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

GOLD COAST COLONY.

REPORT

ON THE

Medical Department

FOR THE YEAR

1930-31.

GOLD COAST:

Printed by the Government Printer at the Government Printing Office, Accra.

To be purchased from the Government Printing Office (Publications Branch), Accra, Gold Coast Colony, and from the Crown Agents for the Colonies, 4, Millbank, London, S.W.1.

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CONTENTS.

Summary of Features.

SHORT SUMMARY OF PRINCIPAL FEATURES OF THE REPORT.

The most striking point is the continued great increase in the number of new cases seeking treatment. The figures for the year show an increase of 29,284 or nearly 16 per cent over the previous year. In ten years the number of new cases seen annually have increased by over 155,000, while the staff engaged in curative work has remained practically the same. This emphasizes the impossibility of Medical Officers devoting so much time to sanitary work, and amply justifies the large increase in Health personnel during the last few years.

The health of the community has remained fairly good and there is nothing noteworthy to remark under this head. The increase in cases seen is not due to any increase in diseases, but to an increasing appreciation of European medicine.

The only epidemic of any note was one of small-pox in the Northern section of the Mandated area of Togoland and here a considerable number of the cases was due to the action of some Mallamai who were found to be practising direct inoculation.

There were two isolated cases of yellow fever—one European and one African.

Malaria still holds pride of place as the greatest cause of invaliding ; 6 per cent of all cases treated being due to this disease, while of the total number of working days lost by Europeans through sickness 20 per cent is due to malaria.

The number of cases under the enteric group has shown a marked increase and attention is again called to the desirability of all Europeans being inoculated against enteric fever before coming to this country.

There is a marked decrease in the number of cases of venereal diseases treated at the Accra Venereal Clinic. It is to be feared that this does not mean a decrease in incidence but is due to the fact that the African Medical Officer on the permanent staff, who took over from an African private practitioner in temporary part-time employment, found that a very large number of yaws and other cases not strictly venereal in origin had been included in the previous returns.

The leprosy survey mentioned in last year's report has been completed and is published as Appendix D (p. 150). The Ho Settlement has continued to do good work and a short report on this institution appears in Appendix C (p. 149).

Tuberculosis does not appear to be increasing to any degree. The percentage of cases of Tuberculosis to all cases seen has shown no increase during recent years.

Very large numbers of cases of yaws continue to be seen—266,184 ; 26 per cent of all cases. Fortunately, the majority respond well to the inexpensive bismuth preparations. Treatment of this enormous number by arsenical preparations would be a financial impossibility.

The Fitzsimons anti-venomous Serum has given very good results and a small stock is now kept in every station.

Two of the Travelling Dispensaries have been on the road throughout the year and have continued to do excellent work. The third had been laid up owing to shortage of staff. An account of the method of working a Travelling Dispensary will be found on page 142.

The first undoubted cases of Acute Rheumatism reported in the Gold Coast are dealt with on page 169.

An account of the training of Nurse-Dispensers for work in village dispensaries is given on page 49. The wholetime Medical Tutor, Dr. J. Caplan, arrived in January.

The Public Health Section of the Report on page 22 deals with the work done by the Health Branch during the year. No new works of any great magnitude were undertaken, but the Korle Lagoon reclamation scheme was continued and is now complete as far as funds permit. The section completed has already had a marked effect in reducing the mosquito breeding areas in Accra. Ability to control the water level and the pumping of the dry weather flow from the surface drains direct to the sea has removed the source of the evil smell which used to come from the foul sludge exposed to the sun when the water receded during the dry season.

In all stations anti-mosquito work has been carried out with unflagging energy, with gratifying results as is shown by the generally low larval indices.

No epidemic occurred except that of small-pox in the Northern Territories already referred to.

There was no suspicion of any case of plague nor were any plague-infected rats discovered among the 102,232 rats destroyed.

An interesting report by the Medical Officer of Health, Kumasi, on relapsing fever appears on page 28. Housing and town planning is discussed at some length at page 37. The present economic crisis has made it necessary to reconsider the high standard possible during more prosperous times.

The Maternity and Child Welfare section appears on page 44. Both the Maternity Hospital at Accra and the Infant Welfare Centres at Accra, Kumasi, Sekondi, Cape Coast and Koforidua have continued to do excellent work and special reports on each institution will be found in Appendices C, D and E.

The report by the Deputy Director of Laboratory Service on his branch gives a very full account of the work done during the year. Such a report does not lend itself readily to summarization and should therefore be read in full.

The interesting Appendices to the Laboratory Report include the following :—

(*a*) Work done on Trypanosomiasis at the Yeji bush laboratory (Dr. G. Saunders) page 66.

(*b*) Observations bearing on Yaws and Syphilis in expectant mothers attending the Maternity Hospital, Accra (Drs. G. G. Butler and G. M. L. Summerhayes) page 75.

(*c*) Report on two cases of Blackwater Fever in natives (Dr. G. G. Butler) page 92.

(*d*) Continuation report on a search for a Precipitin test for malaria. (Dr. G. G. Butler) page 95.

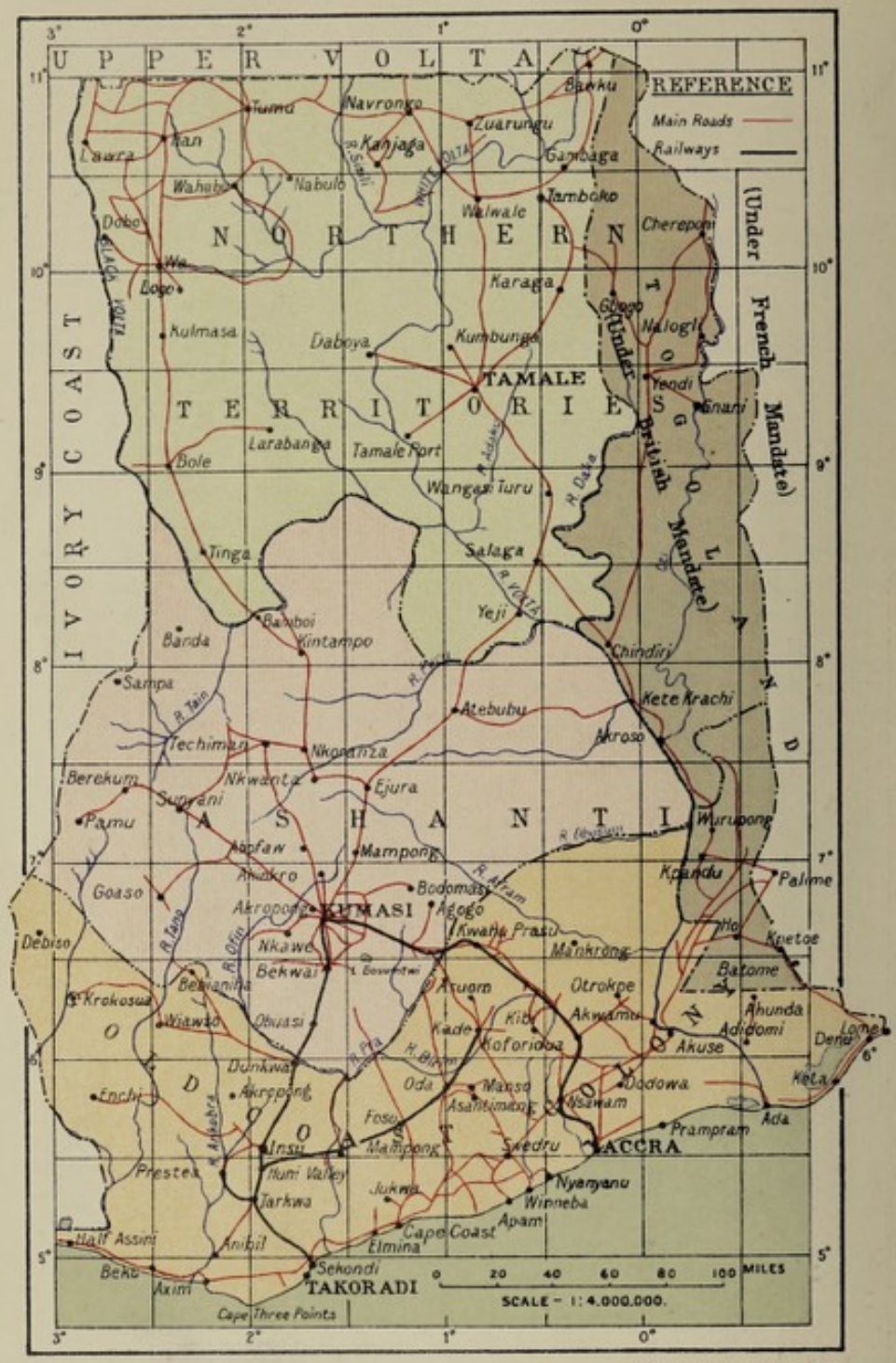
(*e*) Note on the Urea-Stibamine test for Leishmaniasis (Dr. G. G. Butler) page 97.

(*f*) Notes on blood conditions (Dr. A. S. Burgess).

(*g*) Report on the mosquito and tsetse problem at Takoradi (Mr. A. W. J. Pomeroy) page 101.

W. D. INNESS,
Director, Medical and Sanitary Service.

THE GOLD COAST



SURVEY H. Q. ACCRA 1931

Annual Medical and Health Report for the Year 1930-31.

1. *Administration.*—Medical, Health and Laboratory branches. Table I on page 126 shows the actual staff of the Medical, Health and Laboratory branches of the Medical Department.

(*a*) STAFF.—MEDICAL BRANCH.

I.—EUROPEAN.

Promotions.

Dr. A. M. MacRae, Specialist.

Appointments.

Dr. R. Ramsay, Medical Officer.
Dr. J. Caplan, Medical Tutor.
Dr. Dorothy E. Stewart, Woman Medical Officer.

Transfers.

Dr. K. B. Allan, Senior Medical Officer, to Nigeria as Assistant Director of Medical Service.

Dr. A. C. Paterson, Senior Medical Officer, from Sierra Leone.
Dr. A. G. Mackay, Medical Officer, to East Africa.

Retirements.

Dr. W. Spiteri, Medical Officer.
Dr. B. Knowles, Medical Officer.
Dr. J. H. Penman, Medical Officer.
Dr. V. J. G. MacGregor, Medical Officer.
Dr. J. P. M. Donnelly, Medical Officer.
Miss H. F. Furley, Matron.
Miss E. M. Scammell, Senior Nursing Sister.
Miss G. M. Evans, Nursing Sister.
Miss H. P. McLellan, Nursing Sister.
Miss I. K. Young, Nursing Sister.

II.—AFRICAN.

Promotions.

Mr. R. C. Swanikier, First Division Clerk.
Mr. T. B. Ashong, Chief Dispenser.
Mr. W. A. Wellington, First Division Dispenser.
Mr. R. D. Johnson, First Division Nurse.

Appointments.

Medical Officer.—Dr. C. J. S. O. Taylor.

Second Division Dispensers.—Messrs. J. J. Amorin, F. A. Akiwumi, A. A. Kotey, B. K. Mensah, J. C. Bankole-Mercer.

Second Division Nurses.—Messrs. John Ntim, J. N. Onyemesi, A. Owiredu, J. A. Anthony, M. Dako, I. A. Okine, S. A. Sarbah, J. E. Solomon, E. W. Segbawu, E. E. Sobotie, D. Quartey, J. D. Appiah, Miss Clara Anaman.

Retirements.

Chief Dispenser.—Mr. F. W. C. Wulff.
Second Division Dispenser.—Mr. P. D. Adjani.
First Division Nurse.—Mr. W. D. Jones (death).
Second Division Nurses.—Mrs. M. J. Simons, Messrs. N. G. Adjai, M. K. Kudoyor, B. C. Afriyea.

Mental Nurses.—Messrs. H. Edwards and J. M. Adoph.

Nurses-in-Training.—Miss N. L. Quao (death), Misses K. Addo, J. B. Kwatchey, J. H. Stephens, L. K. Baeta, R. Buotu, M. Johnson, M. Odoom, B. Kuofie, R. J. Bull, J. Addison and M. A. Acolatse, Messrs. R. O. Hammond, G. K. Odoi, J. Embill, D. W. Lamptey, E. E. Parker and J. G. Mentz.

Midwife Probationers.—Miss E. Mensah and Mrs. C. Tackie.

HEALTH BRANCH.

I.—European Staff.

Appointments.

Dr. G. R. Baxter, Medical Officer of Health.
Dr. J. Neil Leitch, Medical Officer of Health (transferred from Sierra Leone).
Dr. Florence A. Adam, Woman Medical Officer.
Dr. M. K. Lawlor, Woman Medical Officer.

Other changes in the Staff during the year.

Dr. E. J. Daly was transferred to Nigeria.
Dr. A. B. Monks was transferred to Sierra Leone.
Dr. J. Hamilton was transferred to the Medical Branch.
Dr. (Miss) W. D. Cargill, died.
Dr. (Mrs.) Nora Vane-Percy, Temporary Woman Medical Officer had her appointment terminated.

II.—African Staff.

Promotions.

Mr. J. C. Barnor was promoted Office Assistant and Accountant.

Appointments.

Three Second Division Clerks.
Two Assistant Disinfector Mechanics.
Three Sanitary Inspectors-in-Training.
One Storekeeper.
Three Vaccinators.
One Market Clerk.
Two Village Overseers.
One Sexton.
Two Dispensers-in-Training.
Ten Nurses-in-Training.
One Health Visitor.

Other changes in the Staff during the year.

One Second Division Clerk was dismissed.
One Second Division Sanitary Inspector and one Female Sanitary Inspector retired on pension.
One Second Division Sanitary Inspector died.
One Sanitary Inspector-in-Training was invalided out of the service.
One Storekeeper was dismissed.
Seven Nurses-in-Training resigned, one dismissed and one had her appointment terminated.
One Health Visitor resigned.

LABORATORY BRANCH.

I.—African.

Appointment.

Laboratory Attendant.—Mr. D. E. Ankoma.

Retirement.

Laboratory Attendant.—Mr. H. O. Tetteh.

(*b*) ORDINANCES AFFECTING THE PUBLIC HEALTH.

1. During the year the following places were brought under the Towns Ordinance :—

Abetifi, Suhien, Nkwatia, Oyoko, Krabo, Asankrangwa, Anwiawso, Kpeve, Ho-Kpeve and Sefwi Bekwai.

2. The Mosquito Ordinance was amended defining more fully the words " owner " and " vessel."

3. By-laws and rules were made for the control of pigs, keeping of pigs ; and cattle exportation in Ashanti.

4. Orders were published putting various places in quarantine for small-pox, etc. ; in nearly every case these were revoked before the end of the year.

5. The Infectious Diseases Ordinance was amended and came into force towards the end of the year.

6. An Ordinance to control the importation of animals by sea was enacted.

(*c*) FINANCE.

Estimated Expenditure for the year 1930–31.

(*a*) Personal Emoluments.

Medical.

	£	*s.*	*d.*
Administrative Officers	5,600	0	0
Specialists	3,935	0	0
Senior Medical Officers	6,900	0	0
Medical Officers (European and African)	41,622	0	0
Dental Surgeon	1,579	0	0
European Nursing Staff	14,776	0	0
African Nursing Staff and Dispensers	30,716	0	0
Clerical Staff	4,223	0	0
Various items, allowances, etc.	22,790	0	0
Estimated Total Personal Emoluments ...	132,141	0	0
Actual Total Personal Emoluments	124,086	9	6

Health.

	£	*s.*	*d.*
Administrative Officers	2,700	0	0
Senior Health Officers and Medical Officers of Health	17,863	0	0
European Sanitary Inspectors	11,475	0	0
African Sanitary Inspectors	15,614	0	0
Various items, allowances, etc.	19,986	0	0
Estimated Total Personal Emoluments ...	67,638	0	0
Actual Total Personal Emoluments	60,552	14	6

Laboratory Service.

	£	s.	d.
European Staff	13,134	0	0
African Staff	1,670	0	0
Estimated Total Personal Emoluments ...	14,804	0	0
Actual Total Personal Emoluments	14,371	13	11

(*b*) Other Charges.

Medical.

	£	s.	d.
Passages, transport, etc	18,900	0	0
Hospital equipment, drugs, medical appliances, surgical instruments, etc.	32,195	0	0
Diets, medical comforts	16,600	0	0
Other items	16,130	0	0
Contributions	—		
Estimated Total	83,825	0	0
Actual Expenditure	71,363	18	9

Health.

	£	s.	d.
Passages, transport, etc.	13,345	0	0
General health votes	52,313	0	0
Scavengers and Labourers	44,118	0	0
Estimated Total	109,776	0	0
Actual Expenditure	94,433	4	10

Laboratory Service.

	£	s.	d.
Passages, transport, etc.	2,547	0	0
General research votes	2,774	0	0
Estimated Total	5,321	0	0
Actual Expenditure	4,274	19	8

	£	s.	d.
Estimated total expenditure, Medical Department (all branches)	413,505	0	0
Actual total expenditure, Medical Department (all branches)	369,083	1	2

Revenue earned by Medical Branch.

	£	s.	d.
(*a*) Hospital Fees	7,963	7	10
(*b*) Sale of drugs in private practice	484	16	3
(*c*) Re-imbursement by Railway Department and Takoradi Harbour	2,600	0	0
Total	11,048	4	1

Revenue earned by Health Branch.

		£	*s.*	*d.*
(*a*)	Fines for sanitary offences	10,381	15	3
(*b*)	Market and slaughter-house fees	5,370	18	10
(*c*)	Poundage fees	351	4	3
(*d*)	Births, deaths, and burials	695	10	3
(*e*)	Re-imbursement by Railway Department and Takoradi Harbour	4,379	0	0
(*f*)	Conservancy fees	1,649	6	5
(*g*)	Fees collected at Infant Clinics	2,536	17	11
	Total	25,364	12	11

	£	*s.*	*d.*
Total Revenue earned by Medical Department (all branches)	36,412	17	0
Total Expenditure for the Colony (excluding extra-ordinary or special expenditure)	2,872,385	0	0
Total Expenditure, Medical Services (Medical, Health and Research branches)	369,083	0	0
(This figure is exclusive of the cost of buildings, e.g. hospitals, dispensaries, etc., and other public health works, such as water supplies, town improvements, etc.)			
Net Expenditure (Total Expenditure *less* Revenue) ...	332,670	3	0

The ratio of the net expenditure on medical services to the total expenditure of the Colony was therefore 11.58.

II.—PUBLIC HEALTH.

(*a*) General Remarks.

The following table shows the most noteworthy contrasts in the returns of diseases treated during the years 1928–29, 1929–30, and the present year.

These figures are from the Medical Branch only.

Diseases.	1928–29.		1929–30.		1930–31.	
Small-pox	26		7		25	
Varicella (Chicken-pox)	488		235		211	
Dysentery :—						
(*a*) Amoebic	1,125		1,006		735	
(*b*) Bacillary	304	1,628	209	1,550	313	1,273
(*c*) Undefined or due to other causes ...	199		335		225	
Enteric Group :—						
(*a*) Typhoid Fever	47		39		55	
(*b*) Para-typhoid A	6		4		6	
(*c*) Para-typhoid B	8	64	1	51	3	71
(*d*) Type not defined	3		7		7	
Influenza	863		695		396	
Malaria :—						
(*a*) Tertian	2,422		1,264		1,946	
(*b*) Quartan	532		45		53	
(*c*) Aestivo-autumnal	4,718	10,002	6,395	10,562	9,366	12,930
(*d*) Cachexia	1,034		221		334	
(*e*) Blackwater	13		24		18	
(*f*) Unclassified	1,283		2,613		1,213	
Measles	136		219		303	
Pneumonia :—						
(*a*) Broncho-Pneumonia	421		1,378		305	
(*b*) Lobar-Pneumonia	988	1,560	1,227	2,708	682	1,199
(*c*) Unclassified	151		103		212	
Trypanosomiasis (Sleeping Sickness) ...	94		121		224	
Whooping Cough	265		250		517	
Alcoholism	46		19		22	
Yellow Fever	2		—		2	
Tuberculosis :—						
(*a*) Pulmonary and Laryngeal	856	1,151	939	1,175	916	1,149
(*b*) Other forms	295		236		233	
Plague :—						
(*a*) Bubonic	—		—		—	
(*b*) Pneumonic	—		—		—	
(*c*) Septicaemic	—		—		—	
(*d*) Undefined	—		—		—	
Ankylostomiasis	365		147		184	

Comparative Figures for four years 1927–28, 1928–29, 1929–30, 1930–31, for all Patients treated in Hospitals and Dispensaries of the Medical Branch.

Year.	Remaining in hospital.	Total cases treated (in and out-patient).	Deaths.	Remaining in hospital.	Percentage of deaths to total patients treated.
1927–28 ...	626	133,069	980	601	.66
1928–29 ...	601	177,594	1,009	678	.57
1929–30 ...	678	184,424	1,156	849	.63
1930–31 ...	786	213,708	1,176	816	.55

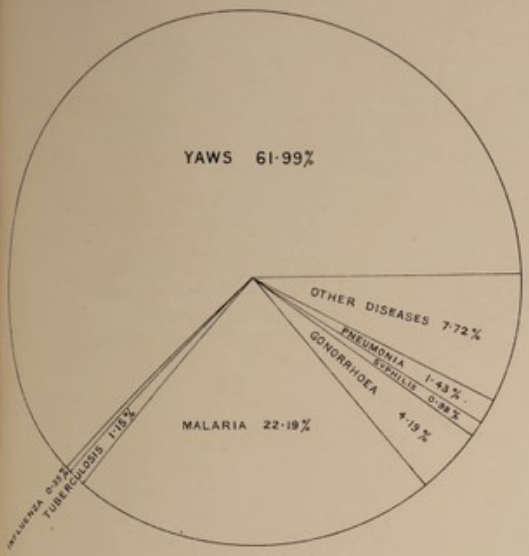
HEALTH OF EUROPEAN COMMUNITY.

Officials and Non-Officials.

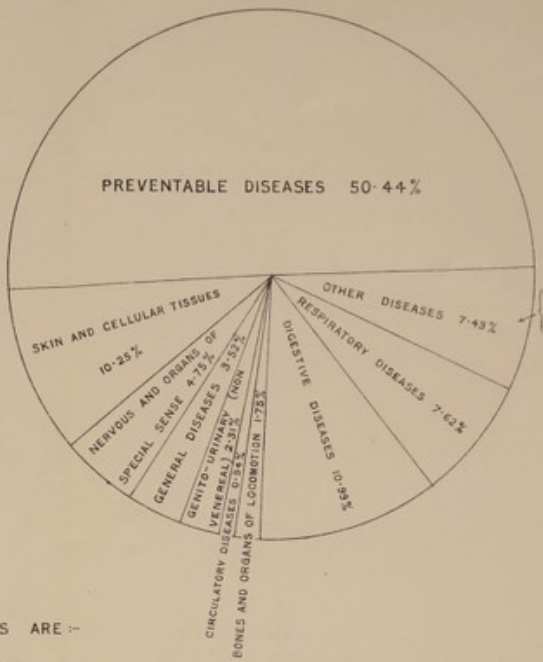
The health of officials and non-officials was fairly good throughout the year.

	1927–28.	1928–29.	1929–30.	1930–31.
Percentage of sick to average number resident ...	2.30	2.20	2.19	2.32
Average sick time to each patient (days) ...	8.41	8.14	8.02	8.5

INFECTIVE DISEASES TOTAL INCIDENCE 112,615.

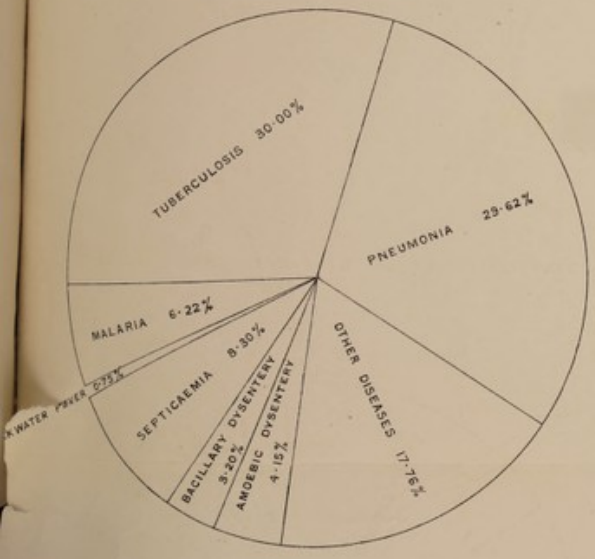


GENERAL SYSTEMIC AND PREVENTABLE DISEASES TOTAL INCIDENCE 270,785.

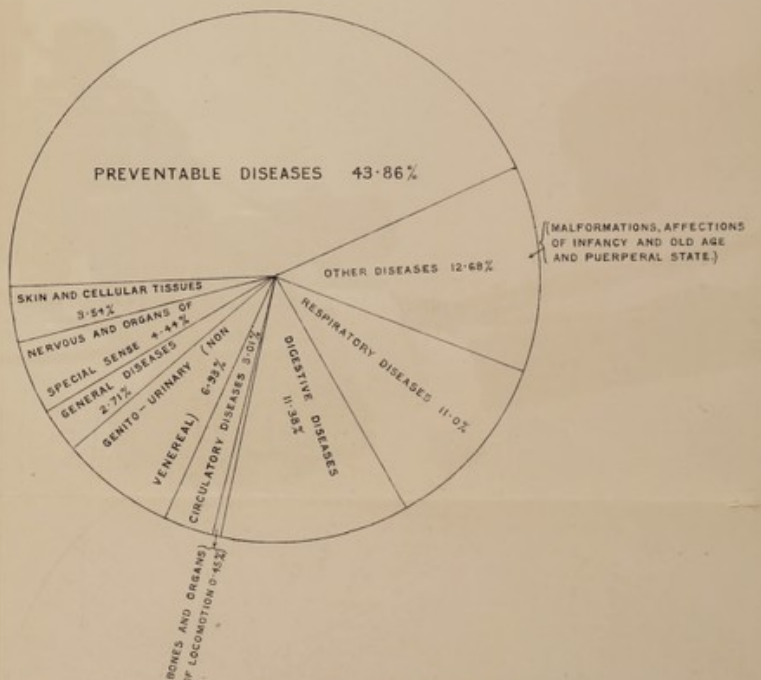


PREVENTABLE DISEASES ARE :-

(1) INFECTIOUS DISEASES
(2) INTOXICATION AND POISONS
(3) SCABIES AND TINEAE
(4) HELMINTHS
(5) AFFECTIONS PRODUCED BY EXTERNAL CAUSES.



TOTAL DEATHS = 530 = ·47% OF TOTAL INCIDENCE.



TOTAL DEATHS = 1327 = ·49% OF TOTAL INCIDENCE.

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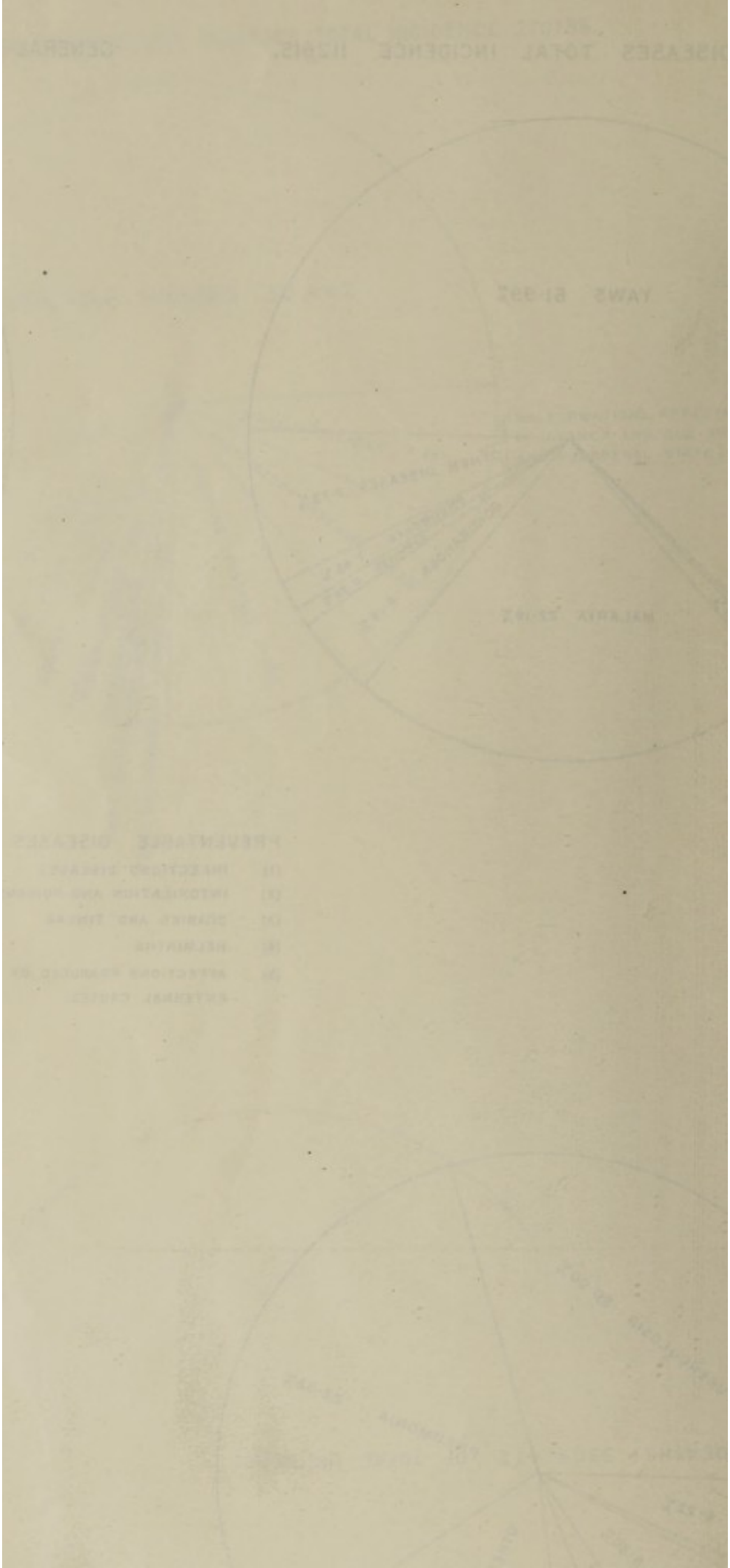


Separate records of invalidings and deaths have been kept for Class "A" and Class "B" officials.

The figures are small and no true inference as to the comparative health of the two classes can be drawn.

CLASSES "A" AND "B" EUROPEAN OFFICIALS.
INVALIDING RATE FOR 1930–31.

Class "A."				Class "B."			
Average No. resident.	Invaliding.	Rate per 1,000.	Rate per cent.	Average No. resident.	Invaliding.	Rate per 1,000.	Rate per cent.
653	36	55.13	5.51	283	13	45.93	4.59

CLASSES "A" AND "B" EUROPEAN OFFICIALS.
DEATH-RATE FOR 1930–31.

Class "A."				Class "B."			
Average No. resident.	Deaths.	Death-rate per 1,000.	Death-rate per cent.	Average No. resident.	Deaths.	Death-rate per 1,000.	Death-rate per cent.
653	3	4.59	.46	283	—	—	—

From this it would appear that contrary to previous experience Class "B" officials enjoyed better health during this year than Class "A" officials.

Below are tables for officials and non-officials shewing the percentage of invalidings and deaths over a ten-year period 1921–1931.

TABLE SHOWING INVALIDING AND DEATH-RATES OF EUROPEAN OFFICIALS IN THE TEN-YEAR PERIOD SINCE 1921, BASED ON THE AVERAGE NUMBER RESIDENT.

Year.	Average number resident.	Total invalided.	Percentage invalided.	Total died.	Percentage died.
1921	612	38	6.20	14	2.28
April, 1922–March, 1923 ...	719	30	4.17	6	.83
1923–24	689	32	4.65	10	1.45
1924–25	680	58	8.52	7	1.02
1925–26	761	59	7.75	8	1.05
1926–27	783	49	6.26	3	.38
1927–28	835	39	4.67	6	.71
1928–29	881	50	5.67	4	.45
1929–30	972	49	5.04	5	.51
1930–31	936	49	5.22	3	.32
Average for the period ...	785	45.3	5.79	6.6	.9

For the purpose of comparison between the health of European officials and non-officials two tables are given below.

EUROPEAN OFFICIALS.—PERCENTAGE OF INVALIDINGS AND DEATHS TO TOTAL NUMBER RESIDENT.

Year.	Total number resident.	Invaliding percentage.	Deaths percentage.
1921	768	4.94	1.82
1922–23	979	3.06	.61
1923–24	994	3.21	1.00
1924–25	846	6.85	.82
1925–26	994	5.93	.80
1926–27	1,046	4.68	.28
1927–28	1,202	3.24	.49
1928–29	1,280	3.90	.31
1929–30	1,323	3.70	.37
1930–31	1,313	3.73	.22
Average for the period ...	1074.5	4.32	.67

EUROPEAN NON-OFFICIALS.—PERCENTAGE OF INVALIDINGS AND DEATHS TO TOTAL RESIDENTS.

Year.	Total number resident.	Invaliding percentage.	Deaths percentage.
1921	2,171	2.44	.82
1922–23	2,019	2.27	1.23
1923–24	2,049	2.68	.68
1924–25	2,020	3.26	.59
1925–26	2,110	3.12	.66
1926–27	2,435	2.66	.94
1927–28	2,375	2.02	.88
1928–29	2,328	1.33	.94
1929–30	2,370	2.11	.80
1930–31	2,195	1.54	.68
Average for the period ...	2207.2	2.34	.82

As usual, malaria accounted for most of the sickness, and the following table shows the relative position of malaria as a cause of time lost through sickness by European officials during the year under review and gives figures for previous years :—

Year.	Average No. resident.	Total sick days.	Total days on sick list for malaria.	Total days on sick list for other diseases.	Percentage of days lost through malaria to total days lost.	No. of days lost through malaria for the year per 100 residents.
1924–25	680	8,614	1,746	6,868	20.26	256
1925–26	761	6,108	1,547	4,561	25.32	203
1926–27	783	6,847	1,204	5,643	17.58	153
1927–28	835	7,023	1,530	5,493	21.81	183
1928–29	881	7,177	1,661	5,516	23.14	188
1929–30	972	7,795	1,920	5,875	24.63	197
1930–31	936	7,961	1,610	6,351	20.22	172

HEALTH OF AFRICAN OFFICIALS.

According to the table given below under " Vital Statistics " there seems to be very little change. As a whole, they enjoy fairly good health, especially, when a comparison is made with the general African population.

HEALTH OF GENERAL AFRICAN COMMUNITY.

The health of the African community was fairly good. It will be seen that the total cases treated in the hospitals and dispensaries of the Medical branch have greatly increased and show a 16 per cent advance on the previous year.

Year.	Total cases treated in hospitals and dispensaries by Medical branch only.	Percentage increase on previous years.
1924–25	82,476	—
1925–26	97,910	18.5 per cent.
1926–27	105,300	7.5 per cent.
1927–28	133,069	26.42 per cent—a remarkable year.
1928–29	177,594	32.65 per cent—a remarkable year.
1929–30	184,424	3.84 per cent.
1930–31	213,708	15.88 per cent.

The marked increase in the figures can be explained to a certain extent by the fact that there were new hospitals built at Lawra and Wa, a new dispensary opened at Bawku, extra wards added to Sekondi and a new hospital at Winneba, a Travelling Dispensary operating in the Lawra and Tumu districts and at certain stations there was a sudden phenomenal increase in the number of patients. This means that each Medical Officer sees and examines 14 new cases every day in addition to the usual long list of old cases which keep turning up daily.

If to these numbers the 52,476 new cases seen by the Women Medical Officers at the Infant Welfare Centres are added, the total of new cases seen during the year is 266,184. This means that each one of the average number resident of Medical Officers engaged in clinical work, including the Women Medical Officers and African Medical Officers, saw 5,915 new cases ; or an average of over 16 new cases daily for 365 days.

Such numbers can only be dealt with at the expense of the health of the officers or, inadequate time must be spent on each case. It may be noted that under National Health Insurance the maximum number of persons permitted by the Ministry of Health to be included in the list of a General Practitioner in England is 2,500.

Of the seven Women Medical Officers on the staff not one was fit to complete a full tour.

The problem of how to cope with the number of cases now coming forward for treatment is a most difficult one and is likely to become much more acute in the future, as owing to the present financial position the staff of Medical Officers is being reduced from 46 to 33; so that during the coming year there will be a shortage of 13 clinicians.

Certain stations have already been closed and others will follow. Naturally, these stations must be the less important ones and within relatively easy reach of another medical station. Still further burdens will therefore be thrown upon the already overworked Medical Officers of those stations which remain open.

Nor will the new nurse-dispenser scheme help matters ; for with the opening of the bush dispensaries more people will be brought into contact with European medicine and still more cases, those beyond the competence of the nurse-dispenser, will require treatment by qualified officers.

There are as far as I can see two alternatives only. The first is to bring the staff up to full strength and the second is to decline to treat more than can be adequately dealt with.

It will indeed be a tragedy if, after all the years of spade work during which we have endeavoured to impress upon a reluctant people the benefits of European medicine and just as we are beginning to get results, we now have to turn them away owing to lack of staff and funds.

During the year there was an epidemic of small-pox in the Mandated area of Togoland and 600 cases were seen and 44 deaths occurred. It should be noted that these numbers differ from the table on page 6, which represents the Medical branch figures only, and from Table V which shows the total number of small-pox cases treated in institutions only.

There was no yellow fever epidemic, but two isolated cases were recorded.

There was a small epidemic of measles among the children at Achimota College, 21 cases having been recorded.

(I)—GENERAL DISEASES.

There is little need for comment under this head as the diseases, as a rule, are not a more common cause of ill-health in the tropics than they are in temperate climates.

In the year 1928–29 report it was noted that out of 177,594 cases treated there were 181 cancer, namely .10 per cent.

In 1929–30 there were 202 cases of cancer out of a total of 184,424 cases, namely .10 per cent. In 1930–31 there were 110 cases of cancer out of a total of 213,708 cases, namely .05 per cent.

There are two cases worthy of note here, namely, acute rheumatism which has been practically unheard of in the Gold Coast. These two cases are published at page 169 of this volume and a careful perusal of the notes will leave very little doubt in the reader's mind as to the correctness of the diagnosis.

(II)—COMMUNICABLE DISEASES.

1. Mosquito or Insect-Borne.

These cause a considerable part of the ill-health from which the community suffers.

MALARIA.

STATISTICS OVER THE FIVE-YEAR PERIOD, 1925–30.

	1926–27.	1927–28.	1928–29.	1929–30.	1930–31.
Total treated	6,444	8,955	10,002	10,562	12,930
Percentage of all diseases treated ...	6.12	6.72	5.63	5.73	6.05

The incidence is practically the same year after year.

BLACKWATER FEVER.

The following table shows the incidence of blackwater fever in Europeans during the last three years and allows a comparison to be made of the two five-year periods, 1917–21 and 1923–28.

	Percentage of cases in Europeans to total European residents.	Percentage of deaths to cases.
Five-year period 1917–21	.89	35.3
Five-year period 1923–28	.47	23.7
1928–29	.16	16.6
1929–30	.40	13.33
1930–31	.42	13.33

By a curious coincidence the percentage figure is exactly the same as it was last year.

The following table, showing the incidence and deaths from blackwater fever in each race for the past three years, is of interest :—

	1928–29.		1929–30.		1930–31.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Europeans	6	1	15	2	15	2
Syrians	3	2	5	2	1	0
Indians	2	1	2	0	0	0
Africans	2	2	3	2	2	2

Trypanosomiasis.

The incidence and case mortality during the past five years is shown in the table below which has been compiled from the Medical branch records of in and out-patients :—

	Cases.	Deaths.	Incidence per 10,000 of all cases treated.	Percentage of Deaths to cases.
1926–27	67	11	6.36	16.42
1927–28	59	4	4.43	6.78
1928–29	94	18	5.29	19.14
1929–30	121	23	6.56	19.00
1930–31	224	16	10.47	7.14

The total number of cases reported is more, and the percentage of deaths is less than in former years. The actual incidence is rising, but it is not likely to be a true increase ; more patients are coming forward as has been seen by the total numbers treated.

The increase was recorded mainly in the Northern Territories especially in Tamale where many more patients were seen than in former years.

Two cases are reported in detail in the Scientific Section of this report, and two interesting signs are discussed in connection with the disease, namely, acute mania and Parkinsonian syndrome.

Judging from the incidence and death-rates during the past few years, trypanosomiasis would not appear to give cause for any anxiety in the Gold Coast.

Yellow Fever.

There were two cases of yellow fever reported during the year ; one a European lady at Cape Coast, who recovered, and another, an African Railway labourer at Tarkwa, who died.

Relapsing Fever.

There were altogether 202 cases reported during the year. Most of the cases were reported from the two largest African hospitals, Accra and Kumasi.

2. Infectious Diseases.

Small-pox.

Small-pox was introduced to the Mandated area in the north from the French side of the frontier and very soon a large number of cases cropped up in Yendi and the surrounding district. It was discovered that two Mallams were practising arm to arm inoculation and before the epidemic was controlled there were 600 cases recorded with 44 deaths.

Dysentery.

There were 1,273 cases of amœbic, bacillary and unclassified dysenteries reported, compared with 1,550 last year. The present figures show 40 deaths giving a case mortality of 3.1 per cent which is slightly higher than the previous year.

	Case incidence Percentage of all cases.	Case mortality.
1926–27	.80 per cent	4.8 per cent.
1927–28	.76 per cent	4.2 per cent.
1928–29	.92 per cent	2.9 per cent.
1929–30	.84 per cent	2.4 per cent.
1930–31	.54 per cent	3.1 per cent.

It is satisfactory to note that the case incidence is definitely lower than it has been for some years.

The case mortality of the bacillary form is lower than it was last year, being 5.43 per cent as against 7.7 per cent ; but the case mortality of the amœbic form has risen from 1.7 per cent to 2.8 per cent.

ENTERIC GROUP OF DISEASES (TYPHOID, PARA-TYPHOID A AND B).

Seventy-one cases were recorded during the year, seven Europeans and 64 Africans, with a case mortality of 16.9 per cent.

Last year there were 51 cases with a higher case mortality of 21.56 per cent.

It will be seen that there is a very marked increase in the number of cases in this group, and the question of compulsory inoculation suggests itself for consideration.

Typhoid and para-typhoid fevers are becoming more common on the Gold Coast, and doubtless the number of " carriers " amongst the African population is increasing, conveying the usual increased risk of spreading infection.

In January, 1930, the Secretary of State decided to apply to West Africa the East African rule dealing with typhoid infections, which states that officers are advised to have themselves inoculated against enteric fever before proceeding to the Colony.

I am strongly of opinion that inoculation against diseases of the typhoid group should now be made compulsory for all candidates entering this service, and that re-inoculation ought to be carried out at certain definite intervals.

PNEUMONIA.

The number of cases recorded was 1,199 with 144 deaths.

As will be seen by the table below the case incidence is very much lower than in previous years, but the mortality rate is distinctly higher. At the same time it must be noted that last year's mortality rate was very much below the average :—

	Incidence per cent.	Mortality per cent.
1926–27	.75	9.5
1927–28	.73	10.32
1928–29	.87	11.3
1929–30	1.47	6.1
1930–31	.56	12.01

The marked difference between the figures for the year under review and last year cannot be accounted for, as there has been no marked change in the conditions which might affect these figures.

TUBERCULOSIS.

The following table gives figures from the period 1923–24 to 1930–31 :—

	Cases	Percentage of all cases treated.
1923–24	411	.53
1924–25	414	.50
1925–26	571	.58
1926–27	698	.66
1927–28	910	.68
1928–29	1,151	.65
1929–30	1,175	.64
1930–31	1,149	.54

In the past eight years there has been practically no variation in the percentage column, and the figures do not suggest that the tuberculosis problem is a very pressing one. Year by year sanitation and preventive medicine are having more attention and this fact should gradually lead to a lowering of the case incidence.

A detailed report on the results of treatment of all kinds of tuberculosis at the Gold Coast Hospital during the year is included at Appendix E.

Venereal Diseases.

The cases treated during the year and, for comparison, during the previous four years are shown below :—

	1926–27.	1927–28.	1928–29.	1929–30.	1930–31.
Gonorrhœa	3,769	3,356	4,809	4,110	4,059
Syphilis	1,277	1,802	3,434	1,553	1,018
Chancroid	246	295	419	431	235

The report on the Venereal Clinic at the Gold Coast Hospital, Accra, will be found under a special section elsewhere.

The following interesting table shows the percentages of gonorrhœa, syphilis and yaws amongst the total of all diseases treated in the hospitals and dispensaries of the Medical branch as compared with all other diseases over a five-year period :—

	1926–27.	1927–28.	1928–29.	1929–30.	1930–31.
Gonorrhœa	3.65	2.65	2.85	2.24	1.90
Syphilis	1.32	1.33	1.58	.86	.47
Yaws	16.49	19.19	24.68	22.82	26.54
All other diseases	78.54	76.83	70.89	74.18	71.09

These figures point to a decline in the incidence of cases of venereal diseases treated in Government institutions.

Leprosy.

In appendix D will be found the reports of Dr. M. B. D. Dixey, Medical Secretary of the British Empire Leprosy Relief Association, which will give the reader a fairly comprehensive view of the present position of the leprosy problem in the Gold Coast.

The leprosy survey mentioned on page 15 of last year's report has been completed during the year and is published in detail in appendix D. The total number of cases seen amounted to 4,170 and the total cases treated, 2,161.

The general opinion gathered from reports by the Medical officers stationed throughout the Colony and Protectorate is that this figure represents about 25 per cent of the true number existing. This, of course, is purely conjectural, but probably very near the mark. Keen interest has been evinced by the Medical Officers of the staff and by the Political Officers of the various districts who have been very helpful in aiding the leprosy survey.

Extensive propaganda has also helped in making the counts as complete as possible.

In studying the various reports one or two points strike one as worthy of note :—

(1) There is amongst the Medical Officers a unanimous request for leper settlements as the only solution of the problem.

(2) Long distances which lepers now have to travel for treatment.

(3) Difficulty in maintaining the interest of the various chiefs who can be very helpful in persuading their subjects to undergo treatment.

(4) Shortage of funds and staff.

(5) Discouragement of patients at the slow cure.

(6) The apathy of the people in general towards the disease and its treatment.

With regard to (1) the building of settlements will depend on the funds available. It is obvious that settlements cannot be built in every district, and I am of opinion that there ought to be two large settlements in addition to the present one at Ho, namely Kumasi and Tamale, from which areas the largest numbers of cases have been reported.

The difficulty in (2) would be solved when settlements are available.

(3), (5) and (6) would be counteracted by maintained propaganda and results of treatment.

(4), of course, controls the whole problem, and little or no financial assistance can be expected in the present state of trade depression.

In the Northern Territories, where leprosy is very prevalent, it was suggested that the native administration should finance a scheme for the construction of a segregation leper village near Tamale, where there is a large out-patient clinic ; but here the difficulty of staff and maintenance is a barrier to what would be a great advance.

The White Fathers at Navrongo in the Northern Territories have for many years done very good work amongst the lepers in their area and hold daily clinics where a trained sister is in charge. They recently received a grant from the British Empire Leprosy Relief Association to help them in their work.

There is no doubt about the value of permanent settlements, where treatment can be carried out in cheerful and healthy surroundings, and segregation put into practice.

The best results can be achieved in this way and it is hoped that the day is not far distant when the problem can be further tackled on the lines suggested.

Ankylostomiasis.

The number of cases recorded was 184, an increase of 37 over the previous year's figure.

Ankylostomiasis is everywhere, but from the figures it would not appear to cause the grave anæmia and widespread ill-health associated with it elsewhere.

Very frequently the eggs are found in casual or routine examination of fæces in cases where there are no symptoms of ankylostomiasis.

Ascaris.

Like ankylostomiasis prevails everywhere, and children are the chief sufferers.

Schistosomiasis.

There were 500 cases treated as against 453 cases treated last year. This is .23 per cent of the total cases treated. Last year the percentage was .24 and in 1928–29 .12 per cent. In certain districts of the Northern Territories the infestation seems to be very rife. In the Nangodi area the Medical Officer estimates that 30 per cent of the population suffer from bilharzia.

Dracontiasis.

One thousand three hundred and seventy-seven cases were reported which is a decrease on last year's figure 1,678.

Guinea-worm is very common in the Northern Territories and in other dry areas, where water is scarce in the dry season and water-holes are used indiscriminately for bathing, laundry and drinking.

The improvement and proper protection of water supplies is the ideal aimed at, but the enormous areas involved and the peculiar conditions prevailing in them make it impossible to apply the method to more than a limited number.

Yaws.

From the table submitted above under the heading of Venereal Diseases it will be seen that in 1929–30, 22.82 per cent of all cases treated by the Medical branch were yaws.

For the year under review the figure is 26.54, a considerable increase.

It is not considered that there is an absolute rise in the incidence of yaws, and the figure can be explained by the great increase in the Northern Territories figures, where yaws is very rife and accounts for a far greater percentage of the total diseases than it does in the Colony.

This fact would give an absolute and also a relative increase. The control of yaws still presents a difficulty which has not been solved by the introduction of the cheap Bismuth preparations, which made it possible to give treatment to a far greater number of patients than could be done with the expensive arsenical preparations.

Medical officers are not yet in agreement as to the relative values of bismuth and arsenical preparations, and further research will be necessary before any definite opinion can be arrived at.

At the suggestion of the Colonial Medical Research Committee, the Secretary of State forwarded to this Government supplies of five different preparations of bismuth in order to find out if a more suitable preparation than the bismuth sodium tartrate could be found.

A series of experiments were conducted at Kumasi and a report was furnished.

Although the numbers of patients and attendances were not sufficient to arrive at a definite conclusion, it was however, fairly well established that the new preparations held no superiority over the old bismuth sodium tartrate. However, it was suggested that additional supplies be obtained and further experiments conducted.

Up to the end of the year the supplies had not been received.

Ulcers.

During the year 14,446 cases were treated, comprising no less than 6.7 per cent of all cases treated. Ulcerative conditions of the skin are extremely common and present a real problem to employers of labour. The problem is even greater than the figures would suggest,

because of the length of time a sufferer from ulcers is incapacitated from work. Periods of two and three months are quite common. Much time is given in out-patient work in dealing with these cases which come up for dressing week after week.

Rabies.

There was one undoubted case of rabies diagnosed during the year and corroborated by laboratory findings.

This makes the fourth case of rabies seen on the Gold Coast. Numbers of people have been bitten by dogs, which have been termed mad, and a few received injections of the active carbolised anti-rabic vaccine which is always kept in stock, *vide* remarks on page 17 of the 1929–30 Annual Report.

The true case of rabies recorded this year was in a Fulani aged 38 years who gave a history of having been bitten by a mad dog three months previously. He was in a drowsy state when admitted, and suffered from partial paralysis. Spasms occurred at intervals of two or three minutes and were practically restricted to the muscles of deglutition. A spasm could be provoked by asking the patient to swallow some water.

The patient died next day. An autopsy was done and Negri bodies were found in the brain.

During the year three French Europeans were sent from French Togo to Accra for a course of the anti-rabic vaccine.

No cases treated developed rabies, but on the other hand there was no proof that the dogs were rabid.

Snake Bite and Fitzsimons Anti-venom Serum.

Two cases of snake bite treated with Fitzsimons anti-venom serum were reported by Dr. P. D. Oakley, Assistant Director of Medical Service, Northern Territories.

The first case was a labourer who was bitten on the left hand. He was seen a few minutes after the bite, a tourniquet was applied, the wound incised, potassium permanganate crystals rubbed in, and 5 c.c. anti-venom serum were injected above the bite subcutaneously. About ten minutes after this 10 c.c. were injected intravenously. The typical signs of snake bite poisoning were present and the patient was in a state of collapse.

After the injection the patient fell into a deep sleep and awoke next morning feeling very well.

About two months previously a Fulani worker was bitten by a snake of exactly the same species and died. No anti-venom serum was then available.

The second case was a Police recruit who was bitten at 8.45 one evening by Naja Nigricollis. The bite was on the pulp of the right second toe. He was admitted to hospital at once and a tourniquet was applied, incisions made and potassium permanganate rubbed in.

The patient had the usual signs of snake bite poisoning. 5 c.c. of Fitzsimons anti-venom serum were injected around the base of the toe and five more given intravenously. Next day the local and general symptoms had practically subsided and the patient made an uninterrupted recovery.

There is no doubt about the life-saving virtue of Fitzsimons anti-venom serum and a small quantity is being stocked in all Medical stations for emergency use.

(*b*) VITAL STATISTICS.

General European Population.

	1928–29.	1929–30.	1930–31.
(i) Government Officials	1,280	1,323	1,313
(ii) Employees of trading firms	1,712	1,723	1,519
(iii) Employees of Mining Companies ...	457	467	453
(iv) Missionaries	159	180	223
Total	3,608	3,693	3,508

A decrease of ten Government officials over the previous year took place and a decrease of 165 non-officials.

I.—EUROPEAN OFFICIALS.

TABLE SHOWING SICK, INVALIDING AND DEATH-RATES.

	1928–29.	1929–30.	1930–31.
Total number of officials resident	1,280	1,323	1,313
Average number resident	881	972	936
Total number on the sick list	846	912	799
Total number of days on sick list	7,177	7,795	7,961
Average daily number on sick list	19.6	21.3	21.81
Percentage of sick to average number resident	2.22	2.19	2.32
Average number of days on sick list for each patient	8.48	8.54	9.96
Average sick time to each resident	8.14	8.02	8.50
Total number invalided	50	49	49
Percentage of invalidings to total residents	3.90	3.70	3.73
Percentage of invalidings to average number resident	5.67	5.04	5.22
Total deaths	4	5	3
Percentage of deaths to total residents ...	0.31	0.37	0.22
Percentage of deaths to average number of residents	0.45	0.51	0.32
Number of cases of sickness contracted away from residence	Not available.	Not available.	Not available.

European Officials.—Invalidings and Deaths 1930–31.

TABLE SHOWING SEX OF OFFICIALS.

	No.	Deaths.	Invalided.	Death-rate per 1,000.	Invaliding rate per 1,000.
Officials { Males	1,242	2	45	1.61	36.23
Officials { Females ...	71	1	4	14.08	56.33
Totals	1,312	3	49	2.28	37.31

NUMBER OF DAYS ON SICK LIST.

	1928–29.	1929–30.	1930–31.
Tropical diseases	2,241	2,462	2,423
Non-tropical diseases	4,936	5,333	5,538
Total	7,177	7,795	7,961

Causes of Invalidings of European Officials.

Neurasthenia 5 ; salpingitis 1 ; arthritis 2 ; peripheral neuritis 1 ; jaundice 1 ; tonsillitis 1 ; dengue fever 1 ; climatic bubo 1 ; cataract 1 ; rodent ulcer of upper eyelid 1 ; exhaustion 1 ; injuries 2 ; fractures 2 ; insomnia 1 ; neuritis 1 ; malaria 5 ; amnesia 1 ; wounds 1 ; pernicious anæmia 1 ; delusions 1 ; gastric ulcers 2 ; cystitis 2 ; chronic appendicitis 1 ; cardiac debility 6 ; pyelitis 1 ; blackwater fever 3 ; hallucinations 1 ; emphysema and chronic bronchitis 1 ; enteritis 1. Total 49.

Of the 49 officials invalided one was military.

Causes of Deaths of European Officials.

Motor car accident 1 ; acute gastro-enteritis 1 ; heart failure 1. Total 3.

Of the three officials who died none was military.

European Officials.—Invalidings.

ANALYSIS OF RESIDENTIAL SERVICE.

Serving under the	Under 6 months.	6 but under 9	9 but under 12	12 but under 15	15 but under 18	18 months and over.	Total.
Old leave regulations ...	1	4	1	1	—	—	7
New leave regulations ...	9	5	5	8	10	5	42

Five-year period, 1926–31, Invaliding and Death rates.

Invaliding rate per 1,000.

1926–27	46.84	
1927–28	32.44	
1928–29	39.06	average—3.85 per cent.
1929–30	37.03	
1930–31	37.31	

Death-rate per 1,000.

1926–27	2.87	
1927–28	4.99	
1928–29	3.12	average—.34 per cent.
1929–30	3.77	
1930–31	2.28	

EUROPEAN MORTALITY AND INVALIDING RATES FOR THE YEAR.

	No.	Deaths.	Invalidings.	Death rate per 1,000.	Invaliding rate per 1,000.
Officials	1,313	3	49	2.28	37.31
Non-officials	2,195	15	34	6.83	15.48

II.—EUROPEAN NON-OFFICIALS.

TABLE SHOWING INVALIDING AND DEATH-RATES.

1928–29.	No.	Deaths.	Invalidings.	Death-rate per cent.	Invaliding rate per cent.
Merchants	1,712	16	22	0.93	1.28
Mining companies	457	6	8	1.31	1.75
Missionaries	159	—	1	—	.62
Totals	2,328	22	31	.94	1.33
1929–30.					
Merchants	1,723	15	24	0.87	1.38
Mining companies	467	3	24	0.64	5.13
Missionaries	180	1	2	0.55	1.11
Totals	2,370	19	50	0.80	2.11
1930–31.					
Merchants	1,519	10	21	0.65	1.38
Mining companies	453	5	7	1.10	1.54
Missionaries	223	—	6	—	2.69
Totals	2,195	15	34	0.68	1.54

EUROPEAN NON-OFFICIALS.—INVALIDINGS AND DEATHS 1930–31.

TABLE SHOWING SEX OF NON-OFFICIALS.

	No.	Deaths.	Invalided.	Death-rate per 1,000.	Invaliding rate per 1,000.
Merchants ... Males	1,139	9	17	7.90	14.92
Females	380	1	4	2.63	10.52
Mining companies Males	438	5	7	11.41	15.98
Females	15	—	—	—	—
Missionaries Males	135	—	6	—	44.44
Females	88	—	—	—	—
Totals	2,195	15	34	6.83	15.48

CAUSES OF INVALIDING OF NON-OFFICIAL EUROPEANS.

Eye trouble 2; cause unknown 2; jaundice 2; tubercular disease 2; debility 3; debility after yellow fever 1; blackwater fever 1; dysentery 2; adenitis 2; bubo 1; fever 2; acute tonsillitis 1; atelectasis lung 1; alcoholism 1; lacerated eye 1; trypanosomiasis 2; persistent vomiting of pregnancy 1; arthritis 1; para-typhoid 1; abscess and cystitis 1; peripheral neuritis 1; malaria 1; cardiac disease 2. Total 34.

CAUSES OF DEATHS OF NON-OFFICIAL EUROPEANS.

Fractured skull 1; new born infant 1; bacillary dysentery 1; suicide (firearm) 1; cardiac failure 1; carbon monoxide poisoning 3; bilious remittent malaria 1; fractured pelvis and perforated intestine 1; carbuncle 1; blackwater fever 2; appendicitis and peritonitis 1; sod. cyanide poisoning 1. Total 15.

III.—AFRICAN OFFICIALS.

TABLE SHOWING SICK, INVALIDING AND DEATH-RATES.

	1928–29.	1929–30.	1930–31.
Total number of officials resident	3,983	4,474	4,775
Average number resident	3,655	4,154.22	4,451.02
Total number on sick list	1,252	1,260	1,175
Total number of days on sick list	11,955	13,176	12,691
Average daily number on sick list	32.66	36.09	32.03
Percentage of sick to average number resident	0.89	0.86	0.72
Average number of days on sick list for each patient	9.54	10.45	10.80
Average sick time to each resident	3.27	3.17	2.85
Total number invalided	25	34	37
Percentage of invalidings to total residents	0.62	0.75	0.77
Percentage of invalidings to average number resident	0.68	0.81	0.83
Total deaths	21	19	11
Percentage of deaths to total residents ...	0.52	0.42	0.23
Percentage of deaths to average number resident	0.57	0.45	0.25
Number of cases of sickness contracted away from residence	Not available.	Not available.	Not available.

Causes of Invalidings of African Officials.

Psycho-neurosis 6; pulmonary tuberculosis 7; carcinoma of liver 1; leprosy 1; optic atrophy 2; defective vision 5; chronic rheumatism 1; chronic nephritis 1; arthritis 2; general debility 2; abdominal aneurysm 1; tertiary syphilis 1; deafness 1; sub-acute yellow atrophy of the liver 1; myocarditis 2; epilepsy (epileptic dementia) 1; traumatic neurosis 1; staphyloma of right eye 1. Total 37.

Causes of Deaths of African Officials.

Toxæmic jaundice 1; syncope following heavy meal 1; septicæmia and miscarriage 1; septicæmia 1; carcinoma of liver 1; pneumonia 2; saltpingitis 1; broncho-pneumonia 1; parenchymatous nephritis 1; carcinoma stomach 1. Total 11.

IV.—GENERAL AFRICAN POPULATION.

For the sake of comparison with previous years particulars are given below of births, deaths and infant mortality rates at six of the principal and most populous centres in the Colony and Ashanti.

During 1930–31, births and deaths registered in the Colony and Ashanti numbered 8,065 and 5,882 respectively as compared with 7,985 and 5,590 respectively in 1929–30.

Town.	Deaths.				
	1926–27.	1927–28.	1928–29.	1929–30.	1930–31.
Accra	1,130	1,233	1,276	1,300	1,190
Kumasi	436	524	561	682	719
Cape Coast	315	325	343	322	324
Sekondi	375	324	280	287	279
Koforidua	239	215	197	317	354
Tarkwa	190	190	122	118	153
Total	2,685	2,811	2,779	3,026	3,019

Town.	Births.				
	1926–27.	1927–28.	1928–29.	1929–30.	1930–31.
Accra	2,095	2,030	1,925	2,428	2,580
Kumasi	550	474	679	719	827
Cape Coast	306	273	303	554	505
Sekondi	242	235	215	284	248
Koforidua	173	187	488	555	243
Tarkwa	72	34	66	62	55
Total	3,438	3,233	3,676	4,602	4,458

Town.	Infant Mortality rate.				
	1926–27.	1927–28.	1928–29.	1929–30.	1930–31.
Accra	124	128	150	140	110
Kumasi	110	142	88	141	119
Cape Coast	124	124	99	52	73
Sekondi	61	68	51	123	145
Koforidua	196	176	181	131	267
Tarkwa	152	382	51	129	236
Total	767	1,020	620	716	950

III.—HYGIENE AND SANITATION.

A.—General Review of Work done and Progress made.

I.—MOSQUITO AND INSECT-BORNE DISEASES.

(*a*) Malaria.

Malaria still remains the greatest predisposing factor in the mortality and morbidity rates amongst children in the Gold Coast and in the adult it plays its part in most pathological processes and is of first importance as a factor in minimizing labour efficiency.

No drainage or anti-malarial works of any great magnitude were undertaken during the year under review with the exception of the continuation of the Korle Lagoon Scheme in Accra.

The construction of the rising main for pumping the surface water collected from the Accra main drains into the sea was practically completed by the end of the year and good progress was made in the construction of the lagoon retaining wall.

In most of the larger centres the progress in general anti-malarial measures has been well up to the standard of previous years, and much good work has been done in the filling-in of low-lying lands incapable of permanent drainage.

In addition, other low-lying areas have been drained by means of graded earth drains fed by ".herring-bone" collaterals, either surface or sub-soil, and many swamps have been kept free of vegetation and treated as often as required by oiling mixtures or Paris Green.

Other swamps and permanent collections of water impossible of any of the above treatments have been stocked with fish of the top minnow species, with excellent results in most cases.

In certain coastal lagoon areas, crab-holes have been a source of great trouble and these are dealt with by waste oil before filling-in.

Periodical inspections of trees are carried out in all stations and holes capable of holding water are filled-in with a sand or sawdust and tar cement.

In most main centres, permanent street drainage continues to be undertaken when funds allow, but, owing to the depressed financial condition of the Colony, progress has been somewhat slow.

(*b*) Yellow Fever.

Two sporadic cases occurred during the year, one at Cape Coast and the other at Aboso in the Tarkwa District. The case at Cape Coast was a European lady who recovered. A specimen of her blood was examined at the Rockefeller Laboratory at Yaba, Nigeria, and it was found to protect monkeys inoculated with the yellow fever virus.

The second case was in an African at Aboso and was fatal. In each case intensive anti-mosquito measures were undertaken and no further cases occurred.

Table I gives the incidence of yellow fever during the last decennial period.

TABLE I.

Year.	Cases.	Deaths.	Percentage mortalty
1921	4	4	100
1922	10	8	80
1923	19	16	84.2
1924	8	6	75
1925	7	4	57.1
1926	65	18	27.6
1927	107	40	37.3
1928	2	2	100
1929	Nil	Nil	Nil
1930	2	1	50

It is to be understood that sporadic cases of yellow fever are inevitable from time to time particularly in outlying districts where only a limited staff can be available for regular inspections.

It is most encouraging to record that the larval indices of towns generally remained low and this is especially the case in the endemic zone in the Eastern Province of the Colony, where intensive sanitation was rendered possible by the 1928–29 increase in staff.

Table II shews the domiciliary visits and larval indices in five large towns.

TABLE II.

