

Authors are alone responsible for the statements
made and the opinions expressed in their papers.

Journal of the Royal Army Medical Corps.

Original Communications

THE BURMA CAMPAIGNS—1942—1945 CLINICAL ASPECTS

BY

RONALD H. GIRDWOOD, M.B., Ch.B., F.R.C.P.Ed., M.R.C.P.Lond.

Lecturer in Medicine, University of Edinburgh

(formerly A/Lt.-Col., R.A.M.C.)

From the Department of Medicine, University of Edinburgh

In a recent report in this Journal, Wigglesworth (1948) has given a detailed account of the administrative aspects of the evacuation of casualties from the fighting front in Burma during the Japanese campaigns. He divides the campaigns into four phases as follows:

Phase I.—The Retreat from Burma, 1942

Phase II.—The Defence of India's Eastern Frontier, 1942—1944

Phase III.—The Liberation of Burma, 1944—1945

Phase IV.—The Occupation of Burma and After, 1945.

Numerous articles have been written about the medical condition of released prisoners of war in Phase IV of the above operations, but general clinical reports of the diseases of British troops taking part in the campaigns are not numerous. Excellent accounts have, however, been given by Leishman and Kelsall (1944), Marriott (1945), and by Marriott, Hill, Hawksley and Bomford (1946). Marriott and Bomford showed that the ratio of disease to battle casualties was 121 to 1 in 1943, 19 to 1 in 1944, and for the 14th Army's campaign in 1945 it was 3.4 to 1. Major-General Thompson (1948) has published notes about the Burma Retreat of 1942.

The present report deals with a relatively small number of British troops admitted to hospital medical divisions during Phases II, III and IV, and it is presented in the nature of a supplement to Wigglesworth's account, as a fairly representative sample of the types of diseases that were encountered. Detailed notes were kept about British patients seen over short periods at various points on the line of evacuation (*see* fig. 1). In addition, reference is made to many of

the published articles dealing with the diseases encountered in India and Burma during the war. The records from which this report is made were maintained under the heading of symptoms of onset, and are presented here in this manner, to indicate the types of clinical problems that occurred. Some of the difficulties involved in diagnosing cases of tropical disease are discussed by Manson-Bahr (1947).

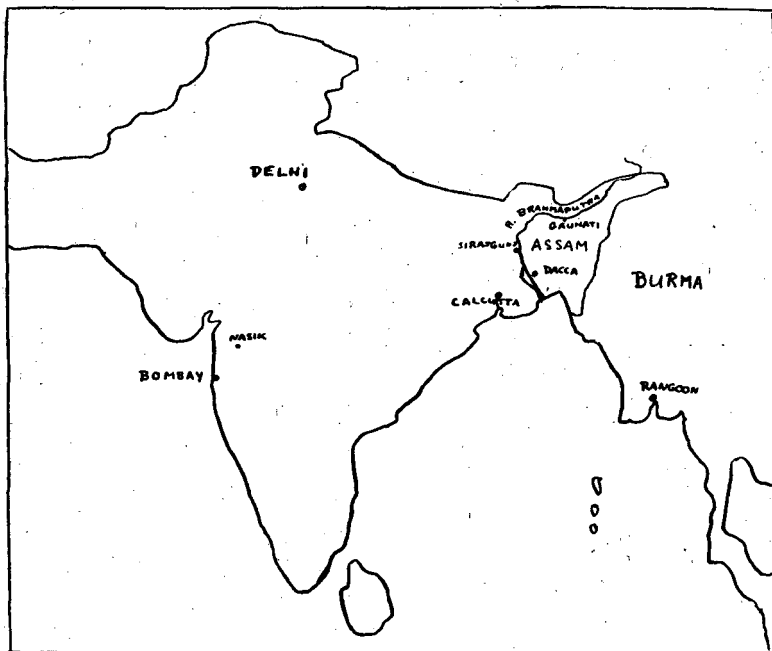


FIG. 1.—Map to show situation of hospitals.

Phase II.—Over a period of two months in July and August 1944, 342 British patients were admitted to an Indian General Hospital sited near Nasik in Bombay Presidency. Most of the cases admitted here came from a division of troops composed of men who had not yet taken part in jungle warfare, and who had spent their period of service in India on the west side of the country. The findings on these men are indicative of the types of disease encountered in the ordinary course of events in troops stationed in India.

Phase III.—In a period of two months during Phase III, 140 British medical patients passed through the Indian General Hospital at Sirajgunj; this was during December 1944 and January 1945, and as Wigglesworth (1948) has shown, at this time the hospital was receiving men from Dacca and Gauhati on their way to Calcutta and to Base Hospitals in India. The cases evacuated through this hospital were patients not expected to recover within three months.

Phase IV.—180 released white prisoners were seen at a British General Hospital in Rangoon in September 1945, immediately following their liberation from Japanese camps, mostly in Thailand.

It should be noted that many Indian patients were admitted to the hospital at Nasik, and that they outnumbered the British patients at Sirajgunj, but that particulars of these Indian cases are not included in the present report. In order to conserve space, particulars of the men seen at these two hospitals have been combined together. The condition of the released prisoners will be considered separately.

Phases II and III: Fever.—This was the commonest presenting feature of illness in the patients seen both at Nasik and in those being evacuated through

TABLE I.—FINAL DIAGNOSIS OF 242 PATIENTS ADMITTED TO HOSPITAL ON ACCOUNT OF FEVER

Disease	No. of cases	
	Nasik	Sirajgunj
B.T. malaria	92	7
M.T. malaria	24	6
B.T. and M.T. malaria	4	2
"Clinical malaria"	10	—
Pyrexia of unknown origin	21	—
M.T. malaria with anæmia	3	—
B.T. malaria with anæmia	—	1
M.T. and B.T. malaria with anæmia	—	1
Cerebral malaria	1	1
Scrub typhus	—	20
Scrub typhus and B.T. malaria	—	6
Scrub typhus and M.T. malaria	—	6
Scrub typhus, B.T. and M.T. malaria	—	3
"Clinical" typhus	—	4
Scrub typhus and clinical malaria	—	1
Quartan malaria	1	—
Scrub typhus, B.T. malaria, amœbic dysentery	—	2
Scrub typhus, B.T. and M.T. malaria, bacillary dysentery	—	1
Amœbic hepatitis and clinical malaria	—	1
Clinical malaria and anxiety state	—	1
Clinical malaria and effort syndrome	—	1
Typhoid, B.T. and M.T. malaria, amœbic dysentery	—	1
Dengue	2	—
Subacute rheumatism	1	—
Amœbic hepatitis	1	—
Tonsillitis	1	—
Pharyngitis	2	—
Sinusitis	1	—
T.A.B. reaction	1	—
Bronchitis	1	—
Urticaria	2	—
B.T. malaria and jungle sores	—	1
Pneumonia	1	—
Acute rheumatism and B.T. malaria	—	1
Glandular fever	1	—
B.T. malaria and acute nephritis	—	1
M.T. malaria and gonococcal arthritis	—	1
Infective hepatitis	1	—
Clinical malaria, typhus, brachial neuritis	—	1
Coryza	1	—

Sirajgunj. As can be seen in Table I, the cases passing through the latter hospital reflected the fact that scrub typhus was an infection of serious import in the course of jungle fighting in Assam and Burma.

