Annual report of the Medical Department / Federated Malay States.

FEDERATED MALAY STATES.

ANNUAL MEDICAL REPORT FOR THE YEAR ENDING 31st DECEMBER, 1923.

I.—ADMINISTRATION.

STAFF.

The total staff of the Medical Department, Federated Malay States, including all branches, on the 31st December, 1923, was 726. It was divided as follows:

Hospitals Branch	626
Health Branch	48
Institute for Medical Research	16
Central Mental Hospital	14
Veterinary Branch	22

2. The following were the principal changes which took place:

Dr. F. E. Wood continued to act as Principal Medical Officer until 1st April, 1923, when Dr. R. Dowden returned from leave, when he resumed his appointment as Senior Medical Officer, Perak.

Dr. Wellington, Senior Health Officer, returned from leave and resumed his duties on 8th February, 1923, and Dr. Cosgrave, who had been acting for him, took up his appointment as Senior Medical Officer, Selangor.

During the year the following were appointed Medical Officers:

Dr. B. Cross	27th April, 1923
Dr. V. M. Mathews	25th May, 1923
Dr. H. P. Hodge	21st July, 1923
Dr. J. G. Dunlea	3rd August, 1923
Dr. J. E. Phillips	3rd August, 1923

PROMOTIONS.

Dr. I. P. Masters promoted Senior Medical Officer, Pahang, with effect from 3rd June, 1921.

Dr. D. T. Skeen promoted Senior Medical Officer, Negri Sembilan, with effect from 6th May, 1921.

Dr. A. K. Cosgrave promoted Senior Medical Officer, Selangor, with effect from 1st July, 1922.

TRANSFERS.

Dr. W. M. Chambers transferred to Straits Settlements Service on 21st July, 1923.

Captain J. W. Hoflin transferred from the Health Branch to act as Personal Assistant to the Principal Medical Officer on 1st October, 1923.

Mr. H. J. Benjafield, Chief Sanitary Inspector, transferred to the Municipality, Singapore, on 15th November, 1923.

RETIREMENTS.

Dr. W. S. Milne retired on pension on 18th April, 1923.

Dr. A. A. Woods retired on pension on 1st June, 1923.

Dr. W. J. Symes terminated his services on 15th August, 1923, on expiration of his agreement.

Dr. E. R. Stone terminated his services on 12th April, 1923.

DEATH.

It is with deepest regret that the death of Dr. H. Mowat who died on 22nd August, 1923, is reported.

Assistant Surgeons.—The following were appointed during the year:

Mr. M. K. Lukshumyah on 6th April, 1923.

Mr. V. R. Gabriel on 6th April, 1923.

Mr. G. A. Lopez on 13th September, 1923.

Mr. G. H. Oorloff on 13th September, 1923.

Mr. S. Subramaniam on 13th September, 1923.

Mr. A. Sivakolunthu on 13th September, 1923.

Mr. Makan Singh on 16th September, 1923.

RETIREMENT.

Mr. M. Sangarappillai retired on pension on 3rd October, 1923.

RESIGNATIONS.

Mr. Yeoh Hone Soo resigned the service on 2nd March, 1923.

Dr. J. L. Gregory, Health Officer, resigned the service on 5th August, 1923.

European Nursing Staff.

APPOINTMENTS.

Miss S. Smith, Sister, on 10th March, 1923.

Miss C. F. Johnson, Sister, on 5th May, 1923.

Miss E. C. Bosden, Sister, on 23rd May, 1923.

Miss E. M. Gilbert, Sister, on 27th July, 1923.

Miss J. Gladwin, Sister, on 6th September, 1923.

Miss E. H. Hayes, Sister, on 8th September, 1923.

Miss E. M. L. Bryant, Sister, on 15th September, 1923.

Miss E. M. Ditcham, Sister, on 28th September, 1923.

Miss E. M. Goulding, Sister, on 26th October, 1923.

PROMOTIONS.

Miss E. J. McCarthy, Sister, promoted to Matron, Grade II, from 30th November, 1923.

Miss L. M. Jacobs, Sister, promoted to Matron, Grade II, from 30th November, 1923.

Miss M. Begg, Sister, promoted to Matron, Grade II, from 30th November, 1923.

TRANSFER.

Miss M. E. Thomlinson, Sister, transferred to Kelantan on 4th May, 1923.

RETIREMENT.

Miss V. E. H. Foley, Matron Grade I, retired on pension on 30th November, 1923.

RESIGNATIONS.

Miss A. H. Ward resigned on 10th March, 1923.

Miss A. Campbell resigned on 7th June, 1923.

Miss J. Dunsmore resigned on 13th September, 1923.

Miss H. Burtson resigned on 17th August, 1923.

Miss M. M. Millard's service terminated on 30th August, 1923, on expiration of agreement.

Miss E. A. Haywood was invalidated home on 2nd August, 1923.

FINANCIAL.

3. (*a*) Statement of Revenue for the year 1923—

Revenue (Hospital Fees, licences, etc.)	$ 246,499
(*b*) Statement of Expenditure for the year 1923 (Personal Emoluments and Other Charges)	3,317,516

Principal Medical Officer	$ 119,009
Senior Medical Officer, Perak	995,524
,, ,, Selangor	832,730
,, ,, Negri Sembilan	388,069
,, ,, Pahang	233,788
Senior Health Officer, F.M.S.	319,309
Director of Government Laboratories	115,286
Medical Superintendent, Central Mental Hospital ...	264,433
Medical Hostel, Singapore	49,363
Total ...	$3,317,516

II.—PUBLIC HEALTH.

(*a*).—GENERAL REMARKS.

4. The general health of the Federated Malay States may be considered as satisfactory as, assuming that the population has increased at the same rate as during the intercensal period and judging from the sickness and death-returns, the health of the country during the year 1923 was better than that of any year under record for the past ten years.

5. The general death-rate for 1923 was 24.40 per mille as against 25.75 per mille for 1922 and 29.18 per mille for 1921.

6. The reason for this improvement must to a great extent be ascribed to the efforts of the various authorities, public and private, which have been concerned with the prevention and abatement of disease.

7. The number of in-patients treated in hospitals was 87,310 with 6,762 deaths, giving a death-rate of 8.05 per mille as compared with 92,690 with 7,334 deaths and a death-rate of 7.91 per mille in 1922.

The distribution of patients in the different States is shewn below:

States.	1922.			1923.		
	Cases.	Deaths.	Death-rate.	Cases.	Deaths.	Death-rate.
Perak	42,567	3,350	7.87	41,097	2,994	7.29
Selangor	30,455	2,419	7.94	27,571	2,220	8.04
Negri Sembilan	14,417	1,149	7.97	13,725	1,131	8.24
Pahang	5,251	416	7.92	4,917	417	8.48
Total ...	92,690	7,334	7.91	87,310	6,762	8.05

8. The reduction in number of in-patients is accounted for by the fact that chronic cases—unless helpless—are sent to Port Swettenham Decrepit Camp and also by the fact that the majority of ambulatory cases are now treated as out-patients. This also accounts for the slightly higher death-rate in hospitals as only acute cases are admitted.

9. The principal diseases commonly treated in hospitals were malaria, venereal diseases, ankylostomiasis, dysentery, diarrhoea, beri-beri, pneumonia and pulmonary tuberculosis. The following table shows the number of cases and deaths during the years 1922 and 1923:

Disease.	1922.			1923.		
	No. of cases.	No. of deaths.	Percentage of deaths.	No. of cases.	No. of deaths.	Percentage of deaths.
Malaria	26,072	1,403	5.38	21,082	1,062	5.03
Venereal diseases...	5,312	84	1.58	4,892	65	1.32
Ankylostomiasis ...	4,223	347	8.22	4,029	300	7.44
Dysentery... ...	3,553	818	23.02	3,310	711	21.48
Diarrhoea	1,294	116	8.96	1,253	81	6.46
Beri-beri	1,122	140	12.48	771	107	13.87
Pneumonia ...	1,672	761	45.51	1,815	711	39.17
Pulmonary tuberculosis	2,214	1,062	47.97	2,157	1,006	46.64

10. *Malaria.*—The number of cases treated in hospital shows a decrease of 4,990 while the death-rate has decreased to 5.03 as against 5.38 in 1922. This is very satisfactory and can be attributed partly to better diagnosis of "fevers" and partly to the active propaganda carried out by the Malaria Advisory Board. Of the total number of 21,082 cases of malaria 1,252 were "type undiagnosed". A number of these cases can be considered as not malaria. Every effort is being made to correctly diagnose malaria and the number of cases of "type undiagnosed" is rapidly decreasing.

11. *Venereal Diseases.*—The total number of cases treated was 4,892 with 65 deaths. It is extremely difficult to induce the public to come for early treatment. The distribution of pamphlets and posters by the Committee for Public Health Education has continued. Venereal diseases clinics, centres and propaganda are being actively organised with a specialist in charge. A successful commencement has been made at the District Hospital, Kuala Lumpur, where an up-to-date venereal diseases clinic has been established which is working exceedingly well. Injections of N.A.B. compounds necessary for cases of syphilis are given at all Government hospitals. The following are the figures for the different States:

States.	1922.	1923.
Perak	10,888 ...	15,550
Selangor	6,802 ...	10,282
Negri Sembilan	1,451 ...	2,739
Pahang	549 ...	1,104

12. *Ankylostomiasis.*—A total of 4,029 cases were treated in 1923 as compared with 4,223 for 1922. The disease is very prevalent and the above figures are only for cases who were treated for this disease alone. A great number of patients admitted into hospitals suffer from this disease. A mass campaign will be undertaken in 1924.

The Committee for Public Health Education has issued a pamphlet on this subject in English, Chinese, Malay and Tamil. The pamphlet is being distributed throughout the country.

13. *Dysentery and Diarrhoea.*—The total number of cases treated in hospitals was 4,563 with 792 deaths and a death-rate of 1.73 as against 4,847 cases with 934 deaths and a death-rate of 1.78 per mille in 1922. The types were as follows:

Amoebic.	Deaths.	Bacillary.	Deaths.	Diarrhoea.	Deaths.
1,400 ...	305 ...	1,910 ...	406 ...	1,253 ...	81

14. *Beri-beri.*—The number of cases treated in hospitals decreased from 1,122 in 1922 to 771 in 1923. The death-rate for 1923 was slightly higher being 13.87 as against 12.48 for 1922.

The subject of beri-beri is dealt with at length in the report of the Director of Government Laboratories, which is attached.

The improved conditions on mines and estates and the better feeding accounts largely for the reduction in the figures for this disease.

15. *Pneumonia.*—There was a slight increase in the numbers treated but a decrease in the death-rate which was 39.17 as against 45.51 for 1922. Intravenous iodine treatment has been freely used with success.

16. *Pulmonary Tuberculosis.*—The total number of cases treated in hospitals during the year was 2,157 with 1,006 deaths and a death-rate of 46.64 as against 2,214 with 1,062 deaths and a death-rate of 47.97 in 1922.

The mortality rate is very high, but it must be realised that only chronic and acute cases come to hospitals for treatment. The death-rate for the whole of the Federated Malay States was 1.39 per mille which is the lowest for ten years.

This disease was the subject of a press campaign during the year, but there was no occasion for any alarm, as the figures show, though there is reason to adopt all the preventive measures possible, and this is largely the work of the Sanitary Boards. In one district the disease was made notifiable but outside Government practice, no case was reported. The fact is that the private practitioner dare not report cases. One Chinese doctor who reported a case of plague was boycotted, lost his practice and had to leave the country, yet public sympathy would support action against plague more readily than against phthisis, for the former disease is better known and more dreaded by the ignorant classes.

Sanitoria are advocated, but persons infected now object to removal to Port Dickson where there are special wards. In every hospital of any size there is special accommodation for tubercular cases, and the percentage of cases of T.B. infection is a good index of the incidence of the disease, for in the later stages the patients' relatives and friends are obliged to send them into hospitals as they become intolerable in private houses. A special enquiry was made and returns were called for. These reveal no increase or alarming incidence of tuberculosis in the hospitals.

The main object of the population in this country is to make money; they have still little belief in many of the facts of Western medicine.

It has been seriously proposed that every suspected case, even before the tubercle bacillus was recovered from the sputum, should be forcibly examined and segregated. This is unthinkable and would not be tolerated.

Early cases with slight physical signs do not consider that they are seriously ill at all, they want a bottle of medicine and a quick cure and invariably would refuse one, two, or three years sanatorium treatment.

This year one can only repeat the former advice, that education, light and air are the only true remedies.

17. *Smallpox.*—The total number of cases notified was 32 with nine deaths. An outbreak in Perak was responsible for 23 of these cases and for all the deaths.

The outbreak was traced to a Malay who had come from Mecca on an infected ship and had developed the disease after release from the Penang quarantine station. Its spread was due to unvaccinated Malays. Energetic vaccination stopped the epidemic.

18. *Plague.*—Sixteen cases with ten deaths occurred during the year. All these cases came from an area in Kuala Lumpur where plague amongst house rats appears to be endemic. There is little tendency to spread and up to date there never has been a real epidemic.

19. *Yaws.*—The treatment of cases of yaws by injections of N.A.B. compound was continued. A total of 40,815 injections were given. The number of cases treated in each State is shewn in comparison with the number in 1922 in the following table:

States.	1922.	1923.
Perak	11,474 ...	14,149
Selangor	1,700 ...	4,381
Negri Sembilan	3,749 ...	9,358
Pahang	6,049 ...	3,247
Total ...	22,972 ...	31,135

The campaign against this disease was continued throughout the year with satisfactory results. Few cases are admitted to hospitals, during the year 278 cases only were treated as in-patients, but the total number treated was 31,135. Although a number were treated as out-patients, the majority were treated in their own kampongs. Medical Officers and Assistant Surgeons pay periodical visits to the outlying districts and find little difficulty in persuading people to undergo treatment.

In the Batang Padang and Kuala Kangsar districts of Perak, the Medical Officers, with the aid of presents, such as beads, bangles, cigarettes and tobacco, have been able to get into touch with the sakais who live along the Pahang Road. Having persuaded them to have injections for yaws in the first place, the results were so good that they are now only too willing to receive treatment and ask for it.

In Pahang a very rigorous campaign was commenced in the latter part of 1922. Its aim was complete eradication of the disease by systematic treatment of all affected cases, as ascertained by yaws census taken throughout the whole State. The campaign has been continued throughout the year, but its original aim has not yet been achieved. About 500 cases, scattered in the various districts, stubbornly refused treatment. Persuasion by District Officers, Penghulus and Officers of the Medical Department proved futile, and they remain a permanent focus of infection from which the disease continues to spread. Fortunately a great many of the fresh infections come for treatment promptly so that the disease is kept in check to some extent.

Though this is gratifying, it is greatly to be deplored that the small group of cases, responsible for the continued spread of the disease, is so completely beyond control. Compulsory treatment would cure everybody in a very short time and could prevent the occurrence of fresh cases. Legislation with this object in views appears to be the only solution. It is the only way by which the scourge of yaws can be, once and for all, completely eradicated.

20. *Influenza.*—There were 2,219 cases with 80 deaths during the year as compared with 1,653 cases with 46 deaths in 1922. The disease was of a mild type.

21. *Eye Diseases.*—The clinics at the Ipoh and Taiping Hospitals have continued successfully.

22. *Out-patients.*—One thousand five hundred and thirty-five new cases were seen and examined during the year, an increase of 257 over the year 1922. There were 9,011 attendances, an increase of 2,651 over the figures for 1922.

23. *In-patients.*—Two hundred and thirty-four cases were admitted for conditions of the eye which necessitated urgent treatment or operation. The principal diseases were conjunctivitis, trachoma, ulcers of the cornea and keratitis and cataract.

That there is a great deal of suffering and loss of vision amongst the native population is evidenced by the fact that of 1,535 cases seen, nearly 4 per cent. had one or both eyes disorganised—the result of infection and neglect. Facial paralysis with a tendency to close the eye on the affected side was a condition frequently met with. Syphilitic and gonorrhoeal infections are responsible for a large percentage of blindness. The advisability of establishing eye clinics at various centres in the other States is having serious consideration.

In a series of examinations of the eyesight of children of different nationalities the vision of Malay children in the vernacular schools was found to be excellent. In the English speaking schools the stress of near work was evident and errors of refraction are relatively common.

Errors of refraction play a small part amongst the natives of this country whilst diseased conditions, the result of infection or injury, form the majority of cases.

Eye clinics in charge of Assistant Surgeons are established in Taiping and Kuala Lumpur and have done good work.

24. *Operations.*—The number of operations undertaken during the year under review is shewn below:

States.	Major.		Minor.	
	1922.	1923.	1922.	1923.
Perak	404	551	1,901	4,651
Selangor ...	293	337	1,174	1,293
Negri Sembilan	68	61	1,024	1,115
Pahang ...	16	12	329	266
Total ...	781	961	4,428	7,325

25. *Vaccinations.*—During 1923, the total number of vaccinations performed was 77,724 as against 65,201 in 1922. They are distributed as follows:

States.	1922.	1923.
Perak	43,644	53,926
Selangor	12,054	11,075
Negri Sembilan	5,422	6,366
Pahang	4,081	6,357
Total ...	65,201	77,724

The considerable increase in cases vaccinated in Perak is due to the outbreak of smallpox in the Selama and Ulu Selama districts which necessitated the vaccination of a large number of adults. The increase in vaccination in Pahang is greatly due to the strict enforcement of the Enactment introduced in July, 1922. The figures show an increase of about 56 per cent. on the previous year, which must be regarded as very satisfactory when the difficulties of controlling evasion in a State so situated as Pahang are considered, and are a credit to the Senior Medical Officer, Medical Officers, Assistant Surgeons and staff.

26. *Women's Hospitals and Wards.*—The numbers attending the women's hospitals and wards are increasing yearly which goes to show that the Lady Medical Officers are gaining the confidence of the female population, and it proves that it is only by Lady Medical Officers that the women of this country can be reached. It is hoped that the number of Lady Medical Officers will be increased so that in the near future women will be as willing to go to hospital for treatment as are men. In every women's hospital and ward the number of maternity cases have increased. In the General Hospital, Kuala Lumpur, 315 patients were confined, an increase of 100 over the numbers for 1922.

27. *Inspection of Schools.*—This was continued throughout the year in some cases by the Health Branch, in others by the Medical Officers and Lady Medical Officers. This is not a very satisfactory method and Inspectors of Schools (Medical Officers and Lady Medical Officers) are urgently needed.

The most prevalent diseases met with are enlarged spleens, scabies, anaemia and many of the children are infected with worms. The children as a rule fail to keep their teeth clean. Cases of yaws are now infrequent. The personal hygiene of the children and the sanitary conditions of the schools in the outlying districts leave much to be desired. A good water supply and latrine accommodation is badly needed in many schools. The numbers of children with enlarged spleens varies considerably in different districts.

Frequent visits are paid to the schools near the main roads by the travelling dispensaries which distribute medicines and treat minor complaints. Quinine is supplied to the schools by the Health Department through the Inspectors of Schools in the various States.

LEPER ASYLA.

28. *Kuala Lumpur.*—During the year under review there has been no occurrence of special interest to report. The satisfactory state due to the reorganisation of the Asylum in 1922 has continued throughout the year. The total number of inmates at the end of the year was 348. Three births took place during the year.

The question of dealing with the healthy children of lepers, which was raised by the Infant Welfare Advisory Board, has had the consideration of Government and steps are being taken to find suitable accommodation for these children.

A Hindu Temple was erected through the kindness and generosity of Mr. Coomarasamy and opened on the 24th of August. This temple has the effect of keeping the Indian lepers in the Asylum, and not one attempted to abscond during the Indian festivities.

The members of the Far Eastern Association of Tropical Medicine paid a visit to the Asylum on 10th September, 1923, and were much impressed by the contentment shown by the lepers.

29. *Pulau Pangkor Laut.*—This Asylum is for Malays only; 61 cases of leprosy were treated during the year. There were nine deaths. The present accommodation is limited but more will be provided for in 1924.

The general health of the patients has been quite satisfactory. All cases were treated with chaulmoogra oil by the mouth and in addition 44 cases were treated by intramuscular injection of E.C.C.O. with encouraging results. Two cases were discharged on parole during the year.

30. *Taiping Leper Wards.*—One hundred and twenty-six cases were treated with three deaths. Sixty-one patients out of the above number were transferred to Pulau Jerejak and to the female leper ward in Penang. Cases have been treated with E.C.C.O. and the Tai Foong Chee treatment has been tried. The results are not very encouraging as the patients as a rule refuse treatment so soon that no real results can be obtained.

31. *Treatment of Leprosy.*—The treatment of lepers in the Kuala Lumpur Asylum is given in detail:

(i) Six were selected for treatment with eight weekly injections of .45 grms. of neosalvarsan at the beginning of the year. None of the cases showed any marked improvement.

