

# **Report on the Medical and Sanitary Departments / Government of the Gold Coast.**

## **Contributors**

Gold Coast. Medical Department.

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**GOVERNMENT OF THE  
GOLD COAST.**

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**Report**  
ON THE  
**MEDICAL DEPARTMENT**  
FOR THE YEAR  
**1920.**

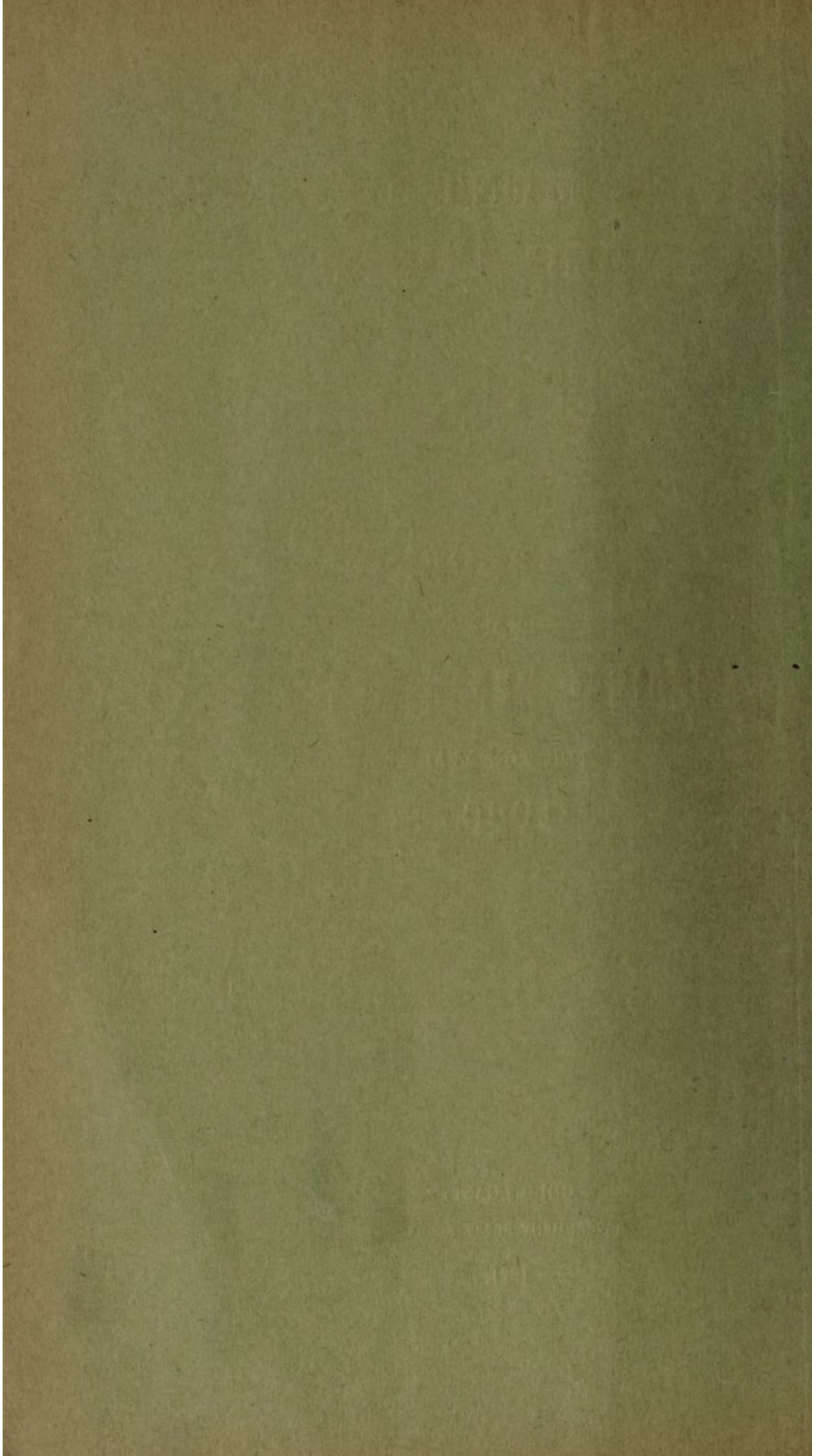
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UNITED STATES DEPARTMENT OF THE ARMY

THE MEDICAL DEPARTMENT

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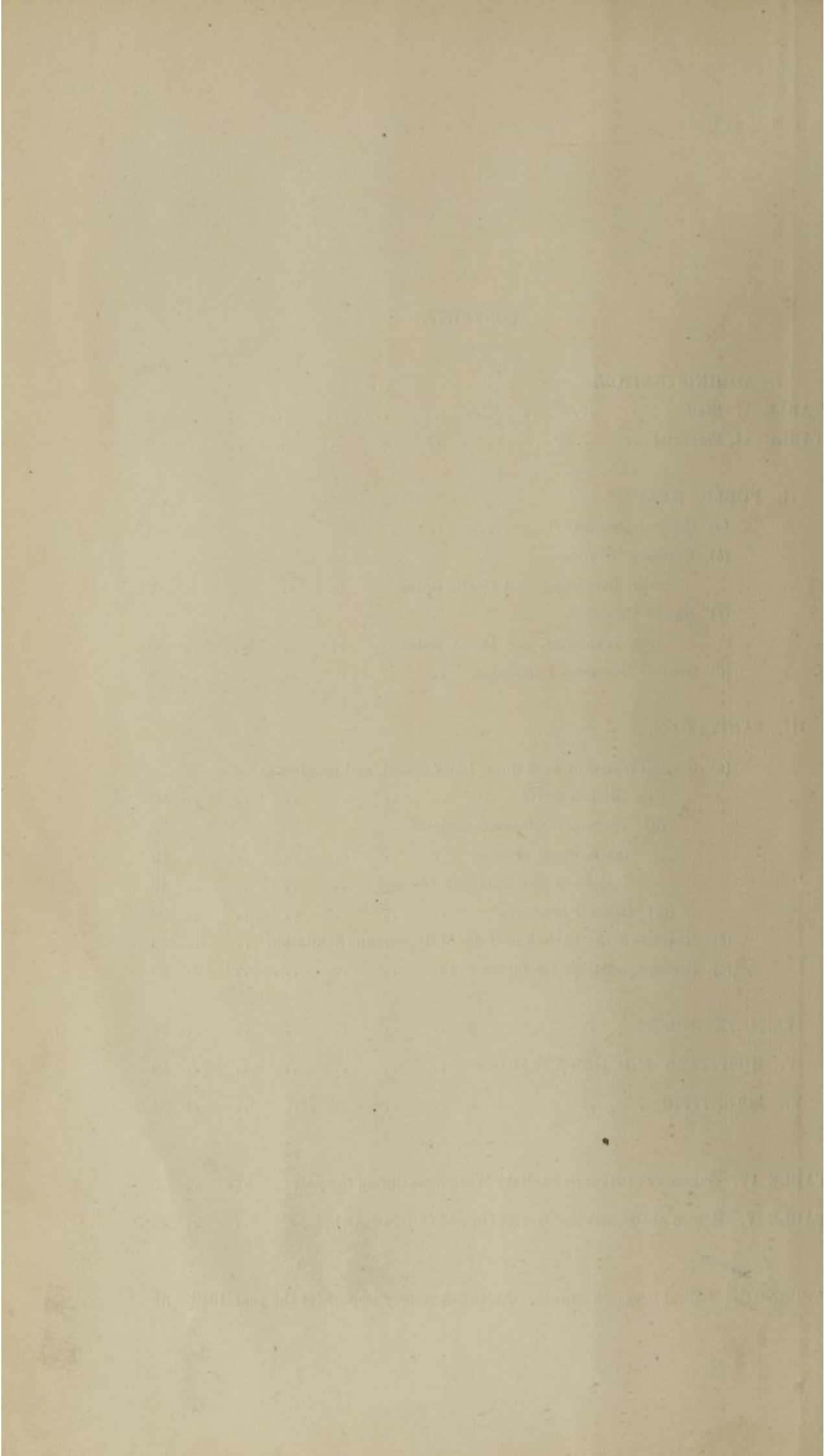
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ANNUAL REPORT FOR THE YEAR ENDING DECEMBER 31st, 1920.

I. ADMINISTRATION.

TABLE 1.—MEDICAL STAFF 31st DECEMBER, 1920.

1	Principal Medical Officer.
1	Deputy Principal Medical Officer.
1	Senior Sanitary Officer.
1	Director of Medical Research.
2	Provincial Medical Officers.
6	Senior Medical Officers.
2	Junior Sanitary Officers.
2	Pathologists.
32	Medical Officers, five of whom are Medical Officers of Health.
1	African Medical Officer.
20	Vacancies { 19 Medical Officers.
	{ 1 African Medical Officer.
2	Dental Surgeons.
1	Office Assistant and Accountant.
1	Analytical Chemist (vacant).
1	Dispensers Instructor.
1	Medical Storekeeper.
5	Superintending Sanitary Inspectors.
1	Laboratory Assistant.

EUROPEAN NURSING STAFF.

4	Senior Nursing Sisters.
8	Nursing Sisters.

PRINCIPAL MEMBERS OF SUBORDINATE STAFF.

1	Chief Clerk.
1	First Class Clerk.
4	Second Class Clerks.
11	Third Class Clerks.
2	Temporary Clerks.
2	Messengers.

DISPENSING STAFF.

2	Chief Dispensers.
4	First Class Dispensers.
12	Second Class Dispensers.
14	Third Class Dispensers.
28	Dispensers-in-Training.
1	Laboratory Attendant.

NATIVE NURSES.

6	Second Class Nurses.
26	Third Class Nurses.
27	Probationer Nurses.
18	Hospital Assistants.

2	Dental Mechanical Assistants.
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LUNATIC ASYLUM.

1	Chief Attendant.
1	Assistant Attendant.
10	Attendants.
1	Matron.
1	Gatekeeper.

## PRINCIPAL MEMBERS OF SUBORDINATE STAFF OF THE SANITATION BRANCH.

1 Chief Clerk.
1 First Class Clerk.
5 Third Class Clerks.
1 Sanitary Inspector and Training Officer.
1 Messenger.
3 First Class Sanitary Inspectors.
14 Second Class Sanitary Inspectors.
40 Third Class Sanitary Inspectors.
2 Female Sanitary Inspectors.
1 Disinfector Mechanic.
1 Storekeeper.
8 Attendants for Contagious Diseases Hospital.
9 Vaccinators.
1 Third Class Clerk to Deputy Registrar of Deaths.
3 Clerks to Deputy Registrar of Deaths.
18 Sextons.
2 Messengers.

TABLE 2. FINANCIAL.

## (a) STATEMENT OF REVENUE FOR THE YEAR 1920.

Revenue (Hospital fees) .. .. .	£2,443 4 5
---------------------------------	------------

## (b) STATEMENT OF EXPENDITURE FOR THE YEAR 1920.

## Medical Department (including Sanitary Branch)—

Personal Emoluments .. .. .	£82,181 17 2
Other Charges .. .. .	123,036 15 8

Total .. .. .	£205,218 12 10
---------------	----------------

## II. PUBLIC HEALTH.

## (a) GENERAL REMARKS.

3. The following table shews the most noteworthy contrasts in the returns of diseases treated during the years 1918, 1919 and 1920 :—

	1918.	1919.	1920.	
Small-pox .. .. .	5	23	298	
Chicken-pox .. .. .	582	121	229	
Dysentery {	Amoebic .. .. .	16	18	..
	Bacillary .. .. .	..	7	..
	Type undiagnosed .. .. .	400	433	824
Enteric Fever .. .. .	6	9	12	
Influenza .. .. .	7,756	135	885	
Malaria {	Tertian .. .. .	825	645	823
	Quartan .. .. .	84	42	9
	Aestivo-autumnal .. .. .	351	460	676
	Chronic .. .. .	67	145	140
	Blackwater .. .. .	17	20	36
Unclassified .. .. .	1,834	2,446	3,021	
Measles .. .. .	80	14	149	
Pneumonia .. .. .	356	277	422	
Rheumatic Fever .. .. .	9	11	29	
Sleeping Sickness .. .. .	10	14	27	
Whooping Cough .. .. .	120	72	126	
Alcoholism .. .. .	25	25	44	
Yellow Fever .. .. .	3	10	3	
Tuberculosis .. .. .	239	269	355	
Plague .. .. .	..	..	..	

4. *Dysentery*.—The number of cases of Dysentery shews a marked increase, and the deficient staff accounts for the cases being unclassified.

5. *Malaria*.—The returns shew four thousand seven hundred and five patients suffering from this affection; a considerable increase on the number treated in previous two years.

6. *Blackwater Fever*.—Thirty-six cases of this disease were reported, seven of which ended fatally.

7. *Yellow Fever*.—Three patients suffering from this disease came under observation, of whom one was a European and two were natives. The European case ended fatally, the natives recovered.

8. *Tuberculosis*.—Three hundred and fifty-five cases were treated as compared with two hundred and sixty-nine in the previous year. From these figures and those of previous years it appears that this disease is distinctly on the increase.

9. *Guinea-Worm*.—Of a total number of seven hundred and seventeen cases treated for this disease, fifty-four were in Accra and it is probable that the majority of these may have resulted from the use of the water in some of the wells which still exist in the town.

(b) EUROPEAN OFFICIALS.

TABLE SHEWING SICK, INVALIDING AND DEATH RATES OF  
EUROPEAN OFFICIALS.

	1918.	1919.	1920.
Total number of Officials resident .. .. .	515	563	775
Average number resident .. .. .	413	522	620
Total number on the Sick List .. .. .	656	396	626
Total number of days on the Sick List .. .. .	5,987	3,210	4,983
Average daily number on the Sick List .. .. .	16.4	8.8	13.6
Percentage of Sick to average number resident .. .. .	3.97	1.69	2.19
Average number of days on the Sick List for each patient	9.12	8.10	7.96
Average sick time to each resident .. .. .	14.49	6.15	8.03
Total number invalided .. .. .	54	28	30
Percentage of invalidings to total residents .. .. .	10.48	4.29	3.87
Percentage of invalidings to average number resident ..	13.07	5.36	4.83
Total Deaths .. .. .	6	6	7
Percentage of Deaths to total residents .. .. .	1.16	0.92	0.90
Percentage of Deaths to average number resident ..	1.45	1.15	1.13

DAYS ON SICK LIST.

Causes.	1918.	1919.	1920.
Tropical Diseases .. .. .	2,584	1,446	1,923
Non-tropical Diseases .. .. .	3,403	1,764	3,060
Total	5,987	3,210	4,983

10. *Causes of Invaliding of European Officials*.—Dysentery (3), Blackwater Fever (3), Malaria (3), Ulcers (2), Compound Fracture of Ankle (1), Amoebic Colitis (1), Hepatitis (1), Jaundice (1), Septic wound (1), Phthisis (1), Aphasia (1), Dislocation of spine (1), Renal Calculus (1), Alcoholism (1), Peripheral Neuritis (1), Phlebitis (1), Pyorrhoea (1), Headache (1),

Otorrhoea (1). Pyrexia of unknown origin (1), General paralysis of the Insane (1), Haematuria (1), Adenitis (1); Total 30.

The following table shews, in periods, the approximate length of tour of those invalided :

INVALIDINGS—EUROPEAN OFFICIALS.	
8 months and under	.. 19
9—16	.. 11
17—21	.. Nil

Of the thirty cases invalided three were military and twenty-seven were civilians.

The invaliding rate 38·71 per 1,000 shews a slight decrease on the previous two years.

	1918.	1919.	1920.
Invaliding Rate (per 1,000) .. .. .	104.84	42.9	38.71

11. *Causes of Deaths of European Officials.*—Blackwater Fever (3), Para-typhoid Fever (2), Malaria (1), Bronchitis (1); Total 7.

(c) NATIVE OFFICIALS.

TABLE SHEWING SICK, INVALIDING AND DEATH RATES OF  
NATIVE OFFICIALS.

	1918.	1919.	1920.
Total number of Officials resident .. .. .	2,158	2,122	2,473
Average number resident .. .. .	2,041	1,739	1,855
Total number on the Sick List .. .. .	1,321	488	768
Total number of days on the Sick List .. .. .	13,520	4,372	7,688
Average daily number on the Sick List .. .. .	37	12	21
Percentage of Sick to average number resident .. .. .	1.81	0.69	1.13
Average number of days on the Sick List for each patient	10.23	8.95	10.01
Average sick time to each resident .. .. .	6.62	2.51	4.14
Total number invalided .. .. .	8	18	6
Percentage of invalidings to total residents .. .. .	0.37	0.85	0.24
Percentage of invalidings to average number resident ..	0.39	1.04	0.32
Total Deaths .. .. .	44	10	8
Percentage of Deaths to total residents .. .. .	2.03	0.47	0.32
Percentage of Deaths to average number resident ..	2.15	0.58	0.43

12. *Causes of invaliding of Native Officials.*—Bronchitis (1), Gonorrhoea (1), Chronic Nephritis (1), Tuberculosis (1), Rheumatoid Arthritis (1), Pneumonia (1); Total 6.

13. *Causes of Deaths of Native Officials.*—Pneumonia (4), Small-pox (2), Phthisis (1), Appendicitis (1); Total 8.

(d) GENERAL EUROPEAN POPULATION.

(i) Government Officials .. .. .		775	
(ii) Employés of Trading Firms .. .. .		1,506	
(iii) Employés of Mining Companies .. .. .		465	
(iv) Missionaries .. .. .		72	
Total .. .. .		2,818	
Estimated European Population on 1st. Jan. 1920 ..		2,025	
Arrivals .. .. .		1,955	
Departures .. .. .		1,443	
Births .. .. .		1	
Deaths .. .. .		32	
Increase .. .. .		481	
Daily Average Population for 1920 .. .. .		2,218.47	

TABLE SHOWING THE SICK, INVALIDING AND DEATH RATES OF  
EUROPEAN NON-OFFICIALS.

How employed.	Number.	Deaths.	Invalided.	Death rate per cent.	Invaliding rate per cent.
1918.					
Merchants .. .. .	681	19	26	2·79	3·81
Mining Companies .. .. .	578	29	21	5·01	3·63
Missionaries .. .. .	49	2	—	4·08	—
Totals .. .. .	1,308	50	47	3·82	3·59
1919.					
Merchants .. .. .	1,902	15	20	0·79	1·05
Mining Companies .. .. .	561	7	25	1·24	4·45
Missionaries .. .. .	66	..	1	—	1·51
Totals .. .. .	2,529	22	46	0·87	1·82
1920.					
Merchants .. .. .	1,506	20	47	1·35	3·17
Mining Companies .. .. .	465	4	19	0·86	4·08
Missionaries .. .. .	72	1	—	1·38	—
Totals .. .. .	2,043	25	66	1·22	3·23

14. *Causes of Invaliding of European Non-officials.*—Malaria (15), Bronchitis (3), Boils (3), Blackwater Fever (6), General Debility (1), Nervous Breakdown (2), Para-typhoid Fever (1), Neurasthenia (8), Liver Abscess (1), Hepatitis (1), Colitis (2), Gastric Ulcer (1), Appendicitis (2), Asthma (1), Amenorrhoea (1), Bright's Disease (1), Double Otitis (1), Rheumatism (4), Adenitis (1), Tumour (1), Phthisis (3), Renal Calculus (1), Gonorrhoea (1), Heart Disease (1), Alcoholism (3), Anaemia (1); Total 66.

15. *Causes of Deaths of European Non-officials.*—Malaria (1), Nephritis (1), Blackwater Fever (7), Yellow Fever (1), Dysentery (1), Enteritis (1), Broncho-pneumonia (2), Cirrhosis of liver (1), Internal haemorrhage (1), Intestinal obstruction (2), Heart Disease (3), Alcoholic poisoning (1), Paralysis (1), Para-typhoid Fever (1), Cellulitis (1); Total 25.

EUROPEAN MORTALITY AND INVALIDING RATES, 1920.

Total Strength.	Number	Deaths.	Invalidings.	Death Rate per 1,000	Invaliding Rate per 1,000.
Official .. .. .	775	7	30	9·03	38·71
Non-official .. .. .	2,043	25	66	12·23	32·30
Totals .. .. .	2,818	32	96	11·35	34·06

### III. SANITATION.

#### A.—GENERAL REVIEW OF WORK DONE, LAWS PASSED, AND PROGRESS MADE.

##### (i) ADMINISTRATIVE.

The Sanitary organisation has been satisfactorily maintained.

Two important epidemics however, which together covered the greater part of the year, imposed a heavy strain on the staff, and, although the routine work at every station has been fairly well carried out, many details had perforce to give way to the more pressing need and thus progress has doubtless been hindered.

The available European Staff was as follows:—

The Senior Sanitary Officer was in the Colony from 1st January to 30th May and from 4th December to the end of the year.

One Junior Sanitary Officer was present from 1st January to December 14th when he went on leave, having acted as Senior Sanitary Officer during leave of the latter.

The other Junior Sanitary Officer was acting as Medical Officer of Health from 1st January until April when he went on leave, and again from 4th December to the end of the year, an arrangement necessitated by shortage of staff. One Medical Officer of Health acted as Junior Sanitary Officer during the period when both the Senior and the other Junior Sanitary Officer were on leave.