Malaria.—It has been shown by Marriott (1945) that in the early stages of the fighting this was the major medical problem, accounting for nearly half of all the total sickness; Leishman and Kelsall (1944) report that of a total of 11,645 patients admitted to a base hospital, 2,819 had malaria. In May and June 1943 the A.L.F.S.E.A. malaria rate was 2.5 per thousand per day. In the summer of 1944 it was over 2.0 per thousand per day, but for the first five months of 1945 it had fallen to 0.35 per thousand per day or less. This improvement was due to strict enforcement of antimalarial discipline, largely following the work of Fairley (1945) who showed clearly the value of mepacrine as a suppressive agent. More recently Fairley (1946) has reported on the use of paludrine in antimalarial prophylaxis and treatment. The varying sensitivity of different geographical strains of *Plasmodium falciparum* to therapeutic agents is, however, commented on by Fairley (1949a). The recent major advances in knowledge of the life cycle of the malaria parasite in the body have been reviewed by the same author (1949b).

Every effort was made to treat malaria as far forward as possible; this, and the strictly enforced use of suppressive mepacrine, is reflected in the fact that the cases of malaria that passed through Sirajgunj during the two months under review in 1944-45 were complicated ones, malaria usually being present as a complication of some other disease. In Nasik, in 1944, on the other hand, in an area where suppressive mepacrine was not being used, 136 malaria cases were seen in two months. In most patients suffering from this disease alone, the symptoms were of chill with headache, weakness and malaise. Sometimes there was nausea or vomiting, and occasionally abdominal pain. It will be seen later that a few of the malaria patients first reported on account of symptoms other than fever; the blood had always to be examined carefully for the presence of malarial parasites in the course of other diseases.

In the majority of cases it was possible to make a definite diagnosis of malaria from the demonstration of parasites in the blood film; both thick and thin films were taken, if possible during a rigor. It will be seen from Table II that it was usually possible to find the parasites on the day of admission. One important point that had to be borne in mind in dealing with suspected M.T. malaria was that the patient's life should never be endangered by the delaying of treatment in order to obtain a positive blood slide.

TABLE II.—DAY OF ADMISSION TO HOSPITAL ON WHICH POSITIVE BLOOD FILM WAS OBTAINED

Day of Admission to Hospital (Nasik)	No. of cases with positive slide	
	B.T.	M.T.
First day	79	23
Second day	9	0
Third day	4	1

The fact that so many of the blood films were positive on the day of admission was possibly because the hospital was situated in close proximity to the troops admitted to it, and that they were sent direct to hospital at the onset of symptoms.

All the patients suffering from M.T. malaria who had first reported on account of symptoms of a febrile state had at some time while in hospital a temperature of 100° or more, but in 12 patients with B.T. infection the temperature did not exceed 100°. Higher temperatures might have been recorded had treatment been delayed. Some patients with malaria, including the more dangerous M.T. form, were admitted for symptoms other than those of fever, and it was well recognized that such cases, whether afebrile or suffering from low fever, were especially dangerous and required careful supervision. Where a fever of more than 100° lasted for six days or longer despite treatment, the patient had to be given a very detailed examination for complicating disease.

TABLE III.—HIGHEST TEMPERATURE RECORDED WHILE IN HOSPITAL WITH PROVED UNCOMPLICATED MALARIAL INFECTION

Temperature (°F.)	98-99	99-100	100-101	101-102	102-103	103-104	104-105	105-106
No. of cases B.T.	2	10	14	13	21	16	12	4
M.T.	—	—	2	2	9	4	5	2

Medical officers without tropical experience were often puzzled as to the likelihood of a patient without a palpable spleen having malaria, and as to whether it was common for a patient with acute malaria to have a palpable liver. Kern and Norris (1944) report that 59 of 100 cases of malaria in their experience had palpable livers and that this was not evidence of chronicity. Leishman and Kelsall (1944) state that chronic anæmia and persistent splenomegaly was rarely seen in their experience, even in patients who had had as many as 15 attacks of malaria in as many months. Routine blood counts were not done on all patients in the present series.

TABLE IV.—UNCOMPLICATED CASES OF MALARIA WITH PALPABLE LIVER OR SPLEEN (SEEN AT NASIK)

Cases of B.T. malaria				Spleen palpable	Liver palpable	Both	Neither
No. of previous attacks of malaria							
None				26	1	6	42
1				3	—	—	5
2				2	—	—	—
3				—	—	—	1
4				1	—	—	1
7				1	—	—	—
9				1	—	—	1
Cases of M.T. malaria							
None				5	1	3	13
1				—	—	1	—
2				—	1	—	—
Cases of B.T. and M.T. malaria							
None				1	—	—	1
1				1	—	—	—
2				—	—	—	1

Scrub Typhus.—This mite-borne infection proved to be a serious problem amongst men fighting their way through the jungles of Assam and Burma. Sayers and Hill (1948) report 2,388 cases with 259 deaths in the 14th Army in nine months in 1944. The mortality rate in British troops at that time was 12.76 per cent. Scrub typhus occurs where the vegetation is suitable for the breeding of mites, usually in areas infested with rats or other reservoir hosts, possibly including both mammals and birds. Willcox (1949) has given an account of 493 cases with 11 per cent mortality in Europeans, and Tattersall (1945) has recorded 700 cases. A report has been given by Sayer *et al.* (1946), and Mackie (1946) gives a detailed preliminary report of the work of the U.S.A. Typhus Commission in the China-Burma-India theatre. Some cases of scrub typhus occurred, too, in other parts of India (Proc. Conf. Medical Specialists Central Command & N.W. Army, and Sayers & Hill (1948)). At the time of the campaigns, no promising drug such as chloramphenicol was available, and immunization experiments were unsuccessful. The extent of the problem is brought out by the report of Marriott (1945), who states that one man was affected out of every 100 exposed to infection.