(ii) Antimony tartrate was and is still being given to ulcerative cases. The largest number on the roll was 31. This drug is given intravenously biweekly. The solution is always freshly prepared, 1 grain being dissolved in 10 c.c. of sterile distilled water, and filtered. The initial dose is 0.5 grain or 5 c.c. of the solution; subsequent injections being raised to 1 grain or 10 c.c. Many cases showed marked improvement, sloughing ulcers taking on a reddish and healthy look and granulating after a few injections. This treatment has no effect on nodular cases.

(iii) The preparation known as E.C.C.O. has been given a whole year's trial extending from 12th July, 1922, to 11th July, 1923. It consists of the ethyl esters of the fatty acids of chaulmoogra oil combined with creosote, camphor and olive oil prepared according to the formula of Dr. Muir. E.C.C.O. was given intramuscularly into the buttock, the initial dose being 0.5 c.c. increasing by 0.5 c.c. until 5 c.c. which was continued weekly throughout the year. Thirty-nine cases were recorded but only twenty-seven came under this treatment for the full twelve months. Of these 27 cases only ten have shown any improvement.

(iv) *Thymol Morrhuate.*—Two injections of 1 c.c. were given inframuscularly to eleven patients on 24th September, 1923, and 1st October, 1923. It was discontinued owing to much pain and swelling.

(v) *Tai Foong Chee.*—The Chinese name for chaulmoogra nut, together with two other seeds, Pak Chut Lai and Foh Mah Yan, has found much favour with the inmates. Two parts of the former and one part each of the latter all thoroughly ground up and mixed, and a varying quantity of from ½ to 1 drachm is taken orally daily.

This treatment began on 4th April, 1923, and on 31st December, 1923, the number on the roll has increased to 161. Several lepers had been treating themselves with these drugs before this. Only nine of them could give definite and reliable histories of having taken them from one to six years. The improvement these nine people showed has been remarkable. Encouraged by the results of these persons, more regular and extensive treatment with these drugs is now on trial. The treatment is a popular one with the patients regardless of age or nationality and works out on an average of $20 per month for 100 patients.

32. *X-Ray and Electrical Treatment.*—This was under the charge of Dr. Mowat, Radiologist, until his regrettable death on 22nd August, when the department was taken over by Dr. Harrison.

The following is a comparative statement of the treatment given during the years 1921, 1922 and 1923:

	1921.	1922.	1923.
Screening	58	33	73
Radiograms taken	357	482	684
Electrical treatment ...	796	996	800
X-Ray treatment	70	109	38
Radiant heat baths	—	254	110
Total ...	1,281	1,874	1,705

VETERINARY DEPARTMENT.

33. *Rinderpest.*—There were two outbreaks of rinderpest amongst buffaloes, one of which was in the Kuantan district of Pahang where there were 51 cases with 49 deaths. There was no evidence as to the original source of this infection. The outbreak had not finished by the end of the year. The other outbreak occurred in the quarantine station, Port Dickson, among a shipment of 33 buffaloes just imported from Siam. All the 33 buffaloes died or were destroyed, 31 cattle in the immediate vicinity of the quarantine station were inoculated with anti-rinderpest serum.

No cases occurred in Perak or Selangor except that during December a tongkang with 49 cattle and buffaloes arrived at Port Swettenham, Selangor, from the West Coast of Siam with two cases of rinderpest on board, four animals having died during the voyage. None of the animals were allowed to land. The importation of cattle from Siam by sea has been prohibited until further notice.

34. *Foot-and-Mouth Disease.*—Mild outbreaks of this disease amongst cattle occurred in various districts and the quarantine stations; altogether there were 1,085 cases with one death.

In every case where an outbreak occurred its spread was stopped by effective quarantine restrictions.

35. *Rabies.*—Only one case of rabies has occurred during the year. This occurred in a dog in Bahau town, Negri Sembilan. The source of this infection could not be traced, the dog affected being said to have been continuously in Bahau for over two years.

The muzzling order in Kuala Lumpur where cases of rabies had occurred during the previous six years was rescinded in March, 1923.

36. *Pleuro-Pneumonia.*—The outbreak which started in 1922 continued. There were only three cases, of which one died and two were destroyed. An outbreak occurred amongst goats in the Matang district in Perak in April. Three goats died and nine others were destroyed. The other three States were free from this disease.

37. *Swine Fever.*—There were no cases of swine fever during the year under review.

38. *Surra.*—Three cases of surra amongst dogs were discovered in Taiping in October and November. All were destroyed.

VETERINARY QUARANTINE STATIONS.

39. *Port Swettenham.*—Eight thousand five hundred and nineteen animals passed through this quarantine station, of which number 4,233 were quarantined for ten days.

40. *Bukit Sentul.*—Three hundred and twenty-seven cattle were quarantined, these animals being from Singapore and Kedah.

41. Kuantan.—The total number of animals passed through this station was 1,751.

42. *Perak.*—The total number of cattle and buffaloes imported and passed through the quarantine station was 5,248 as against 2,672 in 1922. They were distributed as follows:

Port Weld	2,192
Parit Buntar	839
Selama	1,049
Upper Perak	333
Teluk Anson	835
Total ...	5,248

VETERINARY PROSECUTIONS.

43. There were 1,176 prosecutions resulting in 1,133 convictions. The fines imposed amounted to a total of $9,018.

PUBLIC HEALTH.

(*b*).—General European Population.

44. The general health of the European population has been good; there was very little sickness and invaliding. The total European and American population as estimated at the end of June, 1923, was 6,226. There were 126 births giving a birth-rate of 20.24 per mille and 34 deaths with a death-rate or 5.46 per mille.

It is impossible to obtain figures for illness and invaliding of European or others as there are many private practitioners who could not supply these figures nor spare the time to collect facts.

(*c*).—General Native Population.

45. Vital statistics, estimated population per year, birth and death-rates, infantile mortality, etc., etc., will be found in the report of the Senior Health Officer, Federated Malay States.

III.—SANITATION.

46. The Health Branch of the Medical Department has been grievously understaffed during the whole of 1923, and great credit should be given to the admirable efforts made by the Senior Health Officer and the very limited number of Health Officers at his disposal. The results attained fully justify these remarks.

The Health Officers were very busy with the work of the Mosquito Destruction Boards, and the reduction in the number of malarial cases and the death-rate must be largely ascribed to their efforts.

The Railway Health Officer assisted by the Railway Engineers has done very good work and has fully justified the creation of the post.

There were no epidemics of any magnitude during 1923.

Owing to the paucity of staff it was impossible to keep adequate supervision over the estates. Schools were inspected as far as possible, this duty being shared by the Hospital Medical Officers, Health Officers, Assistant Surgeons and Sanitary Inspectors. The Lady Medical Officers made useful inspections of girls' schools wherever possible. Four laws and three lists of rules affecting public health were gazetted during 1923.

47. The Senior Health Officer points out that in towns the death-rates are influenced by diseased persons coming in from rural areas for treatment or greater comfort. If they die at the end of a month's residence the death falls upon the town where the patient had been residing. They are therefore misleading death-rates and are probably too high. The town death-rates are also influenced by the presence of large hospitals.

The health for 1923 has been good and the best on record. To a large extent this highly satisfactory result must be ascribed to the efforts of the public and private authorities to combat disease.

The death-rate, 24.40 per mille, is the lowest ever recorded. Nearly half the deaths are classified under the general heading "Fevers"—the percentage is 45.75 of the total deaths. Dysentery and diarrhoea have a death-rate of 1.55 per cent. against 1.78 in 1922.

48. Pulmonary tuberculosis 1.39 per cent. and pneumonia 1.17 per cent. against 1.76 and 1.31 in 1922. The birth-rate was 25.66 per mille against 25.65 per mille in 1922.

49. Ankylostomiasis—the death-rate this year is 0.28 per mille and was 0.41 last year.

50. Beri-beri for 1922 had a death-rate of 0.33 per mille and in 1923 it stands at 0.27. There is a fall in the death-rates for all the principal diseases and they are the lowest on record for ten years.

51. Enteric fever shows a rise 0.02 against 0.01 for 1922. I believe the apparent rise is due to Medical Officers being more on the alert to detect it.

52. Tetanus also shows a rise 0.04 against 0.02; this is due to the diagnosis of cases in the new born at Infant Welfare Centres.

53. The infant mortality rate has risen from 170.83 per mille in 1922 to 180.07 in 1923, but it has fallen from 240 to its present figure in three years and compares very favourably with infant death-rates in other tropical countries where 600 to 800 deaths per mille are common.

The rise of 10 per mille proves that a centre in one town will not control the death-rate. Centres are being organised in Taiping, Ipoh and Seremban, but more Lady Medical Officers are badly required.

54. The large towns show a fall in the death-rate everywhere, except in Taiping, for the past seven years and even there the death-rate is the lowest for the past six years. The town is old and insanitary and active measures on the part of the Sanitary Board are called for. This town has the highest birth-rate of the four towns which to some extent accounts for the high death-rate.

55. Special attention is directed to the great fall in Seremban's death-rate from 36.16 in 1921 and 27.93 in 1922 to 24.78 in 1923. In the towns the malarial death-rates are low except in Taiping. The constant rain in Taiping is a fertile source of breeding places for mosquitoes.

56. The town death-rates from phthisis are not high, Ipoh and Taiping being higher than the other two. With only 3.61 and 3.73 deaths per mille for Ipoh and Taiping, there is no cause for panic or alarm. The phthisis curve has remained stationary year after year until 1923 when it was the lowest on record.

57. The infant mortality rates in Seremban are too high and an Infant Welfare Centre is much needed; it will be started in 1924. The death-rate in Taiping is also too high but the conditions in that old town are unfavourable to infant life.

58. Quinine distribution is much appreciated by the population, and this has played its part in the lowering of the malaria death-rate. So far as possible the distributors keep records of the amount expended and the persons to whom it is supplied, but nothing should be permitted to hamper easy distribution to the people.

59. The death-rate at the Port Swettenham Quarantine Camp was 0.28 per cent.

60. In connection with the small outbreak of plague in Kuala Lumpur the remarks under the Senior Health Officer's para. 82 should be qualified by the remark that every effort was made to close or demolish the infected houses, but such action was opposed in Court and the Magistrate declined to make an order on points of law cited.

61. Under section 87, pulmonary tuberculosis, although the regulations have provided for more light and air in the houses than is required in England is true, but they are frequently evaded and vigorous action by the Sanitary Boards is called for.

Overcrowding is also extremely common and highly dangerous. This is also a Sanitary Board problem.

62. Night-soil disposal. The disgusting habits of a portion of the population greatly tend to increase the incidence of ankylostomiasis. Smoke latrines were tried and failed as some of the population do not object to the smell of ordure, but they do object to a common latrine.

A proposal from the Medical Department to make it illegal to use night-soil as manure for vegetables was not adopted by Government as a similar proposal from the same official made in 1905.

63. The question of estate labourers health and sanitation and medical attendance as well as prevention of disease on estates is the subject of a special enquiry by Government in 1924 and a report will be submitted in due course.

64. A certain amount of education by propaganda was carried out during the year by the Malaria Advisory Board, the Committee for Public Health Education and the Infant Welfare Advisory Board, who issued posters and pamphlets.

Lectures in the Malay language on malaria, illustrated by lantern slides were given in schools and kampongs throughout Selangor and Pahang. These were well attended and should prove themselves to have been of great value in educating the rural population in the means of preventing malaria and mosquito breeding. The lectures will be extended to Perak and Negri Sembilan during 1924.

Exhibits showing anti-malarial measures and Infant Welfare work were displayed at the Agri-Horticultural Show held in July at Kuala Lumpur.

These were well attended and it is calculated that at least twenty thousand people of all nationalities visited these exhibits.

65. The following were publications that were issued during the year:

Pamphlet on malaria in English and Jawi.

Pamphlet on plague in English only.

Pamphlet on convulsions in four languages.

Posters on malaria in four languages.

Posters on "How to rear an infant during the first year of life," in four languages.

Posters on "Keep your baby's bottle clean," in four languages.

Posters on "Lockjaw," in Chinese.

Pamphlets on "Venereal diseases," in Chinese.

Posters in four languages, "Risk of plague".

Circulars *re* "N.A.B. injections," in four languages.

IV.—METEOROLOGY.

Rainfall in inches in the principal towns:

	Average monthly rainfall.
Kuala Lumpur	7.75
Ipoh	7.97
Taiping	12.84
Seremban	5.38
Kuala Lipis	8.25

The high rainfall in Taiping has probably a good deal to do with the high death-rate there.

V.—HOSPITALS AND DISPENSARIES.

67. *Out-patients.*—The number of out-patients treated by all hospitals, dispensaries and travelling dispensaries for 1923 was 527,414 as compared with 433,111 in 1922, distributed as follows:

States.	1922.	1923.
Perak	150,157 ...	190,990
Selangor	128,806 ...	159,403
Negri Sembilan	81,711 ...	92,692
Pahang	72,437 ...	84,329
Total ...	433,111 ...	527,414

The increase in the number of out-patients is probably due to the restarting of the travelling dispensaries towards the end of the year 1922. These travelling dispensaries get in touch with the villages in outlying districts whose inhabitants would not in the ordinary course of events take the trouble to come long distances to the district hospitals.

They are very useful in dealing with the yaws campaign and in the inspection of outlying schools. They are quite our most useful service out of doors.

INFANT WELFARE WORK.

68. Infant Welfare work is carried out at the Town Dispensaries in Kuala Lumpur, Ipoh and Taiping, but the attendances of women and children at these dispensaries are increasing so very rapidly that the question of providing separate accommodation for Infant Welfare work is becoming very urgent. In Kuala Lumpur it is intended to move the Town Dispensary work to another building and increase the present Town Dispensary and use it entirely as an Infant Welfare Centre.

69. *Kuala Lumpur.*—The number of attendances during 1923 were women 3,559, children (from one to five years) 2,872, and infants (under one year of age) 5,777, a total of 12,008 as against 4,075 in 1922. The number of visits paid by Health Visitors during the year was 6,549.

70. *Taiping.*—The Medical Officer reports that it is a great uphill fight against the ignorance and superstition of the poor Chinese, Tamils and Malays. From notification of birth all new-born babies are visited at once. Some of the parents appreciate this attention and attempt to follow the advice given and later come up to the centre. The majority however pay little attention and a few absolutely refuse to see the Sister or Nurse. The centre, however, has done valuable work and is gradually being appreciated. At the end of the year there were over 200 infants on the books and the majority of these are brought to the centre at least once a month.

The total attendances were 4,440 as against 743 in 1922.

71. *Ipoh.*—This centre has been considerably handicapped by having no Nursing Sister, consequently it has been carried on with difficulty more especially in the absence of a Lady Medical Officer during the latter half of the year.

The total number of attendants was 7,086 as against 1,793 in 1922.

VI.—PRISONS.

72. During 1923, the general health of the prisoners and the sanitation have been satisfactory. The chief diseases prevalent were malaria, dysentery, diarrhoea and ankylostomiasis.

The total number treated during the year in the different gaol hospitals was 1,280 with 32 deaths, and a death-rate of 2.5 as against 1,736 with 27 deaths, and a death-rate of 1.67 for 1922, distributed as follows:

Place.	1922.			1923.		
	Cases.	Deaths.	Per-centage.	Cases.	Deaths.	Per-centage.
Pudu Gaol, Kuala Lumpur ...	421	5	1.18	316	6	1.89
Gaol, Taiping	604	17	2.81	465	17	3.65
„ Batu Gajah	348	3	.08	188	6	3.19
„ Papan	65	2	3.06	11	...	...
„ Seremban	240	2	.82	258	2	0.77
„ Kuala Lipis	15	...	...	17	1	5.88
„ Kuantan	43	...	...	25	...	...
Total ...	1,736	29	1.67	1,280	32	2.5

73. There were five cases of enteric fever admitted to the Taiping Gaol Hospital. All recovered.

74. Eighty-one cases of ulcers on the legs were admitted to Taiping. These were caused by stone chips when stone breaking. The provision of leg shields has prevented any further occurrence of these sores on the legs.

75. There was an outbreak of diarrhoea in the Seremban Gaol, a total of 62 cases were treated of which 45 were admitted to hospital. This was probably due to the substitution of toughay for green peas. On stopping the toughay diarrhoea almost stopped and only five cases were admitted during the remainder of the year. Toughay was supplied from 10th June, 1923, to 5th August, 1923.

VII.—SCIENTIFIC.

Comments on the Reports of the Director of Government Laboratories and the Medical Superintendent, Central Mental Hospital.

REPORT OF THE DIRECTOR OF GOVERNMENT LABORATORIES.

76. The volume of work performed by the various branches of the Institute for Medical Research is rapidly increasing, and great credit is due to the staff for the way in which they have coped with it. It is hoped that additional assistance will be available in 1924.

77. The Director gives an interesting account of melioidosis, formerly known as pseudopestis, and gives notes upon the first case known to have occurred in a European. Apart from anything else the acute course and rapid death of the majority of the cases, together with the symptoms, have caused it to be frequently mistaken for cholera and unnecessary alarms have been caused in the past.

78. Further valuable observations have been made on the use of quinine in malaria. These are being carried further.

79. The Director records the deliberations of the Far Eastern Association of Tropical Medicine on beri-beri and details the measures adopted to combat the disease.

80. A rare case of typhoid septicaemia was discovered.

81. During a small outbreak of plague in Kuala Lumpur the serum treatment proved to have no effect on the mortality. Examinations of live rats disproved an old theory held by some that the comparative immunity enjoyed by the Federated Malay States from plague was due to the slight rate of flea infection of the rat population. The index for *Xenopsylla cheopis* was 3.0.

82. Four thousand one hundred and twenty examinations of blood for the Wassermann Reaction were made against 3,984 in 1922. Five hundred and sixteen specimens were examined for agglutination with the typhoid group against 393 in 1922.

In 1922, 118 were positive and 151 in 1923. On the whole for a tropical country the cases of fevers of the typhoid group are rare.

83. Thanks to the efficient destruction of stray dogs by the police, rabies gave no trouble in 1923.

84. During 1923 thirty-nine cases were positive for *B. diphtheriae* against twenty-nine in 1922. In each year one case of Vincent's Angina was identified.

85. Treatment with insulin was carried out during the year. Its value seems to vary.

86. There were five important publications from the Institute during 1923.

87. The reports of the Malaria Bureau and Chemical Laboratories are records of hard work well done.

REPORT OF THE CENTRAL MENTAL HOSPITAL.

88. The total number of patients shows an increase of 150 patients over 1922. It is explained in the Medical Superintendent's Report attached.

Recent melancholia was the commonest form of mental disease seen.

Endeavours are made to assist discharged patients, with good results.

Gastro-intestinal complaints including intestinal parasites, diseases of the blood or blood-vessels, malaria, syphilis and alcohol are given as causes of mental disorders.

Chinese rather than Indians head the list of cases due to alcoholism and this is probably a result of the restrictions on opium smoking. The Medical Superintendent's remarks on this subject are noteworthy.

89. The death-rate for 1923 is higher than that of 1922 by .42 per cent., but the total death-rate is well below the average for the past ten years.

90. Although phthisis heads the list of the causes of death there were only twenty-two deaths from this disease out of some 1,580 patients remaining on December 31st, 1923; yet, as is well known, a Mental Hospital is usually full of tubercular cases and these figures show no cause for alarm. There was one suicide during the year.

91. The farms, anti-malarial work, etc., have been conducted with success.

92. The changes of the staff referred to by the Medical Superintendent are unavoidable as the Assistant Surgeons do not like the work. Every effort was made to obtain an Assistant Superintendent from England without success. The terms offered do not appear to attract candidates.

93. Police escorts for the insane must still be supplied or the medical estimates will grow unduly and we may lose more important services.

94. The following reports are attached as appendices:

A.—Report of the Director of Government Laboratories.

B.— ,, Malaria Bureau, Institute for Medical Research.

C.— ,, Chemical Laboratories, I.M.R.

D.— ,, Senior Health Officer, Federated Malay States.

E.— ,, Medical Superintendent, Central Mental Hospital, Tanjong Rambutan.

16th April, 1924.

R. DOWDEN,

Principal Medical Officer, Federated Malay States.

TABLE 1.

Return of Diseases and Deaths (in-patients) for the year 1923.

