CHAPTER 26

THE BURMA-THAILAND RAILWAY

1. WORKING CAMPS

WE have seen how a series of parties of troops left the Changi area from time to time for destinations vaguely spoken of as "up-country". Some were working parties on a more expanded scale than those sent to various camps on or in the neighbourhood of Singapore Island; the numbers were considerable. "F" Force for example comprised 7,000 men. Smaller groups were also sent by the Japanese from Sumatra and Java and merged with other working forces. Other parties were purely medical in constitution and function, but all served one end, that of building a railway to link Thailand with Burma. A railway already ran from Moulmein to Ye along the Burmese coastline, and from Thanbyuzayat on this line the new construction was to extend south and east to Bangkok in Thailand, where it could connect with the eastern line to Indo-China. This route presented many difficulties, but its prompt completion was regarded as of tactical importance by the Japanese, as it shortened the line of communication to Burma, which could only be reached by sea from Singapore to Rangoon. The proposed railway was 270 miles (415 kilometres) long and ran through dense uncleared forest for most of the way, with many deep cuttings and embankments and about 700 bridges.

Allied bombing was no doubt expected; it caused considerable damage, particularly in the later period of the war, and many bridges had to be rebuilt, on occasion as many as six times. There was no question of heavy equipment for excavation and construction; manual labour took its place, and the British and Australian troops were used in conjunction with and much in the same way as the large coolie force at the disposal of the Japanese Army. The route passed through dense malarious jungle, with no existing roads, intersected by streams feeding rivers which in the monsoonal season were swollen enough to take barge traffic. This was an important factor in transport, for the engineers demanded that material should be shifted, and that work should go on during the torrential rains of the monsoon. With steep tracks deep in mud, streams to be bridged, ballast to be quarried and walls of rock to be hewn through, the hazards of this enterprise can be imagined. These dangers were immensely increased by the scourges of tropical disease, with a ready reservoir of infection in the coolie population, and with the primitive accommodation and hygiene of the jungle.

"A" Force under Brigadier Varley, was the first party to be drafted for this work, and left Singapore on 14th May 1942. During 1942 the work was in preparatory stages; bases were set up, the route surveyed, roads made, and materials selected. By the time the monsoonal season

of 1942 had ended bands of workers had already established working camps along the surveyed route.

Early in 1943 the Japanese were animated by a more urgent haste, for they had suffered losses of shipping, they were faced with a critical position in New Guinea, and expected an Allied counter-attack in Burma. Therefore the work was pressed on, in the hope of completing it while the monsoon lasted.

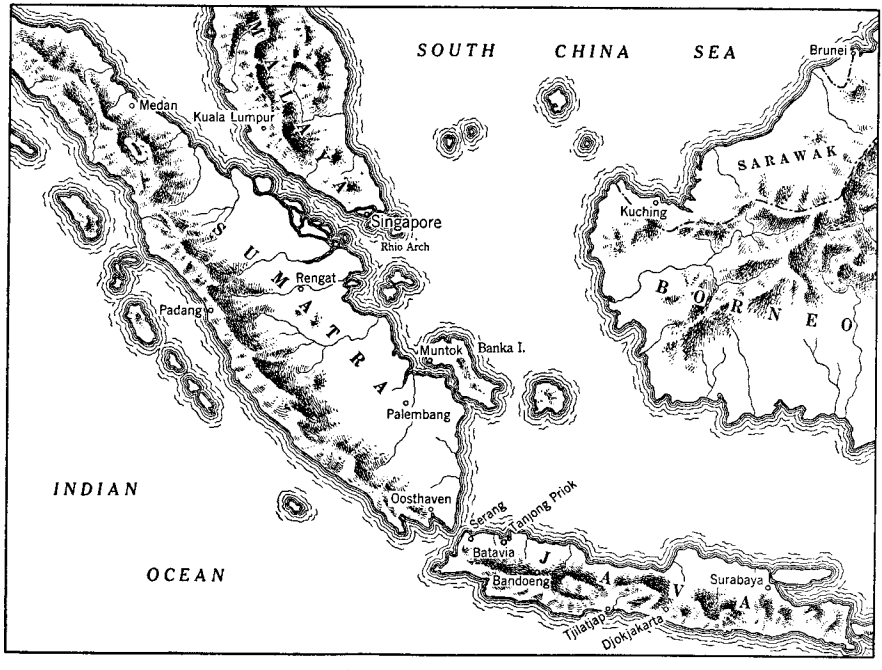
As the work progressed and distances became greater the problems of supply and transport became more difficult. This was particularly so after the monsoon broke, for the constant rain lashed tracks into impassable quagmires before the river rose sufficiently to be used by loaded barges. A medical appreciation of the situation would have shown that only by forethought, resource and the earnest application of both therapeutic and preventive medicine could the labour potential of the force be maintained at a level efficient enough to carry on the work with even reasonable thoroughness and speed. But insight and humanity were lacking, as we shall see.

The story of the working forces in Burma and Thailand is presented in serial order as they left Singapore and other areas where prisoners of war were concentrated, and is pursued through the hospital camps and bases where vast numbers of sick were treated and where so many died. The identity of each of these groups was usually not clearly preserved as time went on, as they were absorbed into local autonomous bodies, and therefore the descriptions must be partly regional, following the prisoners as they slowly gravitated from Burma, and the upper and central Thailand camps to the southern bases and finally returned to Singapore or were liberated from Thailand.

LABOUR FORCES IN BURMA

Coates and Party. The first of these parties based on Singapore was "A" Force, but before this was assembled another working party had been formed in Burma whose destiny was mingled with that of the first oversea working party to leave Changi. It is necessary to hark back briefly to the last few days before the fall of Singapore. When the fall of the island was imminent Lieut-Colonel A. E. Coates received an instruction from General Bennett through the A.D.M.S. Colonel Derham, to join a ship carrying certain key personnel, for use in other areas. At the Clifford Pier he boarded the *Sui Kwong,* which under mortar-fire moved away to another anchorage, and at dawn on 14th February passed through the minefield and the Rhio Strait for Java. Coates was the only surgeon and the only Australian among the medical men on board. The ship was bombed twice with many casualties, and after helping Colonel Broadbent rescue many others in the yacht of the Sultan of Johore, Coates arrived at Tembilahan on the eastern coast of Sumatra on the afternoon of 15th February. Here with the help of colleagues he operated on fifteen of the worst casualties and put them in native huts. An emergency C.C.S. was set up, and when the Australian detachment left next day Coates and

others stayed, and in a week operated on some hundred patients, about fifty major operations being performed with primitive instruments. More wounded were brought in a fishing boat from another sunk ship, *Kuala*. On the 21st the medical party went up river to Rengat, and operated in a mission hospital. Lieut-Colonel Hurd-Wood, I.M.S. and Lieut-Colonel Coates went on to Sawahlunto *en route* to Padang, where it was hoped sea transport would arrive for evacuation. There were 130 patients in the native hospital at Sawahlunto, many of them previously operated on by Coates, who stayed there and helped Major Davies with the medical work.



Sumatra and Java.

On 1st March a cruiser called at Padang and embarked a large number of people, but the party at Sawahlunto still awaited transport for over 130 wounded. On 3rd March Coates went to Padang by train and was asked by the officer in charge, Lieut-Colonel Warren, to act as S.M.O. for the wounded. The British Consul at Padang arranged by radio for a ship to come on the 7th. With great difficulty and not a little opposition from local authorities wounded men were transferred to the Dutch hospital at Padang, and on the night of the 7th there were some 1,000 British and Australian soldiers, fifty of them badly wounded, and a number of women, including some nurses and planters' wives. The Dutch Red Cross provided transport to the port of Padang, Emmahaven, but the ship never came. It had been sunk fifty miles from Padang; some of the crew afterwards met Australians in the prison camps of Sumatra. On 17th

March the Japanese arrived. At first they treated their prisoners well, but Lieut-Colonel Coates and Lieut-Colonel Hennessy, R.A.M.C. were the only medical officers left with 1,500 prisoners of war and fifty seriously wounded. Six weeks later Coates went by ship to Mergui in Burma with 500 British prisoners in a badly overcrowded and filthy Japanese transport, *England Maru*. There was a bad outbreak of dysentery on board, but no drugs were available for treatment. At Mergui this party met the part of "A" Force which had left Selarang on Singapore Island on the 14th May 1942.

"A" Force

The medical section of "A" Force included most of the officers of the 2/4th C.C.S., with Lieut-Colonel T. Hamilton as senior medical officer, Majors A. F. Hobbs, W. E. Fisher, J. S. Chalmers, S. Krantz, and Captains T. le G. Brereton, J. P. Higgin and A. J. White; Captains C. R. B. Richards, C. L. Anderson and G. D. Cumming were R.M.Os. They sailed from Keppel Harbour, and on 20th May 1942 arrived at Victoria Point in Burma, where 1,000 men were left with Captains Higgin and White as medical officers. The ship was crowded and filthy: an epidemic of dysentery broke out, and there was little chance of its alleviation. On 23rd May the C.C.S. staff were divided into two parts; one disembarked at Mergui, and the other went on to Tavoy, where a Dutch party from Sumatra joined "A" Force.

At Tavoy the epidemic of dysentery had reached major proportions, and a British and Australian hospital of 200 beds was established. Major Fisher looked after the dysentery wards. Though these were housed in solid teak huts, the water supply was primitive and the hygiene non-existent. Latrines were dug among rubber trees, but the effort to reach them down steps from the huts in pouring rain was too much for many men. Proper sanitation was later achieved through the efforts of the hospital staff, and with the abatement of the epidemic the conditions improved somewhat, though there was gross overcrowding. It was observed that the epidemic flared up again when sick arrived from Victoria Point and Mergui.

An acute fulminating form of amoebic dysentery had been encountered in Sumatra, and this also appeared in Burma. Coates, who had joined part of "A" Force at Mergui, was himself suffering from amoebic infection contracted in Sumatra. Major Chalmers had enough emetine to treat a few patients, but when the supply ran out the only treatment available at Mergui was powdered charcoal from the kitchen. Some twenty men died. Medical supplies at Tavoy and Mergui were almost non-existent, except those brought by the C.C.S. against the orders of the Japanese, who had given an assurance that quarters and drugs would be available. Captain Richards' medical pannier had been looted on the ship.

In July a small medical section under Major Hobbs went with a working party from Tavoy to Ye. Conditions now improved somewhat in both

Mergui and Tavoy, but there were still eighty to a hundred in each hospital, and there had been several deaths.

In August the parties at Mergui and Victoria Point were brought to Tavoy, thus concentrating the force. The medical staff and patients were brought from Mergui in a little coastal steamer after a shocking trip. Work had been continued on the Tavoy aerodrome, and was pressed on with the augmented working party, in spite of the monsoonal rain, always very heavy in this belt. The men suffered from infected sores, especially on the legs and feet, for their boots soon rotted away. They worked six and a half hours a day, and kept reasonably well on a diet of about 2,600 Calories, though this was deficient in protein and fat. In spite of international conventions medical orderlies were set to work on the Tavoy aerodrome.