Medical Officers of Health were stationed throughout the year at Accra, Secondee, Cape Coast, and in Coomassie this post was occupied by a Junior Sanitary Officer until April when the vacant post of Medical Officer of Health was filled by a new appointment.

One Medical Officer of Health retired from the service and there is at present a vacancy in the establishment.

Superintending Sanitary Inspectors (European) were available throughout the year for Accra and Secondee where they carry out also the duties of Municipal Sanitary Inspectors formerly appointed by the Town Councils. One was on duty in Coomassie throughout the year but a European has not been available for Cape Coast. Two retirements were replaced by new appointments but one vacancy still exists.

The native staff had thus on the whole better supervision in the larger centres than in the immediately preceding years, and their work throughout the Colony has been fairly creditably performed.

It has not been possible to carry out tours of inspection with any degree of regularity, but several necessary visits were made and the epidemic of Cerebro-spinal Fever in the north necessitated a close investigation in North Ashanti.

In the same connection the Senior Sanitary Officer accompanied His Excellency the Governor on his tour to the Northern Territories and visited Yeji, Salaga, Tamale and Yendi.

The Small-pox epidemic in Accra naturally restricted the opportunities to visit farther afield.

Winnebah, Saltpond, Cape Coast, Secondee, Dunkwa, Obuasi and Coomassie were visited by the Senior Sanitary Officer in January.

The Acting Senior Sanitary Officer visited Elmina in July, Lome, Quittah and Ho in September, and Secondee and Coomassie in October.

*Ordinances, etc.*—“The Vaccination Ordinance, 1919,” came into force on January 1st 1920, and was applied to certain towns and districts. It was also enacted with respect to Ashanti and the Northern Territories. A set of regulations were made under Section 6, with respect to vaccination and the duties and powers of public vaccinators.

The following Orders-in-Council, Rules, etc. (besides a few of local reference only) were made under existing enactments:—

## Under the Quarantine Ordinance, 1915 :—

Order by the Governor	No. 1 of 1920	..	Declaring Lagos in Nigeria an infected port by reason of Small-pox.
"	"	"	"
"	No. 21 "	"	Revoking the preceding.
Order-in-Council	No. 15 of 1920	..	Prohibiting importation of bedding and rags from Lagos.
"	No. 34 "	"	Revoking No. 15 above.
Order by the Governor	No. 2 of 1920	..	Declaring Dakar in French Senegal free from Plague.
"	No. 11 "	"	Declaring Accra an infected port by reason of Small-pox.
"	No. 15 "	"	Revoking No. 11 ditto above.
"	No. 17 "	"	Declaring Calabar in Nigeria an infected place by reason of Small-pox.
"	No. 18 "	"	Declaring Secondee an infected port by reason of Small-pox.
"	No. 23 "	"	Revoking the preceding.
"	No. 20 "	"	Declaring Degema and Abonema in Nigeria infected ports by reason of Small-pox.
"	No. 24 "	"	Revoking the preceding.
"	No. 22 "	"	Declaring Accra an infected port by reason of Small-pox.
"	No. 25 "	"	Revoking the preceding.
"	No. 27 "	"	Declaring Warri in Nigeria an infected port by reason of Small-pox.
"	No. 29 "	"	Declaring Monrovia an infected port by reason of Small-pox.

## Under the Infectious Diseases Ordinance, 1908 :—

Order-in-Council	No. 9 of 1920	..	Declaring Labadi an infected area by reason of Small-pox.
"	No. 41 "	"	Revoking the preceding.
"	No. 10 "	"	Declaring Accra Municipal Area infected by reason of Small-pox.
"	No. 11 "	"	Making regulations to control the movements of persons from Accra and Labadi and imposing the duty of notification of infectious disease.
"	No. 23 "	"	Revoking the preceding.
Order by the Governor	No. 12 of 1920	..	Appointing a Compensation Board.
Order-in-Council	No. 25 of 1920	..	Declaring Accra Municipal Area infected by reason of Small-pox.
"	No. 31 "	"	Revoking the preceding.
"	No. 26 "	"	Declaring Winnebah an infected place by reason of Small-pox.
"	No. 27 "	"	Revoking the preceding.
"	No. 32 "	"	Declaring Secondee Municipal Area infected by reason of Small-pox.
"	No. 36 "	"	Revoking the preceding.
"	No. 35 "	"	Declaring Accra an infected area by reason of Small-pox.
"	No. 37 "	"	Revoking the preceding.

## Under the Customs Ordinance, 1876 :—

Order-in-Council	No. 22 of 1920	..	Prohibiting importation of shaving brushes manufactured in Japan as goods likely to be infected with Anthrax.
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## Under the Diseases of Animals Ordinance, 1918.

Order-in-Council	No. 29 of 1920	..	Declaring Accra and environs an infected area by reason of Cattle Plague.
Proclamation	No. 28 of 1920	..	Applying the provisions of the Ordinance to the town of Secondee.

Under the Vaccination Ordinance, 1919 :—

Order-in-Council No. 8 of 1920 .. ..	Rendering vaccination compulsory in certain districts, areas, and places.
„ „ No. 21 „ „ .. ..	Defining the limits of towns and districts to which the Ordinance applies.
Regulation No. 6 of 1920 .. ..	Regulations under section 6 of the Ordinance.

Under the Towns Ordinance, 1892 :—

Order-in-Council No. 18 of 1920 .. ..	Applying the provisions of the Ordinance to the town of Saltpond.
Rule No. 7 of 1920 .. ..	Prohibiting keeping or straying of sheep or goats within certain limits in Accra.

Under the Ashanti Administration Ordinance, 1902.

Rule No. 2 of 1920 .. ..	Appointing the Medical Officer of Health as Deputy Registrar of Births and Deaths.
Rule No. 3 of 1920 .. ..	Regulation of Towns and Villages applied to the towns of Bekwai and Akrokerri.
Regulation No. 6 of 1920 .. ..	“Registration of Cattle in Coomassie Regulations.”
Rule No. 9 of 1920 .. ..	Includes rat-infested premises in definition of Nuisances.

Under the Northern Territories Administration Ordinance, 1902 :—

Regulation No. 4 of 1920 .. ..	Regulations for reporting infectious diseases.
Rule No. 5 of 1920 .. ..	Includes rat-infested premises in definition of Nuisances.

(ii) PREVENTIVE MEASURES AGAINST :—

(1) INSECT-BORNE DISEASES.

(a) *Malaria, Yellow Fever, etc.*—The work of mosquito-reduction and prevention is always a prominent feature of sanitary effort and as in previous years the usual routine measures of inspection and removal of breeding-sources occupied much of the time of the subordinate staff and labourers. All the usual methods were applied according to local needs and were rigorously carried out.

No particular incidence of Malaria is recorded, but, so far as Accra is concerned, an endemic index of prevalence is afforded by the investigation carried out by the Director of Research who found 50% of the school-boys examined, apparently healthy and belonging to a class in favourable circumstances, to be “the unconscious hosts of malaria parasites.” A ten-grain dose of quinine in solution on two consecutive days caused disappearance of the parasites from the blood, without relapse within 50 days in one-third of the cases. Improvement in health, stamina and mental development during the period of school life would be expected if all scholars could be systematically treated.

In Koforidua the conditions favouring Malaria are particularly evident, and in the absence of a permanent drainage system much of the labour spent on clearing ditches and water-logged areas is fruitless.

*Yellow Fever.* Regular routine and systematic inspection of premises is the main defence against *Stegomyia fasciata*.

It has not been necessary to impose quarantine restrictions or to declare an infected area in respect of Yellow Fever at any place during the year. One non-fatal case in a native occurred at Saltpond in May, and one fatal case in a European at Accra in June. At both these places also patients have been isolated on suspicion but in these another diagnosis was eventually made. In either case active measures were taken on the following lines :—

Removal and screening of patient; examination of contacts and surveillance for several days with or without segregation according to class or other circumstances; fumigation of premises where the case occurred and of as many as possible in the surrounding neighbourhood within a reasonable radius; close house to house inspection

of the neighbourhood for mosquito-breeding and for suspicious cases of fever; concentration of sanitary effort in the locality such as scavenging, clearing, repair of tanks, barrels, wells, etc., rigorous prosecution for offences against the "Destruction of Mosquitoes Ordinance," investigation of all deaths occurring in the affected area which are not registered on medical certificate.

*Dengue Fever.*—A case of this was diagnosed at Saltpond in January. It seems to be rare in Gold Coast though the transmitting insects *Stegomyia fasciata* with its probable ally *Culex fatigans* are both common mosquitoes.

*Trypanosomiasis.*—Clearing of bush at frequented fords, watering places and around towns is done as a routine, and cases coming to notice are isolated in fly-proof apartments. No evidence of increase has come to light.

## (2) INFECTIOUS AND EPIDEMIC DISEASES.

Commencing with the month of July a monthly return of Infectious Diseases is now furnished for information of the Secretary of State and transmission to the Ministry of Health. Besides telegraphic reports of Yellow Fever, Plague and Small-pox the following diseases are reported as above by mail monthly:—Plague, Cholera, Yellow Fever, Small-pox, Typhus, Relapsing Fever, Dysentery, Cerebro-spinal Fever, Acute Poliomyelitis, Influenza, Pneumonia.

*Enteric Fever.*—This disease is not scheduled under the Infectious Diseases Ordinance. At Saltpond the Medical Officer had ten cases under treatment during the year, with no deaths. Two cases, one fatal, occurred in Accra, and one non-fatal case in a native was reported in Secondee. The source was not traced.

Cases are probably more frequent in the coast towns than can be ascertained from official periodic returns. Reduction of flies and careful methods of sewage and refuse disposal with protection of water supplies are the means of prevention relied upon.

*Dysentery* and *Diarrhoea* are always prominent in the annual returns, but the majority of deaths registered under these headings are not medically certified. In the larger towns the misuse of public drains and the activities of the house-fly are doubtless of importance in favouring spread. The means of prevention are similar to those for Enteric Fever.

Nothing in the nature of any sustained outbreak has to be recorded but in December there was in Accra a series of cases of diarrhoea with symptoms pointing to food poisoning which the Medical Officer in charge ascribed to consumption of unsound fish. Investigation did not definitely confirm this but the conditions of sale of fresh fish leave much to be desired, particularly in respect of the storage of fish over-night by native vendors in ice-boxes in their homes. In the new market steps to discourage this practice will be taken, possibly by provision of market ice-boxes and by bye-laws to ensure greater safety to the consumer.

*Epidemics of Measles* and *Whooping Cough* occurred in Christiansborg; both diseases are well-known but are not notified. *Measles* was epidemic in both Accra and Christiansborg during the Small-pox epidemic, and 28 deaths were registered under this heading, all but two being children under five years of age.

*Chicken-pox* is a very common disease but probably most cases never come to our knowledge unless casually detected by Sanitary Inspectors. It is apt to linger in gaols if no facilities for isolation outside are provided. At Accra 128 cases were isolated including 47 convicts and warders from the local prisons, and in Secondee 48 were isolated. The importance of discovering and isolating as many as possible at all times became accentuated with the Small-pox epidemic in Accra concurrently with which an extensive outbreak of *Varicella* occurred chiefly amongst the Kroo population. Extra provision of accommodation was made and there were many ambiguous cases taxing the diagnostic powers and in some cases only completely determined by successful vaccination.

*Small-pox.*—The year will be memorable on account of the severe epidemic of Small-pox which occurred in Accra and district, causing much dislocation of routine work of the Department and the usual interference with peaceful pursuits in many other directions as the result of quarantine and local restrictive measures. Dr. Selwyn-Clarke, the Medical Officer of Health,

furnished a full and in every way valuable report of the epidemic and of the measures adopted towards its control, from which the chief details in the following summary are taken :—

Past history of this disease records that the Colony was visited by a severe outbreak at the latter end of last century and the commencement of the present one, culminating in 1901 when 893 cases with a mortality of 16% were reported. The present epidemic some 20 years later, after a series of recurrences of various degrees in the intervening period, attained an incidence of 263 cases in the Accra area with a mortality of 26%.

This figure has been exceeded only once since the year 1901, *viz.*, in 1917 when there were 358 cases with a mortality of 17%.

Lagos has been in quarantine in respect of Small-pox from the end of the previous year and remained infected until October, 1920, a continuous period of 276 days. Other ports in Nigeria were infected for shorter periods, but no proof exists that the outbreak in the Gold Coast arose as the result of sea-borne infection. The town of Accra was in a congested state on account of the influx of labourers and artisans from many quarters and the condition as to vaccination, both amongst these and amongst the normal population of Accra, furnished a community suitable for the incidence and spread of a disease which is not one to be prevented by vigilance of health officers alone. Thus the proportion of the unprotected to the total population must have been favourable for an outbreak in the presence of some case whether of local origin or imported from without.

The first case, a severe but non-fatal one, was isolated on 19th February; and none of the contacts contracted the disease. The second case, a fatal one, was isolated on 28th March, and as the previous movements of both were compatible with infection acquired in another district the question of declaring an infected area did not arise. The third case, also fatal, was isolated on 6th April, and occurred in Christiansborg at the end of the town farther from Accra. The fourth and fifth cases, on 20th and 21st April respectively, occurred in Labadi a township three miles east of Christiansborg, and the area embracing the former was declared infected, by an Order in Council dated 24th April, a condition which remained until 4th December. The first definitely non-imported case in Accra itself was No. 6, isolated on 29th April. Unfortunately this had been concealed for three weeks, and had escaped with six others in an infective state to a village where all seven were tracked down by the vigilance of the Sanitary Inspectors. Three others infected by case No. 6 escaped to another spot and were similarly traced, all ten being eventually isolated on 29th April. Two additional cases were traced from the same source who thus was known to have infected 11 persons; several others who escaped at the same time but reported themselves or were discovered later had doubtless the same origin. In the end, as many as 86 cases were traced directly or indirectly to case No. 6.

The town Block in which case No. 6 occurred furnished 31 out of 66 cases discovered in Accra up to end of June.

The Municipal Area and Port of Accra were accordingly declared infected on April 30th, and full quarantine measures adopted; this period of quarantine lasted until July 3rd, or 64 days. Cases, from one to five in number, occurred almost daily for the next few weeks, and the number isolated during this first period of quarantine was 136 of which 36 were fatal, a mortality of 26.4%.

The preventive measures employed as a routine after isolation of patients may be summarised as follows :—

Contacts vaccinated if considered necessary and segregated for 16 days; disinfection followed by whitewashing; house to house inspection and observation of occupiers for 16 days; vaccination in the neighbourhood within an increasing radius; medical practitioners circularised; inspection of all bodies dead without having been attended by a registered medical practitioner; visit to women giving birth to premature or still-born children; periodic inspection of buyers and sellers in the markets; a Police guard on the Contagious Diseases Hospital to prevent communication; bodies dead of Small-pox were sprayed and wrapped in a blanket soaked in disinfectant before burial which took place by night; demolition of houses incapable of being disinfected; police and sentry posts established on roads and institution of road and market passes signed by the Medical Officer of Health; inspection of intending passengers by ship or train.

The Sanitary Staff received special lectures on the subject and were trained to vaccinate.

In two of the infected blocks, *viz.* Sempe and Gbese quarters, the houses were badly congested and being structurally impossible to disinfect demolition was carried out under section 9 of the Infectious Diseases Ordinance, a Compensation Board appointed, and, first temporary huts and then permanent concrete rooms, etc., provided for the dispossessed.

On 4th May an Order in Council was made embodying regulations to restrict the movements of persons from Accra and Labadi without a passport from the Health Officer, and enjoining notification, and on 6th May a public notice was made relative to passports for passengers by train, ship, lorry, car or foot.

Two of the stations on the railway at which outbreaks had occurred were closed for a definite period.

On May 28th, 1920, an Order in Council was made prohibiting the introduction into the Gold Coast of clothing and bedding which had been used and also of rags from the port of Lagos, unless accompanied by a certificate that they were free from infection. Such an order demands a high degree of efficiency and of disinfecting equipment on the part of the Health Authority at the port of exportation if carried out to the letter, and the work was done during the period that Lagos was in quarantine. The restriction was, however, modified to acceptance of a certificate (under section 17 of the Schedule to the Quarantine Ordinance) of disinfection of such articles as the Health Officer might consider actually infected.

The type of disease during this first period was severe and the cases may be classified as follows:—

Type as to rash.	Number.	Percentage.	No of deaths.
Haemorrhagic .. ..	2	1.4	2
Unmodified confluent .. ..	73	53.6	29 or 39.7%
Unmodified discrete .. ..	45	33.1	5 „ 11.1%
Modified discrete .. ..	16	11.8	0
Total .. ..	136		36 or 26.4%

The second period of quarantine was between the dates 4th August and 18th September, or 45 days. Several cases had occurred in the interval in various villages and one of these was of interest as proving infection through clothing from an infected house in Accra. The case, in connection with which prosecution and imprisonment occurred, led to 23 others in adjacent villages.

Two non-imported cases in Accra on August 1st led to declaration again on August 4th, and on the same date Winnebah was declared infected, a state which continued for only one week.

The previous precautions were carried out except that road and market passes were dispensed with while passengers by sea and train were personally examined, and vaccinators were placed with the Police posts on the main roads from the town.

During this period 95 cases were isolated, the majority being from the villages, and the mortality was 24.2%.

In one village an outbreak occurred with several deaths as the result of the practice of inoculation.

Accra was declared free on 18th September, but on 22nd September Secondee was declared infected and was in quarantine until 12th October.

The third period of quarantine for Accra was between the dates October 9th and November 10th, or 33 days. Infection at this time appeared to be associated with the return of Kroo labourers from bush towns following on partial failure of the cocoa season. Minor outbreaks during the spring and summer had occurred in several country places and doubtless many villages had been infected by persons from Accra during the first period when the supply of vaccine lymph was inadequate, and by some who succeeded in evading the medical posts, whether contacts or actual infective cases removed secretly. The number of Kroomen infected during this third period was out of all proportion to their numbers in residence in Accra, and the type of disease was virulent with several cases of haemorrhagic eruption.

The number of cases isolated during this period was 32 with nine deaths, a mortality of 28%.

Concurrently with Small-pox at this period was an epidemic of Chicken-pox amongst Kroomen and this spread to the convicts in James Fort Prison. Four Nissen huts were erected and as many as 40 cases of Chicken-pox were isolated at one time.

Under these circumstances the prospect of a Race Meeting on October 23rd caused some anxiety to the Sanitary Staff, but as it was not considered feasible to postpone or to restrict attendance public notices were posted intimating that medical examination and vaccination posts would be established. As the result of this 1,030 persons came voluntarily to the Health Officer for vaccination before the races, and 1,130 passing the medical examination posts were vaccinated, a total of 2,160 vaccinations on the day of the meeting.

The total figures for the whole epidemic are as follows :—

In Accra town .. .. .	111 cases (125 in Accra Municipal Area.)	
„ Christiansborg .. .. .	14 „	
„ neighbouring towns and villages, etc.	138 „	including 25 in Labadi and 6 from ships.
Total .. .. .	263 „	68 fatal—mortality 25.8%.

Of the 111 cases in Accra itself 33 occurred in one block of the town.

Four cases were discovered on ships arriving, and two others amongst passengers under surveillance after landing. The importance of surveillance is thus demonstrated these cases occurring on the 9th and 11th day respectively after disembarkation.

Prosecution of persons who concealed or surreptitiously removed cases of Small-pox was resorted to in several instances. Altogether seven persons were charged, with the following result :—

- Two were fined £5 and £25 respectively ;
- Four were imprisoned for periods of one to three months ;
- One case was discharged with a caution.

*Vaccinations.*—Special consignments of vaccine lymph were applied for, and, after the initial shortage relatively to the rapid increase in the number of cases and the extension of the epidemic had been met, the vaccination campaign in connection with this outbreak will probably be found to be the most complete on record in this Colony. School children, Kroo and other labourers, passengers from infected ports and contacts and neighbours of actual cases swelled the numbers.

The recorded number of vaccinations performed during the period January 1st, to November 30th, was 76,897. Of these 45,957 were verified as successful, and the Medical Officer of Health, basing an estimate on various other observed instances, calculates that 80% of those not seen after vaccination were successful. The numbers refer to Accra and villages within a radius of about 20 miles.

Number vaccinated.	Verified successful.	Number not seen.	80% of not seen.	Total successful.
76,897	45,957	29,121	23,296	69,253

The probable percentage of vaccinations which were successful is thus 90·1%. Under the circumstances in general involving vaccination of large numbers in transit, and owing to the employment of temporary vaccinating assistants, probably very many were never recorded.

Only one death occurred of a nominally "successfully vaccinated" case, viz. a Krooman, aged 50, vaccinated ten years previously but showing only a single unsatisfactory mark. With this reservation the Medical Officer of Health is justified in claiming that in reality "no single person who had been successfully vaccinated prior to exposure to infection died of Small-pox."

Three cases of *vaccinia* occurred.