Diseases.	Remaining in Hospital at the end of 1922.	Yearly total.		Total cases treated.	Remaining in Hospital at the end of 1923.	Remarks.
		Admissions.	Deaths.			
Beri-beri	96	675	107	771	101	
Cerebro-spinal fever	...	12	8	12	...	
Chicken-pox	5	76	1	81	2	
Cholera	...	...	...	...	...	
Dengue	...	32	...	32	...	
Diphtheria	...	22	7	22	1	
Dysentery, amoebic	72	1,328	305	1,400	60	
„ bacillary	103	1,807	406	1,910	72	
Endocarditis-infective	...	...	...	...	...	
Enteric	11	135	33	146	8	
Erysipelas	1	95	16	96	4	
Gonorrhœa	88	1,629	6	1,717	91	
Influenza	61	2,158	80	2,219	65	
Kala Azar	...	...	...	...	...	
Leprosy (*a*) Nodular	91	107	12	198	98	
(*b*) Anæsthetic	16	90	5	106	18	
(*c*) Mixed infection	317	183	41	500	348	
Malaria (*a*) Tertian	138	4,019	100	4,157	103	
(*b*) Quartan	36	911	28	947	28	
(*c*) Aestiva-autummal	277	9,405	686	9,682	216	
(*d*) Chronic malaria	117	4,635	170	4,752	134	
(*e*) Black-water	...	9	1	9	...	
(*f*) Mixed infection	11	320	29	331	9	
(*g*) Type undiagnosed	34	1,218	48	1,252	13	
Measles	2	146	1	148	8	
Malta fever	...	...	...	...	...	
Plague	...	16	10	16	...	
Pneumonia	63	1,752	711	1,815	66	
Rabies	...	2	...	2	...	
Pyrexia of uncertain origin	11	238	1	249	5	
Relapsing fever	...	...	...	...	...	
Rheumatic fever	12	228	...	240	5	
Rheumatism	8	113	1	121	4	
Septicæmia	3	86	72	89	1	
Trypanosomiasis (sleeping fever)	...	...	...	...	..	
Small-pox	...	7	...	7	1	
Syphilis (*a*) Primary	33	524	2	557	39	
(*b*) Secondary	100	1,448	27	1,548	56	
(*c*) Inherited	...	12	1	12	...	
(*d*) Tertian	26	417	34	443	41	
(*e*) Other syphilitic diseases	3	16	1	19	...	
Tetanus	6	35	23	41	...	
Tuberculosis	196	1,961	1,006	2,157	196	
Whooping cough	...	9	1	9	...	
Yaws	8	270	...	278	7	
Yellow fever	...	...	...	...	...	
Other infective diseases	26	418	35	444	19	
Intoxications: Alcoholism	...	19	1	19	...	
Intoxications: Morphinism	1	6	1	7	...	
Intoxications: Others	...	13	..	13	...	
Anæmia	38	885	187	923	35	
Anæmic-pernicious	...	...	...	...	...	
Diabetes	4	76	7	80	5	
Exophthalmic goitre	...	1	...	1	...	
Gout	...	1	...	1	...	
Leucocythæmia	...	...	...	...	...	
Hodgkin's disease	...	1	...	1	...	
Myxoedema	...	...	...	...	...	

TABLE 1—(*cont.*)

Return of Diseases and Deaths (in-patients) for the year 1923—(*cont.*)

Diseases.	Remaining in Hospital at the end of 1922.	Yearly total.		Total cases treated.	Remaining in Hospital at the end of 1923.	Remarks.
		Admissions.	Deaths.			
Purpura	...	...	...	...	...	
Rickets	...	2	...	2	2	
Scurvy	...	125	32	125	3	
Other general diseases	91	728	179	819	93	
Neuritis	11	207	2	218	11	
Meningitis	2	38	27	40	...	
Myelitis	1	18	4	19	5	
LOCAL DISEASES.						
Diseases of the nervous system—						
Sub-section 1—						
Hydrocephalus	...	3	2	3	...	
Encephalitis	...	...	...	...	...	
Abscess of brain	...	7	3	7	...	
Congestion of brain	...	...	...	...	...	
Other diseases of brain...	9	150	37	159	25	
Sub-section 2—						
Apoplexy	...	8	7	8	...	
Paralysis	62	233	54	295	45	
Paraplegia	2	4	3	6	1	
Hemiplegia	5	10	3	15	2	
Epilepsy	2	97	10	99	6	
Neuralgia	5	144	...	149	3	
Hysteria	...	19	...	19	1	
Other nervous disorders	14	178	21	192	6	
Sub-section 3—						
Mental diseases—						
Idiocy	1	10	...	11	...	
Mania	...	109	...	109	...	
Melancholia	...	42	...	42	...	
Dementia	...	28	...	28	1	
Delusional Insanity	...	105	...	105	...	
Other mental diseases	8	132	2	140	5	
Diseases of the eye—						
Conjunctivitis	9	367	1	376	11	
Keratitis	3	40	...	43	7	
Ulceration of cornea	20	149	...	169	16	
Iritis	8	59	...	67	3	
Optic neuritis	1	4	...	5	1	
Cataract	30	114	...	144	38	
Other eye diseases	85	351	1	436	94	
Diseases of the ear—						
Inflammation	2	37	...	39	2	
Other diseases	3	198	4	201	6	
Diseases of the nose	1	78	...	79	6	
Diseases of the circulatory system—						
Pericarditis	...	29	21	29	...	
Endocarditis	...	7	5	7	...	

TABLE 1—(*cont.*)

Return of Diseases and Deaths (in-patients) for the year 1923—(*cont.*)

Diseases.	Remaining in Hospital at the end of 1922.	Yearly total.		Total cases treated.	Remaining in Hospital at the end of 1923.	Remarks.
		Admissions.	Deaths.			
LOCAL DISEASES—(*cont.*)						
Diseases of the circulatory system—(*cont.*)						
Valvular mitral	21	209	79	230	20	
Aortic	6	34	18	40	3	
Tricuspid	...	3	...	3	...	
Pulmonary	...	1	...	1	...	
Areterial sclerosis	1	14	2	15	1	
Aneurism	...	28	5	28	3	
Other diseases of heart	7	105	38	112	6	
Diseases of the respiratory system—						
Laryngitis	2	27	1	29	2	
Bronchitis	107	2,771	62	2,878	118	
Broncho-pneumonia	10	239	99	249	4	
Abscess of lung	...	...	...	...	...	
Gangrene of lung	...	18	14	18	...	
Empyema	10	54	17	64	4	
Emphysema	...	1	...	1	...	
Pleurisy	9	236	24	245	11	
Other diseases of the respiratory system	22	678	24	700	21	
Diseases of the digestive system—						
Stomatitis	1	99	3	100	4	
Caries of teeth	3	89	...	92	...	
Glossitis	1	4	...	5	...	
Sore throat	...	29	1	29	...	
Inflammation of tonsils	...	131	...	131	6	
Gastritis	8	348	12	356	12	
Ulceration of the stomach	2	37	17	39	2	
Haematemesis	...	1	...	1	...	
Dilatation of stomach	...	1	...	1	...	
Stricture of stomach	...	...	...	...	...	
Dyspepsia	20	421	4	441	15	
Enteritis	2	123	42	125	6	
Appendicitis	2	107	12	109	7	
Colitis	1	99	4	100	4	
Ulceration of the intestines	...	9	5	9	...	
Sprue	2	61	8	63	6	
Hernia	14	165	10	179	8	
Diarrhœa	35	1,218	81	1,253	49	
Constipation	7	584	...	591	5	
Colic	8	248	...	256	1	
Hæmorrhoids	6	186	2	192	6	
Intestinal Ostruction	...	8	5	8	...	
Heapatitis-acute	3	90	5	93	4	
Abscess	...	62	16	62	2	
Cirrhosis	31	391	162	422	28	
Jaundice	2	164	22	166	3	
Peritonitis	2	79	64	81	2	
Ascites	3	73	17	76	4	
Other diseases of the digestive system	14	565	62	579	16	

TABLE 1—(*cont.*)

Return of Diseases and Deaths (in-patients) for the year 1923—(*cont.*)

Diseases.	Remaining in Hospital at the end of 1922.	Yearly total.		Total cases treated.	Remaining in Hospital at the end of 1923.	Remarks.
		Admissions.	Deaths.			
LOCAL DISEASES—(*cont.*)						
Diseases of the lymphatic system—						
Splenitis	8	170	2	178	1	
Inflammation of lymphatic gland	19	312	...	331	20	
Suppuration of lymphatic gland	10	193	1	203	8	
Lymphangitis	6	56	...	62	4	
Elephantiasis	...	3	...	3	1	
Other diseases of the lymphatic system	4	135	17	139	11	
Diseases of the urinary system—						
Acute nephritis	19	374	110	393	40	
Bright's disease	29	312	124	341	18	
Pyelitis	...	...	...	...	...	
Calculus	2	24	2	26	1	
Renal colic	...	3	...	3	...	
Cystitis	...	4	...	4	...	
Vesical calculus	...	1	...	1	...	
Suppression	...	3	...	3	...	
Hæmaturia	...	...	...	...	...	
Chyluria	...	...	...	...	...	
Other diseases of the urinary system	5	136	13	141	11	
Diseases of the generative system—						
Male organs—						
Urethrale fistula	1	...	...	1	...	
Phimosis	...	15	...	15	...	
Stricture	1	62	1	63	2	
Prostatitis	...	2	...	2	1	
Soft cancre	26	556	...	582	39	
Condyloma	...	...	...	...	...	
Inflammation of scrotum	...	13	2	13	1	
Hydrocele	3	65	...	68	1	
Orchitis	1	120	...	121	5	
Epididymitis	1	49	1	50	3	
Abscess of testicle	2	12	...	14	...	
Other diseases of the male generative system	18	297	10	315	15	
Female organs—						
Ovaritis	2	77	...	79	2	
Ovarian cyst	...	2	...	2	...	
Endometritis	...	20	1	20	2	
Displacement of uterus	...	4	...	4	...	
Vaginitis	...	12	...	12	...	
Amenorrhœa	...	22	...	22	...	
Dysmenorrhœa	...	43	...	43	4	
Menorrhagia	...	15	...	15	...	
Leucorrhœa	...	13	...	13	...	
Abortion	3	152	4	155	7	
Delayed labour	4	54	8	58	...	
Postpartum hæmorrhage	...	4	4	4	...	
Retained placenta	2	20	1	22	...	

TABLE 1—(*cont.*)

Return of Diseases and Deaths (in-patients) for the year 1923—(*cont.*)

Diseases.	Remaining in Hospital at the end of 1922.	Yearly total.		Total cases treated.	Remaining in Hospital at the end of 1923.	Remarks.
		Admissions.	Deaths.			
LOCAL DISEASES—(*cont.*)						
Female organs—(*cont.*)						
Premature birth	...	99	48	99	...	
Puerperal septicæmia	2	73	26	75	1	
Mastitis	...	5	...	5	...	
Abscess of breast	1	6	...	7	...	
Other diseases of female generative system	36	1,041	51	1,077	63	
Diseases of organs of locomotion—						
Osteitis	1	16	2	17	...	
Arthritis	13	206	3	219	16	
Spondylitis	2	6	1	8	1	
Bursitis	...	10	...	10	...	
Other diseases	26	476	16	502	31	
Disease of connective tissue—						
Cellulitis	35	482	48	517	42	
Abscess	72	1,706	35	1,778	91	
Elephantiasis	...	1	...	1	...	
Other diseases	8	182	19	190	8	
Diseases of the skin—						
Urticaria	...	17	...	17	1	
Eczema	11	361	...	372	19	
Boil	2	108	...	110	6	
Carbuncle	8	60	1	68	4	
Herpes	4	59	1	63	2	
Psoriasis	1	20	...	21	...	
Oriental sore	282	2,773	45	3,055	173	
Tinea	1	44	...	45	1	
Scabies	33	1,094	3	1,127	35	
Acne	...	...	...	...	...	
Prickly heat	...	10	...	10	...	
Other diseases of the skin	223	3,080	28	3,303	196*	
Injuries—						
General	24	782	28	806	32	
Local	183	4,678	111	4,861	157	
Surgical operations Major	51	800	110	851	62†	
Minor	147	7,166	49	7,313	179†	
Tumours	11	262	61	273	14	
Malformations	15	31	2	46	20	
Poisons	1	82	8	83	3	
Other diseases	2	25	4	27	2	
Parasites—Animal.—						
Protozoa	...	1	...	1	...	
Trematoda (flukes)	...	3	2	3	...	
Cestoda	...	...	...	...	...	
Tænia Solium	...	4	...	4	...	
Tænia Saginata	...	3	...	3	1	

* Ulcers 1848. † Not included in totals.

TABLE 1—(*cont.*)

Return of Diseases and Deaths (in-patients) for the year 1923—(*cont.*)

Diseases.	Remaining in Hospital at the end of 1922.	Yearly total.		Total cases treated.	Remaining in Hospital at the end of 1923.	Remarks.
		Admissions.	Deaths.			
Nematoda—						
Ascaris	78	2,429	29	2,507	71	
Tricocephalus dispar	...	97	...	97	...	
Trichina	...	...	...	...	...	
Dracunculus	...	1	...	1	...	
Filariasis	3	14	...	17	...	
Strongylus	...	...	...	...	...	
Ankylostomiasis	169	3,860	300	4,029	141	
Oxyuris	...	10	...	10	...	
Others	2	61	...	63	4	
Insecta—						
Myiasis	1	10	...	11	...	
No discoverable diseases and under observation	195	3,309	1	3,504	127	
Total ...	4,362	82,158	6,760	86,520	4,093	

TABLE 2.

MEDICAL STAFF AT 31ST DECEMBER, 1923.

1 Principal Medical Officer
4 Senior Medical Officers
2 Chief Surgeons
1 Opthalmic Physician
27 Medical Officers, 5 acting as Health Officers
4 Lady Medical Officers
1 Financial Secretary
2 Assistant Medical Officers
53 Assistant Surgeons
6 Dressers, Special Grade
56 Dressers, Grade I.
187 Dressers, Grade II.
165 Dressers, Grade III.
23 Dresser Probationers.
6 Head Sisters
35 European Sisters
43 Asiatic Nurses and Nurse Probationers
9 Native Midwives.

HEALTH BRANCH.

1 Senior Health Officer
3 Health Officers
7 Chief Sanitary Inspectors (one acting as Personal Assistant to P.M.O.)
3 Assistant Surgeons
5 Health Inspectors, Grade I.
22 Health Inspectors, Grade II.
1 Probationer Health Inspector.

INSTITUTE FOR MEDICAL RESEARCH.

1 Director
1 Bacteriologist
1 Assistant Pathologist
1 Chemist
2 Assistant Chemists
1 Malaria Research Officer
1 Librarian
1 Laboratory Assistant, Grade I.
3 Laboratory Assistants, Grade II.
3 Laboratory Assistants, Grade III.
1 Laboratory Assistant, Probationer.

CENTRAL MENTAL HOSPITAL.

1 Medical Superintendent
1 Senior Assistant Physician
1 Assistant Physician
1 Second Assistant, Physician
1 Inspector
1 Assistant Inspector
1 Dresser, Grade II.
1 Dresser, Grade III.
1 Matron
2 Nurses
1 Work Mistress
1 Steward
1 Storekeeper

VETERINARY BRANCH.

4 Veterinary Surgeons
1 Assistant Veterinary Surgeon
11 Veterinary Inspectors
6 Veterinary Assistants and Probationers.

ANNUAL REPORT OF THE INSTITUTE FOR MEDICAL RESEARCH, FEDERATED MALAY STATES, FOR THE YEAR 1923.

MELIOIDOSIS.

This subject has been further studied during the year and additional evidence has been obtained in demonstration of the specific character of the disease.

Most cases of melioidosis hitherto reported had not been examined by a medical man before death but during 1923 two cases were met with, both of which had been under observation in hospital for some days. These cases are of special interest as clinical notes are available and as one of them is the first recorded case in which the disease has been identified in a European. A detailed account of the cases will be published separately.

In neither case was the nature of the disease recognised during life and this has been true in all but four of the forty-eight cases in which melioidosis has been diagnosed. In one of the four cases *B. whitmori* was cultivated from the blood, in another from the urine, in a third from a pustular eruption, in the fourth the suspicions aroused by a "positive" agglutination test were confirmed by the cultivation of the bacillus from an abscess which appeared later.

As in animals, so in man the patient may die from a fulminating acute septicaemia or the disease may run a more chronic course. The signs and symptoms of the chronic form of the disease are dependent upon the distribution of the lesions. We have seen one patient in which the brunt of the disease fell upon the urinary system and the prominent symptoms were due to lesions of the kidney, ureters and bladder. In the majority of our cases the illness commenced as an acute septicaemia; if the patient did not succumb within the first few days he passed into the typhoid-like state of chronic septicaemia and abscesses formed in different organs. Every patient died in less than four weeks except two; one of these recovered after a long illness, while the other is still an invalid with abscesses, sinuses and chronic suppuration in the bones of his feet and legs, now more than two years after the commencement of the malady.

In the two patients who form the subject of this special report the onset of the disease was gradual. In other cases the illness has been characterised by a sudden onset accompanied by collapse and sometimes by a purging so violent as to suggest the diagnosis of cholera.

There are no definite clinical signs by which the disease can be recognised: a certain diagnosis can be made only by the cultivation of the causative organism. A "positive" agglutination reaction is of value as presumptive evidence, particularly if the titre of the serum increases after an interval, but this reaction is obviously of little value in the ordinary acute form of the disease. The organism has been cultivated from the blood and the urine of human cases and also from pustules and abscesses when these have been present. In one case of infection in a rabbit it was cultivated from the faeces. Where the lungs are involved, as they usually are, the injection into a guinea-pig of sputum or of material obtained by puncture of the lung might make the diagnosis clear. In cases of obscure fever associated with enlargement of the liver, this organ should be explored with a needle and glycerine agar slopes and animals should be inoculated with the material obtained. Whenever an abscess of the liver is aspirated or drained, glycerine agar slopes and guinea-pigs should be inoculated with the pus. We consider it probable that, in Malaya at least, some cases diagnosed as amoebic abscesses are really cases of melioidosis.

When we come to deal with the epidemiology of the disease, and attempt to learn in what way man becomes infected, we must confess ourselves still in difficulty. Melioidosis can be conveyed to rodents by subcutaneous inoculation, by introducing the virus into the nostrils or by feeding. In animals subcutaneous inoculation is followed by a local lesion before generalisation takes place, but there was no history of any such manifestation in our two patients. Infection by inhalation is unlikely except where a number of cases are closely associated. We are of opinion that the disease was conveyed to these men by the ingestion of food which had been contaminated by rodents infected with melioidosis.

Summary.

Two fatal cases of melioidosis are described. The first a robust Indian labourer; the second a well-nourished, muscular European.

In the first case the onset was gradual with irregular fever and pain in the epigastrium. There were no physical signs of disease at first, except enlarged spleen; later there were signs of consolidation at the bases of both lungs. The patient was constipated at first but diarrhoea came on towards the end and he collapsed and died at the end of the third week of his illness.

At the autopsy there were small patches of consolidation in the lungs and these patches were composed of minute suppurating tubercles. In the liver there were similar aggregations of small suppurating tubercles and two circumscribed abscesses. The gall bladder was thickened. The spleen was enlarged and contained septic infarcts and abscesses. In the caecum there were some small superficial ulcers. *B. whitmori* was cultivated from the lungs, spleen, liver and gall bladder.

A guinea-pig inoculated in the anterior nares with pus from the liver died nine days later with caseous inflamation of the nasal passages and inguinal glands from which *B. whitmori* was recovered. A guinea-pig inoculated subcutaneously with pus from the liver died on the twenty-fifth day with abscesses in the lymphatic glands from which *B. whitmori* was cultivated. A guinea-pig inoculated subcutaneously with a culture of the organism died within sixteen hours from septicaemia and *B. whitmori* was recovered from the heart and spleen. A guinea-pig inoculated subcutaneously with an attenuated culture died on the twenty-fifth day with suppurating buboes and with abscesses in the liver and lungs from which *B. whitmori* was cultivated. Two horses were inoculated subcutaneously with cultures of the strain of *B. whitmori* cultivated from the patient. An abscess developed at the site of inoculation in each case but the local lesion healed and the animals have so far remained healthy.

In the second case the illness commenced gradually with pain after food, occasional vomiting and looseness of the bowels. The temperature became high and of the swinging type, accompanied by rigors and sweats. The liver was enlarged. The patient died on the twenty-fifth day.

At autopsy, two large abscesses were found in the liver; the gall bladder was thickened and there were a few small superficial ulcers in the caecum. *B. whitmori* was cultivated from the liver abscess. No amoebae were found.

Two wild rats were inoculated subcutaneously with a culture from this case and both died from septicaemia in less than twenty-four hours; *B. whitmori* was recovered from the heart's blood. The result of inoculation of a guinea-pig was the same. A guinea-pig inoculated in the nostril died on the fifth day with a cheesy deposit in the nose and septicaemia. Another guinea-pig inoculated in the same way, but after the organism had been subcultivated repeatedly, died on the twelfth day, with caseous tracheal glands containing *B. whitmori*. A rabbit inoculated subcutaneously died in thirty-six hours from septicaemia with tubercles in the peritoneum. *B. whitmori* was cultivated from the peritonium and from the heart's blood. A monkey fed on a culture remained healthy. A pony inoculated intravenously has apparently recovered after a week's fever.

MALARIA AND QUININE.

In the annual report for 1922 reference was made to Dr. Fletcher's observations on rectal injections of quinine. His experiments showed that the injections were irritating and sometimes caused pain and tenesmus; that the passing of blood and mucus is a usual sequel; that the injections are quickly returned and are of little therapeutic value.

These conclusions were greatly at variance with established opinion. The Medical Research Council and the Medical and Sanitary Advisory Committee of the Colonial Office, after consideration of the report, asked that further investigations should be made. These investigations have now been completed and a detailed report of them will shortly be published. The following is a summary of the results:

(1) Injections given to guinea-pigs were returned too quickly to allow satisfactory absorption of quinine to take place.