Station.	Domiciliary Visits.		No. of Larvae.		Larval. Index.	
	1929–30.	1930–31.	1929–30.	1930–31.	1929–30.	1930–31.
Accra	158,141	235,089	1,389	1,037	0.87	0.44
Koforidua	32,393	31,085	201	355	0.64	1.14
Cape Coast	53,635	46,711	640	783	1.20	1.67
Sekondi	50,871	80,378	241	400	0.47	0.49
Kumasi	56,140	55,317	731	656	1.30	1.19

The total figures for the whole Colony, Ashanti and Northern Territories are as under :—

Total inspections.	No. of houses with larvae.	Larval index.
1,199,382	10,469	0.87

In the light of the present state of yellow fever research no protective vaccine is now stocked, but the Director of the Rockefeller Commission at Yaba, Nigeria, advises that, in the event of cases occurring, "it would be well to inoculate a fairly large amount of convalescent serum from some person who had had a definite attack of the disease."

A large number of specimens of blood has been examined at the Rockefeller Institute at Yaba, and it is proposed to keep a list of all persons whose blood is protective against yellow fever in monkeys.

The chief safeguard against yellow fever is, undoubtedly, well organised and unremitting house-to-house inspection.

(*c*) Filariasis.

The Ho District is the only district in which filariasis appears to be at all common.

In this connexion the Medical Officer, Ho, writes :—

"Filaria loa loa is very common in this district. Of the 515 lepers in the Ho Leper settlement 23 per cent have been found to harbour this filaria, and of 100 control cases taken throughout the district 17 per cent were found to harbour it. It is frequently seen in the course of routine blood examinations at Ho. Efforts are being made to capture chrysops."

The only other cases recorded were eight at Tamale, three at Salaga, three at Sekondi, three at Winneba and four at Zuarungu. All other stations report that the condition is very rare or not seen at all.

(*d*) Trypanosomiasis.

Up to the present it has not been proved that trypanosomiasis can be considered a great menace in any part of the Gold Coast.

However, every year brings to light more cases and the disease certainly cannot be ignored and should be the subject of continued research.

In the light of our present knowledge, therefore, it is extremely difficult to indicate the distribution and case incidence.

The highest incidence of the disease appears to be in the fishing villages along the middle two-thirds of the course of the Volta River, in the Kete Krachi, Mampong, Eastern Gonja and Kintampo districts.

In this connexion the Senior Health Officer, Ashanti and Northern Territories writes :—

" There are endemic centres in the Northern Territories, e.g. Makongo, and the cases treated at Tamale (42) were nearly four times as many as in the previous year, but it is very difficult to say whether there has been a real increase in this disease.

" On the other hand only two cases (arising at Kete Krachi) were seen by the Medical Officer, Salaga.

" The Pathologist at Yeji, however, treated the considerable total of 90 cases.

" Two cases with one death were diagnosed at Bekwai.

" At Wa two cases were treated. Tsetse flies are numerous between Bole and Larabanga in which area no cases were seen.

" A few cases were seen at Kintampo.

" In Kumasi 19 cases with 10 deaths were recorded and the Medical Officer of Health discusses the probability of two of these cases having been contracted in Kumasi itself."

Apart from the above there is no indication that the disease is prevalent in any other part of the Gold Coast.

As a preventive measure, clearing of bush in the vicinity of towns, villages and main traffic routes is undertaken by the Health Department.

2.—INFECTIOUS DISEASES.

(*a*) Cerebro-Spinal Meningitis.

There was no outbreak of cerebro-spinal meningitis during the year. Two fatal cases were recorded, one each from Accra, and Kumasi.

(*b*) Dysentery.

Eight hundred and ten cases of dysentery with 170 deaths were reported from all stations.

These cases must not be taken as representing the amount of dysentery prevailing generally since the reporting stations are comparatively few in number. However, for comparative purposes, the figures are of some value as shewn in Table III below.

TABLE III.

	Colony.		Ashanti.		Northern Territories.		Total.	
	1929–30.	1930–31.	1929–30.	1930–31.	1929–30.	1930–31.	1929–30.	1930–31.
Cases ...	681	624	56	56	128	130	865	810
Deaths ...	134	130	8	21	16	19	158	170

Preventive measures undertaken are steady improvement of water supplies and efficient disposal of night-soil and refuse.

(*c*) Enteric Group.

During the period under review 51 cases with six deaths were reported as compared with 51 cases and 12 deaths for the year 1929–30.

There is little doubt that there is much more typhoid and paratyphoid amongst the African population than is generally supposed and it is only by increased laboratory facilities that such cases will be brought to light.

Each year shews a tendency towards increased incidence of the disease ; this, it is thought, being due not so much to any actual increase in prevalence, but to better facilities for diagnosis and a more general recognition of the disease.

The time has now come, it is considered, when preventive inoculation of T.A.B. Vaccine should become compulsory for all Europeans both official and non-official coming to West Africa.

Prevention resolves itself into continued efforts to improve water supplies and unremitting anti-fly work consisting of protection of latrines and efficient disposal of excreta and refuse.

(*d*) Plague.

No case of plague occurred during the year 1930–31 and no plague infected rat was discovered.

In eight large centres 102,232 rats were caught during the period under review and in stations where the requisite facilities for examination existed, a percentage of rats caught was examined daily.

Details of rodents caught are as under :—

Kumasi	24,509
Koforidua	10,623
Winneba and Swedru	6,404
Nsawam	9,307
Cape Coast and Elmina	18,275
Accra	11,932
Sekondi	20,118
Takoradi	1,064
	102,232

Prevention of plague in the Gold Coast consists of the regular trapping and examination of rats, efforts to improve existing housing conditions and removal of insanitary and congested areas, rat-proofing of houses, stores, warehouses, etc., as far as possible and encouraging the sanitary lay-out of townships.

It is most encouraging to note that the help of the health authorities is being sought much more frequently than formerly by trading firms, Government Departments and private individuals in dealing with rat infestation.

Unfortunately many areas still exist in all the large towns of the Gold Coast, with the possible exception of Kumasi, where housing conditions and overcrowding are so bad that an outbreak of plague in them would be disastrous and very costly to eradicate.

(*e*) SMALL-POX.

During the year a total of 94 cases with eight deaths were reported, seven sporadic cases in the Colony, 13 with two deaths in Ashanti and 74 with six deaths in the Northern Territories.

One minor outbreak occurred at Domeabra, in the Konongo-Agogo region of Ashanti which consisted of nine cases with two deaths. Infection was attributable to a Hausa woman coming from the north. The outbreak was quickly subdued and the entire district vaccinated.

Various other small outbreaks occurred in four outlying districts near Tamale in the Northern Territories, the largest consisting of 15 cases with three deaths at Patenga.

The severest outbreak was reported from Zabzugu in the Eastern Dagomba District where there were 16 cases with three deaths and cases were still occurring after the end of the year.

A few sporadic cases occurred also in other parts of the Eastern Dagomba District.

A few cases were reported from the Bawku District on the Northern Frontier of the Northern Territories.

Vaccinations to the number of 188,463 were performed in Ashanti and the Northern Territories alone, there being a great demand for vaccination from the chiefs and people in the infected areas, this demand being met as expeditiously as possible with the limited number of vaccinators and lymph at the disposal of the Health Department.

It is believed that the outbreaks in the Eastern Dagomba and Bawku districts were traceable to French Territory, to French Togoland and the Haute Volta respectively.

Most of the cases were of a mild nature and in this connexion the Medical Officer of Health, Tamale, writes :—

> "It is also interesting to note that several cases of chicken-pox superimposed on yaws came to our notice and caused great difficulty in diagnosis, which was really only cleared up on the administration of Sobita."

Below are appended Tables IV and V shewing the distribution of cases and the number of vaccinations performed :—

TABLE IV.

	Colony.		Ashanti.		Northern Territories.		Total.	
	1929–30.	1930–31.	1929–30.	1930–31.	1929–30.	1930–31.	1929–30.	1930–31.
Cases ...	236	7	17	13	27	74	280	94
Deaths ...	101	Nil	3	2	1	6	105	8

TABLE V.

	1928–29.	1929–30.	1930–31.
Total Number vaccinated	274,795	413,745	376,668
Number verified successful	65,146	82,973	70,787
Percentage successful	27.7	20.05	18.79

The percentage of cases verified successful to the total number of cases seen after vaccination was as high as 80.76 per cent. It is therefore reasonable to suppose that the same proportion of successful cases occurred amongst the number that were not seen after vaccination.

(*f*) Leprosy.

During the year there was a great increase in most stations in the number of cases of leprosy attending for treatment.

This is an example of a disease apparently on the increase whilst in reality due to increased interest in the problem on the part of Medical Officers, increased confidence on the part of the lepers themselves and also without doubt due to the great improvement to patients after treatment in the early stages of the disease.

The incidence of the disease varies widely in the various districts of the Colony, Ashanti and the Northern Territories, but to give any actual figures of the total number of lepers would be quite impossible at this juncture.

During the 1931 Census it is proposed to try and obtain actual figures, but these figures will have little real value as most enumerators have no knowledge of the condition.

(*g*) Anthrax.

Anthrax occurs sporadically amongst live-stock throughout the Northern Territories, but, during the period under review no human cases were recorded.

Every effort is made to control cattle traffic in large centres, cattle are inspected before slaughter and strict meat inspection and proper sanitary control of cattle kraals and slaughter-houses is carried out.

(*h*) Relapsing Fever.

A total of 126 cases with eight deaths were reported from the Colony and Ashanti ; the Northern Territories rendering a nil return.

Fifty-six of these cases with five deaths occurred in Accra and 70 with three deaths in Kumasi.

The Medical Officer of Health, Accra, writes as follows :—

"Most cases occurred amongst people from the Northern Territories.

"The cause was as always dirt, overcrowding and starvation ; most of these men had no regular employment.

"Early and strict measures were adopted to prevent the spread of the disease. When a case was reported by the Hospital, the patient's residence and adjacent rooms were surrounded and every inmate shaved and bathed, and all his belongings steam-disinfected by Lelean's sack disinfector and returned only when the contact had completed his bath.

"The disease did not reach epidemic proportions and the houses where it occurred were widely scattered."

The following interesting report is made by the Medical Officer of Health, Kumasi.

" Seventy cases of Relapsing Fever with three deaths occurred in Kumasi during the year, 62 of the cases, with one death occurring in the months of May, June and July, 1930. It is difficult to ascribe any reason for this exacerbation of a disease which I am convinced is endemic in this town. The disease is confined to those immigrants from the Haute Volta Territories, who are known locally as " Kaya-Kayas " or porters. These people are chiefly Zabramas, but there are among them numbers of Fulanis, Busangas and Grumas. They work for no master, but pick up a living by carrying loads to and from the Railway Station, Lorry park, Market, etc. There are always half a dozen or so outside every large store waiting for a purchaser to hire them. They save every halfpenny they can, even at the expense of food and so are generally speaking a miserable looking lot of specimens. Some club together and hire a room between six or eight or more of them, others forgo even this and sleep huddled together on verandahs of houses and in odd corners of the Zongo market. They are distinctly uncleanly in their clothing and persons. In consequence it is not surprising that the disease should attack these people, indeed it says a great deal for their natural powers of resistance that so many of them remain comparatively healthy.

" No accurate figures of the numbers of these people in Kumasi are available. One morning by starting an hour before sunrise 1,116 of them were collected and counted (over half of these were sleeping out of doors) their clothes were examined and were invariably lousy, they were then shaved, bathed in Izal solution and their clothes boiled for 30 minutes in Izal solution. I have no doubt however that some 2—300 Kaya-Kayas escaped out of the net, which gives a figure of about 1,400, a considerable proportion of a population of about 30,000. Owing to the depressed state of trade far more Kaya-Kayas are leaving Kumasi than are entering it at present, so that the figure is now probably well below 1,000.

" The Relapsing Fever that occurs in Kumasi is undoubtedly louse-borne. That the lice are infected has been demonstrated microscopically. But I am not satisfied that the disease is originally louse-borne. It is possible that these lousy immigrants, in the course of their long trek (on foot) to Kumasi may sleep in tick-infested areas. Since the disease is hereditary in ticks it is not necessary that the area shall have been recently infected. Some of the wanderers may be bitten and become infected, and from them their lice. In Kumasi, where they live under conditions eminently suitable for the breeding of the lice and the transmission of louse-borne disease, the disease spreads and so becomes noticeable. One reason I have for favouring this theory is that there are so many Kaya-Kayas who are not immune to the disease, whereas if it were a disease common in their own country it is probable that there would be few. Language difficulties have prevented much research along these lines.

" Three lines of defence have been organized against this disease. First, since June, 1930, all lousy persons entering Kumasi by the North Road have been bathed, shaved and have had their clothes disinfected—14,164 persons were dealt with in this way in the Quarter ending 31st March, 1931, no records are available for the previous seven months. Secondly, round-ups of lousy- Kaya-Kayas are made at irregular intervals, and these are deloused as above. One such round-up—in February, 1931—resulted in the

cleaning of 1,116 persons in one day. Thirdly, all contacts of cases of Relapsing Fever are collected, deloused and isolated in the Contagious Diseases Hospital for ten days "

In Kumasi facilities are provided for dealing with homeless Northern Territories labourers by the " Refuge " or " Poor-house."

(*i*) TUBERCULOSIS.

During the Calendar year 1930, which is the period dealt with by the Vital Statistics Report of the Principal Registrar of Deaths, there were 566 deaths from all forms of tuberculosis recorded from all the registration areas, numbering 30.

This figure gives a rate of 94.7 per thousand deaths. This is a high rate but is only three above the figure for 1929. Since then it must be remembered that two new registration areas have been instituted in which 214 deaths from all causes were registered. The small increase in the tuberculosis rate is, therefore, to be expected.

From these figures there is no reason to suppose that tuberculosis is on the increase.

In the large, more advanced and populous centres there is some indication that a slight degree of immunity is being acquired. This, however, is not marked and generally it may be stated that the average African has little or no resistance to the disease.

If one is right in the conclusion that the disease is making no marked headway and that the case incidence is practically stationary and this conclusion would appear to be correct from figures returned, then the future must be considered hopeful.

Year by year conditions improve and enlightenment of the general population advances.

Prevention can be summed up briefly under two heads.

Personal.

Education in the fundamental principles of hygiene. The inculcation of more cleanly habits such as curtailment of indiscriminate spitting ; efficient ventilation of living rooms especially at night ; better nutrition by increasing the protein and fat-content of the diet, and excluding tinned articles of no food value.

General.

The abolition of all overcrowded and insanitary areas in towns. These are present everywhere and are seen at their worst in Accra, Cape Coast and Sekondi and in the non-mine owned portions of Mining towns.

This, however, is a big problem and can only be undertaken very gradually and at great expense.

The segregation of the open infectious type of case. This is very necessary and a start could be made at Tarkwa, where the case incidence is the highest in the Gold Coast, amongst the mine labourers.

In the meantime, when the problem is viewed from all angles it would appear that the disease can be best dealt with by improving general sanitation and housing rather than by any costly direct expensive institutions.

Table VII below shews the number of deaths from tuberculosis and percentage of deaths from tuberculosis compared with deaths from all causes for the years 1929 and 1930.

TABLE VII.

EXTRACTS FROM TABLE A: REPORT OF PRINCIPAL REGISTRAR OF DEATHS FOR 1929 AND 1930.

	Accra.				Cape Coast.				Sekondi.				Tarkwa.				Koforidua.				Kumasi.			
	1929.		1930.		1929.		1930.		1929.		1930.		1929.		1930.		1929.		1930.		1929.		1930.	
	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.
Pulmonary Tuberculosis	95	7.3	70	5.6	34	10.9	47	14.8	43	15.4	44	15.1	34	27.6	32	22.2	13	5.1	26	6.4	50	7.7	60	8.2

A report by the Medical Officer of Health, Tarkwa, is shewn as Appendix " A."

(*j*) Yaws.

Yaws still remains one of the problems to be faced in the Gold Coast, especially in the Northern Territories and in rural districts generally.

There are indications, however, in some of the larger centres, that the disease is decreasing in incidence. Thus, in Accra, the Lady Medical Officer in charge of the Infant Welfare Centre states that the number of cases of yaws seen during the period under review has decreased considerably. This is probably consequent to some extent on the yaws clinic opened at Achimota.

The Medical Officer of Health, Koforidua, states that the numbers attending for treatment at that station are steadily diminishing.

Cape Coast also records a large drop in the number of cases attending the Infant Welfare Centre.

The Mines Medical Officer at Obuasi writes :—

> " One or two villages have been practically cleared of yaws and it is expected that the benefits resulting from this will shew themselves in time."

On the other hand the Senior Health Officer, Ashanti and Northern Territories, writes :—

> " This disease is very prevalent and usually accounts for the largest numbers of cases coming under treatment. Such figures as are given are very impressive. Thus the Medical Officer, Wa, reports 6,510 cases treated, many of whom however, came from French territory. Tamale 4,121 ; at Salaga there were 2,537, i.e. 47.3 per cent of all cases seen ; at Kete Krachi 1,194 . . . Yaws forms 37 per cent of the cases seen at the Infant Welfare Clinic, while upwards of 17,000 cases were treated at the African Hospital and the Contagious Diseases Hospital, Kumasi."

In view of the success obtained in the larger centres of the Colony, it is not unreasonable to forecast that eventually the disease will play a much less important part in the general morbidity of the African population, provided that the intensive anti-yaws campaign of previous years is kept up, such campaign consisting of intensive treatment of cases and the continuation of general sanitary measures in the widest meaning of the term.

(*k*) Diphtheria.

During the year three cases of diphtheria were recorded, one from Sekondi and two from Accra. All the three cases were notified from the Infant Welfare Centres and the diagnoses were confirmed bacteriologically.

The case from Sekondi was a female child aged 18 months and ended fatally. All contacts had a series of throat swabs taken and in two cases prophylactic injections of antiserum were given. All swabs were negative.

The account of the two cases in Accra will be found in the Laboratory report.

3.—HELMINTHIC DISEASES.

(*a*) Ankylostomiasis.

Although very few cases were recorded during the year, there is little doubt that a great deal of minor infestation exists which, although, not giving rise to any obvious symptoms of the disease, still must play some part in lowering the resistance of the individual.

Prevention consists in the provision of efficient means of disposal of night-soil and prevention of indiscriminate defæcation.

(*b*) Dracontiasis.

This condition is extremely common in the Northern Territories and in many districts in Ashanti where the water supply is of poor quality and scarce in the dry season.

In the Colony the district of greatest incidence appears to be the rural district between Winneba and Swedru, where water is scarce and of poor quality. Three hundred and eight cases were treated in Kumasi, most of these being immigrants from the Northern Territories or villagers living outside the boundaries of Kumasi.

Two hundred and five cases were seen at Tamale.

The Medical Officer of Health, Winneba, records 32 cases from the outlying villages and states that the condition is very common in Swedru.

The inhabitants of many districts, where the water supplies are poor, seem to know the condition well and therefore avoid infected sources.

Every effort is made to provide safe water supplies and to improve existing ones.

(*c*) Ascariasis.

Ascariasis is very common throughout the Colony, Ashanti and Northern Territories especially amongst children.

The Medical officers of Dunkwa, Wiawso, Keta and Obuasi report that infection is the rule in their districts, and the Medical Officer, Obuasi, gives routine treatment to all children in the same way as quinine. He also records his opinion as follows —

> " It is my belief that this is a much more common cause of child mortality than is generally supposed."

Prevention is directed towards the provision of efficient disposal of excreta.

(*d*) Taeniasis.

This condition is very common in the Northern Territories and 386 cases were reported from Tamale and 234 from Zuarungu, whilst the Medical Officer, Lawra, states that it is very common in that district.

The high incidence is not surprising, as in most parts of the Northern Territories meat is eaten in a half-raw condition due possibly to the scarcity of firewood.

Most of the stations in the Colony report very few cases or none at all but 133 cases were treated at Kumasi in Ashanti.

Efforts are directed towards the provision of slaughter-houses or slaughter slabs, efficient inspection of meat and satisfactory night-soil disposal.

(*e*) Schistosomiasis.

Schistosomiasis does not appear to be very common except in the Swedru district, Colony and in the Zuarungu District, Northern Territories.

The Medical Officer of Health, Winneba, writes —

> " Quite common in the Swedru District . . . . an investigation was made by the Research Department ; no conclusion as to source has been arrived at up to date."

The Medical Officer, Zuarungu, reports 34 cases treated and writes as follows :—

"But recent investigations carried out at Nangodi shewed that 30 per cent of the population was infected. I am, at present, unable to say what the intermediate host is, but none of the snail shells I have examined have been those of *Bullinus* or *Planorbis*."

At Kumasi 50 cases with nine deaths occurred but the Medical Officer of Health is of the opinion that all of these cases were undoubtedly infected elsewhere.

The Medical Officer, Ho, reports 15 cases, but states that "most of the cases were females from Tokoke, and an effort has been made to clean the spot where water is procured in this village."

Efforts are made to deal with all known infected water supplies.

4.—ANIMAL DISEASES.

There would appear to have been no outbreak of epidemic disease during the period under review.

The Medical Officer, Lawra, Northern Territories, writes, as follows :—

"*Rinderpest* is liable to occur in this district but no cases have been reported during the last year. Immunization against this disease is taking place on a large scale at Kani by Mr. Fulton, the Veterinary Officer. Practically all the cattle in the Lawra district have already been immunized, and the Tumu cattle will be dealt with next.

"*Bovine pleuro-pneumonia* is liable to occur but has only been noticed last year in cattle actually undergoing immunization.

"*Piroplasmosis*.—This is endemic among the cattle, apparently being commonest in those cattle which normally graze near rivers. This disease has become most apparent as a complication, when actual rinderpest immunization takes place.

"Normally the cattle appear to tolerate a certain degree of this infection without ill results."

As regards *Anthrax*, the Medical Officer, Lawra, also writes :—

"An outbreak of suspected anthrax broke out at the end of March, 1931, at Gbeturi near Yagga—one goat appears to have died under circumstances suggestive of this disease. Since then 12 hippopotami have been found dead in the river near this place—the natives believe these to have died of anthrax."

One fatal case of rabies occurred at Achimota. The infected dog was destroyed and a round-up of stray dogs made.

During the month of August, 1930, there was an outbreak of sarcoptic mange at Tamale, which was dealt with by the Principal Veterinary Officer. Out of 486 dogs examined, 23 were found to be suffering from this condition.

Routine inspection of animals after slaughter by the Veterinary Department at the Tamale abattoir revealed the following principal pathological and parasitic conditions.

TABLE VIII.

Cattle.

Disease.	Number. Slaughtered.	Number infected.	Percentage.
Cysticercus bovis	590	71	12 per cent.
Contagious bovine pleuro-pneumonia ...	590	77	13 per cent.
Trematodes in liver	590	141	23.9 per cent.
Onchocercosis	590	15	2.5 per cent.
Echinococci	590	2	0.33 per cent.

Sheep and Goats.

Disease.	Number Slaughtered.	Number infected.	Percentage.
Caseous lymphadenitis	3,366	229	6.8 per cent.
Pleuro-pneumonia, goats	1,272	8	0.6 per cent.
Trematodes in liver	3,366	149	4.4 per cent.
Hepatitis, various	3,366	513	15.2 per cent.
Oesophagistomum columbianium	3,366	542	16.1 per cent.
Nephritis	3,366	58	1.7 per cent.
Echinococci	3,366	7	0.2 per cent.

Table IX shows the amount of cysticercal infection found in Accra and Kumasi.

TABLE IX.

	Cattle infected with C. bovis.		Percentage infected.		Swine infected with C. cellulosae.		Percentage infected.	
	1929–30.	1930–31.	1929–30.	1930–31.	1929–30.	1930–31.	1929–30.	1930–31.
Accra ...	15	1	0.72	.038	795	737	17.4	15.26
Kumasi ...	39	13	1.9	.6	1	4	0.69	2.43

5.—SEASONAL PREVALENCE OF DISEASES.

The seasonal prevalence of disease is not very marked except as regards respiratory diseases, which are more prevalent during the months of December and January, when the Harmattan, a dry and dusty wind from the Sahara, blows.

Some stations consider that Malaria is somewhat more frequently met with at the beginning and the end of the rains, while there seems to be little doubt that Relapsing Fever and Small-pox are diseases of the dry season.

The Medical Officer of Health, Tamale, has observed that the incidence of amoebic dysentery varies inversely with the rainfall while the bacillary type varies directly.

II.—GENERAL MEASURES OF SANITATION.

(*a*) Sewage Disposal.

Accra and Takoradi are the only towns possessing water-carriage systems of sewage disposal and these are only small systems connected with public institutions. For instance there is one at the Gold Coast Hospital at Korle Bu, one at the Prince of Wales College, Achimota, two public latrines in Accra Town and a system connected with the European Hospital at Takoradi.

All other stations are served by pan-latrines, salga-pit latrines or 'Smoke-pit Salga latrines. Night-soil is disposed of by tipping at sea, by trenching or by disposal into " fly-proofed " and " fly-trapped " pits.

At Obuasi, in the mines area of the Ashanti Goldfields Corporation, night-soil is incinerated.

In Accra, Kumasi, Sekondi, Koforidua, Tamale and Cape Coast, night-soil is conveyed to the disposal areas by motor-lorry and in other stations by head-loading.

The experiments carried out on the elaboration of a simple concrete-built septic tank latrine have been completely successful so far and this type of latrine has been erected at Labadi (3), and Teshi. A modified type designed by the Medical Officer of Health, Cape Coast, has been erected at the Mfantsipim new school at Cape Coast and has also proved eminently successful.

It is hoped, when funds permit, to replace gradually the old insanitary pan-latrines by these new septic tank latrines.

(*b*) Refuse Disposal.

All combustible refuse is mostly disposed of in concrete or brick incinerators, or in swish-built field incinerators, whilst in some stations it is used for filling in low-lying and swampy areas.

Refuse is placed by the inhabitants in public dustbins from which it is collected by motor lorry, hand-carts or head-loading for removal to the disposal areas.

Incombustible material, mostly consisting of tins and bottles, is disposed of as a rule in swampy or low-lying areas, packed tightly and covered with well rammed earth. In this way, many areas have been reclaimed and put to an economic use.

In Accra, the erection of the high temperature refuse-destructor mentioned in last year's report was completed during the year and has given satisfactory service, dealing with 75 tons of refuse daily. A tin-baler and bottle-crusher is part of the equipment of this destructor.

(*c*) Drainage.

Apart from the permanent drainage work constructed by the Public Works Department, which unfortunately, has not progressed so rapidly this year as in former years owing to lack of funds, a great deal of earth-drainage has been taken in hand by the Medical Officers of Health and Medical Officers of many stations.

The amount done can be gauged from the following extracts :—

Accra	...	192,590 lineal yards dug and graded. 219,110 yards cleaned.
Kumasi	...	80,805 yards dug and graded. 394,593 yards cleaned.
Sekondi	...	2,977 yards dug and graded. 895,172 yards cleaned.
Takoradi	...	10,718 yards dug and graded.
Nsawam		866 yards dug and graded. 7,685 yards cleaned and graded.
Winneba	...	93,072 yards cleaned.
Koforidua	...	11,322 yards dug and graded. 14,921 yards cleaned.
Tamale	...	11,432 yards dug and graded. 46,803 yards cleaned. 7,150 yards graded.

In Accra, the scheme to connect up the outfalls of the main drains, collect the contents into a main collecting-tank and then pump them through a rising main into the sea, was practically completed at the end of the year, and will be working very early next year.

(*d*) Water Supplies.

Work on the Kumasi and Tamale water supply schemes was commenced during the year and great progress has been made in each instance.

Some 14 new village water supplies were constructed in Ashanti, most of them being of the concrete tank with sand-filter chamber type.

Various wells were constructed throughout the Northern Territories and a few in Colony villages.

A detailed scheme for a pipe-borne gravity supply for Koforidua was worked out by the Senior Hydraulic Engineer and it is hoped that funds will become available in the near future to put this badly-needed work in hand.

The existing pipe-borne supplies at Accra, Sekondi, Takoradi, Cape Coast and Winneba have given satisfaction throughout the year, samples for bacteriological examination being taken weekly in the case of Accra, Sekondi and Takoradi, fortnightly at Cape Coast and periodically at Winneba.

In Accra the new service reservoir has apparently overcome the deficiency in pressure, previously experienced in many parts of the town.

(*e*) Clearing of Bush and Undergrowth.

Clearing of bush and undergrowth is undertaken in all centres when necessary and in most instances a great deal of work is performed annually.

Whenever possible in the larger towns, dhub grass is planted to replace the cleared undergrowth.

(*f*) Sanitary Inspections and Prosecutions.

A total of 1,199,382 house-to-house inspections were carried out during the year compared with 840,725 during 1929–30.

Table X shews the results of these inspections in five towns :—

TABLE X.

	Premises inspected.	Convictions for Larvae.	Fines for Larvae.	Insanitary conditions convictions.	Fines for Insanitary conditions.
			£ s. d.		£ s. d.
Accra	235,089	527	491 7 6	4,385	1,048 1 6
Kumasi	55,325	276	139 4 6	1,841	613 5 6
Cape Coast ...	48,705	344	155 17 6	447	127 11 6
Sekondi	82,393	237	128 18 6	841	172 2 6
Koforidua ...	56,968	220	125 0 0	884	291 15 0

III.—SCHOOL HYGIENE.

The hygienic condition of schools generally improves year by year and it is gratifying to record considerable improvements in many districts during the period under review.

In Accra, where overcrowding had been the rule in previous years, the Medical Officer of Health states that there has been a marked improvement since legal power was obtained to deal with overcrowding.

The Medical Officer of Health, Koforidua, states that the schools in his district, with one exception, are " quite commodious, well lighted and well ventilated."

A report by the Medical Officer of Health, Tamale, on the Trade Schools is published as Appendix " B."

The Medical Officer of Health, Sekondi, writes as follows :—

" There are three large schools and one small one at present in Sekondi in all of which the accommodation is well lighted and ventilated, all doors and windows being kept open during school hours."

The Medical Officer of Health, Cape Coast, writes :—

" There are 13 schools in Cape Coast which are with two exceptions fairly sanitary ; the exceptions being . . . now closed and . . . school ; the latter have put in plans for a new and better building . . . ." New Mfantsipim School has some very excellent features of construction. The lay-out is spacious and well chosen. The open-air dining hall and assembly room is a new departure that could well be followed by others."

" The latrine is referred to under Sewage Disposal.

" The kitchen is an excellent attempt to reconcile native cooking ideas with modern sanitary methods."

The Medical Officer of Health, Winneba, reports :—

" Latrine accommodation is not adequate in most of the schools, but improvements are being made. Nsaba Presbyterian Mission is a show place with regard to sanitation. Perfect pit-latrines, fly-proofed and smoke-pits provided ; their own modified Sierra Leone-type incinerator built by the school children."

Regular and systematic inspection of school children in their schools has not been possible owing to the whole time of the Medical Officers being taken up with curative work at the Infant Welfare Clinics.

IV.—LABOUR CONDITIONS.

Labour conditions in the Gold Coast remained much the same as in previous years except that the amount of labour under agreement has decreased.

Owing to trade depression there has been a lot of unemployment, especially in the large cacao centres, and cases of destitution have been frequently met with. Again wages have been reduced, but prices of essential foodstuffs and rents have not decreased in proportion.

The majority of labour is recruited from the Northern Territories and these labourers often arrive in Ashanti and the Colony in an unfit condition.

Owing to trade depression, there has not been the same exodus as in former years from the Northern Territories during the period under review.

During the year 3,511 deck passengers and 380 Kroo immigrants were examined at Accra and 3,088 deck passengers at Takoradi.

V.—HOUSING AND TOWN PLANNING.

Town planning in the outlying districts of Accra is now on a satisfactory basis and the building of good houses has continued to progress, although somewhat slowly.

The congested areas in the middle of the town, however, still remain in the same insanitary condition and the need for action is becoming more pressing year by year. This applies to most of the larger towns with the exception of Kumasi, an exceedingly well laid-out town.

At Takoradi, accommodation for Europeans is now ample and in the African Townships all houses are of excellent quality, all being of stone, brick or concrete. Much progress has been made in Tamale, during the year, where the Ashanti type of compound is now being built.

In this connexion, the Medical Officer of Health, Tamale writes :—

> " During the year the area which lies between the Regimental Lines and Zongo Road on the south-east of the town was surveyed and demarcated into building plots. Of these 98 plots have been allocated and building has commenced on 33. On the Moshi Zongo 28 plots have been taken up and in Tishigu lay-out 116."

The Medical Officer of Health, Cape Coast, reports as follows :—

> " The Hausa Zongo, Rocky Lane and Low Town districts are still the plague spots that they were last year. At the present rate of building it will be 30 years before Cape Coast becomes a well-built town.
>
> " The housing scheme at Amanful still exists precariously and the new housing scheme is still awaiting fruition.
>
> " One thousand five hundred pounds was set aside last year, and it is hoped to add further to this when the year's finances are brought to account. A Housing Committee now exists and a rough scheme for loan of money with adequate security to prospective house builders has been formulated. It is not proposed to take action under this until a minimum sum of £3,000 has been set aside.
>
> " A town lay-out is also under consideration."

In Winneba a new lay-out has been provided and people are being gradually moved to this, as houses in the more congested areas become insanitary or dangerous.

During the year three village overseers trained in the construction of Ashanti lay-outs were transferred from Ashanti to the Tarkwa District to assist in laying out villages, particularly on the new Tarkwa-Aniben Motor Road. Much good work has been done by them.

Building progress in Kumasi continued but slowly owing to financial depression and overcrowding tends to be a menace.

Many new lay-outs were commenced in Ashanti during the year, but here, as everywhere, trade depression has laid its hand with resulting incompletion of compounds.

In this connexion the Senior Health Officer, Ashanti and Northern Territories reports :—

> " This list has an encouraging aspect, but by now one has learned to wait and see what will ensue on the completion of the swish-walls, When the building is ready for roofs of corrugated iron, window-frames, shutters, and doors, a pause follows, and it has to be admitted that throughout Ashanti, meeting on every side the melancholy spectacle of well laid-out roofless and unoccupied towns, the impression one receives is that of a country ravaged by war or desolated by pestilence ; ' mute monuments to the unattainable ambitions of a penurious people,' as one Superintending Sanitary Inspector puts it. The entire village rebuilding scheme is,

without question, an admirable inspiration, and in the prosperous days of its inception deserved energetic support and was entitled to count on successful completion. But now that prosperity has faded to an extent which nobody could have foreseen, none can say when, if ever, it will return. The position is distressing to the Health Officer, and a subject of constant and anxious reflection in the search for such modifications of dimensions and materials as would better suit the people's altered means without, however, mutilating the original plan. Corrugated iron and carpenter-made doors and windows are expensive, especially far away from Kumasi ; for most Zongo inhabitants the cost is prohibitive. What cheaper materials may be sanctioned ? Discussing these questions with Superintending Sanitary Inspectors, Village Overseers, and the people themselves, I came to the conclusion that the choice now lies between standing fast for the unmodified type i.e. acquiescing in present depressing wilderness for years during which the unprotected walls will collapse, and accepting certain modifications. These are :—

" (*a*) A compound of 60′ x 60′, i.e. a saving of 40′ of swish wall with its corrugated iron or cement protection. The number of rooms within this area will, of course, be reduced. All agree that the people would make every effort to complete such houses, and an interesting point is that such dimensions would be especially welcomed by women house-owners, who ' fear ' the larger spaces—a kind of agoraphobia which one can understand. I propose however, to permit these reduced compounds at first only in small villages, which have not been and probably never will be laid out by the Provincial Surveyor. All towns laid out by him are on the 60′ x 80′ standard.

" Whoever feels confident of constructing the larger building will, of course, be encouraged to do so.

" (*b*) Materials. The roof is really the crux. The alternative to corrugated iron are shingles and thatch. I prefer shingles, because, though not very durable, they afford less harbourage for vermin and are not so easily inflammable as thatch, besides which their use may revive in some degree the once-flourishing trade of shingle-cutter. In certain places, especially towards the north, thatch will have to be permitted. In every case, before permitting either shingles or thatch, the comparative cost of corrugated iron will be studied, and in all possible cases it will get the preference.

" Walls. In many Zongos the Seriki has asked to be allowed to build with walls of scantlings or timber posts, roughly dressed, sunk in the ground and bound by horizontal lengths laced to them with " tie-tie," this framework to be filled with swish to a thickness of nine inches, the whole to be plastered and whitewashed. I have debated this from every point of view with Mr. Buckle, Superintending Sanitary Inspector in the Mampong area, and the fact emerges that such walls, though not as good as the standard swish wall, have in many cases stood for 20 years and more. For most Zongo people the standard house is out of the question, and I propose to agree to this type of construction, which will ensure for a generation or so a more spacious compound and ventilated rooms of adequate space in place of the present huddled, crumbling, dog-kennel habitations. This appears preferable to waiting for the last trumpet.

"Two more points I should like to emphasize. In the first place, nobody has been pressed to complete an 8-room or a 10-room house; in every case the builder has been strongly advised to aim at completing the first three or four rooms and then coming to live in the house, further rooms to be added, if he desired them, *pari passu* with his means and energy. But in spite of this, vanity urges them all to put up the walls of a many-roomed house.

"In the next place, I have incessantly warned them to borrow nothing for their buildings, but to build out of their own disposable means, even though completion took a very long time.

"In fact, an alarming recourse was being had to commercial firms for corrugated iorn and other materials on credit, the security being their cacao crop. If they thus got entangled, the consequences would be grave, as the recovery of their independence would be less facile than the loss of it."

VI.—FOOD IN RELATION TO HEALTH AND DISEASE.

It may be stated generally that foodstuffs procurable throughout the Gold Coast are sufficiently varied and plentiful to admit of a well balanced diet.

This is borne out by the fact that deficiency diseases are uncommon and very few are recorded by Medical Officers of Health and Medical Officers, except by the Medical Officer of Health, Cape Coast, who writes as follows:—

"From personal experience at the Clinic the writer expresses the view that there are a large number of 'below-par children' whose condition suggests avitaminosis although he has seen no definite case of the Sierra Leone disease or beri-beri."

There is however, a tendency to overload the diet with carbohydrates and to reduce proteins and fats.

Tinned foodstuffs, especially the cheaper brands, are much in favour in the large towns, but there is as yet no proof that the consumption of these foodstuffs has done a great deal of harm, the diet, apparently being supplemented by a sufficient quantity of articles containing the necessary accessory food factors.

Apart from helminthic diseases caused by the consumption of under-cooked meat, the main trouble is caused by contamination of unprotected foodstuffs exposed for sale by hawkers in dusty, public thoroughfares and in close proximity to public conveniences, etc.

In spite of the tightening up of legislation in some of the larger towns, these hawkers continue to be a nuisance and will be until the general public becomes more enlightened and realises that the safeguarding of its own health depends to a great extent upon itself.

In all centres with an adequate Sanitary Staff, inspection of foodstuffs, exposed for sale in shops, markets, etc., is a routine measure, and that much good work has been done in this direction is proved by the lists of foodstuffs condemned as unfit for human consumption submitted by the various Medical Officers of Health and Medical Officers.

Markets.

All markets are controlled by the Health Authorities or Town Councils in the larger centres and are under the direct whole-time supervision of the Sanitary Inspectors.

By-laws regulating the sale of foodstuffs are in force in all large markets, and in Accra one important amendment was made during the year to the effect that no food may be sold in the state it was to be consumed unless adequately protected from dust and flies.

In Cape Coast a new well-built, well laid-out enclosed market was practically completed by the end of the year and new rules for markets, slaughter-houses, bakeries, dried fish stores and hawkers have been drafted and passed by the Town Council, and are now awaiting the sanction of Government.

The new market at Winneba was well patronised throughout the year and has proved a great boon to the town.

Every effort is made to provide adequate market accommodation wherever necessary, and many new markets have been constructed throughout the Colony, Ashanti and the Northern Territories.

Slaughter-houses.

Slaughter-houses are under constant supervision, all the large centres being equipped with these and most small centres with slaughter-slabs.

The section on "Animal Diseases" should be consulted for information as to the commoner pathological conditions met with.

Aerated Water Factories.

These factories are regulated by by-laws and samples of the products are submitted periodically for bacteriological examination. In most cases samples have been satisfactory throughout the year.

Bakeries.

Bakeries in all the large centres require to be licensed and are inspected regularly.

Prospective licensees have to show a clean, well-constructed and well ventilated mixing room and a clean fly-proof storage room for bread.

Milk.

The Medical Officer of Health, Tamale, writes :—

> "Milk is consumed to some extent in the Northern Territories, and efforts have been made to safeguard the milk supplies. The animals are periodically inspected by the Veterinary Department, and any case of sickness is reported, while the milk-sellers are advised as to cleanliness in milking and sterilization of receptacles and protection of the milk from flies and other insects. Our efforts in this direction have only been crowned with a moderate degree of success."

B.—Measures taken to spread the Knowledge of Hygiene.

The entire health staff take every opportunity of spreading the knowledge of hygiene amongst the population during the routine work of the Department and much good thereby accrues.

Monthly "Health Days" were held in many of the larger centres and at Cape Coast during those "Health Days" a special subject was chosen each month for discussion with teachers and school children.

The Medical Officers of Health, Cape Coast and Sekondi, gave lectures and demonstrations to Tribunal Registrars whilst the Medical Officers of Health, Sekondi, Nsawam and Koforidua, gave lectures and demonstrations to Chiefs' Police.

At Nsawam, the Medical Officer of Health gave lectures and demonstrations to the older scholars in various schools, at Cape Coast periodic lectures were given to teachers whilst the Medical Officer of Health, Kumasi, lectured at the Infant Welfare Clinic, Wesley College and Government schools.

The Lady Medical Officers in charge of Infant Welfare Clinics gave lectures to members of the Gold Coast League for Maternity and Child Welfare.

The Medical Officer of Health, Winneba, writes :—

> "Lectures have been given in the schools. Examinations have been held. Whenever the schools were inspected, a few scholars were taken and examined and some words said regarding sanitation. Although theoretically the schools are the best medium for diffusing knowledge, in practice it is found that the practical application in the villages of the principles of sanitation brings about the best results. The whole district is open to conviction on health matters ; every town and village in the district will do work to make latrines, dumps, and some sort of a water supply if the position is explained to them and moreover will often voluntarily offer to pay the labour. As instances of this I cite Berekum, Mankron, Ayensuaku, Abodom and Old Bobikuma . . . . . young men are taken in for training ; having first been nominated by their chief ; after three months training they return and act in an advisory capacity on sanitary matters to their chief and as sanitary headmen of their town. This system has produced excellent results: Duakwa, Nsaba, Abodom, Bereku, Mankron, Ayensuaku and Asafo have Chiefs' headmen."

(*b*) Training of Sanitary Personnel.

Periodic lectures were given by most Medical Officers of Health and some Medical Officers to their Sanitary Staff but in Accra, Kumasi and Cape Coast, special courses were given.

The Medical Officer of Health, Accra, writes :—

> "The course includes the teaching of (i) Mathematics; (ii) English; (iii) Elementary Physiology and Anatomy; (iv) Public Health and Hygiene; (v) Gold Coast Public Health Laws and how to write notices and summonses and how to give evidence; (vi) Practical meat inspection and examination of other foods; (vii) Practical disinfection, (viii) Outdoor work, field work, mosquito surveys etc."

The Senior Health Officer, Ashanti and Northern Territories, gave weekly lectures and demonstrations to Village Overseers-in-training, whilst the Medical Officer of Health, Kumasi, gave weekly lectures to Sanitary Inspectors.

The Medical Officer of Health, Cape Coast, reports that during the year one complete course of lectures to inspectors was given and a second course half completed.

In this connexion he writes :—

> "Lectures are given weekly by the Medical Officer of Health and Superintending Sanitary Inspector. Practical demonstrations in infectious diseases as cases are obtainable and at the slaughter-house are given. The lectures include meat inspection and Sanitary Law by the Superintending Sanitary Inspector, Anatomy, Physiology, Dietetics, Infectious Diseases, Entomology, Refuse and Excreta disposal, Mosquito control and Disinfection by the Medical Officer of Health."

(*c*) Recommendations for Future Work.

1. The provision of a pipe-borne water supply to Koforidua. A scheme for a gravity supply has already been drawn up and work could be commenced as soon as funds became available.

2. Provision for village water supplies, particularly in the Eastern Province of the Colony and in the Northern Territories.

3. Gradual replacement of pan-latrines by the new type of septic latrine recently constructed at Labadi.

4. Motor conservancy system for Takoradi.

5. Provision for a Maternity Block at the Kumasi Welfare Centre.

As regards the recommendations made last year, the following have been carried out —

1. Tamale water supply has been commenced and good progress has been made.
2. Many village water supplies have been constructed especially in Ashanti, *vide* section on Water Supplies.
3. Septic tank latrines have been constructed at Teshi, Labadi and Cape Coast, *vide* section on Sewage Disposal.
4. The reclamation scheme for Korle Lagoon, Accra, has proceeded albeit somewhat slowly.
5. Village sanitation has been commenced in the Tamale district, Northern Territories, but no local candidates have been trained as Village Overseers.

The other recommendations have not been carried out owing to financial stringency.

H. O'HARA MAY,
Deputy Director of Health Service.

IV.—PORT HEALTH WORK AND ADMINISTRATION.

The Port Health Officer, Takoradi, reports as follows :—

" The 703 vessels which entered the Harbour during the year were boarded by the Port Health Officer. No vessel was found to be ' infected ' or ' suspected ' according to regulation No. 17 of 1928, made under section 3 of the Quarantine Ordinance. Three thousand and eighty-eight deck passengers were landed and passed through the disinfecting station, where they were medically examined and vaccinated when necessary. Those deck passengers who came from infected Ports were disinfected, and put under surveillance for the required periods of the respective diseases. A considerable proportion of these deck passengers was from Liberia.

" In view of the recent report of the Harvard African expedition 1926–27, it not without interest to observe that numbers of these immigrants frankly state that they have come to the Gold Coast for medical treatment. How far we are justified in giving free attendance to these semi-chronic invalids is a question which must come up in the near future.

" *Infectious Diseases.*

" No case of infectious disease was landed during the year. All cases of sickness on a ship on arrival are seen by the Port Medical Officer, and referred for treatment to a Medical Officer.

" *Boarding of Vessels.*

" Under regulation No. 12 of 1924 all vessels on arrival fly the Q Flag until pratique is granted. The Port Medical Officer

boards the ship as soon as possible after arrival. Under the above regulation power is given to the Visiting Officer to grant pratique under certain conditions.

" *Migration of Rodents.*

" Regulation No 24 of 1928 section 117–120 gives power to insist on certain precautions being taken. Most ships used their own rat-guards, but on occasions the Department has provided these on hire.

" One thousand and sixty-four rats were trapped during the year and 25 per cent were sent for examination to the Pathologist, Sekondi, with negative findings in all cases. One thousand and sixty-one were rattus rattus, two were rattus norvegicus and one was rattus coucha. This total is unsatisfactory and does not give one a proper idea of the extent of the rat population. Unfortunately none of our personnel know much about the intricate art of rat catching.

" *Motor Launch.*

" This continues to prove satisfactory. The average monthly cost for maintenance and repairs was £4 19s. 3d.

" *Water Boat.*

" Frequent inspections were made of the Harbour Authority water boat. This boat which has a capacity of 180 tons supplied 1,374,405 gallons of water to vessels during the year. Monthly bacteriological examinations were made of the water which on all occasions were satisfactory."

Accra.—All immigrants from infected or other ports are inspected by the Medical Officer of Health. No case of infectious disease was landed during the year and no case occurred in the port.

Three thousand five hundred and eleven deck passengers and 380 Kroo immigrants were examined.

Cape Coast.—One hundred and ninety-five immigrants were examined and kept under surveillance. No infectious case was landed but one case of yellow fever occurred in the port *vide* section under Yellow Fever.

Winneba.—Three hundred and thirty-three ships entered the port during the year and 250 immigrants were examined and kept under surveillance. No case of infectious disease was landed and none occurred in the port.

Saltpond, Axim and Keta.—All passengers landing at these ports were examined and kept under observation when necessary.

V.—MATERNITY AND CHILD WELFARE.

Maternity and Child Welfare work on the Gold Coast continued to make great strides during the year 1930–31 as will be seen from the various returns rendered by the Lady Medical Officers in charge of the Maternity Hospital, Accra, and the Child Welfare clinics in Accra, Kumasi, Sekondi, Cape Coast and Koforidua.

The Maternity Hospital in Accra has proved its value as shewn by the fact that the maternal mortality rate has been reduced from 9.92 in 1929–30 to 2.87 in 1930–31.

The training of Midwives is one of its most useful functions, and by the end of the year six midwives-in-training were ready to sit for the final examination. If all these pass the examination, and it is expected

they will, there will be a total of 12 trained midwives. These are attached to the Maternity Hospital and to the various Infant Welfare centres.

The Midwives Ordinance mentioned in last year's report was drafted towards the end of the year, and it is hoped that it will become law early next year. This will do much good by enforcing registration of all midwives trained and untrained, and bring them under Government control.

For full information regarding the activities of the Maternity Hospital, the report of the Lady Medical Officer-in-charge should be consulted at Appendix F.

The Child Welfare clinics maintained their progress during the year with the exception, apparently, of that at Cape Coast. The attendances of children at that Clinic shew almost a 50 per cent drop.

The Medical Officer of Health, Cape Coast, gives three reasons for this drop in numbers :—

(1) The system of counting new cases, which last year was by addition of the 12 separate months' totals, thus giving an opportunity of counting cases twice. All cases now refer to different individuals and individuals who return after due intervals with a separate and distinct clinical condition.

(2) The drop in yaws cases, from 3,724 in 1929–30 to 1,046 in 1930–31.

(3) The raising of fees charged to patients since 1st January, has also produced a drop in numbers.

Table XI shews the attendance of children and expectant mothers at the various Clinics.

TABLE XI.

Centre.	Attendances of children.		Attendances of expectant mothers.	
	1929–30.	1930–31.	1929–30.	1930–31.
Accra	28,902	30,637	1,600	2,129
Christiansborg	18,153	18,411	1,191	1,756*
Sekondi	10,507	14,652	3,050	3,590
Chama	1,562	2,125	—	—
Kumasi	28,186	30,897	6,152	12,070
Cape Coast	21,878	11,122	1,257	2,015
Koforidua	3,487	27,901	120	1,854

*Nine months total.

The new clinic buildings at Koforidua were opened on the 23rd April, 1931 and the work increased enormously over that performed in 1929–30.

Antenatal work has continued to flourish, as seen by the attendances recorded from all Clinics and special attention is drawn to the figures rendered by the Kumasi Clinic.

In this connexion the Lady Medical Officer, Kumasi Centre, writes :—

"At times it has been difficult to cope with the number of women attending this Clinic but the charge of a small medicine fee has reduced the numbers."

In fact the numbers of women and children attending the Clinics, especially at Accra, Kumasi and Koforidua are very difficult to cope with, and it is quite beyond the power of one Lady Medical Officer to give the individual attention that is required.

The voluntary members of the Gold Coast Maternity and Child Welfare League continued their very valuable work under the presidency of Lady Slater and great credit is due to Lady Slater and to the African and European ladies who have contributed so much to the movement by their unflagging energy and zeal.

The staff and students of the Prince of Wales College, Achimota, also continued to contribute their share by welfare visiting in the villages near Achimota.

The excellent progress made at the Child Welfare Clinics at Accra, Kumasi, Sekondi, Cape Coast and Koforidua is demonstrated at Appendix C in the reports of the Lady Medical Officers concerned.

VI.—HOSPITALS, DISPENSARIES AND VENEREAL CLINIC

Tables and Returns, etc.

At Appendix A will be found a list showing all the hospitals and dispensaries in the Colony and Mandated Territory of Togoland, including the Infant Welfare Centres and Contagious Diseases Hospitals administered by the Health branch.

Table V gives a combined summary of all cases (in and out-patients) treated by both the Medical and Health branches in the hospitals, dispensaries and prisons of the Colony and Protectorate. This table includes cases treated in the permanent contagious diseases hospitals, and therefore gives all the cases treated during the year in Government institutions except the Lunatic Asylum. The Venereal Clinic figures are included in the out-patients' table.

On table V are based the diagrams showing the incidence of infective and other diseases (facing page 6).

Table VI is an analysis giving separately the figures for the Medical branch and the Health branch.

The Health branch figures are further dissected to show the cases treated at the Infant Clinics and the Contagious Diseases Hospitals.

The following five-year table shows the numbers of in-patients treated at the hospitals of the three principal centres of the Colony :—

Station.	1926–27.		1927–28.		1928–29.		1929–30.		1930–31.	
	European.	African.	European.	African.	European.	African.	European.	African.	European.	African.
Accra	294	2,640	286	2,724	312	2,606	300	3,087	310	3,572
Sekondi	172	885	224	794	224	868	216*	1,050	161	1,157
Kumasi	140	1,953	151	2,412	203	2,508	213	2,137	173	2,360
Total	606	5,478	661	5,930	739	5,982	729	6,274	644	7,089

*Includes Takoradi owing to the transfer of the European Hospital from Sekondi to Takoradi during the year.

AVERAGE COST PER PATIENT PER DIEM.

The average daily cost per patient per diem for the principal hospitals of the Colony during the past three years is shown below. (These costs have been based on the expenditure for diets and provisions, fuel and light, medical comforts and kitchen staff only).

	1927–28.	1928–29.	1929–30.	1930–31.
	s. d.	*s. d.*	*s. d.*	*s. d.*
European Hospitals.				
(Accra, Kumasi, Tamale, Sekondi, Cape Coast, Axim, Winneba*) average cost ...	6 4¾	5 4½	5 5	5 0¼
African Hospitals.				
(Gold Coast Hospital, Accra, Kumasi, Tamale, Sekondi, Cape Coast, Axim, Saltpond, Koforidua, Winneba*) average cost	0 10	1 1	1 2	1 1¼

*European and African Hospitals, Winneba, and the African Hospital, Koforidua, have been included in the 1930–31 average cost.

European Hospitals.

Accra.—No additions or improvements have been carried out during the year. The new electro-therapy unit reported on last year has proved a great success and is of great value.

One hundred and ninety Europeans received treatment at this new Clinic.

Cape Coast.—Suggestions were put forward to mosquito-proof the hospital, but no new works were carried out during the year.

Takoradi.—As was stated in the 1929–30 report, the European Hospital at Sekondi was converted into an African Hospital and the European Hospital at Takoradi was made to serve both places. The Medical Officer's bungalow was completed at the beginning of the year and no further buildings or alterations have taken place.

Kumasi.—No new ward or buildings were erected during the year, and no alterations were made to existing ones. A new and badly needed additional operating theatre is nearing completion.

African Hospitals.

Accra.—The Gold Coast Hospital, Accra, with its 227 beds and cots continues to do very valuable work, and the following table will show what is being accomplished.

	1927–28.	1928–29.	1929–30.	1930–31.
Out-patients—total	11,040	13,786	14,638	14,191
In-patients—total	2,724	2,661	3,087	3,572
Surgical operations, major	644	602	671	650
Surgical operations, minor	364	295	436	670
Average daily number in hospital	207	208	233	221.9

The X-Ray and electro-therapeutic department has, as usual, been very much appreciated and there is an increase in the total number of X-Ray cases.

The total number of X-Ray cases was 1,486 compared with 1,189 in the previous year.

Actual X-Ray exposures amounted to 2,693.

In the electro-therapeutic department, massage, electrical stimulation, muscle testing, diathermy, radiant heat, ultra-violet rays are given, and the number of cases treated actually amounted to 8,904.

The Venereal Clinic carries on its work at the Gold Coast Hospital.

It will be seen by the table that there is a great decrease in the figures all round. This is explained by the fact that all non-venereal cases were diverted to the ordinary out-patients at the Gold Coast Hospital and only strictly venereal cases were allowed treatment at the Clinic.

Formerly many cases of yaws were allowed treatment at this Clinic and doubtless a large proportion of them appeared in the returns as venereal cases.

In these circumstances no deductions can be drawn from a comparison of this year's figures with former years.

The Medical Officer now in charge states that he found that over 50 per cent of the cases treated were non-venereal in character, which tended to give a false impression of the true number of actual venereal cases.

Treatment.—The routine treatment of gonorrhoea and syphilis has remained substantially the same, with the addition of sulpharsenol and T.A.B. vaccine as a means of protein shock in cases of orchitis, epididymitis and soft chancre.

	1927–28.	1928–29.	1929–30.	1930–31.
Patients treated (old and new cases) ...	4,244	3,852	4,083	866
Gonorrhœa, male and female	562	1,599	1,772	766
Chancroid	22	80	66	28
Syphilis, male and female	337	1,161	1,318	72
Frambœsia	882	—	—	—
Non-venereal	—	812	927	—
Injections N.A.B.	2,927	1,819	1,650	789
Injections B.S.T.	5,924	1,395	1,144	776
Injections collosol Iodine (vein)	—	—	1,460	966
Injections intramine (muscle)	—	—	1,137	812

The training of dispensers for the Colony is carried out in the dispensing school at the Gold Coast Hospital under a Dispensers' Instructor.

The new scheme of training nurse-dispensers has been worked out and a Medical Tutor, a special appointment, came out during the year.

The scheme aims at producing a nurse-dispenser trained in both dispensing and nursing who will be of greater use as an assistant to the Medical Officer than is the present product, and who will be capable of carrying on a village dispensary under the supervision of the travelling Medical Officer. The old scheme produced some very good nurses and some very good dispensers, but the former knew no dispensing and the latter very little about nursing.

The title of Dispenser-in-training is abolished and all would-be dispensers are enlisted as Nurses-in-training. The courses of study are so arranged that after a first year of ward work all nurses-in-training take up the study of dispensing in addition to that of nursing. At the end of the third year all are required to pass the examination entitling them to become Second Division nurses. When successful in passing this examination, and not before, they will be permitted to sit for the druggists examination. When this has been passed they will continue to be classed as nurses until a vacancy in the establishment of dispensers permits promotion to that grade. The grades of Senior nurses above that of Second Division Nurse will thus disappear, and all senior posts, whether the holder is engaged in a dispensary or ward will be filled by "dispensers."

The syllabus is an ambitious one and very comprehensive; it includes courses in Anatomy, Physiology, Anæsthetics, Surgery, First-aid, Medicine, Public Health, Materia Medica, Practical Pharmacy, Toxicology, Chemistry, and with a whole-time officer to deal with the curriculum, the results ought to be very good.

The scheme has also the advantage of getting rid of the old and very marked social distinction between dispensers and nurses.

The same, or even a better, type of candidate is now applying for admission as a Nurse-in-training, who before would have only consented to be a dispenser, and the number of candidates coming forward necessitates a competitive entrance examination.

Maternity Hospital, Accra.

This hospital continues to do very useful work, and is highly appreciated by the African public.

It is now three years since it opened and each successive year adds to its popularity. The out-patients have increased by 3,744 and the in-patients by 260.

It is hoped that we shall be able to extend the Maternity Hospital and open up in other large centres when brighter financial days return.

The training of midwives is going ahead and during the year three nurses completed their training and passed the examination for midwives. One is working as Senior Nurse at the Maternity Hospital, and the other two were taken over by the Health branch and posted for duty in the town.

In the training of these midwives the ideal aimed at is to have the girls fully trained in nursing first before commencing midwifery, so that the finished product will be a fully trained nurse-midwife. A few of the nurses in the Gold Coast Hospital joined recently with the idea of taking their midwifery training, when they have passed their nurses examination.

The Draft Midwives Ordinance for the control and regulation of the practice of midwifery by midwives has been approved for introduction to the Legislative Council, and will be in force during the course of the ensuing year.

In Appendix F will be found the Woman Medical Officer's report on the work of the hospital for the year.

Sekondi.

The conversion scheme described in previous reports has been a great success and Sekondi now has a satisfactory African hospital. Additional accommodation has been obtained by converting an old bungalow in the compound into a female ward for nine beds and two cots.

A new operating theatre is in course of construction.

Nsawam.

A new ward was built to take ten beds.

Wiawso.

The male ward was extended during the year, and a dressing shed was erected.

Winneba.

A new African Hospital taking 60 beds was opened during the year. It has electric light and a good pipe-borne water supply, and is very fully equipped.

Mpraeso.

A new ward was built to take eight beds.

Obuasi.

A new up-to-date African Hospital was completed during the year by the Ashanti Goldfields Corporation Limited. It has 25 beds and is very fully equipped. It has electric light and power and running water.

Tamale.

A laboratory block was added to the existing hospital during the year, but it has not yet been opened.

Wa.

A new hospital built of "swish" with iron roof was completed during the year. It takes 16 beds and has an operating theatre. There is a new store attached.

Lawra.

A new hospital taking 15 beds was opened at Lawra.

Bawku.

A new dispensary was opened.

Travelling Dispensaries.

There are three travelling dispensaries, Nos. 1, 2 and 3. No. 2 is not operating at the present time on account of the shortage of staff.

No. 1 dispensary is operating in the Lawra and Tumu districts of the Northern Territories, while No. 3 operates in the Southern section of the British Mandated area of Togoland. Both these units have done useful work during the year, No. 1 having treated 9,678 patients, and No. 3, 4,549.

In Appendix B will be found an excellent account of the working of No. 1 Mobile Dispensary unit, which operates in a very isolated area and is a long way off from the nearest base, where mechanical assistance and spare parts can be obtained. There is no regular transport service to this area, and during the wet season it is quite impossible for any motor vehicle to get through.

Some of the difficulties, and troubles which have to be contended with, are mentioned in the Medical Officer's report. Accompanying the report is a map which will give the reader an idea of the distance covered and the area served.

Mission Dispensaries.

A new up-to-date hospital taking 60 beds belonging to and built by the Basel Mission was officially opened at Agogo in Ashanti on the 21st March, 1931.

The European staff consists of a European doctor, and a qualified European nurse.

The African staff consists of seven young men and two girls. The hospital is very well equipped and furnished, and a special electrical plant and water supply will be installed during the course of next year.

The other missions mentioned in last year's annual report still continue to do very useful medical work.

REPORT ON THE WORK OF THE DENTAL CENTRES DURING THE YEAR.

Staff.—Mr. W. H. Donald was in the Colony throughout the year and was stationed at Accra.

Mr. J. Campbell was stationed in Kumasi until he went on leave on 7th August, 1930.

Mr. Minto, European Dental Mechanic (not a Government official), assistant to Mr. Donald, was stationed in Accra throughout the year.

Dental work was carried out at Accra, Sekondi, Kumasi and Cape Coast.

During the year a considerable amount of work was undertaken among school children, and a marked increase in the incidence of dental caries was noted.

The following statement will show the work which has been accomplished during the year.

The following is a classification of the total patients treated giving the figures for 1927–28 and 1928–29 as well.

	1927–28.	1928–29.	1929–30.	1930–31.
Officials—European	762	789	724	941
Officials—African	819	1,235	1,548	2,240
Total officials... ...	1,581	2,024	2,272	3,180
Non-officials—European	708	805	620	745
Non-officials—African	1,506	1,605	1,259	1,361
	2,214	2,410	1,879	2,106
Total treated ...	3,795	4,434	4,151	5,287

Dental operations including extractions, fillings, dressings, mechanical repairs, etc., amounted to 7,083. The chief pathological conditions met with during the year were dental caries, abscess, pulpitis, periodonitis, pyorrhœa, gingivitis and septic roots; all cases amounted to 6,655 compared with 6,212 of the previous year. Dental caries accounted for 2,875 of this number, equivalent to 43 per cent.

The dental Surgeon is of the opinion that dental caries is increasing in the Gold Coast, but it must be remembered that the great majority of his patients are drawn from the large coast towns, where the changed mode of living, the consumption of imported and tinned foodstuffs and a diet of low nutritional value all play a not inconsiderable part in tooth destruction.

VII.—PRISONS AND ASYLUMS 1930–31.

Prisons.

The prisons of the Gold Coast administered by the Prisons Department are as follows :—

A.—Convict Prisons 4
B.—Local Prisons 24

The *Convict Prisons* are situated in Accra (Ussher Fort), Sekondi, (Central), Kumasi and Tamale.

The *local Prisons* are as follows and are constructed as shown below :—

Accra, James Fort Elmina Cape Coast Sekondi, Fort Orange Axim Keta	Converted Forts of solid masonry.
Tarkwa Kintampo	Brick.
Akuse Ho Salaga	Stone.
Bole Obuasi Winneba Sunyani Kpando Gambaga Zuarungu Bawku Navrongo Lawra Wa Yendi Krachi	Swish.

There is separate accommodation for females at the following prisons :—

Accra, Elmina, Kumasi, Keta and Tamale.

In all prisons, prisoners sleep in association cells. In the more modern prisons the cells are mostly smaller, accommodating three prisoners. This refers more particularly to the four convict prisons, whilst cells at all local prisons are for the most part large cells accommodating from 10 to 30 prisoners.

There are no single cells except for punishment segregation.

At Accra, Sekondi, Kumasi and Tamale, long-sentenced prisoners are employed chiefly in the Workshops or on reconstruction work. Short-sentenced prisoners are employed on farming or sanitary work. The hours of labour are from 6 a.m.—11 a.m. and from 12.30 p.m.—3.30 p.m. Except in the case of particularly dangerous prisoners of whom there are very few, no prisoners are required to work in their cells.

Considerable improvements were effected at Kumasi Prison, where the erection of a new block built of brick and reinforced concrete gave good accommodation for all prisoners. Formerly short-sentenced prisoners were confined in insanitary swish cells. In addition the yard was enlarged and a new kitchen of solid brick construction is nearing completion.

At Yendi arrangements have been made for the construction of a new prison to replace the old one, which was insanitary and overcrowded. This will be built during the year on a site a mile from the town and will give ample accommodation for all prisoners likely to be admitted.

The Diet Scale is attached marked " A."

The average daily lock up was 1,825.89 as compared with 1,753.95 in 1929–30.