In two months, 43 men who had been suffering from the disease passed through the Sirajgunj Hospital. The clinical features were similar to those recorded elsewhere, and hence will not be given in detail. The main features were pyrexia, headache, drowsiness, enlarged glands, splenomegaly, conjunctivitis, chest signs and symptoms, and occasionally deafness. Willcox (1949) points out that serial Weil Felix tests were necessary for diagnosis, but if only one single test was possible, a 1/250 reading to OXK was significant if the clinical features were consistent with the diagnosis. He had 37 negative Weil Felix tests out of 100 patients examined in forward areas, since the test was so commonly negative before the twelfth day.

The possibility of kala azar had to be considered in the differential diagnosis of causes of fever. One specialist saw ten examples of this disease in British troops in 1943 (Proc. Conf. Medical Specialists Central Command & N.W. Army).

DIARRHOEAL DISEASES

As Marriott (1945) has pointed out, diarrhoea and dysentery were second only to malaria as a cause of sickness. In 1944 in the Eastern operational area one man in ten of the total force was admitted to medical units for diarrhoea and dysentery. Every military hospital had its dysentery ward. During the period under consideration 70 cases were admitted to this ward in the hospital at Nasik, and 21 passed through Sirajgunj. It should be noted, however, that the great majority of cases in forward areas were not evacuated to base hospitals.

The common diarrhoeal diseases were bacillary dysentery, amœbic dysentery, simple diarrhoea and sprue. The advent of sulphaguanidine and the fact that large supplies of it were obtained in 1944 resulted in prompt and efficient

treatment of the bacillary cases. There has always been much discussion as to the best methods of treating amœbic dysentery, and from preventing it from becoming chronic. A definite and prolonged course of treatment with careful follow-up investigations was introduced. This research continues, and recently it has been suggested that thioarsenites are very valuable therapeutic agents (Anderson *et al.*, 1949). Results of treatment with aureomycin are said to be promising (McVay *et al.*, 1949).

Das Gupta (1945) claims that examination of the stools of 300 B.O.R.s who had served for one year in India revealed that 26 per cent had infection with *Entamoeba histolytica*. This may have been due to contamination of the Calcutta water supply with sewage. Payne (1945) reports on some 2,000 cases of dysentery in Eastern India, 1,000 of which were amœbic, amœbic infection being one and a half times as common as bacillary in his experience. Fifty per cent of the amœbic patients had mild amœbic hepatitis and of 700 British cases 1.1 per cent developed liver abscess. Leishman and Kelsall (1944) found amœbic infection in approximately one-fourth of their admissions for diarrhoea. Cropper (1945 and 1949) stresses the importance of sigmoidoscopic examination in making a diagnosis, and Adams (1944) reports poor results in the follow-up of patients evacuated to the U.K. from India and Burma at a time when, in his opinion, too much faith had been placed in the use of emetine alone. He points out too the importance of eliminating complicating factors, such as treating secondary streptococcal infection with penicillin and looking for complicating flagellate infection, bacillary dysentery, malaria, kala azar, and carcinoma of the rectum.

Despite intensive work on the subject, the whole problem of steatorrhœa in India and Burma remains a mystery. Keele and Bound (1946) report on 600 patients with the disease, and point out that the maximum incidence was after one to two years of service in India. The earliest occurrence was in the Red Sea *en route* to India. The disease was seasonal in onset, but the incidence of sprue preceded that of amœbic and bacillary dysentery. As has been shown by Bennet (1946), sprue was uncommon amongst prisoners of war in the Japanese camps, but very many cases occurred in Assam and Burma. The absence of sprue in the prison camps has been attributed by Gilroy (1947) to lack of fat in the diet of the prisoners. The condition was seen amongst the Chindits, as reported by Morris (1945) and Keele and Bound (1946); Stefanini (1947) observed 1,069 cases of tropical sprue occurring among 12,000 Italian prisoners of war in a camp in the Himalayan foothills. Although all Italian prisoners of war in India received substantially the same diet, sprue developed in only one camp.

It has long been said that sprue does not occur in Indians, and yet Indian troops in areas East of the Brahmaputra River went down in large numbers with diarrhoea which was sometimes fatty, and often complicated by a macrocytic anæmia, and evidence of vitamin deficiency states. In these regions the syndrome affected Indian troops much more severely than it did British

or African troops. Accounts of the syndrome as it affected Indians have been given by Girdwood (1948) and by Passmore (1949). Perusal of these papers indicates the difficulty that exists in differentiating between sprue and primary malnutrition. Reports on sprue in British personnel have been given by Keele (1946) and Ayrey (1947). Keele (1949) has followed up 62 of his cases for a period of two years in Britain; in them, dietetic therapy was used alone as far as possible, but some patients were given, in addition, parenteral liver therapy, nicotinic acid, or riboflavin. Complete remission occurred in 69.4 per cent of the men and definite relapse in 16.1 per cent. Keele states that 1,073 cases were sent back to the U.K. between 1943 and 1946. Woodruff (1949) reports that of 34 patients sent home, all but 3 were very well three years after they contracted the disease.

Table V shows the diagnosis reached in patients admitted to hospital at Nasik, or passing through Sirajgunj whose primary complaint had been of diarrhoea.

TABLE V.—DIAGNOSIS OF PATIENTS ADMITTED WITH DIARRHOEA, GIVING APPROXIMATE DAILY NUMBER OF STOOLS WHEN FIRST ADMITTED TO A HOSPITAL

Diagnosis	Hospital	Daily Number of Stools When First Admitted to a Hospital																Stools
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16-20	
Bacillary dysentery	N	*	—	—	—	1	4	—	—	1	2	1	6	—	1	1	3	
	S	*	—	—	—	—	—	—	1	—	—	1	—	—	—	—	—	
Simple diarrhoea	N	—	—	4	3	3	5	3	1	—	1	1	2	1	—	1	1	
	S	—	—	—	2	—	—	—	1	—	—	1	—	—	—	—	—	
Amoebic dysentery	N	—	2	6	1	1	2	—	1	3	1	—	—	—	—	—	—	
	S	—	—	—	1	1	2	2	—	1	—	1	—	—	—	—	—	
Giardiasis	N	—	—	—	1	1	—	—	—	—	—	—	—	—	—	—	—	
Sprue	S	—	—	1	1	—	—	—	—	—	—	1	—	—	—	—	—	
Ascariasis	N	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Ankylostomiasis	N	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	
Amoebic dysentery and sprue	S	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	
Amoebic and bacillary dysentery	N	—	—	—	—	—	—	1	—	—	—	—	1	—	—	—	—	
	S	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	
Amoebic dysentery and giardiasis	S	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	
Pulmonary T.B.	N	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	
<i>Balantidium coli</i> infestation	S	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	
M.T. malaria	S	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	

*Indicates whether Nasik or Sirajgunj Hospital.