(2) A series of rectal injections, two each day for at least six days, were given to two groups of men infected with malaria. The first group, consisting of ten patients, received 20 grains of quinine bihydrochloride, dissolved in four ounces of salt solution, at each injection. The second group, which comprised six men, received the same quantity of quinine, but it was dissolved in eight ounces of saline instead of four ounces.

In the first group, out of seventy-one injections, sixty-one were returned during the first twenty minutes; none was retained permanently; the average time of retention was thirteen minutes. Quinine was found in the urine only thirty-six times out of 132 injections.

In the second group of thirty-two injections in which the time was noted, three were retained permanently and the average time of retention for the remaining twenty-nine was seventeen minutes. Twenty-five were returned within twenty minutes. Quinine was found in the urine after thirty-three out of fifty-seven injections. In many of the cases where quinine was present the amount was very small. When 10 grains twice a day were given by the mouth, instead of 20 grains by the rectum, abundant quinine appeared in the urine.

(3) In eleven out of the sixteen cases of malaria in the two groups, 40 grains of quinine bihydrochloride given daily *per rectum* failed to get rid of asexual parasites within a week. Quinine was then administered to these patients by the mouth with the result that the parasites quickly disappeared.

(4) Rectal injections containing 2½ grains and 5 grains to the ounce were given to a healthy European but he was unable to retain them for more than ten or fifteen minutes and the absorption from 60 grains injected into the rectum appeared to be inferior to the absorption from 2½ grains given by the mouth.

(5) The presence of mucus and membranous shreds, passed by patients undergoing treatment with rectal injections of quinine, demonstrates the irritating action of the drug upon the mucous membrane.

(6) In view of these results we reiterate our former conclusion (Fletcher, 1923) that "quinine is too irritating for administration *per rectum*. It should not be given by this route if any other means are available".

BERI-BERI.

In 1922 the question of international action for the control of beri-beri was referred by Government to the Health Committee of the League of Nations and during the year inquiries were made in Malaya and other countries of the Far East by a representative of the League. It is understood that these inquiries did not disclose any satisfactory basis for international action through the intermediary of the League.

At the Fifth Congress of the Far Eastern Association of Tropical Medicine held in Singapore, September, 1923, the question of beri-beri was discussed at length. In the course of a discussion the vitamin deficiency view, as a complete explanation of the causation of beri-beri was opposed by Dr. Noel Bernard of Saigon, who postulated the existence of a secondary factor of infection as did his predecessor, Breaudat, at the 1913 Congress. Professor Megaw, who has studied the question of beri-beri and epidemic dropsy in Calcutta, stated the case against the vitamin deficiency view of beri-beri causation. In support of the vitamin deficiency theory Dr. Kiewiet de Jong of Java asserted that the theory which claimed beri-beri to be an avitaminosis was one of the best established truths of medical science.

Following the discussion in open Congress, the Council of the Association and a Sub-committee on beri-beri further discussed the question of beri-beri control through international action, the methods of standardisation of rice and the commercial and economic considerations involved. Official delegates to the Congress submitted statements on these questions. The statements of official delegates revealed a divergence of views which excluded the possibility of international action at present.

The resolutions finally adopted by the Congress are as follows:

1. The Fifth Congress of the Far Eastern Association of Tropical Medicine has considered the proposals of the Philippine Islands delegation for international action in the control of beri-beri, and has taken note of the views of the official delegates of Governments represented in the Congress.

2. The Association is of opinion that consequent upon the divergence of views disclosed in the statements of official delegates, any international convention is at present impracticable.

3. The Association reaffirms its opinion that beri-beri is a disorder of nutrition, and that in the Far East the principal factor in its causation is a diet of which overmilled rice forms the staple.

4. The Association recommends that interested Governments be invited to promote further research in the following questions in relation to beri-beri control:

(*a*) the standardisation of rice;
(*b*) the effects of transport and storage on rice;
(*c*) economic considerations.

5. The Association recommends that each of the Governments interested and the International Health Board of the Rockefeller Foundation be invited to nominate a representative on a "Beri-beri Committee" which shall report at the next Congress. The names of such representatives should be notified to the General Secretary-Treasurer.

6. The Association considers that, in the meantime, individual Governments should take such action for the control of beri-beri as may be suited to local conditions in their respective countries, and should devote special attention to devising and applying practical methods of improving the diet of the general population with regard to the too exclusive use of overmilled rice, and should be

requested to make available to the next Congress of the Far Eastern Association of Tropical Medicine systematic observations and statistical data showing the results of these methods.

7. The Association considers that educational methods of control on the basis of the available scientific knowledge should be vigorously applied in all countries.

In the Federated Malay States the following measures have been taken to restrict the use of overmilled rice: (*a*) Pamphlets in English and Chinese and advertisements in Chinese newspapers have been published pointing out the dangers of white (overmilled rice) and the advantages of early hospital treatment for beri-beri; (*b*) Undermilled rice is being produced in the Government rice mill for use in hospitals and public institutions; (*c*) Government is encouraging the production for local consumption of undermilled rice in small estate mills.

The fall in the incidence of beri-beri in the Federated Malay States during the past ten years has been so notable that it is thought that simple measures will suffice within a few years to abolish the disease. Even now the recorded incidence of the disease is believed to be in excess of its real incidence. Because of its ill-defined clinical character, "beri-beri" is a convenient diagnosis for any condition of which weakness of the legs is a feature. Within the past year we have seen cases diagnosed as beri-beri which turned out to be such widely different conditions as "traumatic myelitis" and "septicaemic plague".

TYPHOID SEPTICAEMIA.

Dr. W. Fletcher, Bacteriologist, and Mr. J. E. Lesslar, Assistant Pathologist, have reported a case of typhoid septicaemia without typhoid ulcers, a very rare condition. Their paper, of which the following is a summary, will be published elsewhere:

1. Two strains of *B. typhosus*, the one agglutinable, the other non-agglutinable, were isolated from the blood of a elderly Chinese labourer whose blood serum agglutinated *B. typhosus* in high dilutions.

2. *B. dysenteriae*, Flexner, type, X, was isolated from his faeces on each of the four occasions it was examined.

3. The patient died about six weeks after the commencement of his illness. There were two old pigmented scars just above the ileo-caecal valve but no typhoid ulcers. There was no marked thickening or inflamation of the gall-bladder, but an agglutinable strain of *B. typhosus* was cultivated from it.

4. It is an open question whether the patient was a chronic carrier of *B. typhosus* and the septicaemia the result of infection from an old focus in the gall-bladder, or whether on the contrary the gall-bladder had become recently infected as the result of a general septicaemia.

PLAGUE.

There was a small outbreak of plague in Kuala Lumpur during the months of April and May. Some cases of the septicaemic form of the disease presented considerable difficulty in diagnosis and the laboratory was able to render assistance in this connexion.

Two hundred doses of anti-plague vaccine were issued for prophylactic inoculation. Anti-plague serum was used in the treatment of cases but without any favourable result.

With the object of discovering cases of plague that might have escaped recognition before death, films were examined from dead bodies within the Kuala Lumpur Sanitary Board area. Of 179 specimens all were negative for *B. pestis*; in eight of these undiagnosed malaria was proved to be the cause of death.

Rats taken in the areas where cases of human plague occurred were systematically examined. Of 1,037 rats received from the Health Officer, Kuala Lumpur, 25 were found infected.

Live rats examined showed a flea index of 3.0 and all fleas were of the species *Xenopsylla cheopis*, the most efficient carrier of plague. It has been surmised that freedom from serious outbreaks of plague in the Federated Malay States might be due to the absence of an efficient transmitting agent, but this has proved to be untrue.

CHOLERA.

Apart from a small outbreak in the quarantine camp at Port Swettenham in December the country was free from cholera throughout the year.

Of eight specimens received for examination, three were positive for the cholera vibrio.

VENEREAL DISEASES.

The number of blood specimens received for examination by the Wassermann test for syphilis was 4,387; of these 4,120 were examined, the remainder being for one reason or another unsuitable, with a positive result in 1,992 cases.

A comparison of the results in Kahn's test and the Wassermann tests in 2,690 specimens resulted as follows:

Wassermann Test.		Kahn's Test.		
		(1) Weak positive.	(2) Positive.	(3) Negative.
(1) Weak positive ...	218	66	65	87
(2) Positive	1,112	100	867	145
(3) Negative	1,097	45	124	928
Anti-complementary ...	263	27	114	122

Percentage of agreement (1), (2) and (3) 83.47
,, ,, (1) and (2) 82.55
,, ,, (3) 84.59

Of 263 specimens which were anti-complementary by the Wassermann test, 53.61 per cent. were positive and 46.39 per cent. negative by Kahn's test.

Forty-seven specimens were examined by the direct method for *spirochaeta pallida* with a positive result in seven cases.

Twenty-five specimens were examined for gonococci in special cases with a positive result in fourteen.

ENTERIC FEVERS.

Five hundred and sixteen specimens of blood were examined by the agglutination reaction; 140 gave a positive result with *B. typhosus*, four with *B. paratyphosus A.* and seven with *B. paratyphosus B.*

RABIES.

Four specimens only were received for examination and two were positive, one from Seremban and one from Malacca. In 1922, twenty-seven specimens were received and in fourteen of these Negri bodies were identified.

The freedom of the country from rabies during the year may be fairly attributed to the highly efficient measures taken by the Police Department for the destruction of unlicensed dogs.

A number of house dogs were inoculated with anti-rabic vaccine by way of experiment in this method of rabies prevention but, in the absence of rabies among non-inoculated animals, there has been no opportunity of determining the value of this measure.

DIPHTHERIA.

One hundred and thirty-one specimens were received for examination by culture of *B. diphtheriae*. In 39 cases the specific organism was identified. In one case the characteristic spirochaetes and fusiform bacilli of Vincent's Angina were found in smears.

Thirty-six tubes of diphtheria anti-toxin were issued for use in treatment.

CEREBRO-SPINAL FEVER.

Fifty-seven specimens of cerebro-spinal fluid were received for examination. In eleven of these the meningococcus was identified, in seven the pneumonoccus, in one the influenza bacillus, in two streptococci and in one the tubercle bacillus.

Forty tubes of anti-meningococcus serum were issued for use in treatment.

LEPROSY.

One hundred and thirty-two specimens were examined for the presence of *B. leprae*; of 66 smears of nasal discharge, 19 were positive, and of 66 smears of exudate from nodules, 46 were positive.

TUMOURS.

One hundred and nine specimens of tissues were examined. Of these eight proved to be adeno-carcinoma, twelve epithelioma, one lymphosarcoma, three melanotic sarcoma and nine other forms of sarcoma. In one specimen, a polypoid growth from the nose of a Tamil, *Rhinosporidium kinealyi* was identified.

DIABETES AND INSULIN.

One hundred and eighty-two specimens of urine and blood were examined for the quantitative estimation of glucose in connexion with the insulin treatment of diabetes. The results of insulin treatment have varied greatly in different cases; some of this variation may be due to instability in the composition of insulin in tropical conditions.

DYSENTERY.

One hundred and forty-seven specimens of faeces from cases of supposed dysentery were examined by microscopic and bacteriological methods with the following results:

B. dysenteriae, Flexner	27
,, ,, Shiga	2
Entamoeba histolytica	31
Balantidium coli	1
Negative	86
Total ...	147

MEDICO-LEGAL.

Thirty-six specimens of blood stains were examined by the precipitin test for human blood; 25 gave a positive result.

MISCELLANEOUS.

There were 1,385 miscellaneous examinations; urine for the presence of quinine, blood films for parasites in special cases, sputum for the tubercle bacillus, and other clinical laboratory tests. Autogenous vaccines were prepared in 70 cases.

Eighty tubes of tetanus anti-toxin and 138 tubes of anti-streptococcus serum were issued for use in prophylaxis and treatment.

CHEMICAL LABORATORIES AND MALARIA BUREAU.

Reports on the work of the Chemical Laboratories by Mr. H. Marsden, Acting Chemist-in-Charge, and on the work of the Malaria Bureau by Dr. H. P. Hacker, Malaria Research Officer, are appended.

PUBLICATIONS.

The following publications were issued:

Notes on the treatment of Malaria with the alkaloids of Cinchona. W. Fletcher.

Vitamins and Diet. A. T. Stanton.

The control of Beri-beri in the Far East. A. T. Stanton.

Observations on human intestinal protozoa in Malaya. M. W. Jepps.

Protozoa of the human mouth in Malaya: *Entamoeba gingivalis* and *Trichomonas* sp. M. W. Jepps.

STAFF.

Mr. J. Shelton, Assistant Chemist, was transferred from the Geological Department and assumed duty on January 22nd.

Dr. W. Fletcher, Bacteriologist, was on leave from 26th January to 25th October.

Mr. R. W. Blair, Chemist, proceeded on long leave on 14th November.

Mr. S. Aloysius resigned the post of Librarian on 31st May and was replaced by Mr. V. Nagalingam on 1st September.

Mr. Yeo Seng Lee was appointed Probationer Laboratory Assistant with effect from 9th April.

A. T. STANTON,
Director of Government Laboratories,
Federated Malay States.

ANNUAL REPORT OF THE MALARIA BUREAU, INSTITUTE FOR MEDICAL RESEARCH, FEDERATED MALAY STATES, FOR THE YEAR 1923.

Monthly reports on the progress of work have been issued and the present report is a review of the subjects mentioned in those reports.

FIGURES RELATING TO FIELD AND LABORATORY WORK.

Figures showing the amount of material collected and dealt with in the laboratory appear in each of the monthly reports and the following are the total figures for the year:

Breeding places described	2,946
Larvae identified microscopically	54,011
Adults bred out and identified	13,415
Adults caught in houses	9,030
Adults tested for egg-laying capacity	1,760
Adults examined for malaria parasites	681
Blood specimens examined for malaria parasites	679

SEASONAL PREVALENCE OF SPECIES.

This subject has been studied continuously during the past three years and the first two years' results were reported in detail in the Annual Report for last year. The present year's results are very similar, and it is proposed to summarise the conclusions that may be drawn from them and to stop this method of work.

A. vagus has proved capable of laying fertile eggs and of emerging as adult from its larvae in each month during the whole period of the experiment. *A. aconitus* has proved capable of laying eggs throughout the whole period with the exception of July of this year. The completeness of the records with regard to these two species probably depends only on the readiness with which they can be obtained, forming, as they do, 90 per cent. of the specimens caught at the observation stations chosen by Dr. Lamborn.

Fortunately one, *A. vagus*, is a typical small pool breeder and the other is an equally typical representative of the large pool or swamp fauna.

In addition the following species have been proved capable of emerging as adults from their larvae in each month consecutively over a period of at least a year:

Small Pool Breeders.—

A. maculatus.

A. karwari.

A. kochi.

Swamp Breeders.—

A. barbirostris.

A. hyrcanus.

A. aconitus.

A. fuliginosus.

A. subpictus var. *malayensis.*

Jungle Breeders.—

A. leucosphyrus.

A. asiaticus.

There can be little doubt, therefore, that anophelines in this country have no definite breeding season but breed throughout the year, and this may be regarded as proved for *A. vagus*.

The prevalence of species does vary, however, at different times of the year. Curves were given in the last year's report showing the relation that rainfall bears to the monthly proportion between small pool breeders and swamp breeders, and in general, the curves for the present year are very similar to those of last year.

The rainfall was again greater at the beginning and end of the year, and the peaks on the rainfall curve occur in the same two months, namely, March (10.95 inches) and October (13.17 inches). The intervening months were the driest parts of the year and the curve reaches its lowest points in June (4.85 inches) and July (2.33 inches).

At the Malaria Advisory Board's cooly lines the pool breeders form 98.5 per cent. of the 5,845 specimens caught. They reach the maximum of 100 per cent. during the dry months of June, July and August, but fall to 95.5 per cent. in October and to 89.7 per cent. in December owing to the appearance of swamp breeders after the heavy rains of October.

At the house on Petaling Hill the small pool breeders form 52.2 per cent. of the 1,672 specimens caught. In February they form 33.4 per cent. of the catch and increase to 54.1 per cent. after the high rainfall of March, decreasing during the drier weather to their lowest point, 27.9 per cent. in July. At the end of the dry weather they increase rapidly to their maximum, 79.2 per cent. in September and decrease with the onset of rain in October to 48.3 per cent. and to 28.1 per cent. in November. The first rise in frequency was attributed in the last year's report to the increase of small pools during wet weather and the second larger rise to the swampy areas becoming suitable for these species during dry weather, and the fact that the third year's results agree so closely with those of the first two years gives support to this view.

The general conclusion that may be reached from this work is, therefore, that anophelines breed all through the year and increase in frequency when conditions become suitable. This is opposed to the idea which is commonly held by planters that it is safe to fell or prune vegetation during August and September on the assumption that *A. maculatus* does not breed then. It would seem dangerous to make conditions suitable for any species at any time of the year.

WORK AT KENT ESTATE.

During 1922 a change in fauna was noticed in certain drains on this estate and *A. kochi* was observed to take the place of *A. maculatus*. In May out of 454 specimens only one larva was *A. kochi* and the rest were *A. maculatus*. In November there was less breeding but out of 33 specimens 25 were *A. kochi* and only 8 *A. maculatus*.

During the present year 930 yards of drain, far away from houses and outside the oiling areas, were marked out and visited once a week to determine whether the change would recur, and if so at what time of the year.

With regard to the species found the year may be divided into the following four periods:

(1) From January to March 28th *A. kochi* was present but was far outnumbered by *A. maculatus* of which 3,644 specimens were caught as against 253 of *A. kochi*.

(2) From this time up to August 2nd *A. kochi* was not caught at all, and all the 1,996 specimens found were *A. maculatus*.

(3) At the next examination, on August 10th, a complete change had taken place. *A. kochi* had returned, 39 specimens were found and only 4 of *A. maculatus*. *A. kochi* remained predominant up till October 17th, 942 specimens being obtained against 40 *A. maculatus*.

The decrease of *A. maculatus* was as marked as the increase of *A. kochi*. In the last two weeks of the previous period the catches were 72 and 48, but during this period never more than eight were caught at one visit, and in the last two weeks *A. maculatus* was absent altogether.

(4) The last period, from October 24th to the end of the year, started with such heavy rain that the drains were flooded and no collections were obtained. When the first collection was made on November 14th, *A. maculatus* had returned and was breeding freely, 122 specimens were caught and only two of *A. kochi*. It maintained its predominance till the end of the year, affording 250 specimens against 73 of *A. kochi*.

These records show that *A. maculatus* was predominant during the first period, a period of abundant rainfall, and replaced *A. kochi* after the heavy rainfall of March when the water would be fresh and clean. They show that *A. kochi* became abundant and ultimately replaced *A. maculatus* during the dry period of the year when the water would become progressively fouler. These facts lead to the conclusion that polluted water inhibits *A. maculatus* and favours *A. kochi*, and the fact that *A. maculatus* returned after the drains had been cleansed by the floods of October adds confirmation.

The results of chemical analysis of the water by Mr. R. W. Blair also confirms this conclusion since the oxygen absorbed and the albuminoid nitrogen followed closely the alterations in species and were low when *A. maculatus* was common and high when *A. kochi* predominated. Thus on March 28th when both species were present the albuminoid nitrogen was 0.036 parts per 100,000, and on April 4th when *A. maculatus* alone was present it fell to 0.012 parts, rising to 0.048 parts on June 6th

when *A. maculatus* was still alone but less plentiful. When both were present but *A. kochi* the more common, on August 22nd, it had risen to 0.150 parts, and on October 10th when *A. maculatus* had died out it rose to 0.180 parts. On November 21st when *A. maculatus* had returned after the flooding of the drains it had fallen to 0.012 parts again.

During the beginning and end of the year when *A. maculatus* was the prevalent species the characteristic alga throughout the drains was *spirogyra* but in September when *A. kochi* was predominant this alga could not be found and its place was taken by the blue-green algae *spirulina* and *oscillaria*. It may be, as Dr. Lamborn suggested, that the *spirogyra* causes the prevalence of *A. maculatus* by acting as flood-material, but it is more probable that the change in the algae is a concomitant one depending on the alteration of the condition of the water.

The drains have been chosen so that the conditions in one part of the system can be altered artificially without affecting the rest of the area. Observations will be continued on the present lines throughout 1924 in order to ascertain the amount and kind of the breeding that occurs in nature and then it is proposed to use the area for experiments. When the work is complete a report containing the full data will be prepared.

WORK AT SUNGEI BESI.

Sungei Besi was visited once a week in order to test a suggestion that *A. karwari* might be replaced by *A. maculatus* at some period of the year. The work differs from that done at Kent Estate in that no definite area was visited but a search was made for places in which these species are likely to breed.

A. karwari was found all through the year, 1,778 adults bred out all proved to be *A. karwari* and only one *A. maculatus* was found in January. From the Kent Estate material 1,077 adults of *A. maculatus* were bred out and no *A. karwari*.