SCALE OF DIET (r.19.)

No. I.	No. II.	No. III.		Punishment.	European.	West Indian.	Infirmary.	
		5 days a week.	2 days a week.				Full.	Low.
Kenki ... ... 2 lb. Fish, fresh cooked 2 oz. or Fish, salt cooked 3 oz. or Beef, fresh cooked 1 oz. or Beef, salt cooked 1½ oz. Pepper ... ½ oz. Salt ... ¼ oz.	Kenki ... 2½ lb. Fish, fresh cooked 3 oz. or Fish, salt cooked 4 oz. or Beef, fresh cooked 1½ oz. or Beef, salt cooked 2 oz. Pepper ... ½ oz. Salt ... ¼ oz.	Kenki ... 2½ lb. Fish, fresh cooked 4½ oz. or Beef, fresh cooked 1½ oz. or Beef, salt cooked 2¼ oz. Pepper ... ½ oz. Salt ... ¼ oz.	Boiled Cassada 2½ lb. Fish, fresh cooked 3 oz. or Fish, salt Cooked 4½ oz. or Beef, fresh cooked 1½ oz. or Beef, salt cooked ... 2¼ oz. Pepper ... ½ oz. Salt ... ¼ oz. Palm Oil ... ½ oz. Vegetables ... 4 oz. The above articles of diet, excepting the boiled cassada, are to be made into soup.	No. I. Kenki ... 1½ lb. Salt ... ¼ oz. No. II. Kenki ... 1 lb. Salt ... ¼ oz.	*Per diem.* Rice ... 1½ lb. Bread ... 1½ lb. Fresh Beef, cooked or Fowl cooked, 1 lb. *or 3 days a week.* Fresh fish, cooked ½ lb. or Fresh Beef, cooked 1 lb. or Fowl cooked 1 lb. *Per week.* Tea ... ½ lb. Sugar ... ½ lb. *4 days a week.* Eggs 2	Same diet as First and Second Class, except that the Kenki or Cassada shall be reduced by ½ lb. in respect of which reduction Rice ½ lb. or Agidi ½ lb. is to be substituted.	Kenki ... 2 lb. or Rice cooked 1 lb. or Cassada cooked 3 lb. Fish, fresh cooked 4 oz. or Fish, salt cooked 6 oz. or Beef, fresh cooked 2 oz. or Beef, salt cooked 2 oz. Pepper ... ½ oz. Salt ... ¼ oz. Palm Oil ¼ oz. Vegetables, 4 oz. Akassa ... 1 lb.	Kenki ... 2 lb. or Rice cooked ¾ lb. or Cassada cooked 2½ lb. Fish, salt cooked 4 oz. or Beef, fresh cooked 1½ oz. or Beef, salt cooked 1½ oz. Pepper ... ½ oz. Salt ... ¼ oz. Vegetables, 3 oz. Akassa 10 oz.

All Native prisoners are allowed 10 oz. of boiled Akassa every morning, except when on No. 2 punishment diet, to be taken before the day's work is begun.

1. Prisoners sentenced to 7 days and under, No. 1 diet, without fish or meat.
2. Prisoners sentenced to more than 7 days and not more than one month, No. I diet.
3. Prisoners sentenced to more than 1 month and not more than six months, No. II diet.
4. Prisoners sentenced to more than 6 months, No. III diet.
5. In case of Kroo men Rice to be substituted for Kenki at the following rate :—No. I, ¾ lb. ; No. II, 1 lb. ; No. III, 1 lb. ; Punishment, ¾ lb. ; Infirmary, Full, 1 lb. ; Low, ¾ lb.

The total number of deaths numbered 24 as compared with 34 in the previous year equalling 13.14 per thousand. Of these deaths five occurred at Accra, two at Sekondi and four at Kumasi.

	Death-rate.	Total.	Percentage of average daily lock-up.
1925–26	—	35	1.29 per cent.
1926–27	—	30	1.85 per cent.
1927–28	—	53	3.11 per cent.
1928–29	—	39	2.16 per cent.
1929–30	—	34	1.93 per cent.
1930–31	—	24	1.31 per cent.

The general health was good throughout the year and there was no serious outbreak of disease and no epidemic.

The average number on the sick list was 34.43 i.e. 1.8 per cent as compared with 1.87 per cent for the previous year.

Satisfactory sanitary arrangement exists in all prisons.

Central Lunatic Asylum, Accra.

The staff throughout the year consisted of the following :—

Alienist Officer	1
Head Attendant	1
Assistant Head Attendant ...	1
Matron	1
Mental Nurses (male)	17
Mental Nurses (female) ...	4
Gate-keeper	1
The African Staff total ...	25

During the year 1930–31 the following changes in the staff have occurred, Mr. H. Edwards (Mental Nurse) retired on pension on 31st December, 1930 ; Mr. J. M. O. Adoph was invalided from the Service on 1st March, 1931.

On the 31st March, 1931, there was a total of 326 inmates as compared with a total of 275 on the 31st March, 1930.

Number of patients remaining on 31–3–30 ..	326
Number of patients admitted during 1930–31 ..	131
Number of patients discharged during 1930–31 ..	32
Number of patients escaped during 1930–31 ..	1
Number of deaths during 1930–31	47

The mental diseases from which the inmates suffered were as follows :—

	Males.	*Females.*
Imbecility	16	4
Mania	18	13
Homicidal Mania	9	Nil
Melancholia	11	4
Periodical insanity	2	Nil
General paralysis	2	Nil

	Males.	Females.
Suicidal	3	Nil
Epilepsy	7	2
Delusional insanity	26	10
Dementia	10	3
Secondary dementia	15	3
Paranoia	2	Nil
Dementia praecox...	74	5
Recurrent mania	6	2
Confusional insanity	7	1
Stupor	2	Nil
Acute mania	13	2
Impulsive insanity	1	Nil
Insanity due to trypanosomiasis	4	Nil
Mental deficiency	1	1
Chronic mania	3	Nil
Depressive insanity	3	1
Non syst. del. insanity	17	3
Insanity due to cerebral syphilis	4	1
Involutional insanity	Nil	1
Insanity due to organic lesion ...	1	Nil
Senile Dementia	1	1
Under observation	11	Nil
	269	57

The general health of the inmates during the year was not altogether satisfactory, but no epidemic occurred.

Sporadic cases of bacillary dysentery have not been uncommon, and ankylostomiasis is still endemic.

The diet is ample and varied, and no diseases of the food deficiency type have occurred.

The building is somewhat overcrowded, but the sanitation is very satisfactory. The accommodation of the place has been increased by the erection of two new dormitories.

The improvements effected during the year have been as follows :— Two new wards have been built which have greatly assisted in relieving the congestion.

Two new boilers and one kitchen stove have been placed in the kitchen of the institution.

The kitchen premises attached to the Nurses' quarters have been improved and reconditioned.

It is hoped that a new Asylum will be built somewhere near Kumasi which would be more central, and in the meanwhile a further scheme for a village settlement for male dements is under consideration.

VIII.—METEOROLOGY.

AVERAGE FIGURE FOR THE YEAR, 1930–31.

	Solar Max.	Terr. Min.	Shade Max.	Shade Min.	Range	Mean.	Total rain-fall. Amount in inches.	Degree of. Rel. hum. per cent.	Wind. General direction.	Wind. Average force.
Accra	141.9	73.5	87.7	76.2	19.7	81.9	32.37″	77.0	S.W.	2.0
Kumasi ...	135.5	—	87.9	70.6	23.8	79.2	50.82″	86.0	S.W.	0.7
Sekondi ...	129.7	73.0	86.5	74.3	19.1	80.4	51.93″	78.2	S.	2.1
Tamale ...	149.9	69.5	94.1	69.8	30.8	81.9	48.11″	65.1	S.W.	1.9
Takoradi ...	140.1	68.6	89.6	70.5	25.7	80.0	42.43″	86.4	S.W.	0.6

METEOROLOGICAL OBSERVATIONS, LABORATORY GROUNDS, KORLE BU ACCRA, 9 A.M. READINGS.—1930–31.

Month.	Rainfall in inches.	Highest maximum temperature recorded.	Lowest minimum temperature recorded.	Daily average mean.	Temperature of the dew point. Highest.	Temperature of the dew point. Lowest.
April	1.2	87	73	81.43	78	69
May	4.346	87	74	81.18	77	69
June	8.46	85	74	78.78	75	71
July	0.875	82	73	77.77	75	71
August ...	0.005	79	73	76.54	73	68
September ...	8.883	81	74	77.25	74	71
October ...	4.055	85	74	78.50	75	72
November ...	—	87	76	82.00	76	71
December ...	1.76	87	76	82.10	78	67
January ...	1.08	85	75	81.20	76	66
February ...	1.67	95	73	81.60	77	66
March	1.79	88	75	83.00	80	71

Total rainfall 34.124 inches.

IX.—SCIENTIFIC.

(*a*) Annual Report of the Laboratory Service.

ANNUAL REPORT OF LABORATORY SERVICE, 1930–1931.

I. General Remarks.

This report covers the period 1st April, 1930 to 31st March, 1931.

The body of the report consists of a general review of the work carried out by the Laboratory Service, together with comments on the various disease conditions dealt with and items of medical information which may be of interest to local practitioners.

The more technical material is presented in the form of appendices which come after the main report. It includes interim reports of research work, which it is hoped will eventually be published in a medical journal, and matter which is not sufficiently co-ordinated to warrant such publication, but which should be placed on record for the benefit of future workers in the same locality.

Tables of statistics are placed at the end.

The Staff.—The European Staff has not changed since last report Dr. G. G. Butler, Deputy Director of Laboratory Service, has been resident in the Colony the whole year.

Native Staff.—The numbers remain as detailed in last report. Mr. H. O. Tetteh, Attendant-in-training, has left the service and has been replaced by Mr. D. E. Ankoma.

The Laboratories.—The Laboratory at Kumasi was opened in May. The building is regarded as temporary, as it is too small and too hot for permanent occupation.

The laboratory section of the Medical Department therefore consists of six units, viz.: The Medical Research Institute, Accra, the Gold Coast Hospital clinical laboratory, the Sekondi clinical laboratory, the Kumasi clinical laboratory, the Field laboratory for trypanosomiasis investigations at Yeji and the Entomological unit.

Dr. R. D. Reid has been in charge of the Kumasi laboratory since its opening; Drs. Robinson and Thomson have been at Sekondi in succession and Drs. Thomson and Jackson at the Gold Coast Hospital.

The European staff of the Medical Research Institute consisted of Drs. Butler, Burgess and Helen Russell, together with the laboratory superintendent, Mr. F. Leeson, and the two laboratory assistants, Messrs. Abbott and Woodward. Of the last three one is usually on leave, and of the two in the Colony one is engaged on office and store work.

The clinical laboratories are concerned with routine work, and the Institute is intended chiefly for research. A considerable amount of routine work however is still done at the Institute. This includes the examination of material from the Maternity and Princess Marie Louise Hospitals and from outstations, section work from everywhere except Sekondi, bacteriological water analysis and post-mortem examinations at the police mortuary.

Research work has been continued along lines indicated in last year's report. Dr. Butler has continued his work on the malaria precipitin test (Appendix D) and has also made an analysis of statistics relating to yaws and syphilis (Appendix B). Plague work has been stopped and Dr. Burgess has devoted most of his time to blood cytology (Appendix F). Dr. Russell has continued her work on Relapsing Fever and has published an account of it in the *West African Medical Journal.*

An account of the special work on trypanosomiasis carried on at Yeji appears in Appendix I.

PUBLICATIONS.—The following papers have been published during the year :

1. " Virulence, Immunity and Bacteriological Variation in Relation to Plague." By A. S. Burgess, M.D. *Journal of Hygiene*, June, 1930.
2. " Human and Experimental Relapsing Fever, Accra, Gold Coast, 1929–1930." By Helen Russell, M.D. *West African Medical Journal*, January, 1931.

LABORATORY ANIMALS.—Guinea pigs and white rats have been most prolific and the mortality among the young has been small. In fact the supply of these animals has exceeded the demand and it has been necessary to restrict it. On the other hand rabbits and white mice have not bred satisfactorily. They have large litters, but destroy or neglect the young. Feeding has been on the same lines as outlined in last year's report. There has been no epidemic sickness among the animals.

Another achievement of the guinea pigs, which has probably some connection with their fertility, is that they never failed to produce serum rich in complement for the weekly Wassermann tests. The average strength of serum containing one M.H.D. was 2.2 per cent in the case of males and 2.15 per cent in the case of females, the superior potency of female serum being rather unusual. The animals used for the test had always been kept separate from these of opposite sex, and the females had often been the subjects of negative inoculation experiments, and had therefore been kept in separate cages for a matter of weeks. Apart from this they received no special treatment.

In general the condition of the animals has been very satisfactory and shows continued improvement. Credit for this is due to Mr. Woodward who has given much attention to their feeding and housing.

II. REPORT OF ROUTINE DIVISIONS.

Following the plan of last year's report the routine work of the various units is considered as a whole and an account of it is given below. In compiling this account use has been made of the reports received from the pathologists at Sekondi, Kumasi and the Gold Coast Hospital.

Malaria.—In the table the malaria parasites have not been separated into the different species, as it is considered that this cannot be done with sufficient certainty. For the majority of specimens the thick film method has been used and with this there is more difficulty in distinguishing the species of parasites than in thin films, provided that the parasite can be found at all in the latter. The practice has been to diagnose *P. falciparum* (malignant tertian) if rings only are found, *P. malariae* (quartan) being indicated by the presence of typical sporulating bodies. But it is probable that some quartan cases show rings only and are therefore recorded as malignant tertian making the proportion of quartan cases too low. On the other hand moribund malignant tertian cases may have sporulating bodies in the peripheral circulation and be mistaken for quartan, but such cases are rare and this source of error is considered negligible.

In this year's records, of 3,039 cases which were differentiated 93.4 per cent were reported as malignant tertian, and of these only 3.75 per cent showed crescents ; 6.4 per cent were reported as quartan and only five cases or 0.165 per cent as benign tertian (*P. vivax*). With regard

to the last it may be mentioned that three members of the staff have had experience of benign tertian malaria in other countries including Greece and India, but have never recognised this form of malaria in the Gold Coast, unless imported.

Dr. Butler has examined films from a number of apparently healthy students at Achimota and has found a surprisingly large number infected with malaria. The results are given in the following table :—

Ages.	*Number Examined.*	*Percentage Positive.*
4 to 8	41	85
9 to 12	74	47
13 to 16	87	37
17 to 22	232	33

Blackwater Fever.—Examinations of a few blackwater urines are reported from Sekondi and Kumasi, but nothing special has been noted. The Medical Research Institute receives but few of such specimens, as the disease chiefly affects Europeans and the necessary examinations are usually carried out at the European Hospital. It is noteworthy, however, that two fatal cases in natives came under observation at the Gold Coast Hospital. Both patients were policemen. Detailed reports of the post-mortem examinations are given in Appendix C.

Yaws, Syphilis and Gonorrhœa.—The results of Wassermann and Kahn tests were similar to those of last year 3,504 Wassermann tests at Accra yielding 43 per cent of positives and 790 Kahn tests at Sekondi 47 per cent of positives. Most of these tests were called for because the subjects had symptoms attributable to yaws or syphilis, but a certain number included in the Accra total were carried out on groups of individuals without reference to symptoms in order to ascertain the proportion of positive reactions occurring among the general population. These groups include a series from the leper colony at Ho, another furnished by the Medical Officer, Achimota and a third taken from Dr. Butler's analysis (Appendix B) from the Maternity Hospital, Accra. The Achimota series contains not only students but out-patients from the neighbourhood. The collection of sera undoubtedly constitutes the most laborious part of such an investigation and this was undertaken with enthusiasm by the respective medical officers.

The following table gives the results, including the division of positive reactions into double and single according to the intensity of the reaction :—

WASSERMANN TESTS AT ACCRA.

	Number of tests.	Percentage positive.		
		Total.	Double.	Single.
Total cases	3,504	43	28	15
Ho series	124	45	27	18
Achimota series	184	54	40	14
Maternity series	462	32.5	—	—

The high proportion of Wassermann positives in the Achimota series which contains a proportion of healthy juveniles is striking. The figures suggest that the reaction is acquired in early life and is therefore due to yaws and that it gradually fades out with increasing age. In order to test this hypothesis the records of the last ten years were examined in the hope of detecting a relation between the age of the patients and the

frequency of positive reactions, but unfortunately the ages of the patients were recorded only in a small minority of cases and the figures available did not show a clear relation. It may be mentioned however that in individuals over 10 years of age the positive rate was much higher in males than in females, viz., 58 per cent against 36 per cent, an observation which accords with the low rate observed at the Maternity Hospital this year.

In contrast with the frequency of positive Wassermann reactions the rarity of primary syphilis is remarkable. Dr. Jackson, by arrangement with the Medical Officer in charge the venereal clinic and other Medical officers, made dark field examinations of material from all penile ulcers which came under observation during the last six months of the year under review. He reports that only 20 such ulcers were seen and of these only six showed *Spirochaeta pallida*. Of the 14 cases without spirochaetes 11 gave positive Wassermann reactions and of the six with spirochaetes five gave positive Wassermann reactions.

Gonorrhœa calls for no special comment. At the Gold Coast Hospital 639 urethral and vaginal smears were examined and 38 per cent were positive.

Typhoid Group.—Judging from the results of bacteriological examinations and the number of positive Widal tests the prevalence of typhoid is about the same as last year. *B. typhosus* was isolated on ten occasions all at Accra, five times from the fæces, once from the urine and four times from the blood. Fifty Widal tests, three of which were at Sekondi and the remainder at Accra, showed typhoid agglutination with a serum dilution of 1 in 50 or higher.

Bacillus paratyphosus C, a rather uncommon organism, was obtained from two cases with typhoid symptoms, in one from the fæces and in the other from the blood. It may be mentioned that two of last years' cultures which were not identified in time for last year's report also turned out to be *B. paratyphosus C*. Of the four cases three occurred in March and April, 1930 and the fourth in February, 1931. All of them were fatal. The first three cultures were sent to the Lister Institute for identification, for which we are indebted to Dr. St. John-Brooks.

Dysentery.—*Entamoeba histolytica* has been found 105 times and the dysentery bacillus isolated 63 times taking all the figures available. These figures, however, are probably less reliable than those based on clinical signs as a guide of the relative frequency of the two kinds of dysentery as the isolation of the bacillus is a much more elaborate business than finding the amoeba, and is not usually attempted in mild cases.

The following list shows the number of times the different types of *Bacillus dysenteriae* were isolated at Accra :—

B. dysenteriae.

Type of organism.		*Nnmber of Isolations.*
B. dysenteriae Flexner	...	38
Shiga	...	7
Sonne	...	2
Schmitz	...	2

Schistosomum mansoni was found nine times in fæces at the Gold Coast Hospital and twice at Kumasi.

Relapsing Fever.—The number of blood specimens in which the spirochaetes of relapsing fever were found shows a marked increase, 133 against 25 of the previous year. This increase is to be attributed to the opening of the Kumasi and Gold Coast Hospital laboratories and not necessarily to increased prevalence of the disease.

Dr. Helen Russell has continued her experimental work on the disease.

Diphtheria.—Dr. Butler supplies the following note. " An unusual feature in the year under review has been the discovery of cases of this disease. Originally detected this year in Sierra Leone, though not proved to be virulent, the disease seems to have reached Sekondi when it was next reported and then a few cases were found in Accra.

" As regards the Accra cases the first case was detected at the end of November, 1930 though there is suspicion of an earlier case. The culture from this case was inoculated subcutaneously into a guinea pig. .2 cc of a 24 hours culture was given and death was caused in 36 hours with typical adrenal findings. A repetition of this experiment caused death in 52 hours, while a control guinea pig with 500 units of diphtheria anti-toxin remained well. This culture was sent to the Lister Institute who reported that the organism was fully virulent. The second case in Accra occurred on 31st December, 1930 and the organism was diagnosed on its morphology, but there was great difficulty in obtaining a pure culture so that it was not surprising that the subsequent animal experiment was not successful in proving its full virulence. The third case occurred on 23rd February, 1931 the culture being obtained from the tracheotomy wound in a child. .2 cc of a 48 hours' culture given subcutaneously into a guinea pig caused death in 42 hours while the control animal which had received 500 units of diphtheria anti-toxin remained well. The post-mortem findings of the test guinea pig of this case did not give quite the perfect picture that was seen in the first case mentioned but there was much haemorrhagic infection at the site of inoculation and much free fluid in the abdomen and pleural cavities but the adrenals were slightly haemorrhagic only.

" None of the contacts of any of these cases developed the disease."

Hookworm Disease.—Of all fæçes examined a high proportion contain hookworm ova, viz., about 16 per cent at Accra and Sekondi and 30 per cent at Kumasi, but deaths attributable to the parasite are uncommon. The single fatal case that came under observation therefore merits a brief description. The patient was a Wangara man aged 30. On admission the number of red cells was 950,000 per c.mm. and the haemoglobin only 13 per cent. The number of leucocytes per c.mm was 6,300 and no eosinophils were seen in counting 250 leucocytes. There were no protozoa in the blood, but hookworm ova were present in abundance in the fæces. The patient was too weak for radical treatment and in spite of rest and tonics died after about a week in hospital. The autopsy revealed numerous hookworms of the species *A. duodenale* in the upper part of the small intestine. The spleen was very small.

Trypanosomiasis.—This disease is fairly common at Yeji as will be seen from Dr. Saunder's report (Appendix A).

At the Gold Coast Hospital six cases were diagnosed. Trypanosomes were found in the gland juice of all six and in the blood of three. The cerebro-spinal fluid of four of the cases was examined. All four fluids contained trypanosomes and were Wassermann negative. The cell counts and protein contents were as follows :—

	Cells per c.mm.	*Total Protein.*	*Globulin (Nonne-Apelt).*
Case 1.	153 lymphocytes	0.08 per cent	++
Case 2.	212 lymphocytes	0.07 per cent	++
Case 3.	610 lymphocytes	0.085 per cent	++
Case 4.	382 lymphocytes	0.06 per cent	++

Two cases admitted to the Princess Marie Louise Hospital are remarkable for the early age of the patients, six weeks and two weeks respectively. Dr. Malcolm Aitken is to publish an account of these cases shortly in the *West African Medical Journal.*

Schistosomiasis.—*S. mansoni*, as already mentioned, was found eleven times in fæces.

At the Gold Coast Hospital *S. haematobium* was found in 5.3 per cent and at Kumasi in 10.7 per cent of all urines examined microscopically. The pathologist, Kumasi, reports that ova are often found in urine which appears normal in other respects.

Filariasis.—This is relatively uncommon in Accra. In order to ascertain the frequency of *Microfilaria bancrofti* and its relation to muscle abscess Dr. Batchelor, Medical Officer, Gold Coast Hospital made blood films from nearly all the patients in the Gold Coast Hospital on two occasions between 12 midnight and 2 a.m. The result was as follows :—

Number examined.	*Mf. bancrofti.*	*Mf. perstans.*
208	4 cases	6 cases

As muscle abscess is fairly common the low rate of infection with *Filaria bancrofti* suggests that there is no causal relationship between the two.

Histological Examinations.—Of the histological specimens the malignant tumours are the only ones which call for comment. At Accra 23 of these were received. The list includes 16 carcinomata, three sarcomata and four melanomata. Of the carcinomata four were found in the liver, one in the stomach and one in the breast, and seven were epitheliomata.

The Sekondi report mentions two primary carcinomata of liver one of breast and one melanoma.

Melanoma thus appears to be relatively common, there being five cases in the year. Last year four cases were reported.

One of this year's cases was fatal, and an account of it may be of interest. The clinical notes were kindly supplied by Dr. Hawe, Medical Officer, Gold Coast Hospital and the description of the autopsy by Dr. Jackson.

The patient was a Northern Territory man about 45 years of age. He was much emaciated, deeply jaundiced and in a semi-comatose condition when admitted to hospital. On the left heel there was a darkly pigmented ulcerating growth which was recognised as a melanoma, and in the left inguinal region there was a fairly soft mass of glands about the size of a large orange. The mass was fixed to the deeper structures but the skin over it was intact. The liver was enlarged, its edge, located by palpation, extending three fingers breadth below the costal margin, and though the patient was drowsy tenderness was obvious. The organ appeared somewhat harder than normal, its surface was irregular and masses could be felt in the epigastric region.

Beyond tachycardia and feebleness of the heart-sounds, nothing abnormal was noted in the cardio-vascular system.

The urine was of deep brown colour resembling that of a blackwater patient, and had stained some of the patient's clothes. The colour became deeper on standing.

The patient rapidly became worse, coma deepened and death occurred 24 hours after admission.

At the autopsy no jaundice was noticed. There was a fusiform aneurism of the ascending aorta about 2¼ inches in diameter and three inches long, but this appeared to be too small to have accelerated death The left femoral and inguinal and the mesenteric lymph glands were

greatly enlarged and contained numerous nodules of black growth. The peritoneal cavity contained about a pint of clear fluid. The liver weighed 138 oz., i.e. more than twice the normal weight. It was black on the surface and had numerous knobs projecting from it. The cut surface of the right lobe showed areas of black tumour tissue scattered throughout the lobe contrasting strongly with the grey liver tissue. The largest area was nearly an inch in diameter, and the tumour tissue and remaining liver tissue appeared about equal in quantity. The left lobe had been entirely replaced by tumour.

The kidneys were normal in size and form, but were very dark, almost black, in colour. The colour was due, not to tumour formation, but to melanin in process of excretion. The bladder contained a small quantity of dark brown urine.

Zoological.—Mr. Woodward has devoted much of his spare time to zoological studies and has made a useful collection of reptiles. A list of these is given in appendix J.

A collection of snails from the Accra neighbourhood has been made by Mr. F. Leeson and forwarded to the Liverpool School of Tropical Medicine for identification. The collection is believed to include about 15 species and it is hoped to publish a list in the next annual report.

APPENDIX A.—(LABORATORY SERVICE).

Annual Report on Trypanosomiasis by the Pathologist at Yeji.

By G. Saunders.

Staff.—On 1st April, 1930, the staff consisted of :—

Dr. Jackson, Pathologist.

Mr. Nettey, Laboratory Attendant.

On 12th August, Mr. Venkumuni took over from Mr. Nettey ; on 23rd September, Dr. Saunders took over from Dr. Jackson. During the month of January Mr. Venkumuni was returned to the Entomological branch, and Issaka Abdulahi, who had formerly been employed by Dr. Saunders as interpreter and by Mr. Morris as Field Collector was taken on to assist.

Routine Work.—The routine cattle work was kept up until December. Human cases were examined and treated as they presented themselves. In January the cattle work was discontinued and visits were made to various towns from which large numbers of cases had come.

At Ejura numbers of cases of clinical sleeping sickness and of enlarged glands came up, but only a comparatively small proportion proved microscopically positive.

The cases dealt with during the year may be classified as follows :—

Trypanosomiasis :

Remaining from last year	9	
New	90	
Total		99
Sleeping sickness not proved microscopically		74
Enlarged glands not proved to be trypanosomes ...		208

Cattle Trypanosomiasis.

The results of the cattle examination, which are summarised in chart 1 are confirmatory of last year's results.

The wet season peak has been slightly reduced from last year. As was observed last year, the dry season minimum at Yeji was lower than the frontier figure for 1928. This may be due either to the unusually heavy rains in the north that year, as indicated by Yeji flood levels ; or to the preferential slaughter of weak beasts on the road down, or to clearings in French territory.

Taking this factor into consideration, the impression given by the curve is that the infection rates are now down to frontier level ; that is to say, the amount of infection taking place is only just enough to replace the cows eliminated on the road.

Each month this year has been a little lower than last year. This may be due to a small rainfall in the north, or it is possible that the breaking of the vicious circle of infection has been effective in the further reduction.

On the other hand, the re-appearance this year, though in very small number, of *T. congolense* casts some doubt on the validity of this impression. Before the clearings were begun, *T. congolense* was never found at the frontier, but occasionally at Yeji and Kumasi, the highest monthly percentage at Yeji being 1.2 in September, 1928. Throughout 1929 it was never found. But three cows have been found infected with it in 1930, one in April, one in August and one in November, the highest monthly percentage being .02 in August. This apparent anomaly can possibly be explained on entomological grounds.

As last year, the trypanosome rate corresponds roughly with the rainfall.

Human Trypanosomiasis.

Ninety cases of human trypanosomiasis were diagnosed during the year. Trypanosomes were found in all these cases. In addition, 74 clinical cases of sleeping sickness were seen; and large numbers of persons with enlarged glands came voluntarily for examination.

The methods of diagnosis were as follows :—

Tryps. in fresh blood	15
Tryps. in gland juice	31
Tryps. in centrifuged blood	34
Inoculation of blood into animals	10
	90

The same routine methods of examination were employed as last year. In doing triple centrifugalization the leucocyte layer, the first sediment, the second sediment, and the third sediment were examined in succession until trypanosomes were found.

Of the 131 triple centrifugalizations done during the year, 56 were on cases found positive by this or by some other method. The following table shows the horizon in which the trypanosomes came down :—

Leucocyte layer...	2
First sediment	6
Second sediment	8
Third sediment	22
Negative	18
	56

Of 75 centrifugalizations done by Prates' method, 18 were on cases proved positive by this or other methods. In only one of these did Prates' method give a positive result.

Of 87 animal inoculations done from human cases, 41 were from cases proved positive by this or other methods.

The following table shows the results of injecting the blood of these positive cases into animals intraperitoneally, usually followed by olive oil injection.

	Showed trypanosomes afterwards.	*Remained negative.*
Monkey	3	2
Cat	11	23
*C. gambianus ...	2	nil
	16	25

* *Cricetomys gambianus*, the African pouched rat.

In some cases the blood of one patient has been injected into several animals. These observations indicate that *C. gambianus* is more likely to take the infection than monkeys or cats, that monkeys or cats are better than dogs, and dogs than small rats.

Treatment of Human Trypanosomiasis.

Routine Treatment.—The routine treatment adopted has been similar to that used by Maclean in Rhodesian sleeping sickness (*Annals of Tropical Medicine and Parasitology* XXIII. 3. 344) ; five injections of one gram each of Bayer 205 in three weeks, followed, with or without a month's interval, by a course of tryparsamide. A few cases have not returned for their tryparsamide. When mental symptoms are well marked, tryparsamide is given first, as I understand that its effect in mental symptoms is better than that of Bayer 205. In general, we may say that this line of treatment almost always cures, except in cases that are almost moribund or have other debilitating diseases, or have been starving.

Slight dimness of vision occurred in three cases who had had Bayer before tryparsamide.

Treatment with Atoxyl.—The treatment with Atoxyl, by the method used in the French Congo, has been continued in early cases. This method is " six strong subcutaneous injections of atoxyl with an interval of 10 days between the injections, two centigrams per kilobody weight with maximum of one gramme per injection."

The results are summarised in the following table :—

Case No.	*Method of diagnosis.*	*Result of Treatment.*
VI	Blood	Tryps. in triple centrifuged blood.
VII	Gland puncture	Negative to all tests.
IX	Gland puncture	Headache and fever with tryps. in blood.
XIX	Blood	Tryps. in blood.
XXII	Blood	Negative to all tests.
XXIII	Blood	Negative to all tests.
XXV.	Animal inoculation	Negative to all tests.
XXXI	Animal inoculation	Tryps. found by animal inoculation. Died of sleeping sickness.
XXXVI	Gland puncture	Negative to all tests.
XXXVII	Animal inoculation	Negative to all tests.
XXXVIII	Animal inoculation	Tryps. in triple centrifuged blood.
XXXIX	Triple centrifuge	Negative to all tests.
XL	Animal inoculation	Tryps. in triple centrifuged blood.
XLI	Animal inoculation	Negative to all tests.
XLV	Gland puncture	Tryps. in triple centrifuged blood.
XLVI	Triple centrifuge	Negative to all tests.
XLVII	Triple centrifuge	Negative to all tests.
L	Animal inoculation	Tryps. in triple centrifuged blood.
LVII	Triple centrifuge	Negative to all tests.
LVIII	Triple centrifuge	Clinical relapse, but negative to all tests.
LXXVII	Triple centrifuge	Tryps. in triple centrifuged blood.
LXXIX	Gland puncture	Negative to all tests.

Of 22 cases 12 appear to be cured (13 microscopically negative). Twenty became negative to methods which would be used in an ordinary survey. No case of eye trouble occurred. A few local reactions were seen. The tests for cure were usually completed within a month of the end of the course. The results indicate that a considerable diminution of infectivity takes place, but the method cannot be relied on to cure.

Treatment with " 4002."—A few fairly advanced cases were treated with the new preparation Höchst 4002.

Intravenously, doses of 0.5 gm were tolerated by a boy of 14 (LXXIV), doses of 1 gm by a girl of 17 (LXBII) and by all adults treated, 1.5 gm was tolerated by a small adult man (LXXXIX). A dose of 2 gm intravenous produced severe abdominal pain in the boy of 14, and abdominal pain in the small adult man, but was repeatedly tolerated by a tall, well built adult woman.

By mouth all adults tolerated 0.75 as a first dose by mouth, and proportionate doses in children. A few adults tolerated 1 gm as a first dose. But the tolerance rapidly decreased, even with longer intervals or with smaller doses. The following cases illustrate this :—

Case LXXXV.	Age 6.			
Dec.	24	" 4002 "	0.25 gm by mouth.	Tolerated.
Dec.	27	" 4002 "	0.25 gm by mouth.	Slight diarrhœa.
Jan.	2	" 4002 "	0.25 gm by mouth.	Slight diarrhœa.
Jan.	5	" 4002 "	0.25 gm by mouth.	Diarrhœa and cramps for six days.
Case XC.		Adult.		
Dec.	12	" 4002 "	0.75 gm by mouth.	Tolerated.
	15	" 4002 "	0.75 gm by mouth.	Diarrhœa.
	17	" 4002 "	0.75 gm by mouth.	Diarrhœa.
	19	" 4002 "	0.5 gm by mouth.	Diarrhœa.
	20	" 4002 "	0.5 gm by mouth.	Diarrhœa.
	22	" 4002 "	0.5 gm by mouth.	Tolerated.
	23	" 4002 "	0.5 gm by mouth.	Severe diarrhœa six days.
	31	" 4002 "	0.25 gm by mouth.	Abdominal pain.
Jan.	9	" 4002 "	0.25 gm by mouth.	Abdominal pain.
Case CVI.		Age 7.		
Jan.	17	" 4002 "	0.25 gm by mouth.	Tolerated.
	19	" 4002 "	0.25 gm by mouth.	Tolerated.
	20	" 4002 "	0.25 gm by mouth.	One liquid motion.
	23	" 4002 "	0.25 gm by mouth.	Severe diarrhœa began three days after and lasted ten days.
Case CVIII.		Age 12.		
Jan.	17	" 4002 "	0.5 gm by mouth.	Tolerated.
	19	" 4002 "	0.5 gm by mouth.	Tolerated:
	23	" 4002 "	0.5 gm by mouth.	Diarrhœa three days.
	28	" 4002 "	0.5 gm by mouth.	Tolerated.

One adult tolerated 0.75 gm by mouth daily for six days.

The results of treatment were as follows :—

One case (LXXV) with very advanced nervous symptoms, amounting to almost complete paralysis, was given two intravenous injections of 0.5 gm and one of 1 gm, at weekly intervals. He completely recovered physical strength, but became mad, and was treated with tryparsamide.

One somnolent case (LIII) was given 0.5 gm intravenous, and after a month three weekly injection of 1 gm. He completely recovered, but was brought back paralysed two months after. After two further weekly injection of 1 gm each he was able to walk quite well, but became mad.

Four somnolent cases had complete remission of symptoms after intravenous treatment.

LXV had three injections of 0.5 gm at ten days interval. Seen six months later he was in good health and negative to all tests.

LXVII had two injections of 0.5 gm and one of 1 gm. She was later given an injection of tryparsamide.

LXXIV (aged 14) was given seven injections of 0.5 gm at weekly intervals. His symptoms were all gone after the sixth injection. Ten days after the seventh injection trypanosomes were found in centrifuged blood. He was then given three injections of 0.5 gm and one of 2 gm at half-weekly intervals. Trypanosomes were again found in centrifuged blood. He was later given Bayer 205.

LXXXVI had four injections of 2 gm each at weekly intervals. After this treatment she was in good health and negative to all tests.

Two months after the suspension of treatment she relapsed with gross tremor, unsteady gait, and mental instability, and was treated with tryparsamide.

Nine cases were treated with 4002 by mouth alone. Most of these showed some slight transient improvement; very advanced cases were not benefited.

LXXXIX was treated first by mouth, then intravenously. The intravenous doses were 2 gm, 1 gm, 1.5 gm. He showed some improvement after the intravenous treatment, and was later treated with Bayer.

No ill result was caused by the administration of 4002 after or in combination with either Atoxyl, Bayer 205, or tryparsamide. Twelve cases have had combined treatment of Bayer 205 intravenous and 4002 by mouth. It will be necessary to observe these again to find out if this line of treatment is better than Bayer 205 alone.

SUMMARY OF "4002" RESULTS.

1. By mouth tolerance decreases so rapidly that no dosage can be fixed.

2. Intravenous dosage:—

Big adult, 2 gm.
Small adult, 1½ gm.
Age about 17, 1 gm.
Age about 14, ½ gm.

3. By mouth only trivial improvement is produced.

4. Intravenously dramatic improvement is produced, but the drug cannot be relied upon to sterilise the blood, and severe relapse may occur after a short time.

Results of treatment with Bayer 205 alone.—As it is important that end results of treatment should be known, a visit was made to Kintampo to trace the cases previously treated there with Bayer 205 alone. They had been treated either by weekly injections of 1 gm for an adult, or 1 gm on 1st, 3rd, and 5th days, followed by weekly injections. These cases had been the subject of two previous reports; one in 1926, unpublished, and one in 1928, published in the Annual Report of the Medical and Sanitary Department, 1927–28. They fall into two series, the first series including cases treated in 1926 and again observed in 1928, and the second the cases treated in 1928.

The essential figures from these earlier reports are repeated here for comparison of immediate and end results.

With respect to the cases treated in 1926 the results remain exactly as they were in 1928. The case classified as "improved" is still in the same state of somnolence as he was then; the two unknown cases have not been traced.

PROGRESS OF CASES TREATED IN 1926.

	1926.	1928.	1930.
Apparent cure	3	nil	nil
Improved	6	1	1
Worse	1	nil	nil
Died	4	13	13
Unknown	2	2	2
	16	16	16

With respect to the 24 cases treated in 1928 in the 1928 report six were classed as cured. Of these No. 24 was a very early case ; he is still in good health. No. 39 was a fairly advanced case ; I wrote of him "relapse is almost certain." He is in good health, smart and intelligent. No. 38 and No. 41 have died. No. 45 was treated with tryparsamide in addition ; she is now quite healthy.

Her younger sister has since been treated for sleeping sickness with tryparsamide alone and she also has recovered. No. 19 cannot be traced.

Seven cases were classed as improved. Of these one has died (No. 44) one is now in good health (No. 40) ; the others cannot be traced. The two cases classed as not improved have died (Nos. 32 and 43).

PROGRESS OF CASES TREATED IN 1928.

	1928.	1930.
Apparent cure with Bayer	6	3
Treated with Tryparsamide also ...	—	1
Improved	7	nil
Not improved	2	nil
Died	9	14
Unknown	—	6
	24	24

Five cases had been treated by small doses of Bayer 205 intrathecally, on the principle suggested by Edwards (*Trans. Roy. Soc. Trop. Med. and Hyg. XX*, 1 *and* 2, *pp.* 10–71).

Of these four were very advanced cases, and died soon after. The other case is still in good health.

Combining the 40 intravenous cases with the intrathecal, the results are as follows :—

Apparent cure with Bayer	4
Treated with Tryparsamide also ...	1
Improved	1
Died	31
Unknown	8
	45

The percentage of known results of cases treated with Bayer alone are as follows :—

Cure	11 per cent.
Improved	3 per cent.
Died	86 per cent.

MAINTENANCE OF STRAINS OF TRYPANOSOMES.

As noted above, it has been found that the best animal for inoculation direct from the human is *C. gambianus*. After the first one or two passages strains are maintained in rats. An intraperitoneal injection of olive oil is given to the animal which has had the human blood, but this year has not usually been given to any animal inoculated later. It is possibly due to this that strains of very slight virulence to rats have been obtained this year. Last year every infection in a rat was steadily progressive ; this year two relapsing strains have been found, one of which lost its power of reacting in the adhesion phenomenon.

Distribution or Human Trypanosomiasis.

The areas from which cases have come for treatment are indicated on the map. This probably bears some relation to the actual incidence of the disease, but there are complicating economic and psychological factors which obscure it to some extent. Thus, while the Zongo people and the Ada fishermen living in Yeji come for treatment, no native of Yeji has yet come, and only two natives of surrounding villages, both of whom discontinued treatment after a few visits. On the other hand, at Ejura not only did many cases of sleeping sickness come up, but also large numbers of people with enlarged glands came voluntarily for examination. The compulsory surveys done in previous years, however, confirm the impression given by the distribution of the cases.

In the open country infection is mainly confined to the river and the main road, and the highest incidence is where these two lines cross, that is, the Yeji-Makongo area. Coming south, the cases gradually become irregular in distribution, and there is also a change in the symptomatology. Unselected inhabitants of the Yeji-Makongo area give a higher percentage of trypanosome-positive blood and gland-juice than the selected cases who came up for examination at Ejura; but clinical sleeping sickness seems to be more frequent at Ejura. The difference may be partly due to psychological causes; but there are also considerable differences in diet, customs, and exposure to infection, which may possibly influence the course of the disease.

The Adhesion Phenomenon.

It has been found during the year, as had been previously suspected that trypanosomes from different sources vary to a considerable extent in their power of reacting in the adhesion phenomenon.

Johnson and Lester (*West African Medical Journal* II 3. 144) suggested that their failure to obtain positive results with *T. congolense* was due to lack of virulence in the strain used, and it has been found here that a strain of *T. gambiense* of very slight virulence to rats failed to give the reaction. For this reason some of our results, in which there is reason to suspect that the trypanosomes were non-reacting or feebly reacting, have been rejected.

Of the remaining tests, 77 were on cases proved to be trypanosomiasis, 72 were on cases not proved or controls. The following table shows reactions :—

	Proved cases.	*Cases not proved.*
+ + + + +	3 per cent.	Nil
+ + + + —	4 per cent.	1 per cent.
+ + + — —	15 per cent.	2 per cent.
+ + — — —	39 per cent.	6 per cent.
+ — — — —	29 per cent.	14 per cent.
— — — — —	9 per cent.	75 per cent.

The proved cases include a few very early cases; the negative cases include a few very suspicious clinical cases in whom trypanosomes were not demonstrated. But there remains a residue of persons who do not seem to be suffering from trypanosomiasis but who give positive adhesion tests.

As few people in this area escape exposure to tsetse at some time, the theory suggested itself that sub-infective doses of trypanosomes might be able to produce a positive adhesion test.

By injection of very small doses of trypanosomes into rats, it has been found that a positive adhesion test may be produced.

Rat No. 757 (*C. gambianus*) 12 days after injection of small dose, gave — — — — —

Rat No. 770 (*C. gambianus*) 17 days after injection of small dose, gave + + — — —

Rat No. 777 (*C. gambianus*) 17 days after injection of small dose, gave + + + + —

Rat No. 790 (*C. gambianus*) 13 days after injection of small dose, gave + + + — —

It was found, however, in one experimentally infected dog, that, if the incubation period be very long, the animal's serum may give a weak positive adhesion test before the blood shows trypanosomes. This dog gave a + — — — — test 41 days after his inoculation. Four days later trypanosomes were found in his blood, and his adhesion test became negative. He has been under daily observation since, and trypanosomes have not been seen again. His adhesion test was + — — — — on the day after the trypanosomes were seen.

The case of this dog suggests the possibility that the rats referred to above might have become positive if they had lived longer; that is, the doses given were not really sub-infective. In order to guard against this fallacy, the observation of Kritschewshi and Tscherikower (quoted by Davis and Brown, (Trans, Roy, Soc. Trop. Med. and Hyg. XXI. 2,114) was repeated. Trypanosomes were left until they had died, and then injected into rats. Twelve days after one of these rats was killed, and the serum gave + + + — —; another of these rats killed next day gave a negative test. As the loss of mobility and stiffening visible under the microscope may not indicate with certainty that all the trypanosomes are dead, citrated blood containing trypanosomes was dried, re-dissolved in normal saline, and injected into rats.

Fourteen days later one of these gave a + — — — — reaction.

It has been mentioned above that mild relapsing strains in rats have been met with this year. It was found that rats infected with relapsing strains may give a positive adhesion test in their negative periods, varying from + + + + + to — — — — —; but no co-relation has been found between the strength of the test and either the duration of infection, intensity of infection, or number of relapses.

From the analogy of these animals, one may interpret the occasional positive adhesion tests found in persons not proved to have trypanosomiasis as due to

(1) Sub-infective doses of trypanosomes.
(2) Transient infections quickly dying out.
(3) Mild relapsing infections.

The behaviour of the reaction in the dog noted above suggests a relationship between the reaction and immunity. But observations published in last year's Annual Report rather contradict this; it was there recorded that a dog gave a stronger reaction during her relapse than in her negative period, and the few cases observed sufficiently long did not seem to fit in with any direct relation between the adhesion test and immunity. With the larger number of cases now available, an attempt has been made to co-ordinate the strength of the adhesion test and the prognosis of the case. No co-relation has been observed. An attempt has also been made to find out directly if adhesing serum protects. A case has recently been found who gave + + + + + reaction before treatment (not included in above figures, as he is still under examination for

trypanosomes). His serum mixed with trypanosomes was injected into rats, the same quantity of normal saline with the same trypanosome suspension being injected into controls. The rats are still under observation. The loss of power of reacting of strain XXXI, a feeble relapsing strain in rats, was at first confined to the trypanosomes present in relapses, but later it failed to react even when starting in an animal.

The history of the strain is as follows —

Case LXXVIII

Monkey 8

Rat 662

In second relapse gave four — — — — — reactions in cases two of whom were afterwards proved.

Rat 693

Rat 695

Rat 703

Rat 709
Starting tryps.
gave two + + + + +

Rat 711
1st relapse tryps.
gave + — — — —

Rat 727
second relapse tryps.
gave — — — — —

Rat 756
Starting tryps.
gave — — — — —

Eleven parallel tests were then made with the trypanosomes of Rat 756 and those of another strain (Rat 735, strain XXXIII). The latter trypanosomes gave one + + + + +, one + + + — —, five + + — — —, and four — — — — —, Rat 756 gave all — — — — —

SUMMARY OF OBSERVATIONS ON ADHESION TEST.

1. A positive adhesion phenomenon gives a strong presumption that the subject has had trypanosomes in his body.
2. No relationship has yet been noted between the strength of the adhesion test and either prognosis or history.
3. A strain of trypanosomes may lose its power of reacting in the test.

CHART I.

Percentage infection of Cattle with trypanosomes.

CHART II.

Rainfall. Yeji.

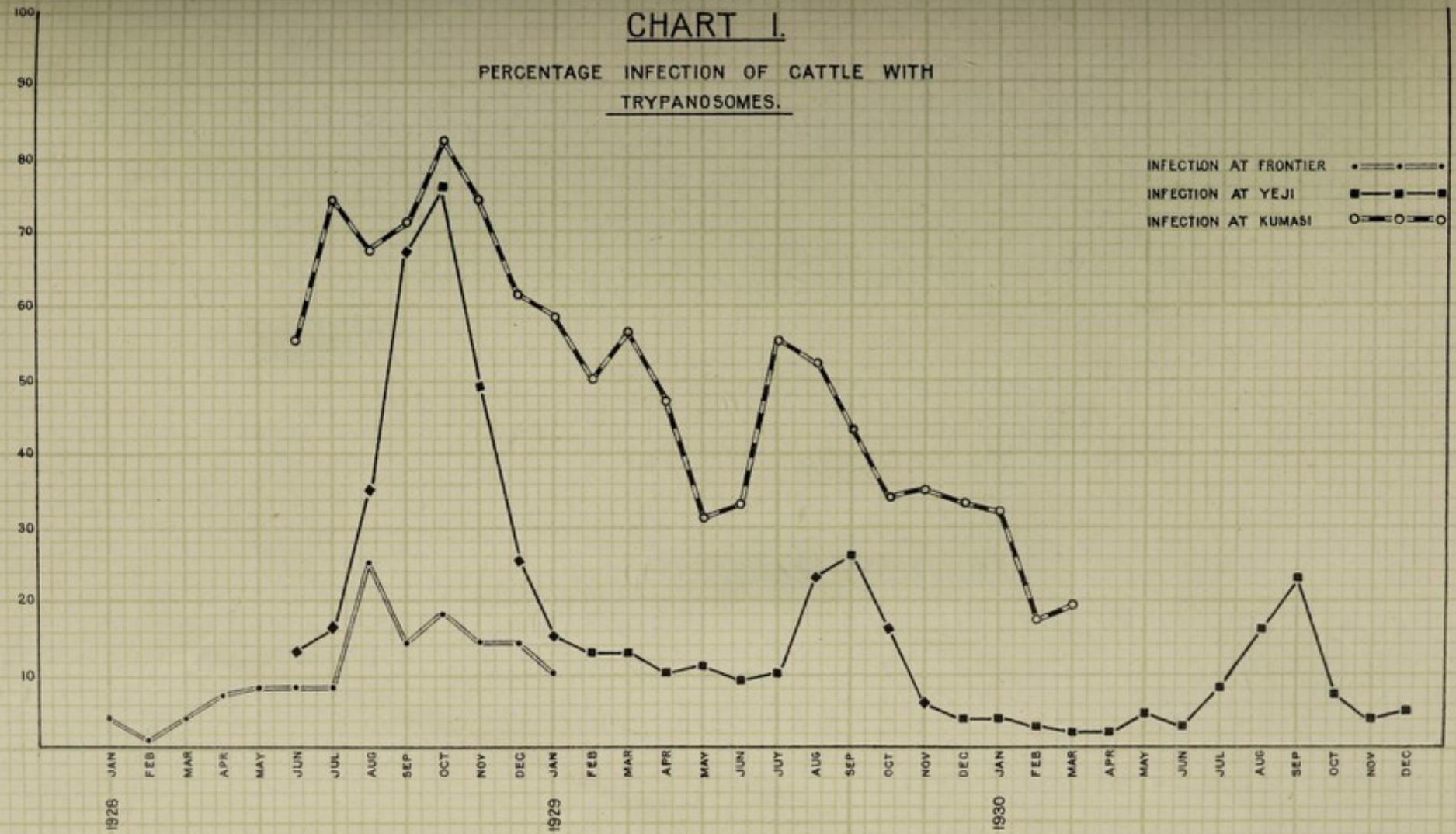
CHART III.

Results of Atoxyl Treatment.

MAP Kumasi—Tamale.

CHART I.

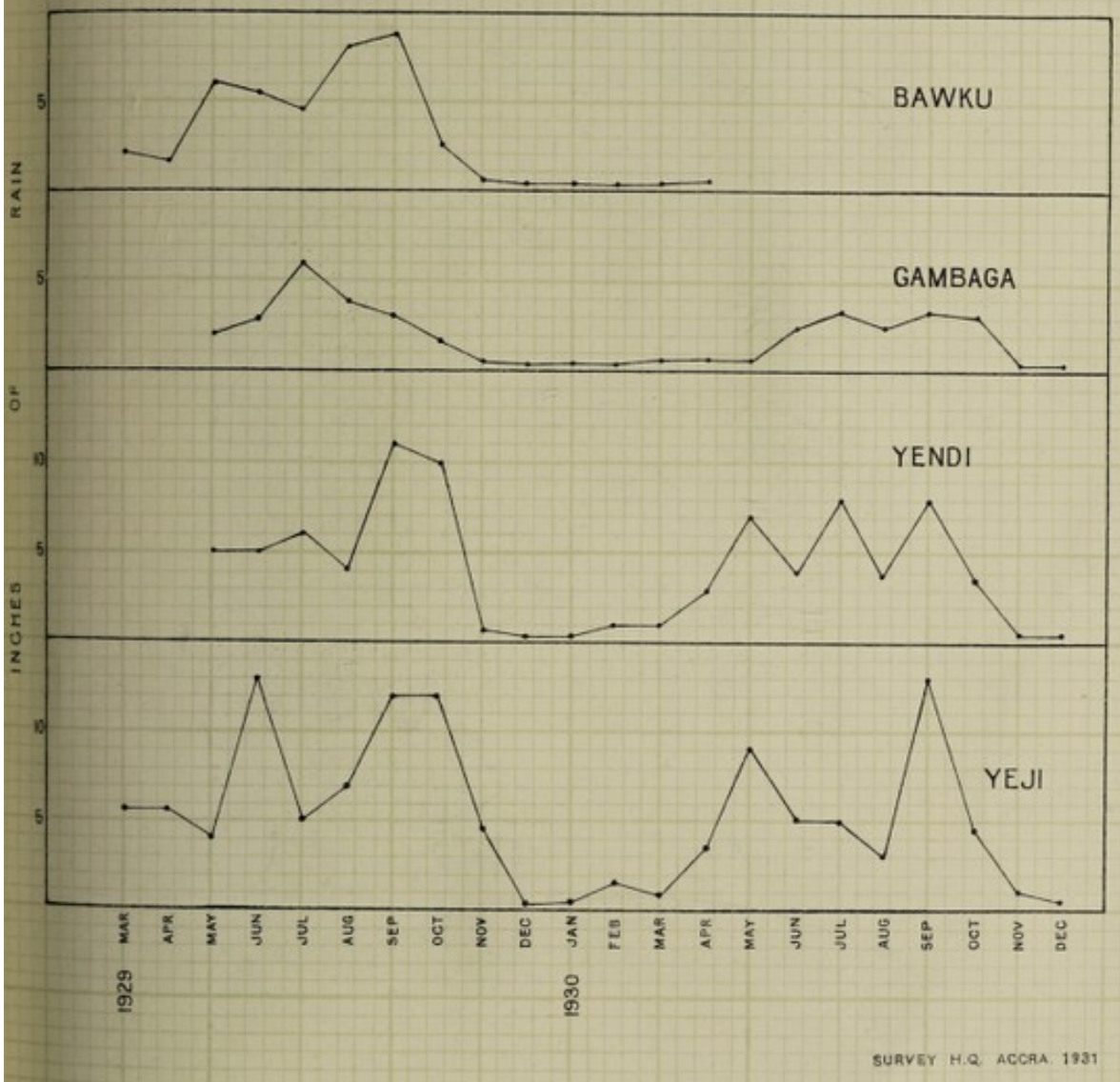
PERCENTAGE INFECTION OF CATTLE WITH TRYPANOSOMES.



SURVEY H.Q. ACCRA, 1931

CHART 2.

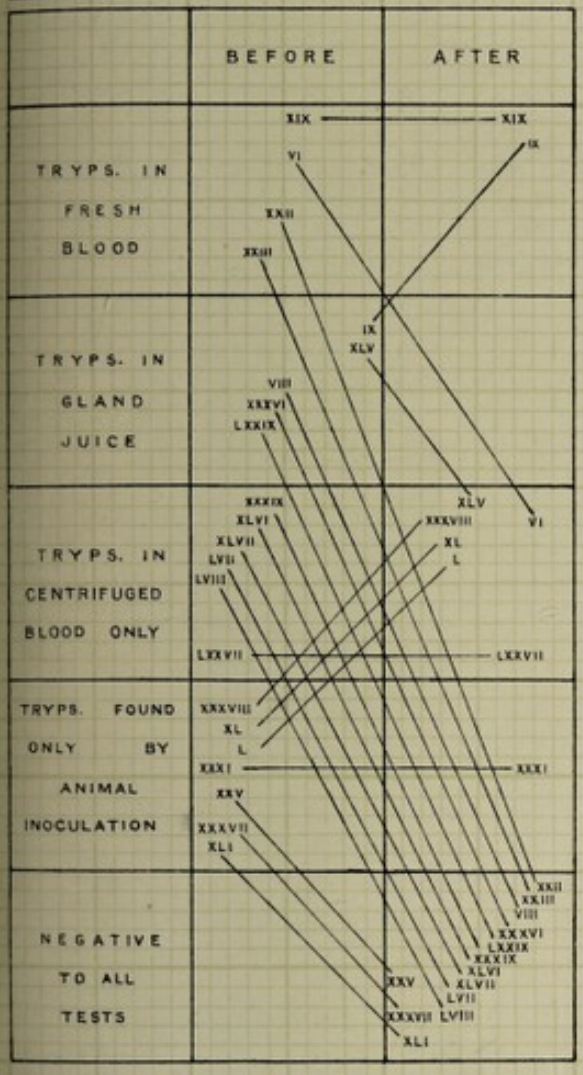
RAINFALL.



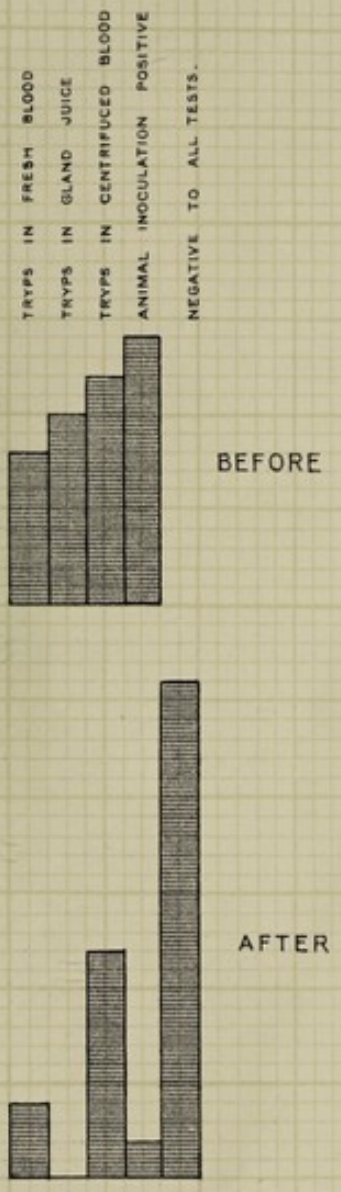
SURVEY H.Q. ACCRA. 1931

CHART 3.

RESULTS OF ATOXYL TREATMENT.

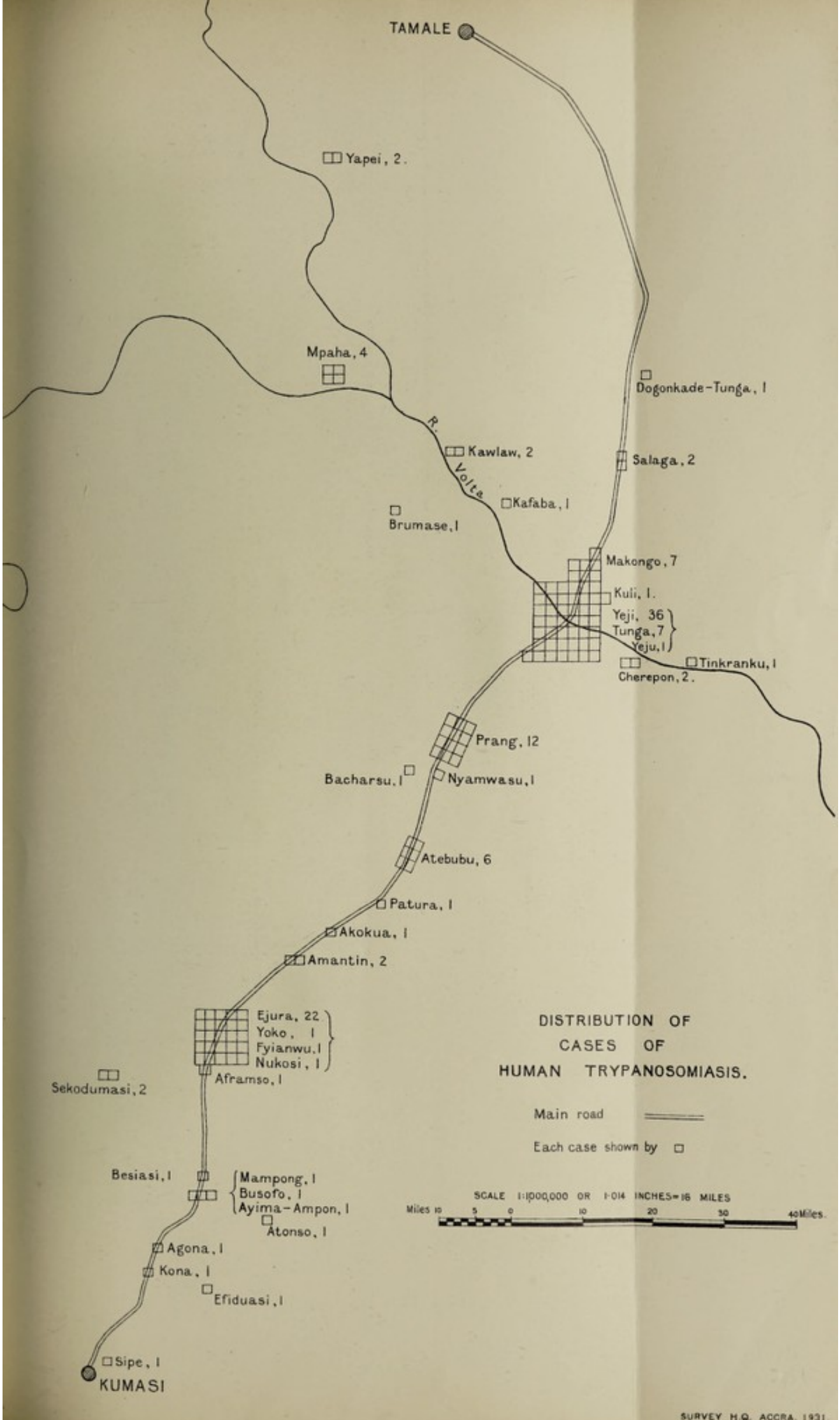


EACH CASE IS SHOWN TWICE, BEFORE AND AFTER TREATMENT. THE HIGHER COMPARTMENTS ARE THE MORE INFECTIVE. THE DIRECTION OF THE LINE JOINING THE TWO ENTRIES OF THE SAME CASE INDICATES THE IMPROVEMENT OR NOT OF THE CASE.



THE SHIFT TO THE RIGHT INDICATES APPROXIMATELY THE AMOUNT OF DIMINUTION OF INFECTION.

SURVEY H Q ACCRA, 1931.


TAMALE
Yapei, 2.
Mpaha, 4
Dogonkade-Tunga, 1
R. Volta
Kawlaw, 2
Salaga, 2
Kafaba, 1
Brumase, 1
Makongo, 7
Kuli, 1.
Yeji, 36
Tunga, 7
Yeju, 1
Tinkranku, 1
Cherepon, 2.
Prang, 12
Bacharsu, 1
Nyamwasu, 1
Atebubu, 6
Patura, 1
Akokua, 1
Amantin, 2
Ejura, 22
Yoko, 1
Fyianwu, 1
Nukosi, 1
Aframso, 1
Sekodumasi, 2
Besiasi, 1
Mampong, 1
Busofo, 1
Ayima-Ampon, 1
Atonso, 1
Agona, 1
Kona, 1
Efiduasi, 1
Sipe, 1
KUMASI
DISTRIBUTION OF
CASES OF
HUMAN TRYPANOSOMIASIS.
Main road
Each case shown by
SCALE 1:1,000,000 OR 1·014 INCHES=16 MILES
Miles 10 5 0 10 20 30 40 Miles.
SURVEY H.Q. ACCRA, 1931.

APPENDIX B. (LABORATORY SERVICE).

Some observations bearing on yaws and syphilis in expectant native women attending the Maternity Hospital in Accra, Gold Coast. By Dr. G. G. Butler, Deputy Director of Laboratory Service, in collaboration with Dr. G. M. L. Summerhayes, Medical Officer in charge of the Maternity Hospital.

The following observations are based on material collected from the Maternity Hospital for African women and examined at the Medical Research Laboratory in conjunction with the statistics obtained from the histories of the patients in the former Institute.

2. The task of obtaining the statistics from the patients has fallen upon one of us (G.M.L.S.), while the compilation of these observations in conjunction with the results of various examinations in the laboratory had devolved upon the other (G.G.B.).

3. The object of this study has been to endeavour to estimate the prevalence of syphilis amongst expectant African mothers, and to form an opinion as to what extent that disease is a cause of the high Wassermann positive rate in order to better assess the value of that reaction as an indication for initiating ante-natal treatment. Owing to the population being heavily infected with yaws this task in not easy.

4. The relationship of syphilis and yaws is not only a subject of great technical interest to workers in tropical Africa, but it is of great importance for Hospital returns, certainly in the British West African Colonies, indicate the comparative infrequency of primary and congenital syphilis and yet this state of affairs is existing where owing to the lack of prophylaxis or restraint syphilis should be rampant. The low records of primary sore must mean either that the disease is rare or unreported, and if the latter the future is indeed serious, for the stamping out of syphilis in a community can only be done at the chancre stage or during its immediate sequelæ.

5. There is however the additional interest in the question of a cross immunity between yaws and syphilis which may explain the paradox and, if there is such a factor, it may very definitely affect our procedure in anti-yaws and antenatal campaigns if we regard syphilis as the more serious disease in its results.