The Winnebah district was infected with Small-pox from May to August, many villages and some of the towns in the cocoa-districts furnishing cases some of which found their way to Winnebah town which was itself in quarantine for a short period in August. Occasional cases continued to be reported in villages to the end of the year. Isolation in temporary huts, and police cordons with active vaccination, were the measures employed.

In Koforidua District the earliest cases could not be traced but apparently an outbreak commenced in June and continued until September. The type was comparatively mild; the number of known cases was 95 with 16 deaths, a mortality of 16·8%. Much evasion was practised and probably the majority of cases occurred among the floating population of the district in villages and Zongos. 17,114 vaccinations were performed in the district, of which about 80% of those verified were successful.

Secondee had a few cases in a group, without any deaths, in September, probably introduced by an arrival from Cape Palmas. The port was worked under quarantine regulation for about three weeks, police patrols were instituted and rigorous inspection of travellers was carried out. 11,000 vaccinations were performed in three weeks.

At Cape Coast only one case occurred, but there were a few cases in villages of the Central Province.

Outside the Colony besides in Nigeria Small-pox was prevalent in Liberia from November to the end of the year.

*Vaccination (General).*—With the enactment of the new Ordinance, vaccination, formerly imposed chiefly by moral suasion except during an actual outbreak, now becomes compulsory in those towns and districts to which the Ordinance is applied. A set of regulations imposing both duties and restrictions helps to ensure that the provisions will be satisfactorily carried out without provoking obstruction. The staff of vaccinators, hitherto four in the Colony since 1917, and one in Ashanti since 1911, was increased to nine. During the epidemic several temporary assistants were employed and Sanitary Inspectors were specially instructed in the duties.

The normal supply of Vaccine Lymph for the whole country for 1920, as originally arranged in view of the new Ordinance, was 1,000 tubes of lanolinated and 200 tubes of desiccated lymph per month. Extra demands as the epidemic progressed were met by larger consignments from England, and up to the end of September about 18,400 tubes were received. Many vaccinations were under the circumstances, never recorded.

The total number of vaccinations performed during the year was 221,386 of which 177,085 were verified as successful.

A table for comparison with previous years is given below.

VACCINATIONS—1914 TO 1920.

	1914.	1915.	1916.	1917.	1918.	1919.	1920.
Total vaccinations ..	7,631	9,723	10,313	21,293	14,700	21,467	221,386
„ verified successful ..	5,417	7,270	7,848	15,619	10,726	16,943	177,085
Percentage successful ..	71	74·7	76	77·3	73	78·9	80

The percentage of those verified as successful ranged from 17·4 in Sunyani in north-west Ashanti to 92 in Winnebah and 91 in Akuse. In some stations, *e.g.*, where many labourers for railway or other works are vaccinated, considerable numbers cannot be verified.

Dried lymph is used chiefly in Coomassie and in the Northern Territories. In Ashanti out of 491 vaccinations with dried lymph 42·3% were successful, as compared with 3,587 with lanolinated lymph of which 36% were successful. A small supply of glycerinated lymph from French sources was also used.

*Plague.*—No case of Plague was reported and no quarantine measures with respect to adjoining countries were imposed during the year.

*Cerebro-Spinal Fever.* The Northern Territories again experienced a serious epidemic of Cerebro-spinal Fever, the previous epidemic years in that Dependency having been 1906, 1907, 1908 and 1919. In these successive outbreaks the range has tended to increase and in 1920 for the first time Ashanti has been the scene of this disease in epidemic form. Its endemic existence in the Northern Territories is accepted, but the reasons for epidemic outbreaks in certain years and not in others is unknown, and perhaps the most important new feature is the extension of its range.

The earliest known cases dated from about the middle of January in the more distant parts of the North-Western Province. Further investigation however renders it probable that in the North-Eastern Province as well as in Ashanti the beginnings of the epidemic wave were coincident in all three areas.

The number of ascertained deaths was approximately 3,000.

In previous epidemics the estimated number of deaths was as follows:—

1906	..	..	20,000
1907	..	..	8,000
1908	..	..	6,000
1919	..	..	986

The evidence of contagiousness was slight though not negligible, and it is clear that the conditions of native life in the Northern Territories are such as to render their grossly crowded and unventilated dwellings a perfect environment for those whose naso-pharyngeal passages harbour and provide an incubator for the known germ of this disease.

The main preventive measures were naturally isolation of the sick and restriction or supervision of the movements of the people; strict injunctions in a simple form to native Chiefs to report promptly, to assist in providing materials and in restricting inter-village communication and obsequies with their social gatherings; destruction of infected houses, etc. In practice it becomes apparent that inquiry should be made if possible in every case of sudden death, and that a trained and fairly intelligent native staff working under adequate European direction both political and medical, is necessary, whether to limit an outbreak once started or to lay the foundations of a quiet but progressive campaign of enlightenment and sanitary improvement which may render future outbreaks less likely, or at least bring them to light in the early stages when more amenable to control. Rules for reporting cases of Small-pox, Anthrax, Plague and Cerebro-spinal Fever, and a set of sanitary rules for the guidance of chiefs and headmen of villages, have now been applied to the Northern Territories, and the epidemic has at least led to exposure of the medical and sanitary needs of that region.

A fatal sporadic case was reported from Gambaga in July, one occurred at Akuse, and two in Accra.

*Influenza.*—A few cases occurred at Cape Coast in April. The usual personal precautions were advised, schools were visited and warning given to schools and places of worship.

A leaflet on Influenza was prepared in the Twi language by Dr. Reindorf and has been widely distributed.

A Prophylactic Vaccine was ordered and received in June.

A rather extensive outbreak occurred at Secondee and lasted from May to September. Some 358 cases were reported but doubtless this figure was exceeded by those who never came under observation. There were four deaths and perhaps some of the nine deaths registered as due to Pneumonia and Broncho-pneumonia may have been of Influenzal origin.

The methods of prevention at first employed were chiefly personal, with an advisory printed leaflet, and the use of a stock gargle for free distribution. After 1st July extra precautions were adopted, viz. isolation of certain cases, examination of coastwise passengers, closure of schools and restriction of public meetings, concerts and native funeral customs.

In Coomassie 23 cases with one death were reported in September. In all these outbreaks the type was mild and no Europeans seem to have suffered.

### (3) ENDEMIC DISEASES.

*Tuberculosis*.—Pulmonary Tuberculosis is not compulsorily notifiable but under departmental instructions cases are reported to Medical Officers of Health by all Government Medical Officers. Isolation is not attempted at present but each case is followed up with a view to carrying out preventive measures on the premises, exercising personal influence, and tracing other cases. A schedule of inquiry is kept and details of each death or notified case are entered for future reference. Treatment of Pulmonary Tuberculosis at Government Hospitals and Dispensaries is free.

There is a great preponderance of pulmonary as compared with bone and joint forms of *Tuberculosis*, (in true correspondence with incidence amongst tropical races elsewhere) indicating infection through personal contact or environment more than by ingestion of diseased products, and therefore the more important line of preventive action is towards early detection of cases and improvement of dwellings and home conditions in general.

Statistical evidence is at present insufficient to prove a real increase, but the number of untreated cases is probably much in excess of the advanced ones which seek relief. As the Vital Statistics also of each of the larger towns show *Tuberculosis* to be a relatively frequent cause of death there is strong presumptive evidence that this disease is one of increasing importance.

Only seven cattle were found at the Accra Slaughter-house to be tuberculous.

### HELMINTHIC DISEASES.

*Ankylostomiasis*.—No special campaign against the hookworm is in action but the general measures of prevention are concerned with cleanly methods of sewage disposal, disinfection of public latrines, prosecution for promiscuous defecation and education to improve the general standard of civilised habits.

*Tapeworm* is commoner amongst the meat-eating races from the north whose method of half-cooking by smoking pieces of meat over a smouldering fire is responsible for the infection. The incidence of the larval form—*Cysticercus*—in the porcine species seems, however, to vary greatly in different stations presuming inspection is equally efficient at each; e.g., at Cape Coast none were discovered in 603 pigs slaughtered although these unclean animals are raised in villages where they are the only scavengers. At Akuse, on the other hand, practically every pig is infected and 90% of the local supply comes from Addah or Quittah where primitive fashions in breeding prevail. The difference probably depends on native habits in disposal of excreta in villages, whether pits inaccessible to the pig are usual or promiscuous use of a sandy soil in the open.

*Bilharzia*.—This parasite is probably fairly widespread in at least some of the southern districts, e.g. Winnebah and the Agona district, and along the Volta in the Eastern Province. In Akuse district the people are becoming acquainted with the modern radical treatment by intravenous antimony. The intermediate host being a common fresh-water snail the best natural scavenger and preventive agent against this parasite is the domestic duck.

*Guinea-Worm*.—The preventive measures are warnings to boil or strain drinking water protection of wells and to prevent infected persons from washing near wells. The incidence is greatest in the Northern Territories and at many coastal stations no local cases seem to arise, but at others, e.g. Saltpond, Dixcove, Quittah, and Ho the prevalence indicates an endemic condition.

### ANIMAL DISEASES.

*Cattle-Plague* was epidemic in the north and was carried south into the Eastern Province where herds at Kpong suffered severely. A veterinary inspector was stationed at Senkye Ferry on the Volta from August to October, and cattle arriving at Akuse, Koforidua, and other places were inspected and isolated or destroyed where necessary.

Accra with its environs was declared an infected area in respect of *Cattle-plague* in August and arrivals were inspected while the movements of local grazing herds were restricted.

Also an outbreak in the Ivory Coast caused the French Administration to close the frontier to cattle trade.

A private firm having proposed arrangements to import cattle from Liberia to Gold Coast *via* Secondee the "Diseases of Animals Ordinance, 1918" was applied to that town to ensure proper supervision and protection of native herds.

No definite case of human Anthrax was reported but at a village called Kokofu in Ashanti a small outbreak of disease of unknown origin was investigated in March. Eleven deaths were stated to have occurred in two or three weeks and the symptoms described were suggestive of Malignant Pustule.

### (iii) GENERAL MEASURES.

Details as to housing, markets, slaughter-houses, disposal of refuse and excreta, water supplies, drainage, clearing of vegetation, reclamation of land, oiling, inspection, prosecutions etc., are shown in Table IV.

At all stations the routine work of inspection of premises and out-of-door conditions with a view to abating nuisance or preventing conditions favourable to disease and the breeding of biting insects was fairly well maintained. Circumstances culminating in an abnormal reduction of labour at Coomassie in the last quarter of the year led to conditions which caused complaint of nuisance but happily without any outbreak resulting therefrom. These were investigated and remedied.

The majority of stations are under-staffed in respect of labour for general sanitary work and improvement of amenities.

The planting of dhub grass has made progress at some stations. The preliminary work absorbs so much time and labour that under present conditions it is difficult to carry out this improvement without allowing other important interests to suffer, but in the end it undoubtedly leads to economy of work now expended on repeated clearing.

*Segregation of Europeans.*—This principle is maintained as a necessary preventive measure against Malaria and Yellow Fever. It cannot be said however that it is fully adopted. In some stations *e.g.* Accra, Secondee, Coomassie and perhaps Cape Coast the majority of European Officials are segregated, *i.e.* live in quarters at a distance from any dwellings occupied by natives, but in no station can it be said that most of the non-official community are so protected. In some instances the latter would take up sites but await lay-out of new Segregation Areas or the extension or clearing and allocation of sites on the existing ones.

At Saltpond an excellent site has been cleared and laid out in plots for both official and mercantile occupiers.

*Drainage and Reclamation.*—A good deal of properly directed effort was performed during the year in laying concrete drains. In the chief large towns the amount in linear yards constructed was as follows:—Accra, 6,684 yards; Cape Coast, 1,444; Secondee, 1,832; Axim, 2,151; Coomassie, 1,849. In several other places important additions were made to previously properly constructed drains. These improvements however lend themselves to objectionable misuse, the remedy for which apart from coercive measures lies in an ample supply of water for flushing. In Secondee a system of daily flushing with the town supply is in use; in Accra with a supply which requires careful conservation a method for the use of sea-water for flushing seems to be indicated. Household refuse and town sweepings are generally applied, either untreated or after incineration, to reclamation of hollows or other waste land, and at Secondee 23,000 square yards of swampy ground, mostly adjoining the lagoon, were so filled up. Many stations in this country have a rainfall under or not much over 50 inches and are to that extent probably suited to a system of refuse destruction by the use of a comparatively simple type of small incinerator.

*Sewage Disposal.*—At coast towns the ultimate disposal is either into the sea or into pits dug in the sand on the beach. Elsewhere pits and trenches are used. The tipping depot with flush tank and sewer discharging to the sea is in use at Accra, and gave satisfactory results until the two outermost piers supporting the concrete channel were destroyed by the surf.

At the same time the shortage of water with temporary stoppage of the flush involved the employment of labour to carry sea-water.

The carriage of night-soil is a difficult and expensive problem and the reluctance of the native labourer of the Colony to handle conservancy work is an added obstacle. Accra is the only town where motor transport is employed, the cost of the contract being £4,000 *per annum*. In Coomassie arrangements for a similar system were not completed, and there as in Secondee this method has to be shelved for the present as too costly.

*Sanitary Improvements.*—At various towns necessary conveniences with a view to improved sanitation were constructed, such as new public latrines, public dustbins, market sheds, wash-places, etc. New wells were constructed at Coomassie, Winnebah and Saltpond.

*Water Supply.*—The method of purification by Excess Lime adopted for the Accra system gave satisfactory results as shown by bacteriological tests of the water leaving the final filters. In the case of the reservoirs the results are naturally more variable, and, in the second half of the year they compared somewhat unfavourably with those of the preceding period. The absence of the Inspector Chemist for certain periods during which important guidance is lacking in respect of strength and quantity of lime to be added, and of amount of Excess Lime in the water after treatment, indicates again the need for constant scientific control in order to ensure uniformity of method and regularity of practical efficiency.

The committee appointed for the purpose of suggesting and carrying out experiments on the method of purification most suited to the Secondee water supply reported in November, 1920. The method recommended was the use of aluminium sulphate as a precipitant to the raw water, with rapid pre-filtration followed by slow sand filtration, and final chlorination of the water after it leaves the clear-water well. This system is at present in use with a temporary experimental plant and the whole supply for Secondee is thus treated. The water thus supplied is practically colourless, without taste or smell, and free from doubtful organisms, but until routine bacteriological examinations can be arranged for locally the European community is recommended to filter and boil the water used for drinking purposes. The complete permanent plant for purification is not yet installed, farther detailed information of the chemical condition at different stages of the process and more precise evidence of constant bacteriological purity being required.

Coomassie with a community rapidly growing in size and importance is dependent on shallow wells, a source equivocal in quality and precarious in quantity. Some improvements to the present supply have been carried out during the year, *viz.*, one new well and two storage tanks, and farther attention to the needs of the immediate future by development of local sources is now being given. With a view to an ultimate pipe-borne supply from the headwaters of the Offin River a scheme has been the subject of special report, and continuous observations of flow and other necessary information are now being recorded at the source.

At Winnebah the scarcity of fresh drinking water is so acute that during the dry months a four gallon tinful may cost several shillings in the town. A scheme to bring a water supply from a distance of five or six miles has been reported upon and is now under consideration.

*Town Planning and Regulation of Buildings.*—The laying out of land for occupation under careful control of building forms the basis of town-planning. The ground so dealt with may be acquired by Government as Health Areas without compensation, and in some cases this involves extension of the existing town boundaries as at Saltpond at present.

No large schemes of town-planning have been executed, but at Cape Coast a demolition and improvement programme is in progress, and at the East end of the town and the Amanful area houses were removed, four roads made and the adjoining lands laid out in building plots. Many applications for building permits were refused pending the clearance of the congested and ruinous property and a proper lay-out of the worst areas.

The Small-pox epidemic in Accra gave the opportunity for, and indeed rendered imperative the demolition of a certain amount of grossly insanitary property and provision of accommodation for the dispossessed.

A lay-out was done at Korle Bu providing for roads and building plots, etc.

Hausa quarters at the towns of Saltpond and Imbraim were laid out, and a lay-out scheme or Dunkwa was started.

Rigid scrutiny of all building permits and careful inspection of the works in process of construction are essential to prevent erection of buildings which add to congestion or which perpetuate the evils of an insanitary environment. The appointment of five European Building Inspectors by the Public Works Department is a valuable guarantee of improvement in this respect.

At the chief stations in the Colony and in Coomassie 886 Building Permits were issued but not all the buildings in respect of which these were signed were completed during the year. In Accra 324 permits for new buildings were granted, being 100 more than in 1919.

*Inspections and Prosecutions.*—The total number of house inspections made was 351,211, and mosquito larvae were found in 2,764 cases. Prosecutions for offences under the Mosquito Destruction Ordinance numbered 3,107, and those under the Towns and Public Health Ordinance for other insanitary conditions numbered 5,260, total 8,367, of which 7,746 resulted in conviction. The total fines amounted to £3,673 7s. 9d. an average of 9s. 6d. per case.

*Food Supply.*—All animals intended for slaughter are inspected before being passed and the flesh and organs are again inspected after slaughter.

Cattle arriving at Secondee have been previously inspected before leaving Coomassie.

In the large towns slaughter takes place in the evening and the carcasses are hung in a fly-proof chamber until next morning when they are cut up and removed to market. Improvement in the method of removal of butcher meat from slaughter-house to public market is possible, e.g. by covered hand carts to avoid exposure incidental to carrying as a head-load.

The meat supply of the coast towns is very unsatisfactory, and, unless a live-stock industry at some place or places nearer the sea can be made practicable, it seems likely that this difficulty will remain until the railway taps a cattle-raising district in the north. The epidemic of cattle plague caused some anxiety and required special action in the interests of the meat supply.

If increase of the pig-breeding industry is to be advocated it would be well that the remarks above on the subject of *Tapeworm* be kept in view, and that in the case of some native communities repression rather than encouragement be exercised until reform of local usage has been brought about.

Considerable quantities of imported articles have from time to time to be inspected at public markets, private stores, auction marts, etc., and where found unfit for human consumption are condemned under certificate and destroyed.

The neglect of cultivation of the ordinary foods of the country is bringing about consequences which may be far-reaching. Already the occurrence in hospital of some cases of grave illness or death attributable to deficiency of important factors in the normal diet—"Deficiency Disease"—have helped to bring this subject into a salutary prominence. The tendency of certain classes to live on an unvaried diet of one or two articles which are often lacking in the minute but essential elements for full nutrition, and the increasing temptation to others to live on the cheaper forms of imported canned provisions, are matters for immediate reform not by statute but by the influence of administrative officers and by instruction and encouragement towards greater production of ordinary farm crops and improved methods of preserving grain and other produce. The cultivation of such an important food as the pulses seems to be particularly neglected. A leaflet in simple language dealing with the subject has been prepared and issued for instruction of native chiefs, school children, etc.

#### B.—MEASURES TO SPREAD THE KNOWLEDGE OF HYGIENE AND SANITATION.

The work of the staff of Sanitary Inspectors and the personal influence they are capable of exercising renders it important that this class should be judiciously selected and carefully trained. The new appointment of a senior experienced officer who is also a qualified teacher, will greatly assist towards realisation of the latter aim.

As regards instruction in Hygiene in Government and Assisted Schools this is done in association with "Hand and Eye" work and the Acting Director of Education states:—

"The teaching of Hygiene is commenced in Standard IV. and continued up to Standard VII. It is mainly taught apart from books though the teachers use Strachan and Prout as guides. These books would have been in the hands of many of the pupils but there has been great difficulty in obtaining them. The latter, I think, is out of print.

"Every attempt, both by advice and the grant of prizes, is made to encourage the teachers to make their teaching practical and to illustrate their lessons by experiment. This has been done with notable success in the Government Senior School where the teachers have formed good collections to illustrate their lessons and a series of experiments designed by various Headmasters to illustrate the principles, is carried out."

Dispenser Pupils, Probationer Nurses, Students in the Teachers Training College and in the Scottish Mission Seminary at Akropong, receive instruction in the same subjects in some cases by European masters. The need for a new text book of Hygiene for schools in West Africa is probably now being felt. A change in the attitude of the people and any proper appreciation of the meaning and objects of sanitary measures is scarcely to be expected in the present generation, but the great importance attached at present to education in general, quite apart from special instruction in health matters, encourages the hope that the conversion of public opinion will progress more rapidly than in the past.

#### C.—RECOMMENDATIONS FOR FUTURE WORK.

1. Increase of European Staff:—
  - a. Sanitary Officers to secure regular supervision throughout the provinces.
  - b. A Medical Officer of Health for Winnebah and Agona towns.
  - c. European Sanitary Inspectors for wider distribution where there is no Medical Officer of Health and for better training of natives.
2. Increase of Sanitary Inspector Staff and labour.
3. Pipe-borne water supplies with drainage for Coomassie, Cape Coast, Winnebah, Saltpond, Koforidua and Axim.
4. Water carriage sewage system and drain flushing for coast towns.
5. Medical Inspection sheds at coast ports for examination, vaccination, etc., in epidemic times.
6. A new Infectious Diseases Hospital for Accra.
7. Medical Inspection and Quinine treatment of school children.
8. Maternity and Child-welfare work.
9. Adequate housing for European Officers.
10. Naming of streets and numbering of houses.
11. Increased European Staff for inspection and maintenance of Water Works.
12. A new Public Health Ordinance.