There seems to be no seasonal relationship between these species therefore, and the reason why similar larvae breeding in similar places should be *A. karwari* in some districts and *A. maculatus* in others is still a mystery.

KLANG WATER-SUPPLY.

The Klang water-supply is unfiltered and comes through pipes and reservoirs in jungle some eight miles away. A visit was paid to find out whether viable mosquito larvae were being conveyed into the town through the pipes.

In a closed mosquito-proofed service reservoir many specimens of midges, *Chironomus* spp., *Tanytarsus* spp., *Trichotanypus* spp. and a caddis-fly were found emerging but no mosquito, culicine or anopheline, was found. By filtering the water from taps through muslin living larvae and pupae of *Chironomus*, *Corethra*, etc., were found; but all these larval forms live submerged in the water and no evidence of the surface-living air-breathing larvae of mosquitoes was found. It seems unlikely that mosquito larvae would survive a journey through the pipes and in Klang it is almost impossible for them even to get into the pipes because the water is not taken from the surface but from a floating intake so arranged as to collect water from a foot below the surface.

WORK IN JOHORE.

This investigation was undertaken at the request of the management of an estate. Malaria was not regarded as a serious factor since the malaria sick rate in the Tamil labour force was under 2 per cent. per month and had shown a progressive decrease during the past three years, but there had been cases among the European staff and the management was anxious about the future. Mr. Ampalavanar spent two weeks on the estate with two collectors and prepared an excellent report on his findings.

Much more malaria was found than was suspected by the manager and the three men engaged in the field-work contracted malaria during their stay of a fortnight on the estate. The predominant species of anopheline was *A. maculatus* which was found in 173 or 72 per cent. of the 240 breeding places examined and formed 70 per cent. (1,366) of the 1,938 specimens collected. Out of 342 adult anophelines caught in houses 335 or nearly 98 per cent. were that species. *A. maculatus* was the only species found carrying the parasites of malaria and as many as 23 were found infected out of 199 dissected—a percentage of 11.5.

The main value of this work is the additional experimental evidence that it affords for regarding *A. maculatus* as a dangerous species. But the main point of interest is that a large amount of malaria may exist on an estate without showing a high rate for hospital admissions. The probable explanation of such cases is that the population has been stable or decreasing for some time and unless adequate precautions are taken a severe outbreak of malaria may be predicted when new labourers are recruited.

WORK AT SABAK BERNAM.

The problem is the cause of an outbreak of malaria in the district which up to recently had been free from malaria. Owing to the courtesy of the Manager of Torkington Estate a field laboratory has been sent up on the estate which forms an excellent centre from which to follow the course of the outbreak and to study various problems in connection with malaria on the coastal plain.

The most striking feature of the work has been the discovery of five infected specimens of *A. barbirostris* out of 103 specimens dissected for parasites. Three of the specimens were caught at Sabak Bernam but the others came from outlying parts of the district, one from near the coast 10 miles away and the other from across the Bernam River. There can be little doubt that this species, which does not appear to cause malaria in the other parts of the country, is an important factor in the outbreak. The work was being continued at the end of the year and a detailed report on the results will be issued in 1924.

GENERAL.

There seems to have been more contact of the laboratory with the outside public during the present year. Forty-eight reports were issued on specimens sent for identification as against 19 last year. Sixteen batches of specimens were sent out to Health Officers and other authorities. A demonstration of specimens was prepared for the Malaria Advisory Board's stall at the Agri-Horticultural Society's show in June.

There have been more visitors to the laboratory and museum during the year and the Bureau was honoured by visits from the Conference of Health Officers in April and from the Far Eastern Association of Tropical Medicine in September.

H. P. HACKER,
Malaria Research Officer.

ANNUAL REPORT OF THE CHEMICAL LABORATORIES, INSTITUTE FOR MEDICAL RESEARCH, FEDERATED MALAY STATES, FOR THE YEAR 1923.

Chemical investigations and routine analyses are carried out in the Chemical Laboratories for the following Government departments: Medical, Trade and Customs, Police, Railway and Public Works.

The total number of samples examined during the year was 6,521 as compared with 2,702 in 1922. The increase is principally in samples of chandu dross and in counterfeit coins.

I.—MEDICAL DEPARTMENT.

The work for this department consists mainly in the examination of samples of milk, water and toddy. The total number of samples examined was 1,651.

(*a*) Milks.

The total number of samples analysed was 774 as compared with 657 in 1922; 759 were samples of fresh milk and 14 samples of condensed milk.

The majority of the samples of fresh milk were submitted under the provisions of "The Sale of Food and Drugs Enactment, 1913". Certificates of analysis were issued in respect of 107 samples which failed to comply with the standards prescribed under this Enactment. Eighteen of these samples were deficient in milk fat, 86 were deficient in non-fatty solids, and three were deficient in both, that is, they were skimmed and watered.

The number of samples received from each State, with the number and percentage of unsatisfactory samples, is shown in the table below:

State.	Number received.	Unsatisfactory.	
		Number.	Percentage.
Selangor	485 ...	67 ...	13.8
Perak	242 ...	32 ...	13.2
Negri Sembilan	14 ...	7 ...	50.0
Pahang	18 ...	1 ...	5.6

Fourteen samples of condensed milk were examined. These consisted of milk powder, unsweetened and sweetened condensed milks.

(*b*) Waters.

Chemical analyses were carried out on 343 samples, and bacteriological examinations on 40 samples of water.

Kuala Lumpur Supply.—The raw waters from the Impounding Reservoir and from the Intake Works at Ampang, and the filtered waters from Maxwell's Hill and Weld Hill Service Reservoirs were examined weekly.

The raw waters are filtered through sand filter beds. Owing to constructional alterations and the cleaning of the filter beds, there was no filtration during the following periods:

Impounding Reservoir... ... 20th August, 1923, to 30th September, 1923
Intake Works, Ampang ... 28th May, 1923, to 30th September, 1923

Average analyses for each month and for the year are given in Table 1.

Proposed New Supply for Kuala Lumpur.—During the period 15th May, 1923, to 30th July, 1923, samples of raw waters from the proposed intakes on the Sungei Sleh and Sungei Klang were examined weekly. As judged by the chemical and bacteriological results, the raw water from the Sungei Sleh is considerably better than the raw water from (1) the Sungei Klang, (2) the Impounding Reservoir, Ampang, (3) the Intake Works, Ampang.

Klang Supply.—In last year's report it was mentioned that it had been decided to treat this water with chlorine. A Paterson chloronome No. 2 (large) pulser has been erected by the Paterson Engineering Company at the Klang Service Reservoir. The raw water from the Ayer Kuning Reservoir has now been treated with chlorine since September, 1923. The addition of 0.5 part of chlorine per million effected a 71 per cent. reduction in the number of bacteria. By increasing the dose of chlorine to 0.75 part per million the reduction in the number of bacteria was increased to 84 per cent.

The Kuala Lipis and Pekan water supplies were visited and reported on.

Chemical investigations have been carried out in connection with Teluk Anson and Carey Island supplies.

Thirty-three samples of water from Kent Estate were examined for the Malaria Research Officer.

Four samples of the effluent from the new Activated Sludge Sewage Plant at Carcosa were examined. All the samples were inoffensive.

(*c*) Toddy.

Four hundred and sixteen samples of toddy were examined. The majority of the samples were from licensed toddy-shops. Two hundred and forty-nine of the samples were from the shops under the control of estate managers.

In eight cases the acidity, calculated as acetic acid, exceeded 0.8 per cent., the highest being 2.5 per cent. No sample contained more than 10 per cent. of absolute alcohol by volume.

The number of samples from each State, and the number in which the acidity exceeded 0.8 per cent. is shown in the following table:

State.	Number of Samples.	Number of samples. Acidity over 0.8 per cent.
Selangor	237	... 5
Perak	135	... 3
Negri Sembilan	27	... —
Pahang	17	... —

(*d*) Liquors.

Two samples of stout and one of gin were examined.

(*e*) Oils.

One sample of castor oil for medicinal use was examined.

(*f*) Toxicological Analyses.

Human Poisoning.—Three cases were investigated, poison being found in the viscera in two cases.

(1) *Hydrochloric Acid.*—A native employed in a tinsmith's shop accidentally drank spirits of salt and died. The oesophagus and the mucous membrane of the stomach were corroded. Free acid and chlorides were found in the vomit and in the stomach.

(2) *Arsenic.*—An estate cooly was taken ill suddenly, collapsed and died. One-eightieth of a grain of arsenic was recovered from the stomach and contents, kidney and portion of the ileum.

(3) *Morphine.*—In this case the deceased had been taking large quantities of morphine by injection for two or three years, and was known to have been supplied with eight grains daily. Morphine hydrochloride and strychnine sulphate were found in his house. The stomach and stomach contents were analysed. No morphine was found, but one-thirtieth of a grain of strychnine was found in the stomach and one-twentieth of a grain in the stomach contents.

Other Animal Poisoning.—Viscera from four animals were examined for arsenic which was found in one case.

Viscera from four rats were examined for barium carbonate, a common rat poison. No barium carbonate was found.

Miscellaneous Exhibits for Poison.—One sample of bread, one medicine and one plant were examined. No poison was found in the bread or medicine. The plant was identified as *Euphorbia tirucalli*, the acid juice of which is well known in India as a purgative.

(*g*) Miscellaneous Samples.

Forty-five miscellaneous samples included:

Bloods for sugar (7), urine for sugar (5), quinine salts (7), cinchona febrifuge (1), disinfectants (3), tartar emetic (2), magnesium sulphate (1), bismuth subnitrate (1), neosalvarsan (2), other medicines (5), chloroform (1), carbon tetrachloride (1), methyl alcohol (2), iodine (1), bread (1), ghee (1), tea (1), coffee (1), roasted beans (2).

(*h*) Vitamin B Extract.

The preparation of this extract from rice polishings, for use in the treatment of beri-beri, was continued throughout the year. During the year 5,192 fluid ounces were prepared, and 5,159 fluid ounces were issued to medical practitioners, dispensaries and hospitals. Seven hundred and thirteen ounces were issued free, the remainder was sold at 25 cents an ounce, this being the estimated cost of production. The revenue from this source was $1,111.

II.—TRADE AND CUSTOMS DEPARTMENT.

Work for this department consists chiefly in the examination of liquors in connection with the assessment of duty, and the examination of samples of chandu and chandu dross under the Chandu Enactment.

The total number of samples examined was 3,619 as compared with 719 in 1922.

(*a*) *Liquors.*—In 61 samples the alcoholic strength was determined. Twenty samples were examined for denaturants, of which four did not contain the necessary ingredients.

(*b*) *Toddy.*—The acidity and alcoholic strength were estimated in 59 samples.

(*c*) *Chandu.*—Sixty-one samples of chandu and substances suspected to contain chandu were examined. Forty of these were found to be Government chandu, eight illicit chandu, one chandu prepared from Government chandu dross, and three imitation chandu containing no opium. Other samples were raw opium, exhausted dross and pills.

(*d*) *Chandu Dross.*—The number of samples of chandu dross examined was 3,402, as compared with 224 in 1922.

The samples were graded as follows:

Grade	I	3,353
,,	II	46
,,	III	3

(*e*) *Deleterious Drugs.*—Three samples were examined, of which two contained morphine hydrochloride. The other substance was a sample of "Jarda", said to be an Indian smoking mixture consisting of tobacco, betel-nut and perfume. Tobacco was identified in this mixture and no deleterious drug was found.

(*f*) *Miscellaneous Samples.*—Thirteen samples were examined including rubber coupons (5), oil for flashpoint (1), poppy seeds (1), toddy vinegar (1), alum (2), borax (1), and two suspected ganja, one of which contained ganja.

III.—POLICE DEPARTMENT.

The work for this department includes the examination of counterfeit coins and coining materials, stains for blood, exhibits for poison, liquors and toddy.

(*a*) *Coins and Coining Materials.*—The number of exhibits examined was 993, of which 967 were counterfeit coins, 19 genuine coins, three moulds, one piece of metal and three chemicals used in the manufacture of counterfeit coins.

(*b*) *Stains.*—The number of exhibits examined for blood was 106, of which 43 gave positive results. Thirty-six of the exhibits which gave positive reactions for blood were examined by the precipitin test for human serum; 23 of these gave a positive reaction. The classification of the exhibits and the results of the tests are shown in the table below:

Exhibits.	Number examined.	Number blood-stained.	Number human blood.
Iron weapons	34 ...	10 ...	4
Articles of clothing ...	48 ...	25 ...	15
Wood, mats, atap, etc. ...	22 ...	8 ...	4
Miscellaneous	2 ...	— ...	—

(*c*) *Toxicological Analyses.*—Twenty-four analyses were made of which 15 were human viscera.

Human Poisoning.—Poisons were identified in only four cases.

Potassium Cyanide.—Two cases of suicide.

(1) A Chinaman was found dead in a lodging-house. Post-mortem examination showed internal organ congested. The stomach contained about three ounces of a dark-coloured fluid with a strong smell of hydrocyanic acid. Potassium cyanide was detected in this fluid.

(2) A Chinese woman, during a quarrel with her husband, a goldsmith, swallowed potassium cyanide. Potassium cyanide was detected in the viscera.

Arsenic.—Two cases.

(1) A Chinese boy, aged four years, died 33 hours after a meal of rice, fish and Chinese cake. Post-mortem examination showed lips and tongue eroded, general inflammation of the alimentary canal and oesophagus and intestines inflamed. From the stomach and contents and liver one-fortieth of a grain of arsenic was recovered.

(2) A male Tamil vagrant was found dead. Post-mortem examination showed liver, kidney and spleen congested, large and small intestines acutely inflamed and the entire mucous membrane a bright red colour. On analysis a minute trace (six ten-thousandths of a grain) of arsenic was recovered from the liver. No arsenic was found in the stomach and contents.

In another case of suspected human poisoning a male Tamil cooly suddenly became ill and died on the way to hospital. On analysis of the stomach and contents a small quantity of a substance which gave general alkaloidal reactions was recovered but the quantity of material was too small for identification.

Other Exhibits for Poison.—Six medicines, two powders and one curry were examined. Morphine hydrochloride was found in two of the medicines, no poison in other four. The two powders were suspected to contain datura but no datura was found. Powdered glass was found in the curry.

(*d*) *Liquors.*—Alcohol was estimated in 34 samples.

(*e*) *Toddy.*—Six liquids suspected to be toddy were found to be toddy.

(*f*) *Deleterious Drugs.*—Four powders were received for examination for deleterious drugs. Three were found to be morphine hydrochloride, the other was lactose, a substance frequently used as an adulterant of morphine hydrochloride.

(*g*) *Miscellaneous Exhibits.*—These included ganja (11), datura seeds (4), powders (3), cartridges (2), bomb (1) and one document.

IV.—OTHER DEPARTMENTS.

Twenty-six examinations were undertaken for other Government departments. These included eight waters, one piece of zinc and one sample of copper for the Railway Department, seven waters, one sample of lime and one sample of scrapings from a water main for the Public Works Department, three photographic chemicals for the Survey Department, and three samples of milk and one toddy for the District Officer, Kuantan.

V.—PRIVATE ANALYSES.

Thirty-six examinations included: Rubber coupons (9), waters (8), samples of coke (5), oils for flash point (3), urines for sugar (2), milk (2), condensed milk (1), butter (1), whisky (1), other liquors (2) and exhibits for poison (2).

The fees for these analyses amounted to $398.

LEGAL PROCEEDINGS.

Members of the staff attended Courts in various parts of the country on 28 occasions.

STAFF.

Mr. J. Shelton, Geological Chemist, was transferred to this department and assumed duties on January 22nd.

Mr. R. W. Blair, Chemist, proceeded on leave on November 14th.

H. MARSDEN,
Acting Chemist, Government Laboratories, F.M.S.

Appendix A.

Total number of Analyses and Examinations made in the Chemical Laboratories during the year 1923.

	Number of Analyses.
Medical Department.—	
Milk	774
Condensed milk	14
Waters, chemical	343
Waters, bacteriological	40
Sewage effluents	4
Toddy	416
Liquors	3
Oils, fixed	1
Toxicological analyses	11
Miscellaneous	45
Trade and Customs Department.—	
Liquors	81
Toddy	59
Chandu	61
Chandu dross	3,402
Deleterious drugs	3
Miscellaneous	13
Police Department.—	
Coins and coining materials	993
Articles for blood stains	106
Toxicological analyses	24
Liquors	34
Toddy	6
Deleterious drugs	4
Miscellaneous	22
Other Departments.—	
Miscellaneous	26
Private Analyses.—	
Waters	8
Milk	3
Spirits	3
Toxicological analyses	2
Miscellaneous	20
Total	6,521

TABLE 1.

Chemical Averages for each month of the year 1923. Parts per 100,000 unless otherwise stated—Kuala Lumpur supply.

Month.	Impounding Reservoir. (Raw Water.)								Intake Works, Ampang. (Raw Water.)							
	Colour M. M. Brown.	Ammoniacal nitrogen.	Albuminoid nitrogen.	Oxygen absorbed in 3 hrs.	Chlorine.	Total solids.	Oxidized nitrogen.	Rainfall in inches.	Colour M. M. Brown.	Ammoniacal nitrogen.	Albuminoid nitrogen.	Oxygen absorbed in 3 hrs.	Chlorine.	Total solids.	Oxidized nitrogen.	Rainfall in inches.
January	22	.0005	.0144	.1610	.08	3.75	.002	7.87	23	.0006	.0069	.1658	.06	2.75	.004	8.54
February	20	.0006	.0126	.1498	.08	3.50	.006	4.16	21	.0009	.0090	.1650	.07	4.25	.006	7.61
March	24	.0006	.0088	.1401	.08	4.00	.002	8.04	21	.0003	.0073	.1705	.06	3.50	.004	9.08
April	18	.0003	.0111	.1553	.08	3.75	.002	7.04	27	.0011	.0082	.2119	.06	4.50	.006	8.09
May	20	.0004	.0128	.1615	.08	3.75	.004	6.94	29	.0007	.0072	.1982	.06	3.25	.008	6.42
June	22	.0004	.0120	.1783	.08	0.75	.004	6.60	24	.0005	.0063	.1585	.06	4.75	.006	6.46
July	22	.0006	.0102	.1677	.08	5.50	.003	3.16	26	.0007	.0053	.1475	.06	4.65	.006	4.17
August	27	.0006	.0104	.2163	.07	5.50	.008	9.80	28	.0009	.0060	.1966	.07	3.75	.006	10.34
September ...	25	.0005	.0080	.2020	.06	4.50	.009	7.67	23	.0008	.0063	.2078	.05	5.00	.005	10.27
October	20	.0003	.0152	.1921	.07	4.00	.003	14.86	25	.0010	.0086	.2200	.07	5.00	.002	12.29
November	19	.0014	.0130	.1919	.06	4.25	.004	14.34	21	.0006	.0052	.1722	.05	3.50	.004	13.36
December	20	.0019	.0112	.1671	.06	4.25	.004	10.39	19	.0011	.0086	.2172	.06	4.00	.001	8.25
Averages ...	22	.0007	.0116	.1736	.07	4.00	.004	8.41	24	.0008	.0071	.1859	.06	4.00	.005	8.74

Month.	Maxwell's Hill Reservoir. (Filtered Water.) *							Weld Hill Reservoir. (Filtered Water.) †						
	Colour M. M. Brown.	Ammoniacal nitrogen.	Albuminoid nitrogen.	Oxygen absorbed in 3 hrs.	Chlorine.	Total solids.	Oxidized nitrogen.	Colour M. M. Brown.	Ammoniacal nitrogen.	Albuminoid nitrogen.	Oxygen absorbed in 3 hrs.	Chlorine.	Total solids.	Oxidized nitrogen.
January	18	.0000	.0049	.0841	.06	...	...	20	.0000	.0049	.1103	.05	3.25	.006
February	16	.0000	.0039	.0861	.07	2.25	.010	17	.0000	.0042	.1225	.06	2.00	.006
March	18	.0000	.0032	.0680	.06	3.50	.008	20	.0000	.0038	.1210	.05	3.50	.006
April	14	.0000	.0038	.0749	.08	2.25	.004	20	.0000	.0048	.1430	.06	1.25	.008
May	14	.0000	.0034	.0786	.07	3.00	.004	22	.0000	.0040	.1305	.06	4.75	.008
June	18	.0007	.0050	.0959	.07	5.00	.006	25	.0005	.0058	.1771	.06	5.00	.006
July	16	.0001	.0043	.0852	.08	3.90	.002	24	.0003	.0048	.1448	.06	4.00	.006
August	26	.0005	.0042	.1520	.07	4.25	.008	28	.0006	.0060	.1953	.07	4.50	.006
September	25	.0004	.0048	.2125	.06	3.70	.010	25	.0005	.0049	.1819	.06	4.50	.011
October	17	.0002	.0056	.1100	.07	3.00	.002	27	.0000	.0053	.1759	.07	3.50	.004
November	15	.0002	.0044	.1090	.06	3.50	.006	23	.0000	.0038	.1424	.05	3.75	.006
December	15	.0000	.0047	.1022	.06	3.50	.006	17	.0002	.0032	.1139	.06	3.50	.006
Averages ...	18	.0002	.0043	.1049	.07	3.50	.006	22	.0002	.0046	.1465	.06	3.60	.007

* No filtration during period 20th August, 1923—30th September, 1923.