6. The control of syphilis of course is dependent on the standard of education of the community and, unless that community has a twentieth century appreciation of the dangers and consequences of the disease, it is unlikely to be capable of control; among the native populations of British West Africa, therefore, it is extremely unlikely that there can be any form of satisfactory control for many decades. It is hoped therefore that there is at least some cross immunity from yaws and that the explanation of that outstanding, and I believe single, tropical African example of a heavily syphilised population, such as is reported in Uganda, is based on the elimination of opportunities of acquiring yaws.

7. The laboratory methods employed have been the Wassermann reaction of the serum from the expectant or recently delivered mothers and from the placental end of the cord together with the examination of the placenta histologically. The Wassermann reaction of infants a few weeks after birth has not been obtained in many instances; in the first place because its value was not realised sufficiently early, and secondly because there is considerable lack of opportunity of following up the more important cases, owing to the patients returning to their

bush villages after their short stay in hospital. The cases have been quite unselected and the tests have been made in a routine manner on all the patients delivered in the Maternity Hospital.

8. The hospital share of this study has been largely statistical besides of course the collection of much of the material, and it is important to call attention to the difficulties of obtaining accurate details concerning the previous histories of the patients; it can only be really appreciated by actual experience. Primitive people are being dealt with saturated with superstitions, practices and customs strange to Europeans, many with scarcely any form of education, and it is difficult to realise that they may have very little conception of what one's questions mean or may even resent them and yield false answers. Difficulties also, for example, occur with interpreters as to the meaning of still births and the accurate gauging of the maturity of the infant in previous pregnancies; there is very little doubt also that ecbolics and deliberate violence are not unusual accessory factors, and the not uncustomary practice of one woman having children by different men leads to complications.

9. As deductions are to be made from the results of the Wassermann reaction, much will depend on an opinion as to what diseases except yaws and syphilis yield a positive reaction, and it is certainly the opinion of one of us (G.G.B.) that it is high time that it be definitely stated that there is no evidence that a positive reaction, obtained by the properly conducted test, means anything else except the presence of yaws or syphilis reacting substances actively or passively acquired in those patients, and that a positive reaction, obtained in a patient suffering from Malaria or Leprosy, can be discounted as having been caused by those infections. As regards the Wassermann reaction in pregnancy, though differences of opinion have been expressed, no reason is known why the reaction should be affected by that condition, and the parallel results of the Wassermann reaction and a yaws history in this study suggests that there is no basis for any diffidence in acknowledging its correctness.

10. The Wassermann technique that has been employed is the one commonly described as the No. 4 method of the Medical Research Council pamphlets, and the antigen and Hæmolytic serum for the test are imported fortnightly from England.

11. Besides the Wassermann reaction, the peripheral blood and placenta of patients have been examined for malaria parasites, and the placenta weighed and portions removed for histological purposes. In actual figures the following laboratory examinations have been made and with the statistical results from the Maternity Hospital form the basis of any deductions that may be reached.

Maternal blood for Wassermann reaction	396
Maternal blood smears for malaria	441
Cord bloods for Wassermann reaction	413
Infants blood subsequently for Wassermann reaction	14
Placental smears for malaria	462
Placentae weighed	236
Placentae sectioned for histological examination ...	292
Cords sectioned for histological examination ...	292
Special spirochaete staining in placenta and cord sections	84

12. The evidence that is to be obtained from so many sources is perhaps best to be examined under several headings. (*a*) the evidence from the mothers (*b*) the evidence from the infants (*c*) the evidence from the placenta and cord. Much of this will necessarily overlap and be required to be examined together.

(a) The Evidence gathered from the mothers.

13. The actual cases that have passed through our hands to form the basis of this report total 462 women, but as three were Europeans and certain others are more or less incomplete in details, the actual total for the major part of the report is in the neighbourhood of 450 African pregnant women.

14. The nationalities of these women and the Wassermann reaction of their sera are as follows :—

Nationality.	*Total.*	*Wassermann +*	*Wassermann —*	*Unknown.*
Ga	339	86	208	45
Keta	16	6	8	2
Fanti	16	5	10	1
Akwapim...	16	8	7	1
Mixed with European	11	—	9	2
Kroo	9	7	2	—
Hausa	7	4	3	—
Sierra Leone	3	—	3	—
Europeans	3	—	3	—
Togoland	2	2	—	—
Lagosians	1	—	1	—
Unclassified	39	11	13	15
	462	129	267	66

15. There is nothing very striking about this list, but it shows that in the whole group the positive Wassermann reactions work out at 32.5 per cent : this is probably about the correct figure for the few treated cases have been classified according to their original Wassermann reaction.

16. If enquiries are made concerning the Yaws history of these women, of the 358 who have been definitely interrogated 105 or 29.3 per cent have a positive history : this is not a wide difference from the positive Wassermann rate given in the previous paragraph and is perhaps a rather useful indication that their history may be reliable when a well understood condition is being enquired into.

17. The relative correctness of these histories of previous Yaws can be gauged by an analysis of the figures and the results are that of the cases claiming to have had yaws the diagnosis is supported in 62.8 per cent of the cases by a positive Wassermann result and similarly those denying a yaws history are supported in their contention by their Wassermann reaction being recorded as negative in 79.7 per cent of the cases.

18. One tribe, the Kroos, shows a high percentage of positive Wassermann reactions in the presence of a low yaws history and, though the figures are so small, it is of interest that there is such a wide variation from the usual findings. It, occurring in a tribe that is probably more closely in contact with European life than other tribes owing to the sea-faring occupation of the menfolk and the homes of the womenfolk being mainly in coastal towns, probably means they are less likely to acquire Yaws : it is in such a group perhaps that syphilis would be expected so that the history of the whole group is given.

No.	Hospital No.	Yaws History.	Wassermann Reaction		Treated.	Previous Pregnancy.				Present Pregnancy.
			Previously.	Now.		A.	D.	M.	SB.	
1	477	0	++	+	N.A.B.	—	1	—	3	A. FT.
2	488	+	—	++	0	—	3	—	—	A. FT.
3	166	0	—	+	0	1	—	—	—	SB. FT.
										2 A.
4	16	0	—	Neg.	0	4	3	—	—	A. FT.
5	441	?	—	Neg.	0	—	—	—	—	*SB. FT.
6	21	+	—	++	0	4	—	—	—	A. FT.
7	378	0	++	Neg.	N.A.B.	—	2	—	1	A. FT.
8	14	0	—	++	0	—	—	—	—	P.
9	367	0	—	++	0	—	—	—	—	P.

A = alive. D = died. M = miscarriage. SB = still-born. FT = full-term. P. = Premature.
*Still birth due to obstetrical causes.

The previous histories of two of these cases, 1 and 7, are not good but there is no very marked suggestion of syphilis in the group, except the first case which will be alluded to later.

19. A general deduction from remarks in this section on the Yaws history in relation with the Wassermann reaction might be that the normal Wassermann Reaction rate is about 32 per cent and that the Yaws history rate is approximately the same figure, namely, about 29 per cent. In one tribe in spite of the few figures there is a marked deviation, the Wassermann positive rate being much higher than the positive Yaws history figure.

20. The next point into which enquiry should be made is the question of the history of past and present pregnancies in order to obtain a general picture of the state of affairs.

Among 434 women, from whom complete accounts of their histories were obtained, there were 149 primi-para, leaving 285 histories to analyse in the past pregnancies group. In the present pregnancy group there are 445 results to examine.

21. Below, then, in the two sets of figures are given the bare results of pregnancies as described by 285 women for their past pregnancies and for 445 women for the pregnancy for which they were admitted to the Maternity Hospital : the former group of women of course form part of the second group. These two groups are not placed in parallel for the sake of comparison, for comparison is impossible in that the hospital cases are always more likely to have been the subject of complications.

22. There were twins on two occasions in the "past pregnancy" group and on 21 occasions in the "present pregnancy" group, beside one lot of triplets, so that additions of two and twenty-three have to be added to the number of pregnancies of the respective groups in order to obtain the actual numerical end result.

23. 948 Past Pregnancies among 285 women.		445 Present Pregnancies among 445 women.	Total.
Born alive	838	404	1,242
Still-born	63	61	124
Miscarriages	49	3	52
	950	468	1,418

24. Attention thould be drawn to the heading " Born alive " for though it is a statement of fact yet it does not indicate that subsequent deaths may be numerous : in actual fact in the past pregnancy group 279 deaths were recorded by the mothers as having occurred among those children at various ages, and in the present pregnancy group there were 27 deaths during the short stay in hospital, the majority of course occurring within a few hours of birth and probably incidental to the delivery.

25. The figures as they stand illustrate certain points that are or may be of interest.

(a) In a total of 1,393 pregnancies, 1,242 ended in the birth of living children, that is a percentage of over 89 per cent, but there is no qualifying statement as to the condition of the children or their average age if they died.

(b) In a similar total 124 or 8.8 per cent terminated in still-births.

26. It is generally conceded that syphilis is one of the most important causes of still-birth and premature birth and that its greatest effect is seen in the production of premature still-births; thereafter postnatal mortality due to syphilis is not particularly marked until the fourth to sixth months.

27. The figures quoted in paragraph 25 cannot be considered to suggest that syphilis is prominent in a population which is 30 per cent Wassermann positive and certainly for all practical purposes also quite untreated.

28. We are well aware that there is much that is unsatisfactory in the classification of these results of pregnancies, but they are all that can be done with the statistics that are available, and it would be quite impossible in the past pregnancy group to determine how many still-births were premature or at full term. It is impossible to estimate also, for instance, to what extent the main figures are concentrated, as it were, by the exclusion of miscarriages that have long since been forgotten or considered too trivial to recall; factors such as these add difficulties to any conclusion, but broadly speaking there appears but little evidence of syphilis in this examination of the plain end results of well over 1,000 pregnancies.

29. As so little suggestion is given in the analysis of these bare figures an attempt has been made to classify the whole group of 445 women according to their histories and Wassermann reactions, the divisions being into good, ordinary or bad histories, primi-para and a small balance of unknown.

30. The question of definition naturally arises, but it would be beyond the limits of this paper to enter into a discussion on this matter, and the classification is given after considerable thought. Originally the bad history group totalled 36, but after much discussion and critical examination by others it has become whittled down to 13 cases definitely considered on all grounds not to be good. This is a percentage of 4.4 per cent—surely lower than might be expected if there was much untreated syphilis in the population.

31. The classification is as follows:—

Previous History.	Total.	W.R. post.	W.R. neg.	W.R. unknown.	Post. W.R. in percentage.
Good	202	56	119	27	32 per cent.
Ordinary	77	18	45	14	28.5 per cent.
Bad	13	8	4	1	66.6 per cent.
Primipara	149	43	92	14	31.8 per cent.
Unknown	4	1	2	1	—
Total ...	445	126	262	57	—

32. Though the figures in the "bad history" group are small, there is a very definite increase in the Wassermann positive rate above the normal figure, so that these cases will be tabulated in greater detail.

Table of cases Classifed as showing a bad History.

Number.	Hosp. No.	Yaws History.	Previous Pregnancies.					This Preg.	Complications.	M.W.R.	Treated.	C.W.R.	Progress of Child.
			No.	A.	D.	M.	SB.						
1	559	0	3	—	—	—	3	2 SB.	Obstet	+	+	Neg.	—
2	286	+	3	—	2	—	1	SB.	Nil	++	0	Neg.	—
3	377	+	2	—	—	1	1	A.FT.	Nil	Neg.	0	Neg.	N.K.
4	477	0	4	—	1	—	3	A.FT.	Nil	++	+	Neg.*	Died 3/12
5	518	0	3	1	—	—	2	SB.	Nil	Neg.	0	Neg.	—
6	267	+	5	—	3	—	2	A.FT.	Nil	++	+	Neg.	N K.
7	336	0	3	—	—	—	3	A.FT.	Nil	Neg.	0	Neg.	N.K.
8	435	0	2	—	—	—	2	A.P.	—	++	+	Neg.	N.K.
9	401	?	2	—	—	—	2	A.FT.	Nil	++	+	Neg.	Died.
10	287	+	3	—	1	—	2	A.FT.	Nil	++	+	Neg.	Good.
11	251	0	4	2	1	—	1	SB.	Nil	?	0	Neg.	—
12	206	0	4	2	—	—	2	SB.	Nil	+	+	Neg.	—
13	314	?	1	—	—	—	1	SB.	Nil	Neg.	0	Neg.	—

A. = Alive now. D. = Died later. M. = Miscarriage. SB. = Still-birth. FT. = Full-term. P. = Premature. N.K. = Not known. M.W.R. = Maternal Wassermann. C.W.R. = Cord Wassermann. *Infant's blood later became Wassermann positive.

34. When the results of the previous and present pregnancies, as recorded in the above table of 13 "bad history" cases, are examined together there is a definite impression that syphilis must be the cause of the bad results. There is very little doubt that case four was definitely syphilitic ; she is the woman alluded to in paragraph 18 and her infant, though never looking like a congenital syphilitic, developed a positive Wassermann reaction a few weeks after birth and died when about three months old.

35. Yet even in this small group of cases no less than four have a negative Wassermann reaction and cases five, seven and thirteen are sufficiently disconcerting to cause hesitation in labelling cases six and ten as syphilitic and in claiming because a positive Wassermann reaction happened to be present that the living child, at the last pregnancy in each of those cases, was due to the treatment given.

36. Similarly also it may be stressed that there is no apparent suggestion of a cross immunity because in cases, two, six and ten treatment does appear to have had something to do with the delivery of a viable child in two of the cases, while the absence of treatment might be held responsible for a further still-birth in the third case. In other words the end results of these three pregnancies may be said to be more suggestive as being due to treatment, or the lack of it, than due to the effects of a cross immunity. The cases are too few to enable a sound deduction to be made because there are cases which make it possible to argue both ways.

37. If an analysis is made of the previous records of the women who have had still-births, some interesting points emerge. It has already been noted in paragraph 25 that 8.8 per cent of 1,393 pregnancies were lost as still-births.

Taking the two groups, past pregnancies and present pregnancies, as mentioned in paragraph 23, 113 of the 124 still-births can be classified according to the Wassermann reaction and yaws history of the mothers as follows.

38. Of 113 still-births 50 came from Wassermann positive mothers and 63 from Wassermann negative mothers, but as the group supplying the former figure numbered 384 pregnancies and 858 pregnancies for the latter figure the result can be stated differently namely, that in every 7.6 pregnancies from Wassermann positive mothers there was one still-birth, while from the Wassermann negative mothers the proportion was one in 13.6 pregnancies, that is still-births were nearly twice as frequent in the Wassermann positive group as in the Wassermann negative group. These results certainly suggest the presence of syphilis.

39. For the sake of comparison, if the same system is applied to "yaws history" groups instead of Wassermann groups, the result, as obtained from 97 still-births among 1,269 pregnancies, in which the yaws history of the mother was obtained, is as follows : 34 came from 377 pregnancies among women with a positive yaws history, that is one in 11.1, while 63 came from 892 pregnancies among women with a negative yaws history, that is at the rate of one in 14.

40. These figures, based on the bare returns of still-births without any qualification of the causation, are of course not very satisfactory and must affect any deduction very considerably. It is impossible to get any opinion of what was the cause of still-births amongst the "past pregnancies" group, but it is possible to do so among the 61 still-births described among the 445 women in their present pregnancies.

41. Any accessory factors that have been present which may influence opinion about the cause of the still-birth have been noted and the following are the tabulated results :—

Acute Anæmia	... in 2	Obstetrical cause	... in 26
Eclampsia ...	... in 1	Long labour ...	... in 3
Albuminuria ...	... in 2	Obstructed labour	... in 1
? Blackwater ...	... in 1	Placenta previa	... in 1
Malaria ...	... in 2	Ruptured uterus	... in 2
High fever ...	... in 1	No apparent cause	... in 12
Twins (one still-born in each case) ...	... in 7		

42. It must be admitted that many of the causes on this list exonerate syphilis as the likely causative factor of the still-births.

Taking the 12 cases, where no apparent reason for the still-birth could be given, as possibly being due to syphilis, certain statements can be made.

Twelve still-births occur among 445 Maternity Hospital patients which are suspicious in the absence of adequate explanation : that is 2.7 per cent. This figure seems very small in a population that practises neither prophylaxis nor restraint and is wholly untreated for all practical purposes against syphilis.

43. The statistics concerning these 12 cases of still-births without adequate cause are tabulated.

No.	*Hosp. No.*	*Yaws History.*	*M.W.R.*	*Treated.*	*Previous pregnancies. A.*	*D.*	*M.*	*SB.*	*Prst. prgy.*	*C.W.R.*	*Plta. wt. grms.*
1	17	+	+	0	—	—	—	—	F.T.SB	?	?
2	122	?	Neg	0	—	—	—	—	F.T.SB	Neg	?
3	139	+	++	0	4	2	—	—	Mac.	Neg	?
4	286	+	++	0	—	2	—	1	F.T.SB	Neg	420
5	350	0	++	0	4	—	—	—	P. Mac.	Neg	259
6	520	0	Neg	0	1	—	—	—	F.T.SB	Neg	565
7	355	0	Neg	0	3	—	—	—	P.SB	Neg	487
8	314	?	Neg	0	—	—	—	1	F.T.SB	Neg	490
9	251	0	?	0	2	1	—	1	Mac.	Neg	273
10	553	+	?	0	—	2	—	—	Mac.	?	1,097
11	316	+	+	0	1	—	—	—	P.SB	?	172
12	206	0	+	+	2	—	—	2	F.T.SB	Neg	477

Mac. = Macerated. Plta = Placenta. Other abbreviations as in former tables.

44. A general scrutiny of the various factors for each of these 12 cases does very little to confirm that the causation has been syphilis.

Cases 4, 8, 9 and 12 alone have appeared previously in the bad history group recorded in paragraph 33, and taking premature still-births are particularly suggestive of syphilis as occur in cases 5, 7 and 11, it could scarcely be possible of picking out samples with better previous histories, certainly in two of the cases.

45. If now the whole group of still-births, recorded amongst past and present pregnancies, is classified according to history groups in relation with the Wassermann reaction and the yaws history interesting figures are revealed.

Previous history.	*Total.*	*WR +*	*WR —*	*WR ?*	*Yaws +*	*Yaws 0.*	*Yaws ?*	*% WR+*	*% Yaws +*
Good	42	14	25	3	12	21	9	35.9	36.3
Ordinary ...	32	6	21	5	9	19	4	22.2	32.1
Bad	32	21	9	2	7	21	4	70	25
Primipara ...	17	9	8	—	5	5	7	52.8	50
Unknown ...	1	—	—	1	—	—	1		
	124	50	63	11	33	66	25		

46. The interesting point in the above table is that amongst still-births in which the previous history is bad the Wassermann positive rates rises to 70 per cent, which is what one would expect, but at the same time it will be noticed that the yaws positive history has fallen, suggesting that syphilis is the cause of the high positive Wasserman rate, but as a corollary of course it may be urged that the low yaws positive history might be evidence that the relative absence of yaws has allowed syphilis to increase, or in other words the absence of yaws has lowered the opportunity of a cross immunity.

47. A summary may now be attempted to gather information from the analysis of the statistics, obtained from the histories of past and present pregnancies in their relationship with the Wassermann reaction, yaws history, and the occurrence of still-births as detailed in the previous paragraphs.

From 445 women, with 1,393 pregnancies, 1,418 results have been recorded the main features of which are 89 per cent infants born alive and 8.8 per cent still-births and this is occurring in approximately 30 per cent Wassermann positive population, which is wholly untreated for all practical purposes (para. 25). Among these 445 women, after excluding primipara and certain cases with incomplete histories, only 4.4 per cent are regarded as presenting bad previous histories (para. 30). When these are examined in detail there is about as much evidence against syphilis as in favour of it as the cause of the bad histories (paras. 31–36). When further search is made among the still-births it is found that about double the number of still-births arise among Wassermann positive as among Wassermann negative mothers (para. 38), but when the causation of these still-births is taken into account, there is apparently very little evidence to point to syphilis as being the incriminating factor (para. 41–4), though that hypothesis is suggested again by the high Wassermann rate in parallel with a low positive yaws rate revealed amongst the still-births, arising from mothers with bad previous histories (para. 45).

(b) The Evidence gathered from the Infants.

48. Much evidence that might come under this heading has already been discussed under still-births, while considering the evidence from the previous histories of the mothers. There remain other points such as the maturity of infants born alive, their progress and the Wassermann reaction amongst the infants generally.

49. It has already been noted that 445 women in their 445 pregnancies, forming the total upon which these observations are built, gave actually 468 results when twins and triplets are taken into account. These end results of all the pregnancies, divided into classes according to the Wassermann reaction and yaws history of the mothers, make the following table :

	Total.	*WR* +	*WR* —	*WR* ?	*Yaws* +	*Yaws* —	*Yaws* ?	% *WR* +	% *Yaws* +
Full term	331	87	205	39	81	228	22	29.8	26.2
P. Obstetrical causes	4	—	2	2	—	2	2	—	—
P. no obvious cause	33	8	18	7	9	20	4	30.7	31
S.B. Obstetrical cause	40	11	24	5	9	17	14	31.4	34.6
SB no obvious cause	12	6	4	2	5	5	2	60	50
Miscarriages ...	3	3	—	—	1	2	—	—	—
Full term	21	8	11	2	6	14	1		
21. Twins Premature	12	5	5	2	6	6	—		
Still born	9	7	2	—	2	6	1		
1. Triplets Premature	3	3	—	—	—	3	—		

P = Premature. SB = Still born. WR+ = Wassermann positive. WR— = Wassermann negative.

50. The figures of course in some cases are really quite inadequate, but the following features are perhaps noteworthy. In the premature group, in which the causation is not apparent, the Wassermann positive rate and yaws positive run so closely together at the normal level, that the indication is that neither yaws nor syphilis are accountable for the condition. In the still-born group, unexplained by any obvious cause, the rise in the yaws positive and Wassermann positive rate suggest that yaws or syphilis is the causative factor, of which the latter is the more likely from the evidence given in previous paragraphs, and from the fact that a yaws positive rate has a tendency to be exaggerated, owing to the inclusion of other skin conditions, presumably being regarded as yaws by the patients, paragraph 17.

51. In passing, attention should be drawn to the large number of premature births, in which no cause seems to be apparent. Their Wassermann positive and yaws positive rate is at the normal level, and therefore probably not the cause. In the Annual Report of the Gold Coast Medical Department 1929-30 attention has been drawn to this question on page 102 and malaria is there regarded as the most important cause of premature delivery. No further attention need be called to the subject except to gather the figures together up to date.

52.

	Total cases.	*Total malaria.*	*Malaria in placenta only.*	*Malaria in peripheral blood and placenta.*	*Malaria in peripheral blood only.*	*Malaria %.*
Full term	331	63	15	43	5	19
P. obstetrical	4	—	—	—	—	—
P. no obvious cause	33	14	4	10	—	42.4
SB. obstetrical	40	10	3	5	2	25
SB. no obvious cause	12	3	2	1	—	—
Miscarriage	3	1	1	—	—	—
21. Twins F.T.	21	2	2	—	—	—
21. Twins P.	12	3	2	1	—	—
21. Twins S.B.	9	—	—	—	—	—
1. Triplets P.	3	—	—	—	—	—
	468	96	29	60	7	

53.

11. Multipara	296	48	18	24	6	16.2
Primipara	149	48	11	36	1	32.2
	445	96	29	60	7	

The relative frequency of malaria in multipara and primipara is of interest. The whole of the patients are included in this table irrespective of the result of the pregnancy.

54. The next point of enquiry is the relationship between the progress of the infant after birth and the Wassermann or yaws positive rates of their mothers, and also in relationship with the malaria infection of the placentae.

55. The following table is arrived at in classifying the cases according to the state of progress, as against the Wassermann and yaws state of the mothers. Owing to complications arising in case of multiple pregnancies, they have been excluded from the table which therefore only contains single births : still-births are naturally not included.

	Total.	*WR+*	*WR—*	*WR*	*Yaws+*	*Yaws—*	*Yaws*	*Per cent WR+*	*Per cent Yaws+*
Good ...	154	42	98	14	44	104	6	30	29.6
Satisfactory	19	6	12	1	7	11	1	33.3	38.8
Not good ...	4	1	1	2	1	1	2	—	—
Died soon ...	24	8	13	3	4	13	7	38	23.4
Not known ...	167	38	101	28	34	121	12	—	—

56. There is not much to note here except that in the " died soon " group the maternal Wassermann positive rate is somewhat raised above the normal, whereas the Yaws positive rate has fallen. The 12 cases that had antenatal treatment for Syphilis or Yaws are included in the above groupings, but, as the totals are so small, they do not affect the main figures.

	Totals.	*Good.*	*Satisfactory.*	*Not Good.*	*Died soon.*	*NK.*	*Good progress per cent.*
Full term	331	137	18	3	19	154	77.4
Premature (induced)	4	2	—	—	—	2	—
Premature without obvious cause	33	15	1	1	5	11	68.1

NK.=not known.

The "satisfactory" group refer to those who have not been followed up for more than a month at the most, though there has been nothing noted against them in that time. A point of interest in this table, except for the small numbers concerned, is the good progress of the infants born with no obvious reason for their prematurity: this, in relation with the high malaria rate found in the placentae and peripheral circulation of the mother's blood (para. 52), suggests that malaria *per se* is not of serious consequence to the infant in spite of the prematurity that it is liable to produce. This is as one would expect in a malaria infested country for, there would have been complete obliteration of the inhabitants therein many decades ago, if they could ever have occupied the area at all.

58. To place the progress of the infants in relationship with malaria, infestation in placentae and peripheral blood of the mother the following table has been constructed.

Progress.

	Total.	*Good.*	*Satisfactory.*	*Not good.*	*Died soon.*	*NK.*	*Satisfactory and good progress per cent.*
Malaria in placenta and peripheral blood	53	18	7	1	2	25	90
Malaria in placenta only	19	9	—	—	1	9	—
Malaria in peripheral circulation only	5	2	—	—	1	2	—
Control group of non-malarial cases	77	35	4	1	3	34	90.7

The group to act as a control consisted of the first 77 consecutive non-malaria cases, and are taken for comparison with the 77 which were definitely malarial.

It is not apparent that there is any particular harm to the infant as a result of malaria infestation of the mother.

59. A summary from the last few paragraphs would seem to indicate that the Wassermann positive rate and Yaws positive rate is approximately similar, and at the normal level, whatever the end result of the pregnancies may be, except in a very small group labelled " Still-births without obvious cause " (paras. 49, 50). There is an indication also that " prematurity without obvious cause " is not influenced by the Wassermann and Yaws positive rate of the mothers, but that it runs in relationship with the malaria positive rate (para. 52). Nor does the

progress of the infants appear to be influenced by the Wassermann positive or Yaws positive condition of the mothers, except in a very small group labelled " died soon ", where there is a deviation of these two factors from the normal levels, and is suggestive of the presence of syphilis (paras. 55 and 56). There is not a very wide divergence between the progress of the infants born at full term, and those " premature without obvious cause ", (para. 57) which suggests that the malaria infestation of the mother in the premature group is not causing much, if any harm, to the infant, and this is confirmed by the satisfactory progress of these infants, when compared with an equal-sized consecutive group from non-malarial mothers.

60. As the still-birth group (para. 43) and the group with bad histories (para. 33) have been tabulated in order to obtain an insight as to the possible incidence of syphilis a similar group is given of those infants who " died soon."

Hosp. No.	*No.*	*Time of death.*	*Maturity.*	*Maternal complications.*	*Yaws.*	*M.W.R.*	*C.W.R.*	*Pltal. malaria.*	*Suspected cause.*
1	108	next day	F.T.	Forceps	—	—	—	—	Asphyxia.
2	130	same day	F.T.	—	—	—	—	—	Asphyxia.
3	317	almost at once	F.T.	Eclampsia	—	—	—	—	—
4	471	almost at once	P.	—	+	++	++	—	Ascites.
5	541	soon	F.T.	Obstetrical	—	—	—	—	Intracranial Haem.
6	426	next day	F.T.	Obstetrical	—	—	—	—	Asphyxia.
7	477	at 3rd month	F.T.	—		++	—	+	Syphilis.
8	226	next day	F.T.	Forceps	—	—	—	—	—
9	117	at 5th month	F.T.	—	—	?	—	—	Pneumonia.
10	450	in 3 hours	F.T.	Forceps	+	+	—	—	—
11	326	in 4 days	F.T.	Septicaemia	—	—	—	—	—
12	600	in a few weeks	F.T.	—	—	—	—	—	—
13	414	in a few hours	P.	Pyelitis	?	?	?	—	—
14	394	soon	F.T.	—	?	—	?	—	Intracranial Haem.
15	500	next day	P.	Pneumonia	—	—	—	—	—
16	21	at 5th month	F.T.	—	+	++	—	—	—
17	209	next day	F.T.	—	+	—	—	—	? Injury.
18	234	at 3rd week	F.T.	—	—	—	—	—	—
19	500	at 3rd day	P.	Bronchitis	—	—	—	—	—
20	401	next day	F.T.	—	?	++	—	—	—
21	14	in 4 hours	P.	A.P.H.	—	++	—	+	—
22	495	in 6 hours	F.T.	Obstetrical	?	++	—	+	—
23	516	in a day	F.T.	Retained placenta	?	++	?	—	convulsion.
24	393	in 1 hour	F.T.	—	—	—	—	—	—

61. One case, number seven, is definitely labelled syphilis, as the infant's Wassermann subsequently became positive and the mother had a very bad previous history (case 4 para. 33). Case 20 also in this series appeared amongst the bad history group recorded in paragraph 33 (case 9) : the mother had a course of antenatal N.A.B., and the infant's liver after death did not reveal the presence of treponemata. The lack of overlapping between the cases in paragraph 33 and the last table is unfortunate, as it was hoped some real indication would be given thereby of cases of syphilis. The other cases that the table indicates as being suspicious, numbers 4, 16, 21 and 23 do not help a great deal : case four had a good previous history with four previous pregnancies, all alive : case 16 is exactly similar, while case 21 is a primipara and in case 21 the previous history is three pregnancies, two alive now and one dead since.

Of this group of cases, after comparing them with the " bad history " group, probably a definite label of syphilis can be given to two cases, numbers 4 and 20, but otherwise this selected group has not helped materially in giving indication of the incidence of syphilis.

62. As a final analysis the cord Wassermann reaction and the reaction after some weeks of life will now be given.

In paragraph 15 the maternal Wassermann rate among 396 patients is given as 32.5 per cent. The reaction applied to the serum from cord blood has been tested on 413 occasions, and the positive findings are five per cent. Samples of sera from 371 women and cord bloods have also been examined in parallel with the following results :—119 Wassermann positive mothers yielded 99 negative cord bloods and 20 positive cord bloods, that is there was agreement in 16.8 per cent of cases at the time of birth. Two hundred and fifty Wassermann negative mothers yielded entirely negative cord bloods, so that the agreement is 100 per cent in the negative cases at the time of birth.

63. As so high a percentage as 16.8 of cord bloods was in agreement with the positive reaction in the mothers, it was hoped that the cord blood would give some definite indication of the presence of syphilis. Nineteen cases, showing a positive Wassermann reaction in the cord blood, are classified together with further details concerning them ; one case is excluded because details were largely missing.

64. List of cases in which the cord blood was Wassermann positive :—

No.	*Hosp.*	*Previous Pregnancies.*				*Yaws.*	*M.W.R.*	*C.W.R.*	*Present*	*Progress.*
	No.	*A.*	*D.*	*M.*	*SB.*				*Pregnancy.*	
1	517	—	—	—	—	+	++	+	A.FT.	Good.
2	483	5	1	—	—	+	++	++	A.FT.	NK.
3	490	5	1	—	—	+	++	++	A.FT.	NK.
4	152	—	—	—	—	+	++	++	A.FT.	NK.
5	471	4	—	—	—	+	++	++	A.P.	Died.
6	494	4	1	—	—	—	++	++	A.FT.	NK.
7	548	—	—	—	—	—	++	++	A.FT.	NK.
8	560	—	3	—	—	—	++	++	A.P.	Died.
9	212	2	—	—	—	+	++	+	A.P.	Good.
10	488	—	3	—	—	+	++	+	FT.	Good.
11	550	1	—	—	—	+	++	++	FT.	Good.
12	98	1	1	—	—	—	++	+	FT.	NK.
13	511	—	—	—	—	+	++	+	FT.	Good.
14	207	—	—	—	—	+	++	++	FT.	Good.
15	352	—	—	—	1	+	++	++	FT.	Good.
16	6	5	1	—	—	—	++	++	SB.	—
17	498	3	—	—	—	—	+	+	FT.	NK.
18	182	—	—	—	—	—	+	+	AB.	NK.
19	244	—	—	—	—	—	+	+	FT.	Good.

+ = Positive. — = Negative. A = Alive. AB. = Abortion. FT. = Full term.
SB. = Still-born. P. = Premature. NK. = Not known.

65. It will be seen, by comparing this table with the tables in paragraphs 33 and 43 representing the " bad history " group and some of the still-births, that there is not a single case which has appeared previously in those two tables. In the " died soon " table in paragraph 60 case four alone reappears in the above table (as case five), but otherwise the four tables of " bad history cases," " still-births without obvious reason ", " died soon " and the " positive Wassermann Cords " show no suggestion that there is a common factor in action in them all.

There is practically not a case in the table of paragraph 64 with a definitely bad previous history, but cases 6, 8, 12, 16 and 17, as judged by the absence of a yaws history in conjunction with a positive maternal Wassermann reaction, might possibly be suggestive of syphilis. Yet only cases 8 and 16 give support for that suggestion by the poor result of each pregnancy, and even in these cases the former was a case of syphilis and the latter a case of twins, and the previous history of both cases is not obviously bad. Case 5 where the infant died in three days with evidence of ascites would perhaps be suggestive, except for the previous history which could not be better.

66. The re-examination of the blood of infants has been done in 13 cases at dates varying from a few weeks to a few months after birth.

It is most unfortunate that our observations in this direction have not been more extensive, for it is now felt that this procedure is the most valuable and definite in its indications : difficulties are encountered locally among semi-educated or uneducated African people which are greater than can occur in the British Isles.

67. A table now follows giving the results of all the cases where a repeat examination has been carried out.

No.	*Hosp.*	*Previous Preg.*				*Yaws.*	*M.W.R. Treated*		*M.W.R.*	*C.W.R.*	*I.W.R.*	*INTVL.*	*Progress.*
	No.	*A.*	*D.*	*M.*	*SB.*		*before.*		*now.*				
1	248	2	—	—	—	+	++	+	?	—	—	7 mths.	Good.
2	387	—	1	2	—	—	?	0	—	—	—	3 mths.	Good.
3	558	—	—	—	—	+	?	+	++	—	—	1 mth.	Good.
4	477	—	1	—	3	—	++	+	+	—	++	6 weeks	Died.
5	313	1	—	—	—	—	?	0	++	—	—	16 days	Epiphysitis.
6	388	—	1	—	—	?	?	0	—	—	—	3 mths.	Good.
7	448	1	—	2	—	—	++	+	++	—	—	5 weeks	Good.
8	267	—	3	—	2	+	++	+	—	?	—	6 mths.	Good.
9	378	—	2	—	1	—	++	+	—	—	—	2½ mths.	Good.
10	369	—	1	—	—	—	?	0	++	—	—	10 weeks	Good.
11	483	5	1	—	—	+	?	0	++	++	—	4 mths.	N.K.
12	488	—	3	—	—	+	?	0	++	+	—	4&8 mths.	Good.
13	511	—	—	—	—	+	?	0	++	++	—	3 mths.	Good.

A = Alive. D = Dead now. M = Miscarriage. SB. = Still-birth.
M.W.R. = Maternal Wassermann reaction. C.W.R. = Cord Wassermann reaction.
I.W.R. = Infant's Wassermann reaction. N.K. = Not known.

68. With one exception there has been no confirmation of a syphilitic condition, and in only one other case has the progress not been satisfactory ; unfortunately in that case the repetition of the Wassermann test occurred only 16 days after birth. No deduction, however, is really permissible in the majority of the cases, because treatment had been started previous to the delivery in six out of the 11 cases showing a positive maternal Wassermann reaction. Case 4 alone is outstanding as a pretty definite case of syphilis.

69. A summary may now be attempted to gather any information from the analysis of the statistics obtained from infants when considering their state at birth, their progress and the cord Wassermann reaction in relation with the Wassermann condition and yaws history rate of their mothers and the malaria infection rate of their placentae.

A very small group among the still-births is found, which shows an alteration from the usual yaws positive and Wassermann positive rate. A somewhat similar small group of premature births does not show a similar deviation, but show a relationship with the malaria infection rate of the placenta.

The progress of the infants, when examined in relationship with the yaws history and Wassermann rate of the mothers, shows very little deviation from the normal rate for those two observations, except in a very small group which deviates slightly from the normal, namely the " died soon " group. Similarly the progress of the infants in relationship with their maturity at birth shows much less variation than one would expect considering the type of surroundings in which the infants are brought up. The progress also of infants born from malaria-infected placentae compare well with a control group. The progress of the infants discussed here of course only alludes to those few months of their life, in which they maintain contact with the Maternity Hospital, which probably works out at about an average of at least six months and often up to a year. The cord bloods show a positive Wassermann rate of 5 per cent, and are in agreement with a positive maternal Wassermann in 16.8 per cent

No overlapping is found in groups consisting of " bad history cases ", " still-births without obvious cause," " died soon " cases and " positive cord Wassermann " cases to suggest the action of some common factor such as syphilis.

Confirmation of syphilis appears to be only really justified in one case.

(c) The evidence from the Placenta and Cord.

70. The results to be enumerated now are only histological and the record of weights, because the cord or placental blood results have already been dealt with, as well as the results of malaria infection found therein.

Various opinions are expressed as to the effect of syphilis on the placenta, one of which is the noticeable increase in weight from these cases. Two hundred and thirty-six placentae have been weighed in grammes as soon after delivery as possible, and the weights given do not include the weight of any escaped blood.

The weights of placentae from multiple pregnancies have been excluded also from the following results.

71. The weights of 201 placentae from mothers, whose Wassermann reaction was known have been obtained, 54 from Wassermann positive mothers and 147 from Wassermann negative mothers. The average weight in the Wassermann positive groups was 570 grammes, and that in the Wassermann negative group was 565 grammes ; there is no indication therefore that the placenta weight is affected by yaws, which we know to be present or that syphilis is present. This is further confirmed by the similarity in the following results. Among 206 placentae obtained from mothers in whom the yaws history had been enquired into, 158 came from yaws negative mothers, giving an average of 568 grammes, and the 48 coming from yaws positive mothers was 571 grammes.

72. The question of maturity of the foetus of course affects the weight of the placentae. From 201 full-term infants the average weight, when they were born alive was 567.5 grammes, while for the still-births the average weight was 573.8 grammes. Here again, if there is a large syphilitic factor among the still-births, it either does not affect the weight of the placenta or else syphilis is not present. The placentae from premature infants is not of great interest, but they will be seen in the attached table.

73. Table of Placenta weights, in grammes, divided into various groups.

	Average weight.	*Minimum.*	*Maximum.*
From 54 Wassermann positive women	570	377	823
From 147 Wassermann negative women	565	273	1,057
From 181 Full-term infants born alive	576.5	358	1,057
From 20 Full-term infants still-born	573.8	273	1,097
From 48 Women with yaws history	571	345	1,097
From 158 Women without yaws history	566	273	1,057
From 10 Premature infants born alive	464.5	307	622
From 4 Premature infants still-born	313	172	487

The placenta from the one case, which is now thought to be syphilis, was unfortunately not weighed.

The Wassermann reaction was not done upon the case showing the placenta of highest recorded weight among the single pregnancies, but the infant was still-born and macerated and the previous pregnancies were two, both now dead. The woman producing the next highest weight namely 1,057 grammes was the mother of seven children all of whom were still alive.

74. The placentae that were infected with malaria, which were actually weighed, totalled 46 with an average weight of 547 grammes, while a representative group of non-malarial placentae totalling also 46 gave an average weight of 566 grammes; but, as there is a tendency for a fair percentage of malaria-laden placentae to be premature, the difference in weights is not strictly comparable. Unfortunately only five of the malarial placentae which were prematurely delivered came to be weighed, their average weight being 465 grammes, while the ten non-malarial premature delivered placentae averaged 411 grammes.

75. Taking the last few paragraphs it may be stated that there is no outstanding evidence of an increase of weight in placentae in any of the groups, and if syphilis does really cause an increase the deduction is in favour of the non prevalence of that disease.

76. The histology of the placenta and cord can only be dealt with very briefly :—292 of the former and 292 of the latter amongst the 445 pregnant women have been examined in this manner with the additional technique of special spirochaete staining by the modified Starch Gelatine method of Warthin-Starry on 84 occasions.

The placentae and cords examined were derived from 75 Wassermann positive mothers, 171 Wassermann negative mothers and 45 in whom the Wassermann reaction had not been done. The results are practically uniformly negative, malaria infestation, of course, being excluded. Hyaline changes and calcification in the placenta are so commonly seen that no indication is conveyed by their discovery beyond maturity of the pregnancy. Opinions vary as to the meaning of pathological changes in the placenta, and, if Williams is correct in stating that the placenta offers twice as great a probability of giving correct information about the child's condition as a positive Wassermann reaction in the mother, then there is no syphilis present and yaws does not produce any obvious change for one-third of the cases came from Wassermann positive mothers.

77. The few cases in which histological changes have been met with either in the placenta or cord are as follows : nineteen sections of cords showed evidence of cellular infiltration in or about the umbilical vessels, as a rule an artery. This change occurred with about equal frequency whether the mother was Wassermann positive or negative, but was more evident among the still-births of each of these groups. The infiltration was a polymorph invasion, and did not consist of small mononuclear cells so that presumably it was nothing to do with syphilis. In two other cases, however, it was recorded that the placentae showed a little fibrosis: each of these cases happens to be a still-birth, the first at full term, and the other at the 26th week (that is really an abortion), both mothers being Wassermann positive with a yaws history but treponemata could not be found by special staining.

78. The deduction that appears to be possible is that no direct evidence of syphilis has been obtained by the examination of placentae and cords.

79. *General Summary*.—Owing to the infrequency with which obvious syphilis is seen in a local African community, that is heavily infected with gonorrhoea and yaws, a problem seems to be presented for it would seem that syphilis should be as rampant as gonorrhoea. Owing to the presence of yaws the value of a serological test alone is almost useless.

The explanation why syphilis should not be obvious everywhere seems inexplicable but there remains the possibility of a cross immunity from yaws.

The importance of knowing the position cannot be over-estimated, for syphilis can only be adequately controlled in its earliest manifestations. If, however, yaws is conveying a cross immunity it must definitely affect our procedure in yaws and antenatal campaigns if a positive Wassermann reaction is any indication of an immunity. The evidence available to indicate the presence of syphilis in the apparent absence of the ordinary direct manifestations would seem likely to be best observed in possible effects on pregnancy and the health of the new born, that is in antenatal and postnatal mortality, and it is on the statistics from the Maternity Hospital balanced against certain Laboratory examinations that the present line of study has been made.

The method of approach has been to superimpose a " map," as it were, of the results of pregnancies, histories of previous pregnancies, and the progress of the infants, upon other " maps " of the Wassermann reaction, and yaws history in order to see where there is deviation or overlapping in the various features that are suggestive of the action of syphilis.

80. The results have been almost uniformly negative and indicate that there is probably in this study not more than about one case which recurs on these " maps " and is highly suggestive of syphilis. If the deductions are sound what is the explanation and can it mean a cross immunity ? The Wassermann positive rate and the yaws history rate runs at about a 30 per cent level throughout most of statistics obtained for the results of pregnancies. The one group in which there is a deviation from this level is among certain still-births, but the group is a very small one, namely, 2.7 per cent, which for a wholly unprotected and untreated population the measure of whose opportunity of acquiring syphilis must be high if judged by gonorrhoeal infections. This group of still-births is only about a fifth of the actual cases of still-births, and it may be improbable that ecbolics and deliberate violence are important factors in their causation so that it may be quite unfair to judge a previous history on the occurrence of a still-birth or two.

The Wassermann reaction on cord bloods show 5 per cent as being positive but there is every indication that it is a passive filtering over of Wassermann reacting substances from the maternal circulation for they disappear very soon in the infant blood in those few cases in which a re-examination has been made.

No indication whatever of syphilis has been obtained in the examination of placentæ.

81. *Conclusions.*—The almost completely negative evidence that has been obtained must be suggestive that syphilis is an infinitely rarer illness than is commonly supposed. We are satisfied that only one case in this series can be definitely regarded as syphilitic, a few others are suggestive but the diagnosis cannot be clinched.

The value of a Wassermann reaction on cord blood is not worth the bother of carrying out the procedure, for the test will have to be repeated later on in the infant's life if the mother's reactions are positive.

The lack of any extensive evidence that syphilis is present indicates that antenatal treatment is best guided by the previous history and, if really bad, there is some probability that the diagnosis is correct.

The negative evidence that has been obtained suggests the need for more confirmation by further study which should be carried out (*a*) on infants and in particular their Wassermann reaction after a few weeks of life and (*b*) on the examination of the tissues of all still-births for direct evidence of the Treponema.

APPENDIX C—(Laboratory Service).

Report on two cases of Blackwater Fever in Natives.

By G. G. Butler.

Two cases of Blackwater Fever in Gold Coast natives occurred during September, a very cool month of the year and came to the post-mortem room. Both were extremely well and powerfully developed policemen of about 30 years old. Because of the comparative rarity of the disease in Africans the post-mortem account of each is given.

One case (R.W.S.) was admitted with a three days history of illness and died 36 hours after admission. Whether quinine had been given outside the hospital is not known. No parasites were found in the blood and the urine was a deep brownish red and showed oxyhaemoglobin and methaemoglobin bands. The blood plasma showed an oxyhaemoglobin band and a faint indirect van den Bergh test only.

A blood examination 24 hours after admission yielded the following report.

R.B.C. 975,000. Haemoglobin (Sahli uncorrected) 25 per cent. Leucocytes 57,500. The differential count showed Polymorphs 92 per cent, myelocytes 2 per cent, lymphocytes 5 per cent and large mononuclears 1 per cent.

The red blood corpuscles showed moderate polychromatophilia and poikilocytosis. Anisocytosis is very marked, sizes from four microns to ten microns diameter were observed. The small forms have an eroded or half-emptied appearance but stain deeply: intermediate sizes appear scanty, the red blood corpuscles tending to form two groups according to size, very small about four microns and large 7.5 microns to eight microns.

Normoblasts and microblasts number 7.5 per 100 leucocytes. Band form polymorphs have been classified as polymorphs. No Eosinophils. Disintegrated leucocytes number about 30 per 100 intact leucocytes and are not included in the differential count.

At the post-mortem examination eight hours after death the conjunctivae appeared to be jaundiced.

The lungs weighed 15 and 16 oz. respectively: there was no pleural effusion but the lungs were very oedematous and much froth, apparently bile stained, could be pressed out of them and was present in the trachea. No petechiae were observed anywhere.

The heart weighed 10½ oz. The pericardial sac contained a few ounces of clear but apparently bile coloured fluid which only gave an indirect van der Bergh reaction, the direct test being quite negative.

The heart-muscle was rather pale but otherwise nothing abnormal was noted. The peritoneal cavity was dry and there was evidence of old perisplenitis. The liver weighed 47½ oz. and appeared a little small. The cut surface was a yellow ochre in colour and lobulation was not obvious. The gall-bladder held some normal looking bile and the bile-ducts were quite patent.

The spleen was large, weighing 19½ oz. The cut surface was very soft and could be scraped away: it was a deep red colour and the malpighian bodies were not noticeable, but some areas were rather greyer red than others. No malaria parasites or pigment was detected in smears from the organs.

The kidneys weighed 5½ oz. each but did not look enlarged. The capsule stripped easily and the cut surface was rather a terra-cotta colour apparently due to a mixture of red blood and rather a bile-stained tissue. Distinction between the medulla and cortex was not well marked, and while linear striae were present in the cortex they were also not so well marked as in other cases of blackwater.

The bladder still contained some haemoglobin coloured urine. The stomach showed some bile-stained mucus only and the remainder of the intestinal canal was healthy.

Microscopically it will be noted that much pigment was to be found in some areas and not in others, but in view of its absence from direct spleen smears it is probably a formalin effect on haemoglobin in solution. The liver showed a fair amount of fatty degeneration in the centre of the lobules otherwise the changes are not noticeable beyond congestion with here and there little areas of focal necrosis and there is astonishingly little pigment present. The heart showed a little fatty degeneration : the muscle-cells are a little granular and separated as if oedematous and only slight pigment is to be seen in the blood-vessels.

The kidney is very congested but shows no fatty changes : the tubule cells are granular and breaking down, amorphous material is present in the lumen of the tubules, sometimes disc-shaped masses suggesting the appearance of red corpuscles : there is much pigment but only in the glomeruli and between the tubes.

The pancreas showed no apparent disease and pigment was absent.

The adrenal showed about the normal appearance after staining for fat : no pigment was present except in small areas of dilated venous spaces especially in the medulla.

The spleen showed great congestion and pigment is present everywhere though much less marked in the lymph nodes.

The second case (G.A.) was a marine policeman and was more or less dumped at the hospital in a semi-comatose condition and no history was available and there was no knowledge as to whether quinine had been taken : he died about 24 hours after admission. No parasites were seen in the blood.

The post-mortem examination was made 1½ hours after death and presented a very muscular African man of about 30 years. The conjunctivae were slightly jaundice coloured and there was slight oedema over the shins.

Blood collected at the post-mortem clotted satisfactorily and the clear serum showed the bands of oxyhaemoglobin and methaemoglobin. Blood films showed no malaria parasites. The lungs weighed 8 oz. each and each pleural cavity contained a little haemoglobin stained fluid. The lungs themselves were pale, quite crepitant and more dry than usual.

The heart looked big and weighed 13½ oz. The pericardial sac was healthy but the visceral pericardium showed a few petechiae at the posterior auriculo-ventricular junction. The muscle-texture was good and the left ventricle a little hypertrophied. The valves were competent and there was no aortitis nor was the aorta bile-stained.

The peritoneal cavity was dry and healthy in appearance. The liver was large weighing 71 oz. and externally the surface was normal in appearance. The cut surface was a deep dark yellow colour and lobulation was indistinct. The texture was not greasy nor was the tissue more friable than usual. The bile-ducts were patent and the gall-bladder held a thick extremely black-green bile.

The spleen was only 11 oz., it was tumid and a very deep red colour and not brownish to suggest malarial pigmentation. The kidneys weighed about 5½ oz. each and were also tumid and their capsule came off very easily leaving a purplish-brown surface. The sectional surface was a purplish-brown also with a rather wide cortex which " wept " as if the tubules were distended with fluid. Striae were very well marked as broad deep-brown lines. The pelvis of the kidneys contained urine of a haemoglobinuric appearance. The urinary-bladder was healthy and held about 10 ounces of urine of typical Haemoglobinuric appearance but was not further examined. The adrenals showed a cortex of rather less yellow colour than usual. The stomach was full of a greenish stained watery material containing portions of black material which when squeezed between the fingers seemed to be very black green in colour like the material in the gall-bladder. Commencing immediately beyond the pylorus the contents of the bowel were a brownish tarry material but no disease of the bowels was noticed.

The brief notes of the microscopical appearance are as follows :—

The liver showed no fatty change : there was a well marked central venous congestion with the appearance of some oedema: the capillaries in this situation show an excess of polymorphs. The reticulo-endothelial system seems degenerating and no pigment was found.

The kidney showed very slight fatty change here and there in some of the tubules : it was very congested also and all the tubules were all rather distended and their cells were granular and very eosinophilic staining but not desquamating. Casts were present in the lower tubules with granular material of a rounded shape in the upper tubules. Pigment was present but it is not prominent except about the bigger veins. The heart showed no fatty change nor anything else noteworthy. The spleen was very congested with pigment very prominent except in the malpighian bodies. The adrenal showed less fatty substances than usual in the cortex by scarlet red staining. The whole tissue stained rather poorly as from cloudy swelling. No pigment was present except in the vessels. Nothing noteworthy was seen in the thyroid, nor was there in the pancreas except pigment in the vessels.

APPENDIX D.—(LABORATORY SERVICE.)

Continuation Report on a search for a Precipitin Test for Malaria.

By G. G. Butler.

In the previous annual report on page 109 a preliminary note was made on the Precipitin test in malaria. During the present period under review the search has proceeded whenever time and opportunity permitted.

During the present year various extracts and preparations made from placentae, malaria laden and otherwise, have been used as an "antigen" and tested for the precipitin phenomenon against sera from malaria free and malaria infected patients and against blood from the umbilical cord of placentae both from malaria laden and non-malaria laden.

The results have been uniformly negative but perhaps even so they should be recorded as indicating the methods employed. It will be seen that 48 kinds of extracts from placentae have been used and also 30 solutions consisting of the albumin and the globulin fractions in extracts obtained also from placentae and from a Blackwater Kidney and Blackwater Urine. The actual types of extract is as follows : —

	Malarial.	*Non-Malarial.*
(*b*) Buffered Saline extracts		
Simple	3	2
Alcohol insoluble	5	2
Acetone insoluble	2	—
Glycerine soluble, alcohol insoluble	1	1
Glycerine insoluble, alcohol insoluble	1	1
(*b*) Alcoholic Extracts		
Simple	5	2
Buffered saline soluble ...	4	1
Buffered saline insoluble ...	5	1
Glycerine soluble	1	1
Glycerine insoluble ...	2	1
Acetone insoluble	2	—
After grinding with salt ...	2	1
(*c*) Glycerine Extracts—Simple ...	1	1
(*d*) Albumins from placental extracts	8	2
(*e*) Mixed globulins from placental extracts	5	1
(*f*) Euglobulins from placental extracts	2	1
(*g*) Pseudoglobulins from placental extracts	2	1
(*h*) Albumins from blackwater kidney extracts		3
(*i*) Globulins from blackwater kidney extracts	—	3
(*j*) Euglobulins from blackwater urine extracts	—	1
(*k*) Pseudoglobulins from black-water urine extracts ...	—	1

The extracts made from the various simple chemicals need no further description than occurs in the above list and as the results were so negative it was thought that the concentration of the albumin and globulin fraction might render a precipitin reaction perceptible so that, by the commonly recognized salting out processes, albumins and globulins were precipitated and then collected and dissolved in distilled water and dialyzed free of the salt used in the precipitating method ; the final fluid or precipitate, as the case may be, had a concentrated buffered salt solution added so that the salt concentration became equal to normal saline solution.

Owing to liability of bacterial contamination in the tropics all dialyzing was carried out in dialyzing thimbles within an ice-chest. The various extracts and the albumins and globulins in comparatively concentrated solution were tested against ten sera from normal individuals, three sera from adults who had recently delivered a heavily malaria laden placenta, nine sera obtained from the cord blood of an infant born with a malaria laden placenta and ten from a non-malarial case but otherwise similar.

The method of test has been the ring test used in capillary tubes in order to economise in sera and to ensure sterility owing to recent drawing in a flame. Undiluted material has been used in all cases except the alcoholic and glycerine extracts when one in five to one in ten dilutions with saline have been used.

In carrying out these tests actually 78 preparations and extracts, 54 from malaria laden placentae, 15 from normal placentae, six from a blackwater fever kidney and three from a blackwater urine have been used each one against 32 different sera : a total of well over 2,000 tests being made. Any suggestion of a precipitin reaction being given necessitated its confirmation by a repeat experiment with varying dilutions and with the usual controls. Readings were made at the end of about 18 hours in the majority of cases.

Unfortunately I have to report that the results proved quite negative when properly controlled.

APPENDIX E.—(LABORATORY SERVICE).

Note on the Urea-Stibamine Test for Leishmaniasis.

By G. G. Butler.

Leishmaniasis is one of the diseases which I believe has not been recorded with certainty from British West Africa.

In order to obtain possibly some serological evidence of the disease and in order to make control tests of the value of the Urea-Stibamine tests as used in India, special brands of the drug were obtained from that country in order that there should be completely comparable results. Mr. Abbott, Laboratory Assistant in this Department, was detailed to carry out the tests and 1,000 sera that have come in for Wassermann test purposes have been used for the investigation and many of these sera have come from ulcer cases.

There is a well recognized dissimilarity in the distribution of Kala Azar and Oriental Sore as if one disease might protect against the other but we are unaware whether the test is one that can be applied to the diagnosis of Oriental Sore as well as Kala Azar but on the assumption that there is such a cross protection of one disease from the other it was hoped that there might be some evidence forthcoming as to the nature of some of our ulcer cases though direct microscopical examination in the few cases that have been attempted in former years gave no such encouragement.

The tests have been carried out according to the technique described by Chopra and De, a 4 per cent Urea-Stibamine solution being layered below the test sera in a one in ten dilution which is considered the most reliable method. Variations in readings as a result of staleness of either sera or the reagent have been watched and there has been no indication of a material alteration.

Up to the present time the results have not been sufficiently examined to express any opinion but they will be recorded in due course.

APPENDIX F (LABORATORY SERVICE).

Notes on Blood Conditions.

DR. A. S. BURGESS.

Methods.— In counting cells the phial method of diluting was preferred to the pipette method on the score of portability. As diluting fluid for both red and white cells 2 per cent formalin in physiological saline was used. This was tinted with B.D.H. universal indicator and neutralised by adding decinormal soda to produce an apple-green colour. The primary cell suspension was further diluted with saline for counting red cells and with acetic acid and cresyl blue for leucocytes.

The distilled water used in the staining of thin films was neutralised in the same way as the formalin, a little B.D.H. universal indicator being added. The presence of the dye does not affect the staining and at once shows any deviation from the correct pH.

Hæmoglobin was estimated by means of a Sahli hæmoglobinometer in which the normal male reading is supposed to be 80 per cent and not 100 per cent. With our instruments however direct readings appear to give correct percentages and therefore hæmoglobin values were recorded as read, no correction being made. It was found that Europeans recently arrived from England gave readings of 100 per cent or higher, but a sudden increase, presumably temporary, is known to occur when an individual enters the tropics.

Anæmia of Pregnancy.—Anæmia of pregnancy seems to be the commonest form of grave anæmia in adults. Four cases came under observation all having a hæmoglobin percentage of less than 25 when first seen. Only four other adult cases with hæmoglobin percentage within this limit were observed, although a look-out was kept at the Maternity and Gold Coast Hospital for cases of anæmia. These four cases included one of blackwater fever, one of ankylostomiasis, one of metrorrhagia from fibroids and one of *B. paratyphosus C* infection, their hæmoglobin percentages being 25, 13, 20 and 22 respectively. No case of pernicious anæmia in a native male was seen.

The case of *B. paratyphosus C* infection (referred to as "N.N.") was regarded as one of anæmia of pregnancy until a few days before death. The patient was admitted to the Maternity Hospital with persistant diarrhœa and anæmia. Her anæmia increased somewhat and diarrhœa tended to persist and six weeks after admission she gave birth to a premature child. Her temperature except on one day had been normal. She took liver badly. Ten days after delivery acute fever supervened, *B. paratyphosus C* was isolated from the blood and when the fever had lasted five days the patient died. *B. paratyphosus C* was obtained in pure culture from the spleen at autopsy. It is not possible to decide whether the whole illness was due to the organism or whether it was a terminal infection. It will be seen, however, that the blood condition differed in some particulars from that of the four cases diagnosed as anæmia of pregnancy.

The results of blood examination of these four cases as well as Case N.N. are given in the following table :—

Case.	Stage of Pregnancy.	R.B.C.	Hb.	Col. Ind.	Leucocytes.	Wassermann.
I.	1 month post part ...	910,000	20	1.1	3,600	+
II.	7th month	700,000	17	1.2	9,400	++
III.	2 days post part	920,000	24	1.3	6,000	
IV.	4th month	750,000	17	1.1	12,000	++
N.N.	4th or 5th month	1,220,000	22	0.9	12,000	Neg.

In cases I to IV the general characters of the blood were similar to those of Addison's anæmia. There was a high colour index well marked anisocytosis with presence of megalocytes (red cells over 11μ in diameter) some polychromatophilia with occasional punctate basophilia and megaloblasts as well as normoblasts were present. There appeared however to be minor differences, viz., poikilocytosis was relatively slight, there was a tendency to leucocytosis in two cases and there was no Arneth shift to the right. With regard to the last feature, although the nuclei of the polymorphonuclear cells appeared multilobed, the lobes were connected by stout bridges and not by fine threads and an Arneth count actually showed a shift to the left in every case.

Myelocytes were present in small numbers and in some cases there were large cells which had the characters of myeloblasts.

In cases II, III and IV improvement was very rapid with liver treatment. The hæmoglobin rose to 40 or 50 per cent in from two to four weeks. Case I remained in hospital for about two weeks and then left of her own accord.

It is of interest to note that case N.N. differed from the others in that the colour index was less than unity, no megaloblasts were found and the Arneth showed a somewhat more pronounced shift to the left.

Malarial Anæmia in children.—Cases of marked anæmia in young children are common and the blood of some of these was examined in detail. Opportunities for this were provided by Dr. Malcolm Aitken, Medical Officer, Princess Marie Louise Hospital, who kindly notified us when children with marked anæmia attended.

There is reason for assuming that these anæmias are usually due to malaria for nearly all cases have fever and show M.T. malaria parasites and pigmented leucocytes, and improvement with quinine is usually rapid.

A marked leucocytosis is common. Of the 13 most severe cases, in which the average red count was about 1.5 million, the leucocytes were over 10,000 in eight cases and over 20,000 in four.

A feature of these anæmias is the occurrence in thin films of large numbers of disintegrated leucocytes (chiefly lymphocytes) known as Gumprecht's shadows or basket cells. These were usually at least half as numerous as intact leucocytes and in some cases they were as much as one and a half times as numerous. Gumprecht stated that the number of "shadows" was related to the amount of purin bodies excreted in the urine, both being manifestations of increased rate of cell destruction such as occurs in fevers, but most observers regard them as artifacts. There seems to be no doubt that they are produced during the spreading of the film and that their numbers depend partly on the thickness of the film, but it is equally certain that they are produced much more readily in some diseases (particularly lymphatic leucæmia) than in others. The conclusion is that Gumprecht's shadows are artifacts but their appearance in abnormal numbers is an indication of increased fragility of the leucocytes. Their importance lies in the effect which they must have on the differential count. It is not practicable to include them for their origin is uncertain and the proportions of cells remaining intact will depend in a measure on the way in which the film is spread.

Other Blood conditions.—Two cases of myeloid leukæmia were seen during the year. One died very shortly after admission and was not studied fully. The other had a leucocyte count of 240,000 but appeared in fair health. The case did not present any unusual features.

The blood condition of a case of blackwater fever is of interest in view of the high leucocytosis, viz., 57,500. Further details are given in appendix C.

Blood examinations of a series of cases of muscle abscess were also made. The average figures for eight cases are as follows :—

Red cells	4,400,000	per c.mm.
Hæmoglobin	70	per cent.
Leucocytes	14,000	per c.mm.
Polymorphs	60	per cent.
Lymphocytes	27	—
Large mononuclears	7	—
Eosinophils	6	—

The results are not of much interest but merely show the mildness of infection, for, although there was usually a moderate leucocytosis, the red cells and hæmoglobin were but little diminished, the polymorphs were not relatively increased in number and eosinophils were fairly numerous. In no case were eosinophils absent, and in the case showing the highest leucocytosis, viz., 24,000, they amounted to 9 per cent of the leucocytes.

APPENDIX G.—(LABORATORY SERVICE).

A Report on the Mosquito and Tsetse problem at Takoradi, 1930-31.

By A. W. J. Pomeroy.

Introduction.

The investigation described in this report was based on three main lines of work. (*a*) An estimation of the incidence of certain insects affecting man: (*b*) The origin of the infestation and the biology of the species involved: (*c*) A study of the ecological factors controlling these species and the possibility of economic artificial control.

2. Takoradi offers a unique opportunity for study as a modern town has been built on a comparatively uninhabited area, a proceeding which should cause considerable changes in the ecological factors governing the incidence and distribution of the insect fauna.

3. The work was commenced in April, 1930, and this report is based on information obtained up to February, 1931. The staff consisted of the Medical Entomologist, three permanent African Laboratory Attendants and such extra help as was required i.e. intelligent Africans, who had passed a certain standard of education, and ordinary field labour.

4. Considerable care was necessary to ensure that the various lines of work undertaken would lead to a practical result, and efforts were mainly confined to experiments, which bore directly on the actual control of the insects in question.

5. The results which had been obtained to date in Takoradi may be summed up as follows: the house to house inspection and control of domestic mosquito is very efficient; the system of drainage owing to the nature of the terrain should be improved; more attention should be paid to the mosquito breeding areas in the environs; the further clearing of vegetation is essential; finally a definite programme of control measures should be undertaken, so that there should be a positive and lasting gain year by year, instead of a general half-hearted attempt to cope with a situation which demands an immediate expenditure, greatly in excess of the funds available at any one time.

6. The report has been divided into the following sections for convenience in referring to the various subjects, but the paragraphs are numbered consecutively.

Natural features of Takoradi.

7. According to information supplied by the Provincial Engineer, Western Province, the area of the Takoradi acquisition is 2,758 acres, Approximately 800 acres of land have been cleared, but a certain proportion has reverted and is overgrown with small shrubs and low verdure. Clearing was first started in the African Township in 1923–24 and completed during the next Financial year. The native village of Takoradi near the sea, just north of the present harbour, was removed and also the small village of Amanful south of the present harbour. Inland, the area was uninhabited with the exception of a few houses in the village of Bedokrom, which still exist.

8. The type of country along the sea-board is hilly, with well defined ridges and corresponding narrow valleys. The highest point of elevation is 110 feet above sea level.