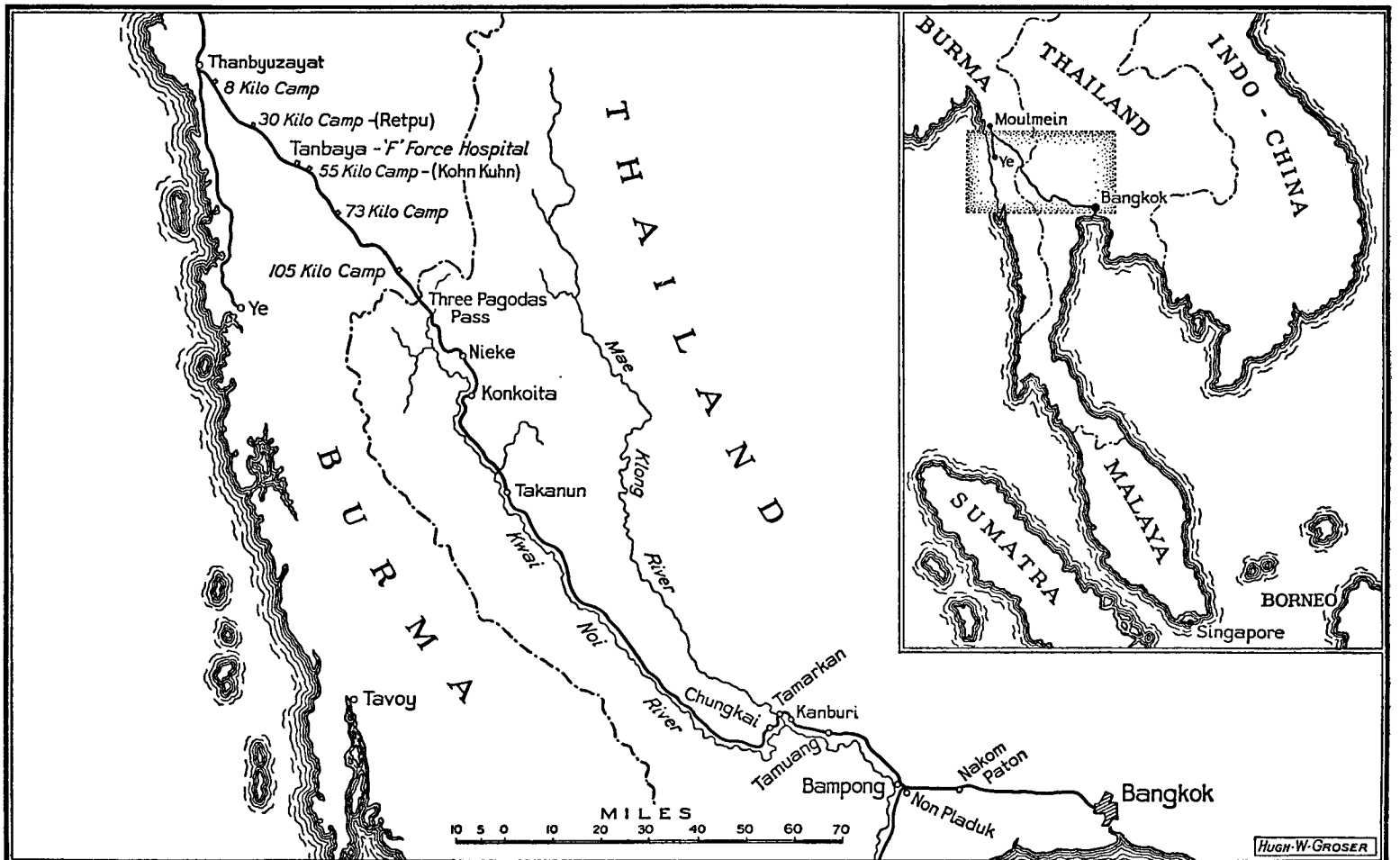
On 30th September the Australians left Tavoy by sea, with the exception of Coates, Chalmers and twenty-five men from the C.C.S. who remained with the hospital and its 144 patients. This journey, for which no rations were provided, took the "A" Force detachment to Moulmein, where the men were loaded into cattle trucks and taken to Thanbyuzayat, where the new railway began. During the next three months further parties of "A" Force arrived from Tavoy, while other parties were sent out working in the jungle from Thanbyuzayat.

There was thus a period of over six months in which "A" Force worked on roads and aerodromes on the Burmese coast, and by degrees collected at the railhead, where parties were being sent out to work in the jungle. The conditions in some of the places already mentioned were fair; in others, like those described in Tavoy in the earlier days they were shocking. At Ye, 100 miles north of Tavoy, diet, though grossly deficient in protein and fat, supplied enough calories to allow some regain of lost weight, and eggs, dried fish, fruit and vegetables such as kachang ijau, a dried green pea, could be bought. Duck eggs, so useful in many other camps afterwards, were a most valuable supplement. Protein deficiency oedema was common. Accommodation and hygiene were poor, and medical supplies comprised quantities of useless drugs, such as creosote and camphor, but nothing of value. Fortunately sickness was not serious, but malaria and especially dysentery accounted for 180 admissions to hospital out of 500 to 600 men in four months. Tropical ulcer was troublesome, but at first relatively benign in type. Numbers of men treated for dysentery at Tavoy were found to be suffering from amoebiasis. Few facilities existed at Tavoy; the improved state of affairs there was due to the initiative of the men themselves, under medical direction. Surgical amenities did not exist, and when one soldier had an acute attack of appendicitis, Major Krantz operated on him in a Japanese hospital. Even in these earliest episodes of Japanese railway construction camps can be seen evidences of lack of reasonable organisation. The efforts of the medical officers were hindered by inefficiency and indifference, which were matched only by a complete disregard for truth and reliability.

At Thanbyuzayat a base hospital was established. Major Fisher was in charge of the hospital, and Lieut-Colonel Hamilton was senior medical officer for all prisoners of war in Burma. Thanbyuzayat was a place of importance, where there were huge dumps of materials for the railway, and a large Japanese camp and headquarters, with anti-aircraft defences. The hospital consisted of shoddy huts of bamboos, with attap roof. Each hut was nearly 300 feet long with platforms 18 inches from the ground and one 6 feet alley way down the centre. They were overcrowded and infested with vermin. At the end of 1942 the Japanese built a new block with wooden floors and sound roofs. The provision of shuttered walls and mats for beds gave some degree of comfort, but only a yard of space per man was allowed, and the resultant overcrowding, together with the inevitable vermin drove the patients to sleep under the huts. Isolation was not provided except for dysentery. For a time Dutch medical staff looked after all the patients with dysentery in the old wards, by order of the Japanese, but the Australians were glad to have their own patients back again, and apply their own methods of sanitation by which the dry pan latrines previously used in the wards were abolished. Severe types of infection were seen here, and a number of deaths occurred especially in the malnourished, averaging about one a day.

Eadie and Party. At the end of October Lieut-Colonel N. Eadie, who had previously commanded the 2/2nd C.C.S. arrived from Java. Digressing for a moment we may note that in March 1943 he had been taken to a native gaol in Batavia after he had unsuccessfully attempted to arrange for hospital accommodation for casualties resulting from a forced march of prisoners of war at Batavia. This gaol was filthy and 2,000 European prisoners of war were crowded into a space meant for 900 native prisoners. With Captain Goding A.A.M.C., Eadie tried to do something for many men suffering from dysentery, malaria and dengue fever, though hampered by a serious shortage of drugs. A month later some of the Australians, with Eadie and Goding, were transferred to a camp in the city known as "Bicycle Camp" where Brigadier Blackburn had been some time previously. In October 1942 Eadie was sent as S.M.O. with a working force of 1,500 Australians and Americans, who suffered horrible conditions on board ship to Singapore. After a few days at Changi Eadie went to Moulmein in Burma, and became absorbed into "A" Force. He later became medical officer to a working party under Lieut-Colonel Williams.

A small operating theatre was built at Thanbyuzayat in November, in which emergency surgery could be carried out. During January most of the remaining personnel of the C.C.S. and patients arrived from Tavoy, but Major Hobbs was allowed to take a detachment to Moulmein on 18th January to attend wounded who had been on bombed ships. The most seriously wounded were quartered in a church and were well treated by the Japanese, who supplied good beds, good food and sterilised dressings. The treatment received by these sick men proved to be unique in the light



"A" Force—Burma-Thailand Railway.

of later experience. There were other signs that there was danger from the air, from Allied planes, for on 1st March two bombers flew over the camp and dropped flares and bombs some one and a half miles away.

By this time camps were stretching out from Thanbyuzayat into the jungle, and patients received at the base from them showed signs of the strains to which they had been subjected. As the work grew harder, and more exacting with the making of roads and bridges, and driving cuttings through rock, so rations deteriorated. The Japanese were trying to discharge as many patients as possible from hospital, and the guards became more truculent and cruel. At the end of April the Japanese made a propaganda film of the camp, complete with band and concert parties drawn from working camps. The medical officers were not impressed by the mock show of drugs and other equipment on shelves in the theatre, nor the scene of "up" patients parading as sick arriving from the jungle.

In April another large base hospital camp was opened at Retpu also known as 30-kilo camp, 18½ miles from Thanbyuzayat. Lieut-Colonel Coates, who had been working at the base since leaving Tavoy in February, was appointed S.M.O. with Major Krantz as surgeon. In May the Japanese decided that most of the patients were fit for work, and, sending the dying back to Thanbyuzayat, they distributed the rest among the jungle camps.

By May 1943 several important events had happened. The sharp heavy showers of April had heralded the monsoonal rains, which added greatly to the discomfort of workers and patients. In March men in some camps had been inoculated against cholera, but in the middle of May, Captain Richards on entering Taunzan, an "inexpressibly filthy" camp, found bodies of Burmese there dead of a cause unknown. This cause was soon revealed as cholera, and further deaths occurred. Treatment with saline solutions was carried out with a wide bore needle extemporised from "salvaged" copper tubing.

On 12th and 15th June further air raids took place, killing thirteen A.I.F., two British and four Dutch, and injuring thirty more, including Brigadier Varley. As a result next day a number of the fitter patients were sent to a camp five miles away. They had to walk and carry their gear, and on arrival found the camp a mere collection of bamboo huts without even attap roofs to give shelter from the incessant rain. All who could stagger left for previously vacated camps, leaving the stretcher cases at Thanbyuzayat for several days with Fisher and a small staff, who managed to move to 18-kilo camp before further raids occurred; later they went to Retpu. Bombers persistently attacked the camp until the 27th June, and during this time, cholera, which had attacked several of the worse working camps was still a major anxiety. The Japanese made bacteriological examinations to discover infected men, but failed to correlate these tests with the isolation of carriers.

During the early part of the monsoon season the men working in the railway camps faced great risks. It is difficult to understand an organisation which moved men as yet untouched by cholera to camps where native

labourers were dying of the disease, and without attempting any local hygiene, examined men by rectal smears and cultures. Yet the Japanese were genuinely alarmed by cholera, and adopted such measures as building a stockade round an infected area, for the purpose of excluding those who had not been submitted to a futile disinfection. In June cholera in the 60-kilo camp was well under control, largely owing to the efforts of Eadie and Richards, and the men, most of whom had recurrent malaria, were sent to 40-kilo camp which was even worse. Men were driven to work by the Japanese, and Lieut-Colonel Eadie and Sergeant T. O'Brien who refused to let sick men go, were sentenced to a month's imprisonment. Fortunately the sentence was cancelled at the last moment.

Retpu camp had been the site of a convalescent hospital for a short time under Lieut-Colonel Coates; it was now re-opened on 4th July under command of Major Fisher. The 18-kilo camp, to which some of the patients from Thanbyuzayat went after the bombing, was evacuated to Retpu. This was a great relief to the patients, as 18-kilo camp was incredibly bad, with mud or swamped padi fields under the huts, which even with dispersal, offered targets for bombers for which no red cross protection was allowed. Retpu was another deserted working camp; its sanitary arrangements were so bad that the latrines were physically dangerous. Convalescents had little rest as they were constantly occupied in boiling water and sterilising mess gear. The majority of the patients suffered from dysentery, relapsing malaria, malnutrition, and many in addition had tropical ulcers. One advantage of this camp was the proximity of the river, which, with the greater dispersal allowed by the Japanese, was more readily reached by the patients for swimming and fishing. Still another abandoned hospital was expanded to make a large base: this was the 55-kilo hospital camp at Kohn Kuhn, designed to take all the sick from the forward jungle camps. Coates was asked by Colonel Nagatomo and Brigadier Varley in person if he would take over this camp; though ill in 70-kilo camp with tropical typhus at the time he agreed, and was later able to initiate work of great value and ingenuity in this hospital. During convalescence he was carried round to see patients before he was fit to walk. The conditions were very bad: there were eight large bamboo huts roofed with attap, and one small isolation hut, in which one hundred patients with dysentery were nursed. No beds or bedding were provided. Early in July there were 1,000 patients of several nationalities; in a few weeks these had increased to 1,800, with only two medical officers and six orderlies. A month later four more doctors were added to the staff.

Malaria was extremely common, but as most patients with other diseases also had malaria the Japanese did not count these in estimating supplies of quinine, and reckoned for 300 only. There was a small amount of quinine hydrochloride for intravenous use in cerebral malaria, but economy of all quinine was imperative.

Amoebic dysentery here appeared as the scourge it is in its acute destructive form; emetine was almost unobtainable. An extemporised proctoscope was used in diagnosis, with sunlight as the illuminant. The Japanese

medical officer, sceptical of the nature of the condition, ordered the term amoebic dysentery to be deleted from death certificates and "hill diarrhoea" substituted. Autopsy evidence proved its nature, and emetine was promised: at last a microscope was available in October, by which Lieut-Colonel Larsen of the Dutch Army Medical Corps confirmed the diagnosis. Fortunately Captain Van Boxtel, a Dutch chemist, made emetine from extract of ipecacuanha, and this was used with complete success.

It was in these early days in Burma that the first attempts were made to alleviate the destructiveness of chronic amoebic dysentery by the manoeuvre of intestinal drainage. In Tavoy Coates performed the first ileostomy of the prison camps for this condition, with complete success, and this life saving measure was repeated in other places on a number of other patients.