† No filtration during period 28th May, 1923—30th September, 1923.

REPORT OF THE SENIOR HEALTH OFFICER, FEDERATED MALAY STATES, FOR THE YEAR 1923.

HEALTH STAFF.

1. The sanctioned staff of the Health Branch of the Medical Department includes a Senior Health Officer, 15 Health Officers, 8 Chief Sanitary Inspectors (Europeans) and 28 Sanitary Inspectors (Asiatics).

2. Up to date there never has been a sufficiency of Health Officers to fill the various posts and the work has been carried on with the aid of what assistance the Medical Branch could afford to give.

3. For the greater part of the year the European staff consisted of the Senior Health Officer; 4 Health Officers; 6 Medical Officers and 8 Chief Sanitary Inspectors.

The Asiatic staff was up to strength.

4. The changes in the European staff were as follows :

Dr. A. R. Wellington returned from leave in February and resumed duty as Senior Health Officer.

Dr. J. G. Castellain reverted to the Medical Branch on the 12th of July.

Dr. J. L. Gregory resigned on the 5th of August.

Dr. E. H. Black proceeded on home leave on November 11th.

REVENUE AND EXPENDITURE.

5. The revenue collected during the year was $2,280 as against $1,565 for 1922. Practically the only revenue is that obtained for certificates issued under the Registration of Births and Deaths Enactment.

The expenditure debited against the votes administered by the Health Branch was :

Personal emoluments	$160.054
Temporary allowance	38,729
Other charges annually recurrent	63,922
Other charges special expenditure	21,502
	$284,208
Clerical service	35,101
Total ...	$319,309

GENERAL REVIEW OF WORK DONE BY THE HEALTH BRANCH.

6. The duties of the members of the Health Branch include :

(i) Vital statistics and work under the Registration of Births and Deaths Enactment.

(ii) Malaria investigation and control, and anti-mosquito measures.

(iii) Work under the following Enactments :

(*a*) Quarantine and Prevention of Disease Enactment;

(*b*) Sanitary Boards Enactment;

(*c*) Sale of Food and Drugs Enactment;

(*d*) Labour Code.

(iv) General, including inspection of schools, Government lines, etc.

7. The paucity of Health Officers necessitated cutting the coat according to the cloth. Certain duties which otherwise would have been done were left undone, and others were only partially done.

8. Work under the registration of births and deaths was behind-hand and extra clerks had to be employed to bring the records up-to-date.

9. Work in connection with Malaria and Mosquito Destruction Boards took up much of the time of the Health Officers. In this line the European Sanitary Inspectors rendered valuable assistance.

10. Under the Quarantine and Prevention of Disease Act the work was shared with the Medical Branch. There were no epidemics of any magnitude. The few outbreaks there were, were checked before they had developed far.

11. Under the Sanitary Boards Act the work was chiefly done by Sanitary Inspectors under the supervision of the Chairman, Sanitary Board, the Health Officer acting as Adviser only.

12. Under the sale of Food and Drugs Act little was done as the pressure of other duties prevented the attention being given to the subject which its importance merited.

13. Work under the Labour Code suffered and the estates and estate hospitals were not visited as often as they would have been had there been the staff available.

14. School inspection was mostly done by the Sanitary Inspectors, as was also the inspection of Government lines.

15. During the year a new scheme for Sanitary Inspectors was approved by the Secretary of State for the Federated Malay States and the Straits Settlements.

16. The Fifth Congress of the Far Eastern Association of Tropical Medicine was held in Singapore in September. The Senior Health Officer attended as one of the Federated Malay States delegates.

After the close of the meetings the majority of the delegates made a tour through the Federated Malay States, where they were socially entertained and made acquainted with matters of medical and hygienic interest.

HEALTH LEGISLATION.

17. The Laws influencing the Public Health passed in 1923 were:

The Burials Enactment Amendment;

The Midwives Enactment;

The Labour Code, 1923;

The Children's Enactment;

Also Rules under the following:

The Sanitary Boards Enactment;

The Deleterious Drugs Enactment;

The Sale of Food and Drugs Enactment.

VITAL STATISTICS.

18. Populations are estimated from the census figures which are believed to be accurate. Immigration and emigration have much more influence on the population than have births and deaths, and the numbers are steadily increasing despite the fact that the death-rate is often higher than the birth-rate.

Accurate data of the number of immigrations and emigrations especially those by rail are not available and tables cannot be prepared.

19. Increase in population is calculated on the arithmetical increase basis as experience has shown this to be more reliable than the geometrical basis.

20. Births and deaths figures are obtained from notifications made under the Births and Deaths Registration Enactment which applies everywhere. The total number of births and deaths is approximately correct. The accuracy of the diagnoses as to the causes of deaths is in the majority of cases open to question for only a small proportion of those who died had been attended by medical men during their last illnesses. In each of the four large towns every uncertified body is viewed by a qualified Assistant Surgeon who interrogates the friends of the deceased and forms a diagnosis. In the rural districts these duties are carried out by the Police.

21. With regard to deaths in towns—owing to the difficulty of getting proper fixed addresses—it has been customary to debit a death against a town when the deceased resided there for one month or over previous to death.

22. The large towns all contain hospitals which cater not only for the town people but those of the surrounding area. Towns attract chronic cases of disease and thus it often happens that a person so ill as to be unfit for work drifts to a town and there remains in a hospital or a common lodging-house until he dies. If he survives a month his death is debited against the town though strictly it should be debited against the district where the disease was contracted.

23. The above explanation is necessary in order that towns shall not be judged on their death-rates alone. Kuala Lumpur has over 1,000 hospital beds and all cases of malaria which died there and which were debited against the town did not contract the disease in the town.

24. In the Straits Settlements the qualifying period is three months. Three months is a fairer period and in future years three months will be the qualifying period for the Federated Malay States.

25. Assuming that the population has increased at the same rate as during the intercensal period and judging from the sickness and death returns furnished to the department the health of the people during the year 1923 was better than that of any year under record.

26. The reason for this improvement must to some extent be ascribed to the efforts of the various authorities, public and private, past and present, who have been concerned with the prevention and abatement of disease; but how much is due to these sources and how much to nature it is impossible to say.

27. The general death-rate was 24.40 per mille, this being the lowest yet recorded for any year. Nearly half the deaths (45.75 per cent.) were attributed to "fevers" a large proportion of which were probably malaria.

28. Dysentery and diarrhoea accounted for 6.33 per cent. of the total deaths, pulmonary tuberculosis for 5.70 per cent. and pneumonia for 4.77 per cent. Comments on these diseases will be found under their respective headings. For convenience of comparison statistics have been arranged under the headings Federal, State, Large Towns.

29. Because of the peculiar age and sex distribution and the fact that the labour of the country is largely imported males from 20 to 45 years of age, and because of the fact that the majority of the labourers passed the doctor before being accepted the death figures cannot be compared with countries where the population is indigenous. With normal age and sex distribution the death-rate would probably be more than twice what it now is.

VITAL STATISTICS (FEDERAL).

Population.

30. The population of the Federated Malay States as estimated was at the end of June, 1923, 1,389,667.

The race distribution was as follows:

Europeans and Americans	6,226
Eurasians	3,329
Malays and other races of the Archipelago	531,067
Chinese	508,342
Indians	335,089
Others	5,614
Total	1,389,667

Births.

31. Thirty-five thousand six hundred and fifty-three births were registered during the year, giving a birth-rate of 25.66 per mille of population. In 1922 the number was 34,906 and the rate 25.65.

The following table shows the number of births and birth-rates according to races:

Race.	No. of births.	Birth-rate.
Europeans and Americans	126	20.24
Eurasians	102	30.64
Malays and other races of the Archipelago	19,250	36.25
Chinese	9,084	17.87
Indians	7,023	20.96
Others	68	12.11

Deaths.

32. Thirty-three thousand nine hundred and fourteen deaths were registered, giving a death-rate of 24.40 per mille. The number of deaths in 1922 was 35,028 and the rate was 25.74.

The distribution of deaths among the several races was as follows:

Race.	No. of deaths.	Death-rate.
Europeans and Americans	34	5.46
Eurasians	42	12.62
Malays and other races of the Archipelago	13,111	24.69
Chinese	12,016	23.64
Indians	8,635	25.77
Others	76	13.54

33. The deaths and death-rates for the total population for the last ten years were as follows :

Year.	Population.	Deaths.	Rate per mille.
1914	1,136,500	39,000	34.31
1915	1,172,336	33,899	28.92
1916	1,208,177	36,985	30.60
1917	1,244,018	42,514	34.17
* 1918	1,279,859	67,639	52.85
1919	1,315,700	38,645	29.37
1920	1,351,541	43,705	32.34
1921	1,304,825	38,077	29.18
1922	1,360,876	35,028	25.74
1923	1,389,667	33,914	24.40

34.— TABLE SHOWING CAUSES OF DEATHS IN 1923.

Diseases.	No. of deaths.	Rate per mille.
Malaria	15,516	11.17
Dysentery and Diarrhoea	2,142	1.55
Pneumonia	1,619	1.17
Pulmonary Tuberculosis	1,934	1.39
Ankylostomiasis	388	0.28
Beri-beri	378	0.27
Syphilis	89	0.06
Enteric	29	0.02
Tetanus	62	0.04
Diphtheria	8	0.01
Convulsions	3,364	2.42
Other diseases	8,385	6.03

35. The following table shows the deaths and death-rates from the principal diseases for the last ten years :

Year.	Malaria.		Dysentery and diarrhoea.		Pulmonary tuberculosis.		Beri-beri.	
	Deaths.	Rate.	Deaths.	Rate.	Deaths.	Rate.	Deaths.	Rate.
1914	13,634	11.99	5,235	4.60	1,655	1.45	1,223	1.07
1915	15,208	12.97	3,148	2.63	1,995	1.70	871	.74
1916	17,627	14.58	3,197	2.64	2,193	1.81	757	.62
1917	18,750	15.07	4,942	3.97	2,446	1.96	1,207	.97
†1918	31,515	24.62	4,280	3.34	3,184	2.48	1,277	.98
1919	16,975	12.90	3,712	2.82	2,445	1.86	939	.71
1920	20,595	15.24	3,804	2.81	2,634	1.95	431	.32
1921	17,168	13.16	2,999	2.30	2,255	1.73	422	.32
1922	15,570	11.44	2,419	1.78	2,393	1.76	443	.33
1923	15,516	11.17	2,142	1.55	1,934	1.39	378	.27

VITAL STATISTICS (*State figures for comparison*).

36.— *Birth Table.*

State.	No. of births.	Birth-rate per 1,000 living.	1922 Birth-rates.
Perak	16,274	26.14	26.59
Selangor	10,120	23.81	23.64
Negri Sembilan	4,893	25.79	24.60
Pahang	4,366	28.68	28.68

* High figure due to influenza epidemic. † Influenza epidemic year.

37.— *Birth Statistics of different nationalities.*

State.	Europeans and Americans.		Eurasians.		Malays and other races of the Archipelago.		Chinese.		Indians.		Others.	
	Births.	Birth-rate.	Births.	Birth-rate.	Births.	Birth-rate.	Births	Birth-rate.	Births.	Birth-rate.	Births.	Birth rate.
Perak	46	20.99	27	26.84	8,997	36.26	4,264	18.85	2,908	20.32	32	16.08
Selangor	70	25.74	55	32.87	3,552	36.31	3,101	17.71	3,322	22.79	20	9.89
Negri Sembilan	7	6.97	15	28.30	3,100	39.03	1,111	15.73	645	17.38	15	15.66
Pahang	3	9.69	5	40.65	3,901	34.08	638	16.74	148	16.16	1	1.55

38.— *Death Table (State figures for comparison).*

State.	No. of deaths.	Death-rate.	1922 Death-rate.
Perak	15,613	25.07	25.93
Selangor	9,933	23.37	25.31
Negri Sembilan	4,679	24.67	26.60
Pahang	3,689	24.24	25.11

39.— *Deaths and death-rates of different nationalities.*

State.	Europeans and Americans.		Eurasians.		Malays and other natives of the Archipelago.		Chinese.		Indians.		Others.	
	Deaths.	Rate.	Deaths.	Rate.	Deaths.	Rate.	Deaths.	Rate.	Deaths.	Rate.	Deaths.	Rate.
Perak	16	7.30	11	10.98	6,197	24.97	5,771	25.51	3,571	24.95	47	23.64
Selangor	13	4.78	24	14.35	2,417	24.71	3,892	22.22	3,574	24.53	13	6.43
Negri Sembilan	2	1.99	7	13.18	1,903	23.96	1,532	21.69	1,221	32.89	14	14.63
Pahang	3	9.68	...	...	2,594	24.55	821	22.61	269	29.37	2	3.09

40.— ***Table showing deaths and death-rates from principal diseases.***

State.	Malaria.			Dysentery and diarrhoea.			Pulmonary tuberculosis.			Beri-beri.		
	Deaths.	Rate.		Deaths.	Rate.		Deaths.	Rate.		Deaths.	Rate.	
		1923.	1922.		1923.	1922.		1923.	1922.		1923.	1922.
Perak	7,758	12.46	12.29	782	1.26	1.42	949	1.52	1.83	79	0.13	0.15
Selangor	4,031	9.48	9.96	821	1.93	2.39	629	1.48	2.00	105	0.25	0.34
Negri Sembilan ...	1,998	10.53	11.51	275	1.45	2.40	268	1.41	1.69	112	0.59	0.64
Pahang	1,729	11.36	12.10	264	1.73	0.74	88	0.58	0.84	82	0.54	0.64

INFANTILE MORTALITY.

41. There were 6,420 deaths of children under one year of age. The infantile mortality rate or rate per 1,000 births was 180.07; the rate for 1922 was 170.83.

Infantile Mortality Table.

State.	Death of children under 1 year of age.	Death-rate per 1,000 births.
Perak	2,770	170.21
Selangor	1,907	188.44
Negri Sembilan	885	180.87
Pahang	858	196.52

42.— *Deaths from Zymotic Diseases.*

State.	Plague.	Cholera.	Smallpox.	Cerebro-spinal meningitis.
Perak	1	—	9	19
Selangor	9	—	—	—
Negri Sembilan ...	—	—	—	4
Pahang	—	—	—	—

43.— *Death-rates of principal diseases for the last seven years.*

Year.	Perak.			Selangor.			Negri Sembilan.			Pahang.		
	Malaria.	Dysentery and diarrhoea.	Pulmonary tuberculosis.	Malaria.	Dysentery and diarrhoea.	Pulmonary tuberculosis.	Malaria.	Dysentery and diarrhoea.	Pulmonary tuberculosis.	Malaria.	Dysentery and diarrhoea.	Pulmonary tuberculosis.
1917	15.81	2.58	2.25	12.75	4.38	1.47	18.81	4.26	2.80	14.00	1.30	1.14
* 1918	Unreliable.			20.29	3.78	1.62	36.31	5.84	4.93	26.62	1.63	1.41
1919	13.45	2.21	1.83	10.23	3.59	2.39	17.15	4.77	1.39	13.22	1.27	1.01
1920	15.82	2.21	2.11	13.13	3.77	1.89	18.18	4.31	2.37	15.24	1.19	0.94
1921	13.32	1.54	1.78	11.80	3.29	1.85	13.07	3.42	1.68	16.61	1.19	1.18
1922	12.29	1.42	1.83	9.96	2.39	2.00	11.51	2.40	1.69	12.10	0.74	0.84
1923	12.46	1.26	1.52	9.48	1.93	1.48	10.53	1.45	1.41	11.36	1.73	0.58

44.— *Vital statistics for the four large towns, Kuala Lumpur, Ipoh, Seremban and Taiping.*

Town.	Estimated population.	Births.		Deaths of persons who previous to disease had resided in town one month.	
		No.	Rate per mille.	No.	Rate per mille.
Kuala Lumpur	88,009	2,001	22.74	1,689	19.19
Ipoh	40,399	904	22.38	813	20.12
Seremban	19,210	456	23.74	476	24.78
Taiping	21,462	735	34.24	718	33.45

45.— *Table showing corrected death-rates during the last seven years.*

Year.	Kuala Lumpur.		Ipoh.		Seremban.		Taiping.	
	Population.	Death-rate.	Population.	Death-rate.	Population.	Death-rate.	Population.	Death-rate.
1917 ...	63,064	28.45	31,032	32.67	13,620	55.35	22,859	31.00
1918 ...	64,686	38.34	32,150	35.92	14,082	81.66	23,481	41.61
1919 ...	66,308	26.36	33,238	23.56	14,544	45.38	24,721	37.45
1920 ...	67,930	30.00	34,357	22.64	15,006	34.05	25,434	39.90
1921 ...	81,197	27.02	37,194	20.38	17,479	36.16	21,178	50.05
1922 ...	84,476	21.36	38,895	21.78	13,398	27.93	21,296	35.08
1923 ...	88,009	19.19	40,399	20.12	19,210	24.78	21,462	33.45

* Influenza year, figures probably very inaccurate.

46.— *Table showing corrected deaths and death-rates for principal diseases.*

Town.	Malaria.		Dysentery and diarrhoea.		Pulmonary tuberculosis.		Beri-beri.	
	Deaths.	Rate.	Deaths.	Rate.	Deaths.	Rate.	Deaths.	Rate.
Kuala Lumpur	181	2.06	156	1.77	256	2.91	30	0.34
Ipoh ...	60	1.48	54	1.34	146	3.61	3	0.07
Seremban ...	55	2.86	61	3.18	47	2.45	12	0.62
Taiping ...	149	6.94	61	2.84	80	3.73	1	0.05

47.— *Infantile Mortality Table.*

Town.	Births.	Deaths under 1 year.	Rate per 1,000 births.
Kuala Lumpur ...	2,001	373	186.41
Ipoh	904	119	131.64
Seremban ...	456	140	307.02
Taiping	735	148	201.36

48.— *Table showing corrected death-rate in the four towns for the past six years.*

Year.	Kuala Lumpur.			Ipoh.			Seremban.			Taiping.		
	Malaria.	Dysentery and diarrhoea.	Pulmonary tuberculosis.	Malaria.	Dysentery and diarrhoea.	Pulmonary tuberculosis.	Malaria.	Dysentery and diarrhoea.	Pulmonary tuberculosis.	Malaria.	Dysentery and diarrhoea.	Pulmonary tuberculosis.
1918	6.08	4.05	3.43	7.52	3.85	4.72	40.83	10.01	3.48	22.32	2.63	2.03
1919	4.69	3.35	3.24	6.32	5.35	3.09	19.18	7.70	3.71	16.78	3.52	2.42
1920	5.08	2.49	3.48	5.64	2.64	3.75	8.99	5.00	3.40	19.14	2.99	1.57
1921	5.25	3.63	3.22	11.24	2.39	4.54	11.76	16.71	6.23	25.06	6.06	3.95
1922	2.79	2.18	3.33	4.50	1.62	2.54	10.44	5.92	6.35	5.45	1.50	1.74
1923	2.06	1.77	2.91	1.48	1.34	3.61	2.86	3.18	2.45	6.94	2.84	3.73

MOSQUITO-BORNE DISEASES.

49. The mosquito-borne diseases of this country are Malaria, Filariasis, and Dengue.

Filariasis.—Embryoes of Filaria nocturna are not uncommonly present in the blood of natives, especially in Hylam Chinese, but elephantiasis is rare.

Dengue is not a rare disease but not being notifiable statistics concerning it are unknown.

MALARIA AND ANTI-MALARIAL MEASURES.

50. As usual, malaria easily heads the list as the most important cause of sickness and death.

In many of the towns malaria is notifiable. Notification is practically confined to Medical Practitioners and officers in charge of hospitals. Owing to the apathy shown by many to western medicine a considerable proportion of the cases are not seen by doctors and therefore not reported. The chief value of notification lies in the clues afforded to the Health Authorities as to the existence of breeding places of malaria-carrying anophelines. Each case notified is made the subject of enquiry.

51. The number of deaths registered as due to fevers was 15,516 or 45.75 per cent. of the total number. The death-rate was 11.17 per mille population or about that of the total death-rate for England. This is the lowest recorded for the last ten years.

52. Malaria was an essential causative factor in many deaths attributed to other diseases. Reckoned in dollars, there is no doubt that the annual loss of this country through malaria runs into seven figures and perhaps into eight.

MALARIA PREVENTION.

53. Experience in the Federated Malay States has proved that malaria prevention by anopheline reduction is (when done in the right way) a sound economic problem where persons are grouped together as in towns, in villages, or on estates.

54. The Government's machinery for promoting efficiency in anti-malarial operations consists of the Malaria Advisory Board and the Mosquito Destruction Boards.

55. The Malaria Advisory Board is a Central Committee formed for the purpose of collecting information with a view to advising generally as to the methods which should be adopted for the control of malaria.