In 9 of the patients, malaria was a complicating factor. Amoebic and bacillary dysentery differed in the typical textbook manner. In bacillary infection, the illness was more acute, blood or mucus frequently being present with little or no faecal matter, whereas in amoebic dysentery the stool was usually more solid, with blood or mucus adhering to the faecal matter. The possibility of a mixed infection had always to be considered. Higher temperatures were generally recorded in bacillary dysentery, although this was not

invariable. None of the cases seen at Nasik were of the chronic type, and as these patients were seen from the commencement of their stay in hospital, it was possible to keep a record of the type of stool passed, as in Table VI.

TABLE VI.—DESCRIPTION OF TYPE OF STOOL PASSED IN AMŒBIC AND BACILLARY DYSENTERY

Description of stool	No. of cases	
	Amœbic	Bacillary
Formed	—	—
Formed with blood visible ...	1	—
Formed with mucus visible ...	2	—
Formed with blood and mucus ...	2	—
Semi-solid	2	1
Semi-solid with blood	3	—
Semi-solid with blood and mucus	3	2
Watery	1	—
Watery with blood	1	—
Watery with mucus	—	—
Watery with blood and mucus	2	9
Blood and mucus; no fœcal matter	—	8

TABLE VII.—HIGHEST TEMPERATURE RECORDED IN CASES OF DYSENTERY

Temperature	No. of cases	
	Amœbic	Bacillary
97.5° — 98°	5	2
98° — 98.5°	4	3
98.5° — 99°	7	3
99° — 100°	1	3
100° — 101°	—	3
101° — 102°	—	2
102° — 103°	—	2
103° — 104°	—	2

Only uncomplicated cases are included in Tables VI, VII and VIII. Stools were examined daily both naked eye and microscopically. The number of days before a stool was found to be positive for amœbæ is shown in Table VIII. In any suspected case where the stool was persistently negative, sigmoidoscopy was carried out; this examination was done also at the end of the period of treatment of all amœbic cases.

TABLE VIII.—NUMBER OF DAYS BEFORE VEGETATIVE FORMS OF *Entamœba histolytica* WERE FOUND IN THE STOOLS IN CASES OF AMŒBIC DYSENTERY

No. of days	No. of cases	No. of days	No. of cases
1	—	8	—
2	5	9	—
3	2	10	1
4	2	11	—
5	1	12	1
6	3	13	—
7	2	14	—

It should, however, be stressed that in chronic cases difficulty may be experienced in finding the amœbæ in the stool.

In a man suffering from illness during or following service in the East, even although there is no history of diarrhœa, the possibility of amœbic infection must always be considered. The commonest forms that this may take are amœbic dysentery, vague abdominal symptoms, dyspepsia, appendicitis, hepatitis, hepatic abscess, pleurisy, pleural effusion or empyema, subphrenic abscess, hæmorrhoids, a tumour formation simulating carcinoma of the colon or rectum, and amœbiasis of the skin. Examples of all these were seen during eighteen months spent in the two hospitals mentioned in this report.

OTHER ABDOMINAL SYMPTOMS

Vomiting.—7 patients were admitted at Nasik on account of vomiting. The final diagnoses were shown in Table IX.

TABLE IX.—DIAGNOSIS IN CASES OF VOMITING

<i>Diagnosis</i>	<i>Notes</i>
Infective hepatitis and giardiasis	Stools loose; jaundice developed later
M.T. malaria	Afebrile
Gastric ulcer and giardiasis	
Duodenal ulcer	
T.B. peritonitis	
Ankylostomiasis	
Functional dyspepsia	

Abdominal Pain.—6 patients were admitted with this complaint. No abnormality was found in one, and another was diagnosed as having psychoneurosis. A third man was thought to have hyperchlorhydric dyspepsia, but a routine blood film showed M.T. crescents. The fourth patient, who felt generally out of sorts, had a hæmoglobin of 9.8 grammes per cent, and a slight evening rise of temperature; the blood film revealed a mixed infection with B.T. and M.T. malaria. Another man had amœbic hepatitis and M.T. malaria, whilst the sixth had vegetative forms of amœbæ in the stool, but no diarrhœa.

Abdominal Swelling.—4 patients passed through Sirajgunj after having reported on account of abdominal swelling. One had amœbic abscess of the liver, 2 had amœbic hepatitis, and the fourth was undiagnosed. A fifth man who complained of only anorexia and headache reached Sirajgunj undiagnosed, and was found to have amœbic hepatitis.

JAUNDICE

Infective hepatitis was a problem in India, although the disease did not become as prevalent as in certain other theatres. 992 of Leishman and Kelsall's 11,645 patients suffered from this disease. At the time no attempt

was made to distinguish between infective hepatitis itself and homoiogous serum jaundice with its longer incubation period, but it was realized that jaundice was common in patients undergoing treatment for venereal disease, and that this was probably due to spread of infection by virus-contaminated syringes. In the two months under consideration 42 patients were admitted to the jaundice ward at Nasik with a diagnosis of infective hepatitis, and in 4 of these men the disease had followed arsenical therapy for syphilis. One man was thought to have "hepatitis sine ictero"; no severe cases were seen, and no patients with evidence of neurological involvement as described by Byrne and Taylor (1945) or by Stokes and Miller (1947) occurred. These last authors have described an epidemic of a severe form of infective hepatitis that was encountered in Burma during the later phases of the campaigns.

SYMPTOMS SUGGESTING RESPIRATORY DISEASE

The diagnoses in the 34 cases seen at the two hospitals were as shown in Table X.