Various forms of malnutrition, due chiefly to avitaminosis, had been recognised for some time. Early in 1943 the same sequences of deficiency diseases were seen as those described in Changi, including beriberi, the pellagroid states due to lack of the *B* complex, in particular the so-called retrobulbar neuritis. Already it was feared that numbers of the men with this ocular deficiency would suffer some permanent loss of sight.

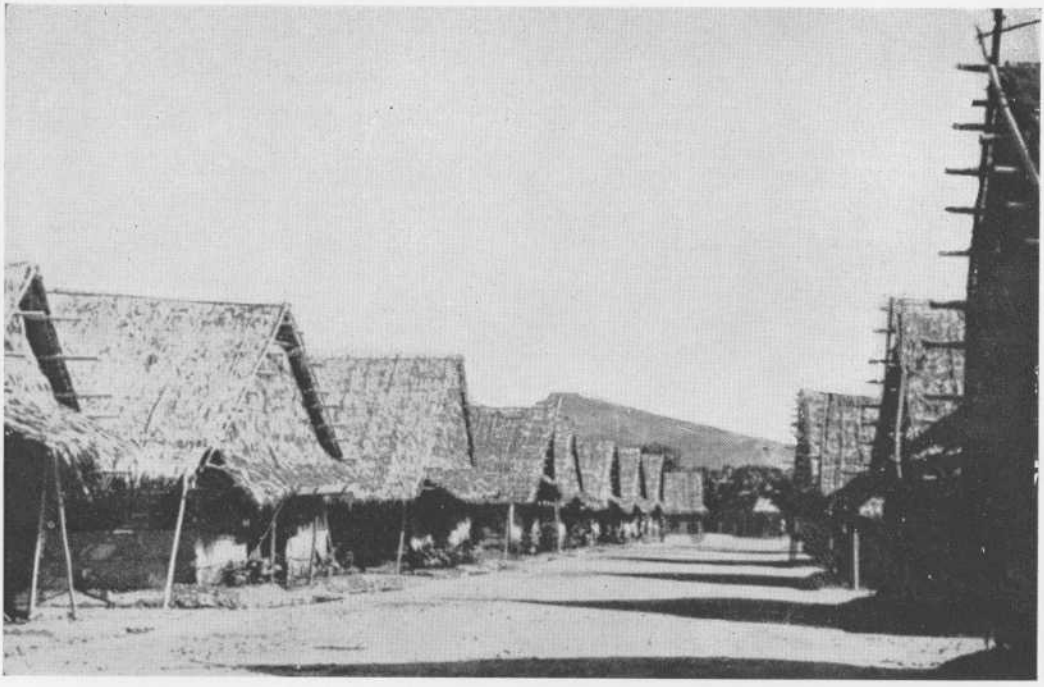
In Burma the pellagroid states were readily recognised once their nature had been established by Fisher's observations at Thanbyuzayat in October 1942. Unfortunately the diet was so inadequate that the clinical hallmarks of serious deficiency were obvious. Angular stomatitis, pharyngitis with dysphagia, painful cracked tongue, usually associated with diarrhoea, and light-sensitive rashes made a clear picture. As in other areas, autopsy often showed atrophic epithelial changes in the hollow viscera. Atrophy of the convolutions of the brain was also found in some patients who had shown signs of mental degeneration before death. The lack of protein and fat was felt severely, and Coates felt justified in consenting to the fund levied from officers' pay being used to buy meat outside the camp. Mr Keith Bostock, a representative of the A.R.C., administered the fund, and the negotiations were conducted with villagers on the initiative of some of the prisoners. Nutritional oedema due to lack of protein was common, the so-called "famine oedema"; when the rare opportunity offered of supplying this deficiency with an adequate ration of meat the response was striking. Oedema was often due to a combination of protein and thiamin deficiencies.

"Tropical" ulcer, as seen in its severest manifestations, was one of the most painful and dangerous common conditions of captivity. There were three chief factors, malnutrition, affecting the whole tissues of the body, and lowering general and local resistance; infection of mixed type and readily propagated under the prevailing conditions, and injury. Even in their lesser manifestations these ulcers were painful and disabling, and in default of dressings the men on working parties strove to cover them with scraps of rag or even leaves. On return to camp the number needing attention was often so great that sick parades lasted till late at night. Even minor abrasions became infected, and particularly in oedematous

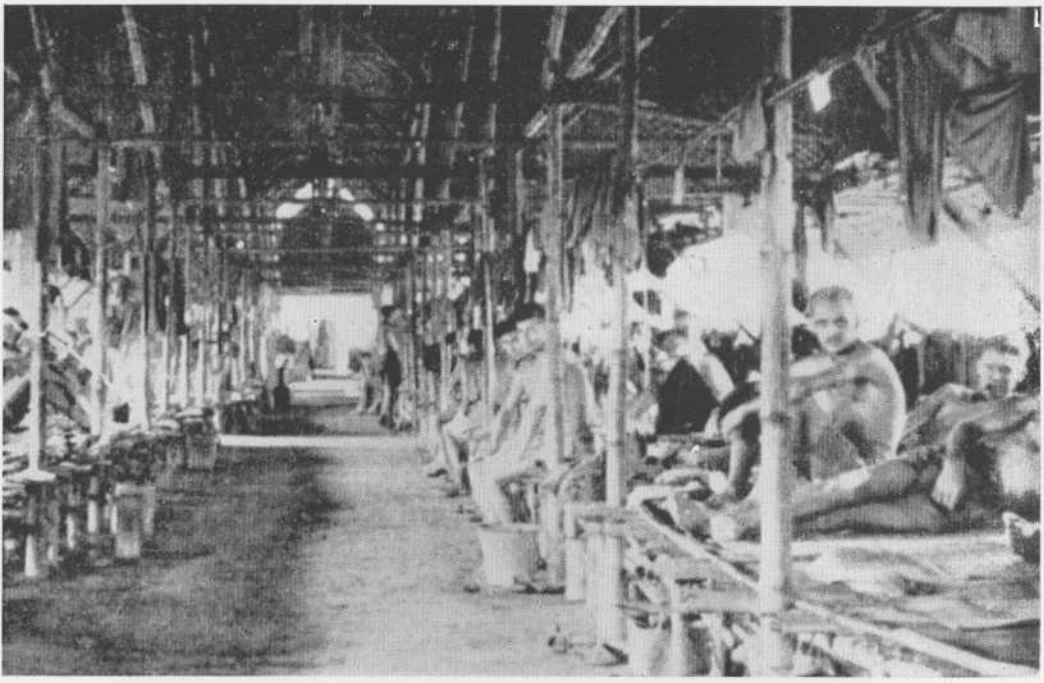
tissue septic and destructive lesions spread often with incredible rapidity. The most usual site was on the lower limbs. The fully developed ulcer had an undermined edge, and extended to the deep fascia, where there was a sloughy base. Once muscle was reached it spread rapidly, and even tendons and periosteum were involved. At 55-kilo hospital over 500 cases were seen. Conservative treatment frequently failed; curettage and the use of iodoform and other applications sometimes gave a good result, but radical excision of necrotic muscle and tendon was frequently necessary. Excellent results were obtained by this last procedure, but when the process had involved deeper structures, such as joints, the pain and disability could no longer be borne: cure was then impossible and amputation was the sole remaining procedure. Coates found that a realistic appraisal of the state of these limbs led him more and more to amputate while there was yet a chance to save life and restore usefulness. One hundred and twenty men were submitted to amputation at 55-kilo camp without any immediate operative mortality. As many as four amputations a day were performed at one time.

One important factor in the production of skin injury in these working camps was the absence of protective clothing. Boots soon fell to pieces, and uniforms ceased to exist. With living reduced to its lowest terms, the men were forced to expose themselves to the repeated traumata of heavy work by day and to ravages of weather during the hours which should have been those of rest. As in all the more or less settled hospital camps, clinical interest was maintained by regular meetings of the staff, much to the benefit of both doctors and patients.

In Kohn Kuhn, at the 55-kilo camp, necessity and ingenuity inspired many improvisations which widened the scope of medical and surgical work. Many instruments were devised to fill the gaps in the very restricted kit available. Beds were provided for the most seriously ill, made from rice bags supported on bamboo frames. All scraps of rag and mosquito netting were hoarded and used for dressings and bandages. Artificial limbs were made from the ubiquitous bamboo, and though these were of the simple pylon type they were used by grateful patients, who were also helped by bamboo crutches made by convalescents. Captain Van Boxtel carried out invaluable work in refining and making various substances needed for treatment. A primitive still was used to distil water for eye drops. Tinea paint (Vleminckz) was made from sulphur and slaked lime; this was valuable for both tinea and scabies: an ointment was also used with axle grease as a base. Since spinal anaesthetics were chiefly used a product was made by careful evaporation and dilution of Japanese novocain. A 4 per cent novocain was produced which could be used intrathecally. Procain was also tried, but the oxidised adrenaline in these tablets could be removed only by kaolin, which also removed some procain. In response to a great need, Van Boxtel experimented carefully with cocaine: 0.75 c.cm. of a 2 per cent solution proved safe and effective.



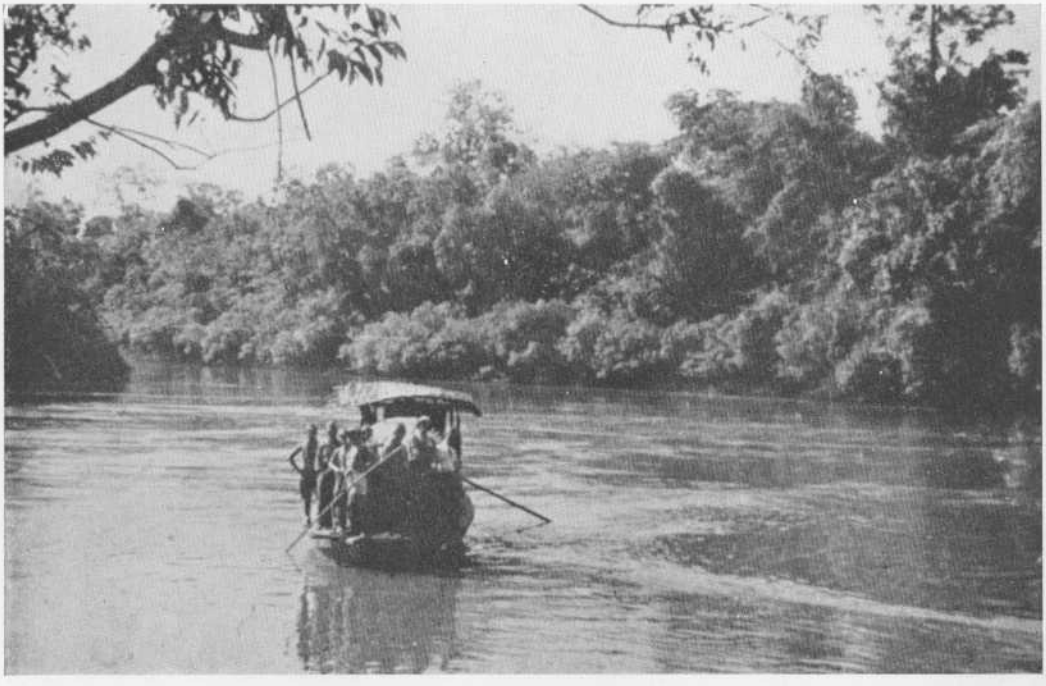
Hospital Camp, Thanbyuzayat, Burma.



(Lent by Ex-servicemen's P.O.W. Subsistence Claims Committee

Hospital Hut, Thanbyuzayat

Rice trucks for carrying thirty prisoners of war.



(Lent by Ex-servicemen's P.O.W. Subsistence Claims Committee)

River barge transporting stores and sick prisoners of war,
Kwa Noi River, Thailand.

Alcohol for surgical use was made by distillation of Burmese "brandy", purchased through the camp commander and interpreter. The percentage of methyl alcohol was apparently low, but a specially prepared fraction of pure alcohol was used for sterilisation of syringes. Disinfectants were soon exhausted, but a weak solution of salicylic acid, a prepared cresol, methyl violet in alcohol, and 1 per cent flavine were found useful for different purposes. Surgical catgut was one of the most useful substances made. After experiment the serous coat of intestines of cattle was found to yield an elastic thread of reasonable strength. Sterilisation was difficult; finally a method of fractional heating in the kitchen fireplace was evolved, and though an irreplaceable thermometer was broken the temperature could be judged with sufficient accuracy. The dried gut was kept in a jar and placed in 5 per cent iodine solution before use. Among other drugs prepared were sodium citrate, acetic acid, calcium chloride, and emetine. In making emetine half-used ampoules of Japanese ether were used with sodium carbonate and alcohol to release the emetine from liquid extract of ipecacuanha. The technical difficulties were overcome with great ingenuity, and an active product was prepared, suitable for intramuscular injection. Finally, precious glass syringes which had been broken were made usable again.