A mile inland, the terrain is very flat with very little fall to the sea, and there are no permanent running streams in Takoradi area itself.

9. The south west portion of the country is bounded by the lagoon, which is the mouth of the Whin River. This lagoon is land-locked during the dry season from 14th November, 1930, till the beginning of the next rains. During the rainy season the fresh waters of the River Whin bank up behind the bar until they reach a sufficient level to overflow. From time to time however, the sea gains access during the period of the highest tides. The conditions are somewhat similar with regard to the lagoon at the mouth of River Butuah, but the same amount of fresh water does not appear to be held up owing to the smaller size of the stream itself.

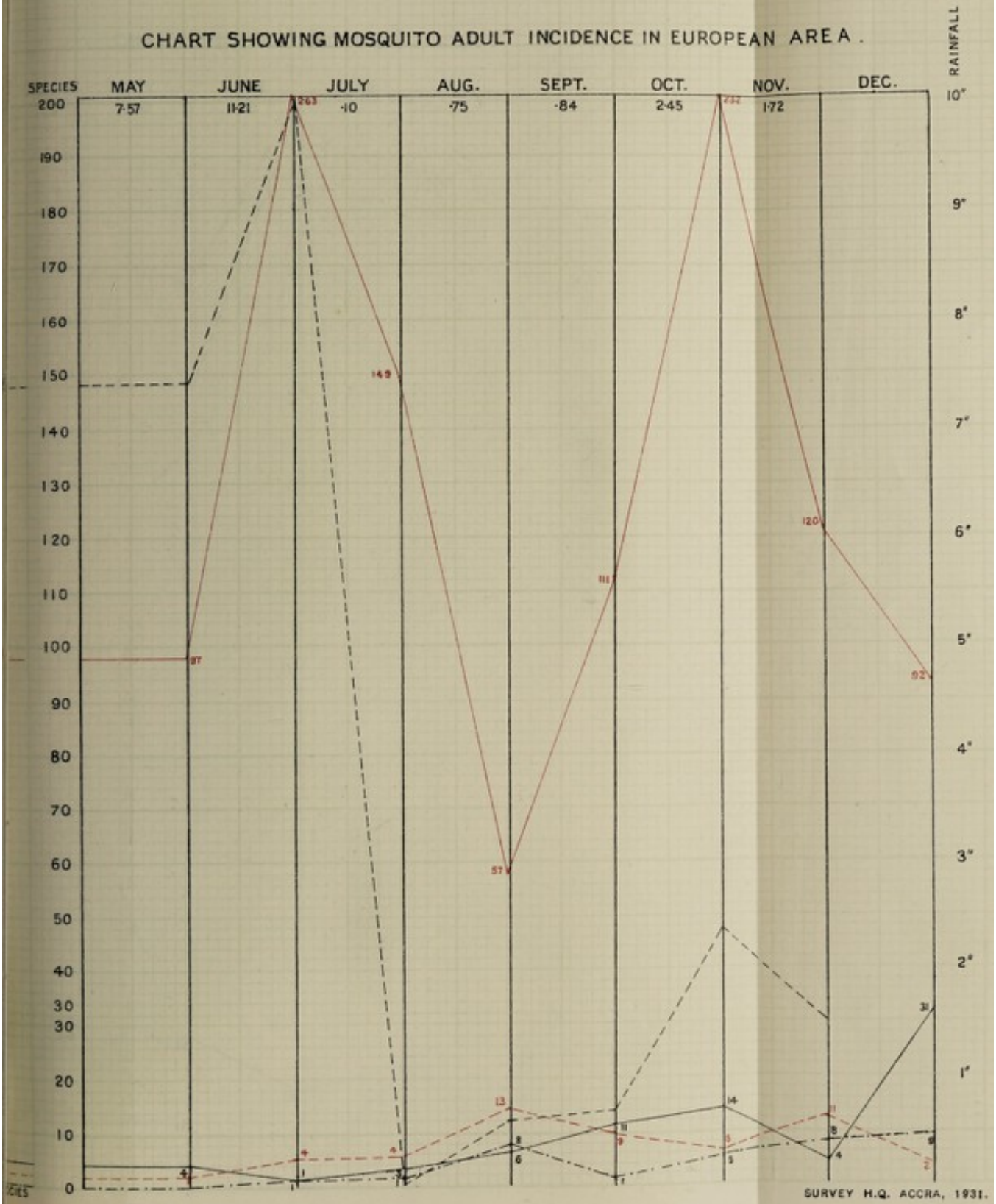
10. Towards Sekondi there are numerous fresh water swamps which are supplied by small streams from inland, and the same applies to the environs of Takoradi between the Axim Road and the point where the cutlet of the Whin River is no longer saline.

11. The vegetation consists of very dense thick scrub and very occasional tall trees, interspersed with clumps of short palm trees. The low-lying lagoon area consists of mud-flats and sandy patches, covered with short coarse grass. About five miles inland vegetation becomes taller, the soil more fertile and the conditions are those of a typical cacao farming area.

12. I understand that Sir Albert E. Kitson has stated that the geological formation of Takoradi comes under the Sekondian system (carboniferous). The surface is generally laterite and there are no outcroppings of rock except along the seashore. Below the laterite, there are down-faulted blocks of various coloured mud-stones, grits and conglomerates. There are also impure oil-shales containing an appreciable proportion of marcasite (the less stable sulphide of iron) and of carbon and sulphur. This material, acted upon by water and the oxygen of the air develops spontaneous combustion. The result of this chemical reaction appears to be the reason for the remarkable acidity of the waters found in certain parts of the area, especially in the vicinity of road and railway cuttings.

13. The light humus, washed into the valleys does not appear to be stable owing to erosion by the accumulating surface water during the heavy rains. There appears to be no clay sub-soil and the water quickly evaporates until saturation point is reached. When this occurs however, the surface water remains for a considerable time as the fall to the sea is so slight that the water cannot escape, and consequently the long valley through the European area section " 8 " becomes one long series of puddles fed by seepage from the hill side. The lagoon basins are sandy-flats with occasional deposits of alluvial soil at the inlets.

CHART SHOWING MOSQUITO ADULT INCIDENCE IN EUROPEAN AREA.



SURVEY H.Q. ACCRA, 1931.

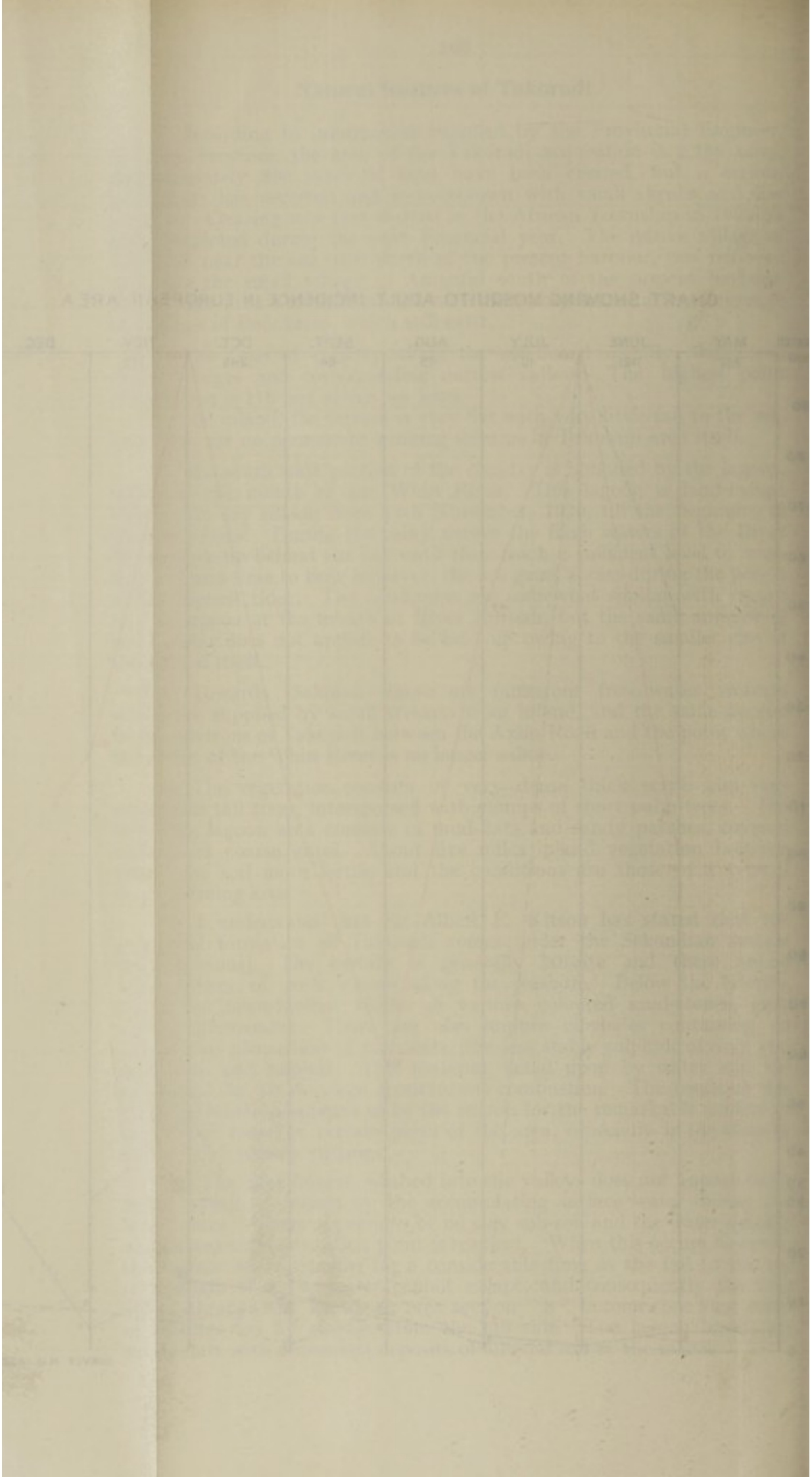
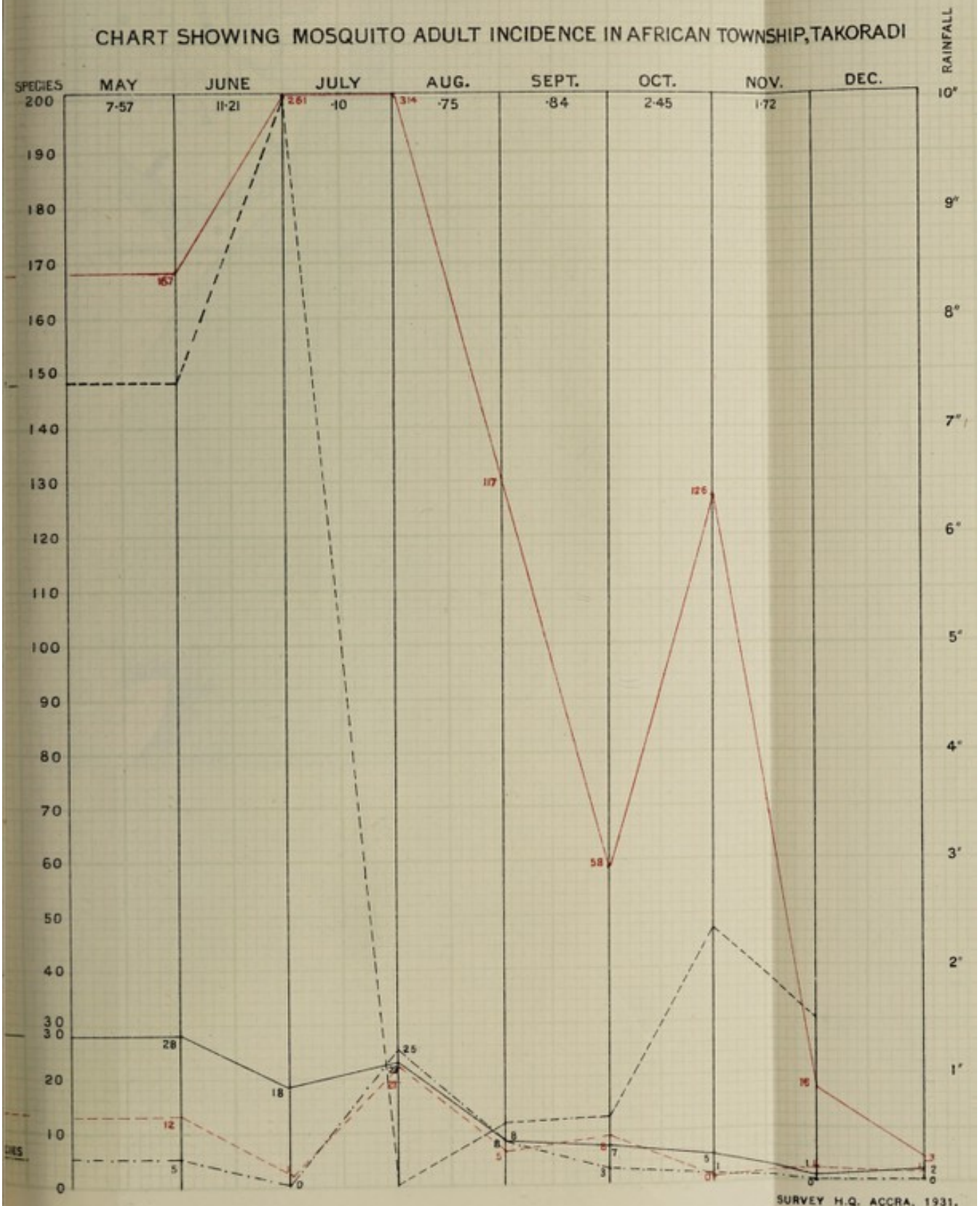


CHART SHOWING MOSQUITO ADULT INCIDENCE IN AFRICAN TOWNSHIP, TAKORADI



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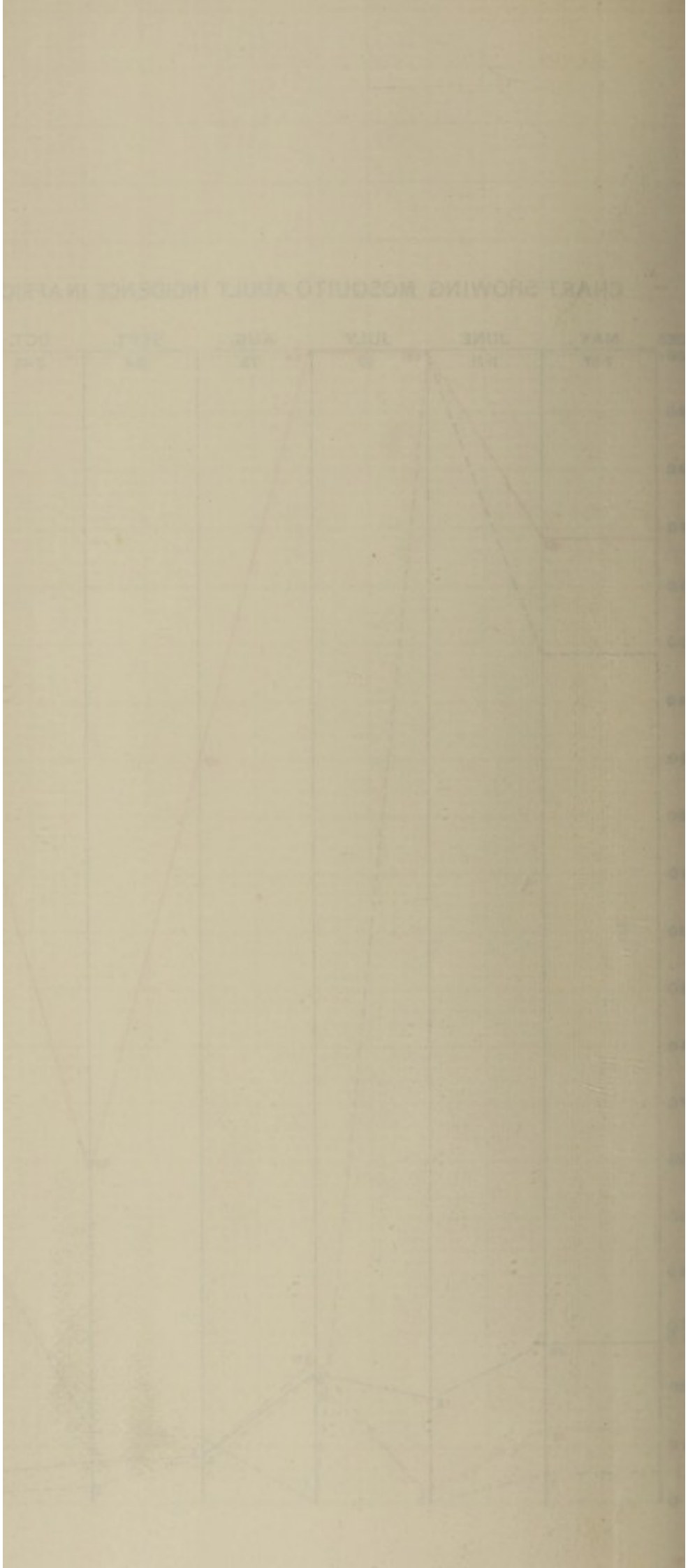

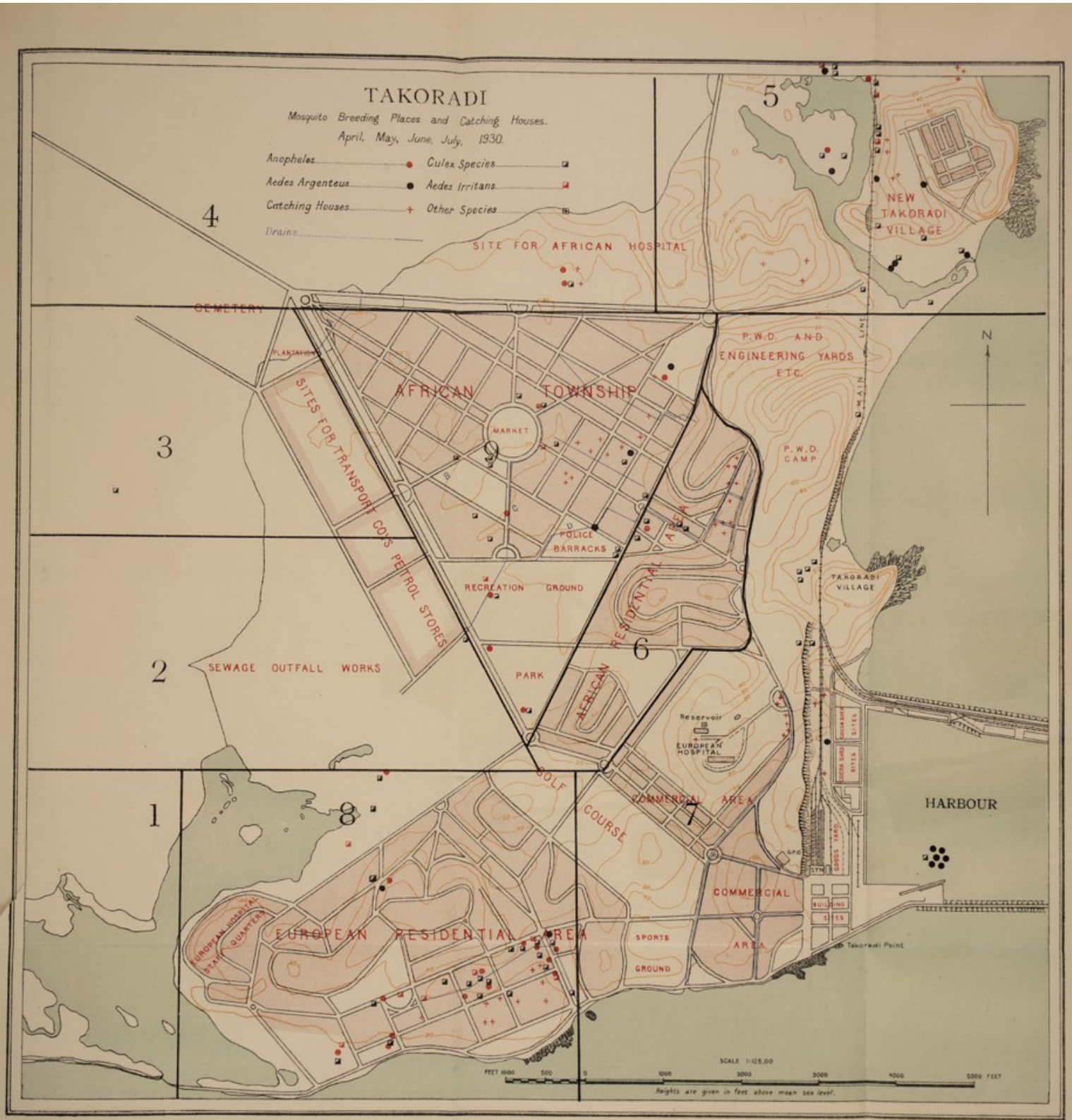

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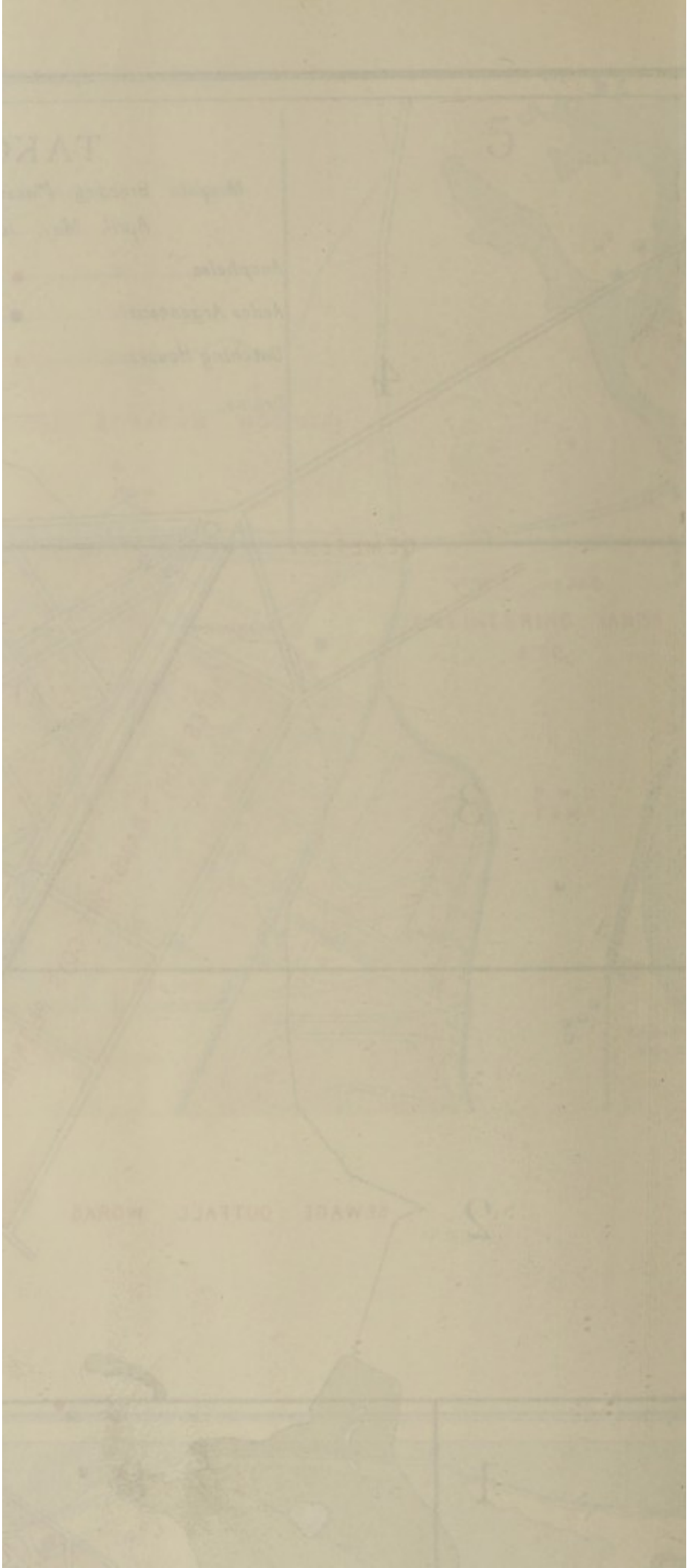

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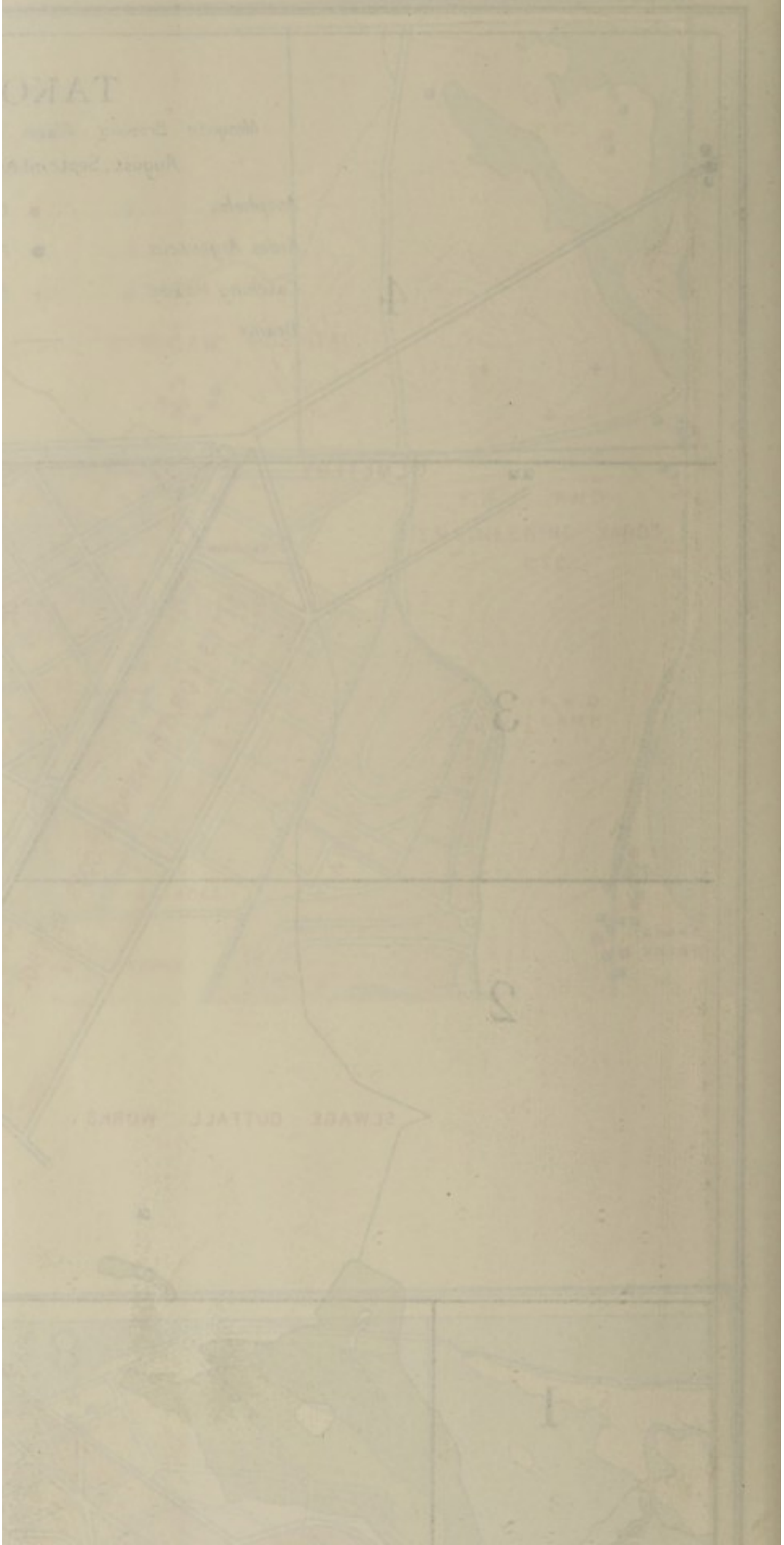


14. For purposes of systematising the observations the map of Takoradi Township was divided into nine sections. Three of these sections (Nos. 1, 2 and 3) contained no dwelling places. Adult incidence was therefore studied regularly by taking observations once in every six days in each section selected. Larval incidence was similarly studied, sections 1, 2, 3 and 4 being combined.

15. Sections 7 and 8 comprise the European reservation areas, sections 6 and 9 the New African Township areas, section 5 the native village of New Takoradi with the addition of the Wireless Station and the Shell Company's premises.

Incidence of Adult Mosquitoes in human Habitations.

16. In order to get a satisfactory index of the mosquitoes prevalent in the houses, a certain number of houses were chosen in each section and all mosquitos were regularly trapped at definite weekly periods, by means of African Field Collectors, supplied with the usual apparatus. The most efficacious was a celluloid tube with an inverted cone at one end and a rubber tubing inserted at the other covered by a muslin filter. The mosquito was sucked into the tube by inhaling. Small hand nets were also used to catch adults on the wing. The work was carefully checked and inspected and the catches were as accurate as possible. It was found however that during the time of a strong prevailing breeze, many adults were driven out of the European houses by the opening of the windows and the general disturbance of cleaning.

17. The results of the adults catches are given in the two charts, I and II, appended. A table (I) is also given giving the different species and the total numbers found of each for the entire period. The position of the ten " catching " houses in each area will be found marked on the general map of Takoradi showing mosquito distribution. Meteorological tables have been kindly supplied by the Harbour Master, Takoradi, showing temperature, rainfall, sunshine hours and wind.

TABLE I.

TABLE SHOWING SPECIES AND COMPARATIVE INCIDENCE OF ADULT MOSQUITOES FOUND AT TAKORADI, 1930-31.

Species.	*Total number caught*
Anopheles gambiae, Giles	2,159
Aedes irritans, Theobald	76
Culex thalassius, Theobald	70
Aedes aegenteus, Poiret	54
Mansonioides africanus, Theobald	42
Culex nebulosus, Theobald	39
Uranotaenia annulata, Theobald	25
Anopheles pharoensis, Theobald	19
Anopheles funestus, Giles	16
Culex duttoni, Theobald	13
Culex fatigans, Wiedeman	7
Eretmopodites chrysogaster, Graham	5
Lutzia tigripes, Grandpre and de C	3
Culex philipi, Edwards	5
Aedes albocephalus, Theobald	3
Species No. 17	2
Aedes simpsoni, Theobald	2
Aedes punctatothoracis, Theobald	1
Aedes (Aedimorphus) nigricephalus, Theobald	1
Aedes (Banksinella) punctocostalis, Theobald	1
Anopheles obscurus, Grunb	1
Culex decens var invidiosus, Theobald	7

18. It will be seen that, as is usually the case, the incidence approximates the rise and fall of the rainfall. In both the European and African areas, Anophelines far outnumber the other groups, and the Culicines were on an average more prevalent than the Aedes group, though in the latter are included other species of Aedes than the domestic *Aedes argenteus*.

19. The only Anopheline of real importance is *Anopheles gambiae*. *Aedes funestus* did not appear until August and it was found that this occurred in sections 5 and 6. As will be referred to later, *Aedes funestus* was not found breeding in Takoradi,and was only taken near Sekondi, at a point where the Takoradi railway line joins the Sekondi main line, as the crow flies, about three to three and half miles distant. The railway cuttings are deep and there are numerous borrow pits and excavations along the line. It would appear that there is every possibility that *Aedes funestus* migrated along the Railway cutting, especially as the railway crosses a few small water streams between Sekondi and Takoradi.

20. *Mansonioides africanus* was not found breeding in Takoradi area and though careful search was made no water "cabbage" *Pistia stratiotes* was found. One pool which possibly had contained pistia, was filled in by the Sanitary Authorities in August, but it is doubtful if this was ever a breeding place. On the other hand *Mansonioides africanus* was found in abundance breeding with *Aedes funestus* in the above-mentioned locality near Sekondi, and this fact appears to give extra evidence that migration of this species also took place from there-along the sheltered artery of the railway cutting. *Mansonioides africanus* was found in a house in the European area on the 6th of January, 1931, when there was no possibility of any Pistia existing within a radius of three miles. The comparative absence of *Aedes argenteus* clearly demonstrates the effect of control by the Sanitary Authorities, but a definite connection between the breeding place and adult incidence was established by the discovery of the heavy infestation of the Lighters in the Harbour, where thousands were breeding from time to time. This infestation undoubtedly spreads to some extent in the Harbour area, but the presence however of a very thick belt of impenetrable undergrowth of two miles in width, between the Harbour area and the European reservation area, undoubtedly checked migration. On the other hand as the Lighters were in close proximity to shipping, breeding in the Harbour itself is a very serious menace.

21. Certain species as *Culex thalassius*, found breeding in great numbers, commonly bite inhabitants sitting outside their houses in the evening, but are not caught in the houses during the day to the extent which might be expected from the size and density of the breeding area. This fact has been noticed also with regard to *Aedes irritans*.

22. In estimating mosquito incidence in any one locality it is essential to take into consideration the possibility of migration from the environs. It is not an uncommon phenomenon for migration to extend for a distance of four to five miles and it may extend further. A brief summary is therefore given of the possible sources of outside infestation,—there is some evidence that the swamps and pools near the Railway workshops at Sekondi are a breeding centre from which *Aedes funestus* and *Mansonioides africanus* migrate along the Railway line. At Akoasi and Efia Nkwanta between Takoradi and Sekondi there are fresh water pools which breed Anopheles in large numbers at certain seasons. As these are adjacent to the Railway line, this possibility cannot be overlooked. Anopheline larvae have been found near New Amanful village and as the prevailing wind is West and usually South West, it is quite probable that Anophelines are carried across

to the European area, which may account for some of the adult infestation found after the breeding places had dried up in this area. The fact however, that outside infestation may increase the incidence, should not adversely influence the policy of eliminating as far as possible the actual sources of infestation in the area under consideration.

Dissections of Adult Anopheles.

THE PERCENTAGE OF INFECTED MOSQUITOES FOUND IN HUMAN HABITATIONS IN TAKORADI.

23. From June to October, 1930 a certain proportion of adult mosquitoes collected during the routine catching experiments were dissected, in order to ascertain whether malaria parasites were present. Both the glands and the stomachs were examined. No infected glands were found, though fresh and stained preparations were examined. Cysts were found in the stomachs which were typical and also certain types of cysts which are not yet determined. The following table gives the actual monthly figures with the percentage of the presumed typically infected mosquitoes.

Dissections of Anopheles gambiae (Giles).

Month.	*Dissected.*	*Infected with typical cysts.*	*Percentage.*
June	52	4	7.9
July	173	11	6.3
August	90	5	5
September	35	2	3.5
October	45	6	13

24. With the time available it was impossible to undertake more dissections and as *Anopheles gambiae* is the only important mosquito which occurs in sufficient numbers, further research is of more academic than economic interest. The percentage of infected mosquitoes however, though comparatively low is significant, when the high percentage of *Anopheles gambiae* is taken into consideration in comparison with other mosquitoes found in houses. Ten *Anopheles pharoensis* were dissected and four *Aedes funestus*. All proved negative.

Mosquito Breeding Places.

25. Each section was examined once a week for larval breeding places. Samples of water were taken whether larvae occurred in them or not. The material collected was bred out for identification and the actual breeding places were marked on a Map with the experiment number.

26. The main Anopheline breeding areas were as follows: In section 8, in the valley extending through the European Residential area; in section 9, South of the African township; in section 7, in the low-lying ground by the Railway yard; in section 4, the drains around the Public Works Department buildings; in section 5, in the pools either side of the Railway and the fresh water pool in the peninsular in the Butuah lagoon.

27. The culicine breeding areas, while approximating the anopheline breeding areas, extend over a much wider area. Under this heading are grouped all species other than *Aedes argenteus* and the *Anophelines*.

28. Owing to the rigid inspection by the Sanitary Authorities domestic culicines are comparatively rare. *Culex fatigans* was rarely taken. The chief species are *Culex thalassius* which breeds in enormous numbers in the saline swamps, the crab-hole mosquito *Aedes irritans* which is ubiquitous and *Culex decens* var *invidiosus*.

The main culicine areas are in the valley in section 8, the swamps and the village of New Takoradi in section 5, the low-lying ground around the African township, the swamp land in section 2, and the depression of section 7 by the railway sheds.

29. *Aedes argenteus* is rarely found in the European Residential area (section 8). It is occasionally found in the African township, but it is held in control by the Sanitary Authorities. A certain amount of infestation occurs in the native town of New Takoradi (section 5). One of the main breeding places however is the harbour area and especially the lighters in the harbour. The harbour area is full of all kinds of machinery and a certain amount of breeding probably occurs on and between the roofs of the Customs sheds. The breeding in the harbour itself of *Aedes argenteus* is a very serious matter, as the adults are within the easy reach of the shipping. The Sanitary Authorities are unremitting in their efforts to cope with the situation, but there is no doubt that continual breeding goes on. It is a very difficult and dangerous procedure to examine the roofs of the cacao sheds and the Customs Warehouses, and owing to the rapidity with which *Aedes argenteus* breeds it is most difficult to discover breeding places in temporary structures and odd bits of machinery.

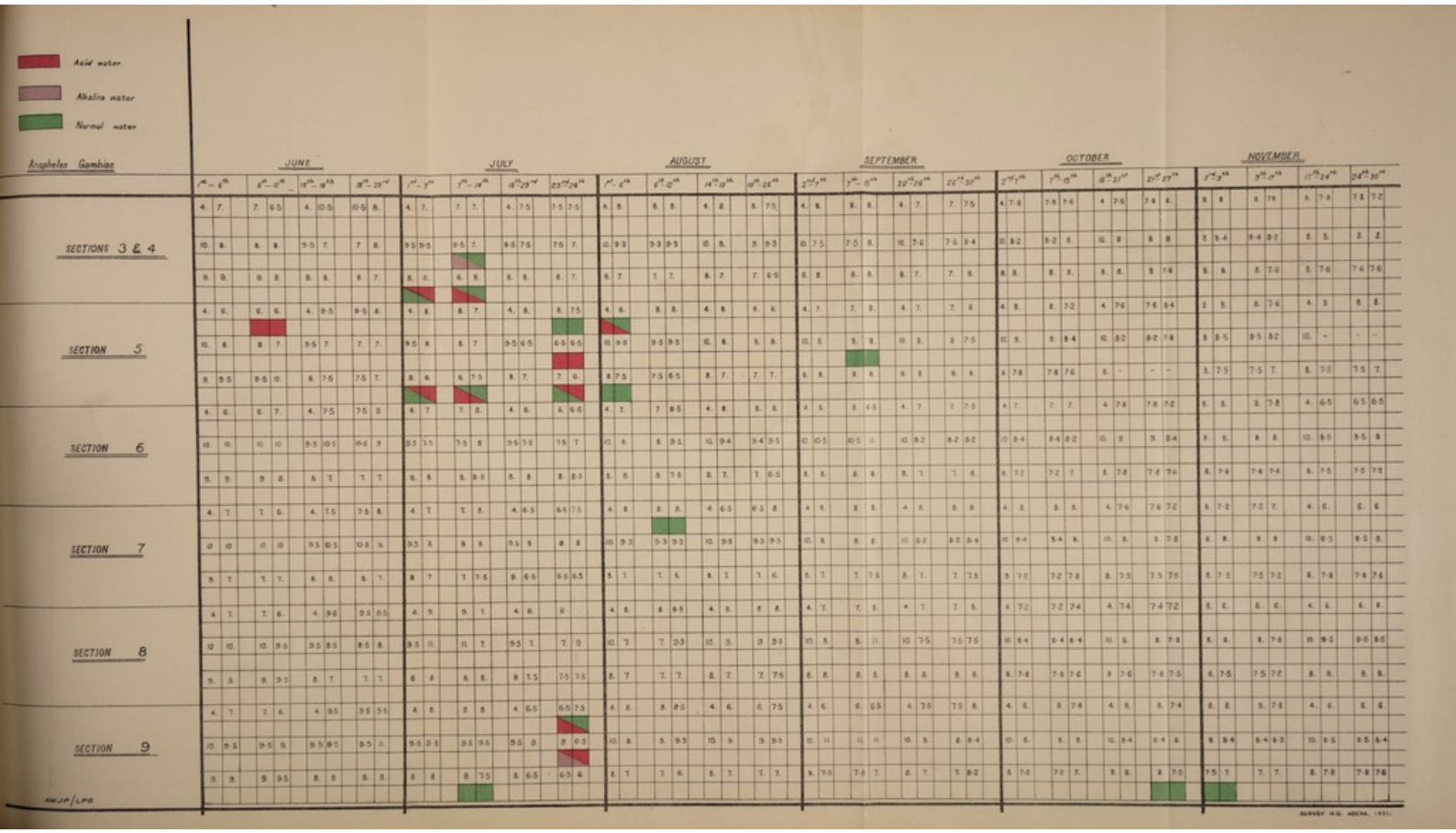
30. During the rainy season a very considerable amount of water comes down from the Whin River, raises the level of the lagoon and overflows the low-lying ground on the inland side of section 8 and section 2. A series of swamps and pools are formed, in which *Culex thalassius* is found breeding in large numbers, but anopheline infestation is very small as the water is too saline, the ground is very sandy and there are evidently a combination of factors which inhibit anopheline breeding. This will be discussed under biological control.

31. Flooding occurs in the Butuah lagoon, which is very saline owing to rapid evaporation and conditions are even more inimical to anopheline breeding. I consider from present observations that these two lagoons are not the chief source of the heavy anopheline infestation at Takoradi. There is no doubt however, that if the Whin River lagoon was not periodically filled by sea water carried over the bar at high tide, during the rainy season the salanity would become very much lowered.

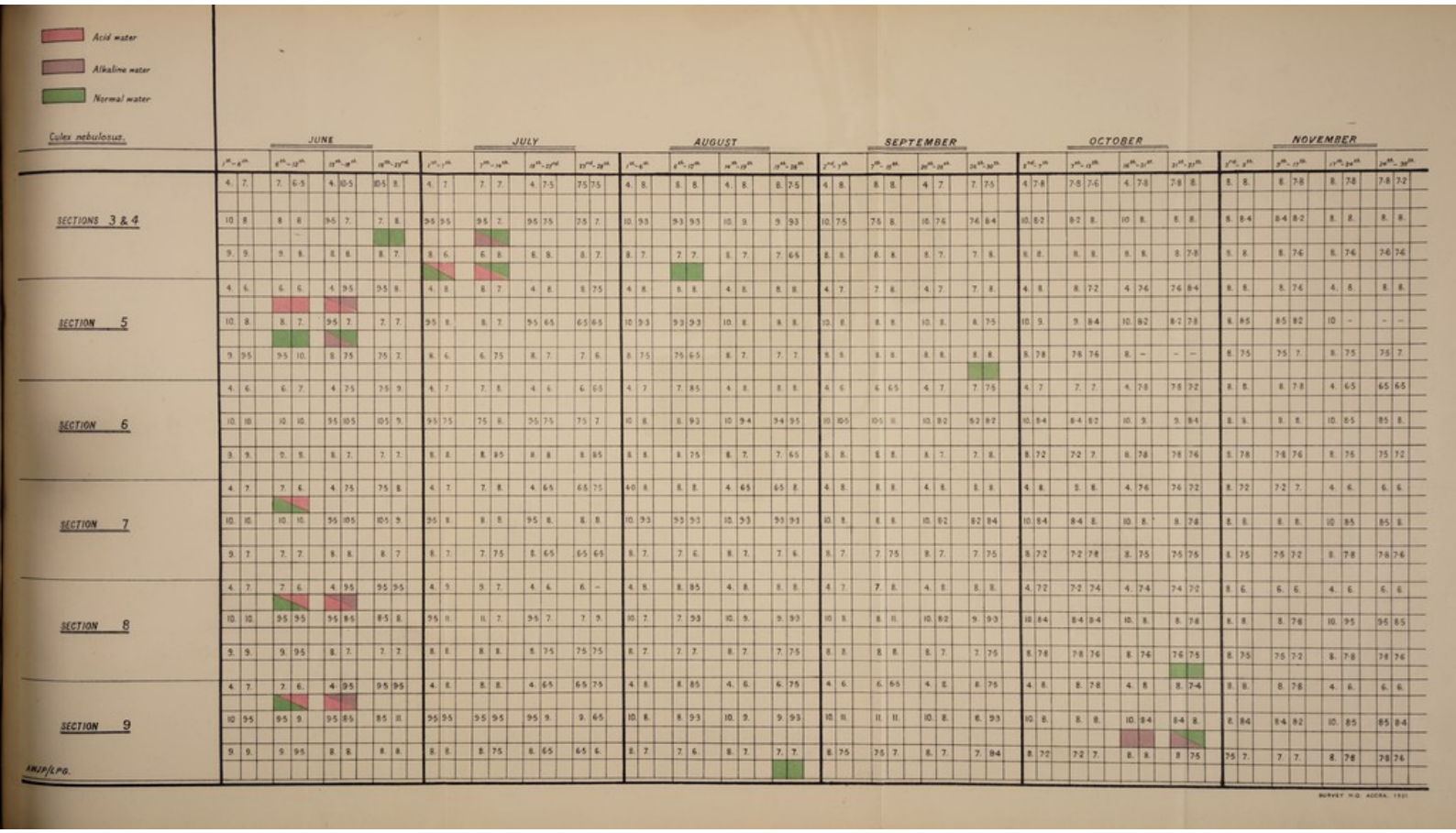
32. A very extensive surface drainage system has been carried out at Takoradi consisting of concrete drains on either side of the road and dwellings. These lead into two main drains, one ending in a swamp in section 2, the water in this instance simply flooding over the area, the other main drain debouching into the sea in section 8.

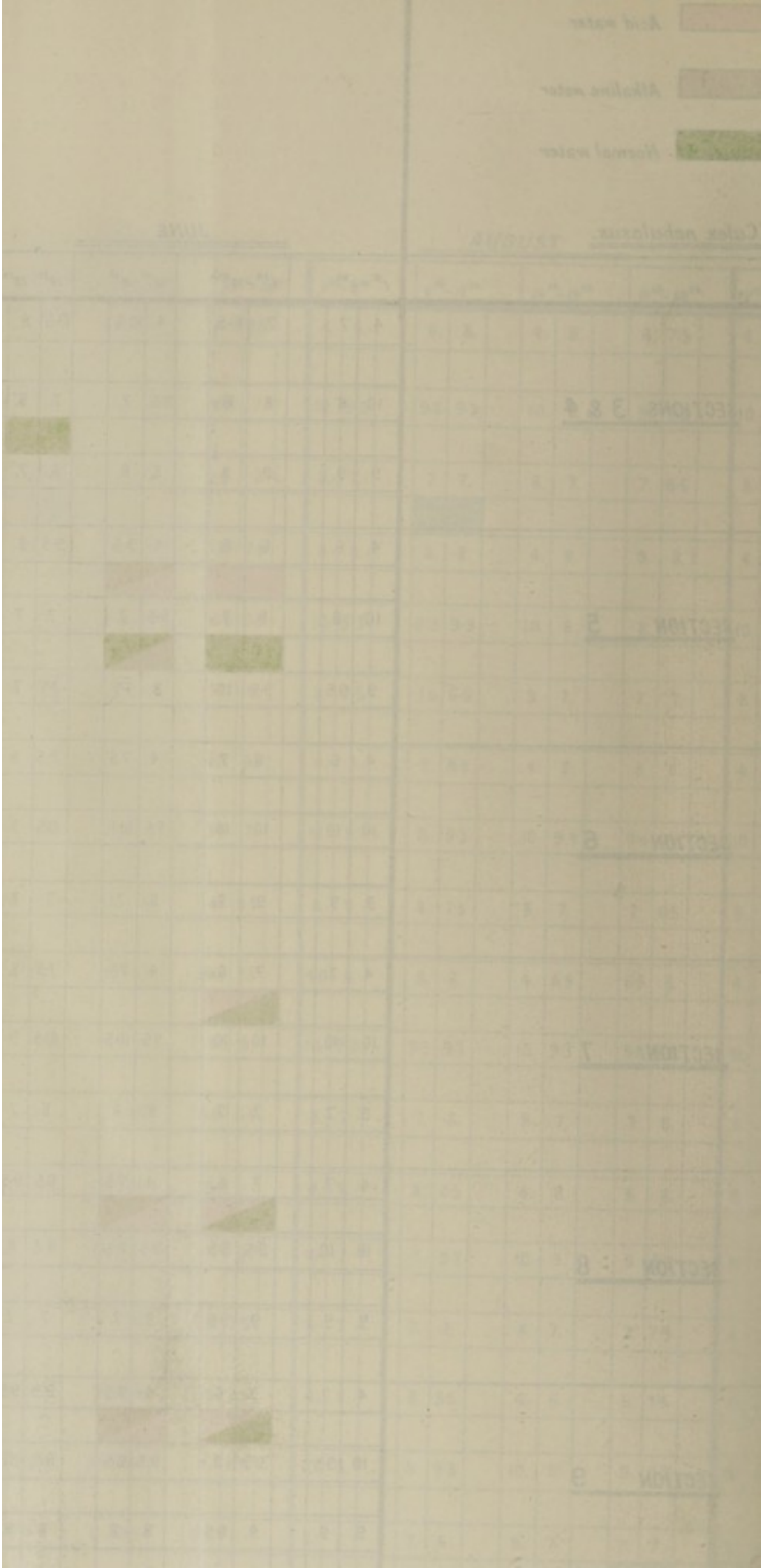
33. Unfortunately the fall is so low that these drains continually hold water and in some cases are actually above the level of the swamps through which they run. The depressions on either side of these drains fill up during the rains, the water does not percolate through the soil into the drains and very extensive anopheline breeding places are formed. With the cessation of rain, these pools dry up in a few days, but the drains themselves often hold water for six weeks after, and blockages through the collection of debris and irregularities in the bottom of the drains cause a series of puddles which breed anopheline in thousands. There is no doubt that the present system of drainage has very greatly increased anopheline breeding beyond the normal period when the ground holds surface water.

34. Efforts are made to keep the drains free by sweeping, but this is impossible with the amount of labour which can be economically employed. There are a certain amount of earth drains connecting the concrete drains which are a great menace. More breeding may occur in an earth drain of 20 yards in length, with its optimum condition of


Acid water
Alkaline water
Normal water
Anopheles Gambiae
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
SECTIONS 3 & 4
SECTION 5
SECTION 6
SECTION 7
SECTION 8
SECTION 9
AM/JP/LPG
SURVEY H.Q. MEDNA. 1931.

Acid water
Alkaline water
Normal water
Aedes argenteus
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
SECTIONS 3 & 4
SECTION 5
SECTION 6
SECTION 7
SECTION 8
SECTION 9
SURVEY H.Q. ACCRA, 1931


Acid water
Alkaline water
Normal water
Culex nebulosus.
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
SECTIONS 3 & 4
SECTION 5
SECTION 6
SECTION 7
SECTION 8
SECTION 9
ANJP/LPG.
SURVEY H.Q. ACCRA. 1931



the pH value of the water and the amount of favourable organisms, than in a much greater swamp area with its restricting factors of adverse chemical conditions of the water and the presence of fish and predatory insects. A single generation produced in an earth drain will flood the adjacent area with adults.

Artificial Traps for Larvae.

Artificial mosquito larvae Index.

35. To accurately gauge the prevalence of mosquitoes in a given area, artificial traps are of considerable value, both for obtaining an indication as to the actual species present and also their preference for certain types of water and environment. The system adopted was as follows: Wooden tubs, lined with cement to render them water-tight were used. The "normal" tubs were filled with water, earth, grass and aquatic plants, the others with water only. All were allowed to stand until there appeared to be no alkalinity resulting from the chemical action of the fresh cement coming in contact with the water. The water in the tubs was then made up to a definite acid, alkaline and "normal" solution, the pH of the first being 4.0 the second 10.0 the "normal" between 7.0 and 8.0. The tubs were placed in each section of Takoradi as far as possible in a situation of equal sun and shade, the "normal" tub being buried in the ground to simulate a typical anopheline breeding place.

36. The tubs were examined on the fifth day, the larvae removed and the pH value of the water taken. It was found that the pH value altered considerably as a rule. The same water was left, and the tubs were examined again five days later. This concluded a particular experiment and a fresh experiment was commenced on the same lines.

37. It was found that *Anopheles gambiae* preferred an acid or normal water. On the two occasions in which anopheline larvae were found in an original alkaline tub, the same water at the end of the experiment had turned normal or acid. On the other hand *Aedes argenteus* appeared to have no preference for any particular type of water and to develop equally well in all. *Culex decens var invidiosus* appeared to favour a normal or acid water; *Culex duttoni* appeared to favour an acid or normal water, and on the occasion when it was found in an acid water which had turned strongly alkaline it was undoubtedly due to an excess of alkali from the fresh cement.

38. Three coloured charts III, IV and V are given dealing with *Anopheles gambiae*, *Aedes argenteus* and *Culex nebulosus*. The pH value of the water at the time of examination is given above and the colours are used to denote the type of water. Red indicates acid; mauve alkaline; green "normal," i.e. between 7.0 and 8.0. Therefore a water commencing with a pH value between 7.0 and 8.0 and becoming acid is shown half green and half red, becoming alkaline half green half mauve, and so on.

39. The following Table II gives the different species and the number of times each was found monthly.

TABLE II.

TABLE SHOWING THE DIFFERENT SPECIES OF MOSQUITO FOUND IN THE ARTIFICIAL TUBS AND ALSO THE ACTUAL NUMBER OF TIMES EACH SPECIMEN WAS FOUND PER MONTH.

Species.	*June.*	*July.*	*Aug.*	*Sept.*	*Oct.*	*Nov.*	*Dec.*	Total.
Aedes argenteus, Poiret ...	25	45	57	35	19	32	30	243
Anopheles gambiae, Giles ...	1	11	3	1	—	2	2	20
Culex nebulosus, Theobald ...	6	2	2	1	1	—	—	12
Culex decens, Theobald ...	5	9	1	—	7	6	—	28
Aedes irritans, Theobald ...	—	2	—	—	—	—	—	2
Culex duttoni, Theobald ...	3	8	7	3	—	1	—	22
Aedes simpsoni, Theobald ...	2	9	3	5	3	2	—	24
Lutzia tigripes, Grandpre and de C.	6	6	22	14	7	11	1	67
Culex thalassius, Theobald ...	—	—	—	1	—	1	—	2
Eretmopodites chrysogaster, Graham	2	1	3	1	1	—	—	8
Culex pruina, Theobald ...	—	—	—	—	1	2	—	3
Culex philipi, Edwards ...	—	—	—	—	—	—	1	1
Culex tritaeniorhynchus, Giles	—	—	—	—	—	—	1	1
Aedes albocephalus, Theobald...	1	—	—	—	—	—	—	1
Culex fatigans, Theobald ...	1	—	—	—	—	—	—	1
Species No. 11	—	1	—	—	—	—	—	1

SALINITY AND pH VALUES.

40. The question of the acidity and the alkalinity of the water in which the various species of mosquitoes will breed, is becoming increasingly important with our knowledge of the main factors governing mosquito incidence. The presence of decaying or living vegetable matter, which causes a definite chemical reaction in the water undoubtedly has a great effect on the growth of the larvae, and I make the suggestion that the acidity or alkalinity of the water may also affect the choice of the adult mosquito when about to oviposit. At present however there does not seem to be sufficient and varied data on which to formulate any definite law.

41. The following table III gives the pH values of the water in which the various species were actually found breeding. From these figures the following points appear to be of real interest :—

Anopheles gambiæ, appears to have a fairly wide range of choice and as verified by further experiments in the Laboratory, will breed in a water of an acid and alkaline nature. In the field, this phenomenon was noticed to take place, when the breeding place was contaminated by acid from the deposits of marcasite exposed on the hill sides between artificial road and railway cuttings. These observations made under the conditions of my experiments differ from that of Macgregor in Mauritius, who found this species unable to tolerate acidity (*Mosquito surveys*, Macgregor, Welcome Bureau Scientific Research, 1927).

EXPERIMENTS IN BREEDING ANOPHELE GAMBIÆ IN WATERS OF A KNOWN pH VALUE.

42. A series of experiments were done in the laboratory under equal conditions of light shade and temperature, to ascertain the effect of a known pH value of the water. Twelve experiments were carried out with alkaline water of a pH value of 9.0. The water was tested every morning and if found to be less alkaline, brought up to the required alkalinity by the addition of a certain proportion of washing soda. The acid series of experiments were carried out with a pH value of 4.0 and kept at that value by the addition of acetic acid. One

hundred eggs were used for each experiment. Glass jars were used, filled with a small amount of earth from the same place and two plants of the "water cabbage" *Pistia stratiotes* were placed in each. The following tables IV shows the results. It will be observed that a larger percentage was obtained on two occasions from the acid series than ever resulted throughout the whole of the alkaline series, the latter showing a percentage of emergence consistently lower than 50 per cent.

TABLE III.

TABLE SHOWING THE pH VALUE OF THE WATER IN WHICH THE VARIOUS SPECIES WERE FOUND BREEDING AND THEIR INCIDENCE.

Species.	4.0	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0
Anopheles gambiæ ...	2	—	—	8	6	10	15	13	6	—	—	—	—	—
Anopheles funestus ...	—	—	—	1	—	—	—	1	—	—	—	—	—	—
Aedes argenteus ...	—	—	1	11	14	56	51	99	13	12	12	—	—	—
Aedes irritans	2	1	—	6	—	7	4	5	—	—	1	—	—	—
Aedes simpsoni ...	—	—	—	—	2	4	7	11	—	2	2	—	—	—
Culex thalassius ...	6	—	1	1	—	10	5	7	3	—	—	—	—	—
Culex decens var *invidiosus*	18	—	2	10	5	18	13	12	3	2	1	—	—	—
Culex nebulosus ...	1	1	1	7	5	12	4	7	—	—	1	—	-	
Culex fatigans ...	—	—	—	1	—	—	—	—	—	—	—	—		
Culex duttoni	1	—	—	3	6	5	7	—	1	2	—	—	—	
Culex philipi	—	—	—	—	2	—	—	—	—	—	—	—	—	—
Culex andreanus ...	—	—	—	1	—	—	—	1	—	—	—	—	—	—
Culex tritæniorhynchus	—	—	—	—	—	—	—	2	—	—	—	—	—	—
Culex pruina	—	—	—	2	—	3	2	2	—	—	—	—	—	—
Culex quasigelidus ...	—	—	—	—	—	—	—	1	—	—	—	—	—	—
Species No. 17 ...	—	—	—	—	—	—	—	1	—	—	—	—	—	—
Aedes albocephalus ...	1	—	—	—	1	—	1	1	—	—	—	—	—	—
Aedes (Aedimorphus) punctothoracis ...	1	—	—	—	—	1	1	2	—	—	—	—	—	—
Species No. 11 ...	—	—	—	—	—	—	1	—	—	—	—	—	—	—
Species No. 7	3	—	—	2	—	1	1	1	—	—	—	—	—	—
Lutzia tigripes... ...	6	—	—	8	6	12	15	25	5	2	6	—	—	—
Uranotænia annulata	—	—	—	—	—	—	1	—	—	—	—	—	—	—
Mansonioides africanus	—	—	—	—	—	—	1	1	—	—	—	—	—	—
Aedomyia africana ...	—	—	—	—	—	—	1	1	—	—	—	—	—	—
Eretmopodites chrysogaster	—	—	—	—	2	2	3	3	—	—	—	—	—	—
Total	40	2	5	61	47	141	137	200	30	19	27	—	—	—

TABLE IV.

(*a*) ACID EXPERIMENTS.

Experiment number.	*Date eggs introduced.*	*Date eggs hatched.*	*Date first adult emerged.*	*Date last adult emerged.*	*Percentage of adults emerged.*
A	15–12–30	15–12–30	24–12–30	4–1–31	58
B	19–12–30	21–12–30	27–12–30	4–1–31	77
C	19–1–31	20–1–31	30–1–31	5–2–31	6
D	22–1–31	23–1–31	1–2–31	8–2–31	41
E	24–1–31	25–1–31	5–2–31	2–2–31	9
F	24–1–31	25–1–31	3–2–31	9–2–31	23

TABLE IV—*contd.*

(*b*) ALKALINE EXPERIMENTS.

Experiment number.	*Date eggs introduced.*	*Date eggs hatched.*	*Date 1st adult emerged.*	*Date last adult emerged.*	*Percentage of adults emerged.*
A	8–1–31	9–1–31	18–1–31	25–1–31	27
B	8–1–31	9–1–31	21–1–31	21–1–31	1
C	3–1–31	5–1–31	19–1–31	25–1–31	43
D	8–1–31	9–1–31	19–1–31	19–1–31	1
E	2–1–31	9–1–31	20–1–31	28–1–31	25
F	11–1–31	12–1–31	21–1–31	21–1–31	1
G	11–1–31	12–1–31	20–1–31	26–1–31	47
H	11–1–31	12–1–31	24–1–31	25–1–31	3
I	15–1–31	16–1–31	25–1–31	31–1–31	7
J	15–1–31	16–1–31	30–1–31	3–2–31	6
K	16–1–31	17–1–31	31–1–31	5–2–31	22
L	17–1–31	18–1–31	27–1–31	4–2–31	30

43. *Lutzia tigripes* has a wide range from pH 6.0 to 9.5, this might be expected as the larvae being predaceous would naturally accommodate themselves to a number of species. *Culex decens var invidiosus* has a wide range, but adapts itself to considerably acid swamps, having been found no less than eighteen times in water with a pH value of 4.0. *Aedes argenteus* has a wide range but its optimum breeding condition is between a pH value of 7.0 and 8.0, the same is true of *Aedes simpsoni*.

44. The following table V gives the incidence of waters found in the field with relation to their pH value.

TABLE V.

Surface waters and crabholes.		*Cement drains.*		*Earthen drains.*		*Swamps, pools and lagoons.*		*Utensils.*	
pH range.	*Times found.*	*pH range.*	*Times found.*	*pH range.*	*Times found.*	*pH range.*	*Times found.*	*pH range.*	*Times found.*
4.0	5	4.0	7	4.0	14	4.0	12	4.0	2
5.0	—	5.0	—	5.0	1	5.0	4	5.0	—
5.5	—	5.5	—	5.5	—	5.5	2	5.5	3
6.0	4	6.0	5	6.0	5	6.0	9	6.0	4
6.5	3	6.5	—	6.5	1	6.5	2	6.5	6
7.0	4	7.0	—	7.0	9	7.0	11	7.0	15
7.5	1	7.5	1	7.5	6	7.5	4	7.5	9
8.0	2	8.0	4	8.0	8	8.0	9	8.0	17
8.5	2	8.5	—	8.5	6	8.5	2	8.5	2
9.0	1	9.0	—	9.0	—	9.0	—	9.0	1
9.5	—	9.5	1	9.5	—	9.5	—	9.5	1
10.0	—	10.0	—	10.0	—	10.0	—	10.0	—
11.0	—	11.0	—	11.0	—	11.0	—	11.0	1

It will be noted that a very considerable number (40) were very acid (pH 4.0), the most prevalent pH value was 8.0 which is the value of the ordinary tap water supplied from the reservoir at Inchaban.

SALINITY OF WATERS IN RELATION TO MOSQUITO BREEDING.

45. A considerable number of samples of water were taken from the field and tested to find the amount of NaCl which they contained. The results of the analyses are given in the following Table VI in equivalents to NaCl in parts per 100,000. The waters are divided into the following groups for purposes of comparison (*a*) " surface waters " include road-side pools, borrow-pits, earthen drains and ditches, (*b*) " drains " included concrete culverts and gutters, (*c*) " swamps " include all waters on inundated land, marshes around the periphery of lagoons and water collected from continual seepage, (*d*) " utensils " include pots, domestic receptacles, old canoes, etc. The salinity of the swamps is very high, due no doubt to rapid evaporation.

TABLE VI.

EQUIVALENTS TO NaCL IN PART PER 100.000.

Surface waters.	*Drains.*	*Swamps.*	*Utensils.*
115	71	4,620	37
102	54	3,646	37
62	12	3,168	21
59	12	2,986	21
54	7.	2,425	21
31	6	1,963	20
15	6	1,864	18
12	5	1,864	18
8	5	1,578	17
8	5	1,237	16
6	3	1,089	15
6	3	1,089	14
4	—	990	13
4	—	491	13
3	—	488	12
3	—	382	12
3	—	313	8
2	—	287	8
—	—	234	8
—	—	234	8
—	—	211	7
—	—	204	7
—	—	184	7
—	—	157	7
—	—	156	7
—	—	136	6
—	—	120	6
—	—	105	6
—	—	92	6
—	—	89	6
—	—	76	6
—	—	74	6
—	—	72	5
—	—	72	5
—	—	41	5
—	—	28	5
—	—	18	5
—	—	15	5
—	—	13	5
—	—	8	5
—	—	7	5
—	—	7	4
—	—	4	4
—	—	3	3
—	—	—	3
Maximum 115	71	4,620	37
Minimum 2	3	3	3
Average 27	15	733	10

46. The following table VII shows the salinity of the waters with reference to the breeding of six of the most important species. *Anopheles gambiæ* was generally found in waters containing a small proportion of NaCl, but on one occasion was found in a salt lagoon edge with an equivalent of 3646.5 NaCl parts per 100,000. *Culex thalassius* is generally found in a very saline waters. *Culex decens* var *invidiosus* is found in waters varying from a very low to quite a high degree of salinity. *Aedes irritans* is usually found in distinctly saline waters. *Aedes argenteus* is not normally found in saline waters, but has been proved in the laboratory capable of breeding out in saline waters. *Culex nebulosus* can tolerate a medium degree of salinity.