J. M. DALZIEL,

*Senior Sanitary Officer.*

Accra.

May, 1921.

## IV.—METEOROLOGY.

## RAINFALL IN INCHES.

	1917.	1918.	1919.	1920.
Accra .. .. .	44·20	32·37	20·44	15·87
Aburi .. .. .	73·16	42·24	34·54	36·40
Cape Coast .. .. .	56·25	35·30	29·19	31·13
Seccondee .. .. .	56·76	34·53	38·25	34·65
Axim .. .. .	94·50	47·64	56·05	66·43
Tarquah .. .. .	92·62	53·80	59·36	68·19
Coomassie .. .. .	71·40	58·64	37·08	50·98
Tamale .. .. .	35·76	44·45	38·61	36·95

## V.—HOSPITALS AND DISPENSARIES.

16. The total cases treated at the various Government Hospitals and Dispensaries during 1920 was fifty-eight thousand five hundred and eighty-five.

The following table shews the total number of In-patients treated at Accra, Seccondee and Coomassie Hospitals :—

Station.	1918.		1919.		1920.	
	Europeans.	Natives.	Europeans.	Natives.	Europeans.	Natives.
Accra .. .. .	140	871	166	594	250	898
Seccondee .. .. .	186	380	184	317	233	432
Coomassie .. .. .	143	2,287	100	1,305	149	1,362
Total .. .. .	469	3,538	450	2,216	632	2,692

17. The construction of the new Native Hospital at Accra was begun at the beginning of September, 1920, it is hoped that several blocks will be completed before the end of 1921.

## PRISONS.

18. The death-rate which in 1919 was 5.51 per cent. was increased to 10.4 per cent in 1920. There were thirty-two deaths in Accra Prison of which twelve were due to dysentery and eight to tuberculosis. There were ten deaths in Tarquah Prison. The mortality-rate in all the other prisons was low. There were seven executions.

	1918.	1919.	1920.
Total admissions .. .. .	6,694	8,166	6,047
Total sick .. .. .	1,391	2,211	869
Total deaths .. .. .	85	45	63

## VI.—SCIENTIFIC.

19. As will be seen from the Pathologist's Report, which is attached as an Appendix, a large amount of valuable work has been carried out during the year, and very important results have been obtained, especially with reference to the investigation on Malaria in school boys in Accra.

M. E. O'DEA,

*Acting Principal Medical Officer.*

6th June, 1921.

TABLE IV.

## 1.—NAME OF TOWN.

Station.	1919.		1920.	
	Approximate Area.	No. of proclaimed open spaces.	Approximate Area.	No. of proclaimed open spaces.
Accra .. ..	4½ sq. miles	26	4½ sq. miles	27
Cape Coast .. ..	2½ sq. miles	4	2½ sq. miles	4
Seccondee .. ..	3 sq. miles	3	3 sq. miles	3
Coomassie .. ..	9 sq. miles	..	9 sq. miles	..

## 2.—POPULATION.

Station.	1919.					1920.				
	Native.		Europeans.			Natives.		Europeans.		
	Males.	Females.	Males.	Fe- males.	Total.	Males.	Females.	Males.	Fe- males.	Total.
Accra ..	13,346	10,485	304	70	24,205	13,340	11,300	346	76	25,062
Cape Coast	4,951	5,419	39	12	10,421	4,858	5,341	46	15	10,260
Seccondee	7,712	4,288	126	18	12,144	8,000	5,000	165	19	13,174
Coomassie	14,028	17,814	140	14	31,996	11,391	9,170	168	11	20,797 includng Syrians (57)

## 3.—HOUSING.

Station.	1919.				1920.			
	Houses.		Huts.		Houses.		Huts.	
	Europeans.	Natives.	Europeans.	Natives.	Europeans.	Natives.	Europeans.	Natives.
Accra .. ..	150	2,969	See	Houses	180	3,016	See	Houses
Cape Coast .. ..	24	1,362	..	319	33	1,366	..	321
Seccondee .. ..	137	1,442	..	..	106	1,504	..	..
Coomassie .. ..	48	2,444	..	123	48	1,300	71	..

TABLE IV.—*continued.*

## 4.—MOSQUITO PROTECTION OF HOUSES.

Station.	1919.				1920.			
	Number of houses wholly protected.	Number of houses with Mosquito-proof room.	Made wholly protected in 1919.	Partially protected in 1919.	Number of houses wholly protected.	Number of houses with Mosquito-proof room.	Made wholly protected in 1920.	Partially protected in 1920.
Accra .. ..	..	20	..	..	..	20	..	..
Cape Coast ..	..	2	..	..	..	..	..	..
Seccondee ..	2	22	2	..	..	22	..	..
Coomassie ..	..	12	..	2	..	12	..	..

## 5. (A).—ERECTION OF NEW BUILDINGS DURING THE YEAR.

Station.	1919.					1920.				
	Public Buildings with full sanction.	Houses with full sanction.	Huts with full sanction.	Houses without sanction.	Huts without sanction.	Public Buildings with full sanction.	Houses with full sanction.	Huts with full sanction.	Houses without sanction.	Huts without sanction.
Accra .. ..	..	224	..	42	..	..	50	..	99	..
Cape Coast	1	11	..	1	..	..	16	..	1	2
Seccondee ..	..	12	..	..	..	..	62	..	..	..
Coomassie ..	..	103	..	..	..	..	221	..	..	..

TABLE IV.—(continued).

## 5 (B).—ACTION TAKEN.

Station	1919.				1920.			
	Number of Prosecutions.		Number demolished.		Number of Prosecutions.		Number demolished.	
	Huts.	Houses	Huts.	Houses.	Huts.	Houses.	Huts.	Houses.
Accra .. ..	..	..	14	..	..	..	Houses & Huts 72	
Cape Coast .. ..	..	1	3	4	..	..	..	7
Seccondee .. ..	..	..	12	..	..	..	..	..
Coomassie .. ..	..	..	..	..	..	..	..	31

## 6.—MARKETS.

Station.	1919.			1920.		
	Number.	Paved and drained.	Unpaved.	Number.	Paved and drained.	Unpaved.
Accra .. ..	3	2	1	3	2	1
Cape Coast .. ..	2	2 (one partly paved)	..	2	2	..
Seccondee .. ..	2	2	..	2	2	..
Coomassie .. ..	3	1	2 (one partly)	3	1	2

## 7.—SLAUGHTER HOUSES.

Station.	1919.			1920.		
	Number.	Paved and drained.	Unpaved.	Number.	Paved and drained.	Unpaved.
Accra .. ..	1	1	..	1	1	..
Cape Coast .. ..	1	1	..	1	1	..
Seccondee .. ..	2	2	..	2	2	..
Coomassie .. ..	2	2	..	1	1	..

TABLE IV.—continued.  
8.—LATRINES. (PUBLIC).

Station.	1919.												1920.											
	Number.			New Ones.			Repaired.			Demolished.			Number.			New Ones.			Repaired.			Demolished.		
	Male.		Female.	Male.		Female.	Male.		Female.	Male.		Female.	Male.		Female.	Male.		Female.	Male.		Female.	Male.		Female.
	Number.	Seats.	Number.	Seats.	Number.	Seats.	Number.	Seats.	Number.	Seats.	Number.	Seats.	Number.	Seats.	Number.	Seats.	Number.	Seats.	Number.	Seats.	Number.	Seats.	Number.	Seats.
Accra ..	38	449	38	226	—	—	—	—	—	—	—	41	453	41	239	3	14	3	13	—	—	—	—	—
Cape Coast ..	18	172	17	164	—	—	13	146	12	122	—	—	8	140	13	132	2	8	2	8	12	82	11	90
Secoundee ..	11	196	11	196	—	—	—	—	—	—	—	—	11	196	11	196	1	12	—	—	—	—	—	2 & rebuilt
Coomassie ..	25	179	25	181	—	—	1	—	—	—	—	—	26	227	26	221	—	—	—	2	—	—	2	1 8 1 8

8.—LATRINES (PRIVATE).

Station.	1919.						1920.						
	Number.	Pails removed daily.	No. of clean pails substituted for dirty ones.	No. of night-soil men.	Cesspools cleanset.	New Cesspools abolished.	Cesspools regularly oiled.	Pails removed daily.	No. of clean pails substituted for dirty ones.	No. of night-soil men.	Cesspools cleansed.	New Cesspools abolished.	Cesspools regularly oiled.
Accra ..	338	610	—	54	—	—	—	580	—	70	—	—	—
Cape Coast ..	80	773	773	28	10	4	777	777	36	36	6	1	4
Secoundee ..	237	199	199	44	—	—	220	220	50	50	—	—	—
Coomassie ..	137	466	466	64	—	—	446	—	—	—	—	—	—

TABLE IV.  
9.—REMOVAL OF REFUSE.

Station.	1919.						1920.					
	Dustbins.	Carts removing street refuse.	Amount of refuse removed daily from streets.	Carts removing refuse from yards and premises.	Men employed.	Dustbins.	Carts removing street refuse.	Amount of refuse removed daily from streets.	Carts removing refuse from yards and premises.	Amount of refuse from yards and premises.	Men employed.	
Accra ..	35	13	74 cart-loads	4	40	33	9	94 cart-loads	—	—	40	
Cape Coast ..	39	10	62½ cart-loads	—	31	39	10	54 "	—	—	32	
Secondee ..	18	2 lorries	25 cart-loads	—	26	20	3 motor lorries.	25 "	13	—	26	
Coomassie ..	—	—	559 head-loads	1	24	17	3	150 head-loads	1	Unknown.	45	

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

Station.	1919.						1920.					
	Buried or trenched.	Burnt.	Thrown into sea.	Otherwise dealt with.	Buried or trenched.	Burnt.	Thrown into sea.	Otherwise dealt with.	Buried or trenched.	Burnt.	Thrown into sea.	Otherwise dealt with.
	Pails excreta per day.	Cart-loads refuse per day.	Cart-loads refuse per day.	Pails excreta per day.	Cart-loads refuse per day.	Pails excreta per day.	Cart-loads refuse per day.	Pails excreta per day.	Cart-loads refuse per day.	Pails excreta per day.	Cart-loads refuse per day.	Pails excreta per day.
Accra..	—	44	—	—	—	—	7	—	—	—	—	—
Cape Coast ..	—	1	1/15	—	—	61½	1/7	—	—	—	94	1/7
Secondee ..	199	—	1½	25	—	—	½ h.d.	—	—	—	—	—
Coomassie ..	446	20·4	8·27	—	—	—	—	446	49	—	—	—

TABLE IV.—continued. \*

11.—AVERAGE DAILY NUMBER OF CARTLOADS OF CANS, BOTTLES AND INCOMBUSTIBLE MATERIAL REMOVED FROM HOUSES AND COMPOUNDS.

Station.	1919.	1920.
Accra .. .. .	40	29
Cape Coast .. .. .	1	1 cart-load.
Secondee .. .. .	2 cart-loads.	2 cart-loads.
Coomassie .. .. .	66-27 head-loads.	49 head-loads.

12.—WATER SUPPLY.

STATION.	PIPE-BORNE WATER				WELLS.				TANKS.								BARRELS.							
	Source.	Local yards.	Public stand-pipes.		Private.		Public.				Private.				Native.			No.	Mosquito-proof.					
			Public stand-pipes.	Private stand-pipes.	No.	Mosquito-proof.	Under-ground.	Mosquito-proof.	Above ground.	Mosquito-proof.	400 gallons or less.	Above 400 gallons.	Under-ground.	Mosquito-proof.	Above ground.	Mosquito-proof.	400 gallons or less.			Above 400 gallons.	Wood.	Iron.	Concrete.	
Accra .. .. .	River Densu	48,673	55	411	—	165	157	5	5	7	7	—	—	13	126	121	145	142	25	120	22	103	20	68
Cape Coast .. .. .	—	—	—	—	10	301	296	13	13	16	16	—	—	†29	65	63	140	140	50	155	10	124	71	476
Secondee .. .. .	Ana-kwan River	37,941	34	69	8	130	128	—	—	*81	81	—	81	42	42	42	301	300	76	225	6	265	72	111
Coomassie .. .. .	—	—	—	—	15	108	72	2	2	—	—	—	—	2	1	1	34	34	34	1	2	30	3	91

\*Includes Railway, F.W.D., Harbour, and Government Quarters.

†Includes F.W.D., Bungalows, Offices, but not Col. Hospital.

TABLE IV.—continued.  
13.—DRAINAGE (PUBLIC).

STATION.	MASONRY DRAINS.						EARTH DRAINS.					
	1919.			1920.			1919.			1920.		
	Lineal yards constructed.	Lineal yards repaired.	Lineal yards constructed.	Lineal yards constructed.	Lineal yards repaired.	Lineal yards constructed.	Lineal yards cleaned.	Lineal yards dug.	Frequency of cleaning.	Lineal yards cleaned.	Lineal yards dug.	Frequency of cleaning.
Accra .. .. .	35,480	—	970	42,164	—	6,684	45,418	7,130	Every 2 months.	4,510	1,760	Quarterly.
Cape Coast .. .. .	19,900	239	152	21,344	50	1,444	20,360	—	Continuously.	8,673	—	Continuously.
Secondee .. .. .	20,152	—	30	—	100	1,832	3,282	—	Twice a quarter.	3,400	1,200	Monthly.
Coomassie .. .. .	8,313	—	4,616	10,162	420	1,849	14,900	1,320	6 times monthly.	14,900	—	4 times a month.

14.—CLEARANCE OF UNDERGROWTH, GRASS, WEEDS, &c.

STATION.	1919.		1920.	
	Square yards grass, etc., cut and removed.	Frequency of clearance.	Square yards grass, etc., cut and removed.	Frequency of clearance.
Accra .. .. .	3,555,400	Every quarter.	836,863	Every 4th month.
Cape Coast .. .. .	436,528	Continuously.	839,749	Continuously.
Secondee .. .. .	248,599	Quarterly.	450,000	Twice quarterly.
Coomassie .. .. .	4,579,505	Every six weeks.	3,744,025	Monthly.

TABLE IV.—continued.  
15.—EXCAVATIONS AND LOW-LYING LAND.

STATION.	1919.										1920.				
	Pools and excavations.	Excavations filled up.	Amount of marsh raised and drained.	Pools, streams, etc., fish stocked.	Cubic yards material used for filling in.	Persons fined for making excavations.	Men employed daily for filling in.	Pools and excavations.	Excavations filled up.	Amount of marsh raised and drained.	Pools, streams, etc., fish stocked.	Cubic yards material used for filling in.	Persons fined for making excavations.	Men employed daily for filling in.	
Accra .. .. .	5	2	6 acres	—	?	—	6	—	—	—	—	—	—	—	
Cape Coast .. .. .	16	13	4790 sq. yds.	—	50,901	1	2	12	74,055 sq. yards	—	2,908	—	—	2	
Secondee .. .. .	80	40	25,000 sq. yards	—	45,000	—	—	80	23,000 sq. yards	—	40,000	—	—	—	
Coomassie .. .. .	—	—	80 sq. yards.	4	Not estimated.	—	—	27	—	3	—	—	—	—	

16.—OILING.

STATION.	1919.					1920.				
	Drains oiled.	Pools and excavations oiled.	Tanks and barrels oiled.	Men employed daily for oiling.	Drains oiled.	Pools and excavations oiled.	Tanks and barrels oiled.	Men employed daily for oiling.	Tanks and barrels oiled.	Men employed daily for oiling.
Accra .. .. .	3,592	3,892	726	3	234	113	428	2	428	2
Cape Coast .. .. .	107	319	512	4	184	845	605	4	605	4
Secondee .. .. .	160	101	72	5	224	120	60	3	60	3
Coomassie .. .. .	371	1,230	—	4	2,267	27	—	4	—	4

TABLE IV.  
17.—INSPECTIONS AND PROSECUTIONS.

STATION.	1919.							1920.								
	Inspectors Employed.	Houses Inspected.	Houses Where Larvae were found.	Notices against Larvae.	Persons fined for Larvae.	Notices re Insanitary Condition.	Persons fined for Insanitary Conditions.	No. of Soda and Aerated Factories Inspected.	Inspectors Employed.	Houses Inspected.	Houses Where Larvae were found.	Notices against Larvae.	Persons fined for Larvae.	Notices re Insanitary Condition.	Persons fined for Insanitary Condition.	No. of Soda and Aerated Factories Inspected.
Accra..	12	113,335	904	288	738	864	21	—	17	118,613	1,087	199	805	735	50	—
Cape Coast ..	12	27,188	296	553	233	191	48	—	10	26,205	137	353	98	49	42	—
Secondee ..	8	49,351	190	250	126	280	134	—	9	53,384	191	230	127	369	88	—
Coomassie ..	5	19,882	391	60	391	473	906	1	5	17,255	121	46	103	349	723	1

TABLE V.

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

Diseases.	*Remaining in Hospital at end of 1919.	YEARLY TOTAL.		†Total Cases Treated.	‡Remaining in Hospital at end of 1920.	Remarks.
		New Cases.	Deaths.			
INFECTIVE DISEASES.						
Beri-Beri .. .. .	1	92	8	93		
Cerebro-Spinal Fever .. .. .	..	17	8	17	..	
Chicken-Pox .. .. .	8	221	..	229	16	
Cholera .. .. .	..	..	..	..	..	
Dengue .. .. .	..	4	..	4	..	
Diphtheria .. .. .	..	..	..	..	..	
Dysentery .. .. .	1	823	20	824	2	
Endocarditis—infective .. .. .	..	2	..	2	..	
Enteric .. .. .	1	11	1	12	..	
Erysipelas .. .. .	..	3	..	3	..	
Gonorrhœa .. .. .	1	1,224	1	1,225	2	
Influenza .. .. .	1	884	3	885	..	
Kala Azar .. .. .	..	..	..	..	..	
Leprosy (a) Nodular .. .. .	..	5	..	5	..	
(b) Anasthetic .. .. .	2	3	2	5	1	
Malaria (a) Tertian .. .. .	2	821	2	823	..	
(b) Quartan .. .. .	1	8	..	9	..	
(c) Aestivo-autumnal .. .. .	1	675	1	676	5	
(d) Chronic Malaria .. .. .	..	140	2	140	..	
(e) Black-water .. .. .	..	36	7	36	2	
(f) Unclassified .. .. .	5	3,016	..	3,021	2	
Measles .. .. .	..	149	..	149	..	
Malta Fever .. .. .	..	..	..	..	..	
Plague .. .. .	..	..	..	..	..	
Pneumonia .. .. .	2	420	44	422	4	
Rabies .. .. .	..	..	..	..	..	
Relapsing Fever .. .. .	..	96	..	96	..	
Rheumatic Fever .. .. .	1	28	..	29	..	
Septicæmia .. .. .	..	3	1	3	..	
Trypanosomiasis (Sleeping Sickness)	..	27	3	27	..	
Small-Pox .. .. .	..	298	73	298	6	
Syphilis (a) Primary .. .. .	2	178	2	180	1	
(b) Secondary .. .. .	3	190	..	193	5	
(c) Inherited .. .. .	..	107	1	107	..	
Tetanus .. .. .	..	12	4	12	..	
Tuberculosis .. .. .	..	355	36	355	1	
Whooping Cough .. .. .	..	126	..	126	..	
Yaws .. .. .	1	531	1	532	..	
Yellow Fever .. .. .	..	3	1	3	..	
Pyrexia of unknown origin .. .. .	..	314	..	314	..	
Other Diseases .. .. .	1	321	5	322	1	
INTOXICATIONS.						
Alcoholism .. .. .	..	44	1	44	1	
Morphinism .. .. .	..	2	..	2	..	
Others .. .. .	..	2	..	2	..	
Anæmia .. .. .	1	250	1	251	..	
Anæmia—Pernicious .. .. .	..	2	..	2	..	
Diabetes .. .. .	..	7	..	7	..	
Exophthalmic Goitre .. .. .	..	5	..	5	..	
Gout .. .. .	..	3	..	3	..	
Leucocythæmia .. .. .	..	..	..	..	..	
Hodgkin's Disease .. .. .	..	1	..	1	..	
Myxœdema .. .. .	..	..	..	..	..	
Purpura .. .. .	..	..	..	..	..	
Ricketts .. .. .	..	6	..	6	..	
Scurvy .. .. .	..	12	..	12	..	
Rheumatism .. .. .	..	2,326	2	2,326	..	
Other Diseases .. .. .	3	336	1	339	2	

The form shows in the main the arrangement of diseases in the nomenclature of the Royal College of Physicians, 1896 Edition. To save space, the unimportant diseases of any class can be grouped in their places as "Other Diseases" of the class.

\* i.e., the year previous to that for which the Return is made.

† "Total cases treated" will, of course, include those remaining in Hospital at the end of the previous year.

‡ The figures in this column to be carried on to the next year's Return.