During the height of the monsoon the men suffered great discomfort. Diet was poor, 300 to 500 grammes of rice with meagre amounts of greer stuff, but an unexpected gift of tinned milk was a great help. The Japanese hounded sick and well to work; in one camp 200 out of nearly 900 men were demanded; only 50 could be produced though but 30 of these were fit to work at all. Jaundice appeared in some jungle camps; its cause was uncertain. By comparison Retpu, to which a number of these sick were sent, was a much better camp. In several of the camps cases of sudden death were recorded. Little warning was given, and after a few minutes of breathlessness and cyanosis these patients died from cardiac arrest. Cases of this kind were seen in all areas where serious deficiency of thiamin existed.

As the year went on the working camps of "A" Force stretched out some distance from the Three Pagodas Pass, and well over the Burma-Thailand border. In some of these the Japanese paid the men in Burmese currency which was of no use in Thailand, and as there was no money to buy supplements, diets were accordingly bad.

In October 1943 the railway was completed and "A" Force made contact with "F" Force at Nieke. Retpu was evacuated to 55-kilo hospital camp, and the additions to the medical staff were welcome, to deal with increased numbers of patients. Casualties occurred among the orderlies, who were doing excellent work; several suffered septic ulcers from men in the wards, one lost a limb as a consequence. Two hundred and twenty men had died so far in Kohn Kuhn. The food became steadily worse, yet it was difficult to persuade the Japanese to recognise Red Cross representatives. In these circumstances the prisoners of war could not but feel

cynical when at a Remembrance Service ordered by the Japanese, Lieut-Colonel Nagatomo addressed the spirits of the dead.

At the end of November 1943 a move of the hospital to Thailand was proposed, and Major Fisher and other officers were consulted about these proposals. Four categories of patients were recognised (1) seriously ill for a hospital near Bangkok (Nakom Paton), (2) lightly ill for Kanburi, (3A) healthy men in two categories, (3B) men left in Burma for maintenance. Reports confirmed previous accounts that the food was worse at 105-kilo camp and others in the neighbourhood than at 55-kilo, where hard work was being carried out on 3,000 Calories, chiefly derived from rice. On 19th December the advance party of 200 left 55-kilo camp with two medical officers and eight other ranks of the C.C.S. The last of three groups left on 24th December and arrived at Tamarkan in Thailand on the 28th: eight stretcher cases or thirty to thirty-five sitting patients were put in each truck, and though the nights were very cold only one thin blanket was issued per man. Three men died during the journey, which occupied four most trying days. Eventually all the prisoners of war in the working camps and hospitals at the Burmese end of the line were evacuated to the Kanburi area, with the exception of some 500 left in workshops for maintenance work.

Lieut-Colonel Hamilton in summarising the position at the close of 1943 estimated the sick rate in the jungle camps remaining in Burma as between 50 and 70 per cent. About 1,500 Australians with some Americans and Dutch were in the main camps, such as that at 105-kilo, and small parties of about 200 men were scattered along the line from Moulmein to the border of Thailand. All camps had at least one medical officer and two orderlies, who regardless of their own condition, worked in the interests of the men, ably taking responsibility which in itself was a burden for officers of junior status. Dental work was also carried out even in outlying camps; Captain S. T. Simpson of the 2/4th C.C.S. worked with an orderly, Private W. Fysh, with only a pannier of supplies, and in addition assisted with anaesthetics and oral surgical cases at Thanbyuzayat.

The further story of "A" Force after the move south to other concentration areas must now be left for the present, while we follow the movements of the other forces which made their way up from the southern end of the line.

LABOUR FORCES IN THAILAND

(a) UPPER THAILAND GROUP

"F" Force

On 8th April 1943 the headquarters of Malaya Command was informed that "F" Force, a working party of 7,000 British and Australian prisoners was to leave Singapore shortly for an undisclosed destination, optimistically described by the Japanese as "health camps". The Japanese on being informed that there were not 7,000 medically fit men in the Changi area,

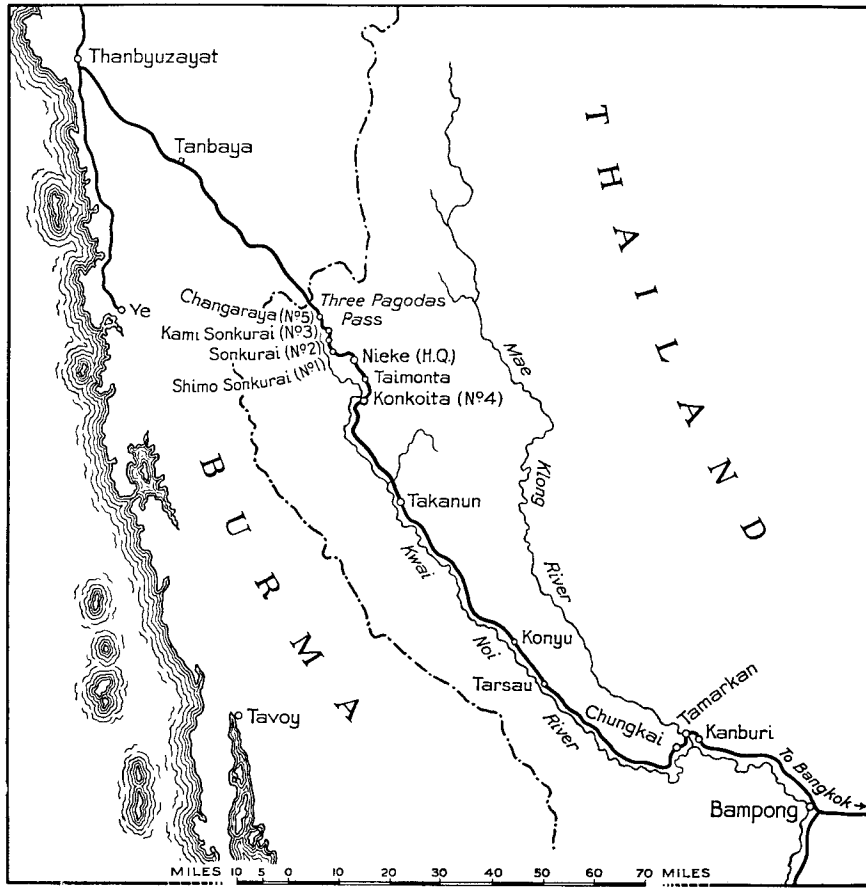
told Lieut-Colonel Harris, the force commander that 30 per cent of the men need not be medically fit, as it was not a working party and conditions would be good. The A.I.F. quota of men was 3,600, and contained at least 125 men who were still suffering from the effects of illness and therefore unfit for work. All ranks were tested for infection with dysentery or malaria, vaccinated, and inoculated against plague and cholera. So short a time was allowed for the selection and preparation of the force that only the first injections of plague and cholera vaccines could be given. A request that a representative of the Red Cross should be sent was nullified by refusal to grant recognition or funds. Three months' medical supplies were sent from the scanty reserves held in Changi. A distribution of reserve boots and clothing came too late to benefit the A.I.F. Lieut-Colonel C. H. Kappe was the A.I.F. commander of the force, Lieut-Colonel J. Huston, R.A.M.C. was S.M.O. of the combined party, and Major R. H. Stevens the S.M.O. of the A.I.F.

The Australian detachment occupied the first six of the thirteen train loads that left Singapore, beginning on 18th April. The men travelled in steel rice trucks ventilated only by central sliding doors; in these trucks measuring 20 feet by 8 feet were placed twenty-seven or twenty-eight men. Most of the stores were also loaded into these trucks. The heat was extreme, only a few could lie down at one time, or even sit with any comfort. Fortunately the men had three days' rations, as meals were meagre, comprising rice and thin stew, at long and irregular intervals. No sanitation was provided, and once over the border Japanese police would not permit men off the train, except at infrequent stops. Drinking water was strictly limited and washing was allowed only once in five days. On arrival at Bampong the men had to carry their equipment and stores nearly a mile to a staging camp. Here each train commander was given a copy of "Instructions for Passing Coolies and Prisoners of War", and the parties were informed that they now had before them a very long march to their concentration area.

The staging camp was a collection of four filthy huts in a fouled area, which needed a day and a half to clear. The only water supply, drawn from a filthy well, was barely enough for cooking and one filling of water-bottles. The men sold much of their clothing and other belongings to the Thais, and bought food. The valuable camp gear and stores were left unguarded by the Japanese, with the result that much was lost by looting by the native population. In this way there were serious losses of personal effects and medical stores from the first trains. Even much of the stores left in a dump at Bampong could not be brought on by lorries on account of the imminent breaking of the monsoon. Exhausted by the long discomfort of the train journey the men now had to begin a march of at least 170 miles.

The marching was done at night, but the humid heat was almost as great as by day. The first stretch of metalled road on the seventeen mile stages to Tamarkan soon degenerated into jungle tracks, which the first rains of the monsoon beat into slippery mud. The fatigue of the men was

evident in the almost shadeless burning sun the next morning, when check parades were held and men detailed for the necessary camp duties. The hiring of ox-carts and other vehicles for carrying some gear and stragglers had helped them along the last miles, but there was worse ahead. A day's rest was a relief after the fifteen mile stage to Kanburi, even though the only water came from a dirty well and was sold at five cents a bucket. Further medical tests by the Japanese took place here, and more inocula-



"F" Force—Burma-Thailand Railway.

tions, medical equipment was divided up for porterage by the parties, sick were attended, and that night the march went on. So night after night the force struggled on, sick and stragglers increasing in number, some collapsing and carried on stretchers, the gear of the weaker men carried by others, except now and then when ox-carts could be hired. Through Wanye to Tarsau they marched and there met men of "D" Force, who had left Chang in March. "D" Force had its headquarters at this camp,

which was extensive, and here had a bamboo hutted hospital where determined attempts were made to leave sick who were unable to proceed. Though the Japanese medical officer agreed the Japanese N.C.O. in charge refused to leave any but a few, and after altercation assaulted Majors Hunt and Wild, injuring the former's hand.

From Tarsau the sick had to be helped along the muddy road, now running through hilly country. Sixteen miles beyond Tarsau Lieut-Colonel Huston, S.M.O. of "F" Force, was ordered to form a wayside hospital for those falling sick *en route,* using the medical panniers. He asked that permission might be given instead to go on ahead and arrange accommodation in advance for the sick, but this was refused. The only shelter available was the rat-eaten lining of a marquee, under which men were cared for as well as possible after the night's long march. When the force reached Konyu shortage of rations was encountered for supplements could no longer be bought. The food supplied consisted of inadequate quantities of rice and watery stew. Stage after stage was painfully passed, night after night, and after the fourteen or fifteen miles of effort the men would collapse on the featureless clearings which were little better than a camp in name, and try to rest. Frequent check parades were held by the Japanese guards, and there were always camp fatigues on cookhouses and latrines. At Brancali harsh conditions were met, and the difficult country ahead had hazards for the marchers in slippery bridges and embankments, where numbers were injured by falls. Many men had sores on the feet and legs, and still more had dysentery.

At Takanun the bivouac site was for once clean and pleasant with shade and running water; Konkoita was really the only area where there was a staging camp. The A.I.F. troops were finally halted at a series of five jungle camps in the Nieke area, spread out over a distance of some thirty miles. Those whose destination was Sonkurai, the farthest north camp of the group, had by this time marched 185 miles. Many men had to be carried or helped over the track, and most men carried another man's gear as well as their own. After seventeen exhausting nights with occasional rests, followed by days of discomfort, the first elements of the force reached Konkoita. Lieut-Colonel Harris, who had been sent ahead with the Japanese commander met them there, and tried unsuccessfully to obtain better rations and conditions. Lieut-Colonel Pond's party of 700 men arrived at Konkoita at the same time, 9th May 1943. This party was one of the train parties which was self-contained; it was under the medical care of Captain R. M. Mills, A.A.M.C. The camp at Konkoita was filthy, and it was impossible to walk about without fouling one's boots with excreta. The Australian quarters were close to the coolie lines: coolies were lying dead in blood and mucus, and a high death rate was reported. On 16th May the party joined its advance section at Upper Konkoita, to find that Major Stevens and Captain Hendry had been sent north to cope with cholera at Nieke. There was no longer any doubt that cholera had broken out among the native labourers, and that it was spreading to other camps. On the night of the 16th the monsoon broke

in earnest, and constant rain poured down, not to cease till at least September. Dysentery and malaria were rife; within a month it was estimated that 90 per cent of the force had malaria.