47. Figures also are given in this table showing a series of waters taken at random from swamps and surface waters, in which no larvae were found breeding. These samples were principally from the back water pools in section 8. This salinity combined with acidity appears to be the factor which inhibits breeding to a large extent in this area.

TABLE VII.

Anopheles gambiae.	*Culex thalassius.*	*Culex decens* var *invidiosus.*	*Aedes argenteus.*	*Culex nebulosus.*	Water containing no larvae.
92.4	4620.0	184.8	25.4	231.0	2128.5
76.4	3168.0	156.9	21.7	54.4	1864.5
54.4	3003.0	136.9	21.4	41.2	1578.0
25.4	2986.0	120.4	18.3	37.9	1237.5
18.6	2425.5	115.5	16.6	25.4	1089.0
12.8	1963.5	110.5	12.9	18.1	1088.0
8.6	1864.5	105.6	7.2	15.5	990.0
8.5	92.4	102.0	6.8	15.1	488.4
6.9	72.6	74.2	6.3	13.8	382.8
6.9	7.5	72.6	5.9	12.5	234.3
6.1	5.2	72.6	5.7	8.6	214.5
5.7	4.7	62.0	5.2	7.2	211.2
5.7	—	31.6	5.2	7.0	157.9
5.2	—	28.3	3.9	7.0	89.1
5.2	—	25.4	3.9	6.9	59.4
4.9	—	20.2	3.9	4.6	54.5
3.9	—	18.6	3.1	—	7.2
3.4	—	15.5	—	—	3.5
—	—	14.5	—	—	—
—	—	13.4	—	—	—
—	—	12.5	—	—	—
—	—	9.0	—	—	—
—	—	8.5	—	—	—
—	—	8.3	—	—	—
—	—	7.5	—	—	—
—	—	6.1	—	—	—
—	—	5.9	—	—	—
—	—	4.6	—	—	—
—	—	3.9	—	—	—
—	—	3.7	—	—	—
—	—	3.6	—	—	—
—	—	3.5	—	—	—
Maximum ... 92.4	4620.0	184.8	25.4	231.0	—
Minimum ... 3.4	4.7	3.5	3.1	4.6	—
Average ... 20.3	1684.4	46.9	9.0	31.6	—

The Effect of Light and Shade on the Breeding of *Anopheles gambiae.*

48. It has been found by certain investigations in Malaya and by Macgregor in Mauritius that *Anopheles gambiae* required a certain amount of direct sunlight in order to breed successfully. Some preliminary experiments on this subject have been carried out in Takoradi both in the field and in the laboratory. The results obtained to date are very interesting as they do not bear out this hypothesis. *Anopheles gambiae* were found breeding in a culvert which admitted no direct sunlight at any time during the day. The following method was then adopted.

49. A cement drain 60 feet long 12 inches wide and 12 inches deep was constructed, the ends were blocked and a small outlet constructed of fine wire gauze. Iron barrels were sunk in the ground at each end of the drain, which in turn were connected with other sunken barrels by small drains. One-half of the drain was shaded, the other exposed to full sunlight. The drains and barrels were filled with water which soon developed Algæ. For some time the concrete drain remained alkaline. On the other hand the water in the iron barrels was usually normal. No Anopheles larvae developed in the concrete drain either in the shaded and unshaded portion. The factor here was obviously the pH value of the water rather than the amount of sunlight.

Barrel number.	*Date collected.*	*Condition.*	*pH value.*	*Remarks.*
No. 1	29–10–30	Unshaded	4.0	Numerous larvae found.
No. 1	12–11–30	Unshaded	8.0	Numerous larvae found.
No. 4	22–11–30	Shaded	7.5	Numerous larvae found.
No. 1	6–12–30	Unshaded	8.0	Numerous larvae found.
No. 2	6–12–30	Unshaded	7.5	Numerous larvae found.
No. 5	17–12–30	Shaded	7.0	Numerous larvae found.
No. 2	17–1–31	Unshaded	7.5	Numerous larvae found.

50. Two cages were placed in the shaded and unshaded part of the main concrete drains, and a hundred eggs put in each, no adults emerged. Ten adults were then introduced into each cage, but no breeding took place. The water in the main drain was infested with immature frogs. Whether there is any relation between the presence of " Tadpoles " and the absence of larvae I have not been able to ascertain, but on many occasions I have noted that when " Tadpoles " were present in any number, mosquito larvae were absent. Experiments were then tried in large cages with a cement base, filled with water of a pH value of 7.5 black earth, grass and the aquatic plant *Pistia stratiotes*. Three hundred eggs were put in each, one cage (*a*) was exposed to full sunlight, the other (*b*) completely covered with heavy brown paper which excluded practically all light. From cage (*a*) 17 adults emerged during a period of 18 days. From cage (*b*) shaded 12 adults emerged during a period of 14 days. The experiment was then tried with adults. Five *Anopheles gambiae*, females, were put in each cage under the same conditions, from cage (*a*) unshaded, 19 adults emerged during the period of 14 days, from the shaded cage (*b*) 89 adults emerged during a period of 12 days, there is no doubt therefore that *Anopheles gambiae* can complete its life cycle not only without direct sunlight, but in a nearly total darkness. Apart from the value of these experiments with regard to light and shade they were very useful as traps for some of the rare Culicines which were not obtained in any other way.

REMEDIAL MEASURES FOR MOSQUITOES.

The present drainage system in Takoradi and its effect on mosquito breeding production.

51. As mentioned before in paragraph 32, the present drainage system in Takoradi has in certain instances increased rather than decreased mosquito incidence. On the general Map 1 the main drainage systems are shown in blue. They are as follows: The main drains through sections 6 and 7 flow into the sea. A, system, drains the North West portion of the African township, and ends in the low-lying ground through the Horticultural Plantation. B, system is a short drain arising near the market and ends in a swampy area in section 3. Systems C. and D, comprise the main culverts draining the African Township. They join at a point at the Wiawso Road resolve into one main culvert which ends in a swamp in section 2. The portion between Wiawso Road and the end of the drain is considerably above the level of the swamp through which the drain passes, the latter being carried on a causeway. It is customary to make holes at intervals along the sides of the culverts, so that any seepage may find its way into the drain. In this instance however, the drain being at a higher level, the water in the drain spouts through these holes into the swamp on either side.

52. On the Map are shown only the main culverts, but around all the permanent buildings and along the completed roads are smaller concrete drains and gutters which generally connect up with one of the main systems. In some cases however, where the work is not completed the water flows into a sump-hole, temporary earth drain or simply spreads over the area.

53. It is obvious from the point of view of mosquito control, that to collect surface water from an area and allow it to spread over a swamp in close proximity to a township is not very satisfactory. As there is at present no money to carry these drains to the sea the following remedy is suggested: shallow artificial lakes should be formed by digging out the swamp and banking up the sides. The water would then be confined within a definite boundary and if the local fish were introduced and the sides kept clean, mosquito breeding will practically cease to exist. An excellent example of the way mosquito breeding is controlled in

this way, are the excavations on either side of the Sekondi-Takoradi Road in section 5. The ponds formed by these excavations are comparatively free of vegetation and the mosquito-eating fish which abound in them can gain access to all parts of the water. These lakes should be made with a view to gradual extension as funds permit. They must not be allowed to silt up, must be deepened from time to time, the soil removed being used to fill in any shallow depressions in the adjacent area.

54. The question of the banking up of fresh water in the Whin River Lagoon is a very serious one. If the lowest possible level were maintained and the sea allowed continual access, the water should become generally so saline as to prevent any considerable Anopheline breeding around the periphery.

At present this area seems to breed surprisingly few Anophelines, but the holding up of the fresh water and the inundating of further areas must increase breeding during the rainy season.

55. The fall is so slight that the drains continually hold water in many instances. It is recommended that all subsidiary concrete drains left unfinished and draining into sump-holes, or connecting up with earthen drains should be blocked, or joined up with the main system so that the whole flow of water will rapidly flow into the main culverts.

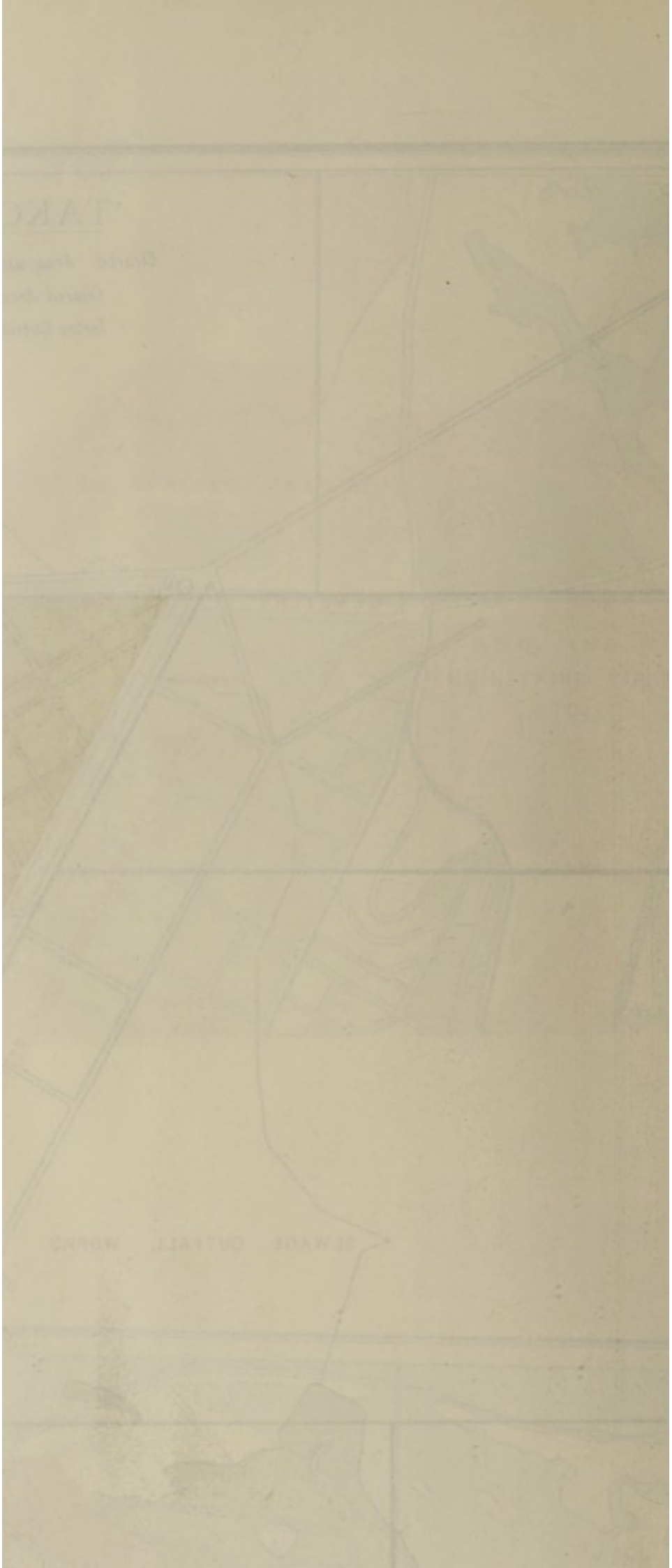
56. The present method of sweeping the drains is unsatisfactory and uneconomical for two reasons: (*a*) not enough labourers available (*b*) it is impossible to properly supervise continually the hundreds of yards of drains in use. It is therefore suggested that, if possible, a system of flushing the drains should be tried. The drains might be flushed at least every five days with a sufficient flow of water to drive out any larvae breeding in the puddles caused by stoppages or irregularities in the bottom of the drains.

57. Owing to the present financial situation it is impossible for Government to undertake the extensive operations necessary for the adequate control of mosquito breeding over the whole of Takoradi. I suggest therefore that the most urgent problem is that of the European area (section 8) which represents *per capita* a very large sum invested in personnel, both Government and mercantile.

58. Through this area runs a valley, which is flooded during the rainy season. *See* paragraph 13 and paragraph 33. The main drain running through the valley is not completed and part of the ground is lower than the drain. There is only one way to remedy this condition satisfactorily, and that is to fill in the low-lying portion between the drain and the hill-side and construct "Irish" or underground drains where necessary. The area should be levelled and planted with "Dhub" grass to keep out other vegetation.

59. The area of section 8 is approximately 302 acres of which 125 acres have been stumped and cleared. It is essential that further clearing be undertaken and this should be done thoroughly, the ground planted with grass and treated uniformly with the rest of the present cleared area. The thick and very dense belt of bush over the proposed Golf course should be gradually cleared, but a thicket of 50 yards wide should be left on the edges as a protection and screen against *Aedes argenteus* migrating from the Harbour area. This dense thicket should also act as a screen against tsetse migration from the tsetse breeding area south-west of the European Hospital. The swampy pools just south-west of Bungalow 32 should be filled in, as they are a continual menace.

SURVEY H.Q. ACCRA, 1931.



60. The northern portion of the area bounded by the back water from the Whin River is at present covered with dense bush which extends from the open grass land up the hill-side to within a few yards of Bungalows Nos. 178 to 162. This should certainly be cleared first, as it is a menace from a tsetse point of view as well. As funds permit, clearing should be continued in sections 6 and 7, so that the dangerous tsetse breeding areas south-west of the European Hospital would be eliminated, and the numerous concealed mosquito breeding areas be exposed and generally dried up through evaporation.

TSETSE INCIDENCE.

Tsetse incidence at Takoradi.

61. Three species of tsetse have been found at Takoradi, *Glossina longipalpis*, *Glossina palpalis* and *Glossina medicorum*. As the most important problem at Takoradi was that of malaria and mosquitoes, observations on tsetse were restricted to the following lines: The comparative incidence of the species present; their habitat; remedial measures.

62. *Glossina longipalpis* was very abundant and was found along all bush paths and commonly in the vicinity of human habitations. In the screened Laboratory it was found that by leaving the doors open, sufficient numbers could be caught of this species, and also of *Glossina palpalis*, which gave an adequate monthly index. The presence of *Glossina longipalpis* can be accounted for by the prevalence of numerous small antelopes in the dense bush and thickets in the area.

63. In June, 1930, 20 out of 75 flies dissected were found to be infected with T. *vivax*. This is very interesting, as there are no cattle in Takoradi, and no goats, sheep or pigs. Monkeys are common and Varanus is fairly plentiful.

64. *Glossina palpalis* is abundant and breeds around the small swamps and clumps of palm trees in the valleys. On two occasions *Glossina palpalis* has been taken biting human beings at night by electric light. The gut of 19 flies dissected were infected with T. *vivax*.

65. The occurrence of *Glossina medicorum* is remarkable as there is no typical forest vegetation nearer than six miles. Apart from the local swamps, the banks of the mouth of the Whin River are primary foci.

66. The problem of remedial measures appears to be a simple one. At present the thick bush and vegetation often approaches within a few feet of the houses. If this vegetation was properly cleared and the smaller swamps drained, *Glossina palpalis* would cease to exist. By clearing the patches of the dense bush, driving out the game and farming the cleared land, these three species should disappear. A Map III is appended showing the general distribution of the breeding areas. I think there is little doubt that human beings afford one of the principal food supplies of tsetse in this area.

67. I make the suggestion that as Takoradi town is of very recent growth, it may not have become noticeably an endemic area of human trypanosomiasis, but that with the comparatively high incidence of tsetse, if infective human beings were introduced—a not unlikely possibility as the population is foreign and migratory—human trypanosomiasis might become a serious menace.

68. Further research might be interesting but is not essential. We know that tsetse are very prevalent, that human beings are continually being bitten, and the remedial measures are quite obvious.

It will not be necessary to clear a vast tract of country. The open area of the lagoon back water surrounding most of the European Residential area should prevent any migration of *Glossina palpalis* from the Whin River.

69. *Glossina longipalpis* evidently exist largely on account of the small antelopes which have been driven in and concentrated in the refuges of thick bush in the Township area itself; *Glossina medicorum* is so scarce as to be a negligible factor. A perusal of the Map appended will show that it should not be a vast undertaking to clear the township itself. Half of the area is protected by the sea and by clearing a belt around the remaining half, the town should be completely isolated from any outside infestation.

70. The following table VIII shows the tsetse incidence in the Laboratory itself, from June, 1930 to January,1931. During the rainy season in June, July and August tsetse are decidedly more numerous and gradually decline in numbers after the heavy rains have ceased.

TABLE VIII.

Tsetse incidence, Takoradi, 1930-31.

JUNE, 1930.

Species.	*Total number caught.*	*Sex.*	
		Male.	*Female.*
Glossina longipalpis	77	18	59
Glossina palpalis	19	3	16
Glossina medicorum	2	1	1

JULY, 1930.

Glossina longipalpis	51	19	32
Glossina palpalis	15	6	9
Glossina medicorum	—	—	—

AUGUST, 1930.

Glossina longipalpis...	40	17	23
Glossina palpalis	15	6	9
Glossina medicorum	—	—	—

SEPTEMBER, 1930.

Glossina longipalpis	5	—	5
Glossina palpalis	16	5	11
Glossina medicorum	—	—	—

OCTOBER, 1930.

Glossina longipalpis	5	2	3
Glossina palpalis	1	1	—
Glossina medicorum	—	—	—

NOVEMBER, 1930.

Glossina longipalpis	1	—	1
Glossina palpalis	6	2	4
Glossina medicorum	—	—	—

TABLE. VIII—*contd.*

DECEMBER 1930.

Glossina longipalpis	—	—	—
Glossina palpalis	3	1	2
Glossina medicorum	—	—	—

JANUARY, 1931.

Glossina longipalpis	13	5	8
Glossina palpalis	30	9	21
Glossina medicorum	2	—	2

Other Insects.

CHRYSOPS SPP.

71. Chrysops is very common everywhere during the rainy season and if found in the dry season occasionally in the vicinity of swamps. On one occasion they were found attacking man repeatedly by the swamp in the European area near Bungalow 223. As this insect is the vector of Loa loa, the occurrence is important from a medical point of view. The draining and the elimination of these swamps in connection with mosquito control should also control this insect to a large extent.

72. Various species of *Tabanidae* have been found from time to time. *Culicoides* is not very common and to date no *Simulium* have beenfound, due no doubt to the fact that there is no running water.

73. A very considerable number of *Anopheles gambiae* were found infested with Nematodes. These occurred in the thoracic and abdominal cavity of the mosquito, and on one occasion were found in the proboscis itself. The species has not yet been determined. Three per cent of *Anopheles gambiae* were found infested, the number of individual Nematodes varying from two to 20.

Summary.

74. *Anopheles gambiae* is the only carrier of malaria at Takoradi of serious importance. While there is the possibility of mosquito infestation by migration from some distance away, there is no doubt that one of the main sources of infestation is the badly drained valley running through the European area. This problem should be dealt with before any other remedial measures are undertaken. The danger of a concentrated breeding area within a few yards of permanent European quarters is obvious. Palliative measures, such as oiling and dusting with arsenicals are not recommended in this instance, as the cost is out of all proportion to the immediate gain, with no permanent advantage.

75. Further clearing of the thick vegetation, which in some cases is situated within a few feet of the houses, would undoubtedly reduce the heavy tsetse incidence to a minimum, but the primary foci must be treated at the same time. Whatever clearing is undertaken must be permanent as partial clearing only results in doubling the expenditure within two or three years.

76. The chemical properties of the waters in which mosquito breeding takes place in Takoradi show remarkable variation, and observations and experiments have shown that the factors influencing the development of *Anopheles gambiae* differ considerably from certain other localities in Africa.

77. While domestic mosquitoes are very largely controlled by the Health Services, no serious attempt is made to control the sources of anopheline breeding or culicines in the swamp areas.

78. Owing to the difficulties of the terrain the present system of drainage in Takoradi is very unsatisfactory from the point of view of mosquito control. Again it may be impossible to carry out an ideal plan owing to lack of finances, but a reasonable expenditure in controlling the conditions due to the non-completion of the present scheme should go a long way in ameliorating the present unsatisfactory state of affairs.

79. From a purely scientific point of view some very interesting results have been obtained. Certain rare species of mosquitoes such as *Culex andreanus* and *Aedes punctocostalis* have been found and the breeding of *Culex philipi* has settled its nomenclature. The life histories of 20 species have been worked out with a special reference to their environmental condition, some of which are included in this report, the remainder I propose to illustrate and complete when I have access to the literature at the British Museum, and with the help of Mr. F. W. Edwards whose knowledge of mosquito systematology is indispensable in settling final points of nomenclature.

80. I wish to express my thanks to the officers of the Public Works Department who have assisted me with maps and information, to Sir, G. A. K. Marshall, C.M.G., F.R.S., Director, Imperial Institute of Entomology, and Mr. F. W. Edwards for the determinations of the material and to my African Staff especially to Mr. L. Philip Gray, who has shown exceptional ability and untiring effort.

APPENDIX J.—(LABORATORY SERVICE).

Identification of Reptiles.

Collected by Mr. S. F. Woodward,

Corresponding Member of the Zoological Society of London.

A. Snakes.

	Where obtained
Family Typhopidae.	
1. *Typhlops punctatus*	Sekondi.
2. *Leptotyphlops* (*Glauconia*) *bicolor* (Jan.)	Accra.
Family Boidae.	
3. *Python regius*, Royal Python	Accra.
4. *Python sebae*	Sekondi.
Family Colubridae.	
A. Aglypha.	
5. *Tropidonotus ferox*	Tarkwa.
6. *Boodon lineatus*, African lined snake	Sekondi
7. *Boodon virgatus*	Accra.
8. *Boodon fuliginosus*, Sootey snake	Accra.
9. *Prosymna meleagris*...	Accra.
10. *Dasypeltis scabra*, Egg-eating snake	Accra and Sekondi.
11. *Chlorophis heterolepidotus*, Odd-scaled snake	Sekondi.
12. *Chlorophis irregularis*, Spotted leaf-snake	Accra.
B. Opisthoglypha.	
13. *Tarbophis variegatus*, Variegated cat-snake	Accra.
14. *Leptodira hotambaeia*, Herald-snake	Sekondi.
15. *Dipsodomorphus blandingii*	Sekondi.
16. *Rhamphiophis oxyrhynchus*, African sharp-snouted snake ...	Accra.
17. *Dromophus praeornatus*	Accra.
18. *Psammophis sibilans*, African beauty snake	Accra.
19. *Psammophis elegans*, W. African slender snake	Accra.
20. *Thelotornis*, Tree-snake	Sekondi.
C. Proteroglypha.	
21. *Naia nigricollis*	Accra.
22. *Dendraspis jamaisonii*	Sekondi.
Family Viperidae.	
23. *Causus rhombeatus*, Night adder	Accra and Sekondi.
24. *Bitis arietans*, Puff adder	Accra.
25. *Bitis nasicornis*, Nose-horned viper	Accra and Sekondi.
26. *Echis carinatus*	Pusiga, Northern Territories.

B. Frogs.

1. *Rana mascareniensis* (Dumeril and Bibron) Dumeril's Frog ...	Nsawam and Nsaba.
2. *Rana oxyrhynchus* (Smith)	Korle Bu.
3. *Rana bibroni* (Günther)	Korle Bu.
4. *Rana albolabris* (Hallow)	Nsaba.
5. *Rana occipitalis* (Günther) African Bull Frog	Korle Bu.
6. *Rana galamensis* (D. and B.)	Nsawam.

APPENDIX J.—*continued.*

7. *Rana fuscigula*, Brown-throated Frog ... ... Nsawam.
8. *Kassina senegalensis* (D. and B.) Senegalese Striped Frog ... Korle Bu.
9. *Hemisus marmoratus* (Peters) Pug-faced Frog ... ... Korle Bu.
10. *Hylambates aubryi*, Aubry's Tree Frog ... ... Korle Bu.
11. *Hyperoluis acutirostris* (Buch. and Peters) ... ... Nsaba.
12. *Phrynobatrachus plicatus* (Günther) ... ... Nsawam.
13. *Phrynobatrachus* acridoides (Cope) ... ... Nsawam.
14. *Phrynomerus microps* ... ... Korle Bu.
15. *Bufo regularis* (Reuss) African Toads ... ... Accra and Sekondi.

C —Vermiform Amphibia—Coecilians.

1. *Geotrypetes seraphini* (Duméril).
2. *Amphisboena peters* (Boulenger).

The majority of the snakes have been identified with the aid of Boulenger's Key (*Snakes of West Africa*, P.Z.S., June, 1919). They were subsequently confirmed and all the other species identified by H. W. Parker, Esquire of the British Museum (Natural History) and the Curator of Reptiles, London Zoological Society. Coecilians are rare and Mr. Woodward's two specimens are the first that have been received from the Gold Coast by the British Museum.

A. S. BURGESS,

Acting Deputy Director, Laboratory Service.

TABLE I.

Statistical Return from the Routine divisions.

Inclusive of Repeat examinations.

	Medical Research Institute.	*Sekondi.*	*Kumasi.*	*Gold Coast Hospital.*	*Total.*
Examinations of blood :—					
(*a*) For parasites, total	3,272	2,751	813	2,916	9,752
1. Malaria	1,307	1,474	205	385	3,371
2. Relapsing fever ...	4	—	23	106	133
3. Trypanosomiasis ...	4	3	23	3	33
4. Microfilaria	18	5	59	155	237
5. Negative	1,941	1,269	509	2,267	5,986
(*b*) Differential and other counts	114	67	6	169	356
(*c*) Agglutinations	207	30	6	—	243
(*d*) Wassermann and Kahn tests	3,504	790	171	—	4,465
(*e*) Blood cultures	56	7	—	15	78
(*f*) Chemical examinations, total	71	—	3	44	118
1. Van den Bergh ...	22	—	1	14	37
2. Urea	19	—	—	11	30
3. Dextrose	34	—	2	33	69
(*g*) Compatibility tests	13	—	—	—	13
Examinations of fæces, totals ...	449	439	532	2,188	3,608
(*a*) General examinations ...	285	389	532	2,188	3,394
(*b*) Bacteriological examinations	164	50	—	—	214
Examinations of urines, totals ...	235	430	691	3,113	4,469
(*a*) General examinations ...	164	413	617	2,948	4,142
(*b*) Bilharzial infections	11	17	74	165	267
(*c*) Bacteriological examinations	60	—	—	—	60
Examinations of sputa	71	192	150	323	736
Miscellaneous and pus examinations	235	184	135	1,352	1,906
Cerebro-spinal fluid examinations ...	21	3	9	66	99
Histological examinations	1,400	140	—	—	1,540
Post-mortem examinations	69	79	145	65	358
Medicolegal examinations	10	—	—	—	10
Bacteriological examinations of drinking waters	190	438	12	—	640
Animal examinations and inoculations	170	—	3	—	173
Rats examinations	2,725	2,147	28	—	4,900

TABLE II.

Post-Mortem Examinations.

	Accra.	*Sekondi.*	*Kumasi.*
Typhoid Fever	4	—	—
Paratyphoid C	2	—	—
Relapsing Fever	3	—	1
Malarial cachexia	1	—	—
Malaria and status lymphaticus ...	—	—	1
Blackwater Fever	2	—	—
Diphtheria	1	—	—
Dysentery amœbic	2	2	5
Yellow Fever	1	—	—
Trypanosomiasis	—	—	1
Rabies	1	—	—
Tuberculosis pulmonary	11	11	2
Tuberculosis glandular	—	1	—
Tuberculosis disseminated	3	—	1
Septicæmia	1	5	—
Pyæmia	3	—	—
Ulcers and toxæmia	—	—	2
Cancer of liver	3	1	2
Cancer of stomach	1	—	—
Melanoma	1	—	—
Lymphosarcoma	—	1	—
Anæmia unclassified	1	—	1

TABLE II.—*continued.*

	Accra.	Sekondi.	Kumasi.
Leukæmia myeloid	1	—	—
Alcoholism	2	3	—
Meningitis (non-tuberculous)	4	1	2
Cerebral hæmorrhage	4	—	1
Brain abscess	1	—	1
Myelitis	—	—	1
Pericarditis	2	1	3
Myocarditis	1	5	—
Valvular disease of heart	1	—	1
Ulcerative endocarditis	—	2	—
Aneurism aorta	7	1	—
Hæmorrhage from splenic artery ...	1	—	—
Oedema of glottis	—	—	1
Broncho-pneumonia	1	3	5
Pneumonia lobar	10	9	3
Pulmonary oedema	1	—	—
Hæmoptysis	—	—	2
Pleurisy	1	—	2
Empyæma	1	—	—
Pulmonary embolism	1	—	—
Cellulitis retropharyngeal	1	—	—
Ankylostomiasis	1	—	—
Appendicitis	2	1	—
Perforating ulcer of intestine	2	—	—
Intestinal obstruction	—	1	2
Hernia strangulated	2	1	—
Intussusception	1	—	—
Cirrhosis of liver	7	—	4
Jaundice, toxic and unclassified ...	2	—	1
Portal pyæmia	2	—	—
Peritonitis of unknown origin	1	3	2
Nephritis	1	7	4
Schistosomiasis	4	—	5
Circumcision	—	—	1
Pyocolpos and hydronephrosis	1	—	—
Ectopic gestation, ruptured	1	1	—
Sequelæ of labour	1	—	—
Still-birth	1	—	1
Birth injuries	—	—	1
Asphyxia neonatorum	1	—	—
Icterus neonatorum	—	—	1
Food poisoning	—	2	—
Snake bite	—	—	1
Poisoning	—	—	1
Hanging	—	2	11
Burns	2	1	5
Suffocation	—	—	1
Drowning	3	6	2
Wounds, knife	—	1	8
Wounds, gunshot	3	1	10
Fractured skull	5	1	20
Fractured spine	1	1	5
Fractured femur	—	—	1
Rupture of lungs	—	—	4
Rupture of spleen	—	—	2
Multiple injuries	2	3	9
Electric shock	—	1	—
Undiagnosed	5	—	5

TABLE III.

Bacteriological Examinations of Water Supplies.

Source.	Negative.	*B. coli* present; specimens enumerated according to smallest volume (c.cs) in which *B. coli* found.					Totals.
		100	10	1	0.1	0 01	
Accra Water Supplies.							
Storage reservoirs	21	1	1	—	—	—	23
Final filters	78	1	—	—	—	—	79
Laboratory tap	52	—	—	—	—	—	52
Other examinations of water ...	1	—	1	—	—	—	2
Soda waters	29	4	1	—	—	—	34
Sekondi Water Supplies.							
Raw water	22	3	10	10	7	—	52
Prefilters	44	—	3	—	—	—	47
Final filters	73	4	4	—	—	—	81
Pumping main	26	—	—	1	—	—	27
Laboratory tap	50	2	—	—	—	—	52
Takoradi area	100	2	1	—	—	—	103
Other examinations of water ...	8	—	—	—	—	—	8
Soda waters	10	—	—	—	—	-	10
Other samples examined at Sekondi.							
Abosso	3	—	1	—	—	—	4
Cape Coast	38	—	1	1	—	—	40
Insuta	13	—	1	—	—	—	14
Kumasi Water Supplies.							
Well waters	2	2	2	—	1	—	7
Ice waters	2	—	—	—	—	—	2
Soda Waters	3	—	—	—	—	—	3
Totals	575	19	26	12	8	—	640

IX.—SCIENTIFIC.

(*b*) Annual Report of the Analytical Chemist.

The number of samples dealt with was 1,421 and comprised the following :—

Examinations for poisons :—		
Human Viscera	28	
Stomach and intestinal contents ...	15	
Blood	9	
Animal Viscera	5	
Native medicines	17	
Drugs	72	
Miscellaneous	4	
	——	150
Medical and Health Services :—		
Potable waters	7	
Lagoon waters	36	
Palm wine	12	
	——	55
Customs Department :—		
Whisky	37	
Brandy	28	
Geneva	31	
Gin	16	
Rum	45	
Methylated spirits	93	
Wine	164	
Medicated wine	56	
Vermouth	82	
Liqueur	4	
Beer and Stout	96	
Patent medicines	145	
Perfumery	159	
Polish	19	
Paint	17	
Aerated water	22	
Sweetened condensed milk	26	
Unsweetened condensed milk ...	27	
Miscellaneous	48	
	——	1,116
Police Department		74
Public Works Department		10
Gold Coast Railway		7
Department of Agriculture		6
Miscellaneous		3
Total		1,421

The analyses of human organs, stomach contents and blood were made in connection with 19 deaths from suspected poisoning.

In a case of suicidal death caused by sodium cyanide 0.83 grain hydrocyanic acid equivalent to 1½ grains sodium cyanide were recovered from the stomach and contents. The same poison was found in two drops of solution in a glass tumbler used by the deceased.

Five mgms. of cresols were recovered from the urine in a case of suicidal poisoning by Lysol.

Unidentifiable resinous matter was obtained from the remains of an infusion of some unknown bark which was drunk by two men who died 24 hours later after excessive purging.

Alcohol in amounts ranging from 0.7 to 4.5 grams was recovered from stomach contents, and from five specimens of blood in amounts ranging from 0.034 to 0.17 per cent by volume as absolute alcohol.

Native medicines submitted in connection with supposed deaths from poisoning comprised the seeds of thevetia neriifolia containing the poisonous glucoside thevetin ; leaves of conopharyngia chipii in which no poisonous principles were found ; and the roots of calliandra portoricensis which was found to contain a saponin.

From small portions of the livers of a horse and two sheep arsenic was recovered in the proportion of 5.5., 10.7 and 12.5 mgms. per kilo weight of the organs.

These animals had used a small area of soil in the Northern Territories, where arsenical bait for killing locusts had been mixed, and died shortly afterwards. The dried soil from this area contained 0.45 per cent of arsenious oxide.

Samples of the water from the Korle Lagoon were collected by the Health services at the beginning of each month during the year. The salinity, organic content, and hydrogen on concentration of these waters were determined with the view of ascertaining the influence of these factors on mosquito breeding during the 12 months.

Among samples examined for other departments were, submitted by the Police, 22 specimens of spirits made locally in six cases of illicit distillation in the " bush."

The alcoholic strength of these spirits ranged from 32.2 per cent to 69.8 per cent, average 49.8 per cent of alcohol by volume, a remarkably high proportion in view of the crude apparatus used as stills.

All these raw illicit spirits were characterised by a high content of volatile acidity and esters and were totally unlike any imported potable spirits. There was no evidence, chemical or otherwise, that methylated spirits had been used in their manufacture.

Sixteen exhibits of alloy were examined on behalf of the Police. Evidence was given in two cases in which pieces of brass were used in attempts to obtain money under the false pretence of their being solid gold.

The remainder of the samples examined for other departments comprised boiler-feed waters from the Railway, fuel and lubricating oils from the electric power station, and artificial fertilizers from the Department of Agriculture.

The number of samples examined for the Customs Department has again shown considerable increase over previous years.

Mr. R. Simmons returned from leave on 6th May, 1930, and Mr. R. W. Clarke was absent on leave for four months from the 2nd August, 1930.

W. D. INNESS,

Director,

Medical and Sanitary Service.

RETURNS.

TABLE I.—MEDICAL, HEALTH AND LABORATORY SERVICE STAFF ON THE 1ST APRIL, 1930.

Office.	Authorised Establishment.	Provision in Estimates.	Vacancy.
Director of Medical and Sanitary Service	1	1	—
Deputy Director of Medical and Health Service	1	1	—
Deputy Director of Health Service	1	1	—
Deputy Director of Laboratory Service	1	1	—
Assistant Director of Medical Service	2	2	—
Assistant Director of Sanitary Service	1	1	—
Specialists (two Surgical and one Medical)	4	3	—
Senior Health Officers	2	2	—
Senior Medical Officers	6	6	—
Senior Patholigist	1	1	—
Pathologists	6	5	—
Entomologist	1	1	—
Assistant Entomologist	1	1	—
Medical Officers	47	45	2
Medical Officers of Health	15	15	1
Alienist Officer	1	1	—
Medical Secretary, Gold Coast Branch, British Empire Leprosy Relief Association	1	1	—
Women Medical Officers	3	3	—
Women Medical Officers (Infant Clinic)	8	8	1
African Medical Officers	6	5	1
Junior African Medical Officers	3	2	1
Secretary to Director of Medical and Sanitary Service	1	1	—
Radiographer	1	1	—
Assistant Radiographer	1	1	—
Dental Surgeons	2	2	—
African Government Dentist	1	—	—
Analytical Chemists	2	2	—
Dispensers' Instructor	1	1	—
Medical Storekeeper	1	1	—
Secretary, Gold Coast Hospital	1	1	—
Senior Superintending Sanitary Inspector	1	1	—
Superintending Sanitary Inspectors	24	24	—
Laboratory Superintendent	1	1	—
Laboratory Assistants	2	2	—
EUROPEAN NURSING STAFF.			
Matron	1	1	—
Senior Nursing Sisters	4	4	—
Nursing Sisters	30	30	—
MEMBERS OF THE SUBORDINATE STAFF.			
MEDICAL BRANCH.			
Chief Dispensers	3	3	—
First Division Dispensers	6	6	—
Second Division Dispensers and Dispensers-in-Training	69	69	—
Laboratory Attendants	3	3	—
Chief Nurses	3	—	—
First Division Nurses	14	8	1
Second Division Nurses and Nurses-in-Training	218	212	4
Midwives-in-Training	6	6	1
Chief Clerk	1	1	—
First Division Clerks	2	2	—
Second Division Clerks	26	26	1
Lodge-keepers	2	2	—
Telephone Operators	4	4	—
LUNATIC ASYLUM.			
Head Attendant	1	1	—
Assistant Attendant	1	1	—
Mental Nurses	21	21	—
Matron	1	1	—
Gate-keeper	1	1	—
HEALTH BRANCH.			
Office Assistant and Accountant	1	1	—
First Division Clerks	2	2	—
Second Division Clerks	22	22	—
Sanitary Inspector and Training Officer	1	1	—
Senior Division Sanitary Inspectors	2	2	—
First Division Sanitary Inspectors	6	6	—
Second Division Sanitary Inspectors	100	100	3

RETURNS.

TABLE I.—Medical, Health and Laboratory Service Staff on the 1st April, 1930—*continued*.

Office.	Authorised Establishment.	Provision in Estimates.	Vacancy.
Female Sanitary Inspectors	—	2	2
Storekeepers	2	2	—
Disinfector Mechanic	1	1	—
Vaccinators	12	12	—
Senior Village Overseer	1	1	—
Village Overseers	18	18	—
Assistant Disinfector Mechanics	4	4	1
Nurse-Midwives	7	7	1
Midwives	6	6	—
Second Division Dispensers and Dispensers-in-Training	7	7	—
Second Division Nurses and Nurses-in-Training ...	14	14	—
Health Visitors	4	4	—
Engineering Fitter	1	1	—
Market Clerk	1	1	—
Contagious Diseases Hospital.			
Caretaker	1	1	—
Attendants	3	3	—
Medical Research Institute.			
Laboratory Attendants	8	8	—
Laboratory Leaners	4	4	—
Second Division Clerk	1	1	—

TABLE III.

Accurate return of statistics of population for the year cannot be given as the birth and death registration districts cover but a small portion of the Colony and its dependencies.

TABLE V

Return of Diseases and Deaths (In-Patients) and Diseases (Out-Patients) for the Year, 1930–31.

Diseases.	In-Patients.					Out-Patients.	
	Remaining in hospital on 31st March, 1930.	Yearly Total. Admissions.	Yearly Total. Deaths.	Total cases treated.	Remaining in hospital on 31st March, 1931.	Male.	Female.
I.—*Epidemic, Endemic, and infectious diseases.*							
1. Enteric Group—							
(*a*) Typhoid fever ...	—	40	10	40	1	18	5
(*b*) Paratyphoid A. ...	—	5	—	5	—	1	—
(*c*) Paratyphoid B. ...	—	2	1	2	—	1	—
(*d*) Type not defined	—	9	3	9	1	1	1
2. Typhus	—	—	—	—	—	—	—
3. Relapsing fever	4	251	10	255	2	89	1
4. Undulant fever	—	—	—	—	—	—	—
5. Malaria—							
(*a*) Tertian	7	236	—	243	2	1,328	380
(*b*) Quartan	—	22	—	22	—	79	62
(*c*) Aestivo-autumnal	13	984	20	997	9	7,421	4,688
(*d*) Cachexia	—	18	2	18	—	171	146
(*e*) Blackwater ...	—	14	4	14	—	4	1
(*f*) Unclassified ...	1	103	11	104	6	4,758	4,557
6. Smallpox	—	36	8	36	8	17	17
Altastrim	—	—	—	—	—	—	—
7. Measles	4	84	—	88	16	314	209
8. Scarlet fever	—	—	—	—	—	—	—
9. Whooping cough ...	—	10	1	10	—	712	729
10. Diphtheria	—	4	2	4	—	4	—
11. Influenza	—	120	—	120	—	238	38
12. Miliary fever	—	—	—	—	—	1	—
13. Mumps	1	24	—	25	1	80	36
14. Cholera	—	—	—	—	—	—	—
15. Epidemic diarrhœa ...	—	—	—	—	—	—	1
16. Dysentery—							
(*a*) Amœbic	5	212	22	217	6	374	188
(*b*) Bacillary	—	125	17	125	2	139	53
(*c*) Undefined or due to other causes	—	14	2	14	—	248	143
17. Plague—							
(*a*) Bubonic	—	—	—	—	—	—	—
(*b*) Pneumonic ...	—	—	—	—	—	—	—
(*c*) Septicæmic ...	—	—	—	—	—	—	—
(*d*) Undefined ...	—	—	—	—	—	—	—
18. Yellow fever	—	2	1	2	—	—	—
19. Spirochætosis ictero-hæmorrhagica ...	—	—	—	—	—	—	—
20. Leprosy	76	126	6	202	82	1,783	1,239
21. Erysipelas	—	4	—	4	—	8	4
22. Acute poliomyelitis ...	—	1	—	1	1	23	7
23. Encephalitis lethargica	—	1	—	1	—	3	—
24. Epidemic cerebro-spinal fever	—	3	3	3	—	2	1
25. Other epidemic diseases—							
(*a*) Rubeolla (German measles) ...	—	5	—	5	—	15	8
(*b*) Varicella (chicken-pox)	10	229	—	239	6	132	63
(*c*) Kala-azar ...	—	—	—	—	—	—	—
(*d*) Phlebotomus fever	—	—	—	—	—	—	—
(*e*) Dengue	—	5	—	5	—	5	10
(*f*) Epidemic dropsy	—	—	—	—	—	14	—
(*g*) Yaws	34	451	—	485	24	39,915	29,419
(*h*) Trypanosomiasis	4	114	17	118	11	111	14
26. Glanders	—	—	—	—	—	—	—
27. Anthrax	—	—	—	—	—	4	1
28. Rabies	—	1	1	1	—	2	—
29. Tetanus	3	58	24	61	1	44	14
30. Mycosis	—	—	—	—	—	6	4
31. Tuberculosis, pulmonary and laryngeal ...	23	308	146	331	24	523	196
32. Tuberculosis of the meninges or central nervous system ...	—	3	2	3	—	3	2
33. Tuberculosis of the intestines or peritoneum	—	11	6	11	—	10	4

TABLE V—*continued.*

RETURN OF DISEASES AND DEATHS (IN-PATIENTS) AND DISEASES (OUT-PATIENTS) FOR THE YEAR, 1930–31.

DISEASES.	IN-PATIENTS.					OUT-PATIENTS.	
	Remaining in hospital on 31st March, 1930.	Yearly Total.		Total cases treated.	Remaining in hospital on 31st March, 1931.	Male.	Female.
		Admissions.	Deaths.				
I.—*Epedemic, Epedemic, and Infectious Diseases—(contd.)*							
34. Tuberculosis of the vertebral column ...	6	10	1	16	3	17	10
35. Tuberculosis of bones and joints	2	21	3	23	6	26	13
36. Tuberculosis of other organs—							
(*a*) Skin or subcutaneous tissue (lupus)	—	—	—	—	—	1	1
(*b*) Bones	—	—	—	—	—	6	1
(*c*) Lymphatic system	1	13	1	14	—	49	29
(*d*) Genito-urinary ...	—	—	—	—	—	—	—
(*e*) Other organs ...	—	—	—	—	—	10	9
37. Tuberculosis disseminated—							
(*a*) Acute	—	—	—	—	—	—	1
(*b*) Chronic	—	—	—	—	—	—	—
38. Syphilis—							
(*a*) Primary	1	45	—	46	2	232	27
(*b*) Secondary... ...	—	17	—	17	—	83	26
(*c*) Tertiary	—	64	7	64	11	209	186
(*d*) Hereditary ...	1	13	2	14	2	43	38
(*e*) Period not indicated	2	11	4	13	—	81	30
39. Soft chancre	—	27	—	27	—	203	5
40. A.—Gonorrhœa and its complications ...	10	291	2	301	12	2,742	547
B.—Gonorrhœal ophthalmia	—	45	—	45	1	116	118
C.—Gonorrhœal arthritis	6	75	1	81	3	191	54
D.—Granuloma venereum	—	1	—	1	—	12	2
41. Septicæmia	—	37	33	37	—	11	4
42. Other infectious diseases Trypanosomiasis ...	*See* item 25 (*h*).						
II.—*General diseases not mentioned above.*							
43. Cancer or other malignant tumours of the buccal cavity ...	—	1	—	1	—	1	1
44. Cancer or other malignant tumours of the stomach or liver ...	—	11	10	11	—	6	6
45. Cancer or other malignant tumours of the peritoneum, intestines, rectum ...	—	8	2	8	1	2	4
46. Cancer or other malignant tumours of the female genital organs	—	1	1	1	—	—	2
47. Cancer or other malignant tumours of the breast	—	4	—	4	1	—	6
48. Cancer or other malignant tumours of the skin	—	3	—	3	—	4	2
49. Cancer or other malignant tumours of organs not specified	2	19	3	21	3	15	15
50. Tumours non-malignant	10	55	—	65	4	174	83
51. Acute rheumatism ...	—	2	—	2	—	—	—
52. Chronic rheumatism ...	5	163	1	168	3	4,898	2,284
53. Scurvy (including Barlow's disease) ...	—	3	1	3	—	3	3
54. Pellagra	—	—	—	—	—	—	—
55. Beri-Beri...	—	12	3	12	—	18	2

TABLE V—*continued.*

RETURN OF DISEASES AND DEATHS (IN-PATIENTS) AND DISEASES (OUT-PATIENTS) FOR THE YEAR, 1930–31.

DISEASES.	IN-PATIENTS.					OUT-PATIENTS.	
	Remaining in hospital on 31st March, 1930.	Yearly Total.		Total cases treated.	Remaining in hospital on 31st March, 1931.	Male.	Female.
		Admissions.	Deaths.				
II.—*General Diseases not mentioned above (contd.)*							
56. Rickets	—	3	1	3	—	11	4
57. Diabetes (not including insipidus)	1	16	—	17	—	13	2
58. Anæmia—							
(*a*) Pernicious... ...	—	1	—	1	—	2	2
(*b*) Other Anæmias and chlorosis ...	6	43	7	49	3	470	374
59. Diseases of the pituitary body	—	1	—	1	—	1	1
60. Diseases of the thyroid gland	—	2	—	2	—	—	—
(*a*) Exophthalmic goitre	—	3	—	3	—	4	17
(*b*) Other diseases of the thyroid gland, myxœdema ...	—	5	—	5	—	14	27
61. Diseases of the parathyroid glands ...	—	—	—	—	—	—	1
62. Diseases of the thymus	—	—	—	—	—	—	1
63. Diseases of the suprarenal glands ...	—	—	—	—	—	—	—
64. Diseases of the spleen ...	2	10	1	12	1	79	51
65. Leukæmia—							
(*a*) Leukæmia... ...	—	3	1	3	1	—	2
(*b*) Hodgkin's disease	—	2	—	2	—	3	1
66. Alcoholism	—	15	2	15	—	7	—
67. Chronic poisoning by mineral substances (lead, mercury, etc.)	—	4	—	4	—	3	—
68. Chronic poisoning by organic substances (morphia, cocaine, etc.)	—	1	—	1	—	6	1
69. Other general diseases—							
Auto-intoxication ...	—	5	1	5	—	17	2
Purpura hæmorrhagica	—	1	—	1	—	1	—
Hæmophilia ...	—	3	1	3	—	1	—
Diabetes insipidus	—	—	—	—	—	—	—
69a. Pyrexia of unknown origin	1	38	1	39	4	245	181
III.—*Affections of the Nervous System and Organs of the Senses.*							
70. Encephalitis (not including encephalitis lethargica)	—	10	1	10	1	5	—
71. Meningitis (not including tuberculous meningitis or cerebrospinal meningitis) ...	—	24	10	24	1	10	7
72. Locojotor ataxia ...	—	2	—	2	—	6	2
73. Other affections of the spinal cord ...	—	8	2	8	—	8	7
74. Apoplexy—							
(*a*) Hæmorrhage ...	—	22	17	22	—	9	2
(*b*) Embolism ...	1	1	—	2	—	1	—
(*c*) Thrombosis ...	—	3	2	3	—	—	—
75. Paralysis—							
(*a*) Hemiplegia ...	8	44	6	52	4	80	29
(*b*) Other paralyses ...	7	39	2	46	2	86	32
76. General paralysis of the insane	1	17	3	18	4	—	—
77. Other forms of mental alienation	1	36	2	37	1	61	20

TABLE V—*continued.*

RETURN OF DISEASES AND DEATHS (IN-PATIENTS) AND DISEASES (OUT-PATIENTS) FOR THE YEAR, 1930–31.

DISEASES.	IN-PATIENTS.					OUT-PATIENTS.	
	Remaining in hospital on 31st March, 1930.	Yearly Total.		Total cases treated.	Remaining in hospital on 31st March, 1931.	Male.	Female.
		Admissions.	Deaths.				
III.—*Affections of the Nervous System and Organs of the Senses (contd.)*							
78. Epilepsy	1	36	6	37	8	100	39
79. Eclampsia, convulsions (non-puerperal) five year or over ...	—	2	1	2	—	1	—
80. Infantile convulsions ...	—	8	2	8	—	39	34
81. Chorea	—	4	—	4	1	5	2
82. A.—Hysteria	—	5	—	5	—	34	8
B.—Neuritis	1	51	—	52	5	370	149
C.—Neurasthenia ...	—	22	3	22	1	134	28
83. Cerebral softening ...	—	2	1	2	—	—	1
84. Other affections of the nervous system, such as paralysis agitans	—	17	1	17	—	47	20
85. Affections of the organs of vision—							
(*a*) Diseases of the eye	4	50	—	54	—	600	225
(*b*) Conjunctivitis ...	10	227	—	237	4	3,340	2,052
(*c*) Trachoma ...	—	21	—	21	—	54	35
(*d*) Tumours of the eye	—	1	—	1	—	19	6
(*e*) Other affections of the eye	3	129	—	132	5	758	386
86. Affection of the ear or mastoid sinus ...	7	73	—	80	1	1,977	1,145
IV.—*Affections of the circulatory system.*							
87. Pericarditis	1	6	2	7	—	11	6
88. Acute endocarditis or myocarditis ...	—	10	1	10	1	16	4
89. Angna pectoris ...	—	11	—	11	—	4	3
90. Other diseases of the heart—	1	—	—	1	—	21	28
(*a*) Valvular—	1	9	—	10	1	11	17
Mitral	2	43	14	45	—	119	56
Aortic	—	12	3	12	—	35	7
Tricuspid	—	—	—	—	—	—	—
Pulmonary ...	—	—	—	—	—	—	1
(*b*) Myocarditis ...	1	50	16	51	2	84	54
91. Diseases of the arteries—							
(*a*) Aneurism	—	7	1	7	—	11	5
(*b*) Arterio-sclerosis ...	—	4	—	4	—	37	34
(*c*) Other diseases ...	—	—	—	—	—	22	8
92. Embolism or thrombosis (non-cerebral) ...	3	41	—	44	1	—	—
93. Diseases of the veins—							
Hæmorrhoids ...	—	24	—	24	—	302	96
Varicose veins ...	—	—	—	—	—	29	7
Phlebitis	—	1	—	1	—	4	3
94. Diseases of the lymphatic System—	—	3	—	3	—	13	2
Lymphangitis ...	1	41	1	42	1	36	15
Lymphadenitis, bubo (non-specific) ...	6	17	2	123	5	794	182
95. Haemorrhage of undetermined cause ...	—	6	—	6	—	11	10
96. Other affections of the circulatory system	—	13	—	13	1	28	15

TABLE V—*continued.*

RETURN OF DISEASES AND DEATHS (IN-PATIENTS) AND DISEASES (OUT-PATIENTS) FOR THE YEAR, 1930–31.

DISEASES.	IN-PATIENTS.					OUT-PATIENTS.	
	Remaining in hospital on 31st March, 1930.	Yearly Total.		Total cases treated.	Remaining in hospital on 31st March, 1931.	Male.	Female.
		Admissions.	Deaths.				
V.—*Affections of the Respiratory System.*							
97. Diseases of the nasal passages— ...	—	—	—	—	—	1	4
Adenoids	—	16	—	16	—	54	14
Polypus	—	1	—	1	—	7	4
Rhinitis	—	5	—	5	—	291	134
Coryza	—	41	—	41	—	1,898	443
Ill-defined	—	1	—	1	—	23	12
98. Affections of the Larynx— Laryngitis	—	25	2	25	—	403	188
99. Bronchitis—							
(*a*) Acute	14	270	2	284	5	5,592	2,342
(*b*) Chronic	3	123	5	126	3	3,283	2,556
100. Broncho-Pneumonia	4	126	37	130	5	251	202
101. Pneumonia—	—	1	—	1	—	—	—
(*a*) Lobar	13	327	91	340	11	337	134
(*b*) Unclassified ...	9	71	29	80	1	119	22
102. Pleurisy, empyema ...	6	168	6	174	11	406	104
103. Congestion of the Lungs	—	7	—	7	—	13	7
104. Gangrene of the Lungs...	—	3	2	3	—	12	1
105. Asthma	—	36	3	36	2	222	87
106. Pulmonary emphysema	—	2	1	2	—	4	4
107. Other affections of the lungs—	—	3	—	3	2	167	22
Pulmonary Spirochaetosis ...	—	—	—	—	—	—	—
VI.—*Diseases of the Digestive System.*							
108. A.—Diseases of teeth or gums—caries, Pyorrhoea, etc.	3	100	1	103	4	2,310	1,258
B.—Other affections of the mouth—	—	3	—	3	—	45	63
Stomatitis	—	43	2	43	2	592	377
Glossitis, etc. ...	1	12	1	13	—	239	203
109. Affections of the pharynx or tonsils—	—	—	—	—	—	1	—
Tonsilitis	4	65	1	69	1	453	310
Pharyngitis ...	—	30	2	30	—	351	99
110. Affections of the œsophagus	—	1	—	1	—	11	7
111. A.—Ulcer of the stomach	1	5	—	6	2	10	4
B.—Ulcer of the Duodenum	—	10	—	10	—	7	4
112. Other affections of the stomach—gastritis	—	40	—	40	—	580	4
Dyspepsia, etc. ...	1	39	—	40	—	1,438	241
113. Diarrhoea and enteritis— Under two years ...	—	63	22	63	3	1,505	739
114. Diarrhoea and Enteritis— Two years and over	11	237	10	248	2	1,583	1,070
Colitis	5	62	4	67	—	441	769
Ulceration	—	3	1	3	—	13	146
114*a*. Sprue	—	—	—	—	—	—	—
115. Ankylostomiasis ...	6	109	20	115	9	60	18
116. Diseases due to intestinal parasites—							
(*a*) Cestoda (Taenia)	—	22	—	22	—	841	285
(*b*) Trematoda (flukes)	—	1	—	1	—	—	—
(*c*) Nematoda other than ankylostoma)	—	15	—	15	—	—	—
Ascaris	2	68	1	70	3	674	607
Trichocephalus dispar	—	—	—	—	—	—	—

TABLE V—*continued.*

RETURN OF DISEASES AND DEATHS (IN-PATIENTS) AND DISEASES (OUT-PATIENTS) FOR THE YEAR, 1930–31.

	Diseases.	In-Patients.				Out-Patients.	
		Remaining in hospital on 31st March, 1930.	Yearly Total. Admissions.	Yearly Total. Deaths.	Total cases treated.	Remaining in hospital on 31st March, 1931.	Male.	Female.
116	Diseases due to intestinal parasites—(*contd.*)							
	Trichina	—	1	—	1	—	1	—
	Dracunculus ...	12	286	—	298	20	939	199
	Strongylus ...	—	—	—	—	—	5	5
	Oxyuris	—	3	—	3	—	67	46
	(*d*) Coccidia	—	—	—	—	—	—	—
	(*e*) Other parasites ...	—	6	—	6	—	6	—
	(*f*) Unclassified ...	—	1	—	1	—	74	65
117.	Appendicitis	3	25	3	28	—	24	6
118.	Hernia	15	185	18	200	8	447	34
119.	A.—Affections of the anus, fistula, etc. ...	—	64	1	64	2	175	85
	B.—Other affections of the intestines— ...	—	9	3	9	—	12	4
	Enteroptosis ...	—	1	—	1	—	2	7
	Constipation ...	2	236	—	238	—	9,059	3,025
120.	Acute yellow atrophy of the liver	—	2	2	2	—	—	1
121.	Hydatid of the liver ...	—	—	—	—	—	—	—
122.	Cirrhosis of the liver—	—	1	1	1	—	—	—
	(*a*) Alcoholic	—	1	—	1	—	3	—
	(*b*) Other forms ...	—	29	16	29	1	21	7
123.	Biliary calculus ...	—	—	—	—	—	—	1
124.	Other affections of the liver—	—	—	—	—	—	1	—
	Abscess		34	7	34	1	37	5
	Hepatitis	5	58	3	63	5	78	23
	Cholecystitis ...	—	9	—	9	—	1	2
	Jaundice	3	55	6	58	3	115	68
125.	Diseases of the pancreas	—	—	—	—	—	—	1
126.	Peritonitis (of unknown cause)	—	32	20	32	—	17	6
127.	Other affections of the digestive system ...	—	26	6	26	—	71	16
	VII.—*Disease of the Genito-urinary System (non-Venereal).*							
128.	Acute nephritis	5	82	13	87	4	95	66
129.	Chronic nephritis ...	2	73	39	75	6	95	51
130.	A.—Chyluria	—	—	—	—	—	—	—
	B.—Schistosomiasis ...	7	110	11	117	9	329	92
131.	Other affections of the kidneys—	1	2	—	3	—	1	—
	Pyelitis, etc. ...	1	24	2	25	2	19	12
132.	Urinary calculus ...	—	3	—	3	—	5	1
133.	Diseases of the bladder—	—	1	—	1	—	10	6
	Cystitis	9	80	4	89	1	348	204
134.	Diseases of the urethra—	—	—	—	—	—	2	3
	(*a*) Stricture	5	204	10	209	10	306	1
	(*b*) Other	14	51	1	65	5	265	15
135.	Diseases of the prostate—							
	Hypertrophy	—	1	—	1	—	3	—
	Prostatitis	—	17	—	17	2	72	—
136.	Diseases (non-venereal) of the genital organs of man—	1	17	—	18	—	37	—
	Epididymitis	—	23	—	23	—	71	—
	Orchitis	5	103	1	108	1	329	—
	Hydrocele	2	50	—	52	1	243	—
	Ulcer of penis ...	4	107	—	111	5	211	—
	Phimosis and paraphimosis	2	93	—	95	2	127	—
137.	Cysts or other non-malignant tumours of the ovaries	—	15	1	15	1	—	17
138.	Salpingitis—	1	38	2	39	2	—	61
	Abscess of the pelvis	3	21	—	24	2	—	170

TABLE V—*continued.*

RETURN OF DISEASES AND DEATHS (IN-PATIENTS) AND DISEASES (OUT-PATIENTS) FOR THE YEAR, 1930–31.

DISEASES.	IN-PATIENTS.				OUT-PATIENTS.	
	Remaining in hospital on 31st March, 1930.	Yearly Total. Admissions.	Yearly Total. Deaths.	Total cases treated.	Remaining in hospital on 31st March, 1931.	Male.	Female.
VII.—*Diseases of the genito-urinary system (non-venereal)—(contd.)*							
139. Uterine tumours (non-malignant)	—	22	2	22	2	—	50
140. Uterine Hæmorrhage (non-puerperal) ...	—	4	—	4	—	—	60
141. A.—Metritis	3	52	1	55	—	—	284
B.—Other affections of the female genital organs—	1	84	3	85	3	—	167
Displacements of uterus	1	24	—	25	2	—	122
Amenorrhœa ...	—	13	—	13	—	—	256
Dysmenorrhœa ...	—	11	—	11	—	—	410
Leucorrhœa ...	1	10	—	11	—	—	569
142. Diseases of the breast (non-puerperal)—							
Mastitis	1	18	—	19	—	14	129
Abscess of breast ...	—	11	2	11	—	1	41
VIII.—*Puerperal state.*							
143. Normal labour	21	464	3	485	10	—	633
143*a*. Maternal welfare (ante-natal)	—	56	1	56	10	—	9,293
B.—Accidents of prgnancy—							
(*a*) Abortion	5	125	8	130	—	—	214
(*b*) Ectopic gestation	—	4	1	4	—	—	2
(*c*) Other accidents of pregnancy ...	3	181	17	184	8	—	110
144. Puerperal hæmorrhage	—	10	2	10	—	—	6
145. Other accidents of parturition ...	6	115	19	121	4	—	21
146. Puerperal septicæmia ...	—	26	11	26	—	—	11
147. Phlegmasia dolens ...	—	—	—	—	—	—	—
148. Puerperal eclampsia ...	—	9	3	9	—	—	2
149. Sequelæ of labour ...	3	35	—	38	—	—	70
149*a*. Postnatal attendances on mothers and infants	—	60	—	60	2	440	3,351
150. Puerperal affections of the breast	—	7	—	7	1	—	8
IX.—*Affections of the skin and Cellular tissues.*							
151. Gangrene	1	26	11	27	2	50	37
152. Boil—	1	58	—	59	3	1,022	347
Carbuncle	3	54	1	57	—	428	163
153. Abscess—	14	346	2	360	12	539	225
Whitlow	2	118	—	120	2	684	236
Cellulitis	32	585	10	617	23	1,813	439
154. A.—Tinea	—	20	—	20	—	1,775	833
B.—Scabies	—	57	—	57	—	1,330	716
155. Other diseases of the skin—	—	16	—	16	3	1,764	1,146
Erythema	—	16	—	16	—	226	106
Urticaria	—	13	1	13	—	192	64
Eczema	—	28	1	28	4	902	605
Herpes	1	11	—	12	2	101	13
Psoriasis	—	5	—	5	—	25	13
Elephantiasis ...	4	36	2	40	2	139	55
Myiasis	—	2	—	2	—	19	7
Chigers	—	2	—	2	—	31	10
Cutaneous leishmaniasis	—	—	—	—	—	—	—
155*a*. Ulcers	154	1,027	19	1,181	136	9,718	4,318

TABLE V—*continued.*

RETURN OF DISEASES AND DEATHS (IN-PATIENTS) AND DISEASES (OUT-PATIENTS) FOR THE YEAR, 1930–31.

DISEASES.	IN-PATIENTS.				OUT-PATIENTS.	
	Remaining in hospital on 31st March, 1930.	Yearly Total. Admissions.	Yearly Total. Deaths.	Total cases treated.	Remaining in hospital on 31st March, 1931.	Male.	Female.
X.—*Diseases of bones and organs of locomotion (other than tuberculous).*							
156. Diseases of bones— ...	—	—	—	—	—	7	9
Osteitis	6	105	3	111	9	442	205
157. Diseases of joints— ...	—	—	—	—	—	4	—
Arthritis	13	178	3	191	13	1,506	392
Synovitis	1	96	—	97	7	459	89
158. Other diseases of bones or organs of locomotion	9	109	—	118	8	889	238
XI.—*Malformations.*							
159. Malformations— ...	—	6	—	6	—	10	9
Hydrocephalus ...	—	4	1	4	—	11	5
Hypospadias ...	—	—	—	—	—	—	1
Spina bifida, etc. ...	—	2	—	2	—	4	6
XII.—*Diseases of infancy.*							
160. Congenital debility ...	1	35	16	36	—	167	167
161. Premature birth ...	—	40	11	40	1	21	25
162. Other affections of infancy	3	81	14	84	1	417	385
163. Infant neglect (infants of three months or over)	—	1	—	1	—	69	67
163a. New born infants (attendances on) ...	—	413	19	413	2	1	1
XIII.—*Affections of old age.*							
164. Senility—	1	1	—	2	—	19	15
Senile dementia ...	—	11	7	11	1	7	4
XIV.—*Affections produced by external causes.*							
165. Suicide by poisoning ...	—	1	1	1	—	2	1
166. Corrosive poisoning (intentional) ...	—	9	—	9	—	—	—
167. Suicide by gas poisoning	—	—	—	—	—	—	—
168. Suicide by hanging or strangulation ...	—	—	—	—	—	4	1
169. Suicide by drowning ...	—	—	—	—	—	1	—
170. Suicide by firearms ...	—	—	—	—	—	2	—
171. Suicide by cutting or stabbing instruments	—	8	8	8	—	5	—
172. Suicide by jumping from a height	—	—	—	—	—	—	—
173. Suicide by crushing ...	—	—	—	—	—	1	—
174. Other suicides	—	—	—	—	—	—	—
175. Food poisoning— ...	—	3	—	3	—	2	2
Botulism	—	—	—	—	—	—	—
176. Attacks of poisonous animals—							
Snake bite	—	43	1	43	2	56	12
Insect bite	—	19	—	19	—	123	22
177. Other accidental poisonings	1	11	2	12	—	12	4
178. Burns (by fire)	2	99	24	101	13	1,165	181
179. Burns (other than by fire)	2	53	1	55	2	125	51
180. Suffocation (accidental)	—	3	—	3	—	2	1
181. Poisoning by gas (accidental) ...	—	3	—	3	—	1	—
182. Drowning (accidental) ...	—	—	—	—	—	2	2
183. Wounds (by firearms, war excepted)	7	190	39	197	17	107	31
184. Wounds (by cutting or stabbing instruments)	25	502	20	527	22	3,834	577
185. Wounds (by fall) ...	9	226	8	235	18	1,337	319
186. Wounds (in Mines or quarries)	—	59	1	59	3	430	1
187. Wounds (by machinery)	3	37	6	40	—	79	6

TABLE V—*continued.*

RETURN OF DISEASES AND DEATHS (IN-PATIENTS) AND DISEASES (OUT-PATIENTS) FOR THE YEAR, 1930–31.