TABLE X.—SYMPTOMS IN PATIENTS ADMITTED WITH SUSPECTED RESPIRATORY DISEASE

<i>Main symptoms</i>	<i>Final diagnosis</i>	<i>No. of cases</i>
Chronic cough and breathlessness	Chronic bronchitis	13
	Chronic bronchitis; ankylostomiasis	1
Cough and pain in the chest	Acute bronchitis	1
	Anxiety state	1
Cough and loss of weight	Pulmonary tuberculosis	2
	Chronic bronchitis	1
Breathlessness	Thyrotoxicosis	1
	Fibroid tuberculosis	1
	Complete heart block	1
Breathlessness and collapse	Spontaneous pneumothorax	1
	Heat exhaustion	1
Loss of weight	Tapeworm infestation	1
	Chronic laryngitis	1
Husky voice	Ascaris escaping through the mouth	1
Choking attack	Scrub typhus	1
Cough with fever	Pulmonary T.B. with pleurisy	1
	Bornholm's disease	1
Pain in the chest	Amoebic hepatitis	2
	Pulmonary tuberculosis	1
	Amoebic infection of the lung	1
Hæmoptysis, loss of weight		

The importance of always being on the look-out for amœbiasis is brought out by this table. In a suspected case of amoebic hepatitis it was always important to screen the chest for impaired movement of the diaphragm.

DISEASES OF THE CENTRAL NERVOUS SYSTEM

Nineteen cases came under this heading, and these are summarized in Table XI.

TABLE XI.—DISEASES OF THE CENTRAL NERVOUS SYSTEM

Clinical features	Diagnosis	No. of cases	
		Nasik	Sirajgunj
Headache and neck rigidity	Infective mononucleosis	1	—
Headache	Migraine	1	—
Sciatic pain	Prolapsed disc	1	—
Fever and coma	Cerebral malaria	1	—
Paralysis (extensive; fatal)	Acute anterior poliomyelitis	1	—
Pain in the arm	Brachial radiculitis	1	1
Weakness			
Legs only	Polyneuritis following	—	2
Legs and arms	jungle sores	—	6
Legs, arms, swallowing		—	1
Legs, arms, accommodation		—	1
Weakness of the legs	Polyneuritis, cause uncertain	—	1
Jacksonian epileptic fits	Cysticercosis	—	1

Polyneuritis.—In Assam and Burma, diphtheritic ulcers of the legs (Naga sores) were common, and polyneuritis was a frequent complication. An account of different forms of cutaneous diphtheria has been given by McKenna (1944) who describes the following types: Acute eczematous; acute bullous; ulceration with cellulitis; chronic eczematous. Leigh (1948) reports on diphtheritic paralysis in troops fighting in Burma, and shows that there was no correlation between the number of sores and the degree of polyneuritis. In his series of 183 cases of post-diphtheritic polyneuritis, 150 followed jungle sores, 73 having also had sore throat, and 31 followed what was probably asymptomatic faucial diphtheria. 43 per cent of his total number of patients had palatal paresis, and 68 per cent had blurring of vision. The source of infection was thought to be British carriers of diphtheritic organisms. Two-thirds of the cases occurred in the monsoon months of April to July.

Occasional examples were seen, too, of a form of acute brachial radiculitis, a condition described by Turner (1944), in which pain over the back of the shoulder and outer side of the arm was followed by paralysis of some muscles of the same area. In cases of epilepsy occurring *de novo* after service in the East, the possibility of cysticercosis has to be borne in mind.

OTHER DISEASES

The further 42 cases seen at the two hospitals presented no special features. No case of smallpox was seen during the period under review. Leishman (1944) has given a report on his experience of the disease. Between November 1942 and April 1943 he saw 68 cases at an Indian Base General Hospital. 22 were major, the remainder having been modified by vaccination.

Thomson (1946) has referred to the difficulty in supplying food to the troops in Burma, but no cases of primary malnutrition were seen in the present series in British troops, other than those released from Japanese P.o.W. camps and referred to later. In contrast to this is the report of Morris (1945), who reported on the health of 401 Chindits who took part in General Wingate's second operation. The outstanding feature in these men was severe wasting.

In 186 patients examined, the mean hæmoglobin was 85 per cent (11.9 grammes/100 ml.). The malnutrition was thought by Morris to be due to under-consumption and diarrhœa, but the condition may have been a form of the sprue syndrome. 86 of the 401 men had glossitis, flatulence, and diarrhœa, 87 had infective hepatitis (22 per cent of the whole group), 128 had malaria, and 14 had suffered from polyneuritis.

No patients suffering from the effects of dehydration or overheating were seen in the periods under review, although several cases of heat exhaustion and heat stroke, two of which were fatal, occurred near Nasik when men fresh from the United Kingdom performed a march in the heat of the day.

PREVIOUS ILLNESSES

Records were kept of previous illnesses suffered in the East by all the medical in-patients seen during the two periods of two months, and these are shown in Table XII. In this table, surgical conditions are also included; it is obvious that medical diseases were far more important as causes of invaliding of the men.

TABLE XII.—PREVIOUS ILLNESSES THAT OCCURRED IN THE EAST, AND LENGTH OF SERVICE OF MEN SEEN AT NASIK AND SIRAJGUNJ

Disease	Service: Less than							
	$\frac{1}{2}$	$\frac{1}{2}$ -1	1-2	2-3	3-4	4-5	5 or more years	
No previous illness in India or Burma ...	27	42	58	112	36	22	2	
B.T. malaria 1 attack ...	1	1	5	6	4	1	1	
2 attacks ...	—	—	1	1	—	—	—	
3 attacks ...	—	—	—	2	—	—	—	
4 attacks ...	—	—	1	2	—	—	—	
5 attacks ...	—	—	—	—	1	—	—	
7 attacks ...	—	—	—	1	—	—	—	
10 attacks ...	—	1	—	1	—	—	—	
more than 10 attacks ...	—	—	—	2	—	—	—	
Malaria, type uncertain; several attacks ...	—	3	1	5	1	—	—	
M.T. malaria 1 attack ...	—	1	1	1	—	—	—	
2 attacks ...	—	1	—	—	—	—	—	
3 attacks ...	—	—	—	1	—	—	—	
B.T. and M.T. malaria (several attacks) ...	—	4	1	10	2	—	1	
Bacillary dysentery (once) ...	4	2	2	7	—	—	—	
(twice) ...	—	—	—	1	—	—	—	
(thrice) ...	—	—	1	—	—	—	—	
Amœbic dysentery (once) ...	—	—	3	2	—	—	—	
(twice) ...	—	—	—	1	—	—	—	
Diarrhœa ...	1	2	—	2	—	—	—	
Amœbic and bacillary dysentery ...	—	—	1	2	—	—	—	
"Dysentery" ...	—	—	1	—	1	—	—	
Bacillary dysentery; malaria ...	—	—	—	3	—	—	—	
Bacillary dysentery; typhoid ...	—	—	—	1	—	—	—	
Bacillary dysentery; appendicitis ...	—	—	—	1	—	—	—	
Bacillary dysentery; infective hepatitis ...	—	—	—	1	1	—	—	
Amœbic dysentery; malaria ...	—	—	1	3	—	—	—	
Clinical dysentery; malaria ...	—	—	1	2	—	—	—	
Venereal disease ...	—	2	4	11	1	2	—	