## RETURN OF DISEASES AND DEATHS (IN AND OUT-PATIENTS) FOR THE YEAR 1920.

Diseases.	Remaining in Hospital at end of 1919.	YEARLY TOTAL.		Total Cases Treated.	Remaining in Hospital at end of 1920.	Remarks.
		New Cases.	Deaths.			
LOCAL DISEASES.						
Diseases of the Nervous System :—						
Sub-Section 1.						
Neuritis .. .. .	..	108	1	108	1	
Meningitis .. .. .	..	19	2	19	..	
Myelitis .. .. .	..	..	..	..	..	
Hydrocephalus .. .. .	..	3	..	3	..	
Encephalitis .. .. .	..	..	..	..	..	
Abscess of Brain .. .. .	..	1	..	1	..	
Congestion of Brain .. .. .	..	5	..	5	..	
Other Diseases .. .. .	1	8	1	9	..	
Sub-Section 2.						
Apoplexy .. .. .	2	3	2	5	..	
Paralysis .. .. .	..	30	3	30	..	
Chorea .. .. .	..	3	..	3	..	
Epilepsy .. .. .	..	36	1	36	..	
Neuralgia .. .. .	..	355	1	355	..	
Hysteria .. .. .	1	28	..	29	..	
Other Diseases .. .. .	3	159	3	162	1	
Sub-section 3.						
Mental Diseases :—						
Idiocy .. .. .	1	2	..	3	..	
Mania .. .. .	1	5	1	6	..	
Melancholia .. .. .	..	1	..	1	..	
Dementia .. .. .	..	2	..	2	..	
Delusional Insanity .. .. .	..	1	..	1	..	
Diseases of the Eye :—						
Conjunctivitis .. .. .	3	2,088	..	2,091	1	
Keratitis .. .. .	..	51	..	51	..	
Ulceration of Cornea .. .. .	1	79	..	80	..	
Iritis .. .. .	..	104	..	104	..	
Optic Neuritis .. .. .	..	4	..	4	..	
Cataract .. .. .	2	98	..	100	..	
Other Diseases .. .. .	2	208	..	210	..	
Diseases of the Ear :—						
Inflammation .. .. .	..	501	..	501	..	
Other Diseases .. .. .	..	500	..	500	..	
Diseases of the Nose .. .. .	..	180	..	180	..	
Diseases of the Circulatory System :—						
Pericarditis .. .. .	..	13	3	13	..	
Endocarditis .. .. .	..	70	1	70	2	
Valvular Mitral .. .. .	..	93	7	93	..	
"  Aortic .. .. .	..	4	1	4	..	
"  Tricuspid .. .. .	..	..	..	..	..	
"  Pulmonary .. .. .	..	1	1	1	..	
Arterial Sclerosis .. .. .	..	3	..	3	..	
Aneurism .. .. .	..	18	2	18	2	
Other Diseases .. .. .	1	..	..	1	..	
Diseases of the Respiratory System :—						
Laryngitis .. .. .	1	144	..	145	..	
Bronchitis .. .. .	3	4,010	8	4,013	3	
Broncho-pneumonia .. .. .	..	737	7	737	2	
Abscess of Lung .. .. .	..	4	..	4	..	
Gangrene of Lung .. .. .	..	..	..	..	..	
Emphysema .. .. .	..	15	..	15	..	
Pleurisy .. .. .	5	285	2	290	..	
Empyema .. .. .	..	3	..	3	..	
Other Diseases .. .. .	..	216	1	216	1	
Diseases of the Digestive System :—						
Stomatitis .. .. .	..	269	1	269	1	
Caries of teeth .. .. .	..	1,096	..	1,096	..	
Glossitis .. .. .	..	5	..	5	..	
Sore Throat .. .. .	1	142	..	143	..	
Inflammation of Tonsils .. .. .	..	241	..	241	..	
Gastritis .. .. .	..	482	1	482	1	

## RETURN OF DISEASES AND DEATHS (IN AND OUT-PATIENTS) FOR THE YEAR 1920.

Diseases.	Remaining in Hospital at end of 1919.	YEARLY TOTAL.		Total Cases Treated.	Remaining in Hospital at end of 1920.	Remarks.
		New Cases.	Deaths.			
LOCAL DISEASES—(continued.)						
Ulceration of Stomach .. .. .	..	9	..	9	..	
Hæmatemesis .. .. .	..	4	..	4	..	
Dilatation of Stomach .. .. .	..	3	..	3	..	
Stricture of Stomach .. .. .	..	..	..	..	..	
Dyspepsia .. .. .	..	656	..	656	..	
Enteritis .. .. .	1	386	3	387	..	
Appendicitis .. .. .	..	38	1	38	..	
Colitis .. .. .	..	52	..	52	..	
Ulceration of Intestines .. .. .	..	7	2	7	..	
Sprue .. .. .	..	..	..	..	..	
Hernia .. .. .	6	279	4	285	4	
Diarrhoea .. .. .	1	1,279	5	1,280	2	
Constipation .. .. .	..	4,504	..	4,504	..	
Colic .. .. .	..	469	..	469	..	
Hæmorrhoids .. .. .	1	221	..	222	..	
Pancreatitis .. .. .	..	..	..	..	..	
Hepatitis—Acute .. .. .	..	135	1	135	..	
Abscess .. .. .	..	54	2	54	..	
Cirrhosis .. .. .	..	19	3	19	..	
Jaundice .. .. .	..	46	1	46	..	
Peritonitis .. .. .	1	18	6	19	..	
Ascites .. .. .	2	20	1	22	..	
Other Diseases .. .. .	3	234	1	237	..	
Diseases of the Lymphatic System—						
Splenitis .. .. .	..	86	..	86	..	
Inflammation of Lymphatic Gland .. .. .	1	271	1	272	4	
Suppuration of Lymphatic Gland .. .. .	..	136	..	136	..	
Lymphangitis .. .. .	..	29	1	29	..	
Elephantiasis .. .. .	..	31	..	31	..	
Other Diseases .. .. .	..	33	3	33	..	
Diseases of the Urinary System:—						
Acute Nephritis .. .. .	..	94	8	94	1	
Bright's Disease .. .. .	2	48	1	50	1	
Pyelitis .. .. .	..	1	..	1	..	
Calculus .. .. .	1	..	..	1	..	
Renal Colic .. .. .	..	4	..	4	..	
Cystitis .. .. .	1	125	2	126	..	
Vesical Calculus .. .. .	..	..	..	..	..	
Suppression .. .. .	..	9	1	9	..	
Hæmaturia .. .. .	1	21	..	22	..	
Chyluria .. .. .	..	..	..	..	..	
Other Diseases .. .. .	..	12	..	12	..	
Diseases of the Generative System—						
Male Organs:—						
Urethritis .. .. .	..	148	..	148	..	
Gleet .. .. .	..	35	..	35	..	
Stricture .. .. .	..	125	1	125	..	
Prostatitis .. .. .	..	13	..	13	..	
Soft chancre .. .. .	1	227	..	228	1	
Condyloma .. .. .	..	..	..	..	..	
Inflammation of Scrotum .. .. .	..	11	..	11	..	
Hydrocele .. .. .	..	58	1	58	..	
Orchitis .. .. .	1	273	4	274	1	
Epididymitis .. .. .	..	38	..	38	1	
Abscess of Testicle .. .. .	1	10	..	11	..	
Other Diseases .. .. .	6	301	1	307	1	
Female Organs:—						
Ovaritis .. .. .	..	11	..	11	..	
Ovarian Cyst .. .. .	..	1	..	1	..	
Endometritis .. .. .	1	165	..	166	..	
Displacement of Uterus .. .. .	..	8	..	8	..	
Vaginitis .. .. .	..	61	..	61	..	
Amenorrhœa .. .. .	..	80	..	80	..	
Dysmenorrhœa .. .. .	..	101	1	101	..	
Menorrhagia .. .. .	..	26	..	26	..	
Leucorrhœa .. .. .	..	7	..	7	..	

## RETURN OF DISEASES AND DEATHS (IN AND OUT-PATIENTS) FOR THE YEAR 1920.

Diseases.	Remaining in Hospital at end of 1919.	YEARLY TOTAL.		Total Cases Treated.	Remaining in Hospital at end of 1920.	Remarks.
		New Cases.	Deaths.			
<b>LOCAL DISEASES—(continued).</b>						
<b>Female Organs—(continued).</b>						
Abortion .. .. .	1	33	2	34	1	
Delayed Labour .. .. .	..	13	1	13	..	
Postpartem Hæmorrhage .. .. .	..	1	1	1	..	
Retained Placenta .. .. .	..	13	..	13	..	
Premature Birth .. .. .	..	7	..	7	..	
Puerperal Septicæmia .. .. .	..	3	..	3	..	
Mastitis .. .. .	1	38	..	39	..	
Abscess of Breast .. .. .	..	22	..	22	..	
Other Diseases .. .. .	4	61	1	65	..	
<b>Diseases of Organs of Locomotion:—</b>						
Osteitis .. .. .	4	199	..	203	1	
Arthritis .. .. .	1	495	..	496	..	
Spondylitis .. .. .	..	19	..	19	1	
Bursitis .. .. .	1	44	..	45	..	
Other Diseases .. .. .	2	138	2	140	1	
<b>Diseases of Connective Tissue—</b>						
Cellulitis .. .. .	5	448	1	453	1	
Abscess .. .. .	6	752	3	758	9	
Elephantiasis .. .. .	..	16	1	16	..	
<b>Diseases of the Skin—</b>						
Urticaria .. .. .	..	58	..	58	..	
Eczema .. .. .	..	449	..	449	..	
Boil .. .. .	..	478	..	478	..	
Carbuncle .. .. .	..	44	1	44	2	
Herpes .. .. .	1	27	..	28	..	
Psoriasis .. .. .	..	24	..	24	..	
Oriental Sore .. .. .	..	1	..	1	..	
Tinea .. .. .	..	701	..	701	..	
Scabies .. .. .	..	602	..	602	..	
Acne .. .. .	..	20	..	20	..	
Prickly Heat .. .. .	..	42	..	42	..	
Ulcers .. .. .	22	5,018	2	5,040	19	
Other Diseases .. .. .	3	671	3	674	1	
<b>Injuries—General .. .. .</b>						
Local .. .. .	3	264	21	267	8	
Surgical Operations .. .. .	35	7,491	33	7,526	36	
<b>Tumours .. .. .</b>						
Diseases undiagnosed .. .. .	..	178	4	178	..	Not included in totals.
Malformations .. .. .	..	1	..	1	..	
Poisons .. .. .	..	3	..	3	..	
<b>Parasitis—Animal .. .. .</b>						
Protozoa .. .. .	..	25	..	25	..	
Trematoda (Flukes) .. .. .	..	..	..	..	..	
Bilharzial .. .. .	1	55	..	56	..	
Other Diseases .. .. .	..	10	..	10	..	
<b>Cestoda—</b>						
Tænia Solium .. .. .	..	353	..	353	..	
Tænia Saginata .. .. .	..	268	..	268	..	
<b>Nematoda—</b>						
Ascaris .. .. .	..	313	..	313	..	
Tricocephalus Dispar .. .. .	..	50	..	50	..	
Trichina .. .. .	..	..	..	..	15	
Dracunculus .. .. .	7	710	..	717	..	
Filariasis .. .. .	..	94	..	94	..	
Steongylus .. .. .	..	..	..	..	..	
Ankylostomiasis .. .. .	..	127	4	127	1	
Oxyuris .. .. .	..	2	..	2	..	
Other Diseases .. .. .	..	10	..	10	..	
<b>Insecta—</b>						
Myiasis .. .. .	..	20	..	20	1	
Others .. .. .	..	341	..	341	..	
<b>Total. .. .. .</b>	<b>200</b>	<b>58,385</b>	<b>414</b>	<b>58,585</b>	<b>179</b>	



**APPENDIX.**

MEDICAL RESEARCH BRANCH.

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ACCRA LABORATORY REPORT

FOR THE YEAR

1920.

APPENDIX

MEDICAL RESEARCH BRANCH

LABORATORY REPORT

1950

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Hoc te rogo, ne demittas animum.

Cic.

Yau da gobe shi ya sa alura ginin rija

Hausa proverb.

## INTRODUCTION.

The work of the Laboratory at Accra was carried on throughout the year. The staff consisted of Dr. J. W. S. Macfie, the Pathologist, and Dr. A. Ingram. The former was absent from the Colony from the 17th of May until the 4th of November, during which time he was working with Mr. H. F. Carter at the Liverpool School of Tropical Medicine, in the department of Professor R. Newstead, in continuation of the investigation of the biting midges of the Gold Coast begun by Dr. Ingram and himself at Accra six months previously. The latter sailed for England on the 30th of November hoping to be able to carry on the work with Mr. Carter, and had not returned from leave at the end of the year.

In October the Secretary of State approved of the creation of a Medical Research Department in the Gold Coast with a staff which should consist ultimately of a Director and six Pathologists. Up to the end of the year none of the additional staff had been appointed and the Director was without assistance in the Laboratory. In December Dr. J. F. Corson was recommended for one of the posts of Pathologist, but owing to the fact that his appointment has not been officially confirmed, and because of the shortage in the ranks of the medical staff, he has not yet been permitted to undertake duty in the Laboratory. In anticipation of his appointment, and notwithstanding his manifold other duties, Dr. Corson, however, contrived to devote a part of his time to laboratory work, and made some interesting observations on clinical material obtained from the Cantonments, the Prison, and the Asylum, of which he was in medical charge.

Mr. F. W. Abbott, the European Laboratory Assistant, sailed from Liverpool on the 22nd of December, but did not reach the Gold Coast until the beginning of January. Mr. P. C. Paittoo, Junr. again did good work throughout the year, discharging the duties of clerk and laboratory attendant; and Mr. E. E. Bannerman assisted in the examinations of samples of water.

In accordance with the instructions of His Excellency, the Governor, the Annual Report of the Medical Research Department will be primarily a general survey of the work done in the laboratory or laboratories during the year. Scientific papers will not be included in it; but His Excellency directs that when there is any special matter to publish it should be published by the Gold Coast Government in pamphlet form. In this way it is hoped that in the course of years a valuable series of memoirs or bulletins may be published.

The present Report will therefore deal mainly with the routine work done at the Accra Laboratory. I think, however, that I should not be interpreting the instructions of His Excellency in the spirit in which they were given were I to restrict it too rigidly to the recording of the specimens received and the examinations carried out. At the end of the Report therefore will be found some brief notes on matters which it is hoped may be of interest, and some records of cases of medical importance. It has not been considered advisable to limit these notes absolutely to work done during the year 1920. Some records made in 1919, which for one reason or another were not completed until the following year, and others which although begun in 1920, were carried on into 1921 are included, but none made later than the 31st March 1921.

At the end of the Report will be found also a list of the papers published during the year by the staff of the Medical Research Department.

## ACKNOWLEDGEMENTS.

During the year we have received numerous donations of specimens, books for the library, etc., and gratefully take this opportunity of expressing our special thanks to Dr. D. Alexander, Dr. K. B. Allan, Dr. A. L. Anthony, Dr. J. B. Bate, Mr. C. Binding, Dr. L. H. Booth, Dr. A. S. Burgess, Dr. W. F. Campbell, Dr. J. F. Corson, Dr. D. Duff, Mrs. Finlay, Mr. E. G. Grey, Mr. J. Hutton, Dr. W. B. Johnson, Dr. G. E. H. Le Fanu, Dr. R. W. Macklin, Mr. H. S. Newlands, Major J. J. F. O'Shaughnessy, Mr. P. C. Paittoo, Junr., Mr. L. E. B. Pearse, Mr. T. Hansen Quao, Lt. Comm. Saxton, Dr. P. S. Selwyn-Clarke, Dr. J. R. C. Stephens, Dr. F. H. Storey, Dr. W. H. Tytler and Dr. W. G. Watt.

As in former years we are indebted to the Imperial Bureau of Entomology for the identification of very many specimens and for much assistance in our entomological work. In particular we have to thank the Director, Dr. G. A. K. Marshall, for the help which he has always given to us most liberally.

We have also to thank the staff of the Liverpool School of Tropical Medicine for much assistance, and especially Professor R. Newstead and Professor Warrington Yorke, who extended to us the hospitality of their laboratories. In working up some of our materials from the Gold Coast we had indeed the privilege of collaboration with Professor Yorke and Mr. H. F. Carter and we would wish to thank them most sincerely in this Report for all the time and trouble they expended on this work.

J. W. S. MACFIE,

*Director of Medical Research.*

22nd April, 1921.

(B).

### ROUTINE EXAMINATIONS.

#### (I)—EXAMINATIONS OF CLINICAL MATERIALS.

The following examinations were made of clinical materials submitted by Medical Officers and others, but mostly by the Senior Medical Officer and the Medical Officer at Accra (see Table I).

TABLE I.—EXAMINATIONS OF CLINICAL MATERIALS.

Nature of the examination.	Europeans.	Africans.	Totals.
Blood examinations .. .. .	193	117	310
Examinations of faeces .. .. .	45	135	180
Examinations of urine .. .. .	10	33	43
Examinations of sputum .. .. .	12	77	89
Miscellaneous examinations .. .. .	82	52	134
Totals ..	342	414	756

These figures do not, of course, include examinations, which were very numerous, made of cases under special investigation, nor materials examined for purely scientific purposes. They relate only to the specimens submitted to the pathologists in the ordinary routine manner.

With these should be mentioned sixty-two animals and slaughter house specimens examined mostly at the instance of the Hon. Secretary of the Accra Polo Club and the Superintending Sanitary Inspector, and a few exhibits in medico-legal cases submitted by the police.

#### BLOOD EXAMINATIONS.

The majority of the blood examinations were made in quest of malaria parasites. In many cases quinine had been taken before the blood films were made, and this probably accounts for the fact that in a large proportion of the cases (74 per cent. in Europeans) no malaria parasites were found. It may be noted that practically all the infections identified were due to *Plasmodium falciparum*, in fact no case of simple tertian malaria was encountered, and only one, in a native, of quartan. The frequent rarity of the malignant tertian parasites in the blood even in well defined cases, and the prevalence of the habit of taking quinine whenever feeling out of sorts, make the confirmation of a clinical diagnosis of malaria a difficult, or often impossible task. Little help is to be expected from a search for crescents subsequently as these forms are well known to be of rare occurrence in this part of Africa excepting in children.

Wassermann tests have been carried out regularly throughout the year, use being made of the products supplied by Messrs. Burroughs Wellcome and Co. which have been found to be satisfactory. Experience has proved that blood sent from a distance, even if only two or three days on the road, usually arrives in a condition quite unsuitable for any delicate test. In many

cases it becomes a thick, dark-coloured fluid resembling the dregs at the bottom of a coffee cup. For this test therefore serum should be sent and not whole blood; it should be removed from the original sample of blood, after clotting, with aseptic precautions, and sealed in a sterile tube.

#### EXAMINATIONS OF FAECES.

The examinations of faeces, most of which were carried out in cases of clinical dysentery and diarrhoea, revealed the presence of the usual parasites. The actual infections recorded are shown in the attached table (see Table II), but in many instances only one particular infection was looked for, so that the figures have no real value excepting as showing the types of intestinal parasites commonly met with at Accra.

TABLE II.—INTESTINAL PARASITES FOUND IN THE ROUTINE EXAMINATIONS OF SAMPLES OF FAECES.

Intestinal parasites.	Europeans.	Africans.
<i>Balantidium coli</i> .. .. .	—	1
<i>Blastocystis enterocola</i> .. .	—	4
<i>Entamoeba histolytica</i> .. .	3	24
<i>E. coli</i> .. .. .	3	19
<i>Giardia intestinalis</i> .. .. .	1	12
<i>Strongyloides stercoralis</i> .. .	—	6
<i>Tetramitus mesnili</i> .. .. .	—	3
<i>Trichomonas intestinalis</i> .. .	1	4
Worm eggs: <i>Ascaris</i> .. .. .	—	21
Hook-worm ( <i>Ankylostoma</i> or <i>Necator</i> ) .. .	—	23
<i>Oxyuris</i> .. .. .	—	1
<i>Taenia</i> .. .. .	1	4
<i>Trichuris</i> .. .. .	1	5

Diarrhoea and dysentery were prevalent in both Europeans and Africans towards the end of the year. It is probable that infections due to bacilli of the typhoid and dysentery groups are more common than is generally supposed, but as the subject is under investigation no definite statement will be made at present.

Another type of intestinal trouble which is being investigated is the spruce-like diarrhoea so common at times among the natives. In these cases the faeces are heavily charged with yeast-like cells belonging to various species of the Genus *Monilia*. Several species of *Monilia* have already been isolated from such cases and will be described later. Whether these fungi are a cause of the affection is disputed; their presence in vast numbers may be secondary, caused by the conditions attending the intestinal disorder favouring their growth and multiplication, but they certainly aggravate the discomfort of the patient by the fermentation which they set up.

#### EXAMINATIONS OF URINE.

Not a few of the samples of urine were from cases of vesical bilharziasis. During the year several favourable reports were received of the action of tartar emetic in the treatment of this disease. The introduction of this treatment, which we owe to the researches of Christopherson, for a disease previously considered well nigh incurable, marks another step in the advance of tropical medicine. Bilharziasis may not be the serious problem in the Gold Coast that it is in Egypt, but the disease is nevertheless prevalent in a somewhat mild form. As has been said elsewhere, the almost dramatic early effects of the treatment are in a sense one of its dangers, for on the disappearance of the symptoms, especially the haematuria, the patient is apt to think himself cured and to neglect to attend for the further treatment that is necessary to rid him finally of his infection.