DISEASES.	IN-PATIENTS.					OUT-PATIENTS.	
	Remaining in hospital on 31st March, 1930.	Yearly Total. Admissions.	Yearly Total. Deaths.	Total cases treated.	Remaining in hospital on 31st March, 1931.	Male.	Female.
XIV.—*Affections produced by External Causes (contd.)*							
188. Wounds (crushing, e.g. railway accidents, etc.)	14	171	11	185	2	489	61
189. Injuries inflicted by animals, bites, kicks, etc.	9	26	3	35	—	142	51
190. Wounds inflicted on active service ...	—	—	—	—	—	—	—
191. Executions of civilians by belligerents... ...	—	—	—	—	—	—	—
192. A.—Over fatigue ...	1	12	7	13	—	—	—
B.—Hunger or thirst...	—	26	9	26	—	4	
193. Exposure to cold, frost bite, etc.	—	—	—	—	—	—	—
194. Exposure to heat—							
Heatstroke ...	—	2	—	2	—	3	1
Sunstroke	—	3	—	3	—	—	1
195. Lightning stroke ...	—	1	—	1	—	2	—
196. Electric shock	—	—	—	—	—	2	—
197. Murder by firearms ...	—	—	—	—	—	1	—
198. Murder by cutting or stabbing instruments	—	—	—	—	—	—	1
199. Murder by other means	—	—	—	—	—	—	—
200. Infanticide (murder of an infant under one year)	—	—	—	—	—	1	1
201. A.—Dislocation ...	1	21	—	22	—	39	10
B.—Sprain	1	96	—	97	3	607	79
C.—Fracture	27	419	29	446	53	242	55
202. Other external injuries...	11	410	7	421	19	2,709	602
203. Deaths by violence of unknown cause ...	—	—	—	—	—	—	—
XV.—*Ill-Defined Diseases.*							
204. Sudden death (cause unknown)	—	4	4	4	—	3	—
205. A.—Diseases not already specified or ill-defined	11	122	6	133	34	—	—
Ascites	1	22	6	23	2	51	13
Œdema	—	28	2	28	7	114	39
Asthenia	1	69	14	70	5	600	189
Shock	1	21	2	22	—	10	3
Hyperpyrexia ...	—	6	1	6	—	91	31
Other diseases ...	—	—	—	—	—	467	400
B.—Malingering ...	—	10	—	10	—	175	14
XVI.—*Diseases, the total of which have not caused 10 deaths* ...	—	23	—	23	2	121	26
Inspections	—	31	—	31	—	55	5
Total	904	17,960	1,327	18,864	950	154,387	97,534

Surgical Operations Major 1,208; Minor 3,318.

TABLE VI.

Analysis of the totals given in Table V (showing the figures for the Medical Branch and the Health Branch separately, also showing separately the Health Branch figures for Infant Clinics and Contagious Diseases Hospitals).

Diseases.	In-Patients.					Out-Patients.	
	Remaining on 31st March, 1930.	Admissions.	Deaths.	Total cases treated.	Remaining on 31st March, 1931.	Male.	Female.
Medical Branch	786	16,231	1,176	17,017	816	127,272	69,419
Health Branch { Infant Clinics ...	33	1,098	89	1,131	38	24,719	26,626
Health Branch { Contagious Diseases Hospitals	85	631	62	716	96	2,396	1,489
Totals	904	17,960	1,327	18,864	950	154,387	97,534

APPENDIX A.

Government Hospital Bed Accommodation and Dispensaries, Gold Coast Colony, Ashanti, Northern Territories and British Mandated Togo, Medical Branch.

Colony.	Hospital.		European.				African.				Dispensaries.	Medical staff (Medical officers and women Medical officers).	Remarks.
			Total Beds at present.		Number of Beds possible.		Total Beds at present.		Number of Beds possible.				
	European.	African.	M.	F.	M.	F.	M.	F.	M.	F.			
Accra	1	1	17	3	17	3	166+6 cots	43+12 cots	166+6 cots	43+12 cots	2	5 (M.O.s)	
Accra Cantonments	—	1	—	—	—	—	6	—	6	—	1	1 (M.O.)	
Accra Maternity	—	1	—	—	—	—	—	29+15 cots	—	29+15 cots	—	1 (W.M.O.)	
Accra Princess Marie Louise	—	1	—	—	—	—	—	2+20 cots	—	2+20 cots	1	1 (W.M.O.)	A children's Hospital.
Accra Christiansborg ...	—	—	—	—	—	—	—	—	—	—	1	1 (W.M.O.)	Infant Welfare Clinic.
Sekondi	—	1	—	—	—	—	46+2 cots	9+2	46+2 cots	9+2	1	3 (M.O.s)	
Sekondi	—	—	—	—	—	—	—	—	—	—	1	1 (W.M.O.)	Infant Welfare Clinic.
Takoradi	1	—	10	2	16	2	—	—	—	—	1	1 (M.O.)	
Chama	—	—	—	—	—	—	—	—	—	—	—	1 (W.M.O.)	Infant Welfare Clinic visited by W.M.O.
Cape Coast	1	1	3	1	4	2	22	13	24	22	1	1 (M.O.)	
Cape Coast	—	—	—	—	—	—	—	—	—	—	1	1 (W.M.O.)	Infant Welfare Clinic.
Saltpond	—	1	—	—	—	—	8	4	8	4	1	1 (M.O.	
Winneba	1	1	7	1	7	1	30	28+6	32	28+6	1	1 (M.O.	
Ada	—	1	—	—	—	—	4	4	8	4	1	1 (M.O.	New African Hospital, completed.
Keta	—	1	—	—	—	—	13	4	13	4	1	1 (M.O.	
Kibi	—	1	—	—	—	—	16	4	16	4	1	1 (M.O.	
Mpraeso	—	1	—	—	—	—	8	6	8	6	1	1 (M.O.	
Dunkwa	—	1	—	—	—	—	15	8	17	8	1	1 (M.O.)	
Tarkwa	—	1	—	—	—	—	11	—	11	—	—	1 (M.O.)	
Axim	1	1	4	2	4	2	12	4	12	4	1	1 (M.O.)	
Wiawso...	—	1	—	—	—	—	7	1	11	4	1	1 (M.O.)	
Akuse	—	1	—	—	—	—	12	6	12	8	1	1 (M.O.)	
Koforidua	—	1	—	—	—	—	13	6	13	6	1	1 (M.O.)	
Koforidua	—	—	—	—	—	—	—	—	—	—	1	1 (W.M.O.)	Infant Welfare Clinic.
Elmina	—	1	—	—	—	—	—	—	—	—	1	1 (M.O.)	Visiting from Cape Coast.
Oda	—	1	—	—	—	—	12	4	12	4	1	1 (M.O.)	
Nsawam	—	1	—	—	—	—	10	4	10	4	1	1 (M.O.)	
Total	5	21	41	9	48	10	411+8 cots	179+55 cots	425+8 cots	193+55 cots	25	33	

GOVERNMENT HOSPITAL BED ACCOMMODATION AND DISPENSARIES, GOLD COAST COLONY, ASHANTI, NORTHERN TERRITORIES AND BRITISH MANDATED TOGO, MEDICAL BRANCH.

Ashanti.	Hospital.		European.				African.				Dispensaries.	Medical staff (Medical officers and women Medical officers).	Remarks.
			Total Beds at present.		Number of Beds possible.		Total Beds at present.		Number of Beds possible.				
	European.	African.	M.	F.	M.	F.	M.	F.	M.	F.			
Kumasi	1	1	10	1	10	1	105	33+2 cots	105	33+2 cots	1	3 (M.O.s)	
Kumasi	—	1	—	—	—	—	—	20 cots	—	20 cots	1	1 (W.M.O.)	Infant Welfare Centre.
Bekwai...	—	1	—	—	—	—	6	4	6	4	1	1 (M.O.)	
Sunyani	—	1	—	—	—	—	10	4	12	4	1	1 (M.O.)	
Kintampo	—	1	—	—	—	—	16	14	16	14	1	1 (M.O.)	
Total	1	5	10	1	10	1	137	55+22 cots	139	55+22 cots	5	7	

Northern Territories.	Hospital.		European.				African.						
	European.	African.	M.	F.	M.	F.							
Tamale...	1	1	4	2	6	2	41+3 cots	4	41+3 cots	4	1	2 (M.Os.)	
Wa	—	1	—	—	—	—	11	4	12	4	1	1 (M.O.)	New Hospital completed.
Lawra	—	1	—	—	—	—	10	5	10	5	1	1 (M.O.)	New Hospital completed.
Zuarungu	—	1	—	—	—	—	9	2	9	3	1	1 (M.O.)	
Salaga	—	1	—	—	—	—	7	3	7	3	1	1 (M.O.)	
No. 1 Travelling Dispensary	—	—	—	—	—	—	—	—	—	—	1	1 (M.O.)	
No. 2 Travelling Dispensary	—	—	—	—	—	—	—	—	—	—	1	—	No. 2 Travelling Dispensary not in use owing to shortage of M.O.s.
No. 3 Travelling Dispensary	—	—	—	—	—	—	—	—	—	—	1	1 (M.O.)	
Total	1	5	4	2	6	2	78+3 cots	18	79+3 cots	19	8	8	

BRITISH MANDATED TOGO, MEDICAL BRANCH.

Mandated Togo	Hospital.		European.				African.				Dispensaries.	Medical staff (Medical officers and women Medical officers).	Remarks.
			Total Beds at present.		Number of Beds possible.		Total Beds at present.		Number of Beds possible.				
	European.	African.	M	F.	M.	F.	M.	F.	M.	F.			
Ho	—	1	—	—	—	—	14	5	14	5	1	1 (M.O.)	
Kete Krachi	—	—	—	—	—	—	—	—	—	—	1	1 (M.O.)	Visited occasionally by M.O.
Yendi	—	1	—	—	—	—	9	—	10	—	1	1 (M.O.)	New Hospital.
Total	—	2	—	—	—	—	23	5	24	5	3	3	
Grand total ...	7	33	55	12	64	13	649+11 cots	257+77 cots	667+11 cots	272+77 cots	41	51	

CONTAGIOUS DISEASES HOSPITAL—HEALTH BRANCH.

	Hospital.		European.				African.						
	European.	African.					M.	F.	M.	F.			
Labadi	1	1	—	—	4	—	35	24	70	70	—	(1 M.O.H.)	Visiting.
Cape Coast	—	1	—	—	—	—	5	4	13	13	—	(1 M.O.H.)	Visiting.
Sekondi	—	1	—	—	—	—	2	—	26	24	—	(1 M.O.H.)	Visiting.
Tarkwa	—	1	—	—	—	—	—	—	5	1	—	(1 M.O.H.)	Visiting.
Winneba	—	1	—	—	—	—	—	—	2	2	—	(1 M.O.H.)	Visiting.
Ada	—	1	—	—	—	—	—	—	4	4	—	(1 M.O.H.)	Visiting.
Saltpond	—	1	—	—	—	—	2	—	4	—	—	(1 M.O.H.)	Visiting.
Kumasi	—	1	—	—	—	—	18	6	18	6	—	(1 M.O.H.)	Visiting.
Keta	—	1	—	—	—	—	2	2	4	2	—	(1 M.O.H.)	Visiting.
Total	1	9	—	—	4	—	64	36	146	122	—	9	

*The number of beds possible is a variable figure. It can in case of outbreak be largely increased.

APPENDIX B.

Report on the Working of a Travelling Dispensary on the Gold Coast.

Preliminary.—In writing a description of the work done it is proposed to start with a short description of the Lawra-Tumu District.

This district is bordered on the north by the Anglo-French boundary separating the Upper Volta District from the Gold Coast, which follows almost exactly the eleventh parallel of latitude.

The southern boundary of the district is roughly 40 miles south of this and borders on the Wa District. The western edge of the district is also the Anglo-French boundary between the Upper Volta and Gold Coast, which in this case is formed by the Black Volta River.

To the east the district is limited by the Sissili River some 115 miles from the Black Volta.

The district is 3,840 square miles in area and is occupied mainly by the Lobis and Dagartis in the west and the Issalas in the east.

There is a springling of strangers in the form of Hausas, Fulanis and Moshis.

The Issalas, Dagartis and Lobis do not dwell in towns in the proper sense of the term but rather in compounds, the capacity of which varies from 20 to 200 persons. These are scattered over the whole district, being thickly placed in the western half and sparsely in the eastern.

The physical aspect of the country is undulating and covered with orchard bush. There are 422 miles of relatively excellent roads, and the country is accordingly ideally suited to the working of a Mobile Dispensary.

The writer took over the running of the Mobile Dispensary at the end of February, 1930. Previous to this Drs. Matthews, Dixey and Saunders had been in charge of it at various times.

During 1930 a hospital was built at Lawra and this fact as will be explained later, has considerably modified the programme of work.

Staff.—The staff attached to the Mobile Dispensary and incidentally to the new hospital has been as follows: One Medical Officer, one 2nd Division Dispenser (Mr. W. S. Forson) one hospital boy (Jatto Dagarti), one interpreter (Dinner Lobi for the latter half of the year), and one or two drivers as required.

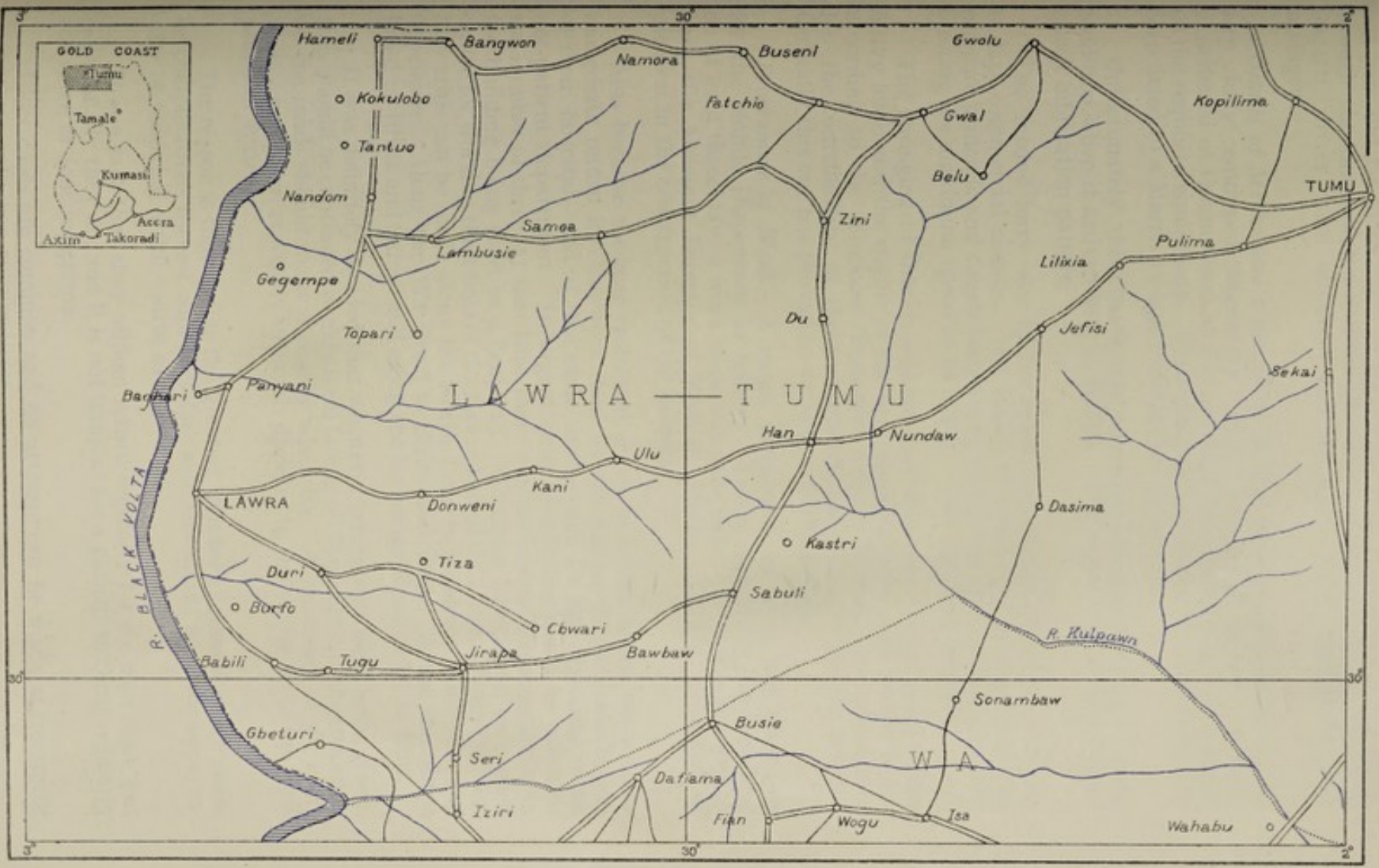
Mr. Forson who has had previous experience of work in the Northern Territories has proved of the greatest assistance and can be relied upon to carry on the work of the Mobile Dispensary when the Medical Officer is working elsewhere.

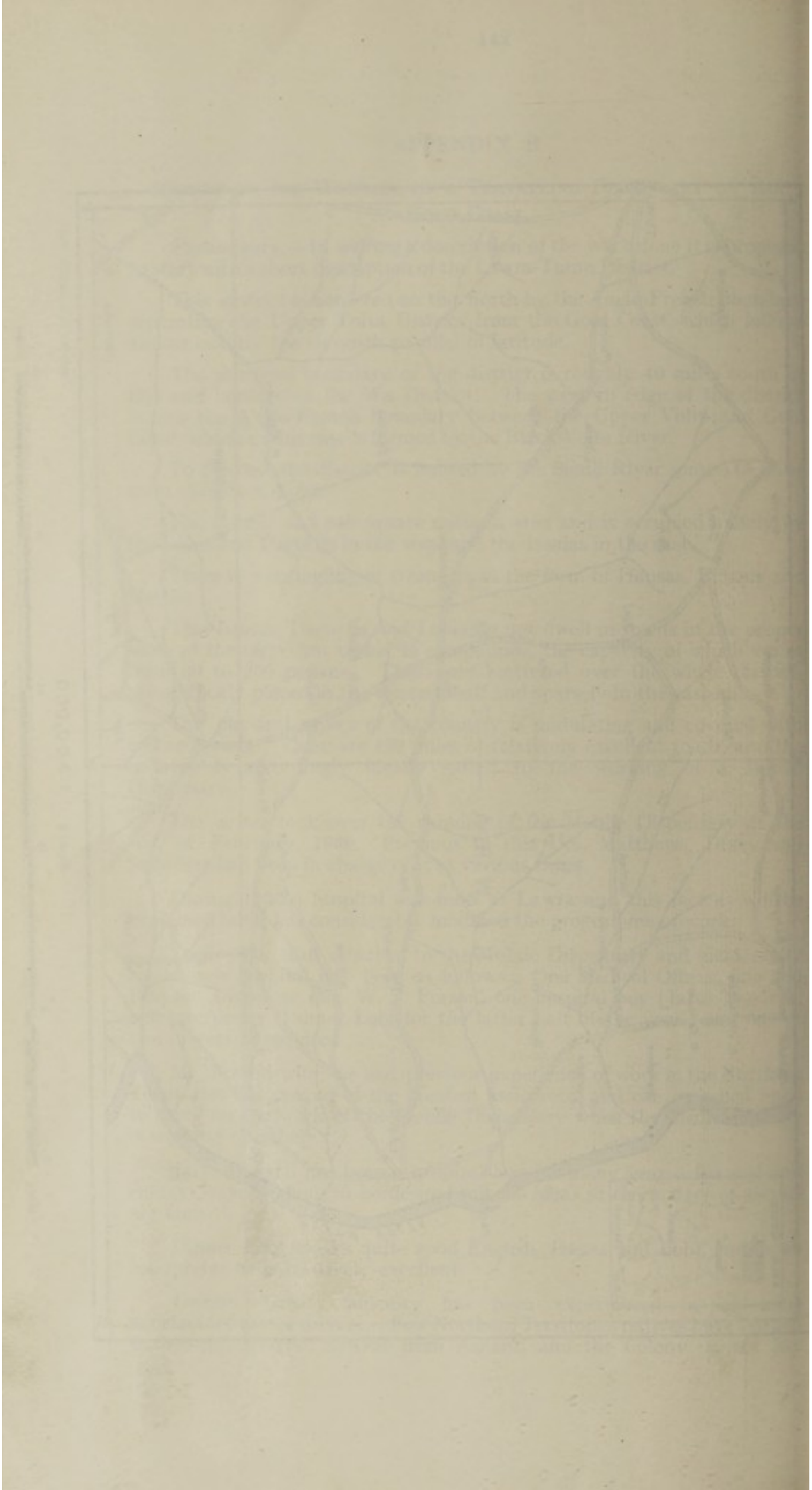
Jatto Dagarti has been a hospital boy for many years—his zeal and energy leave nothing to be desired but his ideas in the matter of asepsis are limited.

Dinner Lobi speaks quite good English, Hausa and Lobi, and as an interpreter he is relatively excellent.

Drivers.—Great difficulty has been experienced in obtaining satisfactory motor drivers. Few Northern Territories natives have learned to become drivers; natives from Ashanti and the Colony do not like

AREA SERVED BY NO1. TRAVELLING DISPENSARY.





coming so far north—partly due to fear of the people (largely unjustified) and partly because their customary diet is unobtainable here. The first two drivers were found endeavouring to sell Mobile Dispensary petrol. Of the two sent to replace these, one was incompetent, the other unwilling to do any work, finally leaving without notice. The next driver-fitter sent here did far more harm to the lorries than otherwise. Eventually through the kind assistance of the District Commissioner the services of a Dagarti driver were obtained and he seems both industrious and intelligent.

Details of Mechanical Unit.—The Mobile Dispensary consists of one very fully equipped dispensary lorry. The body is very strongly constructed of Odum wood and is provided with lockers and shelves for all the requisite equipment. The equipment is adequate. This body has been fitted to a Morris 14 h.p. commercial chassis.

Unfortunately this chassis was somewhat old and not in very good condition when it arrived here in March. The engine was of the original splash lubrication pattern.

The second lorry was of the truck type fitted to a newer Morris 14 h.p. commercial chassis. The engine of which was lubricated on the pressure principle and the carburretor of which was fitted with a governor limiting the maximum speed to 24 m.p.h.—Two excellent features.

The springing of this chassis however was very harsh except under heavy load, and the engine of the high speed variety ; two factors which according to the Engineer Transport Officer, Kumasi, are responsible for the unreliability of these chassis in the hands of native drivers. Certainly this one has proved no exception in this respect.

Programme of Work.—A rough programme of work was made out for the Mobile Dispensary as follows : Lawra should be the base and on at least three days a week work was done there. This was in order to keep the Assistant Director of Medical Service, Tamale, informed of progress in the construction of the hospital.

Also because medical treatment given in Lawra would show some immediate return for the work done by the natives in the construction of their hospital—and at the same time would be the beginning of an out-patient department. In urgent cases in-patients could be taken to the number of three (at that time there was no further accommodation in the building being used as a hospital). Moreover Lawra is a very good centre for working the whole of the Lawra half of the Lawra-Tumu District. Day trips can be made along the North Road to Nandom, Lambussie and Gegenpwe. Along the Wa Road to Birifu and Tugu. Along the Jiripa Road to Jiripa and Sabuli and along the Navrongo Road as far as Han.

It was definitely decided that whenever treatments were being given, they should be continued weekly until falling off in numbers or the condition of the roads should make a change advisable. A minimum of six visits to any one place at weekly intervals appears to the writer to be the most practical system.

The reason is that by far the greatest number of cases seen are yaws, or complications thereof and therefore sufferers should have the opportunity of receiving a full course of injections.

It is a fact that they seldom return regularly for six injections, but occasionally they do, and it is not unusual for a patient to come regularly for three or four injections.

Ulcer cases are common and no attempt can be made at treatment if they are only seen once or twice.

This principle of working the same places for long periods does not touch nearly such large numbers as would be possible if work was done in a different direction each week. But long continued visits should cause satisfactory results and definite control of yaws, whereas one or two visits to a large number of places can only show good results on paper and poor results in practice.

Record of Work.—In April, work was begun weekly at Jiripa and continued until May when the roads became too bad for regular visits. Permission having been given for the White Fathers to administer Sobita, the work could be carried on in the absence of the writer. Indeed the number of cases seen at this Mission ever since has been really excellent and averages forty persons daily.

Weekly visits to Nandom were begun later in April and immediately proved extremely successful. The chief at that time was a man named Bora who had great influence over his people. He was most anxious that his people should receive medical attention, and the numbers varied between 150 and 450 patients.

Nandom was accordingly visited until August when the state of the road prevented further visits.

In June, weekly visits were begun along the Navrongo Road as far as Han, (35 miles from Lawra), stops were made at Donweni, Kani and Ulu. Fairly good numbers were treated at these places, but the previous Medical Officers had also given treatment at some of these places, and it was stated that many of the yaws cases so treated had shown no recurrence of symptoms.

During the three months April, June and July small epidemics of influenza, (9 cases) small-pox, (4 cases) and measles, (10 cases) and a suspected outbreak of rabies among Lawra dogs were dealt with.

The Lawra hospital although not completed was useable in part from the end of May—hence all cases treated in Lawra have been returned as hospital cases, and those seen outside Lawra returned as Mobile Dispensary cases. In actual practice, however, the staff was primarily attached to the Mobile Dispensary, and the drugs and equipment used until the end of the year belonged to the Mobile Dispensary. It is not inappropriate therefore to record that the work done at the hospital had been in the neighbourhood of 30 cases daily and patients seen outside Lawra with the Mobile Dispensary who required in-patient treatment were brought back to the hospital.

July, August, September.

During the months of July, August and September, the rainy season, it became gradually more difficult to travel on account of the state of the roads, and work became more concentrated on Lawra. However, during this time there were nearly 4,000 attendances and over 2,500 individual cases treated.

From 17th August to 8th September, Mr. Forson was on the sick list and at the same time measles broke out at Jiripa. The truck type lorry also broke down due to trouble with the engine bearings. The dispensary fitted lorry was at this time unuseable, owing to its being too heavy for the sodden roads.

On the evening of 23rd of September, just before dark an urgent message was received to the effect that the Chief of Nandom was very ill with a swelling of his right arm.

The Acting District Commissioner gave every possible assistance. The road to Nandom was put in repair during the night, and at dawn the next morning we proceeded to Nandom.

On arrival the chief was found to be ill and in great pain—the right arm considerably swollen and very tense.

The swelling extended to the chest wall and above the shoulder. Attempts had been made in the way of incisions to allow pus to escape.

A three days' history was given and a diagnosis of acute cellulitis made.

The chief was immediately taken to Lawra and a grave prognosis given to his people.

On arrival at Lawra the arm was operated upon, under general anaesthetic, and what had appeared to be a cellulitis proved to be gas gangrene. Amputation of the affected limb was out of the question owing to the spread of the disease to the chest wall and operative measures had to be confined to numerous incisions through the cellular tissue, and into intramuscular spaces. This was done as rapidly as possible and the patient returned to the ward.

Death occurred two hours later.

October, November, December.

During these three months the Dispensary was again able to take the road. The writer went on local leave for most of November. The truck lorry was taken to Kumasi for attention to its electrical equipment and the dispensary lorry left at Lawra to carry on the work. Unfortunately the driver-fitter put shea butter into the sump in lieu of lubricating oil one day, thus wrecking the engine and causing a discontinuance of treatment along the Han Road, and on the circular route *via* Jiripa and Birifu.

For nine days in December the writer was sick but this did not cause any discontinuance in this work, as the dispenser was able to carry on.

Despite these interruptions, 2,218 cases received treatment during this quarter.

During the nine months just reviewed the Mobile Dispensary had operated within 10 miles of the majority of places in the Lawra half of the district but the Tumu side had been neglected. The Chief of Tumu who is paramount chief over the Issalas, has asked for medical attention for his people and this had been promised for the earliest possible opportunity.

It was therefore decided to devote three or four days weekly to Tumu, Jeffisi and Lilixia, beginning in January.

Unfortunately this necessitated closing the wards of the hospital during that time and cutting down the out-patient work at Lawra to two or three days a week. It was known however that the District Commissioner intended fitting a permanent roof to the hospital main block at about this time which in any case would have necessitated the closure of the wards.

January, February, March.

Weekly trips to the Tumu District were commenced on 6th January, and continued for eight weeks. Numbers during the first four weeks were excellent at Tumu being from three to four hundred each time, after which they dropped very considerably.

Jeffisi and Lilixia were absolutely apathetic and only once did people turn up at these places. The District Commissioner showed no surprise when told this. He says that the Issalas are in general apathetic and lacking in ambition towards any change in their civilization or customs. Lambussie had up till this time received no attention since it is situated only four miles from Nandom.

It has a separate chief, however, and the people of Lambussie are hereditary enemies of the Nandom people. It therefore seemed only fair to give first attention to this town when resuming work in this direction. Accordingly during the last week of January weekly visits were begun at Lambussie, which proved extremely prolific in the way of numbers from the start.

After a few weeks these visits were continued to Nandom, and to Gegenpwe as well.

Trouble was again experienced during this quarter due to the condition of the dispensary lorry engine and a further breakdown due to burnt bearings of the truck lorry engine. Work was maintained however by the use of the writer's car and the very kind loan on the part of the District Commissioner of his car when more than one car was required.

During March however a new Ford truck lorry was sent from Accra together with a driver-fitter who overhauled the whole dispensary unit. A board was held on the old Morris chassis belonging to the Dispensary lorry, and this is to be converted to spares. The newer Morris chassis has had the dispensary body fitted thereon.

An outbreak of measles occurred at Jiripa in January and an outbreak of suspected Anthrax near Yagga at the end of March.

At the end of March Mr. A. A. Kotey came to take over the duties of Dispenser to the hospital, thus leaving Mr. Forson free for the Mobile Dispensary—the activities of which can be greatly increased in consequence.

Types of diseases.—Yaws, as mentioned earlier, is by far the commonest disease seen here—in fact it seems doubtful if any African goes through life without contracting it at some period. Eight thousand seven hundred and sixty-five Yaws cases were treated during the year, and 2,660 further cases treated at Lawra. Sobita is used almost exclusively as the expense incurred by the use of N.A.B. would be prohibitive. No Wassermann can be done here and the number of actual cures is at present unascertainable. The Yaws eruption or manisfestation such as Gangosa rapidly improves, but until recently it seemed doubtful if any actual cures took place. The District Commissioner while taking the census found some villages almost free from this disease and nearby ones very badly affected. He found that the Yaws-Free village had received medical treatment—that all obvious Yaws cases remaining in these villages had not received such treatment, owing to some bodily infirmity preventing their walking to the nearest place where the dispensary called.

The badly infected villages in all cases had not had such opportunity.

This certainly sounds hopeful, and whether these cases apparently without Yaws were free or not does not alter the fact that they were probably non-infective. In this way the disease can at least be controlled and its spread to children of the future prevented.

Leprosy.—This is a most unsatisfactory disease to treat in this district. The sufferers are told in every instance that they cannot expect the same dramatic results in such short time as Yaws patients—further that they must return regularly for a matter of months until told by the Medical Officer that they are free. The result is usually regular attendance for three or four weeks at the most. One hundred and nineteen cases received treatment and a further 50 at Lawra.

Elephantiasis is common but largely tolerated by the natives who do not often come for treatment.

Eye diseases.—These are extemely common and many of them are late complications of Trachoma—especially Trichiasis and consequent opacity of the cornea.

Strangely enough very few eye cases apart from Trichiasis and acute Conjunctivitis come for treatment. Most usually they come for some other affection such as Yaws; these accordingly are entered as such in the list but also received treatment for their eye condition at the same time.

Affections of the Ear.—Otorrhoea is very common among the children and usually clears up if the patient can be seen sufficiently regularly.

Mastoid infection has not been seen, chronic sub-acute Otitis Media is not uncommon in adults.

Ulcers.—These are extremely common and usually appear to be primarily due to Yaws.

Certainly anti-Yaws treatment assists their cure to a marked degree. Less commonly Yaws does not appear to enter into the cause—these cases are less tractable.

Multiple Abscesses.—Numerous cases are seen of this most crippling condition. The abscesses which are most often intramuscular appear in all parts of the body and are slow to heal. As soon as an abscess heals in one place a second appears elsewhere. This condition commences in childhood and is probably associated with a diet deficiency usually coupled with Yaws infection.

In many cases good feeding, rest, repeated injections of N.A.B. or Sobita cause improvement if not cure. As the disease is in all probability a chronic septicaemic condition autogenous vaccine therapy if available might prove useful.

Number of cases treated.—Nine thousand two hundred and fifty-eight cases received treatment with 13,205 attendances.

A further 3,277 cases were treated at Lawra with 5,702 attendances.

The following places have been visited *North:* Panyoti, Nandom, Lambussie, Gegenpwe. *South:* Birifu, Tugu, Jiripa, Duri. *East:* Donweni, Kani, Ulu, Han, Jeffisi, Lilixia and Tumu. The mileage covered has been 6,151.

Recommendations for further work.—The Mobile Dispensary is now in a far better position than previously to carry on extensive work in the future. The unit has been overhauled and is in excellent mechanical condition.

The new driver, Bayior Dagarti, seems well suited to the work and can interpret efficiently when the services of Dinner Lobi are required at the hospital. Further more since Mr. Forson's services are now confined to the Mobile Dispensary there is no limit to the time the unit may be away from Lawra. A circular trip is already being made weekly to Birifu, Sabuli, Han, Samoa, Lambussie, Nandom, Gegenpwe, and back to Lawra. Patients requiring in-patient treatment will be left at Lawra hospital. This route covers all the western half of the district and touches all three tribes—Lobis, Dagartis and Issalas.

When the state of the roads prevents the regular running of this route the dispensary might be stationed at some such place as Tumu, in the Issala District, which must otherwise become largely isolated during the rainy season.

The writer is shortly going on leave and the above programme is merely suggested to show future possibilities. There seems no doubt that with very scattered, but numerically high population, a Mobile Dispensary is the only way to bring efficient medical aid to the people. The further presence of a hospital fully equipped for in-patients and operative treatment, should make for a marked improvement in the public health of the district which at present is admittedly low.

D. W. SETH-SMITH,

Medical Officer.

APPENDIX C.

Short Note on the Leper Settlement, Ho, 1930–31.

The new buildings were completed and occupied at the close of the last financial year, this year has therefore been one of consolidation rather than of expansion, so as to get the maximum benefit from the facilities at the new settlement.

An ulcer dressing room, an injection room, and a clinical room, where specimens are taken for examination have been furnished and put into use.

A scheme has been put up and sanctioned by the Honourable the Director of Medical and Sanitary Service for the training of some of the more intelligent hospital lepers as dressers and hospital boys. This has greatly facilitated the work as it is now possible to dress daily the ulcers of over 130 of the inmates, which is helping to relieve the congestion in the settlement, as we have been able to clear up some of the ulcers in the old " burnt out " cases and discharge them to make more room for the early and infectious cases awaiting maintenance.

Individual case cards are being kept and a commencement has been made in carrying out examinations for concomitant infections, with the help of the Research Institute. (A report of the investigations will be found in the report on leprosy work in the Colony.)

One leper has been trained as a dresser ; he assists with the injections, the taking of specimens and keeping the settlement registers. As a result it is now possible to give more attention to each individual case than formerly, and it is possible to give special treatment in any case that is found to have some other concomitant infections. These factors are helping to make the work more effective, and lessening the period that cases will have to stay in the settlement.

The various trades of weaving, carpentry, shoe-making, wood carving and pottery are being carried on. All the furniture for the dressing room, injection room and clinical room, was made by the settlement carpenters, who have also carried out all the necessary joinery repairs during the year. The annual white-washing and road repairs have been carried out by the inmates, who have also cleared for themselves a football pitch which is in great demand. A drainage system is now being made by the inmates to prevent the flooding of the compounds after tornadoes, and the subsequent nuisance which was rather troublesome.

Summary for Year, 1930–31.

Remaining on 31/3/30	499
Admitted during the year	105
Discharged clinically and bacteriologically negative ...	17
Discharged on parole, to report every three months ...	63
Died	2
Ran away	7
Remaining on 31/3/31	515
On maintenance allowance	440

M. B. D. DIXEY,

Medical Officer, Ho.

APPENDIX D.

Report on Leprosy Survey and Investigation, 1930–31.

Sir,

I have the honour to forward a report on Leprosy work carried out during the year, 1930–31.

The work has been proceeding along several lines as in previous years :—

(*a*) A Leprosy survey of the Colony.

(*b*) The formation of Leper out-patients clinics at stations where Medical Officers are resident.

(*c*) Propaganda in regard to Leprosy work.

(*d*) Clinical and laboratory investigations on cases in the existing settlements.

In April, a circular was sent by the Honourable the Director of Medical and Sanitary Service to all Medical Officers and Medical Officers of Health asking for information in regard to leprosy and leprosy work in their respective districts. From the replies received to this circular and from the results of previous surveys in various parts of the Colony it is possible to give some idea of the prevalence of leprosy in the various parts of the Colony, Ashanti and the Northern Territories, and the means which are being undertaken to combat this problem. This general survey, while admittedly incomplete, gives a clue as to where the leprosy incidence is highest, and where leper settlements are most needed at the present time. Altogether over 4,300 lepers have been seen of whom 2,160 have received treatment. At 18 stations lepers are being treated as out-patients at special clinics ; at three stations lepers are being treated at the local Contagious Diseases Hospitals where accommodation is provided for a certain number of cases, and there is one large settlement.

As the results of this survey are of great interest, I propose to give a resume of the findings.

The largest number of cases have been noted in Ashanti and the Northern Territories ; fewer cases have been seen in the Eastern Province and in Togoland, and fewer still in the Central and Western Provinces. As requested in your circular, Medical Officers in most cases asked the Local District Commissioners for political assistance. In some cases this was of the greatest value, in others it was of little use owing to the apathy of the local chiefs concerned.

Eastern Province.—In Accra the Contagious Diseases Hospital is used as a Leper settlement, and accommodates 42 lepers. In other districts, with the exception of the Kwahu District, few cases came forward through the circularization of the chiefs, the majority having been seen by Medical Officers during their work and treated as out-patients.

At Mpraeso the Omanhene rendered assistance, and over 174 cases were seen ; between 50 and 100 of these attend fairly regularly for treatment. If a central settlement is agreed upon at Kumasi, it is thought that those cases living at a distance from Mpraeso might agree to go there which would obviate the need for a local settlement.

Central Province.—With the exception of the Saltpond District the circularization of the chiefs proved futile. In the Saltpond District 33 cases came forward, but none of these cases, in spite of free treatment, has come forward for treatment. In the Cape Coast District 40 cases were seen during the investigations in 1928, of these only one has persevered with treatment. At Oda the Medical Officer found several cases which are attending for treatment fairly regularly.

Western Province.—Few cases have been noted in this Province, except in Axim where 90 cases have been seen. The attendances are however very irregular, owing to the distance to be traversed to the clinic. A settlement is desired chiefly by people not affected by the disease ; its formation would be a complicated matter owing to the need for the co-operation of the seven Omanhene in the district.

Ashanti.—In Ashanti a large number of cases have been seen especially around Kumasi and the Kokofu Division of the Bekwai District which borders Lake Bosumtwi ; 735 cases have been seen in this area of which 664 are undergoing treatment. At Kumasi Contagious Diseases Hospital 378 cases are at present undergoing treatment ; at Bekwai attendances are unfortunately irregular owing to the distance to the clinic, and a settlement is favoured.

At Kintampo over 200 lepers have been seen. Attendances are, however, not very regular and a settlement is recommended by the Medical Officer as the only method of dealing successfully with this problem.

At Sunyani attendances are poor as the Medical Officer's tours of inspection have been much curtailed.

At Obuasi 36 cases are attending for treatment fairly regularly.

The question of a settlement for all these cases has been raised. The late Senior Health Officer at Kumasi was in favour of a large settlement at Kumasi to serve the whole of Ashanti, a large central scheme being considered to have a wider sphere of usefulness and likely to be more economical in administration.

If, however, this would be out of the question owing to financial stringency, the present arrangement at the Kumasi Contagious Diseases Hospital, together with a smaller scheme at Kokofu carried out with the assistance of the Omanhene and run by the Medical Officer from Bekwai might be possible. There can be no doubt that owing to the nature of the Kokofu Division and its distance from Bekwai attendances cannot but be poor. This case therefore demands some kind of settlement especially as this division appears to have one of the highest leprosy rates in the world.

Northern Territories.—In the Northern Territories and particularly in the Northern Province where the population is dense, the water supply is a difficulty in the dry season, shortages of food occur and sanitation is absent, leprosy is very prevalent. The number of lepers seen is large and many more would appear were there a larger Medical staff to see and treat the cases.

The White Fathers at Navrongo received a grant from the British Empire Leprosy Relief Association in January towards building and equipment. Another sister has just arrived to assist with the treatment. Work started in September, many lepers have been seen in the district, but owing to the distances to be covered to the centre, there are as yet but few in regular attendance. A village settlement has been suggested and political assistance promised in its construction.

In the Lawra-Tumu and Wa Districts 630 lepers have been seen; owing to the distances to be covered in order to reach the two Medical Officers in this area, very few of these cases are attending for treatment.

At Tamale through the energy of Dr. Gillespie, 520 lepers have been seen and the majority of those from villages near Tamale are attending regularly, lepers at a distance from Tamale are also attending, but irregularly. A village settlement has been proposed for these cases and would undoubtedly be a success if commenced immediately, otherwise with the prolonged treatment required and the distance to be covered to the Tamale clinic, numbers may commence to drop and a great opportunity to consolidate leprosy work in Tamale will have passed. If the cost of a settlement scheme would not be too great it might be possible to obtain a grant from the British Empire Leprosy Relief Association.

Togoland.—In Southern Togoland owing to the Ho settlement cases are now coming forward for treatment in the earlier stages of the disease and are prepared to stay a considerable period in order to get rid of the disease or ameliorate their condition, the work becoming well established. In the Kete Krachi and Yendi Districts conditions are more primitive and leprosy work is a more difficult problem.

Some of the main difficulties which are met with in leprosy work are :—

(*a*) The type of Leprosy.
(*b*) The apathy of the people.
(*c*) The slow progress of treatment.
(*d*) The paucity of Medical Officers.

(*a*) The anaesthetic type of leprosy appears to be the predominant type throughout the Colony. Nodular leprosy which is so repulsive, is less common. (The " A " type case is more common than the " B " type case, according to classification.) From figures to hand the percentage of anaesthetic cases varies in different parts of the Colony from between 81 per cent to 66 per cent of the total number of cases seen. This experience is similar to experience in Southern Nigeria, the Congo, and South Africa, and is undoubtedly a stumbling block in carrying out leprosy work as it has been argued, that this type of leprosy is not a virulent type, it has existed from time immemorial, and only a small percentage of those infected develop the disfiguration and deformities seen in the later stages of the disease.

(*b*) Lepers in many parts of the country especially in the Northern Province of the Northern Territories are well tolerated by their fellows, eating and drinking out of the same utensils as healthy persons, sleeping in the same room and even in the same bed or mat. In some places more precautions are taken after the death of a leper to avoid the disease than were never thought of during his lifetime. The natives can usually recognize leprosy even in its early stages and appreciate its infective nature, most of them dread the disease, and few lepers would admit that their parents have been lepers, though in many cases it is undoubtedly a fact. In many parts of the country there are various native customs the object of which is to segregate the leper or cast him out, but on close investigation little notice appears to be taken of these customs in most parts of the Colony, and nothing appears to be done to arrest the spread of the disease. In certain districts near the Coast the fear of leprosy is greater, and the leper is sometimes segregated on an isolated area of farm land.

(*c*) The treatment of leprosy is not so spectacular as the treatment of yaws, where immediate and visible results are often observed. Often cases are disheartened by their slow progress and discontinue treatment.

(*d*) Medical Officers are few and far between, distances to treatment centres are often great and may perhaps be in a district where both language and people are foreign to the patient, so that unless accommodation can be provided close to the treatment centre and maintenance of some sort provided the patient is unable to prolong his stay sufficiently to have the necessary treatment.

There is no doubt that these difficulties are gradually being overcome in many parts of the Colony by out-patient clinics, settlements and propaganda. The value of treatment is being slowly realized and efforts are being made to find accommodation for cases that are prepared to stay.

Propaganda has been carried out during the year among all Medical Officers, through the treatment centres and by means of the Teachers' Journal.

Clinical and Laboratory investigations: The lepers at the Contagious Diseases Hospital, Accra, were examined last year, and this year I have been able, with the kind help of the Medical Research Institute, to carry out further examinations on the lepers at Ho, while stationed there as Medical Officer. The aim has been, in making these investigations, to study the symptoms and signs of the disease, to note the common concomitant infections in this district, and also the results of treatment.

Observations at Ho Leper Settlement, Togoland.

There are 515 lepers in the Ho settlement, the majority of whom come from the Ho District.

The Ho District comprises the southern section of British Togoland. The southern part of the district consists of savannah country, and the northern part forest country of a hilly nature. Seven hundred and seventy-six lepers have been seen and examined in the district, giving a leprosy incidence of over seven per mile. The greater number of these cases have been seen at Ho or are at present at Ho in the settlement. There appears to be little, if any, difference in the leprosy incidence in the savannah part as compared with the forest part of the district.

Certain points of interest have been noted while making notes on the cases in the settlement. It must however be remembered that it is often difficult to get accurate information from primitive people about the length of time they have had the disease and any prodromata they may have noticed, etc. In making the following observations use has only been made of the case cards of those patients who appeared to understand the questions asked and to give intelligent replies, about 70 per cent of the total number.

Sex and Age Incidence.

There are in the settlement 310 males and 205 females. The number of males in the district closely coincides with the number of females. There is therefore a large preponderance of males over females suffering from the disease. This is similar to experience in other parts of the world.

The Age of onset.—The various age-periods expressed in percentages are as follows :—

	1–10,	11–20,	21–30,	31–40,	41–50,	*over* 50.
Males	8	21	35	27	8	1
Females ...	12	21	31	27	8	1

In over 50 per cent of cases leprosy was first noted between 10 and 30, and in over 75 per cent between 10 and 40. This is similar to observations in other parts of West Africa.

Occupation.—The chief industry of the district is farming, farmers are therefore in a majority. There does not appear to be any marked increase in the leprosy incidence in any particular trade in the district.

Type of Leprosy.—The classification of these cases has been carried out according to the method recommended by Muir, which with slight modifications appears to have been adopted in the recent International Congress on Leprosy in the Phillipine Isles. The " A " type of case being those in which no bacilli can be demonstrated, and are diagnosed clinically by nerve signs, while " B " cases are those in which bacilli can be demonstrated, and are found in the skin lesions.

The " B " type embraces all case of nodular leprosy, and mixed types, as in these mixed cases bacilli are demonstrable.

The " A2 " type consists of cases in the late anæsthetic stage of the disease, in which late nerve manifestations such as acroteric anæsthesia and trophic signs are to be found.

The cases at Ho may be classified as follows :—

	Purely anæsthetic (A1 and A2 type.)	*Nodular and mixed. (B types.)*
Males ...	66 per cent	34 per cent
Females ...	70 per cent	30 per cent

The anæsthetic cases consist of the following percentages of early anæsthetic (A1) and late anæsthetic cases (A2).

	Early anæsthetic.	*Late anæsthetic.*
Males ...	57 per cent	43 per cent
Females ...	61 per cent	39 per cent

A hopeful sign is that the number of cases coming in the early anæsthetic stage of the disease is on the increase.

Dnration of the disease.—The average duration of the disease in the males and females in the various stages of the disease was as follows :—

	Males.	*Females.*
Early anæsthetic ...	4.9 years	5.9 years
Nodular and Mixed	5.7 years	6.2 years
Late anæsthetic ...	10.6 years	10.4 years

This table merely expresses averages. In the table of type of the disease it will have been noticed that less than one-third of the patients are nodular and have passed through the nodular phase. There are, however, cases in the settlement that have remained in the early anæsthetic stage for 30 years or more, and also some cases that have shown late anæsthetic signs within a few months of onset. In regard to nodular cases some commence as nodular leprosy without having ever shown anæsthetic signs, and have remained nodular for 30 years or more. From the above table there may be a slight tendency for a case to become nodular, if it is going to become nodular, between the fifth and tenth year of the disease.

It is difficult to understand why only about one-third of the total cases ever pass through a nodular phase. The disease may have been of long endemic in this area that there is a high degree of immunity in

the native population. A full investigation was carried out in Accra on 40 lepers in 1929, to see if there was any marked concomitant infections in nodular cases lowering the vitality and the resistance of the patient in nodular patients as opposed to anæsthetic patients, but no conclusion could be arrived at.

Prodromata.—In the majority of cases, (70 per cent), it seemed that the patient failed to notice any prodromata before the onset of the initial lesion. In 30 per cent of the cases certain prodromata were noticed before any sign of a lesion. These symptoms were in order of frequency, pain, fever, parasthesia, headache, weakness, prickly sensations under the skin. In a few cases the initial lesion was first noticed on the site of an old ulcer or lesion of crab yaws.

Initial Lesion.—The commonest types of initial lesion appear to be :—

(*a*) A pale copper-coloured macule, which slowly enlarges, in the skin. Anæsthesia to light touch can sometimes be demonstrated in it. There is also often a loss of the sense of heat and cold. The colour is due to depigmentation. It is the commonest initial lesion.

(*b*) A raised discoloured patch in which bacilli can often be demonstrated.

(*c*) A marked acroteric anæsthesia of a hand or foot. This is rare.

(*d*) An atrophy of a group of muscles in the hand or foot causing drop wrist and drop foot. Only two cases of this type were seen.

The types (*c*) and (*d*) are instances of cases where nothing has been noted by the patient until there has been marked nerve involvement.

Sometimes in the routine medical examination of patients in general medical work, one observes small depigmented patches of leprosy in which it is often possible to demonstrate anæsthesia to light touch or heat and cold. On enquiry it is often found that the patient has had the disease for years and has never bothered about treatment as the disease has not progressed.

In other cases leprotic lesions are seen which have been submitted to native medicines and various devices, such as scarification and rubbing in gunpowder in order to camouflage all signs of the disease. The usual preparation seems to be some kind of vegetable dye. Keloids sometimes result from the gunpowder treatment. A few cases appear to have been deliberately burnt with a hot iron, and the leprosy can be seen extending from all round the edges of the resulting scar.

The Site of the Initial Lesion.—This is sometimes of interest. In this district the cheeks and forehead, the back, the buttocks, the extensor surfaces are common sites for the initial lesion. Initial lesions on the feet are not common. No initial lesions were noted on the scalp. The native dress of the district consists of a cover cloth loosely draped about the body, this is tied around the waist while at work, at night they lie on mats completely enshrouded in cloth. The women wear a loose bodice, and a cloth draped round the lower part of the body reaching almost to the feet. From the common sites of the initial lesion infection would appear to be most often from contact with infected clothing or from lying on an infected mat. The common sites for the initial lesion do show some variation in different parts of the Colony. Around Lake Bosumtwi in Ashanti where crab yaws is very prevalent, the site of the initial lesion is often noted round these lesions. In the Northern Territories, especially in the Northern Province where water shortages occur very often during the dry season, the craw craw is very prevalent, there appears to be frequently a co-relation between the sites commonly affected by craw craw and the initial lesions of leprosy. The natives notice this fact themselves.

Nasal Smears.—These are made by rubbing the nasal septum with the sterile platinum loop and rubbing it on a slide, and afterwards staining by Ziehl Neilsens method. By this means it is possible to discover those patients which have an infectious nasal discharge and therefore the chief dangers in the dissemination of the disease, and also it is extremely important in regard to diagnosis and prognosis, as cases which appear clinically to be purely of the anæsthetic type, or " A " cases, may be found to be mixed or " B " cases, a fact which very materially alters the diagnosis, and the prognosis.

As a result of this test it was found that 35 males and five females who appeared, from the physical signs, to be purely anaesthetic, or " A " cases, were found to be " B " cases in which bacilli were demonstrable, which showed an error in the clinical diagnosis of 11 per cent in the males and 2.5 per cent in the females. In 86 per cent of the Nodular cases bacilli could be found in the nasal smears, and in the remaining 14 per cent bacilli could be found in the lesions.

The Nodular and mixed types (" B ") are therefore the chief source of infection.

Thickening of the Superficial nerves.—This was noted in 15 per cent of cases, the ulner and the superficial nerve are usually the nerves involved.

Concomitant Infections.—It is an essential part of leprosy treatment to search for concomitant infections which may be lowering the vitality of the patient, and nullifying the effect of treatment.

In every case thick blood films were taken and examined for microfilaria and malaria. The films were taken between 10 a.m. and noon. A single drop of blood examination gives a rather low indication of the numbers infected, to obtain accurate figures repeated examinations during the day are necessary. The results showed that 23 per cent of the inmates of the Leper Settlement harboured microfilaria loa loa.

A control was done by examining 100 out-patients seen on trek through the district, the films also being taken between 10 a.m. and noon. Of these 17 per cent showed the presence of microfilaria loa loa. None of the lepers has complained of Calabar swellings, though I have once or twice seen symptoms suggestive of Calabar swellings in Hospital out-patients. I have never seen or heard of a case in this district of a filaria crossing the anterior surface of the eye.

One case of infection with filaria perstans was found. There are no lepers suffering from elephantiasis in the settlement.

The commoner biting flies in the Ho District are chrysops, simulium, tabanids and various culicines; glossina have only been found in one localized area in the district.

An infection with subtertian malaria was found in 9.5 per cent of the cases.

The number of cases suffering from filarial or malarial infection is not proportionately greater in the Nodular and mixed cases. It cannot therefore be said that the vitality of these cases is lowered more than the anæsthetic cases by this infection.

The examination of the stools has not yet been completed. The commonest helminthic infections in this district appear to be ascaris, trichuris, strongyloides, and ankylostome infections. Tape worms are sometimes seen. In Hospital practice helminthic infections with the exception of Ascaris and oxyuris infections are not a frequent cause of complaint by the patient.

It has not been possible to take the Wassermann reaction of all the lepers owing to transport difficulties and the fact that only a small number can be taken each week. For despatch, the serum is separated off and pipetted into small ampoules into which has been put a very small amount of boracic acid as recommended by Butler. These ampoules are sealed and posted to Accra. The serum appears to keep well and very few have arrived in Accra contaminated or spoilt.

It has been claimed that a positive Wassermann reaction is apt to occur in cases of nodular leprosy when there is no yaws or syphilis present, this is however not thought to occur if Kolmers new method of carrying out the Wassermann reaction is adopted.

Of 108 Wassermanns done to date 56 have been positive, giving a percentage of 52. This is high, but it must be borne in mind that yaws is very prevalent throughout the district.

The results were as follows :—

Early Anæsthetic	23
Nodular and mixed	17
Late Anæsthetic	16

All the cases were males.

There is not a marked difference between the rates for the anaesthetic and Nodular cases.

Complications.—Ulcers are to be seen in these cases ; the majority are tropic but some are broken down nodules.

Eye lesions are not uncommon in nodular cases, and are usually of the nature of an irido-cyclitis.

There were two cases of stenosis of the larynx.

Treatment.—During observations over the last 10 months the following results have been noted at Ho.

Great improvement	119
Improving	295
Slight improvement	47
Stationary	25
Worse	29

During the year, 23 patients were discharged as clinically and bacteriologically free of the disease, and have to report at six-monthly intervals.

Any concomitant infection found is treated ; for cases with yaws or with a positive Wassermann a course of N.A.B. or Sorbita is given.

Leprosy treatment consists of the bi-weekly subcutaneous injection of Alepol, and the external application of Trichloracetic acid in varying strengths to the skin lesions. Potassium iodide is now only used in specially selected cases.

Moogrol which is a more irritating injection and expensive form of treatment is preferred by many of the patients, although results from its use do not appear more satisfactory than results obtained from Alepol. Doubtless there is in the primitive mind an idea that the more painful an injection is the more efficacious it will be.

In the treatment of ulcers hot permanganate soaks are useful in sloughing cases, and eucalyptus oil and iodoform has been found useful for granulating surfaces. Trophic ulcers sometimes require to be scraped.

In 20 cases Ideal Milk injections have been employed; smart reactions occur which are difficult to control, the results have not been altogether satisfactory.

Work is an essential and all cases that are not suffering from the effects of a reaction should be turned on to some kind of task for at least an hour a day. One is continually struck by the fact that the industrious patients seem to improve very much more rapidly than those who sit down all day doing nothing. All are encouraged to work and have small farms.

There is no doubt that the disease goes in cycles of remissions and exacerbations whether it is being treated or not, and it is important to stop treatment when there are signs of acute exacerbation or reaction, otherwise the disease may be aggravated.

Summary.

1. Leprosy is prevalent throughout the Gold Coast and British Togoland.

2. Among the chief difficulties to contend with are :—

(*a*) The apathy of the people in many parts of the country.

(*b*) The slow and non-spectacular results of treatment.

(*c*) The anæsthetic type of leprosy predominates, and may partly account for this apathy.

(*d*) The paucity of Medical Officers and the distances to treatment centres for many of the patients.

3. The average case of leprosy appears to go slowly from the early anæsthetic stage into the late anæsthetic stage. Few show nodular symptoms.

4. Prodromata appear to be often unnoticed before the onset of the initial lesion in the Ho District.

5. The common concomitant infections in the Ho District are given.

6. Out-patient clinics have been found useful, and settlement for cases living at a distance from treatment centres.

7. The results of treatment are given, and important points in treatment.

I have the honour to be,

SIR,

Your obedient Servant,

M. B. DUNCAN DIXEY,

Medical Secretary,
British Empire Leprosy Relief Association.

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LEPROSY SURVEY FIGURES FOR 1930–31.

District.	*Number of cases seen.*	*Number of cases treated.*	*Estimated rate per mile.*
EASTERN PROVINCE.			
Accra	54	42	.5
Akuse	28	28	3.6
Keta	72	1	5.0
Nsawam	22	9	3.28
Koforidua	20	10	—
Kibi	42	20	.93
Mpraeso	131	4	3.14
	369	114	
CENTRAL PROVINCE...			
Winneba	—	—	—
Saltpond	33	0	.46
Elmina and Cape Coast	40	1	—
Oda	7	7	—
	80	8	
WESTERN PROVINCE.			
Sekondi	5	4	.02
Axim	87	87	2.17
Wiawso	2	—	—
Tarkwa	8	6	.13
Dunkwa	2	—	—
	104	97	
ASHANTI.			
Kintampo	200	138	14.28
Sunyani	84	2	. 8
Kumasi	446	378	3. 0
Obuasi	37	36	1. 0
Bekwai	64		4. 0
Kokofu	203		21. 8
Dengiase	15		6.
Manso Nkwanta ...	7		. 5
Bekwai District total ...	289	286	
Total ...	1,056	840	
NORTHERN TERRITORIES.			
Eastern Gonja	—		
Western Gonja	—	—	—
Western Dagomba ...	520	520	8.0
South Mamprussi ...	60	—	2.7
North Mamprussi ...	219	26	1.3
Kusasi	300	—	3.0
Lawra-Tumu	403	1	4.5
Wa	200	—	4.6
	1,702	547	
TOGOLAND.			
Eastern Dagomba ...	40	40	3.13
Kete Krachi	43	—	1. 7
Ho	776	515	
	859	555	
Totals	4,170	2,161	

INVESTIGATION INTO THE LEPROSY INCIDENCE IN THE REGION OF LAKE BOSUMTWI, KUMASI.

SIR,

I have the honour to submit the following report on Leprosy in this district.

A register of all lepers seen was begun in June, 1928 and this register now shows a total of 300 names of those who have been seen and treated. Dr. MacPherson, on whom the brunt of the enquiry appears to have fallen, collected 267 cases.

The chiefs of the four native divisions of the district were circularized in March of this year and again in July with a view to ascertain the numbers of lepers in each division. The Kokofu Division, unfortunately, is the only one in which much assistance was given.

In the Kokofu Division the paramount chief has supplied a list of 228 people alleged to be lepers and in his return he states that 146 of these have received injections presumably for the disease leaving a balance of 82 untreated. Leprosy is so familiar to them that they are rarely mistaken. In the Leprosy Register 203 cases are recorded as coming from the Kokofu Division.

In the Bekwai Division the Leprosy Register shows a total of 57 cases. No assistance was received from the Omanhene who was recently deposed.

The Dengiase Division yielded only 15 lepers and in the more distant Mansu Nkwanta Division only seven lepers are recorded, but here again the Omanhene gave little or no assistance.

The total of 300 cases seen by the Medical Officer of the district has been diagnosed as follows :—

			per cent.
Anæsthetic	...	217	72.33
Nodular type	...	46	15.33
Mixed type	...	34	11.33
Not specified	...	3	1.00

It is unfortunate that the Census figures of the 1921 Census for this district are not reliable. The district was then part of the Obuasi District. Figures for the Kokofu, Dengiase and Mansu Nkwanta Divisions are available but the figures for the Bekwai Division are not set forth in detail but are given in a summarized table which is so ambiguous, and so obviously erroneous, that no reliable conclusions can be drawn from it. Sixteen thousand might be a rough estimate of the population of the Bekwai Division.

The following table shows the population of the four divisions at the last census—the total number of lepers known to exist in each and the rate per thousand of the population.

Division.	Population.	Total No. of Lepers.	Rate per 1,000.
Bekwai	16,000 ?	64	4.0
Kokofu	9,300	203	21.8
Dengiase	2,535	15	6.0
Mansu Nkwanta	14,221	7	.49

Eleven other lepers were seen from places outside the district. If the figures supplied by the Omanhene of Kokofu are correct namely: 228 cases, the rate per thousand for this division would be 24.5.

The following tables show the age and sex incidence of the 300 cases. The age incidence is shown in decades.

Total cases.	*Male.*	*Female.*
300	128	172

AGE INCIDENCE BY DECADES.

1–10 years.	11–20	21–30	31–40	41–50	50–60	60 and over
20	73	84	59	38	9	2

There is also a group of 15 cases in which no age is stated.

The youngest case was a child of four years.

The Kokofu figures are of great interest, as it has long been known that leprosy is prevalent in the neighbourhood of Lake Bosumtwi and throughout the Kokofu Division, although not to the extent disclosed by the above figures. There is, however, indisputable evidence that the whole of the Kokofu Division is heavily infected and particularly so in the vicinity of the lake. The figures for the Mansu Nkwanta Division are so unsatisfactory that no conclusions can be drawn from them.

A leper Clinic has been established at Bekwai Hospital where a temporary waiting room has been erected in the hospital grounds. The attendance at this clinic is very irregular ; apparently the lepers expect the same dramatic improvement to follow injections of Alepol as that following the exhibition of N.A.B. in yaws.

It is my intention to establish a clinic in the Kokofu Division and I will endeavour to visit this twice-weekly.

I have the honour to be,

SIR,

Your obedient Servant,

M. T. CASSIDY,
Medical Officer.

APPENDIX E.

Report on Clinical Tuberculosis as seen at the Gold Coast Hospital, 1930–31.

The number of patients seen with pulmonary disease far out-number the other types—thus, of the total 65 patients, 54 were suffering from a primary lung infection. It will be convenient to consider this group first :

Pulmonary Tuberculosis.—All classes of African are affected but the labouring type emanating from the Northern Territories appears to be particularly vulnerable. These people usually present themselves for treatment when the condition is far advanced and therefore form a big proportion of those who succumb in hospital. The more educated types drawn from Accra and the Colony proper, are more often seen at an earlier stage and their general condition compares very favourably with the class just mentioned.

Since the number of male patients attending hospital is far greater than that of the females, it is not possible to form any accurate estimate of the sex distribution. The following table, however, gives the age and sex distribution of the group under consideration :—

Age (yrs.)	*Male.*	*Female.*
0–9	—	—
10–19	3	2
20–29	25	3
30–39	14	1
40–49	5	
50 and over		

The disease most commonly manifests itself as a fibro-caseous tuberculosis with a preponderance of the caseous process. Other types are occasionally seen—thus two cases commenced as acute pneumonia involving one of the upper lobes, and two cases of fibroid phthisis were also seen. Such varieties as hilum tuberculosis, miliary tuberculosis and pleural effusion are considered later. It is of considerable importance to note that the chronic type of disease, such as fibroid phthisis where there is a preponderance of the healing and fibrous processes is distinctly rare.

A large number of patients are first seen with both lungs extensively involved. It is also evident that many of these have been continuing their occupations apparently unaware of the seriousness of their condition right up to the time of admission. Of the 54 cases (on which the report is based), in 33 or 62 per cent the disease was far advanced when the patients were first examined. Nineteen or 35 per cent were seen in an early or moderately early stage. In the great majority of both early and late cases the underlying pathology is the same, one merely representing an advanced stage of the other.