Disease	Service:	Less than	$\frac{1}{12}$	$\frac{1}{6}$ -1	1-2	2-3	3-4	4-5	5 or more years
Bronchitis	—	—	—	1	—	—	—
Venereal disease; malaria	—	—	1	1	—	—	—
Jungle sores	—	2	7	2	2	—	—
Diarrhoea; malaria	—	—	—	1	—	—	—
Scrub typhus	—	—	—	1	—	—	—
Infective hepatitis	—	—	1	1	—	—	—
Head injury	—	—	2	3	—	—	—
Gunshot wound	—	—	1	—	—	—	—
Pneumonia	—	—	1	—	—	—	—
Pyrexia of unknown origin	1	1	—	1	—	1	—
Dyspepsia	—	—	—	1	—	—	—
Septicæmia	—	—	1	—	—	—	—
Renal colic	—	—	—	1	—	—	—
Tonsillitis	—	—	—	1	—	—	—
Amœbic hepatitis	—	—	—	1	—	—	—
Diphtheria	—	—	—	1	—	—	—
B.T. malaria; dengue	—	—	1	—	—	—	—
Infective hepatitis; bronchitis	—	—	—	1	—	—	—
Bacillary dysentery; venereal disease	1	—	—	—	—	—	—
M.T. malaria; appendicitis	—	—	—	—	—	—	1
M.T. malaria; gunshot wound	—	—	—	1	—	—	—
Clinical malaria; infective hepatitis	—	—	—	1	—	—	—
Clinical malaria; jungle sores	—	—	—	1	—	—	—
Bacillary dysentery; malaria; ankylostomiasis	—	—	—	—	—	—	1
Amœbic and bacillary dysentery; malaria	—	—	—	1	1	—	—
Amœbic dysentery; malaria; infective hepatitis	—	—	—	1	—	—	—
Typhus; malaria; infective hepatitis	—	—	—	1	—	—	—
Sandfly fever; dengue; malaria; pneumonia	—	—	1	—	—	—	—
Malaria; bacillary dysentery; jungle sores	—	1	—	—	—	—	—
Malaria; jungle sores; infective hepatitis; V.D.	—	—	1	—	—	—	—
Malaria; infective hepatitis; bacillary dysentery	—	—	—	1	—	—	—

Phase IV.—Records were kept of 180 released European prisoners seen at a British General Hospital in Rangoon immediately following their liberation from Japanese camps, mostly in Thailand. Many articles on the sufferings of these men have been written, and numerous reports of their medical condition have been given, mostly by the medical officers who organized their care so well under such extremely adverse conditions. A symposium on this subject has been presented by several workers (Proc. Nutrition Soc., 1946).

The men seen in Rangoon had been in captivity for three and a half years. Some of them had taken part in the building of the Burma-Thailand railway, and others had helped to construct the notorious Mergui road. One patient who was employed on this latter project stated that of the original number of a thousand in his party, approximately 400 men had died.

The men examined were a selected population in that the most ill patients had been retained for treatment in Thailand, and because a large number of

cases of amblyopia were concentrated in the ward in which the investigation was carried out. Accounts of the sufferings of the men have been given by Warrach (1946), Markowitz (1946), and Robins (1948), amongst others.

Major H. Tanner (R.A.S.C.) supplied the official diet scale of a camp in Thailand shown in Table XIII. In addition there is recorded the average daily weight of foodstuffs actually received and secretly weighed during the period 26.11.42 to 10.3.43.

TABLE XIII.—FOOD SUPPLIED TO EUROPEAN PRISONERS IN A JAPANESE P.O.W. CAMP

	Official daily scale (Grammes/day/man)	Food actually received (Grammes/day/man)
Vegetables	500	75
Sugar	20	16
Salt	20	12
Oil	5	4.5
Fish	50	16
Meat	100	32
Tea	3	nil
Rice	750	750

It should, however, be noted that sick persons were given less food than fit ones, and that much of the food was bad when issued. The officer giving this report was of the opinion that many lives were saved by ducks' eggs supplied by the natives of Thailand. This diet scale may be compared with that given by Massey (1946).

ILLNESSES DURING IMPRISONMENT

One hundred and eighty men were questioned about illnesses from which they had suffered during captivity; it should be remembered that these records pertain to the fortunate survivors of the period of imprisonment. Malaria was the commonest disease, and 154 men stated that they had had malarial attacks, in many cases as often as forty or fifty times. The other diseases are shown in Table XIV against the years in which they occurred, except that with oedema and beriberi only the first year in which this occurred is recorded.

TABLE XIV.—DISEASES SUFFERED BY EUROPEANS IN JAPANESE P.O.W. CAMPS (180 MEN)

	1942	1943	1944	1945	Total No. of attacks
Oedema	19	32	7	4	62
Pellagra	8	22	14	5	49
Dysentery, probably bacillary	20	16	4	3	40
Dry beriberi	8	17	7	2	34
Dengue	10	14	7	2	33
Jaundice	1	9	11	10	31
Dysentery, probably amoebic	6	10	8	2	26
Diarrhoea	9	8	4	2	23
Scrotal dermatitis	6	14	2	—	22
Dysentery, type uncertain	3	13	4	—	20
Cholera	—	5	1	1	7