56. The Mosquito Destruction Boards are local bodies with executive powers appointed by the British Resident to deal with the mosquito situation in their respective areas.

57. The Chairman of the Malaria Advisory Board is the Principal Medical Officer, and the Vice-Chairman, the Senior Health Officer; the Chairmen of the Mosquito Destruction Boards are wherever possible the local Health Officers.

58. The Malaria Advisory Board met periodically and minutes of the meetings were published.

59. The Mosquito Destruction Boards continued to perform good service. Minor works such as open ditching and oiling were carried out by the Board's staff; major works such as subsoil draining were performed by the Public Works Department under the supervision of the Executive Engineer who is ex officio a member of the Board.

60. Arrangements were made for the Health Officer, Railways, to be ex officio a member of every Mosquito Destruction Board whose area was cut by the railway. In this way close co-operation between the Railway Health Authority and the Board was ensured.

61. Under the supervision of the Health Officer, Railways, anti-malarial works such as draining and oiling were carried out at 20 stations with good results. Payment was made to numerous Mosquito Destruction Boards and Estate Managers for work done on Railway Reserves in their respective districts.

62. The night mail trains were regularly sprayed with "Lotal" with the result that there was a marked abatement in the mosquito nuisance.

The expenditure on anti-malarial work by the Health Officer, Railways, was $32,638.

63. During the year the Senior Health Officer accompanied by the Anti-malaria Engineer visited the Mosquito Destruction Board areas, inspected the works and conferred with the authorities.

64. At the Fifth Congress of the Far Eastern Association held in Singapore in September, the Senior Health Officer read a paper on the solution of the malaria problems at Gemas, showing how empirical methods had failed and a scheme based on entomological investigation had succeeded. Through the co-operative efforts of the Health Staff and the Railway Engineers a very malarious station was turned into something approaching a health resort permitting the abolition of the Gemas bonus and the Gemas leave. Altogether a saving of $50,000 a year was effected.

65. After the Congress the majority of the delegates visited Gemas and were shown the works which had brought about the result. The delegates paid a visit to Kuala Lumpur, where the Anti-malaria Engineer demonstrated the extensive subsoil drainage work of the town.

66. Apart from the work in connection with the Malaria Advisory Board and Mosquito Destruction Boards the anti-malarial activities of the Health Branch included the teaching of mosquitology, propaganda, investigation and quinine distribution.

67. The teaching of mosquitology continued throughout the year. All the Inspectors are trained in both laboratory and field work and are competent to make accurate anopheline surveys.

68. Lectures and lantern demonstrations have been given in schools and kampongs. In every district there have been numerous mosquito surveys.

69. The arrangement by which medical men, estate managers and others can obtain free advice and assistance in anti-malarial work continued.

Quinine Distribution.

70. The free distribution of quinine continued to be carried out by the Health Branch. 1,179,400 tablets of quinine were issued to the various Health Officers and the Senior Medical Officers for ultimate distribution to the public through the Police, the Education Department and the Penghulus.

71. Owing to the favourable reports received of cinchona febrifuge a stock was obtained. This drug is cheaper than quinine and said by some to be just as efficacious in the treatment of malaria.

72. The European Chief Sanitary Inspectors have again proved their worth in the tackling of mosquito problems. The Asiatic Inspectors have afforded valuable assistance.

The Health Staff, the Malaria Engineering Staff and the Malaria Research Staff worked in harmony and have been mutually helpful.

MEASURES TAKEN FOR PREVENTING THE INTRODUCTION AND SPREAD OF INFECTIOUS AND CONTAGIOUS DISEASES.

Quarantine and Port Health Work at Port Swettenham.

73. During the year, 30 ships with immigrant labourers were boarded and inspected. The labourers were landed at the Quarantine Station. One ship was infected with smallpox, one with cholera, one with chicken-pox, and from one a case of cerebro-spinal meningitis was removed.

74. The number of immigrants who entered the Quarantine Station, Port Swettenham, was 17,756, the number remaining on the 1st of January, 1923, was 527 making a total of 18,283. The largest number on any one day was 1,413 on October 7th.

Thirteen thousand nine hundred and fifty-eight immigrants received routine anti-ankylostome treatment.

Seventeen thousand seven hundred and fifty-six vaccinations were performed.

75. The number of infectious cases were cholera 4, smallpox 1, chicken-pox 14, measles 42, cerebro-spinal meningitis 4, mumps 2, and enteric 1. All these cases either came from ships or developed the disease in the camp. They are therefore not debited against any of the States.

In the endeavour to prevent the spread of cholera 419 persons were injected with cholera vaccine. The sick were treated by Roger's method. For their work in connection with this outbreak the Health Officer and Deputy Health Officer received the thanks of Government.

76. Many camps being empty and accommodation required for the housing of decrepits the latter were temporarily housed there, the Medical Officer being placed in charge of the decrepits and of the Camp Hospital.

77. During the year 1,202 immigrants and decrepits were treated in the hospital. The total number of deaths among those quarantined was 51 or 0.28 per cent. Influenza complicated by pneumonia was responsible for 32 out of the 51 deaths.

78. Observations were made to determine the source of influenza and lung diseases and graphs were made showing the admissions from day to day dating from the arrival of the steamers. The conclusions arrived at were that infected persons landed from ships and spread the disease in the camps. Every effort was made to stop the spread by frequent inspections, and isolation of all suspects.

Infectious Diseases outside the Quarantine Camp.

79. The following table shows the cases of infectious diseases reported and the State in which they originated.

State.	Smallpox.		Cholera.		Plague.		Diphtheria.		Cerebro-spinal meningitis.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Perak	23	9	...	...	2	1	6	4	4	3
Selangor ...	1	...	...	...	14	9	6	2	4	2
Negri Sembilan...	8	...	...	...	...	...	5	1	3	2
Pahang	...	...	...	...	...	...	..	...	1	1
Total ...	32	9	...	...	16	10	17	7	12	8

80. The smallpox outbreak in Perak was traced to a Malay who had come from Mecca on an infected ship and had developed the disease after release from the Penang Quarantine Station. Its spread was due to unvaccinated Malays. Energetic vaccination stopped the epidemic.

Routine vaccination continued to be under the control of the Medical Branch. In epidemic times the Health Branch renders assistance.

81. The plague cases all came from an area in Kuala Lumpur, where plague among the house rats (*mus grisieventer*) appears to be endemic. From time to time for reasons unknown the virulence of the causative organism becomes enhanced and an epizootic spreads among the rodents. When this happens isolated cases of human disease occur. There is little tendency to spread and up to date there never has been a real epidemic. The immunity of humans is ascribed to the consistently high atmospheric temperature which is detrimental to flea propagation. The average number of fleas per rat is less than two. The flea is X. cheopis.

82. The 16 cases which occurred were spread over three months, and only in one or two cases was there more than one infection from one house. The measures taken were prophylactic inoculation, rat catching and disinfection of premises. Houses where infection had occurred were not closed because one house was as bad as another and closure simply meant emigration of rats next door. Previous experience had shewn that the chances of a second infection in the same house were very small. The health authorities as in previous outbreaks asked for complete demolition of this very old and shaky block of houses. Up to date they have not been demolished.

83. Cerebro-spinal cases are from time to time spotted in this country. All have been sporadic and the source of infection has never been traced.

Sporadic cases of diphtheria occur. The source of infection is seldom discovered.

Enteric fever—36 cases were reported. In most instances an endeavour was made to trace the source of disease.

84. In this country when a sporadic case of enteric comes under notice it is usually weeks after the invasion and the search for a source is almost hopeless.

The number of deaths registered during the year as enteric was 29 giving a death-rate of .02 per mille.

85. Dysentery is not a notifiable disease and incidence figures are not known to the Health Department. The number of deaths from dysentery and diarrhoea was 2,142 giving a death-rate of 1.54 per mille population.

Pulmonary Tuberculosis.

86. The death-rate for the whole country was 1.39 per mille, this being the lowest recorded for the last ten years. The rates for all the four States were less than those for 1922. With regard to the four large towns the rates were down in Kuala Lumpur and Seremban, but up in Ipoh and Taiping. As explained above, the method of debiting deaths against towns is such that no definite conclusions can be drawn from one year's rates. The rates for all towns were below the average.

87. During the year there was much discussion on the subject of pulmonary tuberculosis in the four large towns, it being held by some that the disease is rapidly increasing owing to improper house construction.

Statistics show that there has been no increase.

88. The rapid progress of the disease in the majority of cases, even when treated under the best conditions in hospitals, would seem to prove that the natural immunity of the native is low.

Attention should be directed against overcrowding and the filthy habit of indiscriminate spitting.

89. *Helminthic Diseases.*—The only one of importance in this country from a public health point of view is ankylostomiasis. Ninety per cent. of the natives of this country are infected, but the cases which show symptoms are rare and the deaths recorded as due to this disease gave a death-rate of 0.28 per mille. As it is not unusual for a dresser who finds an egg in a stool to diagnose ankylostomiasis, the chances are that the real death-rate is less than that given.

90. Efforts have been and are being made by the health authorities to prevent the spread of this disease, but it is difficult to convince either Europeans or Asiatics of the seriousness of ankylostomiasis when so many are infected and so few show symptoms.

All immigrants quarantined at Port Swettenham received anti-ankylostome treatment.

SCAVENGING, NIGHT-SOIL AND DRAINAGE, ETC.

Night-soil Collection and Disposal.

91. With the exception of a few private plants which deal with isolated units there are no water carriage sewage systems in the Federated Malay States. Most of these small plants are working satisfactorily and it is to be hoped that this system will replace the offensive commode arrangements in use in even the best of our private houses.

92. In the towns and some of the villages the pail system with daily removal is in use. Disposal is by trenching.

93. The Chinese look upon human excrement as a most valuable fertilizer, and there can be no doubt that in spite of the precautions taken by the health authorities a considerable amount finds its way to the Chinese vegetable gardens which abound near the towns. It would be of economic benefit to all if this valuable manure were sterilized by heat and then handed over to the agriculturists. The natural soil bacteria would soon render the sterile organic matter fit for plant food. One of the great difficulties experienced in trenching operations is that of getting detailed instructions carried out by the low caste coolies who alone engage in this work. Such people spoil the best schemes if not closely watched and fly breeding results.

94. Night-soil disposal in rural areas varies with the races concerned. Tamils defæcate anywhere. Malays and other Mohamedans prefer to defæcate in a stream or pond. The various Chinese races carefully conserve excretions for use as manure.

Collection and Disposal of Refuse.

95. In the large towns and in many of the small ones scavenging is well done, and the neatness of the streets is well above the average of the East.

Disposal is not always so satisfactory. The belief that an incinerator must necessarily be a nuisance is almost universal and it is difficult to convince authorities that a plant properly designed and constructed can be run so as to be inoffensive even to those living next door.

96. The idea that it must be a nuisance has caused most of our incinerators to be placed at such a distance from the houses that proper supervision is impracticable and fly breeding in the unburnt refuse is common. Where there are no incinerators the method of disposal is dumping. This always results in fly breeding, which is the reason why Health Officers oppose the filling with rubbish of low lying areas in towns and villages.

Attempts have been made to prevent breeding in such fillings but so far with little success.

Drainage.

97. Street drainage is controlled by the Sanitary Boards, anti-malarial drainage by the Mosquito Destruction Boards. As mentioned above, open ditching is carried out by the Board's staff and subsoil piping by the Public Works Department.

Clearance of Bush.

98. In this country clearance of bush covering wet hill foots has given rise to much malaria. The Malaria Advisory Board have issued warnings of the danger of clearing valleys unless at the same time they are thoroughly drained.

In the Straits Settlements Labour Ordinance there is a clause forbidding the clearing of valleys except with the permission of the Health Officer.

Clearance of bush or undergrowth of public lands is done by the Sanitary Boards or Mosquito Destruction Boards.

Water Supplies.

99. In the majority of cases towns are supplied with water derived from uninhabited catchment areas and passed through the filters. Both slow sand beds and rapid mechanical filters are in use.

100. In the alluvial plains of Krian and Lower Perak river water passed through the Jewell gravity filters is distributed for many miles through the pipes. Cholera, which formerly was an almost annual event in these districts, is now rarely met with.

PUBLIC HEALTH EDUCATION.

101. The Public Health Education Committee was appointed by Government to promote the spread of knowledge on questions of hygiene and sanitation. This Committee, which contains both medical men and laymen, officials and non-officials, met periodically under the chairmanship of the Principal Medical Officer. The minutes of the meetings were published.

102. From time to time information of public health interest was sent to the Press. Articles drawing attention to important facts were printed as advertisements. Pamphlets on plague, pulmonary tuberculosis, ankylostomiasis, venereal diseases and convulsions were distributed.

103. Popular lantern lectures on malaria were given in numerous schools and kampongs. Lectures to congregations of Europeans and others were given by certain of the Health Officers.

104. General hygiene is one of the regular subjects taught in the schools.

The Education Department is desirous of extending this teaching and the Health Department is anxious to assist. Unfortunately the number of Health Officers is so small and the ground they have to cover so great that little assistance can be given.

105. The school teaching of hygiene is most important as only through the children can real progress be made. For success in public health work it is necessary to have the sympathetic co-operation of the masses, and that sympathetic co-operation will only become manifest when the masses understand the benefits of sanitation.

The saying that old dogs cannot be taught new tricks is just as true for Asia as it is for Europe, and the hope for salvation lies in the education of the children.

SCHOOL INSPECTION.

106. The duties of school inspection were shared with the Medical Branch. Altogether 215 visits of inspection were made by the Health Staff. In many schools the sanitary conditions as regards water supply and latrine accommodation are unsatisfactory.

107. Each school has a stock of Government quinine which is issued by the School Master free of charge to those requiring the drug.

108. Travelling dispensaries belonging to the Medical Branch visit periodically for the purpose of supplying medical treatment.

MATERNITY AND INFANT WELFARE.

109. The Infant Welfare Advisory Board—the body appointed by Government to collect information and issue advice—met at intervals during the year. The minutes of each meeting were published.

110. The Infant Welfare Centre in Kuala Lumpur continued to do good work. The attendances have steadily increased and it is now necessary to extend the accommodation. The vote for this work is with the Medical Branch. During the coming year a similar institution will be started in Ipoh.

111. The Chinese Maternity Association of Selangor, which maintains a free lying-in hospital in Kuala Lumpur, met regularly during the year. The hospital is very popular and beds are almost always full. Negotiations are proceeding for the provision of additional wards.

The Perak Chinese Maternity Association maintains a free lying-in hospital in Ipoh. This institution is very well run and deservedly popular.

112. In February, the Midwives Enactment of 1922 was *Gazetted*. This Enactment, the objects of which are to secure the better training of midwives and the regulation of their practice, is applicable to such Sanitary Board areas as the Chief Secretary to Government shall direct and appoint.

WORK UNDER THE LABOUR CODE.

113. One of the most important duties of the Health Department is to co-operate with the Labour Department with the object of ensuring a reasonable standard of sanitation for those who come under the Labour Code.

The responsibility for the protection of health and the cure of disease lies with the employer of labour and it is his duty to engage the staff necessary for that purpose.

The duty of the Health Officer is to inspect on behalf of Government and to report whether the sanitary conditions prescribed by Government for the protection of labour are being carried out.

ESTATES.

114. In the Federated Malay States there are 1,384 estates which send in sickness and deaths returns. Besides there are many small estates of less than 100 acres from which no returns are received. Owing to the insufficiency of staff it has not been possible for the Health Officers to pay the requisite number of visits to estates.

115. Details of the distribution of estates and estate hospitals and the frequency of visits by Health Officers is given below :

State.	Health district.	Estates.		Estate Hospitals.	
		No.	No. of visits by H.O.	No.	No. of visits by H.O.
Perak	Perak North	273	124	25	39
	Kinta	135	67	6	12
	Perak South	250	258	26	38
Selangor ...	Bernam	8	12	2	4
	Selangor Coast	189	124	34	32
	Selangor East	204	219	23	53
Negri Sembilan ...	All districts	270	29	43	42
Pahang	All districts	55	49	8	11
	Federated Malay States ...	1,384	882	167	231

Supplementary visits were paid by Chief Sanitary Inspectors and Sanitary Inspectors.

116. There is room for improvement in sanitation on estates especially in the case of water supplies and the disposal of night-soil.

Estate hospitals are usually satisfactory in so far as the buildings and equipment are concerned but the medical supervision is not infrequently below the standard desired by the Health Officer.

117. The Senior Health Officer and the Controller of Labour paid a visit to Malacca for the purpose of enquiring into the system of medical control in vogue there. The system issatisfactory so far as it goes but it does not go far enough.

A Committee has been appointed by the Federated Malay States Government to enquire into the question of sanitation and medical treatment on estates.

118. The distribution of labour was as follows :

		Indians.	Others.	Total.
Perak ...	Perak North	20,964	4,486	25,450
	Kinta	5,940	2,122	8,062
	Lower Perak and Batang Padang	20,020	2,856	22,876
Selangor ...	Bernam	1,336	—	1,336
	Coast	34,722	1,011	35,733
	Kuala Lumpur, Ulu Selangor and Ulu Langat	14,831	4,264	19,095
Negri Sembilan ...	All districts	16,392	13,286	29,678
Pahang	All districts	1,805	3,241	5,046
	Total, F.M.S. ...	116,010	31,266	147,276

119. The table below sets out the mortality rates among estate labourers during the past thirteen years, that is, since the Health Branch took over the supervision of health condition on estates.

Year.	Total number of estate labourers.	Deaths.	Death-rate per mille.
1911	143,614	9,040	62.9
1912	171,968	7,054	41.02
1913	182,937	5,592	29.6
1914	176,226	4,635	26.3
1915	169,100	2,839	16.78
1916	187,030	3,299	17.61
1917	214,972	3,906	18.71
* 1918	213,425	9,081	42.55
1919	216,573	3,384	15.16
1920	235,156	4,367	18.57
1921	175,649	3,195	18.19
1922	159,279	2,556	16.05
1923	147,276	1,924	13.06

There were 1,593 deaths among the 116,010 Indian estate labourers during the year giving a mortality of 13.73 per mille.

* Influenza year.

120. Return of malarial admissions and deaths of Indian labourers and others in estate and Government hospitals.

Divisions.	Malaria admissions to estate and Govt. hospitals.	Malarial deaths in estate and Govt. hospitals.	Total admissions to estate and Govt. hospitals.	Total labourers employed, all nationalities.	Total deaths.	Death-rate per mille.	Indians employed.	Deaths, Indian labour force.	Death-rates, Indian labour force.	Number of estates.	Number of estate hospitals.
Selangor East ...	4,241	112	7,942	19,095	258	13.51	14,831	240	16.18	204	23
Coast, Selangor	4,115	151	14,209	35,733	432	12.09	34,722	426	12.27	276	34
Pahang	1,446	29	5,087	5,046	129	25.56	1,805	56	31.02	55	8
Negri Sembilan	5,249	125	12,315	29,678	485	16.34	16,392	391	23.85	270	43
Perak North ...	4,224	74	10,917	25,450	255	10.02	20,964	246	11.73	273	25
Kinta	1,394	27	2,971	8,062	153	18.98	5,940	77	12.96	135	6
Lower Perak and Batang Padang	1,819	53	9,628	22,876	208	9.09	20,020	153	7.64	250	26
Sabak Bernam ...	154	2	679	1,336	4	2.99	1,336	4	2.99	8	2
Total ...	22,642	573	63,748	147,276	1,924	13.06	116,010	1,593	13.73	1,471	167

Mines.

121. The average population engaged in mining during the year was 96,662. Mines are not required to send in sickness and death returns and the sick-rates and death-rates are unknown.

As the great majority of miners are Chinese whose habits are more hygienic than those of the Tamils forming the bulk of the estate population, the sick and death-rates on mines were probably lower than those on estates.

Owing to the lack of staff no mines were visited.

A. R. WELLINGTON,
Senior Health Officer, F.M.S.

REPORT OF THE MEDICAL SUPERINTENDENT, CENTRAL MENTAL HOSPITAL, TANJONG RAMBUTAN.

Sir,—I have the honour to forward the thirteenth annual report of the Central Mental Hospital, that for the year 1923.

	Males.	Females.	Total.
2. There remained on 31st December, 1922 ...	838	212	1,050
Admitted during 1923	358	111	469
Discharged ... (*a*) recovered	160	34	194
(*b*) relieved	19	4	23
(*c*) not improved ...	4	2	6
(*d*) not insane	2	—	2
Absconded	37	1	38
Died	74	28	102
Remaining on 31st December, 1923 ...	900	254	1,154
In addition there were Singapore patients—			
Remained on 31st December, 1922 ...	142	87	229
Admitted during 1923	—	50	50
Discharged	4	1	5
Absconded	1	—	1
Died	8	10	18
Remaining on 31st December, 1923 ...	129	126	255
Criminal patients—			
Remained on 31st December, 1922 ...	65	2	67
Admitted during 1923	32	—	32
Discharged	16	—	16
Absconded	2	—	2
Died	6	—	6
Remaining on 31st December, 1923 ...	73	2	75
Kedah patients—			
Remained on 31st December, 1922 ...	71	13	84
Admitted during 1923	39	11	50
Discharged	12	4	16
Absconded	8	—	8
Died	9	5	14
Remaining on 31st December, 1923 ...	81	15	96
Total remaining on 31st December, 1923 ...	1,183	397	1,580
Percentage of recoveries	41.36 per cent.		
,, of deaths on total treated ...	6.89 ,, ,,		
,, on daily average	9.36 ,, ,,		

An increase of 150 against 117 last year and 189 in 1921.