Recently a number of observers have reported good results from the treatment of bilharziasis with emetin. This treatment has been tried in a few cases by Dr. Fraser and Dr. Corson and a brief note on their results will be found on pages 55-56.

## EXAMINATIONS OF SPUTUM.

The majority of the specimens of sputum examined were from cases suspected of being tuberculous. It is thought that one of the after-effects of the influenza epidemic has been an increase in the incidence of pulmonary tuberculosis, but the records at the laboratory do not furnish any data which can be adduced either in support of or in opposition to this assertion. In one or two cases, complicating pulmonary tuberculosis, bronchomoniliasis was observed. A full account of one of these cases, and of the fungus (*Monilia*) found in it, will be published later by Dr. Ingram and myself. The credit for identifying this case, the first of its kind to be recorded from West Africa, is due, however, entirely to Dr. Ingram.

## MISCELLANEOUS EXAMINATIONS.

Under this heading are grouped all sorts of examinations which cannot be included anywhere else, and which are not sufficiently numerous to be worthy of separate consideration. They were of the most varied and dissimilar kinds, and if we include with them the sixty-two examinations of animals referred to previously (which are not included in Table I), may be said to have ranged from a sarcoma of the human leg to a fowl suffering from roup.

The majority of the examinations require no special comment. Reference may, however, be made to the fact that several juxta-articular nodules, excised by Dr. Corson, were examined. The occurrence of this disease in the Gold Coast is perhaps not so widely known as it should be, and it is hoped that the investigation started by Dr. Corson at Accra may be continued, and the results reported when a larger number of observations have been made. It may be noted here, however, that up to the present no evidence has been obtained of the fungal infection believed by some authors to be the cause of the nodules.

Mention may be made also of a large ganglion, with a capacity of about 30 c.c. sent to us for examination by Dr. Mensa Annan. This specimen had been removed from the neighbourhood of the knee, a rather unusual situation, of an adult African man. The patient before the operation had a circular swelling over the proximal end of the fibula and the anterior aspect of the tibia which was about three and a half inches in diameter, its posterior border was lobulated, the skin was not affected, but walking was impeded.

Among the sixty-two specimens from animals were two or three collections of nematode worms (*Strongylidae*) obtained from horses and mules. These were examined recently by Professor Warring on Yorke and myself, and we found amongst them a new species and a new variety of the Genus *Cylicostomum* for which we have proposed the names *Cylicostomum tridentatum* and *Cylicostomum catinatum* var *litoraureum* respectively. A considerable number of other animals of various sorts were examined during the year and several interesting parasites were found in them, but as these were not submitted to us in the ordinary routine manner they will not be dealt with here.

## (II).—POST-MORTEM EXAMINATIONS.

One hundred and twelve post-mortem examinations were made during the year. The causes of death are shown in the following table (see Table III).

The large number of deaths attributable to diseases of the lung, especially broncho-pneumonia, is notable. Many of these cases were undoubtedly influenzal, and others were possibly due to the after-effects of this disease.

Many of the cases examined were of greater interest than the mere recital of the names of the disease which proved fatal can convey, and therefore, additional notes on one or two of them are given in the last section of this Report (see D. Clinical and Pathological notes, pp. 51 and 61). An account of one case, the death of a boy due to spontaneous rupture of the spleen, will be published later by Dr. Ingram. From the blood withdrawn from the heart of another case, in which death was due to a somewhat obscure condition, a fungus of the Genus *Nocardia* was cultivated. An account of this fungus has been drawn up by Dr. Ingram and myself and will be published as soon as we are able to fill in one or two gaps in the description which, for lack of the necessary reagents, we are at present unable to do here.

TABLE III.—POST-MORTEM EXAMINATIONS.

Cause of death.	Europeans.	Africans.	Cause of death.	Europeans.	Africans.
Aneurysm, Aortic ..	—	2	Morbus cordis ..	—	5
Bronchitis .. ..	—	1	Nephritis .. ..	—	6
Broncho-pneumonia ..	—	28	Pericarditis .. ..	—	2
Burns and Scalds ..	—	2	Peritonitis, general	—	1
Drowning .. ..	—	4	Pleurisy .. ..	—	2
Dysentery : Amoebic ..	1	3	Pneumonia : lobar	1	6
Do. bacillary ..	1	2	Do. septic	—	2
Ectopic gestation, ruptured .. ..	—	1	Scarcoma .. ..	—	1
Encephalitis lethargica	—	1	Small-pox .. ..	—	1
Endocarditis .. ..	—	1	Spleen, ruptured ..	—	1
Hanging .. ..	—	5	Tetanus .. ..	—	1
Hernia, strangulated ..	—	2	Tuberculosis: general	—	..
Injuries : gunshot ..	1	—	pulmonary	—	10
Do. accidents, etc.	1	8	Volvulus .. ..	—	1
Leucocythaemia ..	—	1	Yellow Fever ..	1	—
Liver : amoebic abscess	1	1			
Cirrhosis .. ..	—	2			
				7	105
			Total ..	112	

## (III).—EXAMINATIONS OF RATS.

Two hundred and ten rats, received from the Medical Officer of Health, Accra were examined. The numbers examined each month, and the species, are shown in Table IV,

The proportion of *Mus rattus* was 46.6 per cent. A few of the rats were examined for spirochaetes and *Leptospira* spp., the kidneys being removed and ground up with sterilised sand and saline solution and the filtrate examined by the dark ground method. No spirochaetes were found (see pp. 53-54.)

In the blood of one pouched rat (*Cricetomys gambianus*) haemogregarines were found. These interesting parasites have previously been described by J. Rodhain, but their life history does not appear to have been worked out.

At the request of the Senior Sanitary Officer (Dr. J. M. Dalziel) we carried out a few experiments on the effects of squill (*Scilla maritima*) on rats. Boulenger has reported very favourably on the use of this bulb as a rat poison in England, and it is said that the minimum lethal dose is half a grain. We found it impossible to make a powder out of the bulbs; when sliced and dried they remained glutinous. We therefore pounded up the bulbs with sand and water and administered the filtrate to the rats on bread. The filtrate was made of such a strength that 1 c.c. contained the materials extracted from 1 grain of the bulb.

Without going into details it may be stated briefly that we found that both *M. rattus* and *C. gambianus* were apparently unaffected by doses as large as ten grains. Larger measured doses were not tried. The rats ate the bread soaked in the scilla filtrate quite readily, indeed in a test experiment in which two pieces of bread were placed in the cage of a *M. rattus*, the one soaked in scilla extract and the other in weak eosin solution, the former was eaten before the latter was touched. As a final test pieces of the actual bulbs, each weighing about 100 grains, were placed in the cages of hungry rats: they were eaten by *C. gambianus* without ill effects, but were not touched apparently by *M. rattus*.

TABLE IV.—EXAMINATIONS OF RATS.

Species.	1920.												Totals.
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
<i>Mus rattus</i> ..	7	4	28	15	6	4	12	—	7	3	3	9	98
<i>Mus decumanus</i>	—	—	11	7	—	1	1	—	—	1	—	1	22
<i>Cricetomys gambianus</i> ..	6	15	18	11	5	8	3	—	9	2	6	7	90
Totals..	13	19	57	33	11	13	16	—	16	6	9	17	210

Paraform, which gives off formalin but is itself not irritating, was also tried as a rat poison and was given in bread to one *M. rattus* and one *C. gambianus* without causing any apparent ill effects. The dose given to the former animal was half a grain, followed next day by one grain, that to the latter one grain followed next day by two grains.

## (IV).—EXAMINATIONS OF MOSQUITOS AND THEIR LARVAE.

Seven hundred samples containing mosquito larvae, submitted for identification by the Medical Officer of Health, Accra, were examined during the year. The numbers of samples submitted each month, and the species of mosquito found in them, are shown in Table V. The small number of samples submitted during May was the result of an outbreak of small-pox.

It will be noted that as usual *Stegomyia fasciata* (*Aedes argenteus*) was far and away the commonest species in the samples, and that in this year it was found in 91·4 per cent. of the samples. It will also be noted that *Anopheles costalis*, the only known malaria mosquito in the list, was encountered only once. Several of the samples contained more than one species; the commonest association was that of *Culex fatigans* with *Stegomyia fasciata*.

TABLE V.—EXAMINATIONS OF SAMPLES OF MOSQUITO LARVAE.

Month of the year.	Number of samples examined.	Species of mosquito larvae found, and the number of samples in which they occurred.				
		<i>Stegomyia fasciata.</i>	<i>Culex fatigans.</i>	<i>Culex thalassius.</i>	<i>Culex decens.</i>	<i>Anopheles costalis.</i>
January .. ..	81	79	1	1	—	—
February .. ..	38	37	2	—	1	—
March .. .. .	102	93	10	1	—	—
April .. .. .	50	47	5	—	—	—
May .. .. .	2	2	—	—	—	—
June .. .. .	68	60	13	—	1	—
July .. .. .	79	69	14	1	—	—
August .. .. .	39	37	4	—	—	—
September .. ..	55	49	7	—	—	—
October .. .. .	61	57	4	—	—	—
November .. ..	86	74	13	—	—	1
December .. ..	39	36	5	—	—	—
Totals ..	700	640	78	3	2	1
Percentages ..		91·4	11·1	0·4	0·3	0·1

In addition to these samples a number of mosquito larvae were found in materials collected by the laboratory staff. These materials included 136 samples procured in connexion with the study of the early stages of West African mosquitos and of the Ceratopogonine midges of the Gold Coast, on which we were engaged.

For a few months, commencing at the end of November 1919, mosquitos collected alive in houses and offices in Accra were forwarded to us by the Sanitary Department. The identifications of the 607 specimens received, which were made by Dr. Ingram, are shown in Table VI.

TABLE VI.—ADULT MOSQUITOS COLLECTED IN HOUSES AND OFFICES IN ACCRA.

Species.	Month.							Total.	Percentage.
	1919.		1920						
	Nov.	Dec.	Jan.	Feb.	Mar.	April	Sept.		
<i>Anopheles costalis</i> , Theo.	1	17	13	2	24	27	1	85	14.0
<i>Stegomyia fasciata</i> , F. ..	18	22	14	8	21	4	9	96	15.8
<i>Ochlerotatus irritans</i> , Theo	1	4	2	—	1	—	—	8	1.3
<i>O. minutus</i> , Theo. ..	1	—	—	—	—	—	—	1	0.2
<i>O. punctothoracis</i> , Theo. ..	1	—	—	—	—	—	—	1	0.2
<i>Culex decens</i> , Theo. ..	5	2	1	—	1	—	—	9	1.5
<i>C. fatigans</i> , Wied. ..	14	62	114	122	61	4	11	388	63.9
<i>C. thalassius</i> , Theo. ..	1	1	3	—	3	—	—	8	1.3
<i>C. tritaeniorhynchus</i> , Giles	1	2	—	—	—	—	—	3	0.5
<i>Culciomyia nebulosa</i> , Theo.	1	—	1	—	—	—	—	2	0.3
<i>Mansonioides africanus</i> , Theo. .. ..	—	—	—	—	1	—	—	1	0.2
<i>Banksinella lineatopennis</i> , Ludl... ..	—	—	—	—	5	—	—	5	0.8

The method of collecting the mosquito was not supervised by us in any way, and no particular system was adhered to as regards the periodical inspection of a predetermined number of houses in each block of the town, etc., so that no close deductions can be made from the figures. The specimens were as a matter of fact procured mainly in order that any Anopheline mosquitos amongst them might be dissected and examined for malaria infections.

Any list of mosquitos collected in houses must be liable to chance variations of many different kinds. The presence of an undetected breeding place in the neighbourhood, for example, might entirely change not only the relative percentages of the different species found in the house, but also the actual species, and the draining of a swamp or the filling in of a pool might alter the character of the list over a whole section of a town.

In the list given in Table VI there is some indication of a change of the latter type in Accra. When in 1914-1915 I collected the mosquitos in my bungalow and the adjoining boy's house during eight consecutive months, by far the commonest species was *Mansonioides africanus* which formed 46.0 per cent. of the specimens taken. In the Table given above this species is one of the rarest, and forms only 0.2 per cent. of the specimens taken. It is not improbable that this change is to be attributed in part to the filling in of most of the pools at Christiansborg which used to be covered by the water weed *Pistia stratiotes*, the plant on the roots of which the larvae of *Mansonioides africanus* live, but mainly it is probably seasonal.

As emphasising once again the lack of correspondence between the mosquitos found in the houses and the larvae found in the compounds it is interesting to compare the data for the months of January to April 1920, given in Tables V and VI.

Three additions were made during the year to the list of mosquitos indigenous to Accra, namely *Banksinella lineatopennis*, Lud. *Culex perfidiosus*, Edw., and *C. rima*, Theo.; *Culex perfuscus*, Edw., or a variety of that species, was also collected so that the list now includes sixty-two species or well-recognised varieties. A new species of the genus *Stegomyia* was reared from material taken from rot holes in a tree (*Cynometra* sp.) at Oblogo, and a silk-cotton tree (*Eriodendron anfractuosum*) at Nsawam. For this species, Mr. Edwards proposes the name *S. dendrophila*.

## (V).—EXAMINATIONS OF WATER SAMPLES.

One hundred and thirty samples of water were submitted for bacteriological examination. The majority of these samples were from the Accra Water Works at Weshiang and the stand-pipes in Accra itself. The results of the examinations are included in the reports of the Senior Sanitary Officer, and do not require special discussion here.

(C).

## A LIST OF THE PAPERS PUBLISHED.

The following is a list of the papers published during the year by members of the Medical Research Department either alone or in collaboration with others.

- 1— The chaetotaxy of the pupa of *Stegomyia fasciata*.  
By J. W. S. Macfie.  
Bull. Ent. Res., X, pp. 161—169.
- 2— Three cases of filariasis in which intravenous injections of tartar emetic were given.  
By J. W. S. Macfie.  
Jour. Trop. Med. and Hyg., XXIII, pp. 36—38.
- 3— The occurrence of lateral-spined bilharzia eggs (*Schistosomum mansoni*) in urine.  
By J. W. S. Macfie.  
Jour. Trop. Med. and Hyg., XXIII, pp. 45—46.
- 4— Intravenous injections of tartar emetic in guinea-worm infections.  
By J. W. S. Macfie.  
Lancet, 1, pp. 654—655.
- 5— Xerophthalmia in a native of the Gold Coast.  
By J. W. S. Macfie.  
Annals of Trop. Med. and Parasitology, XIII, pp. 343—345.
- 6— An observation on the effect of malaria in leukaemia.  
By J. W. S. Macfie.  
Annals of Trop. Med. and Parasitology, XIII, pp. 347—349.
- 7— Heat and *Stegomyia fasciata*: short exposures to raised temperatures.  
By J. W. S. Macfie.  
Annals of Trop. Med. and Parasitology XIV, pp. 73—82.
- 8— I. Oral administration of quinine or quinine and arsenic for short periods to young native children infected with malignant tertian malaria.  
By J. W. S. Macfie and M. W. Fraser.  
Annals of Trop. Med. and Parasitology, XIV, pp. 83—91.
- 9— II. Oral administration of quinine sulphate grains 20 to adult natives infected with malignant tertian malaria.  
By J. W. S. Macfie.  
Annals of Trop. Med. and Parasitology XIV, pp. 93—94.
- 10— III. Oral administration of quinine sulphate grains 10 daily for two consecutive days only to native school-boys infected with malignant tertian malaria.  
By J. W. S. Macfie.  
Annals of Trop. Med. and Parasitology, XIV, pp. 95—109.
- 11— IV. Oral administration of quinine sulphate to natives infected with quartan and simple tertian malaria.  
By J. W. S. Macfie.  
Annals of Trop. Med. and Parasitology, XIV, pp. 111—114.
- 12— The early stages of West African mosquitos. V—*Culex decens*, Theo. and *Culex invidiosus*, Theo.  
By J. W. S. Macfie and A. Ingram.  
Bull. Ent. Res., XI, pp. 105—112.
- 13— Tartar emetic in guinea-worm infections.  
By J. W. S. Macfie.  
Annals of Trop. Med. and Parasitology, XIV, pp. 137—146.
- 14— Three cases of cardiac aneurysm in native boys of the Gold Coast.  
By J. W. S. Macfie and A. Ingram.  
Annals of Trop. Med. and Parasitology, XIV, pp. 147—152.
- 15— Strongylidae in horses. IX—*Cylicostomum tridentatum* sp. n.  
By W. Yorke and J. W. S. Macfie.

- Annals of Trop. Med. and Parasitology, XIV, pp. 153—157.
- 16— Strongylidae in horses. X—On the Genus *Poteriostomum*, Quiel.  
By W. Yorke and J. W. S. Macfie.  
Annals of Trop. Med. and Parasitology, XIV, pp. 159—163.
- 17— Strongylidae in horses. XI—Species found in West Africa and Jamaica.  
By W. Yorke and J. W. S. Macfie.  
Annals of Trop. Med. and Parasitology, XIV, pp. 165—167.
- 18— Strongylidae in horses. XII—*Cylindropharynx rhodesiensis* sp. n.  
By W. Yorke and J. W. S. Macfie.  
Annals of Trop. Med. and Parasitology, XIV, pp. 169—174.
- 19— Strongylidae in horses. XIII—*Cylicostomum triramosum* sp. n.  
By W. Yorke and J. W. S. Macfie.  
Annals of Trop. Med. and Parasitology, XIV, pp. 175—179.
- 20— Observations on the Ceratopogonine midges of the Gold Coast with descriptions of new species—Part I, Introduction.  
By H. F. Carter, A. Ingram, and J. W. S. Macfie.  
Annals of Trop. Med. and Parasitology, XIV, pp. 187—210.
- 21— Observations on the Ceratopogonine midges of the Gold Coast with description of new species—Part II, *Culicoides*.  
By H. F. Carter, A. Ingram and J. W. S. Macfie.  
Annals of Trop. Med. and Parasitology, XIV, pp. 211—274.

(D).

## CLINICAL AND PATHOLOGICAL NOTES.

SARCOMA OF THE THIGH WITH SECONDARY INFECTION  
OF THE LEFT PLEURAL CAVITY.

The following report, written by Dr. A. Ingram, describes an interesting case of sarcoma examined by him.

Adjuah, aged about 22 years, an African female, having died without a certified cause of death on the 4th November, 1920, a post-mortem examination was made on the 5th November about 24 hours after death by order of the Coroner, Accra.

The body was that of a well developed female and showed no signs of emaciation, it was identified by Mama Grunshi who gave the following history of the case. Deceased had had a swelling of the right thigh ever since she was a child, this swelling had appeared to increase and decrease at irregular intervals, it had not been painful. Latterly deceased had suffered from cough and three days previous to death had aborted.

A distinct but ill defined swelling was visible upon the front and inner aspect of the lower third of the right thigh. Upon dissection a rather soft and rounded tumour was found occupying the lower third of the right thigh, it appeared to originate from the periosteum of the femur to which it was attached, in size it was rather larger than a cricket ball but was oval rather than round in shape. No other abnormality was visible upon the body. Postmortem rigidity was absent from the limbs and neck.

No pathological lesion was found in the abdominal viscera. The Uterus was about the size of a coconut, it was not dissected. The Spleen was slightly enlarged, weighed 210 grms., but showed no secondary growth. The Kidneys and Liver showed venous engorgement most conspicuous in the former, no secondary growth could be found in these viscera. The Brain was not examined. The Heart and large blood vessels were normal in appearance.

The right Lung was hyperaemic and showed patches of broncho-pneumonia in all its lobes. The left pleural cavity was found to contain almost two quarts of amber coloured fluid, the left lung was completely collapsed. Upon the visceral pleura, the pleural surface of the diaphragm, and upon the parietal pleura—chiefly over the ribs—numerous rounded gelatinous looking growths were visible: these growths occurred in clusters like grapes and varied in size from that of a currant to that of a plum. The appearance of these growths suggested to one observer the appearance of a hydatidiform mole. None of the lymphatic glands in the groin, pelvis or mediastinum showed enlargement. Sections of the primary growth of the right femur and of the growths in the left pleural cavity showed both to be of a similar nature, namely a mixed round and spindle celled sarcoma.

The immediate cause of death in this case was probably the broncho-pneumonia of the right Lung, the left Lung being thrown out of action by the accumulation of fluid in the left Pleural Cavity and the action of the Heart being impeded by this also.

### ANOPHELINE MOSQUITOS AND MALARIAL INFECTIONS AT ACCRA.

From May 1919 to April 1920 Dr. Ingram and I examined for malarial infections all the Anopheline mosquitos we could procure. The proof of infection we took to be the presence of sporozoites in the salivary glands. Throughout the period the mean temperature and humidity were favourable for the development of malaria parasites in the mosquitos (see Table VII).

TABLE VII.—MEAN TEMPERATURE AND HUMIDITY RECORDS FOR ACCRA  
MAY, 1919 TO APRIL, 1920.