	1942	1943	1944	1945	Total No. of attacks
Cerebral malaria	—	2	2	1	5
Fractured limbs	4	1	—	—	5
Gastric symptoms	—	3	—	2	5
Hookworm infestation	—	—	2	3	5
Cardiac beriberi	—	2	2	—	4
Pneumonia	—	2	1	1	4
Corneal ulcers	3	1	—	—	4
Typhus	—	1	1	2	4
Renal colic	—	2	—	1	3
Bronchitis	1	1	—	1	3
Conjunctivitis	1	1	1	—	3
Erysipelas	—	2	1	—	3
Otitis media	1	—	1	1	3
Anæmia	—	—	1	1	2
Cystitis	1	—	—	1	2
Appendicitis	—	1	1	—	2
Cellulitis	—	2	—	—	2
Acute rheumatism	2	—	—	—	2
Diphtheria (faucial)	2	—	—	—	2
Mental derangement	—	1	—	1	2
Lumbago	—	1	1	—	2
Pyrexia of unknown origin	—	1	1	—	2
Hip abscess	—	1	1	—	2
Blackwater fever	—	1	—	—	1
Heat stroke	—	1	—	—	1
"Spastic syndrome"	—	1	—	—	1
Hæmorrhoidectomy	—	—	1	—	1
Synovitis	—	—	1	—	1
Herpes zoster	1	—	—	—	1
Meningitis	1	—	—	—	1
Tonsillectomy	—	1	—	—	1
Relapsing fever	—	1	—	—	1

In view of the number of articles already written on the subject, detailed comments about these illnesses will not be made. The condition of "burning feet," a polyneuropathy with pain and burning of the feet associated with vitamin deficiency, has been referred to by Bennet (1946). Cruickshank (1946) has described a spastic syndrome, an upper motor neurone lesion that affected the legs and sometimes one or both arms. The extent to which œdema was due to beriberi as opposed to famine œdema is uncertain, but it appears that both factors played a part. As Murgatroyd (1946) has recorded, the œdema increased in some patients when the diet improved.

CLINICAL CONDITION OF THE RELEASED PRISONERS

One hundred and eighty men were examined just after release, and the positive findings, other than the ocular abnormalities, were shown in Table XV. The general condition of the men was good on the whole, there was no abnormality of blood pressure, and the hæmatological findings on a hundred of the patients was as recorded in Table XVI. At another hospital, however, some men were seen who had been working on the Mergui Road

right up to the time of the capitulation. They were very ill, and some were suffering from severe malnutrition with anæmia.

TABLE XV.—ABNORMALITIES FOUND ON EXAMINING 180 RELEASED PRISONERS

Diseases	No. of patients
General	
Partial nerve deafness	5 (4 had amblyopia)
Edema of the legs	2 (Plasma proteins normal)
Acholic jaundice	1 (Familial)
Pain in the tongue	nil
Atrophy of tongue papillæ and fissures	18
Angular stomatitis	20
Scrotal dermatitis	nil
Abdominal	
Abdominal distension	in the majority
Liver palpable	13 (5 had jaundice history)
Liver tender only	2
Spleen palpable	13
Abdominal tenderness	3
Indigestion	10
Flatulence	8
Varicocele	1
Hydrocele	1
Chest	
Active pulmonary T.B.	1
Rhonchi	6
Chronic laryngitis	1
Asthma, acute	1
C.N.S.	
Reflexes brisk	20
Reflexes very brisk	3
Knee and ankle jerks absent	2
Knee and ankle jerks sluggish	3
Sensory loss in legs	2
Tender calves	2
Rombergism	2
Cardiovascular	
Systolic apical murmur	7
Aortic incompetence; mitral stenosis	1
Skin	
Lichen planus	1

TABLE XVI.—HÆMATOLOGICAL FINDINGS IN 100 RELEASED PRISONERS, MANY WITH AMBLYOPIA

No. of patients	<i>Hæmoglobin distribution (grammes per cent)</i>							
	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18
	2	2	6	6	19	29	27	9
	Mean 15.216 grammes per 100 ml.							

No. of patients	<i>Red cell distribution (millions per c.mm.)</i>					
	3-3.5	3.5-4.0	4.0-4.5	4.5-5.0	5.0-5.5	5.5-6.0
	2	7	17	27	33	14
	Mean 4.861 million/c.mm.					

No. of patients	P.C.V. distribution (per cent)					
	25-30	30-35	35-40	40-45	45-50	50-55
	2	3	13	47	33	2
	Mean 43.099 per cent					
	White cell mean		9,150 per c.mm.			
	M.C.V. mean		88.7 cubic microns			
	M.C.H.C. mean		35.3 per cent			

AMBLYOPIA

Of the 180 men examined, 77 suffered from amblyopia. These men had been specially selected for admission to the ward, and were examined by Major H. Ridley, for visual disturbances. He has given an account of their condition (Ridley, 1945). The visual acuity of the 154 eyes examined were as shown in Table XVII. Examination of the optic discs showed atrophy in 27 eyes, temporal pallor in 67, doubtful pallor in 24, and pseudopapilloedema in 4. The fields of vision showed a central scotoma in almost all cases, greater for blue than for white, and slit-lamp examination revealed that the fine capillary plexus at the limbus was increased in extent, and that there was a variability in the size of these capillaries with the appearance of aneurysms.

TABLE XVII.—VISUAL ACUITY OF 154 EYES IN 77 PATIENTS WITH AMBLYOPIA

No perception of light	...	1	5/60	1
Perception of light	...	1	6/60	42
Fingers visible	...	2	6/36	35
Less than 6/60 vision	...	7	6/24	22
1/60	...	4	6/18	11
2/60	...	4	6/12	4
3/60	...	10	6/9	6
4/60	...	2	6/6	2

The time when the amblyopia was first noted by the men is given in Table XVIII. Occasionally the loss of vision occurred in the course of an illness such as dysentery or cholera, but in most cases there was no evidence of a precipitating cause. A man might be able to read a book one day and not the next, or the amblyopia might develop much more gradually over a period of weeks or months.

TABLE XVIII.—DATE OF ONSET OF AMBLYOPIA IN 77 PATIENTS

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Patients
1942	—	—	—	—	1	2	2	2	2	1	9	7	
1943	2	6	4	2	3	5	8	3	8	3	—	—	
1944	—	1	—	—	1	—	2	—	—	1	—	1	
1945	—	1	—	—	—	—	—	—	—	—	—	—	

These men were treated with ten multivitamin tablets and 6 mg. of thiamine hydrochloride daily by mouth, and 8 c.c. of crude liver extract daily by injection this last being given for a period of six days. In addition they received suppressive mepacrine, and graduated dietetic treatment. 47 per cent

of them showed slight improvement in visual acuity (ability to read one more line), and 20 per cent showed definite improvement (ability to read two or more lines) following this therapy.

Comprehensive reviews of this condition of amblyopia have been made by Denny Brown (1947) and Spillane (1947). Garland (1946) doubted whether it could be due to deficiency either of vitamin B₁ or of vitamin B₂. Reed (1947) wondered whether it was due to a toxin, to infection, to dietary deficiency, or to a combination of such factors. Shapland (1946) did not consider that starvation was a sufficient explanation but attributed the condition to a diet of excessive amounts of rice with insufficient vitamin B₁ to metabolize it.