From their arrival at the working camps the troops of "F" Force were driven mercilessly by the Japanese engineers to laborious work, such as pile driving in water up to their waists. During the march there had been daily battles with guards who forced sick men to march on, and violent assaults on the persons of officers and men trying to protect them. Similar conditions prevailed in the working camps, and sickness multiplied.

Certain factors in the administration intensified the difficulties which beset the special "forces" brought from Singapore Island. Construction of the railway had began simultaneously at each end of the route, at Thanbyuzayat in Burma, as we have seen, and at Non Pladuk, near Bampong on the railway line to Bangkok. Non Pladuk was a base for workshops and engineers throughout the construction work, and a camp hospital was maintained there. From the two ends the north and south sections pushed on till they met in the middle. The headquarters of the force working on the central camps was at Nieke. "F" Force had been already sorely tried by having to reach these working camps by an arduous march, immediately after which the men were thrust ill-nourished and weary into work beyond their capacity. Like "H" Force and other reinforcement parties drawn from Singapore Island they remained under the administration of the Japanese in Malaya. Remote, and largely at the mercy of the Japanese engineers who, without regard for life, wished to push the railway through in the height of the monsoon, these men had separate medical and hospital arrangements. These arrangements were crude and insufficient in the extreme, and "F" Force, working northward up the string of working camps, was dependent upon the meagre medical supplies held by their own medical personnel, such still more meagre replacements as they could wring from the Japanese, and such makeshifts as they could devise.

The working parties, already menaced by malnutrition and overwork, were further endangered by the proximity of a civilian labour force. This force consisted of coolies, Tamils, Chinese, Malays and others, who were recruited by the Japanese early in 1943, allegedly for contract times, usually for six months. The morbidity and mortality amongst them were very high, and we shall later see what arrangements were made for their welfare. Notoriously lacking in any notions of hygiene, they were a constant source of infection with bacillary and amoebic dysentery and cholera. Once the Japanese could be persuaded that cholera had broken out their alarm took scientific form, with the use of anal swabbing and cultures, and inoculations, and care in sterilising their own soldiers' mess gear, but these measures were negated by a complete sanitary breakdown. As Captain Mills with Pond's Party remarked, a bamboo fence between the main camp and the neighbouring coolie quarters was not respected by the cholera vibrio or by the flies.

On 10th May Colonel Banno arrived by lorry at Nieke with Lieut-Colonel Harris. At this headquarters camp there was then no shelter at all supplied for the prisoners of war. Within the next week detachments of "F" Force arrived, and frequent thunderstorms, yielding to steady rain added to their discomfort. The "F" Force troops were distributed between Changaraya and Konkoita: the British were concentrated in Sonkurai and Changaraya, the A.I.F. were in Shimo (lower) Sonkurai, Kami (upper) Sonkurai, Konkoita, and the headquarters camp at Shimo Nieke. Scattered down the southward road were between 500 and 600 Australians, some drivers and cooks, others were sick, and others had died.

The breaking of the monsoon coincided with the realisation of the position about cholera. Captain J. L. Taylor, A.A.M.C., made a definite diagnosis of five cases of cholera on 15th May. Colonel Harris immediately urged Banno to establish an isolation hospital, to complete the inoculation of the force, and to prohibit further movement of uninjected men into Konkoita and Shimo Nieke camps. Though a hospital was started and the Japanese produced cholera vaccine after ten days, no attempt was made to limit movement up the line. The British and Australian medical officers did their utmost to maintain isolation at Nieke and to treat the sick, but inevitably cholera spread to the other camps.

By 19th May further inoculation of the troops had been begun and was completed on the 25th, but no appreciable immunity appeared to be conferred till the beginning of June. The wave of primary infection due to the first contacts produced a number of deaths, but by the time this was subsiding, late in May, better isolation and improved hygiene were achieved. In particular, kitchens, mess gear, personal hygiene and safer sanitation were given close attention. There was at first a feeling of despair creeping over the men, but the spirited encouragement of the responsible officers and the candour with which the position, with its risks, its hopes and its duties was put before the men kept the corporate spirit of the affected camps at a high level.

At the end of May a remonstrance was addressed to the Japanese who agreed that work should cease for three days, but did not keep this agreement, though at that time ninety patients were in hospital with cholera and fifty-three had died in one camp alone. Attempts to bring Lieut-Colonel Huston forward also failed, though he was ultimately permitted to join the main force, after six weeks delay and then was not allowed to bring medical stores with him. Stevens remained at Shimo Nieke in charge of the base hospital, and Hunt and Taylor with British and Australian volunteers went forward from Konkoita to deal with the growing epidemic.

The conditions at Shimo Sonkurai during the epidemic may be described as typical of those prevailing in the working camps where cholera had to be treated and controlled. The secondary wave of cholera began on 24th May owing to infection in the camp. Tests made by the Japanese revealed 53 carriers among 250 apparently healthy men. The camp was hutted, but the huts were roofless, and its layout was such that spread of infection was almost inevitable, as the latrines were situated above the

camps. There was great scarcity of tools for constructing new latrines or drains to cope with the flooding from incessant rain, and the tired men had little energy.

In the small isolation hut treatment was standardised. All care was taken to keep the patients warm as far as possible, fluids by mouth were forced, and saline was administered intravenously wherever practicable. Though it was necessary to use boiled creek water for making saline very few reactions were encountered. Over 200 cases were diagnosed here as cholera and Major Hunt was sure on clinical grounds that another 200 men had mild attacks which otherwise would have been regarded as dysentery. "Cholera Hill", as the isolation hut was called, was put under the personal care of one medical officer, Captain R. L. Cahill, with assistance when required from Major Hunt or Captains Taylor and Juttner. Lance-Corporal K. R. Marshall and Private A. E. Staff with other orderlies and volunteers did much to provide the patients with a devoted standard of nursing care. The death rate was naturally high, but was below 50 per cent, 101 out of 209 men, and when the estimated mild infections are included it was approximately 25 per cent. Twenty-three men associated with the medical work of this epidemic died; only three of these were members of the A.A.M.C., the remainder were volunteers. No medical help was given by the Japanese; indeed it was only after vigorous pressure that consent was given by the Japanese camp commanders that men would not be taken from hospital for working parties.

By the end of June cholera was under control in the camps north of Nieke. The Japanese made periodic tests by culture, and directed that convalescents should be kept in isolation until four anal swabs had given no result on culture. In Shimo Sonkurai the last case was seen on 29th June. It was at this time that the establishment of a hospital in Burma was suggested, nearer the head of the supply line. Hunt visited a number of the forward camps early in July with the Japanese commander, and was able to assist with some of the local medical problems in the light of his experiences in Shimo Sonkurai. He discussed the project of a new hospital in Burma with Lieut-Colonel Harris the force commander, Lieut-Colonel Hutchinson and Major Stevens, the S.M.O. In view of the shortage apparent in the Sonkurai-Nieke area the establishment of a hospital farther north seemed to have some advantages. After a struggle approval had been given for the forming of a convalescent section of the hospital at Shimo Sonkurai; this enabled men recuperating after illness to do some light work and to draw a slightly less poor ration.

While the proposition of a purely hospital camp was under consideration local conditions in the working camps had deteriorated even below the previous low level. We may digress from the story of the movements of "F" Force and its components to gather some picture of the privation and hardships suffered by these men. The country was difficult, the only roads were but tracks, and even on occasions when ox-carts or other vehicles were available for the transportation of gear, man-power was often necessary also to push the vehicles through thick mud. The height of

the monsoon was approaching. Nothing was dry, and working parties were often not allowed to return till after dark and even till late at night. A walk of some miles was not uncommon from the place of work to the camp, and then the weary men washed themselves as best they could, had the meagre evening meal, and in wet clothes and a damp blanket, if they possessed such things, sought such sleep as was possible. Sick parades often went on till late at night, and little could be done to alleviate the diarrhoea which frequently made continued sleep difficult for the sufferers and their companions crowded together in a leaky shelter. Dressings for ulcers were almost unobtainable, so too were most essential drugs. The work demanded was usually laborious, and most of the men were totally unused to it, and unable to cope with it in their malnourished state. Bridge building, road making, cutting away rock or laying stones or logs, and digging drains were exacting forms of labour. The engineers were usually ruthless in their demands, and violent in their treatment of those workers who could not keep up the desired pace. Men showing resentment or interceding for sick or tired men were often assaulted, so too were officers who were on occasion made to stand to attention for many hours as a punishment. Officers were also often sent to work; they were in any case usually employed on the tasks of the camp. Endless arguments went on about sending sick men to work, but even a partial success was a triumph for the medical officers.

Clothing was by this time fragmentary; some men possessed nothing but a loin cloth. Few men had boots that could be worn with any advantage, and replacements were grudgingly given by the Japanese. Vermin, the "minor horrors of war" were common, even in those who had opportunities for washing. Scabies was troublesome in some places, and difficult to relieve except when the appropriate treatment was to hand.

Rations were poor and insufficient. The same story was endlessly repeated; a diet poor in protein and fat, and deficient in vitamins. Occasionally fresh meat was provided, from poorly nourished cattle or yaks, and green vegetables were supplied in part from local substitutes when practicable. The best commentary on the diet in these camps is the commonness of deficiency diseases, in particular beriberi and the various syndromes associated with lack of the elements of the vitamin *B* complex. Emaciated and oedematous men were common sights, not merely in the hospital wards but in the working parties. Medical stores were lamentably deficient. Sometimes necessary surgical dressings or essential drugs like sulphonamides, or quinine, or iodoform were issued, but never in quantities reaching adequacy for the needs. The education of the force in the practice of hygiene was difficult to accomplish and maintain in such conditions of misery, but discipline was never relaxed in important matters, and there was excellent liaison between the administrative and medical sections of the force.

Camp hospitals have been described already. It is difficult to free the mind of illusory pictures about such establishments. More extemporisations were possible in fixed bases; in most of the camps it was most difficult to

supply any degree of comfort to men lying on bamboo platforms in long huts, unlit at night save by fires, which were hard to keep going on account of shortage of firewood. The provision of water either hot or cold was a labour; the distribution of meals in exceedingly scanty containers was still more trying. Nursing procedures difficult by day were doubly difficult at night. Evacuation of the sick to other bases was occasionally possible; at the height of the monsoon sick were sent down the river in boats or barges to Kanburi hospital, and were often subjected to hunger, exposure and neglect during transit.

Though figures do not convey the true physical state of men who were required to work, the following table of particulars from some of the camps is presented. It should be remembered that all the labour required for the camps, including carrying water, collecting and cutting firewood in the jungle, sanitary duties and general maintenance had also to be done often by men who were really not fit for work:

Camp	Date	Total Camp Population	Number Sick	Number demanded for work
Shimo Sonkurai	19th July	1,850	1,350	345
Takanun	mid July	564	404	160
Sonkurai	28th July	1,300	1,050	280
Kami Sonkurai	16th Aug.	1,670	1,075	450

Something more may now be said about the clinical aspects of illness in the working camps of "F" Force. The tragic episode of cholera in the first few months killed 650 men of the force; it was remarkable that more did not die and that the epidemic was stayed comparatively soon. Other diseases not only seriously undermined the already low resistance of the men but also killed them in numbers. Dysentery both bacillary and amoebic, dietary deficiency diseases and malaria competed for the first place as destroyers, and to these must be added tropical ulcers. Few, if any, men suffered from a single malady.

Malaria began before the end of May; the infection had been acquired in the staging camps, and experience soon showed that the camp sites were usually hyperendemic areas of infection. A survey of the Shimo Sonkurai area showed free breeding of *A. maculatus* and *minimus*. The prevailing type was malignant tertian, but it was evident that benign tertian was present, though temporarily in a subservient role, for relapses soon became widespread, and caused much anaemia and invalidity. Captain Wilson, R.A.M.C., was able to confirm the types by microscopic examination in July. He also confirmed the clinical conviction of the medical officers that amoebic infections were common, and found 25 per cent of stools examined contained the *Entamoeba histolytica*. It is certain that the actual incidence was much higher; possibly it reached 75 per cent of those infections of chronic type. Bacillary dysentery responded

well to sulphapyridine when this was obtainable. Hunt found that in the malnourished men the outlook was much better when they were urged to consume all their food ration. He found that in camps where calories were not wasted, even though a dysenteric infection existed, the death rate was much lower.