Month.	Mean temperature.	Mean humidity.
May, 1919 .. .. .	75·9° F	63·1
June .. .. .	75·2	88·2
July .. .. .	73·3	84·9
August .. .. .	77·1	88·0
September .. .. .	79·1	85·9
October .. .. .	79·5	83·9
November .. .. .	79·5	80·7
December .. .. .	79·0	85·4
January, 1920 .. .. .	80·4	91·1
February .. .. .	81·3	87·1
March .. .. .	84·7	81·4
April .. .. .	84·7	81·2

Altogether we obtained 432 specimens, and of these we dissected 231. The 201 other specimens were mostly males, but a few were females which for one reason or another we were unable to dissect. In Table VIII are shown the numbers of Anopheline mosquitos dissected each month. All the specimens collected from November 1919 to April 1920 were obtained from houses in the town; those collected in the earlier months were obtained from Bungalow A.10.

TABLE VIII.—DISSECTIONS OF ANOPHELES MOSQUITOS AT ACCRA.

Species.	Month.												Totals.
	1919. May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	1920. Jan.	Feb.	Mar.	Apr.	
<i>Anopheles costalis</i> , Theo. ..	69	71	15	8	—	—	2	18	12	2	21	9	227
<i>A. funestus</i> , Giles. ..	—	—	—	—	1	—	—	—	—	—	—	—	1
<i>A. pharoensis</i> , Theo. ..	—	2	1	—	—	—	—	—	—	—	—	—	3
Totals ..	69	73	16	8	1	—	2	18	12	2	21	9	231

Of the 432 specimens collected, 428 were *Anopheles costalis*, three *A. pharoensis*, and one *A. funestus*. Of the 231 specimens dissected only one was found to have sporozoites in its salivary glands: this was a specimen of *A. costalis* taken in June 1919 in Bungalow A.10.

This result, and the well-known prevalence of malaria in Accra, are difficult to reconcile, and it may be of use to record here briefly the data so far as they are at present worked out.

Two cardinal factors are considered to be necessary for the spread of malaria, (A) the parasite in the vertebrate host, and (B) the insect capable of transmitting the disease. So far as is known the vertebrate host is always a human being, and the insect transmitter an Anopheline mosquito.

<sup>b</sup> As regards (A), the parasite in the vertebrate host:—

<sup>1</sup> I. Malaria is very common in Accra. Some examinations made in 1919 showed that of 22 adults, inmates of the Asylum, 37.5 per cent. were infected, and that among apparently healthy school-boys 27.9 per cent. of those of 15 to 18 years, 56.3 per cent. of those of 9 to 14 years, and 75.8 per cent. of those of 5 to 8 years were infected. These figures relate to only a single blood examination and are therefore minimal.

<sup>2</sup> II. Malignant tertian malaria is the common type. Of the infections referred to above 5 per cent. were malignant tertian.

<sup>3</sup> III. The stage of the malignant tertian parasite infective to mosquitos, the crescents, is singularly uncommon. In the infections referred to above crescents were found in only 5 per cent. of the malignant tertian cases.

<sup>4</sup> As regards (B), the insect capable of transmitting the disease:—

<sup>4</sup> IV. Mosquitos do not appear normally to be very common in Accra. In eight consecutive months one year I was only able to collect 280 in my bungalow and the boys' house adjoining.

<sup>5</sup> V. Of the mosquitos found Anophelines form only a small proportion. Of the 607 mosquitos collected in houses and offices in Accra, 1919-1920 (See Table VI) only 14 per cent. were Anophelines. Of the samples of larvae received from the Medical Officer of Health, Accra, from 1912 to 1915 only 1.6 per cent. contained larvae of Anophelines.

<sup>6</sup> VI. Of the Anophelines that are found nearly all are *Anopheles costalis*. From May 1919 to April 1920 we collected 432 Anophelines, of these 99 per cent. were *A. costalis*.

<sup>7</sup> VII. Of the *A. costalis* very few appear to be infective with malaria. From May 1919 to April 1920 we dissected 227 females; only one was infective, that is 0.4 per cent.

<sup>8</sup> From the data given in III to VII it might have been anticipated that malaria would be rare in Accra; that this is not the case is shown in I. How these apparently inconsistent facts may be reconciled is not certainly known, although plausible explanations are not difficult to devise. It would appear, however, that the position in Accra is an unfavourable one for the spread of the malaria parasites, and that a very little more might perhaps turn the scale definitely against it.<sup>8</sup>

#### EXAMINATIONS OF RATS FOR SPIROCHAETES.

Leger and Certain, in 1917, searched in vain for the organism of icterohaemorrhagic jaundice (*Leptospira icterohaemorrhagiae*) in rats at Dakar. Their lack of success was thought to be attributable perhaps to a seasonal influence, and Noc, who later (1919-1920) repeated the examination, stated that "le virus ictéro-hémorragique, bien que faible et disséminé, existe chez les rats de la ville de Dakar, tout au moins de novembre à avril."

In 1917-1918 Dr. Ingram examined a number of rats at Accra for spirochaetes other than intestinal species and especially *Leptospira icterohaemorrhagiae*, and failed to find any.

Recently (December 1920 to March 1921) a further examination has been made at Accra, the technique employed being as follows. The kidneys of the rats were removed and ground up with sterilised sand and normal saline solution, the resulting fluid filtered, and the filtrate examined with a dark-ground illumination apparatus.

*See also  
+ notes  
on p.  
230  
ms*

Forty-four rats were examined in this manner, namely, thirty-two *Mus rattus*, and twelve *Cricetomys gambianus*. In no case were spirochaetes detected. The result therefore confirmed the previous observation of Dr. Ingram.

All the rats were supplied by the Medical Officer of Health, Accra, to whom we are much indebted for procuring them for us. As opportunity occurs further rats will be examined, and if of sufficient interest the results will be reported later. It is a matter of some importance to determine if these animals harbour such spirochaetes, an almost constant proportion of rats in other parts of the world being infected with *Leptospira icterohaemorrhagiae*. Observations made on rats in other parts of the Colony, and on other species of rats in addition to those referred to above, would be valuable; especially in view of the fact that there is a close similarity between *L. icterohaemorrhagiae*, the virus of infective jaundice, and *L. icteroides*, the organism which Noguchi believes to be the virus of yellow fever.

### GONORRHOEAL INFECTIONS IN APPARENTLY HEALTHY AFRICANS.

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It not infrequently happens that Medical Officers and Pathologists are called upon in cases of alleged rape, etc., to give evidence in Court with regard to the results of their examinations of the parties concerned for gonorrhoeal infections. I do not know what importance the legal authorities attach to such evidence, but the fact that it is called for and that it is laid before the jury in such a way as to be capable of influencing their verdict, indicates that it is considered to be not without weight. From the medical point of view, the value of such evidence must depend on the percentage of the apparently healthy normal population in which evidence of gonorrhoeal infection can be detected. So far as I am aware no data on this point are available, and I have long thought that an investigation of this question should be undertaken in the interests of justice and in vindication of the value of medical evidence.

In 1919 Dr. M. W. Fraser started such an investigation at the Accra jail but unfortunately it had to be abandoned before it had proceeded beyond the preliminary stages. The actual data collected have been lost, but Dr. Fraser informs me that he found about 15 per cent. of the prisoners to be infected with gonorrhoea on admission.

Dr. J. F. Corson has recently taken up the same line of investigation and once again the observations have had to be suspended owing to the intervention of other duties. Dr. Corson, however, has handed to me a copy of the data collected by him and permits me to quote from them in this Report.

The persons examined were 144 male prisoners, consecutive admissions to the Accra jail from the 24th December, 1920 to the 3rd March, 1921. From 43 of these men it was possible to obtain, without special means, smears of discharge from the urethra; twenty-eight showed a definitely purulent discharge, and fifteen a sero-purulent or scanty one. On examination fifteen of these smears revealed the presence of the virus of gonorrhoea (*Micrococcus gonorrhoeae*) that is 10.4 per cent. of the male prisoners admitted to the Accra jail during the period mentioned were found to be suffering from gonorrhoea.

In stating these facts it is necessary to explain that the figures are for several reasons minimal. Those prisoners only were examined who showed more or less obvious discharge, no precautions were taken to prevent previous clearing of the urethra by micturition, etc., and only a single smear was examined from each man. No thorough examination was made to determine that the subjects were free from gonorrhoea, and free from the risk of imparting the disease to others, such as is undertaken in the so-called "marriage test" carried out in the clinics of certain European hospitals.

It is clear therefore that a very considerable proportion of apparently healthy African males in the Gold Coast is infected with gonorrhoea. No data are at present available with regard to the women. The investigations of Dr. Fraser and Dr. Corson, frankly tentative and incomplete as they are, are nevertheless sufficient to prove, I think, the necessity for a more detailed enquiry into this important matter.

## THE EMETIN TREATMENT OF BILHARZIASIS.

See Erian

Recently several authors have claimed to have cured bilharzial infections, both vesical and rectal, by the administration of emetin hydrochloride. To mention only two, Erian (Practitioner, November 1919, pp. 391-393) treated a number of vesical cases and appears to have had fifty recoveries and no failures, and Bonne (Trans. Soc. Trop. Med. and Hyg. 1919, pp. 82-84) treated a series of twenty-two rectal cases and concluded that the drug certainly had a beneficial influence.

The treatment, if efficacious, would commend itself to many medical practitioners in the tropics, notwithstanding its high cost, because it would not be attended by the risks inseparable from injections of tartar emetic, and because it could be given subcutaneously or into a muscle instead of into a vein.

Up to the present no systematic attempt has been made to test this treatment in the Gold Coast, but Dr. M. W. Fraser and Dr. J. F. Corson have both given it a trial in bilharzial haematuria in Africans. Both these observers failed to obtain the good results anticipated from the reports of Erian, and others, and it may therefore be as well to give details here of two cases.

The following is the history of one of Dr. Fraser's cases. The patient was an African, a native of Big Addah, about 35 years of age. He stated that he had passed blood in his urine for about ten years, and with his faeces for about three months. The quantity of blood passed was always about the same, and he was not conscious of any ill effect produced by it on his general health. The urine on examination was found to be tinged with blood, but not deeply, and to contain many living eggs of *Schistosoma haematobium*. The treatment administered and the changes observed in the urine may be summarised in tabular form as follows:—

Date 1921.	Treatment given.	Condition of the urine.
Feb. 1	Emetin hyd. $\frac{1}{2}$ grain (subcutaneous) .. ..	Urine blood stained : many living eggs:
2	" "	Urine unchanged.
3	" "	"
4	" "	"
7	" "	"
8	" "	"
9	" "	"
10	" 1 grain ..	"
11	" "	"
14	" "	"
15	" "	"
16	" "	"
17	Tartar Emetic, 1 grain .. (intravenous)	"
18	" "	"
19	" "	"
21	" "	"
22	" "	Urine free from blood : few eggs.
23	" "	"
24	" "	"
25	" "	Urine clear : eggs seen apparently dead.

In this case therefore emetin, in the doses given, failed to arrest an old-standing bilharzial haematuria which subsequently improved rapidly when tartar emetic was administered.

Dr. Corson's case was an adult African man, a Grunshi, who stated that he had passed blood with his urine for six years. The urine at the commencement of treatment was darkish red in colour, and contained numerous living eggs of *S. haematobium*. The treatment administered and the changes observed in the urine may be summarised in tabular form as follows:—

Date 1921.	Treatment given.	Condition of urine.
May 7	Mistura Pot. Cit. & Tr. Hyos	Urine darkish red : numerous living eggs.
8	"	"
9	"	Urine clearer
10	Emetin hyd. 1 grain .. (subcutaneous)	Urine light red.
11	"	"
12	"	"
13	"	"
14	"	"
15	"	" numerous living eggs.
16	Tatar Emetic, 1 grain .. (intravenous)	"
17	"	Urine clearer : living eggs present.
18	"	" redder : numerous living eggs.
19	Patient went away ..	

The short course of emetin treatment given in this case failed to check the haematuria. The patient was not under observation sufficiently long after the antimony treatment was started for results to be discernible. The initial treatment with a diuretic mixture was given to see if this treatment alone would have any effect on the haematuria.

In these two cases, and in several others treated by Dr. Fraser but not described here in detail, treatment with emetin failed to arrest haematuria due to bilharzial infections. The doses given were not very large, and it should be clearly stated that they were much smaller than those recommended by Erian. For the information of anyone who may be inclined to give this treatment a trial, and who has not at hand recent literature, it may be convenient if the doses used by this observer are stated. Quoting then from the review of his paper in the Tropical Diseases Bulletin (Vol. 15, p. 221), the dosage adopted would appear to vary but that given in the case quoted is 0.18 gm. (2.8 grains) rising to 0.2 gm. (3.1 grains) at intervals of four or five days. A second case received nine intramuscular injections in ten days starting with a dose of 0.1 gm. (1.5 grains) and increasing up to 0.14 gm. (2.2 grains).

#### A REMARKABLE CASE OF APPENDICITIS.

The busy medical practitioner too often lacks the time to recount his experiences, and valuable observations, which would be of assistance or interest to others, are thus left unrecorded and may be eventually lost. He requires in fact a chronicler, and it is in this capacity that I give the following brief account of a remarkable case of appendicitis reported by Dr. C. V. Le Fanu

The history of the case, as furnished by Dr. Le Fanu, was as follows. " Early in November, 1919, I was requested by cable from Freetown to prepare for the admission into hospital at Sekondi of a female European patient. She had sailed from Liverpool in excellent health ten days previously accompanied by her husband, who was in business in the Gold Coast Colony. A month before her departure she had an early abortion, but from this she made a good and rapid recovery, and on examination a few days before sailing, was passed by her medical attendant as perfectly fit. On the fourth day out from Liverpool she suffered violent abdominal pain accompanied by vomiting. This continued for three days when, with the onset of menstruation, the symptoms slowly abated. On landing at Sekondi there was pain in the abdomen, mainly in the right lower half, with rigidity of the abdominal muscles; fulness and very definite resistance and dulness to percussion on the right side from the level of the umbilicus downwards and across the middle line to the other side. The point of maximum tenderness was over the ileo caecal valve and here also there was slight, but definite swelling. The temperature was raised to 101°F and the pulse to 90 and over. Examination *per vaginam* pointed to trouble in the region of the appendix, the uterus and adnexa being apparently normal. The motions were examined carefully and on the fifth day after admission into hospital, in a normal semi-formed milky motion, the patient passed a long finger-like body, evidently the vermiform appendix.

It was complete with its mesentery, which latter showed at its base a gangrenous line of separation. There was no blood, and apparently no pus in the stool, but the next day a few small shreds were noticed mixed with the faeces and there was also present a good deal of mucus. The fever continued for a fortnight, when the temperature fell to normal with gradual clearing up of the other symptoms."

The specimen passed in the faeces was sent to me for examination. It was a long tubular structure, closed at one end and open at the other, resembling exactly a vermiform appendix. Its length was about three and a half inches, and its maximum breadth, when flattened a little over half an inch. Its open end was the broader and appeared to be the base, the other end was smaller and rounded. Along one border was attached a somewhat thickened membrane containing what appeared to be thrombosed blood vessels; this membrane did not reach to either end of the specimen, being attached a little below the blunt apex and fraying out basally. The external surface was ragged; the inner surface was dark coloured and partly covered by blackish flakes. The wall of the tube was thin, and at one point, about one and a quarter inches above the base, was torn, but the condition of the specimen was such that it was not possible to say if this tear was due to ulceration and perforation or to some other cause. Sections showed that the cellular elements had almost entirely disappeared, but the arrangement of the muscular layers, which could still be made out, and the general appearance was similar to that seen in an appendix after the complete disintegration of the mucus lining, and the conclusion was formed that the body was indeed the appendix.

That this was in fact the nature of the specimen subsequently received confirmation in the following manner. The patient had been invalided, and on her return to England underwent a laparotomy. The pelvic coils of the bowel were found matted together. There was no collection of pus anywhere and no appendix could be found, but on the posterior surface of the rectum was noticed a healed scar. Apparently localised ulceration of the rectum had taken place, and the appendix, separated from its anchorage to the caecum by a process of local gangrene, had escaped through the resulting opening. The after-history was uneventful. The patient made a good recovery and is now again in the enjoyment of excellent health.

#### AN OCCURRENCE SIMULATING HAEMATURIA.

Few symptoms cause so much anxiety to a patient in West Africa as those which seem to indicate that he is passing blood in his urine, for it is well-known that in blackwater fever something of this sort is the outstanding feature, and the non-professional man does not distinguish between haemoglobinuria and haematuria. This fact recently led to a case being brought to my notice which was the first of its kind that I have encountered here, but as similar cases might occur not infrequently a brief account of it may be of interest.

On the 11th of June, 1919, a specimen of urine, brought by a patient, was sent to me by the Medical Officer in charge of the Native Hospital at Accra with the request that I should examine it for blood. The specimen was pink coloured and looked exactly as if it contained a small quantity of blood. It was not fluorescent. The urine was alkaline, specific gravity 1.010, neither albumen, sugar, nor pus present, chemical tests and spectroscopic examination negative as regards blood, and there was no deposit. Bacteria were present and were very numerous. By cultivation *Bacillus coli* and *Staphylococcus aureus* were isolated, but no chromogenic organism producing a red colour.

The patient, a well educated, highly intelligent African, aged 65 years, stated that his urine had assumed a pink colour daily since the 8th of June. He felt well, but was alarmed by what he thought must be the blood in his urine. So far as could be ascertained there was nothing in his diet to account for the condition, but it transpired that he was troubled with constipation and had been taking a proprietary laxative medicine from the 7th of June, the day before he first observed the red colouration of his urine.

This suggested the explanation of the condition, for many proprietary purgatives and laxatives contain phenolphthalein which, if it passed through the kidneys, would produce a red or pink colouration of the urine as soon as its reaction changed from acid to alkaline, a change which under tropical conditions takes place rapidly after the urine is passed.

A tablet of the medicine was obtained from the patient and was powdered, mixed with water, and filtered. The filtrate was colourless but on the addition of ammonia changed to a brilliant red exactly resembling the colour produced by phenolphthalein in alkaline solutions.

Not being a chemist I am unable to say that the medicine actually contained phenolphthalein, but it did contain some such substance which, passing through the kidneys, gave the urine a pink colour as soon as ammoniacal changes began to take place. At any rate, when the patient stopped taking the medicine his urine ceased to turn red, and some healthy adults to whom phenolphthalein was given as a purgative subsequently passed urine similar to that passed by the patient which turned a reddish colour when allowed to stand and undergo the natural process of ammoniacal decomposition.

*See Editor*

## DENGUE AND DENGUE-LIKE FEVERS.

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From time to time cases of dengue, or of dengue-like fevers, are reported in West Africa. The details of a number of such cases were furnished to the Yellow Fever Commission (West Africa) and are recorded in the reports issued by it, but up to the time when the Fourth and Final Report was issued (1916) no definite conclusion had been arrived at with regard to them. The Commission in this Final Report (p. 10) summed up the position as follows: "There has certainly been no epidemic of Dengue Fever on the West Coast during the period covered by the work of the Commission, and in the absence of such a clear indication of the presence of that disease it is advisable to speak with some reserve as to the nature of the cases which have presented signs suggesting such a diagnosis," and concluded (p. 25) that the presence of dengue in the West African Colonies "cannot be held to have been proved."

Similar cases of dengue-like fever, whatever their true nature may eventually prove to be, continue to occur in West Africa and occasion not a little difficulty in diagnosis. Some of them are reported in full, others are only heard of casually, and probably the majority are completely unrecorded, so that little or no progress is made towards their elucidation. In the Gold Coast several such cases are known to have occurred during the last few years, and it is with the object of drawing attention to them that this note is included in this Report. The cases to which I refer were reported by Dr. C. V. Le Fanu (1917) six cases, Dr. F. H. Storey (1919) two cases, Dr. R. O. White (1919) two cases, Dr. G. E. H. Le Fanu (1920) one case, and Dr. J. F. Corson (1920 and 1918) two cases; thirteen cases in all, all in Europeans.

Dr. Storey's cases, two adult European men, occurred at Koforidua in August 1919. Details unfortunately are not forthcoming, but at the time Dr. Storey wrote with regard to one of them that the chief symptoms were "a profuse measly rash from head to foot excepting on palms and soles; not so profuse, but distinct, on face. Temperature 101°F. Injection and running of eyes, coryza. Some joint pains, not severe, and occasional severe muscle pains." Dr. White's two cases, both adult European men, occurred at Accra in November 1919. The symptoms in each case were fever, not relieved by quinine, severe headache and pain behind the eyes, severe pains in the limbs and back, red congested throat, and an erythematous rash. Malaria parasites were not found in the blood of these patients. Dr. Corson's cases, both adult European men, occurred at Cantonments, on the outskirts of Accra, and at Kumasi respectively. Full details of these cases will be published later but for the present I am permitted to give the following brief summary of the symptoms. In the Accra case the onset was characterised by pains in the back and limbs. There was a general eruption of very small macules and bright red points especially well marked on the front of the chest and abdomen. The posterior wall of the pharynx was red and congested in patches. The glands in the axilla and at the back of the neck were slightly enlarged and tender. The temperature was in the neighbourhood of 103°F. on the first two days, fell gradually to normal during the next two days, rose again to nearly 102°F. on the fifth and sixth days, and then came down slowly. Malaria parasites were not found in the blood at any stage of the illness. In the Kumasi case the onset was sudden and accompanied by pains in the knees and back. A rash similar to that described above developed next day and lasted about five days. There was no secondary rise of temperature, and no desquamation.