SUMMARY

An account is given of patients seen at three hospitals in India and Burma during the campaigns against the Japanese. These are representative of the types of medical conditions seen in the Far East during the campaigns. Reference is made to many of the papers that have already been published about the medical condition of troops taking part in this theatre of operations.

ACKNOWLEDGMENTS

I am grateful to the Director-General, Army Medical Services for permission to publish this paper, and to Sister M. E. Williams, Q.A.I.M.N.S./R. (now Mrs. R. H. Girdwood) for assistance in making records of patients at Sirajgunj.

REFERENCES

- ADAMS, A. R. D. (1944) *Trans. R. Soc. trop. Med. Hyg.*, **38**, 237.
 ANDERSON, H. H., JOHNSTONE, H. G., ROSTICK, W., CHEVANIA, A. P., PARKER, H. (1949) *J. Amer. med. Ass.*, **140**, 1251.
 AYREY, F. (1947) *Trans. R. Soc. trop. Med. Hyg.*, **41**, 377.
 BENNET, J. (1946) *Proc. Nut. Soc.*, **5**, 85.
 BYRNE, E. A. J., TAYLOR, G. F. (1945) *Brit. med. J.*, **1**, 477.
 CROPPER, C. F. J. (1945) *Lancet*, **2**, 460.
 — (1949) *Brit. med. J.*, **2**, 886.
 CRUICKSHANK, E. K. (1946) *Proc. Nut. Soc.*, **5**, 125.
 DAS GUPTA, D. (1945) *Bull. War. Med.*, **5**, 572.
 DENNY BROWN, D. (1947) *Medicine*, **26**, 41.
 FAIRLEY, N. H. (1945) *Trans. R. Soc. trop. Med. Hyg.*, **38**, 311.
 — (1946) *Trans. R. Soc. trop. Med. Hyg.*, **40**, 105.
 — (1949a) *Trans. R. Soc. trop. Med. Hyg.*, **42**, 623.
 — (1949b) *Brit. med. J.*, **2**, 825 and 891.
 GARLAND, H. C. (1946) *Brit. med. J.*, **1**, 143.
 GILROY, J. C. (1947) Personal communication.
 GIRWOOD, R. H. (1948) *Trans. R. Soc. trop. Med. Hyg.*, **42**, 65.
 KEELE, K. D. (1946) *Brit. med. J.*, **2**, 111.
 — (1949) *Brit. med. J.*, **1**, 986.
 —, BOUND, J. P. (1946) *Brit. med. J.*, **1**, 77.
 KERN, R. A., NORRIS, R. F. (1944) *U.S. Nov. med. Bull.*, **43**, 847.
 LEIGH, A. D. (1948) *Lancet*, **1**, 277.

- LEISHMAN, A. W. D. (1944) *Journal of R.A.M.C.*, **82**, 58.
 —, KELSALL, A. R. (1944) *Lancet*, **2**, 231.
 MCKENNA, R. M. B. (1944) *Brit. J. Derm. Syph.*, **56**, 1.
 MACKIE, T. T. (1946) *Trans. R. Soc. trop. Med. Hyg.*, **40**, 15.
 MCVAY, L. V., LAIRD, R. L., SPRUNT, D. H. (1949) *Science*, **109**, 590.
 MANSON-BAHR, P. (1947) *Trans. R. Soc. trop. Med. Hyg.*, **41**, 269.
 MARKOWITZ, J. (1946) *Journal of R.A.M.C.*, **86**, 139.
 MARRIOTT, H. L. (1945) *Lancet*, **1**, 679.
 —, HILL, I. G. W., HAWKSLEY, J. C., BOMFORD, R. R. (1946) *Trans. R. Soc. trop. Med. Hyg.*, **39**, 461.
 MASSEY, C. W. (1949) *Journal of R.A.M.C.*, **92**, 244.
 MORRIS, J. N. (1945) *Journal of R.A.M.C.*, **85**, 123.
 MURGATROYD, F. (1946) *Trans. R. Soc. trop. Med. Hyg.*, **39**, 482.
 PASSMORE, R. (1949) *Trans. R. Soc. trop. Med. Hyg.*, **42**, 367.
 PAYNE, A. M. M. (1945) *Lancet*, **1**, 206.
 Proceedings of the Conference of Medical Specialists, Central Command and N.W. Armies, Lahore, 1944, quoted in *Bull. War. Med.*, 1945, **5**, 572.
 Proceedings of the Nutrition Society (1946) **5**, 85.
 REED, J. G. (1947) *Trans. R. Soc. trop. Med. Hyg.*, **40**, 411.
 RIDLEY, H. (1945) *Brit. J. Ophth.*, **29**, 613.
 ROBINS, J. E. C. (1948) *Journal of R.A.M.C.*, **91**, 51.
 SAYER, J. J., POND, H. S., FORRESTER, J. S., WOOD, F. C. (1946) *Medicine*, **25**, 155.
 SAYERS, M. H. P., HILL, I. G. W. (1948) *Journal of R.A.M.C.*, **90**, 6.
 SHAPLAND, C. D. (1946) *Journal of R.A.M.C.*, **87**, 253.
 SPILLANE, J. D. (1947) *Nutritional Disorders of the Nervous System*. Edinburgh, E. & S. Livingstone Ltd.
 STEFANINI, M. (1947) *Gastroenterology*, **8**, 729.
 STOKES, J. F., MILLER, A. A. (1947) *Quart. J. Med.*, **16**, 211.
 TATTERSALL, R. (1945) *Lancet*, **2**, 392.
 THOMPSON, T. O. (1948) *Journal of R.A.M.C.*, **90**, 23 and 47.
 THOMSON, A. M. (1946) *Proc. Nut. Soc.*, **5**, 62.
 TURNER, J. W. A. (1944) *Brit. med. J.*, **2**, 592.
 WARRACH, A. J. N. (1946) *Journal of R.A.M.C.*, **87**, 209.
 WIGGLESWORTH, R. (1948) *Journal of R.A.M.C.*, **91**, 101.
 WILLCOX, P. H. A. (1949) *Trans. R. Soc. trop. Med. Hyg.*, **42**, 171.
 WOODRUFF, A. W. (1949) *Trans. R. Soc. trop. Med. Hyg.*, **42**, 605.