Deficiency states appeared early in "F" Force. The arduous march imposed on the men at the outset, with their immediate employment in still harder labour, rapidly reduced their existing low level of vitamin *B*1, and thus precipitated an outbreak of beriberi within the first two weeks of their arrival. Fortunately a good supply of beans was obtained at the time, and the disease almost disappeared. But the physical and chemical drain of dysentery and cholera reduced the reserves again and a fresh outbreak of beriberi occurred in which oedema was frequent, and neuritic signs, though less common, sometimes appeared with striking suddenness. Seven deaths occurred from acute cardiac beriberi (*shoshin*). Other disabilities also appeared owing to deficiency of the other components of the vitamin *B* complex, though these were not severe. Pellagroid lesions of the skin attracted attention when exposed to bright sunlight after the rains slackened in intensity. Amblyopia was not uncommon; its intensity and seriousness could not well be estimated at the time. Stevens reporting on the dietary position in "F" Force on 12th July 1943 stated:

> The present ration scale of this force is viewed with the utmost concern by the medical officers. The present scale is entirely deficient in vitamin *B*, protein and calcium, and if persisted in will result in the rapid deterioration of the health of the, at present, moderately fit men, and the impossibility of recovery of the already sick. My appreciation is that on the present scale the force will be totally incapacitated in one month's time, and that the death rate will be extremely heavy.

He laid down the necessary additions for a reasonable diet; these were rice polishings 2 ounces per man per day, towgay 3 ounces, beans 3 ounces, cooking oil 1 ounce, meat or fish 4 ounces and whitebait 2 ounces.

The value of curetting with the application of iodoform, when obtainable, was established in tropical ulcers, provided the necrotic process had not advanced too far. Surgical facilities were very limited in these camp hospitals, but with the small resources at hand and even with the risks and difficulties of operating in semi-open shelters, emergency procedures were carried out.

In July the work on the railway was being pressed on and the north and south sections were rapidly approaching the centre of the route. The headquarters of the Nieke group of camps was then shifted to Sonkurai. The decision was announced to the force command that a hospital would be set up in Burma to take up to 2,000 patients, particularly those who were not likely to recover in under two months, and those having permanent disabilities and unfit for hard work. Lieut-Colonel Hutchinson, R.A.M.C. was appointed as administrative commandant, and Major Hunt, A.A.M.C. as hospital commander. Arrangements were made for the medical staffs of the camps to select patients suitable for transfer; it was

realised that enough men would be needed who were capable of doing the camp work, therefore an appreciable number of semi-fit men were included. After a characteristic change in decision, postponing the scheme indefinitely, Lieutenant Saito, who had been appointed as Japanese commandant of the new camp, instructed Hunt to accompany him immediately to inspect the site. After twelve hours' notice on 30th July 1943 the advance party left and marched to Changaraya. The advance party included Major Hunt, Captains F. J. Cahill, S. S. Roberts and F. E. Stahl. The Japanese plan was for 1,250 patients to be drawn from Nieke, Shimo Sonkurai, Sonkurai, Kami Sonkurai and Changaraya and that these would proceed by scheduled flights.

Tanbaya. The advance party reached Tanbaya, the site of the new hospital, on 3rd August, part of the distance by motor transport, part on foot in pouring rain, as a bridge had collapsed in a flood and the railway was not working. This was an arduous journey, made more so by the necessity for preparing huts at staging camps for the patients. This work should have been already done by the Japanese.

The Japanese had planned to move 250 men in a series of flights, by motor transport, with three nightly stages along the route. Only eight medical officers were permitted to be assigned to the hospital, with 130 other ranks and an administrative staff of four officers and five other ranks. The camp was on the site of an old camp. Only one hut and the cookhouse were roofed when the parties arrived. The plan provided seven huts each over 300 feet long with attap sides and roof, and a bamboo platform wide enough to take two men, with a gangway along one side. Each hut was supposed to accommodate 200 patients. A smaller hut had a central gangway and held 80 patients. Eventually the hospital had nine wards for patients, and huts for officers and stores and for those concerned in administration. The actual site was reasonably high and dry, and was intersected by the railway line. There was a good water supply. Heavy tasks were imposed on the staff, as there were no tools, except one axe brought from Thailand, and medical personnel had to draw and carry rations. Cooking utensils were never fully sufficient; the shortage of all containers meant that meals were spread over a long period of time, but the force headquarters sent up a number of additional containers which eased the problem. The latrines provided at first were open trench types, and had already been used.

The transfer of the patients to Tanbaya was at last accomplished after irritating delays and muddling; it was not completed till September. As it was a hospital camp and not associated with a working camp, and as the Japanese promised that no man would be taken from Tanbaya hospital for work, better results were expected. The outcome was, however, depressing; the death rate was appalling, as 660 men died out of 1,924 up to the end of November 1943. This was, of course, largely due to the poor physical condition of the men when transferred to Burma.

When the rains ceased a serious difficulty arose, failure of the water supply. The cookhouse was moved near a stream at the opposite end of the camp, but this failed too, and the kitchen was again moved near the main stream. With a pump or with ropes and buckets much labour could have been saved, but neither was provided.

Diets at first were consistently bad, and were composed of polished rice, often inadequate in amount, some onions, sweet potato, pumpkin, sometimes dried beans, and a small amount of green vegetables. Dried beef and fish were small and inconstant in quantity. The resultant diet was highly deficient in all vitamins, particularly *A* and *B*1, calcium, and fat. There were also deficiencies, though less in degree, of protein and the other members of the vitamin *B* complex. Only after repeated protests did the T/NFC ratio (thiamin in microgrammes divided by total Calories from carbohydrate) reach the minimum standard of 0.3. After a time rice polishings of good quality were issued, and potatoes and sweet potatoes were occasionally plentiful. Canteen facilities were almost nil, and traders visiting the camp had little to sell and that expensive, sometimes prohibitive. No centralised entertainment was possible, but diversions of various sorts were arranged in the wards.

Some more references may here be made to the medical work carried out in the hospitals in the Nieke area and continued at Tanbaya. Major Hunt made a special study of beriberi in "F" Force, which has been drawn upon largely for the account given in Volume I, especially that part dealing with cardiac beriberi. Records show that in the camps from Konkoita to Kami Sonkurai the T/NFC ratio was never above 0.24, usually less than 0.2, and even as low as 0.14. At Tanbaya it only rose above 0.3 in October to 0.43, and reached 0.6 in the last months of the year, when after repeated protests the Japanese supplied rice polishings. With such gross deficiency of thiamin beriberi was inescapable. By comparison the figures for Changi were considerably higher, for though the T/NFC ratio was often low it seldom fell below 0.2, and after 1942 was usually adequate until the bad diets of 1944 showed gross deficiency again. Tanbaya figures show that in September and October 1943 the percentage of the camp population with beriberi ranged from 31 to 39 per cent. Between August and December 1943, 413 deaths occurred attributable solely to beriberi, and 477 deaths due in part at least to the same cause.

Oedema was often extensive, ascites was not uncommon. Neuritic signs were not common, but weakness in the limbs and wasting were not infrequent. Sensory changes were observed, and laryngeal adductor paresis also. Cardio-vascular changes were common; irregularities were frequent; fibrillation was an ominous sign. Signs of cardiac enlargement chiefly on the left side were observed in a large number of patients at Kanburi. Fortunately subsequent investigation at Changi on the return of these men showed that most of them had made a good recovery after treatment. Sudden death occurred sometimes and was observed more frequently among the men of "F" Force at Changi than among others. Diagnoses as stated in medical records were subject to some modification, for the

Japanese forbade some diagnoses; but beriberi, being a condition recognised by them, was used as a diagnostic label when justifiable, though perhaps with occasional freedom. However, the evidence for the frequency and severity of beriberi in Burma and Thailand is convincing.

Tropical ulcers were very severe in these camps. The spreading sepsis caused by these lesions, especially in conjunction with oedema caused dangerous destructive inflammation of deep tissues which cost a large number of men a limb and very many their lives.

Wardmastering. A feature of the medical work of these camps which merits special notice is the system of wardmastering, so successful, and so beneficial to the patients in hospital.

In Sonkurai in May 1943 when affairs were desperate and later in Tanbaya, in Kanburi, and in other hospitals there was need for an organisation to deal with the care of sick men by an insufficient number of orderlies. This was met by wardmastering, on which Captain G. W. Gwynne, of the 2/4th M.G. Battalion has made an illuminating report. Orderlies with variable degrees of experience were working with volunteers, and Hunt obtained the services of combatant officers to manage wards. The wardmaster was in a position of authority, by virtue of which he organised the various services of the wards, supervised the details, and by keeping the domestic affairs and nursing procedures running smoothly did much to raise and maintain the moral and physical condition of the patients. Firewood, fires, hot water and cold boiled water had to be provided, instruments and mess gear had to be sterilised, details of hygiene faithfully carried out and a regular routine maintained. Records also had to be kept, and where a canteen was available this was supervised. Though the wardmaster had no medical training he was in authority over N.C.Os. and O.Rs. and the improvement in the discipline of staff and patients did much to inculcate the principle that there are other duties than to self. Without discipline the weaker and less worthy degenerated: thefts from the dead for example were at one time common, but at Tanbaya the wardmaster had complete power to deal with offences on the spot. The primary objective of this system concerned the spirit more than the body and it was attained. Gwynne, in eulogising the work of the medical staff of the hospitals at Shimo Sonkurai, Kanburi and Tanbaya in particular states finally that "only first class organisation and daily attention to detail saved Tanbaya from becoming a place of death and misery".

In October 1943 Hunt in reporting on Tanbaya pointed out that in five months 30 per cent of the men in "F" Force had already died from disease, that is 2,000 men. The most lethal diseases were cholera, dysentery, chiefly the amoebic type for which specific drugs simply could not be obtained from the Japanese, beriberi, malaria and tropical ulcers. The medical stores in Tanbaya consisted chiefly of the remnants of the original supplies of the force. About 1,150 patients were then in hospital, and

their health was not improving. Nearly half the R.A.M.C. and A.A.M.C. orderlies were then themselves ill in hospital.

Kami Sonkurai. Meanwhile we must return to the remainder of "F" Force left after the most desperately ill men were removed to Tanbaya. This part of the force was gathered from the working camps and marched to Kami Sonkurai, where under Lieut-Colonel Kappe's command they worked till November. Major Stevens made a special report on this period. The camp was poorly drained and in the monsoon was a quagmire, with leaky decrepit huts, and poor hygiene improved only by constant effort. In the final stages of the railway work the men were often out for fourteen hours a day or, in September, even longer, working in the continuous rain which was the *leit-motif* of that period. Three days' rest, promised when the work was finished dwindled to one, on 19th September, and even after trains started running labour was still required for heavy quarrying and maintenance work.

During the period 3rd August-31st October 1,965 Australians and 1,460 British were admitted to hospital, and 1,236 and 896 discharged; deaths numbered 130 and 195. By November the relatively fit men formed a very small percentage of the force, and Stevens forecast "almost total annihilation of the force" unless conditions were greatly improved. The diseases encountered were the same as in other areas, with the addition of an epidemic of respiratory disease, in which some cases of pneumonia were seen. The heavy mortality in cholera, reaching 80 per cent was due to the enfeebled state of the men, in whom it was really a terminal event.

In November 400 men were moved south with Kappe, the sick, including 450 on stretchers remaining at Kami Sonkurai. At first the Japanese insisted that all should be carried six miles to Nieke, and only after a great deal of trouble did they consent to stop trains at Kami Sonkurai where the camp was only fifty yards from the line. Even then trains were often not halted long enough to load the sick, and the bodies of men dying during the journey were not allowed to be buried till they reached Kanburi, a journey of five days.

The centre of gravity of medical work now shifted south. The hospital at Tanbaya was to be moved south to Kanburi, and so too the camp hospitals along the line were to be transferred south to the bases there. Before describing these moves and the work done in the southern group of hospitals we must follow the fortunes of other forces sent from Changi.

Pond's Party. Pond's party has already been mentioned. A distinct train detachment, it remained separate in its movements on the railway. After the same fatiguing train journey of 1,000 miles in 100 hours the party marched from Bampong to Konkoita, 170 miles. Medical supplies were carried, first in the panniers on bamboo poles, later sub-divided among the men's packs. Every third or fourth night was spent at staging posts, which were all filthy, and footsore men were left to cook for succeeding train loads. At Konkoita dead coolies were lying on the fouled ground, it was soon evident that some had died from cholera. On 16th

May the party went on to its forward base at Lower Taimonta, where half constructed huts raised a serious problem not merely of accommodation, but of isolation of cholera, dysentery and diphtheria.