The increase was to be noted in all classes of patients.

3. There was an increase of 104 in the Federated Malay States patients against 82 last year and 133 the year before.

The Singapore patients increased by 26 against 39 the year before. Criminals increased by eight and Kedah patients by 12. The most marked increase was that amongst the Federated Malay States female patients who increased by 44 against 11 in 1922 and 15 in 1921.

4. *Admissions.*—The total admissions for the year were 601 against 604 in 1922. The admissions of most importance are the Federated Malay States admissions, as Table II; the others are more properly transfers, and it is with Federated Malay States figures that I shall, as usual, deal in my table.

Federated Malay States admissions numbered 358 men and 111 women giving a total of 469, which is the smallest we have had since 1920, though fifty over the average for the last ten years. This reduction is only on total however, as we have had an exceptionally heavy female admission, viz., 111, which is 20 more than 1922 and 16 more than 1921.

5. I cannot tell what the great increase in Federated Malay States females is due to. Is it due to the fact that the number of women in the country is increasing, or that the trials of 1923 weighed more heavily on the women than the men?

6. The common form of disease on admission was recent melancholia, 115 against 102 last year, while recent mania which headed the list last year has fallen to second place with 86 appearances against 112 last year. Confusional insanity again occupies the third place with 53 and primary dementia again the fourth with 50.

7. This shows three fewer cases of primary dementia than last year; but there were fewer admissions, and, as I pointed out last year, this is a disease which principally attacks young adults, and if it does not put them out of the running at once shows a tendency to recur, and at the best leaves a weakened intellect behind.

8. General paralysis made 22 appearances against 27 last year.

9. Again there were some readmissions, but not so many as last year, principally due to the fact that we were able to help the discharged patients through after-care arrangements which we have been able to make.

10. *Discharges.*—Numbered 225 against 244 in 1922 and 194 in 1921. There was a slight reduction under each head on total though we actually discharged one man more recovered than in 1922—161 against 160.

11. The principal reduction was in female recoveries, of whom we discharged 9 less—34 against 43.

12. I still persisted in discharging patients "improved" who would have been classed as recoveries had I kept them a few weeks longer; but I believe it pays, as one feels that friends and relatives are beginning to see that this is primarily a hospital, and that our object is to cure and discharge our patients as soon as possible, and not merely shut them up and keep them out of harm's way.

13. Table III. *Recoveries.*—Number 194 against 204 in 1922 and 177 in 1921 giving a recovery rate of 41.36 against 42.04 in 1922 and 35.68 in 1921.

14. Though the recovery rate is below that of last year it is above the average for the last ten years which works out at 39.52.

15. Table III which gives "the form of disease on admission of those discharged recovered" shows recent mania with 72 recoveries against 79 in 1922 and 62 in 1921, recent melancholia with 44 against 47 and 49 respectively, while confusional insanity and primary demantia appear 29 times and 14 times against 26 and 12 in each of 1922 and 1921.

16. The order is just the same as last year and year before, and the constancy of the figures is very remarkable.

17. Table IV. *Aetiology.*—We have continued to send out forms to patients' friends and relatives to fill in what information they can give. In the great majority of cases when these reach their destination they are returned filled in more or less intelligently, and I must say that, on the whole, the information contained in them is of considerable value. I was struck with the number of cases in which the person mentioned as a friend or relative in the descriptive roll did not exist and of whom the patient when he improved denied all knowledge. Again a remarkable fact was that in a number of cases where the forms were returned by the Post Office as "address unknown" I was able to get the letters delivered by the Police or by some other channel.

18. "Gastro intestinal system" again heads the list, and, though intestinal parasites have a considerable bearing, they are not the only trouble which is to blame. The point to be noted in this connection is that although 179 or 36.03 per cent. of patients suffered from intestinal parasites, only 117 cases were attributed to the "Gastro intestinal system", and in nearly every case as a contributory cause.

19. Next on the list are "Haemopoietic system" and "Cardiovascular degeneration". These two usually appear as contributory, and in addition are usually more or less dependents on the other causes, which themselves appear in the list. The former depending primarily upon malaria and intestinal parasites, and the latter on syphilis or alcohol. Malaria again appears more frequently as a contributory cause, though it has been again made use of as a plea in murder cases.

20. Next we have the two most important causes, alcohol and syphilis. I say two most important causes as, in the vast majority of cases these two appear as principal causes whereas those we have already discussed are almost invariably contributory and, as I have told above, a greater number of the 65 cases of "Cardio-vascular degeneration" might be divided between syphilis and alcohol.

21. Syphilis appears only 25 times against 35 times last year. This does not mean a decrease in syphilis is due to the fact that owing to being shorthanded most of the year I was unable to enquire into cases as carefully as in 1922 and depended on the Wassermann test. As we cannot get the blood of every patient admitted tested, the whole matter is unsatisfactory, and will be so until it is possible to get all bloods examined. Could we have a Wassermann done on every patient I am confident that a great many of the patients returned under head "M"(no cause assignable) at present would be added to the cases assigned to syphilis, and probably bring syphilis near the head of the table.

22. As to alcohol we find it appears on 42 occasions, usually as a primary cause, and, as I said with regard to syphilis, a considerable number of the 65 cases appearing under the head of "Cardio-vascular degeneration" might be added.

23. I, as last year, when dealing with alcohol differentiated between Chinese and Indians, and found the startling figure of 34 Chinese and only 8 Indians. Last year we had 37 Chinese and 26 Indians so that, though the total number of alcoholic cases is down, we see that the reduction is due to an extraordinary fall in the number of Indians whose trouble can be attributed to alcohol.

24. This to my mind bears out my contention that the Chinese have taken to alcohol, and I fear this will go on and increase. There is a conspiracy on foot to stop the Chinese smoking opium with the result that they are turning to alcohol as a substitute, which from my point of view is vastly more dangerous. All I can say is that the day opium is cut off and alcohol substituted will certainly be a bad one for the Chinese, and I fear we may find an increase in such crimes as murder and rape.

25. It is a remarkable fact that not one of my patients showed deprivation symptoms although no opium is supplied to anyone here.

26. One patient was described on the friends' form as an opium eater, but the man turned out to be a case of general paralysis of the insane which has never been associated with opium. In fact, in the opium-smoking days in this country, general paralysis of the insane was declared to be unknown. I don't mean to claim opium as a preventative of general paralysis of the insane, but merely mention a remarkable fact. This patient's trouble was of course due to syphilis.

27. "Critical periods" (puberty, adolescence, etc.) show a goodly list, but "privation and starvation" show a decrease, as does mental stress.

28. Heredity appears 11 times as it did in 1922 but I am quite confident that it was really responsible for a considerably greater number, especially in cases of primary dementia. The people are not yet educated sufficiently far enough in their views of mental disease to willingly acknowledge "heredity" as a cause.

29. *Deaths.*—The death-rate works out at 6.89 per cent. on the total treated and 9.36 on the daily average, which figures are .42 and .57 per cent. higher than last year which was the lowest on record.

30. This year's figures are however below the average for the last ten years which is 10.92.

31. I have pursued my policy of isolating all dysentery and phthisis cases, and also of not passing any patient into the general wards until he has been found to be clear of all intestinal parasites. When it is pointed out that 179 giving a percentage of 36.08 admitted, suffered from intestinal parasites of some sort the importance of this precaution can be realised.

32. The principal causes of deaths were phthisis, dysentery (amebic 15, bacillary 4, chronic 4), general paralysis of the insane and malaria.

33. All the above cases save general paralysis of the insane show a slight increase. Though phthisis heads the list I should like to point out that though a mental hospital is one of the chief places for a high phthisis rate owing in many cases to the form of disease from which the patients suffer, mental cases being practically prone to phthisis, we only had 22 deaths during the whole year.

34. Phthisis shows one more death than last year and three less than 1921 but I regret to record an increase of 7 deaths from dysentery, i.e., 23 against 16 last year and 31 in 1921. I cannot explain this increase save by the usual fluctuations from year to year that one always finds. We have continued our policy of isolating all dysentery cases and not returning them to the wards until they are no longer a danger.

35. There is also a slight increase in deaths from malaria—16 against 12 last year.

36. *Suicides.*—I regret to say we had one suicide, a case of hanging. The patient was a Tamil, who had for years been working as grass-cutter attached to the cow-shed. He showed no suicidal tendency and never had, but was discovered hanging to the branch of a tree with his grass sack half full and his curve knife at the foot of the tree.

37. *Fatalities.*—There were six fatalities, most of them being due to quarrels between patients with enlarged spleens. A blow in such cases usually means death due to ruptured spleens. One spleen weighed 3 lbs. 1 oz.

38. These cases are most distressing, and most trying to those in charge of the hospital, but I do not see how they can be prevented. At home, patients fight too, but there, there are no enlarged spleens, and attendants are more alert.

39. *Absconding.*—Again we had a large number—49—but when patients have so much freedom as they have here, such cases must occur. The policy of giving so much freedom may be criticised but I would point out that the object of a hospital is to cure, and if patients are shut up into wards continually they will never recover.

40. Consequently patients whenever possible are sent out to work.

41. This was the policy of all my teachers, and I am perfectly convinced that it is the right one. A large number of those who absconded returned, many of their own accord. The majority of the abscondings were from working parties, and in the majority of cases were due to the carelessness on the part of the attendants. A few more from the farms, and those supplied most of those who came back of their own accord, the truth being that they went merely for a more extended stroll than usual and had no intention of absconding.

42. Several cases actually got away from the wards, and they can only be ascribed to gross carelessness on the part of the attendants, and in addition, as a rule, direct disregard to orders.

43. *Criminals.*—There were 32 admissions, against 22 in 1922, and 16 discharges against 8. There were also two escapes, but they were short term prisoners who were out of their term and were no longer in the criminal ward. Indeed it is a question if they should ever have been sent in as criminals.

44. Of the admissions some had become insane while in gaol, some were found guilty but insane, and others were sent in under observation.

45. Of the 8 discharges, 5 were not insane, and of them 3 were definitely malingering. Fortunately they were discovered and two were hanged, the third had the sentence commuted to imprisonment for life, and is now in the Convict Establishment.

46. The type of mental disease amongst the criminals was much the same as amongst the ordinary patients.

47. *Singapore.*—The Singapore patients were much the same, chronics and dements as usual. We had no male admission from Singapore but had 50 females sent in a batch for whom we put up a temporary ward.

48. One interesting point with regard to the Singapore patients is, that the Federated Malay States has now bought the wards put up by Singapore when the transfer of Singapore patients was first decided on, so that the Federated Malay States now owns all the wards at Tanjong Rambutan.

Kedah.—There were 59 Kedah admissions against 54 last year and 16 discharges against 11 last year.

49. Kedah patients are now being sent direct without any delay and the patients have now a good chance of recovery. One might now treat them as direct admissions and include them in the general tables, which I hope to do next year.

50. *New Buildings.*—Again there was little or no building in hand.

51. There was merely a double clerks quarter, which was badly needed, and which was not started until October, and of course is still under construction, which means that two members of the staff, a dresser and a clerk, are without quarters of their own.

52. A much needed addition to the kitchen was completed during the year. This took the form of two small kitchens, one for Mohamedans and the other for Hindus. This, in addition to allowing of what we should have had long ago, seperate cooking accommodation for Mohamedans and Hindus, relieves the congestion in the main kitchen, which had been handed over to the Chinese.

53. My great regret is that this work, which was begun very late, though not so late as the quarters, was not completed when the delegates to the Congress of the Far Eastern Association of Tropical Medicine visited. However, I was able to point to them under construction as an improvement in hand.

54. *Farms.*—The farms did well though the value of product was much less than 1922. This was to a great extent due to a fall in prices. For example we supplied 225,553 katis 2 tahils of vegetables (excluding those supplied to Ipoh Hospital) against 212,351 katis 6 tahils in 1922. In addition our wood-cutters at Highfield supplied 16,541½ piculs of firewood valued at $6,616.60. We supplied less milk but more pork than in 1922 and I hope to supply more of both in 1924. Some of our exchanges with the hill did not work out as well as I had hoped, but I have learned from my mistakes.

55. The fruit farm has been an unqualified success and as time goes on should be one of the finest in the country.

56. We have now under cultivation 234 acres.

57. Before I leave this section I should like to put on record my indebtedness to the Agricultural Department and the Veterinary Department.

58. *Work.*—I attach a list of the work done, and a valuation. As usual all the patients' and attendants' clothes were made and mended in the workshops.

59. We have also done a great deal of levelling, draining, etc., which I shall deal with again in another paragraph.

60. I do not wish anyone to run away with the idea, because the value of the work is shown, that the work is done with the idea of profit. It is not. The work is purely undertaken as a form of treatment for the patients and the fact that it happens to be profitable is merely an accident—a fortunate one I allow.

61. *Staff.*—The staff has been satisfactory.

In April, Dr. Stone, at the end of his two years' agreement, went to Singapore, where he is acting Superintendent of the Asylum.

62. In October, the staff suffered a great loss. Mr. Ah Fatt, the Inspector, retired after 40 years' Government service.

63. Now that he has retired, I hope, I may infringe the rule as to comment on individuals, and say how much he has done for the Central Mental Hospital. He had been my right-hand man from the day I opened this hospital, and no one will ever know how much of the organisation is due to Mr. Ah Fatt.

64. Mr. Kanapathippillay has been promoted Inspector vice Mr. Ah Fatt and Mr. Ooi Cheng Yean replaces Mr. Kanapathippillay as Assistant Inspector.

65. Mr. Pal was on leave from 19th February, 1923, till 6th July, 1923, and Mr. C. Murgiah acted for him. While Mr. Pal was on leave he was confirmed in the appointment as Senior Assistant Physician.

66. Mr. Ah Fatt was on three months' leave prior to retirement from July 1st.

67. Mr. Tan Hong Ann was transferred, after having been here over a year, on 17th July, 1923, on Mr. Pal's return from leave.

68. The vacancy amongst the Assistant Physicians was filled on 7th April, 1923, by Mr. M. Luchumeyah who in turn was succeeded by Mr. Sabapathy on 6th October, 1923.

69. Mr. Murugiah left on 19th July, 1923, and was replaced by Mr. Vaithilingam.

70. Amongst the dressers Mr. Masim Ali was appointed on 21st February, 1923, but left the service without notice a few months later; since when there has been a vacancy in the dresser staff.

71. Mr. Mahmud bin Shaik Abdul Majid was appointed to the vacancy caused by Mr. Ah Fatt's retirement on 15th October, 1923.

72. Judging by the number of applications I had for the appointment, the dresser posts here must be very much more popular than the Assistant Surgeon ones.

73. Mr. Chan Ah Choy, Clerk, Class II, was appointed to the staff on 8th June, 1923, and on 1st July, 1923, Mr. Wong Piang Seong was transferred and was succeeded by Mr. C. L. Marcus.

74. This was the only clerical change but I think one will agree that the above is a goodly list of changes in one institution in one year.

75. One of the most remarkable points about the staff is the haste with which Assistant Surgeons get out. The plea is always that they get no experience of general diseases.

There were no candidates for the Medico Phychological Association's Nursing Certificate as I could not find time to lecture owing to the fact that I was attempting to do the Assistant Superintendent's work as well as my own.

76. The attendants were a greater trial than ever, and it now appears impossible to get even moderately reliable ones. I again tried Malay attendants, but had to my great regret to again give them up. They do not appear to take to the work, or show the slightest grasp of it.

77. *Maintenance.*—The maintenance rate works out at $176.88 per head per annum against $182.14 in 1922, and $223 in 1921, so that the rate is still being reduced and I hope and believe will be further reduced without in any way reducing the efficiency of the hospital.

78. *General.*—The Mental Diseases Enactment has had a year's trial and so far has worked well. People have learned very quickly that they need no longer go to the Police or the Court, so that this delay is cut out. The only trouble I have had is, that several have thought that no certificate of any sort was needed, and just brought their ailing relative or friend along. We have also several voluntary boarders.

79. I should, now we have got rid of the criminal idea, like to see Police escorts done away with, and the escorting of patients taken over by the Medical Department, to whom such a duty rightly belongs.

80. So far there is only one point that I should like to see added to the Enactment and that is that now that admission to a Mental Hospital has been made easier, discharge should also be made easier. I should like to see the Medical Superintendent given power to discharge patients within the first three months without waiting for a board meeting. He could report at the next meeting.

81. Of course this can be done as it is under the section which deals with the discharge on trial; still, a section as I suggested above would be an improvement.

82. Anti-malarial work was proceeded with, and the scheme for the Sungei Bulat, which I explained last year, carried a step further. The concrete inverts are laid and the banks are sloped and partially sodded as far as the road which leads to Horten Farm and Highfield. We also made a concrete and stone bridge over the stream to carry the road. When the rains got too heavy to allow of work on the Sungei Bulat the parties who had work there were transferred to the piece of land which was taken over from Mr. Heintse, in 1921, and inverts laid for its whole length, and the bank sloped and sodded. The parties are now doing the same at a stream at the other side of Horten Farm, and by the time that it is finished the weather should be dry enough to enable work in the Sungei Bulat to be resumed.

83. We laid 1,878 feet of subsoil pipes, varying from 2 inches to 6 inches in diameter and we have just begun to make 8-inch pipes. We made, as a glance at the work return will show, close on 15,000 subsoil pipes.

84. I hope to get a large section of the Sungei Bulat done in the coming year, as the draining of the whole reserve depends on this stream, and until it is dealt with no really satisfactory work can be done elsewhere.

85. Our daily average malaria rate was, on cases .61, and individuals .56. In the case of attendants it was .25 and .21, respectively.

86. Before closing this section I should like to thank the Health Officer, Ipoh, and the Executive Engineer, Mosquito Destruction Board, Taiping, for the advice they have given me, and the interest they have taken in the work.

87. We have planted up 20 acres with batai trees to replace the timber cut out for firewood, and have prepared 19 acres for planting so that we should not run short of firewood in the future. The value of the firewood we supplied to the hospital shows how serious a matter it would be if the timber was not replaced.

88. With regard to the number of the different nationalities affected by the different forms of disease, the most remarkable fact is that all 22 cases of general paralysis of the insane admitted were Chinese. It is extraordinary how the other races, save Japanese, appear almost immune from general paralysis of the insane.

89. Another remarkable fact with regard to nationalities is, that although the male Chinese admissions were exactly twice as numerous as Tamils, there was only a slight difference in the female admissions—47 to 40.

90. *Surgery.*—We had several cases of operation during the year. All were sent to Ipoh where the Chief Surgeon operated, and they all returned recovered. The list comprised amputation of the penis (cancer), (attendant):

Gall stones (attendant);

Richter's hernia (toty);

Removal of ovarian cyst (patient);

Mastoid operation (patient).

91. In September, we had a visit from between 30 and 40 delegates to the conference of the Far Eastern Association of Tropical Medicine.

Unfortunately the early part of the morning was wet, following a very heavy rain at night. Still the visitors saw everything to be seen inside and a good deal outside, but the state of the roads after the heavy rain prevented many from seeing some of the most interesting work, e.g., the work on the Sungei Bulat, and all, from seeing the fruit farms and other outlying parts.

92. I had had the roads made up and had intended taking the delegates in cars, but our unmetalled roads became impossible to cars, especially cars kindly lent by the various Ipoh residents who had come forward and put delegates up, and sent them out to Tanjong Rambutan in their own cars. I bitterly regretted that my repeated request to have the roads metalled had been ignored, and the items cut out of my Public Works Department budget year after year. Had the roads only been metalled every delegate could have seen everything that was to be seen in the place.

93. I have been without an Assistant Superintendent since April last. The hardest part of this is that the Colonial Office sent a man out to the Medical Department who had all the requirements I asked for. Had the Colonial Office told him of the vacancy he would have applied at once.

94. *Amusements.*—Drafts, chess, cards, shimisoes, etc., were played in the wards by the patients. Sunday walks in the grounds were taken by the patients and those who were fit visited the town. The visit of a travelling circus or cinema was taken advantage of to take suitable patients.

95. The sports were held in July and as usual went off well, and were thoroughly enjoyed by patients and attendants alike.

96. The cricket team had a very good season indeed, but the football team was poor.

97. May I, in closing my report, express my thanks to Government for the support and encouragement it has been good enough to extend to me.

I have the honour to be,
Sir,
Your obedient servant,
W. F. SAMUELS,
Medical Superintendent,
Central Mental Hospital, Tanjong Rambutan.

Federated Malay States Government Press.