Sudden onset on the 23/8/48, with headache, malaise, when she at once went to bed.

On admission she had sores on her lips and a slight cough. There were a few scattered Rhonchi heard in her chest.

Spots were present from the 8th until the 19th day, coming out in crops.

The appetite was fair, and she was at no time distressed.

At the end of a week her temperature dropped to normal, and she was allowed up on the 16/9/48.

Case 9, Mr. J.S., aged 17.—Admitted on the 28/8/48, on the 16th day of his disease after being in bed 10 days. Symptoms were of gradual onset.

He was in a very poor condition, unable to take any solids, with severe ulceration of the tongue and fauces, drowsy and deaf. Spots were present, the spleen palpable and the abdominal reflexes absent.

On the 2/9/48, he was delirious and cyanosed; moist sounds were heard in his chest.

Penicillin 200,000 units twice hourly, Sulphathiazole 1 gm. thrice hourly were given for 6 days. There was immediate improvement in his mouth and chest, but his temperature remained at about the same level, and he remained in a semi-conscious condition until the 13/9/48, although his temperature started to fall on the 11/9/48, and became normal on the 14/9/48.

Case 10, Mr. P.S., aged 29.—Admitted on the 28/8/49, on the 8th day after being in bed for 5 days.

The onset had been gradual with headache, fever and slight diarrhoea. The spleen was palpable from the 10th to the 23rd day and he was put on *B* diet. Blood Culture positive on the 13th day.

There was severe ulceration of the tongue, tense distended abdomen and signs of bronchitis.

Penicillin-Sulphathiazole treatment was started on the 1/9/48, and the ulceration of the tongue cleared rapidly, being scarcely noticed by the 4/9/48. Treatment was stopped on the 7/9/48.

Cough and rhonchi persisted for 8 days, and he remained exhausted and apathetic until the 15/9/48, when his temperature fell to normal.

He was allowed up on the 26/9/48, and was discharged on the 13/10/48.

Treatment did not appear to affect the general course of the disease.

Case 11, Mr. L.N., aged 7.—Admitted on 28/8/48, on the 6th day, after being in bed for 2 days.

The onset had been gradual with listlessness and headache, and he complained of cough, abdominal pain and sore mouth.

Signs of bronchopneumonia were heard and on the 31/8/48. Penicillin 70,000 units twice hourly and sulphathiazole $\frac{1}{2}$ gm. thrice hourly were started.

His mouth was clear in 3 days, and only a few rhonchi were heard after 5 days, but he remained prostrated and delirious until 14/9/48.

Thereafter he made a rapid recovery, but on the 24/8/48, he had a relapse lasting 15 days.

DISCUSSION

The difficulty in diagnosis of an early sporadic case is emphasised by the varied clinical picture and by the fact that not one symptom or physical sign except raised temperature was common to all cases. The most constant sign, the presence of rose spots, was not seen until the 8th day at the earliest.

Examination of the completed charts showed 15 out of 32 to be quite a typical and disparity between temperature and pulse rate was not marked in more than 6 cases.

Three patients had received T.A.B. inoculation on 10/7/48, which, allowing the longest incubation period, was less than a month before they could have contracted the disease.

One of these (Mrs. W., Case 7) was among the most severe cases but made a more rapid recovery than could have been expected from the severity of her condition.

The other two cases (Miss I.D., Case 8) had exceptionally mild attacks lasting 17 and 21 days respectively.

It has been mentioned above that there were 5 other adults who were bright and well, relatively free from symptoms and with a good appetite throughout the course of the disease, and that the onset of symptoms had in all these cases been abrupt.

The relation between these facts was considered to be that patients with an abrupt onset of symptoms go to bed at once and that bed rest during the first week has an important bearing on the course of the disease.

Careful questioning of the patients revealed that this was so, and that the most severe cases were those who had been ambulant for 5 or more days after the onset of symptoms.

It has been suggested that a high calorie diet reduces the incidence of intestinal complications, but increases the relapse rate.

However desirable a high calorie diet may be it is seldom possible to make patients who are ill take it, and in this series of 32 cases not more than 12 could be induced to take any solid food during the second week.

The incidence of intestinal complications was low, there being but two hæmorrhages, and both cases had been on the lowest A diet from the beginning.

There were 3 true relapses, lasting 10 days or more and occurring 8 days after the temperature had become normal.

One of these cases had been inoculated in 1947, one had a course of Penicillin and Sulphathiazole and all three had been on A diet from their admission to hospital.

In four other cases there was a recrudescence of fever lasting 10 days or more but occurring the day after the temperature became normal. Of these, two had been on A diet throughout, and two had been on C diet from their admission.

Only 5 other cases had been able to take C diet from the first, and these were the cases already mentioned who had exceptionally mild but prolonged fever.

It seems possible therefore that a high calorie diet may influence the course of the disease by prolonging the fever.

The diets were of high vitamin content, and patients were allowed a constant supply of oranges by their bedside. It was found that this was a valuable method of keeping their mouths comfortable. 6 cases were in addition given large doses of Vitamin C by intravenous injections.

Conflicting reports about the efficiency of Penicillin and Sulphathiazole have been written during the last two years.

So varied and unpredictable was the duration of fever and clinical course in this series that no reasonable assessment of the results of this treatment is possible. Furthermore no case received it during the first week

The 6 cases chosen to receive the treatment were a selected group, being those who presented the gravest clinical picture on admission.

Of these 1 died (the only death in the series) and one appeared to derive no benefit from treatment. One case with bronchopneumonia, 2 cases with severe ulceration of the mouth and 1 case with both these complications were undoubtedly improved, the ulceration clearing up in 3 days (as compared with 6 to 9 days in untreated cases) and the chest conditions cleared up rapidly.

Two further cases who in the fourth week showed no progressive fall in temperature and were in a state of exhaustion were treated with Penicillin and Sulphathiazole. In both cases the temperature fell to normal within 4 days, but an analysis of the charts of other untreated and similar cases shows that this might have happened in any case.

Case No 2 (*F.B.*, age 41) is unusual in that mental symptoms were a prominent feature of the clinical picture in an otherwise mild infection.

A case of typhoid fever presenting as a confusional psychosis is described by Maude (*H.M.J.* 1/6/47) but in an individual with a previous history of mental illness who subsequently died.

In the present case enquiries were made from his family in England, and no such history was obtained.

Case 5 (*Mrs. F.*, age 50) appears to have been admitted while incubating the disease, her blood culture was positive 3 days before her temperature began to rise.

SUMMARY

Thirty-two cases of typhoid from an epidemic occurring on a ship are briefly reviewed.

Factors influencing the course of the disease are discussed, and the effects of Penicillin and Sulphathiazole therapy, particularly in cases suffering from severe ulceration of the mouth and bronchopneumonia, are noted.

Eleven case histories are given in greater detail (with copies of their temperature charts).

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