The rice issue was at times down to 7½ ounces a day per man, and only at intervals was the meat of a thin or dying yak added. Only a few cases of cholera occurred, but the wet and hungry men, isolated from their fellows were in poor shape. The party moved into Nieke where the prospects of food seemed better, and the sick were forced to work, unless the Japanese medical officer could discover a palpable spleen. Work at least meant a slightly increased food ration. Leaving fifty sick behind, the party now moved to Takanun in July, and encamped in a very restricted area. Tools were issued for the preparation of the site, but four hours after the tiring march of nearly forty miles they were withdrawn. Five hundred and eighty men, 30 per tent, crowded into an area 75 by 30 yards, and those well enough worked from daylight to dark.

In a week cholera broke out, there were sixty-two cases in all. Mills used most of his orderlies in an isolation block, which was a quagmire with a marquee and two tents. The Japanese sent technicians to find carriers; as one culture was made of five swabbings, which had to be repeated singly if a culture grew, the process was slow. The main camp hospital was supervised by Chaplain Vellacott, and contained a section for suspected carriers, whose disposal was most difficult in the restricted space. The text book instructions given by the Japanese were quite impracticable to carry out. Only crude improvisations were available for the intravenous treatment of cholera with saline, but these were often gratifyingly effective. A 300 c.cm. ampoule was connected with stethoscope tubing to a thermometer case, and thence to a bamboo cannula. These cannulae, made on the spot, were tied in and worked better than the small steel needles. Four pints could be given in twenty minutes, and orderlies after training by the R.M.O. could cut down on a vein and insert the cannula. After the first week at Takanun saline was made at a Japanese laboratory by two R.A.F. medical officers. Forty-four men died out of 102 in both series of cholera. In the circumstances the results were remarkable.

At the end of July 470 sick were sent from Takanun to Wanye by barge, and conditions improved. In August all pretence was abandoned of allowing medical officers to select the sick unable to work; at the end of the month leaving sixty sick behind for transfer to Kanburi the party returned on foot to Taimonta, where 294 men spent two weeks in "double decker" huts with 1,700 coolies, but by the end of September the party had moved to a clean area with good accommodation, though sick men still had to work. On 15th October they met the rail laying gang and saw the first train. A party of 100 was sent to Nieke to bring back tools, and was overtaken by an empty train while the men were carrying 300-pound anvils, a load for four. The whole party, or its remnant of 291 men moved on to Nieke, carrying its sick; these numbered 150, half of them in hospital. Some sick were moved south by train, but

arrangements were chaotic. The party eventually went by train to Kanburi. Up to 10th December 1943, 153 men had died; the underlying causes were malnutrition, chronic dysentery and malaria, aggravated by exposure and overwork. All efforts were made to secure reliable hygienic measures in the camps. Deep open latrines were found most satisfactory if the excreta were covered. In some camps bathing facilities were good, until forbidden, owing to cholera. All drinking water was boiled and mess gear sterilised. The Japanese provided quinine, and some plasmoquine, and a pint of lysol during the cholera outbreak: other drugs were very scanty.

The medical conditions encountered were counterparts of those already described in other forces. Thanks to good leadership, tireless medical care and its own undimmed spirit this party emerged, albeit with heavy losses, from an ordeal which was characteristic of that endured by many others who shared the trials of the working camps. After the completion of the railway Pond's force moved southward, and shared the experiences of the other components in "F" Force in the base hospital camps and the subsequent movements.

(b) CENTRAL THAILAND GROUP

"D" Force

"D" Force consisted of 5,000 troops, 2,780 British and 2,220 A.I.F., who left Singapore on 14th-18th March 1943. Lieut-Colonel C. A. McEachern, R.A.A. was in charge, and Major A. R. Hazelton was S.M.O. Seven A.I.F. medical officers accompanied the force, including Captains R. G. V. Parker, R. G. Wright, P. T. Millard, D. Hinder, I. L. Duncan and J. T. Finimore (Dental). There were thirty other ranks A.A.M.C.

The train journey from Singapore to Bampong took five days and four nights, thirty men travelling in each steel truck. The crowding tempted men to open doors and swing their legs outside: in other parties several accidents occurred in this way through men striking their legs against bridges owing to the narrow clearance on the railway. The whole force was supposed to be inoculated against cholera, plague and dysentery. Hazelton's party had not been immunised against dysentery, but the Japanese produced vaccine and insisted that inoculation should be carried out on the train. This was done with rudimentary asepsis, but without harm. From Bampong the force travelled by sections in flat trucks, but instead of being taken to a British hospital as promised they were left in a paddock. The only water was in two wells which were out of bounds: these soon went dry, and for two days, until the rest of the train parties assembled there was a severe water shortage. They were then driven to Tarsau in lorries. Duncan's party drove straight through and penetrated as far as the Three Pagodas Pass; all trace of them was lost by the others for about a year, when they returned with only about half the men. The peculiar system of Japanese administration made this easily possible, as the railway was split into areas, within which were different

groups each autonomous. Incidentally this made movement difficult between groups, even to medical officers who wished to see how the men were faring.

Hazelton's party and other medical officers went to Tarsau, and their parties were scattered to various camps, in the central group from Konyu to Tarsau. Hazelton came under the command of Lieut-Colonel E. E. Dunlop in this area, and here the "D" Force parties came into contact with Majors Corlette and Moon, who were doing excellent work in the camp hospitals.

Like most of the forces on the Burma-Thailand railway, except "F" Force, "D" Force soon lost its identity: indeed it was absorbed into various autonomous local groups as soon as it arrived at Tarsau. Here Lieut-Colonel Knight was in charge and Lieut-Colonel Harvey, R.A.M.C. was S.M.O. Conditions were bad in these camps. Malaria was very common, for the Konyu camps were in hyperendemic areas and were so badly sited near swamps, that the camps were virtually morasses. Hazelton had brought eight panniers of medical supplies from Changi, but some of the contents were not of great value in the camps: these medical supplies were handed over by Hazelton to Harvey. Some anti-malarials were obtained from Tarsau for use in the Konyu camps, where the casualty rates were high. The British medical officers in this area also had very meagre supplies. The entire medical stocks here for 900 men were contained in a soapbox and there was not even a scalpel. The Australians found, however, that even simple nursing procedures, and the organisation of items of care such as the washing of sick and apathetic patients did much to raise their morale. Konyu No. 1 became a hospital camp; at its peak it held about 1,000 men, with the least sick maintaining the camp. This entailed the carrying of 56-pound bags of rice from river barges; as the river was three miles away and a steep slippery hill of from 500 to 1,000 feet intervened, the exertion entailed was very considerable.

At one time the death rate was so high that there were eight deaths per day. Each morning a "death count" was made, and the men were of necessity buried in common graves. There was an outbreak of cholera during the monsoon. A number of men in one party fell ill with cholera within a few days of being inoculated: it was thought possible that this might have been due to their poor powers of resistance in addition to a negative phase of immunity. Intravenous therapy was not used in this outbreak, but the mortality rate did not differ significantly from that in areas where saline infusions were used. It was noted that the commonest immediate cause was early dehydration, whereas death in the groups treated with infusion was more often due to renal failure, possibly accentuated by disturbance of the balance of electrolytes.

Hazelton went from Tarsau to Konyu in a small boat to inspect these areas, but had great difficulty in gaining permission to inspect outlying camps. Later he walked back along the river through the indescribable mud. Some camps fared better than others, depending to some extent on the amount of successful bargaining which could be carried on with

the Japanese. One combatant officer, Captain Newton, who realised clearly the medical aspects of expectation of life in these camps, was particularly successful in this regard. The railway was pushed quickly through Konyu and the men in the camps were later returned to Tarsau by river barges.

One interesting feature of the medical work may be mentioned. Malarial diagnosis was possible, as a microscope was obtained and some stains, and M.T. was found to be common. Some of the infections did not respond well to quinine, and atebrin was used, though very little was available. In order to ensure prompt action and full absorption intravenous injections of atebrin were used. On the suggestion of Captain Markowitz a solution of atebrin in 12½ per cent alcohol in water was used with success; no untoward reactions were observed, and the euphoria caused by the alcohol was appreciated by the patients. Some sudden deaths occurred after the oral administration of Japanese quinine. A suggestion was made that these were due to impurities such as quinidine.

Gradually the components of "D" Force came back to Kanburi in the southern concentration area; the sick were sent to Nakom Paton, and the fitter men to Tamarkan. Before the end of the war the officers were taken away and put in officers' camps. During the early months of 1945, after withdrawal of combatant officers who had charge of the camps, medical officers were placed in charge, and as the problems were largely medical in nature administration ran on smoothly. "D" Force never reassembled as an entity, but its total mortality was reckoned at 18 per cent, rather less than the more usual figure of 25 per cent which was the mortality experienced by most of the other forces.

"Dunlop" Force

The day on which the first ship of the convoy bearing A.I.F. troops from the Middle East arrived in the south of Sumatra was the day of the capitulation of the forces in Singapore, and hurriedly the *Orcades* sailed for Java, and disembarked troops at Tanjong Priok. With these troops was the 2/2nd Australian C.C.S. Lieut-Colonel Eadie, the commander, was appointed S.M.O. of the Australian forces in Java under Brigadier Blackburn ("Black" Force), and Lieut-Colonel E. E. Dunlop then took over command of the C.C.S. The staff of this unit, including also Majors A. A. Moon, E. L. Corlette and J. E. Clarke (Dental) formed the nucleus of the Allied General Hospital at Bandoeng, the command of which was taken over by Lieut-Colonel Dunlop on 24th February, with a staff reinforced by R.A.M.C. and R.A.F. medical personnel. Six members of the A.A.N.S. had arrived at Batavia on 15th February from Singapore, and helped to evacuate wounded on H.M.I.S. *Kapala*. They did not embark on this ship, but went to a hospital at a convent, and for several days assisted the C.C.S. at Bandoeng. Eight nurses of the 2/2nd C.C.S. who had disembarked at Tanjong Priok on 19th February moved with the unit to Bandoeng. All the nurses were sent back to Batavia on 21st February and sailed for Australia on the *Orcades*.

The Allied General Hospital was now busy with patients arriving from Sumatra, many of whom had wounds inflicted two or three days previously requiring treatment. The hospital rose to a total of 1,000 beds, and work continued there even after the unconditional surrender of Java on the 8th March, and the staff were still doing valuable work when the Japanese suddenly disbanded the unit on 18th April at a few hours' notice. From the 27th February to 18th April 1,351 casualties were treated including 170 men with wounds and fractures. Most of these came from the action of "Black" Force against the enemy on 4th and 5th March on the Llewellong River. The Japanese forcibly marched the staff and most of the patients to a grossly overcrowded native gaol with negligible facilities for treatment, where they were humiliated, underfed and subjected to harshness and violence. All red cross markings, rank badges, and protective cards were abolished. Lieut-Colonel Dunlop was recognised as the senior officer and as such was placed in administrative charge of camps of varied nationalities, up to 2,000 in strength. He was then ordered to assume command of a detachment of troops which was known locally as "Dunlop" Force which travelled by ship to Singapore and ultimately by rail and road to Konyu railway construction area on the Menam-Kwa Noi River in Thailand. With this party travelled fifty-eight of the seventy-eight captured members of the 2/2nd C.C.S. who left Makasura transit camp near Batavia on 4th January 1943. Orders had been given that no medical stores should be taken, but as many supplies as possible were distributed amongst a number of individuals. Dunlop himself took a set of surgical instruments which he always carried personally.

After a bad trip in an overcrowded ship the party reached Singapore, and shortly resumed the journey by rail under conditions of similar crowded discomfort for four days and nights. The party after further travel by truck and on foot reached a site at Konyu in the untouched jungle of the Kwa Noi River over ninety miles from Bampong. Most of the medical orderlies were ordered to work on railway construction in spite of the greater need for their technical services. Dunlop in addition to doing medical work administered the working battalions. He was for some time commanding Hintok jungle camp, while another detachment of his Java party was commanded by Major F. A. Woods. "Dunlop" Force worked under shocking conditions, with totally inadequate rations, labouring at night as well as by day, with twenty men crowded into a small R.D. tent to sleep. It is not surprising that 149 deaths eventually occurred in this force, for the greater part of the men needed treatment on sick parades or in hospital. There were already ominous signs of starvation and exhaustion among the 3,000 British troops who had been working in this area. Hygiene was very poor among the working battalions, and was difficult to improve, especially as the Japanese themselves and the native labourers did nothing to prevent fouling of the area; nothing was done by them to supply tools and materials. The men entered almost uninhabited jungle areas with only primitive equipment, and even in cold weather they frequently had to sleep in the open without protection.