Symptoms and signs are well marked and do not require detailed consideration. Rapid loss of weight, irregular and continued pyrexia, frequent cough with nummular expectoration usually render clinical examination superfluous in arriving at a correct diagnosis. Signs of unilateral or bilateral consolidation, coupled with bubbling or moist rales and crepitations, and evidence of cavitation are usual. Hæmoptyses are frequent and are often terminal. In this series four patients were admitted because of this condition and it proved rapidly fatal in three. The sputa show an enormous number of tubercle bacilli on microscopic

examination and it is rare for a search to be required to find the organism. Anorexia occurs late but one gains the impression that this symptom is masked by the natural disinclination of the African to refuse food even though gravely ill. Cachexia is prominent when a fatal termination is imminent, and anaemia and oedema of the extremities are frequently conspicuous at this period. Cavities are frequent and usually multiple. They appear at quite an early stage of the disease, but X-ray examination is usually necessary to determine their exact size and distribution.

A few facts only need be mentioned about the less common types of pulmonary tuberculosis. The two cases of fibroid phthisis observed showed the usual characteristics. One of these patients was known to have been ill for a period of at least five years and had received treatment at Keta Hospital. His pulmonary condition had been in a stationary condition for some time and his general condition was good. The second patient had unilateral disease and the shrinkage of the affected lung had caused a secondary scoliosis which caused him to attend hospital. Tuberculous pleurisy is dealt with separately, but one case of pleural efusion complicated by disease of the ipsolateral lung with a positive sputum has been included here. Only one case of spontaneous pneumothorax was seen and the physical signs were well shown. The findings of tubercle bacilli in the sputum cleared up any doubt that might have existed about the cause of the condition.

In a series of patients where the predominating type of disease was a caseating process, this condition might be reasonably expected to occur with greater frequency.

Results.

Total cases of pulmonary tuberculosis			54
Died in hospital	...	...	15—27.7 per cent.
Discharged not improved	...	...	29—54.0 per cent.
Discharged improved	...	...	10—18.5 per cent.

Some comment is necessary on the above results. It is seen that over 80 per cent of cases either die or leave the hospital with no improvement, and only 18 per cent are discharged improved. When it is realized that the improvement obtained in many of the cases is merely temporary, the results are very depressing. Pneumothorax was attempted in 11 cases (20.3 per cent) but was found to be impossible in four. It was also used as a temporary procedure only (to control hæmorrhage) in one case. Collapse was obtained to a moderate or good degree in seven patients only, the immediate results being very good in five and unfavourable in two.

Other Varieties of Medical Tuberculosis.

Glandular Tuberculosis.—This condition is usually dealt with in the surgical wards. Hilum tuberculosis was recognized and treated in one case with good results. Hilum tuberculosis is uncommonly seen here, but it is possibly more frequent in hospitals restricted to the treatment of children.

Bone Tuberculosis.—Caries of the spine is distressingly common. Paraplegia is a frequent complication and is often the cause of the patient seeking medical aid. The results obtained in the treatment of this condition are almost uniformly bad.

Generalized Tuberculosis.—Miliary tuberculosis was seen only in children, and its clinical recognition presented great difficulty. The outstanding symptom in one case was a severe secondary anaemia with general anasarca, and splenomegaly was a prominent sign in a second case. The diagnosis in these cases were confirmed at autopsy.

Abdominal Tuberculosis.

This variety is occasionally met with. The results in the plastic variety are sometimes favourable. With one exception, the serous type proved invariably fatal. One case of tabes mesenterica in a young girl with co-existing adenitis of the neck recovered completely and has been seen after an interval of two years as the healthy mother of a healthy child.

Tuberculosis of the Nervous System.

In contradistinction to pneumococcal meningitis, the tuberculous variety appears to be very rare. The condition has occasionally been suspected but the spinal fluid examination failed to substantiate the clinical diagnosis. Miliary tuberculosis is not included in this section. No instance of tuberculoma have been seen either in the brain or cord.

Genito-Urinary Tuberculosis.

Renal tuberculosis is another variety which has not been observed. It is thought that if any cases occurred they would have been brought to light as cystoscopic examination in vague abdominal cases has become a more or less routine procedure in the hospital. No case of genital tuberculosis has been seen by me.

Tuberculosis of the Skin.

Lupus appears to be a rare condition and no case of this condition has been seen in the hospital. It is suggested that climatic conditions may be a factor in the rarity of this disease.

Tuberculosis of the Serous Cavities.

Pleural effusion is a common complaint and bacteriological and cytological examination of the fluid shows that many cases are tuberculous in origin.

Treatment by gas replacement has given good results in refractory cases. The condition occasionally occurs with a co-existing pulmonary lesion.

Tuberculosis of the pericardium has been seen in previous years and is not a very rare condition in West Africa. The symptoms are predominantly cardiac and many patients have come to autopsy.

Tuberculosis of the Abdominal Viscera.

It is necessary to mention that a few obscure cases of splenomegaly were proved to be tuberculous in origin at autopsy.

Splenomegaly was also the outstanding feature in one patient who died of generalized tuberculosis.

A. J. HAWE,
Medical Officer.

APPENDIX F.

Report of the Maternity Hospital 1930–31.

It is now three years since the opening of the Maternity Hospital. It has become a recognized institution and the people of Accra and neighbourhood come as in-patients and out-patients without hesitation.

Training of Midwives.—Three nurses completed their training and passed the examination for midwives.

One is working as senior nurse at the Maternity Hospital, and two have been posted to work in the town under the Health branch of the Medical Department.

Requests for the services of a Maternity Nurse have come from various outlying towns and villages.

Fees.—From 1st April, all patients have been asked to pay a small fee towards hospital expenses. It is interesting to note that even in these times of trade depression this has not hindered the increase in the attendance of patients.

Out-patients.—A few women have been delivered in their own houses by nurses-in-training from the hospital. The two midwives appointed under the Health branch in the town attend the antenatal clinics and some of the patients who do not wish to go into hospital for confinement.

Attendances at the outpatient clinics have increased by over 3,000.

	1928–29.	1929–30.	1930–31.
Attendances at antenatal and postnatal clinics	3,599	6,224	9,968
In-patient admissions	183	418	678
Deliveries	107	260	452

In-patients.—It was predicted last year that the number of in-patients could not increase owing to lack of accommodation. By making temporary wards of anæsthetic and clinical rooms extra patients have been admitted. It must be realized however that to carry on satisfactorily under such conditions is difficult, and when the suitable isolation of septic cases is in question, it is often anxious work.

Research.

(A). *Syphilis and Yaws.*—In conjunction with the Medical Research Institute investigations were pursued to find out whether infection with syphilis is common in the cases attending the Maternity Hospital and if any light could be thrown on the problem of cross immunity between syphilis and yaws.

Wassermann reaction. Maternal blood was tested in 396 cases with a positive result in 32.5 per cent ; the average rate for the Colony. Infant cord bloods were tested in 413 cases with a positive result in five per cent.

In 371 cases where maternal and cord Wassermanns were tested 119 were positive in the mothers and 20 in the infants.

For further details the report of the Research branch should be consulted.

(B). *Malaria.*—From placental smears from 445 cases the following points are of interest :—

Malaria rate :—

Multiple	16 per cent.
Primiparae	32 per cent.
Deliveries at full-term	19 per cent.
Premature deliveries	42 per cent.

From this it would appear that malaria has a definite causative connection with prematurity.

Analysis of cases admitted :—

In-patient admissions	678
Admitted for antenatal treatment	122
Labour cases	419
Abortions	37
Postnatal complications	66
Infants	14
Other cases	20
Total deliveries	452
Living infants	389

Still births, dead, births and premature still births 63

Presentations in 452 deliveries :—

Vertex unclassified	15
V. LOA	243
V. ROA	156
V. LOP	8
V. ROP	4
POP not classified	2
Breech	6
RSA	2
LSA	8
LMA	1
Brown	1
Transverse	2
R. Dorso ant.	1
Left Dorso ant.	3

Maternal deaths.—There were 13 maternal deaths :—

Puerperal fever	2
Pelvic cellulitis	1
Eclampsia	2
Obstetric shock	1
A.P.H.	1
Ruptured uterus	1
Heart failure following toxic vomiting	1
Pyemia	1
Septic nephritis	1
? Embolism	1
Paratyphosus	1

Infant Deaths.—There were 15 infant deaths as follows :—

Difficult labour with intra-cranial injury ...	4
Prematurity	7
Congenital debility	3
Purpura	1

Still births.—Of the 63 cases of still births definite obstetric cause could be shown in 34.

Morbidity Rate.—There were 92 cases counted as morbid by B.M.A. standards. One-third of these were due to non-obstetric causes :—

Malaria	7	
Breast conditions	5	
Sapremia	14	
Septicæmia	6	
Dysentery	9	
Pneumonia	3	
Pyelitis	4	
Cystitis	1	
Morbid	31	(four due to general condition).
Ruptured uterus	2	
Cæsarian section	2	
Empyema	1	
Abscess thigh	1	
Septic perineum	1	
Rheumatism	2	
Bronchitis	1	
Pelvic cellulitis	1	
Pyæmia	1	

Operations :—

Forceps delivery	36
Craniotomy	4
Repair of cervix	6
Cæsarian section	6
Surgical induction of labour	26
Vaginal hysterotomy	1
Hysterectomy for ruptured uterus ...	1
Abscesses opened	14
Manual removal of retained placenta	2
Incomplete abortion curetted ...	7
Repair of vagina	4
Dilatation and curettage	9
Vertion and extraction	4
Episiotomy	2
Repair of bladder	1
Rubins test	7
Excision fibroma uterus	2
Decapitation	2
Pelvic abscess	1
Perineorrhaphy	1
Insufflation tubes	1
Empyema	2
Excision ganglion	2
Circumcision	48
Total	189

S. RUSSELL,

Medical Officer, Maternity Hospital.

APPENDIX G.

Cerebral Diplegia: A Group of Cases.

This small group consists of three male babies who have been seen in the course of the last six months. The clinical picture in all three cases was alike, and all three cases approximated closely to the classical picture of the condition given by Little in his paper in the *Lancet* of 16th December, 1840. The point of similarity was the sex—all were male. The second feature in which they resembled one another was age of onset—all were about two years old. Third the complaint for which they were brought was in all cases inability to walk properly. This point shows that they were all brought for treatment at about the same age. The mothers, though they did not know the ages of their children, felt that they ought to be walking properly by this time. On examination all these children were found to be rather above the average in bodily development and nutrition. All presented a mask-like expression, and in all mental non-development was obvious. One showed widely opened palpebral apertures and slight head retraction with a mild degree of occiptal flattening. One held its mouth constantly open, slobbered continually and continuously protruded its tongue. The third held its head forward with the chin almost touching the chest; there was a slight but definite degree of pes cavus on both sides. Only one showed lordosis. The spine in both the others was not deformed, as far as could be made out. None of these children had yet learned to talk.

One lalled in an aimless but perfectly characteristic fashion. The gait was tested in all cases. It was possible to get all three of the children to "walk" if someone held a hand on each side. All cases showed the typically spastic, clumsy slow gait of Little's disease. Mild contracture at the knees was present in one case, but the limbs could be passively extended. Rotation inwards of the thighs and knock-knee was common to all, but in no case was the adductor spasm strong enough to produce the classical scissors gait. The arms showed neither rigidity nor weakness. Rigidity rather than weakness was the noticeable feature of the affection of the legs.

The deep reflexes could not be obtained in one case. In the other two the knee and ankle jerks were slightly exaggerated. The planter reflexes were bilaterally extensor in two and flexor in one. There was no sphincter involvement in any of the cases. The pupillary reflexes were normal in all cases, but fundus examination was not possible. There was no strabismus. Involuntary and perverse movements were not noted in any of them. It was thought that there was a tendency to facial over-reaction in the latter. Thus it can be seen how exactly alike the main signs and symptoms, were in all three cases.

The picture was, in brief, that of a child in the second year of life who showed spastic diplegia, a characteristic facies and a marked degree of mental non-development. And this is the picture of one of the grades of cerebral agenesia. Apparently in these cases the neuroblasts of the basal ganglia and cerebellum had completely escaped. No family history could be obtained from the parents in any case, nor was it possible to get a history of difficult or prolonged labour from any of the mothers. In fact all the three children had healthy brothers and sisters. A moderately good but guarded prognosis was given in all cases, and treatment with thyroid was begun.

P. B. WILKINSON.

ACUTE RHEUMATISM.

G. A. NYANKA—AGE 12—SCHOOL BOY, TAMALE.

Admitted to hospital on 10th September, 1930.

For a day or two prior to 9th September, 1930 he did not feel well but was able to attend his classes. On 9th September, 1930, about 4 o'clock in the afternoon he felt feverish and headache and sore throat About 6 o'clock he was suddenly seized with pain in the right shoulder This was so severe that it kept him awake most of the night.

He was seen by Dr. MacPherson, who was then in charge of the schools, on 10th September, 1930, and was admitted to hospital.

On admission the temperature was 100.4 respiration 24 and pulse rate 92, regular, full and soft. The eyes were slightly injected, the tongue flabby with a greyish fur. The skin was hot and dry. The pharynx was congested and the tonsils slightly enlarged and somewhat inflamed. There was frontal headache. Bowels were open. There was pain and tenderness in the right shoulder and the left knee which was slightly swollen and extremely painful on movement.

The heart was slightly enlarged downwards and outwards the apex beat being in the 6th costal interspace ½ inch lateral to the mid clavicular line. There was pulsation over the precordial area and pulsation in the supra sternal notch and under the xyphoid process ; no thrill could be felt on palpation over the precordial area. On auscultation there was a soft musical systolic murmur in the mitral area which was propagated into the axilla and was heard faintly under the angle of the scapula. There was a faint systolic murmur in the pulmonary area.

The lung.—Nothing abnormal was noted.

Blood.—No parasites were seen on examination. The Hb. was 70 per cent.

Spleen was enlarged 1 inch below the costal margin but was not tender.

Liver was not enlarged or tender.

Urine.—Scanty, specific gravity 1022, acid, deep amber colour, no albumen or sugar, abundant urates.

Nervous system.—There was nothing abnormal to note.

Treatment :—

Mist Alba 1½ ozs. was given.
Sod. Biscarb. grs. xx.
Sod. Salicyl. grs. xv.
Syr. Aurantii. M. xv.
Aqua ad ½ oz. in water every four hours.
R. Tr. Digitalis m.v.
Tr. Nuc vomic m.v.

Aqua chloroform ad ½ oz. thrice daily in water.

Mist. Quinine ½ oz. (grs. v) was given at night.

Lin. Meth. Salicyl was applied to the affected joints and they were wrapped in cotton wool.

During the day there was profuse sweating, the perspiration having a sour odour and in the evening he complained of pain in the right elbow and wrist.

On 11th September, 1930 the pain in the right shoulder was much improved and the temperature 99.2, respiration 24, pulse rate 90. During the course of the day the left wrist was involved.

On 12th September, 1930 the temperature was 98, respiration 24 and pulse 80. There was no change in the condition of the heart. The joint pains were markedly improved and he was much more comfortable. Profuse perspiration continued to be a marked feature and whenever the patient fell asleep he perspired very freely and would wake up with his garments quite wet.

On 14th September, 1930, there was a recurrence of pain and tenderness in the left knee and the temperature was 99.6. This joint continued painful until 17th September, 1930 when it subsided.

By the 22nd September, 1930 the joint had entirely subsided and there was free movement and no tenderness. The cardiac condition had also improved and the mitral systolic murmur was fainter and not heard so well in the axilla. On this date two subcutaneous nodules were noticed over the terminal inter-phalangeal joints of the left ring and middle finger and two days later three similar nodules were noted on the right forefinger and one on the right fifth finger.

The digitalis mixture was stopped on 22nd September, 1930, and the Sod. Salicyl continued in reduces doses, grs. 5 three daily for seven days. The salicylate was well borne.

On 4th October, 1930 the patient was much improved and was allowed up.

There was no pain in the joints and the cardiac condition had subsided. No murmur audible and there was no appreciable enlargement of the heart. A mixture containing iron and arsenic was prescribed.

On 11th October, 1930 the patient was quite well and was discharged.

On 24th October, 1930 patient was readmitted to the hospital suffering from severe pain in the right knee and ankle. The joints were swollen, very painful and tender to touch. The temperature was 100°, respiration 22, pulse 80.

There was slight enlargement of the heart outwards, the apex beat being situated in the sixth costal interspace quarter inch lateral to the mid-clavicular line. The first mitral sound was replaced by a soft systolic murmur that was propagated into the axilla.

No parasites were found in the blood there was no albumen in the urine. Hæmoglobin 75 per cent, and the spleen was enlarged and firm and extended ½ inch below the costal margin. The patient perspired freely.

Treatment was similar to that given on the first occasion and by 27th October, 1930, the temperature was 98.8 pulse 82 and the pains greatly improved. He continued to improve until 15th November, 1930 when he had a recurrence of pain in both knee joints with a temperature of 99.8. This attack lasted for three days and then subsided.

The condition of the heart steadily improved and the murmur described had disappeared by 25th November, 1930.

On 2nd December, 1930 had another attack of acute pain in the knee and elbows and did not sleep much during the night while on 3rd December, 1930 his right wrist and left ankle were involved. The heart was not affected on this occasion. By 8th December, 1930 the symptoms had entirely subsided and the patient was much improved in his general condition.

A. M. GILLESPIE,
Medical Officer.

ACUTE RHEUMATISM.

DAWUNI DAGOMBA—AGE 11, SCHOOL BOY,

PRIMARY SCHOOL, TAMALE.

The patient was in hospital from 15/9/30 to 5/10/30 under observation as he was suspected of Acute Rheumatism.

On this occasion the heart was quite healthy.

On the evening of 15/10/30 he became ill suddenly with pain in the left knee and fever. He was a little better on 16/10/30 and attended school but on the same evening his condition became worse and the right knee was affected. He was admitted to hospital on 17/10/30. His temperature was 103 respiration 24 and pulse 100 regular full and soft. He complained of severe pain in both knees and in the left elbow. The pain was increased on movement. The joints were slightly swollen and very tender to touch. There was frontal headache, the tongue was flabby with marks of the teeth on its edges and thickly coated with a greyish fur. The bowels were constipated. He perspired freely.

Heart.—There was marked pulsation in the precordial area, no thrill could be felt and the left border of the heart was displaced outwards, the apex beat being situated in the fifth costal interspace quarter inch lateral to the mid-clavicular line. on auscultation a soft blowing systolic murmur was heard in the mitral area and was well propagated in to the axilla. There was a faint aortic murmur and a soft murmur in the pulmonary area.

Respiratory System.—Nothing abnormal was noted.

Spleen.—The lower border was ¼ inch below costal margin, firm and not tender.

Liver.—Was not enlarged or tender.

Urine.—Scanty, deep amber coloured. Specific gravity 1020, Acid no albumen or sugar, urates increased.

Nervous System.—There was nothing abnormal to note.

Treatment.—1. A saline purge was given

2. R. Sod. Bicarb. grs. xx.
   Sod. Salicyl. grs. xv.
   Syr. Aurantii. m. xv.
   Aqua ad ½ oz. four-hourly in water.

3 R. Tr. Digitalis m.v.
   Tr. Nuc. Vomic. m.v.
   Aqua Chloroform ad ½ oz. thrice daily in water.

4. Ung. Meth. Salicyl was applied to painful joints which were wrapped in cotton wool.

5. Mist. Quin. (grs. v) was given nightly.

The temperature was 99° F. in morning and in evening 100° F.

On the 18/10/30 the joint pains were less severe, he perspired very profusely and the condition of the heart was much the same.

Temperature 98.8° F. in morning and 99° in evening.

On 19/10/30 the pain in the left knee had completely subsided while the right knee and left elbow were somewhat improved.

The cardiac condition was unchanged.

On 20/10/30 temperature was 98° F. The improvement was maintained and the cardiac murmurs were not quite so pronounced.

On 22/10/30 the pains in the joints had cleared up and there was a considerable improvement in the cardiac condition, the pulse rate was 72, regular and of good quality. The improvement continued steadily from day to day.

By 1/11/30 the heart murmurs had cleared up and no enlargement was to be made out.

On 9/11/30 the patient was allowed up and a week later was discharged cured.

Diagnosis.—These two cases are interesting in view of the fact that Acute Rheumatism is, so far as is known at present, not common in the Gold Coast.

The salient features of the cases recorded are the occurrence of an acute multiple arthritis in young subjects who are definitely known to have been previously in good health (all the school children are thoroughly examined every three months and a record of this is kept), fever accompanied by profuse sweating, in one case the appearance of subcutaneous nodules and in both a definite endocarditis which gradually cleared up under treatment.

Differential Diagnosis.—Several diseases have to be considered and these will be taken in rotation.

1. Acute Polyarthritis: There was no evidence of primary septic focus, no tendency to pus formation in the joints and the temperature and course were not typical of this condition.

2. Pyæmia: The joint affections in this condition usually recover slowly. In the cases under review the arthritis cleared up rapidly under treatment with Salicylates.

3. Gonococcal Synovitis can be definitely ruled out.

4. Acute Osteomyelitis: Here the pain is in the bones not in the joints and the subsequent course is against this.

5. Malaria: No parasites were found in the blood and there was a polymorph leucocytosis while the occurrence of Endocarditis is strongly in favour of rheumatic fever.

6. Dengue: Against this there is the absence of the typical " saddle back " type of temperature chart, the polymorph leucocytosis, the profuse perspiration and the endocarditis.

7. Enteric Fever: The symptoms and signs together with the subsequent course would seem to rule this out.

Taking all the features into consideration a diagnosis of Acute Rheumatism or Rheumatic Fever seems justifiable.

A. M. GILLESPIE,
Medical Officer.

ANEURISM OF THE TRANSVERSE ARCH OF THE AORTA.

An interesting case was seen at the dispensary a short time ago—A Gonja woman aged about 48 suffering from an aneurism of the thoracic aorta in an advanced stage.

She complained of swelling in front of the neck of ten years duration : the swelling commenced at the episternal notch a little to the left side and gradually increased in size. She also complained of persistent cough : pain in both shoulder joints shooting down both arms : insomnia and slight dyspnoea.

On examination the swelling proved to be firm and pulsating and lying between the clavicular heads of the sternomastoid. Although firm, the finger could be pressed into the tumour but was readily felt to be pushed out again by the strong pulsation. Needless to say this procedure was not repeated. The mass was immovable and also was not affected by deglutition : tracheal tugging was present. Hoarseness was pronounced as also was a persistent brassy cough. There was a loud bruit easily heard all over the mass, and a well marked aortic systolic murmur, which was also heard over the upper dorsal region of the spinal column. The pupil on the left side was smaller than that on the right, probably due to paralysis of the cervical sympathetic.

The pulse rate was different on each side at the wrist, viz.: Left, 108, Right, 134. In addition to this the blood-pressure on the left side was diminished by 30 mms. Hg.

A. WALKER,
Medical Officer.

A case of Nephritis in a boy approximately aged five years.

At Bisa this boy was brought to the dispensary for the usual injection.

He had general oedema which was very marked in the face.

His spleen was enlarged below the costal margin.

His parents stated the condition had been in existence for nearly two years.

Heart and lungs nothing to note.

Injections refused. I put him on quinine grs. t.i.d.

On my next visit a fortnight later I saw the patient and he really was much improved.

I persuaded the parents to bring him to Akuse Hospital and in the meantime to continue the quinine.

The patient was brought to the hospital a week later on the 28th February, 1931. There was not much further improvement.

His urine was heavily laden with albumen. On boiling about two inches of urine in a hot tube and adding acetic acid and allowing to cool, it was approximately two-thirds albumen.

Blood negative for malarial parasites.

He was kept on quinine and the amount gradually increased to grs. xv daily.

The spleen reduced below costal margin. Albumen persisted. He developed a few moist sounds at the base of the lungs and ran a temperature (maximum 100) which came to normal in a few days.

On examining the retina, direct method (dry battery ophthalmoscope), to my surprise I observed "cotton wool" patches. I immediately thought of albuminuric retinitis (Taylor 14 Ed. p. 603).

I have never before seen a similar case in the tropics. I meant to have further and extensive examinations, but the boy was removed because I would not inject him.

Would this be a case of parenchymatous nephritis or nephritis of childhood (Taylor 14 Ed. p. 601 and 370). The fact that more details are lacking is regretted. I am reporting the case as it is the first I have met out here and it may be of interest to some brother officer.

J. BYRNE,
Medical Officer, Akuse.

APPENDIX A (HEALTH BRANCH).

No. 90/3/1930.

To

THE DEPUTY DIRECTOR OF HEALTH SERVICE,
ACCRA.

SIR,

I have the honour to submit a report on the problem of tuberculosis in the Tarkwa District.

2. I propose to deal with the Births and Deaths registration areas of Tarkwa, Aboso and Prestea for which certain figures are available and in all of which tuberculosis is common. I can give no reliable information about other places in the Tarkwa District.

3. Although records cannot at present be as accurate as are similar records in Great Britain, the following table gives some indication as to the prevalence of tuberculosis in the district. The figures refer to the 18 months, January, 1929 to June, 1930.

	Total Deaths.	*Tuberculosis Deaths.*	*Per cent.*
Tarkwa	200	52	26.0
Aboso	236	88	37.3
Prestea	129	32	24.8
Total	565	172	30.4

With the exception of one psoas abscess amongst the Aboso cases all these 172 deaths were from pulmonary tuberculosis. The number includes only ten females. There were two children under 15 (a boy of 11 and a girl of 12) and 24 deaths over 45.

4. Thirty decimal four per cent or 304 per 1,000 deaths is a very high rate, more than three times that for the Colony as a whole. In 1929, deaths from tuberculosis in all its forms numbered 497 (in all the registration areas) or 91 per 1,000 deaths. I suggest that reasons for this prevalence are :—

(*a*) Mine labour.

(*b*) Housing conditions.

(*c*) Lack of racial resistance.

5. I put occupation first because the other two factors are present in most native villages, and also, so few women and children appear to die from the disease. Here we have a community amongst which are many individuals whose resistance is lowered below the already low level of the race by virtue of their work in a mine. Infection once introduced, its spread is facilitated primarily amongst underground workers, and secondarily amongst ordinary contacts.

6. There would seem to be little prospect of changing the conditions of mine labour underground. Men who perform manual work in a hot moisture-laden atmosphere and then come up into comparatively cool fresh air, must be liable to chest troubles as well as other and various kinds of chills, while the inhalation of dust containing siliceous matter is recognized as among the predisposing causes of pulmonary tuberculosis. This last point is not one that I wish to emphasize. I have discussed it with the Secretary for Mines and have come to the conclusion that the regulations as to the use of water in drilling are effective—that is to say, that the quantity of dust in the air is very little, although it may not be possible to say that none is present. It is also worth noting that a man does not contract to work for any definite time. If he dislikes the work or begins to feel unfit he can take his discharge and ask to be paid up.

7. Housing conditions can be and are being improved though gradually, and in well-supervised mine villages there should in time be little difficulty in reducing overcrowding, in spite of the African's fondness for getting as many people as possible into a house and shutting all doors and windows at night.

8. The lack of resistance is a racial handicap which, it may be hoped, time will remove. Naturally it must be very many years before a useful degree of immunity is developed, but progress in this direction will be assisted by improvements in sanitary conditions generally, including housing.

9. The individual case also requires consideration, and although the great majority of patients seem destined to die whether admitted to hospital or not they should be segregated.

10. During the 18 months, January, 1929 to June, 1930, 16 patients with pulmonary tuberculosis were admitted to Tarkwa hospital. Of these 11 died, all within three months of admission, three were discharged " not improved " and two discharged " improved." It is not improbable that of the five patients discharged some have died.

11. Of the many who attend for treatment as out-patients the majority refuse admission when it is offered, and in view of the shortage of accommodation they are seldom pressed to accept. This state of affairs is wrong. The district requires a tuberculosis hospital with at least 12 beds and a staff adequate not only for day and night nursing but for cooking. At present more is done by the mine hospitals at Aboso and Prestea than can be done in Tarkwa.

12. It might be a good thing to establish a larger hospital in Tarkwa, and there to collect patients from all the mining districts—such hospital to be under the control of the Medical Officer of Health.

13. Under present conditions large numbers of highly susceptible individuals are subjected to massive infection. Segregation of as many as possible of the cases—all highly infective—would mean that the healthy individuals would receive smaller average doses. Many no doubt would still receive an almost lethal dose, but others—more than at present—would receive the many small doses necessary for the production of an at least relative immunity.

I have, etc.,

S. P. WILSON,
Medical Officer of Health.

8th September, 1930.

APPENDIX C (HEALTH BRANCH).

Princess Marie Louise Hospital and Clinic.

Report, April, 1930—March, 1931.

I.—OUT-PATIENTS.

The work of the Out-patients Department was continued, and included daily clinics for children (morning and afternoon), with bi-weekly Antenatal Clinics ; Yaws injections were given bi-weekly, and vaccinations performed weekly, a Public Vaccinator being in attendance.

There was an increase in number over the previous year both of new cases and of total cases attending for treatment.

The opening of the new Clinic at Koforidua drew away all the Bush people from that area, but patients attended the Accra clinic from the nearer outlying stations such as Nsawam and Aburi.

A study of the analysis of some 12,000 cases will show that Malaria was the disease most prevalent amongst the children, and that the number of cases of Yaws was decreased very considerably.

Malaria.—An analysis of the reports of 1,275 blood films sent for examination to the Medical Research Institute showed that 60 per cent of those children whese blood was taken were infected with Subtertian malaria and three per cent with Quartan ; 1.3 per cent were reported to have crescents—the remaining 35 per cent showed no parasites. In many of these cases no clinical evidence of Malaria was present at the time of examination.

Yaws.—There was a considerable decrease in the number of Yaws cases ; in no case did the affected child come from Accra without having been in Bush at some date prior to the first symptoms of Yaws. Sobita injections were continued as in former years.

Diarrhœa and enteritis.—These accounted for much serious illness and general debility especially in children under two years.

Bronchial catarrh.—This term was applied to those cases which gave a history of and had cough without any physical signs in the lungs; and such cases were very numerous.

Other chest conditions were rarer : *Asthma* was due frequently to Helminthic infection.

Diseases of the skin and ulcers.—These were very common, especially forms of impetigo, weeping eczema and tinea of the scalp. *Ulcers* were due usually to Yaws or Trauma.

Diseases of the mouth, gums, etc.—Children between the ages of two and six years suffered frequently from bad gingivitis and stomatitis; nine cases of true Cancrum oris, some following measles, were seen.

Infectious diseases.—Pertussis was the most common, but was of a mild type: *Measles* were almost as prevalent: more so in the months of December-March. Two cases of Diphtheria were seen and each proved to be due to the K.L. Bacillus.

Diseases of the ear.—Otorrhoea was seen frequently, but no definite cause could be found for its occurrence in most cases.

Diseases of the eye.—Conjunctivitis was very common; many cases of Ophthalmia usually gonorrhoeal were met with.

Helminthic diseases.—Those due to Ascaris were the most frequent and accounted, together with malaria, for much of the debility and anaemia in children from 1½ years upwards.

The payment of a small fee by all patients was started at the beginning of January, 1931, with a resultant decrease in the number of attendances, noticeably amongst the school children. This result was not altogether undesirable, as in many cases these children attended the clinic for the most trivial or no complaint, tending thus to a waste of time both of their school hours and of that of the medical officer in charge.

A Health Visitor (Cadbury) was appointed in May, 1930. The medical officer paid weekly visits with her whenever possible.

II.—ANTENATAL CLINIC.

The Antenatal Clinic was attended fairly satisfactorily; there was an increase in numbers both in new cases and in the total number of attendances; many of the new cases were brought by Registered Native Midwives, who reported their deliveries in due course.

Wassermann tests were performed only on primiparae, on cases giving a history of Yaws, and of miscarriages or still births.

The Government Midwife (part-time) attended the bi-weekly clinics. The number of deliveries by her was disappointingly small; many cases were visited by her antenatally who failed to send for her in time for delivery.

All patients were requested to report delivery to the medical officer and those who did so were visited either by the Medical Officer or the Health Visitor.

III.

All the pathological and serological work has been done at the Medical Research Institute, and much interest has been added to the work in both Out-patient and In-patient Departments by the reports sent from the Director and his staff.

IV.—IN-PATIENTS.

The number of cases admitted for In-patient treatment showed an increase of 148 over that of the previous year, the total deaths of total cases being 45.

Malaria.—The largest number of patients admitted suffered from *Malaria* in varying degrees of severity ; one death occurred from malarial meningitis and one from malarial convulsions.

Ulcers.—Generally due to Yaws or Trauma; healed satisfactorily under in-patient treatment ; these cases were in hospital as a rule for long periods.

Lung conditions.—Accounted for 55 cases, 24 of which were due to Broncho-pneumonia with seven deaths—a very high percentage ; Lobar Pneumonia responded to treatment more readily.

Diarrhoea and enteritis.—Were very fatal in children under 2 years ; of 20 such cases eight died, whereas no death occurred in eight cases over 2 years. On examination of the stools two or three cases classified under this heading were proved to be infected by organisms of the Salmonella group which are still being investigated.

Helminthic infections.—Included Ascaris (13 cases) ; Dracunculus (two cases) Schistosomiasis (three cases) ; treatment of the last by Emetine was slow but fairly satisfactory. Five cases of outstanding interest which occurred during the year were :—

1. *Intussusception* in a female child of 1 year ; found post-mortem to be due to the presence of innumerable " Ascaris " in the intestinal tract (over 30 were counted).
2. *Two cases of Paratyphoid C.* in children aet 6/12 and 1 year ; with great toxaemia, chest symptoms, pyrexia and considerable anaemia ; both were fatal, one dying a few hours after admission.
3. *Two cases of Trypanosomiasis* in infants aet six weeks and two weeks, neither of which was congenital and both of which recovered by treatment with injections of " Bayer " in very minute quantity. (.075—.1 gm.).

Post-mortems were obtained on six cases and performed by one of the staff of the Medical Research Institute.

During the year an arrangement was made with the Dental Surgeon at the Gold Coast Hospital to admit children requiring general anaesthesia to the P.M.L. Hospital during the week-end ; they were sent to Gold Coast Hospital for operation and returned to P.M.L. Hospital for recovery.

This arrangement appeared to be satisfactory.

I. M. MALCOLM AITKEN,

Woman Medical Officer.

13*th April*, 1931.

ANNUAL REPORT OF THE PRINCESS MARIE LOUISE HOSPITAL AND CLINIC FOR THE YEAR 1930–31.

General Report.

A.—Out-patients.

Month.	New cases.		Old cases.		Total attendances.	
	1929–30	1930–31.	1929–30.	1930–31.	1929–30.	1930–31.
April	727	693	506	636	1,963	2,478
May	759	694	628	665	2,130	2,453
June	754	611	646	675	2,098	2,248
July	905	800	806	838	2,518	2,799
August	844	819	579	736	2,408	2,552
September	655	824	655	765	2,398	2,918
October	648	788	584	807	3,308	2,807
November	627	816	609	900	2,568	2,981
December	703	635	629	782	2,173	2,422
January	659	672	664	700	2,402	2,353
February	579	597	623	662	2,227	2,147
March	671	704	641	687	2,714	2,479
Total	8,531	8,653	7,570	8,853	28,907	30,637

B.—School Children.

	1929–30.	1930–31.	1929–30.	1930–31.	1929–30.	1930–31.
April	47	64	11	48	134	300
May	63	58	35	46	215	300
June	44	65	44	35	163	306
July	70	57	41	51	211	262
August	43	80	29	42	168	320
September	34	98	11	52	94	360
October	58	93	29	46	294	337
November	54	75	9	55	193	321
December	39	30	14	31	128	154
January	60	22	18	34	178	135
February	71	34	30	32	225	159
March	109	52	52	34	358	218
Total	692	728	323	506	2,361	3,172*

* Included in total of Table A.

C.—Ante and Neo Natal.

Month.	New cases.		Old cases.		Total attendances.	
	1929–30.	1930–31.	1929–30.	1930–31.	1929–30.	1930–31.
April	53	46	51	61	157	163
May	45	51	45	56	152	179
June	43	44	39	64	123	157
July	46	80	38	60	128	203
August	35	41	37	71	106	167
September	43	55	33	61	115	168
October	54	51	32	71	157	206
November	25	74	42	68	110	198
December	31	52	27	61	94	160
January	66	45	30	59	160	166
February	40	57	49	69	148	181
March	63	62	43	68	150	181
Total	544	658	466	769	1,600	2,129

D.—In-patients.

Month.	1929-30.	1930-31.
April	29	37
May	18	42
June	32	34
July	34	47
August	36	50
September	34	39
October	34	42
November	31	55
December	24	39
January	29	47
February	32	39
March	35	45
Total	368	516

Antenatal Cases, etc.

Number of cases examined, i.e. *new cases* only 658.

Primiparæ	120	Referred to Maternity Hospital	27
Not pregnant	64	Referred to Gold Coast Hospital	9
Deliveries reported (all cases) ...	148	Transferred to other stations	6
Still births (including history of)	30		
History of miscarriage	131		
Miscarriages	13	Wassermann tests ...	353
Interval hæmorrhage	1	Wassermann tests + ...	130
History of yaws	160		
Yaws treated before	42	Dressings, etc., issued to private midwives ...	7
Yaws treated before W + ...	45		
Albuminuria	7		
Jaundice	1		
Nausea, vomiting, giddiness ...	27	Deliveries by Government Midwife	27
Meibomian cyst	1		
Corneal ulcers	4		
Conjunctivitis	6		
Mastitis	9	Deliveries by Woman Medical Officer	1
Elephantiasis breast	2		
Pyorrhœa	12		
Stomatitis	4		
Glossitis	25		
Constipation	89		
Skin Lesions	17		
Cardiac Lesions	46		
Pulmonary lesions	26		
Hæmorrhoids	2		
Varicose veins	2		
Diarrhœa and enteritis ...	4		
Tonsilitis	1		
History of malaria	69		
Malaria	4		
Anæmia	4		
Anæmia of pregnancy	1		
Twin delivery	4		
Breech presentation	7		

1. *Government Midwife.*—(Nurse Eyo).

Deliveries 27.

Visits paid including puerperal periods, antenatal and neo-natal 573.

Attends clinics (antenatal) twice weekly.

2. *Cadbury Health Visitor.*—(Mrs. Macaulay).

Appointed in May, 1930 and transferred to Sekondi for three weeks.

Total visits paid 1,574.

3. Total visits paid by Woman Medical Officer 473.

4. Vaccinations performed 890.

5. *Blood Films examined at Medical Research Institute.*—(Out-patient department. Children only.)

Total number examined June—March, 1,275.

Total number S.T. rngs 775 or 60 per cent.

Total number crescents 17 or 1.3 per cent.

Total number quartan 40 or 3.1 per cent.

Total number no parasites seen 443 or 34.8 per cent.

I. M. MALCOLM AITKEN,
Woman Medical Officer.

13*th April*, 1931.

KUMASI WELFARE CENTRE.

Annual Report, 1930–31.

The comparative statistics relating to the Welfare Centre for the year under review are as follows :—

	Children's Clinic.	*Antenatal Clinic.*	*In-Patients.*
1927–28 (9 months) ...	15,846	328	—
1928–29	24,019	1,787	(1 month) 27
1929–30	28,186	6,152	476
1930–31	30,897	12,070	566

Children's Clinic.			
New cases	10,488		
Old cases	1,728	Total attendances	30,897
Total cases ...	12,216		

The popularity of the Kumasi Clinic has continued, as is evident by the record of attendances. During the latter part of 1930 the numbers were too large for one Medical Officer to deal with efficiently ; the charge of a small medicine fee during the last three months has reduced the attendances to more reasonable numbers. An overcrowded clinic means that the Medical Officer cannot give the necessary individual attention to each case, thus diminishing the value of the welfare work. As the Clinic becomes better known to the Ashantis the difficulty of confining the activities of the Centre to welfare work becomes greater. Nearly every child is suffering from some definite disease. Out of 10,488 new cases seen, 9 per cent only were brought for inspection and advice.

2. *Yaws* is the outstanding disease, being 37 per cent of new cases. Whilst the secondary skin lesions clear up rapidly with Sobita, the bone lesions common amongst older children are often resistant to the drug. The system of treatment with Sobita is still unsatisfactory because the patients fail to attend for a complete course. When the secondary lesions clear after two or three injections, the parent considers the child cured ;

such cases often return within six months, either with tertiary lesions or a re-infection with secondary lesions. A composite dose of six or eight grains of Sobita for children up to 4 years appears necessary to effect a cure.

N.A.B. is occasionally given to cases with extensive ulcers or periostitis, but the cost of the drug prevents its more extensive use. The general condition of the bush children suffering from yaws is poor; malaria, anaemia and malnutrition are frequently concurrent diseases.

3. *Malaria.*—Parasites can be found in the blood of most bush children between the ages of 3 months and 5 years; of the cases diagnosed, 24 per cent were those suffering from malaria only. Anaemia is a marked feature of malaria in infancy, the haemoglobin ranging between 30 and 65 per cent. (Talquist.)

4. *Bronchitic affections.*—Many infants suffer from mild bronchitic trouble and the combination of this complaint with an enlarged spleen and some degree of anaemia suggests that it may be secondary to a malaria infection, possibly a reflex irritation from an enlarged spleen.

5. *Nutritional disorders.*—The habit of continuing breast feeding into the third or fourth year is definitely injurious to the child's general nutrition. At every opportunity the child goes to his mother's breast and only takes odd scraps of ordinary native food. There is evidence also that the ordinary diet of the bush child, after weaning, is deficient in fat and protein. Helminthic infections are another cause of under-development. A marked contrast exists between the bush child and the town child as seen at the Welfare Centre. Possibly the ailing town-bred child comes more quickly under the care of the Welfare Centre, but better housing conditions, a good water supply and better food are all contributory factors. In Ashanti, few women attempt artificially to feed their infants, and "comforters" are seldom seen. The women are as a rule good nursing mothers, digestive troubles in infants being generally due to overfeeding.

6. *School children.*—New cases 676. Total attendances 2,864. Attacks of malaria and yaws ulcers are the usual complaints. The health of the school children is on the whole good. Although quinine is no longer supplied to the schools, the number of children attending for malaria has not increased.

7. *Antenatal clinic.*—New cases 3,847. Primiparae 908. Total attendances 12,070. At times it has been difficult to cope with the number of women attending this clinic, but the charge of a small medicine fee has reduced the numbers. The clinic is of value in diagnosing conditions which may be of danger to the mother and infant—Every woman has her urine tested at each visit; three abdominal examinations are made during her pregnancy and a vaginal examination in primiparæ or if there is any reason to suspect trouble.

Pelvic measurements found in English textbooks cannot be taken as a standard for Ashanti women whose pelves are somewhat smaller, the infants' cranial measurements being relatively decreased. The ordinary complaints of pregnancy are not frequent, constipation being the most common. Vomiting and dyspepsia occasionally occur, but most women appear to suffer no discomfort during the first few months. Haemorrhoids and varicose veins are excessively rare. Few malpresentations are found. Most of the women attend the clinic because it is customary to take medicine during pregnancy and many have lost infants during the first few months of life or have had difficult confinements. The general condition of the Ashanti woman of child-bearing age is not good; she usually suffers from tertiary yaws and is undernourished.

Although she usually has two years at least between each confinement, the strain of prolonged breast feeding and hard manual work is considerable.

The clinic is of value in relieving the complaints of pregnancy, and in encouraging the women to bring their infants to the Welfare Centre in the first few weeks of life. The difficulty of dealing with abnormal cases without maternity beds makes much of the work unsatisfactory. Cases of obstructed labour are sent to the Colonial Hospital where the Medical Officer often has a hopeless task to perform. A general hospital is not the place where difficult cases can be sent to await delivery. It is only natural that women coming to the clinic for advice should expect to be looked after at the critical time.

The need for maternity beds at this large centre remains urgent. Until the Government can afford to provide some sort of hospital accommodation, the antenatal and maternity work of this clinic cannot be developed on more satisfactory lines.

In October, 1930 a letter pointing out the necessity for maternity beds was submitted to the Honourable, The Director of Medical and Sanitary Services, who replied that the petition would receive attention immediately funds permitted.

8. *In-patients.*—Admissions 566. Deaths 44. Two bright airy wards containing 10 beds each are a great asset. At first the bush people were naturally timid, but now the wards are always full and there is usually an overflow of infants into basket cots. Cases of malnutrition improve rapidly on special foods, the difficulty being to keep them in long enough as the parents want to go home at the first sign of improvement.

Cases of severe anaemia due to prolonged malarial infection have been successfully treated with fresh liver juice. Older children suffering from extensive yaws ulceration improve rapidly as in-patients. A few antenatal cases are admitted. The women come with their children, and this adds considerably to the difficulties of the nursing staff, but is of some value in teaching the mothers. During the last eight months maternity cases have not been admitted to the wards. The Clinic was not designed, equipped or staffed as a maternity hospital and maternity cases are referred to the Colonial Hospital. The beds at this Clinic are required for the children for whose benefit the centre was originally intended.

9. *District visiting.*—The Cadbury Health Visitor has been working in the town under the Medical Officer. It is difficult to train this visitor locally, and it would be more satisfactory if she could have a short course of instruction at the Maternity Hospital in Accra where other visitors and midwives are trained.

It is a physical impossibility for the Medical Officer to supervise her work in the district; she has however to attend the Infant Clinics at certain hours, and any lectures given to nurses.

The midwife has attended an increasing number of confinements and has visited in her spare time.

Health visiting is an important branch of the work, and can only be done properly by Africans with a certain amount of knowledge and education. Attempts have been made to organize voluntary health visiting but have not proved successful due to lack of continuity both in the work of the African and European visitors. A few European ladies have kindly given valuable help in weighing infants at the centre.

10. *Staff.*—The clinic suffered a great loss in the tragic death of Dr. Cargill in June, 1930. She was well known to the townspeople and had the task of organizing the work at the new centre.

For a few months there were two Medical Officers, but not for a long enough period to reorganize the work accordingly. It is evident that with the large attendances at the clinic it is not possible for one Medical Officer to give very much time to organizing voluntary work in the town, or to getting into contact with the mothers in their own homes.

The work of the Nursing Sister has been invaluable both in training the nursing staff and in her care of the sick children admitted to the wards.

During the year five Nurses-in-training came, and four were discharged.

The clerical work connected with the centre has been facilitated by the appointment of a fully trained clerk.

11. The building and equipment are excellent for the purpose for which the clinic was designed, the only luxury being tiled floors in the wards and consulting rooms. A few minor improvements have been made during the year.

M. C. CHAPPEL,
Lady Medical Officer.

ANNUAL REPORT OF INFANT WELFARE CLINICS, SEKONDI AND SHAMA, 1930–31.

I have the honour to forward herewith the Annual Report for Sekondi and Shama Clinics for the year, 1930–31.

2. The numbers, until just recently, when there has been a small decrease due chiefly to the new charges, partly to other disturbances, have been increasing. More space is badly needed ; the lack of adequate waiting-room and dressing-room accommodation makes careful and accurate work extremely difficult. It is impossible to segregate infectious, septic and clean cases, and the noise created by patients outside the consulting room is distressing.

3. With reference to the proposed new building, it is doubtful whether the proposed beds will be of great value unless a fully trained staff under the supervision of an European Sister can be provided for them. On the other hand there are a number of cases, not necessarily requiring skilled treatment, which could be admitted under observation for short periods, a procedure which is not possible at present owing to the number of serious cases requiring admission to the Colonial Hospital.

4. The Antenatal work shows a most gratifying increase, and it is, I think, worthy of note that fifty-three women who received treatment in a previous pregnancy were again patients during the year. The Government Midwife has done excellent work.

5. The *preventive* aims of the Clinic seem to be but imperfectly understood both by patients and by the voluntary Health Visitors belonging to the Gold Coast League for Maternity and Child Welfare. The number of children brought up for inspection, weighing, etc., (for which no charge is made), is extremely small compared to what it might be. When the new system of charging fees becomes more widely known and appreciated this problem may be partially solved.

6. The school routine work is well in hand, all children at the schools have been examined during the past four years, so that at present there are only new entrants and a small number of re-examinations to be accounted for. The numbers of new entrants are not large this year, owing to the closing of the Zion School and the consequent filling up of the three remaining large schools.

7. This routine work is, however, made difficult by the lack of co-operation by the headmasters. It is almost impossible to obtain, for example, correct lists of the names of new entrants to any school, and it was only through the courtesy of Mr. Flynn, the Provincial Inspector of Schools, that I was able to obtain comparatively correct lists for the beginning of this year.

8. The carrying out of treatment for children found at routine examination to require it, is also extremely difficult, but here the schools blame the parents for inaction.

9. Since the institution of the six-penny fee for school children comparatively few have come for treatment. This is not, I think, to be considered as detrimental to their health, as the vast majority of those who used to attend for free treatment had either trivial injuries or abrasions, or complained of some vague pain of which no physical sign could be found. This is particularly noticeable at Shama, where often almost half the cases seen were school children.

10. The *Medical Research Institute Laboratory* has again helped us considerably throughout the year. It is of interest that the first case of diphtheria to be proved bacteriologically (which is not, I suggest, to say that it was the first case suspected or provisionally diagnosed) occurred in a patient which attended the Sekondi Clinic.

ELLA M. STRATTON,
Lady Medical Officer.

14*th April*, 1931.

INFANT WELFARE CLINIC—SEKONDI. 1930–31.

SCHOOL.

	New patients.	*New attendances.*	*Total attendances.*
April	30	58	115
May	27	85	160
June	33	89	236
July	5	12	132
August ...	38	77	154
September ...	20	74	160
October ...	27	46	147
November ...	34	79	195
December ...	18	39	100
January ...	10	30	131
February ...	15	35	47
March	11	27	46
Total	268	651	1,623

MOTHER WELFARE WORK, 1930–31.

Births reported	388
Domiciliary visits.	
Lady Medical Officer	364
Health Visitor	3,905
Government Midwife	6,682
Deliveries.	
Lady Medical Officer	10
Government Midwife	61

ROUTINE MEDICAL EXAMINATIONS–SCHOOL CHILDREN.

Roman Catholic	... 76
St. Peters (English Church Mission) ...	... 146
Wesleyan	... 152
West African Industrial Academy ...	... 36
Total ...	... 410

ELLA M. STRATTON,
Medical Officer.

INFANTS.

	New patients.	*New attendances.*	*Total attendances.*
April	298	532	1,034
May	300	536	1,085
June	279	470	959
July	332	506	1,068
August	260	450	942
September ...	307	549	1,198
October	282	573	1,140
November ...	265	464	1,285
December ...	335	518	1,403
January	262	448	1,183
February ...	241	414	972
March	185	296	860
Total ...	3,346	5,756	13,129

Total Patients treated ... 3,848.

ANTENATAL WORK—SEKONDI, 1930–31.

	New patients.	*New attendances.*	*Total attendances.*
April	53	84	290
May	66	113	259
June	47	71	217
July	66	101	314
August	50	71	174
September ...	65	93	292
October	69	104	303
November ...	68	107	262
December ...	77	144	442
January	108	180	441
February ...	64	100	319
March	50	75	278
Total ...	783	1,343	3,590

Total patients treated 1,036.

SHAMA CLINIC—1930–31.

	New patients.	*New attendances.*	*Total attendances.*
April	64	92	179
May	77	96	201
June	66	84	190
July	57	87	170
August	54	71	173
September ...	61	79	162
October ...	67	99	233
November ...	58	88	217
December ...	54	81	209
January	51	68	149
February ...	52	64	138
March	35	51	104
Total ...	696	960	2,125

LABORATORY WORK DONE FOR CLINIC—1930–31.

Blood films....	... 2,312				
Positive Malaria	... 1,359	P. falcip.	1,245	Crescents	26
		P. mal.	109	Double infection	
		P. vivax.	5	P. falcip and P. mal.	14
Blood Culture	... 1				
Blood Count.	6	R.B.C.	2		
		Differential	4		
Urine Tested	... 69	Schistosoma haematobium			8
		Oxyhaemoglobin			1
		Methaemoglobia...			1
		G. negative intracellular diplococcus			1
		Quantitative estimation of albumen in urine			1
Faeces	19	Entamoeba histolytica			5
		Hook worm			1
		Strongyloides			1
Smears. from eye ...	7	— Gonococci			1
Vagina	5	— G. negative intracellular diplococcus			1
Ulcers	2				
Sputa	9	positive———Tubercle bacillus ...			1
Widal	1				
Throat Swab. ...	1	(Diphtheria)			
Kahn Tests ...	186	Positive 97.			

INFANT WELFARE, CAPE COAST.

The new clinic at Cape Coast was opened by His Honour Mr. Justice Woolhouse Bannerman, O.B.E., Acting Puisne Judge, on the 16th June, 1930.

The main building is made up of a Dispensary, Consulting and Dressing Rooms, also a small office and an annex. The outbuildings provide living quarters for an African Nurse and Midwife, not yet appointed.

The clinic has been in charge of

Dr. Stratton, from 16th June to 19th June and from 28th July to end of September.

Dr. M. K. Lawlor from 19th June to 26th July.

Dr. F. A. Adam, from October to the end of the year under review.

The African staff includes a dispenser (male), two females temporarily appointed acting as nurses and dresser. A Second Division Clerk was added on the 1st October, 1930.

In December, 1930, a weekly clinic was started at Asebu, 10 miles from Cape Coast ; where quarters were provided in the Rest House. This village is the headquarters for the Paramount Chief and is a large marketing centre, hence it was hoped that it would prove successful and give an indication of the health in the bush villages outside the coastal area. The attendance so far is not very high but there are signs that with perseverance it will prove popular and beneficial to the community ; so far its activities have been confined largely to treatment of yaws.

An endeavour was made also to establish a weekly clinic at Mouree. This is a thickly populated coast village (six miles from Cape Coast) but owing to lack of support the clinic was closed down. Nevertheless it achieved a result as more patients from that town attended the clinic at Cape Coast.

In January an increased charge for treatment was initiated consequently there was a falling off in attendance.

The prevailing diseases treated are yaws, malaria, coughs and gastro-intestinal troubles ; the latter seem to be caused by irregular feeding and prolonged breast feeding.

There have been a few cases of urinary schistosomiasis but these have occurred in patients from areas outside Cape Coast. One case of trypanosomiasis was diagnosed during an examination of school children and treated ; this case again came from an outlying locality.

Circumcisions are now being performed at the clinic.

The average dental condition is poor. In November, 1,732 school children were examined and 510 required dental treatment. The Government Dentist actually treated 565 children when visiting Cape Coast in February, 1931. A large proportion of the children attending the clinic for other conditions have unhealthy mouths and defective teeth, these oral conditions seem to be largely due to avitaminosis which improve after instruction on diet has been given and carried out.

Fortunately, lectures by the Lady Medical Officer and Medical Officer of Health continue under the Gold Coast League for Maternity and Child Welfare. The scheme of house visiting by the Female Sanitary Inspector and Voluntary Health Visitors is being extended to include the supervision of antenatal patients, as well as new-born children. Now that the post of Female Sanitary Inspector is abolished it is hoped to train a paid Health Visitor.

A Government midwife is to take up duty in April, when more complete and satisfactory treatment will be possible and also it is proposed to give practical and theoretical instruction to 20 African midwives now practising in the town.

Patients have been encouraged to report births at once to the Lady Medical Officer who visits them and gives advice and treatment.

Antenatal patients are on the whole healthy and abnormality the exception. The few patients with albuminuria have responded to treatment at home and there have been no cases of eclampsia.

F. A. ADAM,

Lady Medical Officer.

	Mothers.						School Children.								
	Cases.			Attendances.			Cases.			Attendances.			School Medical Examination.		
	New.	Old.	Total.	New.	Old.	Total.	New.	Old.	Total.	New.	Old.	Total.	Boys.	Girls.	Total.
April	16	61	77	26	88	14	21	21	42	21	28	49	36	23	59
May	34	53	87	68	111	179	23	8	31	41	30	71	32	35	67
June	36	49	85	41	108	149	43	22	65	44	73	117	18	2	20
July	23	59	82	42	144	186	17	23	40	30	45	75	—	—	—
August	33	55	88	76	133	209	27	15	42	63	25	88	—	—	—
September	19	53	72	40	105	145	30	24	54	53	43	96	—	14	—
October	46	54	100	74	113	187	63	32	95	95	52	147	55	83	138
November	34	63	97	43	105	148	98	47	145	126	86	212	31	9	40
December	30	58	88	39	83	122	38	48	86	49	69	118	—	—	—
January	48	76	124	86	138	224	26	17	43	36	24	60	—	—	—
February	37	72	109	58	107	165	27	14	41	35	32	67	40	—	40
March	45	70	115	74	113	187	39	25	64	67	39	106	35	62	97
Total	401	723	1,124	667	1,348	2,015	452	296	748	660	546	1,206	227	228	455

ANNUAL REPORT OF CAPE COAST CLINIC—INFANTS.

1930–31.	Cases.			Attendances.			Yaws—Cases.		
	New.	Old.	Total.	New.	Old.	Total.	New.	Old.	Total.
April ...	221	212	433	367	322	689	91	70	161
May	193	176	369	313	278	591	55	40	95
June ...	252	233	485	260	463	723	53	59	112
July	371	310	681	592	607	1,199	66	75	141
August ...	253	208	461	478	414	892	53	54	107
September ...	165	217	382	330	466	796	35	53	88
October ...	199	241	440	351	434	785	61	67	128
November ...	269	248	517	484	436	920	43	50	93
December ...	313	321	634	517	532	1,049	27	57	129
January ...	317	318	635	518	479	997	68	56	124
February ...	170	203	373	296	270	566	51	53	104
March ...	193	201	394	384	335	719	56	48	104
	2,916	2,888	5,804	4,890	5,026	9,916	653	629	1,282

Lectures and Visits.

	Lectures.	Visits.		
		L.M.O.	F. San. Insp.	Health Visitor.
April	2	30	—	—
May	2	18	—	—
June	—	15	—	—
July	—	5	—	—
August	1	3	98	65
September	1	—	103	52
October	2	17	96	49
November	2	15	—	92
December	1	31	98	27
January	2	18	114	51
February	—	7	112	35
March	1	19	—	84
Total	14	178	621	455

KOFORIDUA INFANT WELFARE CLINIC.

ANNUAL REPORT, 1930–31.

Attendances at Infant Clinic.—The numbers attending the Clinic are shewn in Table I. The decrease in November and December was probably in great part due to the depression in the cacao trade. This was followed by a great increase in January, when money became more plentiful. A large number of cases in April, May and June were those of long standing yaws—affording some explanation of the immediate rise almost to maximum figures.

The children are brought from a wide radius—20, 30 or 40 miles in some instances.

2. *Diseases.*—

(i) *Malaria* is the cause of the greatest morbidity, especially in children from 6 months to 2 years. It is gratifying to note that a considerable number of infants are brought to the Clinic for "Inspection" and a request for routine quinine administration.

(ii) *Yaws* is an extremely common disease in this district, though the long-standing cases attending in the early part of the year are rarely seen now. It is remarkable how few really

early cases are seen in the Clinic—four to six months being the average duration of the disease before treatment is sought.

Intramuscular sodium bismuth tartrate has been found a most effective treatment ; the difficulty being to persuade the parents to attend regularly when lesions disappear.

(iii) *Helminthiasis:—Ascariasis* is very common, and causes a large morbidity—especially a general oedema for which no other cause can be found.

Strongyloides.—Five cases.
Ankylostomiasis.—Seven cases.
Taenia.—One case.

(iv) *Leprosy.*—Four cases have been sent on for treatment.

(v) *Pneumonia and Whooping Cough*—Are very common.

(vi) *Rare cases.*—The following cases are of interest:

Scurvey—three cases.
Myelogenous Leukaemia—two cases.
Spirochaetal Dysentery—two cases.
Intussussception—One case.
Transposition of Viscera—One case.

(vii) *Congenital deformities.*—are remarkably rare.

Many of the acutely ill cases have been transferred to the Colonial Hospital—and thanks are due to the Senior Medical Officer for his help.

There is considerably difficulty in getting adequate treatment carried out at home. *A Health Visitor* would be of great help in following up these cases and in seeing that instructions are obeyed.

Mortality.—It is impossible to give an accurate report on this subject—as in spite of a certain number of moribund cases attending the Clinic, there are very few requests for Certificates of Deaths.

The general impression gained after examining a large number of cases is that the children are remarkably healthy on the whole—considering the conditions under which they live. They compare very favourably with the cases seen in an Out-Patient Department of a European Hospital.

3. *School Children.*—No systematic inspection has been possible this year, owing to the large numbers at the Infant Clinic. Any child reporting sick is sent to the Clinic by the teachers. At one time, numbers of children were attending on little or no provocation.

The Provincial Inspector of Schools was good enough to write to the Managers about this—There is now no cause for complaint.

School children pay the usual clinic fee.

4. *Antenatal Clinic.*—This is held twice weekly. Attendances shewn in Table III.

The Clinic is growing steadily. Many patients come from distant villages simply for examination.

Nurse Williams is gradually becoming known to the people and by her visiting and modern methods, should do much in educating the women.

Number of Deliveries—44. This small number is in great part due to the fact that a large percentage of people come from the bush villages, and return there for their confinements. If there was any accommodation for them, these patients would be only too willing to remain in the town.

TABLE I.

Attendances at Infant Clinic.

Month.	*New cases.*	*Total attendances.*
April	780	1,767
May	992	2,405
June	773	2,145
July	1,011	2,572
August	847	2,395
September	818	2,224
October	797	2,200
November	637	1,933
December	720	1,428
January	1,130	2,596
February	748	2,001
March	972	2,689
Total ...	10,225	26,355

TABLE II.

Attendances of School Children.

	New cases.	*Total attendances.*
April	70	213
May	56	211
June	49	162
July	11	173
August	28	178
September	10	131
October	16	105
November	15	56
December	12	106
January	4	99
February	10	35
March	17	77
Total ...	298	1,546

TABLE III.

Antenatal attendances.

Month.	*New cases.*	*Total attendances.*
April	37	77
May	22	63
June	25	64
July	38	135
August	71	147
September	74	172
October	74	153
November	45	130
December	43	124
January	105	285
February	81	238
March	70	266
Total ...	685	1,854

TABLE IV.

Month.	Malaria.	Pneumonia.	Dysentery Unclassified.	Dysentery Amoebic.	Phthisis.	T.B. Spine.	T.B. Glands.	T.B. Meningitis.	Tabes Mesenterica.
April	312	12	—	—	—	—	—	1	—
May	418	18	—	1	3	—	—	—	—
June	315	24	5	—	9	—	—	—	—
July	456	27	15	—	9	1	—	—	—
August	452	30	9	1	10	—	1	—	—
September	407	26	15	2	12	—	1	—	—
October...	383	19	11	3	10	—	—	—	—
November	294	18	9	2	8	2	—	—	—
December	271	14	2	1	5	—	—	—	—
January	514	9	9	3	6	—	—	—	1
February	314	7	3	—	4	—	1	—	—
March	454	9	6	—	2	1	1	—	—
Total	4,590	213	84	13	78	4	4	1	1

APPENDIX D (HEALTH BRANCH.)

ANALYSES OF THE MORE IMPORTANT CONDITIONS TREATED IN THE OUT-PATIENT DEPARTMENTS OF THE CHILD WELFARE CLINICS DURING 1930–31.

Diseases.	Male.	Female.	Total.	Ratio to diseases due to all causes.
Yaws	5,060	4,487	9,547	18.5
Malaria	5,930	5,897	11,827	23.0
Diseases of respiratory system	3,005	2,933	5,938	11.5
Diarrhœa and enteritis	1,216	1,013	2,229	4.3
Diseases of teeth, gums and mouth ...	778	881	1,659	3.2
Diseases of the eye	1,088	1,166	2,254	4.3
Ulcers	381	343	724	1.4
Diseases of infancy	663	631	1,294	2.5
Constipation	744	929	1,673	3.2
Whooping cough	432	498	930	1.8
Parasitic skin diseases	1,394	1,280	2,674	5.2
Intestinal parasites	425	452	877	1.6
Dysentery	125	93	218	0.4
Injury external causes	616	360	976	1.9
Pyrexia of unknown origin	177	169	346	0.6
Diseases of lymphatic system	121	103	224	0.4
Measles	158	126	284	0.5
Other conditions	2,406	5,265	7,671	14.9
Total	24,719	26,626	51,345	—

APPENDIX E (HEALTH BRANCH).

MATERNAL WELFARE VISITS AND DELIVERIES—CHILD WELFARE HEALTH VISITS 1930–31.

Station.	Visits.	Deliveries.		Number of domicilary visits.	
		Woman Medical Officer.	Midwives.	Woman Medical Officer.	Health Visitors.
Accra	—	1	27	473	2,147
Kumasi	—	25	80	131	3,129
Sekondi	—	10	61	364	10,587
Cape Coast	—	—	—	178	1,076

APPENDIX F (HEALTH BRANCH).

MOSQUITO PROOFING OF OFFICIALS QUARTERS, 1930–31.

Province.	Total permanent quarters.	Total temporary quarters.	Total bush quarters.	Number partly protected.	Number completely protected.
Accra	252	4	—	20	
Eastern Province (other than Accra)	75	2	—	3	—
Central	51	13	3	—	—
Western	112	10	5	10	12
Ashanti	152	—	2	3	—
Northern Territories	42	22	1	22	—
Total	684	51	11	58	12

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