The cases observed by Dr. C. V. Le Fanu and Dr. G. E. H. Le Fanu have been described in official reports which, by courtesy of the Acting Principal Medical Officer, I am permitted to reproduce here:—

## NOTES ON A SERIES OF CASES OF DENGUE FEVER.

Report by Dr. C. V. Le Fanu, dated, Accra, 5th December, 1917.

During the last three months I have had a series of cases under my treatment which, in their clinical aspects, bear a distinct resemblance to "Dengue fever."

I have hesitated to publish my diagnosis until now, as the earlier cases were extraordinarily mild and presented no feature sufficiently definite to justify me in declaring the prevalence of a disease, which is not commonly known in this Colony.

I have knowledge only of two other cases resembling dengue. One occurred in Accra about four years ago (Mrs. H.); the other in the Northern Territories (*vide* notes on Dr. Ievers' case, June 1913).

All my patients were male adult Europeans with the exception of the last, (No. 6), and that was a European lady. It may be noted that all the six cases occurred in the valley between the East and West Ridge, *i.e.* along the line of the prevailing wind. The notes of the cases are as follows.

1—S., Co-operative Wholesale Society. Last Bungalow on Dodowah road beyond 89. 25-9-17. Pyrexia, not exceeding 100.5°F., for two days. A roseolar rash on face, trunk, and extremities. Puffiness of face, particularly eyelids. No joint or muscle pains. Urine normal. No malaria parasites. Duration about five days.

2—G., Tarquah Trading Co. Bungalow near laboratory. 26-9-17. Malaise followed by rather high fever lasting four days. Scanty roseolar rash on trunk and extremities. Eyes congested, headache after temperature had become normal, pains in loins and shoulder joints. Urine normal. No malaria parasites. Duration ten days.

3—P.S.S. Bungalow 51. 2-11-17. Malaise and severe prostration for three days. Then sudden profuse rash on trunk and extremities. No pyrexia. Headache, but not very severe. Aching of muscles of lower extremities. Duration about seven days.

4—J.A.B. Bungalow 85. 15-11-17. Malaise soon followed by appearance of profuse rash lasting three days; slight pyrexia. An intermission of two days and then muscular aching, pains in loins, congestion of eyes and *very* severe headache. Slight fever. No malaria parasites. Duration eight days.

5—J. H. O'C. Bungalow 86. Malaise dating from 22nd November 1917. Rash appeared on 24th on forearms. Seen on 28th. Slight pyrexia. Profuse rash on face, trunk, and extremities which practically disappeared by 1-12-17. On 2nd reported with severe loin pain, headache, congestion of eyes. Temperature slightly raised that evening. Admitted hospital. Urine normal. No malaria parasites. Duration twelve days.

6—X. Government House. Had been visiting bungalow 51 on or about 21st November 1917. About the same day bitten by a mosquito on left forearm, an angry red mark still visible ten days later (bruises easily). On 23rd felt faint and from then on complained of malaise. Rash appeared on 28th. On 29th temperature 99°F., pulse 80. A discrete roseolar rash on trunk, most pronounced on back and extremities. A patchy irregular erythema on both cheeks. Eyes very congested; lower eyelids puffy. General discomfort; aching in muscles of lower extremities and pain in ankle and knee joints. Headache, but not excessive. Tongue slightly coated. Throat normal. Urine normal. No malaria parasites. On 30th rash fading. Muscular aching increased; pain on pressure over tibiae. An irregular pink erythema from knees to ankles. 3-12-17: rash practically disappeared. Appearance of face normal. General improvement, but muscular pains persist. Duration twelve days.

## B.

## DENGUE FEVER AT SALTPOND.

Report by Dr. G. E. H. Le Fanu on the case of Mr. D., dated the 16th February, 1920.

January 19th 1920. Mr. D., European Assistant at the Commonwealth Trust, Ltd., Saltpond, was seen at 9 a.m. He stated that on Saturday the 17th he felt very tired, which he attributed to a dinner party the evening before. The next day, Sunday, he says he felt quite well, played a game of tennis in the evening, and went to bed feeling perfectly well. He slept well, but woke up with a headache this morning. Mr. W., the Agent who called me in, said he particularly noticed that Mr. D. looked very ill when he came in to lunch on the Sunday. It seems likely, therefore, that Mr. D. had been ill two days before I saw him. When seen, he complained of frontal headache across the region of the eyebrows, and of pain in the eyes with photophobia. His skin was cool, the pulse was over 100. He looked well enough and remarkably cheerful. Tongue was broad and flat with a creamy coating at the back. No epigastric pain. He had taken nine grains of quinine hydrochloride that morning and took another six grains at 10 a.m. 3 p.m. : pain in eyes ; skin hot and clammy ; pulse 96 ; phenacetin ten grains. 4.30 p.m. T. 102.8°F., P. 96 ; occasional twitching, pain in eyes and severe lumbar pain ; sweating freely. 9 p.m. : T. 101.6°F., P 80, to 88, irregular and full ; pain in left eye ; headache persists ; epigastric pain just below the end of the sternum ; skin moist.

January 20th 6.30 a.m. : T. 100.4°F., P. 80 to 82 : headache as before ; lumbar pain gone ; urine copious, dark straw coloured, 1,018, clear, acid, no albumen. 9.30 a.m. : T. 100.2°F., P.76 ; fluid diet. 1 p.m. T. 100°F., P. 78. 2.15 p.m. : T. 100.2°F., P.78 ; has been reading with comfort most of the morning ; urine ten ounces, clear, strongly acid, faint trace of albumen ; to take an alkaline diuretic mixture containing small doses of Bismuth Carb. 5.30 p.m." T. 99.8°F., P. 66 to 68, full and regular. 9 p.m. : T. 100.2°F., P. 75 ; neuralgic pain " shooting : down right arm.

January 21st 6.30 a.m. : T. 102.4°F., P. 88 ; urine copious, clear, 1,022, very acid, trace of albumen opacity. 9 a.m. : T. 102.8°F., P. 92 to 96 ; tongue slight creamy coating ; frontal headache and aching eyes 12 noon : T. 102.8°F., P. 96 ; headache and photophobia ; epigastric pain. 2 p.m. : T. 102.8°F., P. 96 ; headache as before. 6 p.m. : T. 103.2°F., P 100 ; condition as before ; vomited after taking milk and egg, the vomit containing curdled milk and egg, no bile or blood. 9 p.m. : T. 102.4°F., P. 96 ; condition unchanged ; phenacetin ten grains.

January 22nd 6.30 a.m. : T. 101°F., P. 82 ; headache has passed off during sleep ; urine copious, 1,030, very acid, albumen marked opacity. 9.30 a.m. : T. 101.6°F., P. 90. 12.30 p.m. T. 102.2°F., P. 96. 5 p.m. : T. 101.6°F., P. 88 to 92 ; slight splenic enlargement. 9 p.m. : T. 100.8°F., P. 80.

January 23rd : temperature normal, urine acid, albumen marked opacity, patient feels perfectly well. January 24th, 9 a.m., urine acid, no albumen. January 25th, 9 a.m., urine acid, no albumen.

Note. Recovery uneventful. About a week later patient had a typical attack of malarial fever which rapidly yielded to quinine, fifteen grains of the hydrochloride per day. The blood was examined carefully in thick and thin films on January 21st when no parasites or pigment were found. No rashes were noticed. Flushing of the skin and slight injection of eyes were noticed during the second rise of temperature. The urine test employed was : filtering, boiling, addition of acetic, followed by hydrochloric acid. There was no indication of nephritis. Diagnosis: Dengue fever.

## TONSILLAR NOCARDIOMYCOSIS.

One case may be mentioned here as it has not been referred to elsewhere ; this was a case of tonsillar nocardiomycosis.

The patient, a European male, about thirty-two years of age, showed a number of small white concretions in the crypts of both tonsils. The throat was not inflamed, and there was neither pain nor discomfort, but the presence of the concretions had been noticed by the patient

at least a month previously, and as they showed no signs of disappearing he applied for treatment for them. Scrapings of the white patches consisted mainly of fungal hyphae in short lengths. The hyphae were similar to those of fungi of the Genus *Nocardia*; they were about 1 micron in diameter, branched, and either Gram-positive or composed of Gram-positive coccoid bodies connected together by Gram-negative strands. Inoculations made on to agar and glucose agar failed to produce any colonies of the fungus.

This condition is referred to by Castellani and Chalmers in their Manual of Tropical Medicine (Third Edition, 1919, pp. 1747—8), and this particular case is recorded here merely to draw attention to the fact that it occurs in West Africa.

#### AMOEBIC ABSCESS OF THE LUNG.

Amoebic abscess of the lung is apparently a rare condition. Most authors content themselves by stating briefly that such abscesses do occur and that they are usually secondary to amoebic abscesses of the liver. Phillips (*Amoebiasis and the Dysenteries*, 1915, p. 27), who is more explicit than many others gives the following details regarding them. "The lung" he says "is usually affected secondarily to a liver abscess, but in rare cases an abscess may occur in the lung without there having been a previous liver abscess. A liver abscess may rupture into the pleural cavity and spread to the lung, or adhesions may form between the base of the lung and the diaphragm and the infection be carried straight to the lung without involvement of the pleural cavity; sometimes the infection reaches the lung through the mediastinum, or through the ligamentum latum pulmonis. We may, therefore, have a liver abscess draining through the lung direct, or it may empty by a circuitous channel. In yet other cases there is no direct communication between the liver and lung, the amoebae having reached the lung through the blood-vessels and set up a secondary abscess there; in some of these cases there has been no liver abscess, the amoebae having passed through the portal system into the systemic veins and settled in the lung." In the case briefly described below both lungs contained a few small amoebic abscesses, and the liver was extensively affected by the same disease, but there was no direct communication between the liver and the lungs.

The patient was an African man, a Moshi, about thirty years of age, who died at Accra on the 24th to 25th December, 1920. It subsequently transpired that he had some time previously been admitted to the Native Hospital on account of an enlarged liver, and had twice been thoroughly and vainly explored with a trocar in the belief that he was suffering from abscess of the liver.

On examination the body was found to be emaciated. No gross morbid conditions were detected in the heart, the digestive tract, the kidneys, and the lymphatic system; the spleen was small and appeared normal; the brain was not examined. The abdominal cavity, however, was found to be filled with fluid blood which had evidently escaped from ragged openings on the under surface of the right lobe of the liver. The liver itself was very greatly enlarged and was a mass of white, almost caseous nodules which in several places had broken down into abscesses full of creamy or brownish pus. There was very little healthy liver tissue left, almost the whole organ being occupied by these caseous nodules and abscesses. None of the abscesses were very large, but on the under surface of the right lobe of the liver were several which projected downwards as fungating masses, and two of these had burst and from them had escaped, apparently, the blood found in the abdominal cavity.

The lungs were free, being adherent neither to the pleural wall nor to the diaphragm. In the lower lobe of each lung were two or three small, isolated nodules which on section were found to contain soft curd-like matter. The lung tissue at the periphery of these nodules was somewhat infiltrated. No direct connection existed between the liver and the lungs.

Material from the abscesses of the liver and the lungs was found to contain amoebae (*E. histolytica*) which were still active. Sections of the lung showed groups of amoebae especially at the edge of the abscess cavity. The lung tissue round the abscess was more or less consolidated and the alveoli drawn out and flattened. There was an increase of the fibrous tissue. The more central portions of the abscess contained disintegrated matter and in places were partly divided into loculi by fibrous partitions.

## A CASE OF BLACKWATER FEVER IN A KRU MAN.

The following case of blackwater fever is of interest because, (1) it occurred in a native, (2) so far as could be ascertained no quinine had been taken, and (3) the symptoms were in some respects suggestive of yellow fever. For the clinical and post-mortem notes I am indebted to Dr. R. Whyte, the only additions I have made to them are the blood counts and the brief reference to the examination of sections of the liver and kidney.

The patient was a Kru man, aged 24 years, who was admitted to the Saltpond hospital on the 20th May, 1919. Although not a native of the Gold Coast he had lived in Saltpond continuously for over a year before his illness, having been employed as a labourer by one of the trading firms. He resided in a compound with twenty-four other Kru men. No other similar case of illness occurred in the compound.

*History.* The patient was taken ill on the 16th May with fever and headache, but did not come to hospital. On the 18th he was better, but on the the following day was not so well, and on the 20th, the fifth day of his illness, was brought to hospital.

*State on admission.* On admission the patient was deeply jaundiced; temperature 101°F., pulse 110, tongue slightly coated. When requested to do so he passed a little urine, two ounces, which was port-wine coloured, opaque, and loaded with albumen. The deposit after centrifugalisation was composed largely of granular casts, and some blood corpuscles were present. His blood was difficult to spread; no malaria parasites were found. A differential count of 500 leucocytes gave the following percentages:—

Polymorphonuclear neutrophiles .. .. .	63.8
Lymphocytes .. .. .	14.8
Large mononuclears .. .. .	20.4
Eosinophiles .. .. .	0.8
Basophiles .. .. .	0.2

The Arneth count was: Class I—31, II—46, III—19, IV—4, V—0; index 77.

*Subsequent history.* 20th May. In the evening the temperature rose to 102.6°F., pulse 116. Two ounces of urine were passed similar to the previous specimen.

21st May. Morning: temperature 101°F., pulse 120. Patient dull and apathetic, could not, or would not reply to questions; some tenderness of the abdomen on palpation over the liver and spleen. Evening: temperature 102.8°F., pulse 126; breathing laboured, nostrils dilating with each respiration, no cough, no expectoration of sputum. No urine was passed during the day. After a dose of "white mixture" a motion was passed consisting of a dark green fluid. There was no vomiting at any time.

22nd May. The patient died at 5.30 a.m.

*Post-mortem examination.* Body jaundiced; subcutaneous tissues stained yellow. Heart—slightly enlarged; both auricles contained large ante-mortem clots. Lungs—congested and oedematous; numerous superficial, punctate haemorrhages; upper lobe of right lung consolidated, on section dark grumous fluid exuded. Liver—enlarged, stained a deep greenish colour; sections cut with a freezing microtome and stained with Sudan III showed no fatty degeneration. Spleen—enlarged about twice the normal size, dark red and firm. Kidneys—enlarged, capsule partly adherent, stained a greenish colour; there was no fatty degeneration; sections showed a marked hyperaemia, small haemorrhages into the substance of the organ and into the tubules, some degeneration of the tubular epithelium, and extensive blocking of the lumen of the tubules with granular material and brown pigment. Stomach—contained dark matter resembling coffee grounds; haemorrhagic areas on the mucous membrane. Duodenum—contained matter similar to that found in the stomach. Bladder—contained about one ounce of dark, opaque urine, loaded with albumen, similar to that passed on the 20th May.

"FILTHY LUCRE."

Many unkind things have been said about the West African currency notes. Not with least provocation perhaps on an occasion when our dog-faced baboon snatched a wad of them from a gaping pocket and stuffed them into her cheek-pouches where, though clearly visible as bulky swellings, they were beyond hope of recovery. But I do not recall having heard of any test being carried out as to the chances of the spread of disease by their means, although the fact that the native African is often pocket-less and much given to using his mouth as a receptacle for all sorts of things, is fraught with serious pathological possibilities.

Having received from the Bank a pile of damp and dirty shilling notes that well deserved the name of "filthy lucre," I therefore examined them in the following manner. Ten of the notes, taken at random, were placed in a sterile dish and soaked for half an hour in 200 c.c. of sterile normal saline solution. They were then brushed with a sterile brush and removed from the dish. The fluid left behind was (1) examined with a microscope, (2) tested for "*B. coli*" in the same manner as a water sample, (3) plated on agar, sown in broth, etc., for the detection of bacteria, yeasts, moulds, and similar organisms, and (4) centrifuged and the deposit examined.

The results of this examination were as follows. The presence of "*B. coli*" was not demonstrated, and no other evidence of faecal pollution, such as eggs of intestinal worms or cysts of intestinal protozoa, was obtained. As would naturally be expected the fluid was found to contain vast numbers of bacteria, yeast cells, moulds, etc.; those that over-grew all others in cultures being a long Gram-positive bacillus and an organism of the *B. subtilis* type. The deposit thrown down on centrifugalisation contained sand and grit, a good deal of food material, pollen grains, and not a few sarcoptid mites and their eggs. The mites were alive and active.

Such a cursory and inadequate examination, based on the testing of only ten specimens, does not do more than indicate the probable range of the pathological rôle of these notes. It shows, however, that they may harbour moulds, and yeast cells, and many bacteria, gross particles such as sand and food-stuffs, and living mites; and it can scarcely be questioned therefore that, given the opportunity, they might convey the fungi of skin affections, the virus of exanthems normally spread by scales of desquamated skin, the eggs of intestinal parasites, the spores of pathogenic bacteria, and itch mites or other similar vermin. Many a "travelled shilling" must meet with ample opportunity.

THE OWL MIDGE.

*Telmatoscopus meridionalis*, Eat.

*Telmatoscopus meridionalis* notwithstanding its long and formidable name is a very small and inoffensive insect which is probably familiar to most residents in the Gold Coast as the "owl midge." It is not itself a biting insect, but it belongs to a family, the Psychodidae, which includes in its ranks biting species, some of which are believed to be disease carriers. It is, indeed, a rather attractive little creature, with its demure dark-grey colouring, its broad fringed wings, and its silky hairiness, and as curiosity prompted me to rear it in the laboratory at Accra, a few notes on its life-history may be included here.

It is easily reared in captivity. In the laboratory I have kept strains going for many months on end in glass jars containing nothing more elaborate than a few stones half submerged in impure water and resting on a sandy bottom. Generation after generation can be reared under such conditions. The larvae, however, thrive particularly well if faecal matter is mixed with the water. As to the adults, a little honey and water appears to supply all the nourishment they require.

*Eggs.* When confined in glass jars as described above the eggs are deposited in groups or masses on the sides of the vessel, on the projecting surface of the stones, on pieces of filter paper laid over the stones, and on the strips of cardboard inserted in the jars as rests for the insects and ladders for their larvae. They are usually laid a little above the level of the surface of the water. The eggs are at first a pale brown colour, darkening slightly when the enclosed larvae are nearly ready to emerge. They measure about 0.4 mm in length, and 0.1 mm, in greatest breadth. The duration of the egg stage varies, under favourable conditions it may be less than two days.

Sub-vent  
used a  
h. 23  
gms

*Larvae.* The young larvae are pale coloured with dark heads ; they are first seen crawling along the water's edge. Older larvae are dark, banded, and often almost black. The older larvae hang vertically from the surface of the water with their heads downwards ; they are easily disturbed, when they sink rapidly to the bottom. They reach the surface again by crawling up over stones, etc., for they are unable to swim and die if confined in a tube with no such ladders to the surface. When hanging from the surface of the water they frequently become entangled with other larvae. The larvae are able to crawl over the surface of stones and other rough surfaces, along the edge of the water, and at the bottom of the jars, looping their bodies so that their movements superficially resemble those of a caterpillar, holding the siphon at the posterior end a little raised, and bending the head forwards and backwards under them. When submerged they carry a small air bubble at the end of the siphon. The body of the larva is very flexible and is capable of great extension ; when fully extended it has a striped or banded appearance due to the exposure of the pale inter-segmental rings. The duration of the larval stage varies greatly both with the supply of nutriment and the temperature. When abundantly supplied with faecal matter this stage may last eight days ; under less favourable circumstances it may be much longer, thirteen days at least.

*Pupae.* The pupae are dark coloured, becoming almost black before hatching. They hang vertically from the surface of the water, and seldom move. If disturbed they sink to the bottom, and subsequently return to the surface again by floating slowly upwards with the assistance of slight dorso-ventral movements of the abdomen. Their bodies are very flexible, the abdomen being capable of a considerable range of movement both forward and backward and from side to side. The duration of the pupal stage is two to four days.

*Duration of the life cycle.* The following actual experiment illustrates the duration of the complete life cycle under favourable conditions.

- Day 1. Four adults isolated in a glass jar containing sand, stones, a cardboard rest, and faecal polluted water.
- Day 2. Many eggs seen on the cardboard rest just above the water.
- Day 3. The adults removed.
- Day 4. First larvae seen. Eggs removed and a new cardboard rest put in the jar.
- Day 12. First pupa seen.
- Day 15. First adults hatched.
- Day 18. Eggs found—laid by the new generation of adults.

Although *Telmatoscopus meridionalis* is not a biting insect and has been alluded to above as inoffensive, it is nevertheless in a sense a sanitary danger signal. It breeds in the most filthy collections of water and thrives particularly well in the presence of faecal contaminations. Its appearance therefore should be regarded as an indication that somewhere not very far away there is in all probability an unwholesome drain or collection of foul water which requires to be sought out and cleared away not because it is the breeding place of this little midge, but because it is at least a potential source of more inimical pests.