Bedding and clothing were almost non-existent, and boots soon disintegrated. In June 1943 out of a total of 1,085 men 302 had no boots, 288 had useless boots, and only 341 had satisfactory footgear of any kind. Anti-malarial work was virtually impossible, and in consequence malaria attacked most of the men, who also suffered from malnutrition, and tropical ulcers. There was in addition an outbreak of cholera in these camps of this central area.

The hardships and dangers of these camps would have been even greater had it not been for the self-help of the prisoners of war. In addition to heavy tasks of construction, often carried out by the administrative staff remarkable works were carried out. For example, at Hintok mountain camp Woods, while second-in-command of one of Dunlop's working battalions was instrumental in the building of a catchment dam for spring water which was piped in bamboo for several hundred yards. This provided showers, ablution and water-bottle filling points, kitchen supplies and water for distillery condensers.

Towards the close of 1942 the need for some further service for the sick in the southern areas gave rise to the establishment of hospitals towards the Bampong end of the railway; these worked under very unfavourable conditions. One of the earliest of these was a camp hospital at a railway workshop base at Non Pladuk, established by Major Smythe R.A.M.C. in October 1942, and accommodating 500 to 600 patients. In November 1942 Major Black R.A.M.C. opened a hospital at Chungkai, where medical work continued on a large scale till near the end of the period of captivity. Though this was in the main administered by the R.A.M.C. Dunlop acted as S.M.O. for a time. At Tarsau, sixty-eight miles from Bampong was another hospital base, established by Lieut-Colonel Harvey, R.A.M.C. and also administered by Dunlop for a time. At Kanburi Lieut-Colonel Malcolm, R.A.M.C. began a hospital in January 1943, which took the sick from the jungle camps. It was largely built by the men themselves, and accommodated 1,000 patients, and in spite of difficulties did excellent work, including the performance of appendicostomy for amoebic dysentery, which as a method of intestinal drainage was pioneered by Pemberton and Dunlop in jungle camp hospitals. At Kinsayok on a rather swampy site near the river Major Bennett, R.A.M.C., established a hospital in February 1943, taking 1,000 to 2,000 patients, and here the Japanese in 1943 assented to a new and better building programme. Dunlop for a time acted as S.M.O. Two other hospitals were begun in 1943, at Takanun in the central area with Major Pemberton R.A.M.C. as S.M.O., and at Tamarkan in the south, administered by Major Moon A.A.M.C. Takanun later suffered severely from a cholera epidemic. The size of these hospitals, arising from the need of the central and upper Thailand camps, gives some measure of the physical state of the men in working camps such as Konyu and Hintok at this period when severe pressure was put upon them by the railway engineers, regardless of their obvious unfitness for labour.

In the central camp groups the 2/2nd C.C.S. detachment kept some degree of cohesion as a unit until the railway was completed, when it was broken up into a number of small groups. The members suffered badly from illness, but all who were able carried on with their work. The value of these men trained in a school of hard experience in Java and Thailand was seen to particular advantage when they were dispersed and worked in small parties.

Mortality was high in these hospitals during 1943, due principally to dysentery, deficiency diseases, malaria and tropical ulcers in this order. The medical officers were fully aware of the important part played by poor nutrition in the high death rate. Malaria was chiefly of the benign tertian type, and cerebral malaria and blackwater fever were rare, but later in Tamarkan malignant tertian became more common. Most of the association of the 2/2nd C.C.S., with the bases was during a later period, after the railway had been completed. During the early and middle parts of 1943 the bad conditions in the hospitals reflected those of the working camps like Konyu and Hintok. The larger hospitals grew up in response to the need of camps in their neighbourhood, and were in this way different from those organised during 1944 when the Japanese policy underwent a change. In these early working camps in Thailand facilities were negligible, and evacuation of patients to larger centres was capricious. It was only after continued pressure that the Japanese would permit very sick men to be taken to Tarsau by barge, though the facilities for such movement were to hand. The haphazard methods exposed sick to delays in transit, which sometimes lasted for days, during which time they had no attention or food. It was not uncommon for men to die during the journey. The treatment of the sick was harsh in the extreme; pay was stopped, rations were reduced, and sick men were employed on tasks which accentuated their hardships. For example men with ulcerated feet were sent to work hauling logs or clearing rock in rock cuttings after blasting, with the excuse that this was light work. Dunlop saw some 1,000 men suffering from severe tropical ulcers, in 20 per cent of which bone was exposed. He found that curettage with application of phenol or lysol followed by a dusting of iodoform gave good results and if used in time amputations were unnecessary. The only surgical supplies obtainable were those carried by the medical personnel from camp to camp, plus what they could improvise. Even important specific drugs were not supplied. Some small stores brought from the Middle East lasted during the early months of 1943, such as sulphaguanidine and sulphapyridine, but in spite of the benefits gained, dysentery still killed many.

Canteens were almost useless, as goods, even if obtainable, could not be transported, owing to the disinterest of the Japanese engineers. Eggs were the most valuable supplement that could be bought, and, as was often said in this connection, much was owed to the Thailand ducks.

In Hintok cholera appeared among the coolie labourers, and in spite of precautions broke out among the prisoners of war in June 1943. Ingenious and successful methods were used in treatment. Improvised stills pro-

duced 120 pints of saline per day, and individuals received up to 20 pints in a day. The Japanese would not allow men who collapsed at work to be carried in except by the hospital staff; it was remarkable that the patients survived periods of exposure to blinding rain and a rough journey in the dark. Of 150 patients 66 died in about two months, often from the combined effects of malnutrition and infections of various kinds, particularly the debility following cholera.

An operation for perforated duodenal ulcer was successfully performed by Dunlop by the light of candles and a bonfire; and similar emergency operations were carried out in various camps. The mortality during these grim months of 1943 in this group of railway camps varied from 12 per cent in some working battalions to nearly 50 per cent in others. Of a total of 1,727 in four working battalions in August 1943 1,290 were in hospital.

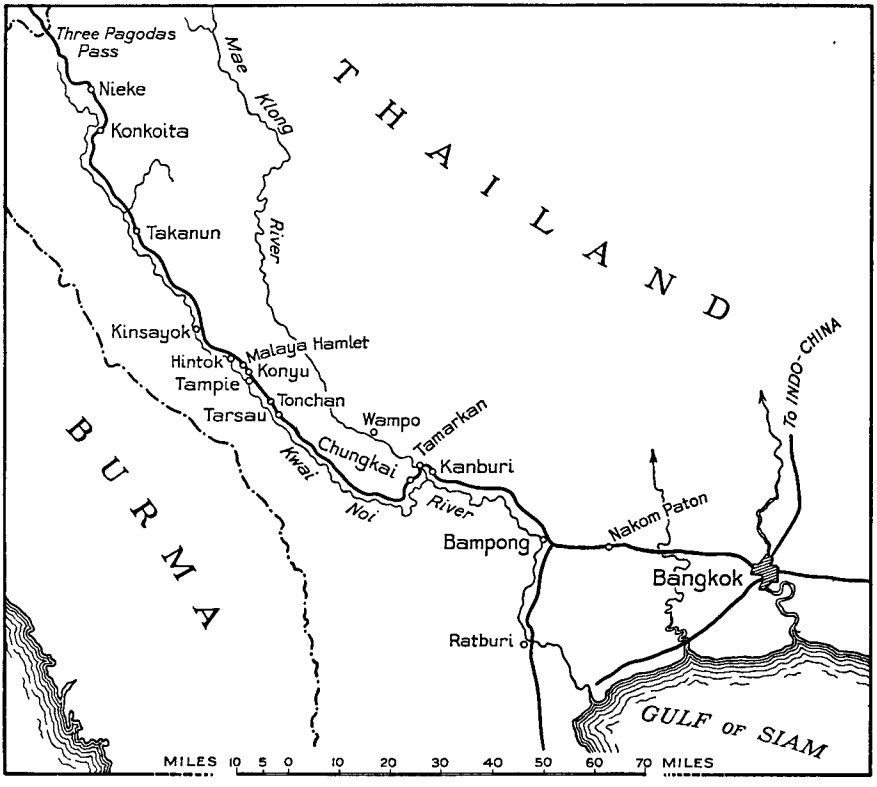
The Japanese camp commanders occasionally required answers to *questionnaires* sent out by them. In one of these at Konyu Dunlop pointed out clearly that the camp conditions were unsatisfactory, both with regard to accommodation and hygiene, and rations were insufficient to maintain health, especially when hard work was demanded. The commander not being satisfied with this, asked for a further exposition of the "attitude" of mind as to camp". To this Dunlop replied that his attitude of mind was one of grave disquiet and fear for the lives and health of troops placed in his care. He expressed worry that the men could not possibly remain healthy while only a fraction of the scale of vegetables and meat was supplied, quoting the amount of entitlement for the period 25th January to 2nd March 1943, 3,212 kilogrammes of meat and 18,000 kilogrammes of vegetables, and contrasting these amounts with those actually received, 300 kilogrammes and 4,500 kilogrammes. He further stated that of 873 men only 350 were fit for heavy work. To this may be added the following list of medical supplies received on 16th April 1943 at Hintok camp for one month's supply for 1,000 men:

Kruschen salts . . .	1 bottle	Cloth for bandages	1 square yard
Pot. Permang. . . .	1 oz.	A few tablets each of	
Salicylic acid . . .	½ oz.		aspirin
Mercurochrome 2½% .	3 ozs.		sod. bicarb.
Cotton wool	4 ozs.		acriflavine
Methylated spirit . .	1 oz.		plasmoquine
			atebrin

The incidents and conditions described in this section are characteristic of those experienced in this group of camps, and illustrate not only the medical work attempted and carried out there, but also one of the rare instances in which a medical unit was able for a time to work without entirely losing its identity. The Australian history of the various groups of Thailand working and hospital camps is, however, so bound up with the history of "F" and "H" Forces that further account of the work done there must be incorporated with the story of these parties.

"H" Force

On 5th May 1943 the first of six parties comprising "H" Force left Singapore by train, the other parties following at intervals up to 22nd May. This composite force of some 3,000 men consisted mainly of British troops; 600 were Australians, over half of whom had returned from Java, and there were also some American and Dutch troops. Lieut-Colonel H. R. Humphries commanded the whole force, and Lieut-Colonel R. F. Oakes the A.I.F. section. There were three A.I.F. medical officers, and eighteen other ranks and Major E. A. Marsden acted as S.M.O. During



"H" Force—Burma-Thailand Railway.

the journey from Changi to the central working camps on the Thailand railway the component parties of "H" Force experienced similar conditions to those suffered by other forces. Rations were carried from Changi for the journey and in addition, a double meal was issued daily mostly rice and spinach soup; it was possible to supplement this by purchases. The four days and nights of travel were most wearying, with no water for washing and insufficient for drinking, and hygiene was very bad. The transit camp at Bampong was filthy, with no provision for accommodation

of the sick and shocking sanitary arrangements. Many men had diarrhoea during the train trip, and after arrival others presented signs of clinical dysentery. Medical officers treated the sick so far as their limited facilities permitted, but even though the Japanese medical officer agreed that certain patients were unfit to proceed on the march the guards refused to allow more than a small number to remain.

The party marched on by night, carrying their gear and such of their belongings as they had not sold to natives. Small numbers of sick were allowed to remain at the various staging camps along the route, but most, including those with septic lesions of the feet, were forced to go on. The incidence of these ulcers increased, and many men suffered from fever of undetermined nature. Heat exhaustion also affected numbers of men, and one of them died. The conditions of the march were poor; the rain-spoiled roads were slippery with mud, and many of the men, in poor condition at the start, collapsed on the way. The stages were not long in themselves, about fifteen miles, and the total distance covered ranged from sixty to ninety miles, as no party of "H" Force went farther north than Hintok at this time. The state of the roads hindered the use of motor transport, and this adversely affected the distribution of rations and other supplies.

At Kanburi the Japanese carried out tests for cholera and the men were inoculated against cholera and dysentery. On 21st May the first site for a camp was reached at Malaya Hamlet, at the northern end of the central group of working camps on the railway. The food in some of the staging camps was reasonably good, particularly when extras could be bought at canteens, and the guards were on the whole patient and sympathetic.

One of the "H" Force parties, known as H6 officers' party left Changi on 17th May 1943, travelled by train to Wanye, forty miles from Bampong, and from this point marched in two stages to Tonchan South and began there the preparation of a permanent camp. It then appeared that this party was to be used on railway construction work: protests were made but were quite ineffective.

On arrival at its camp site each party of the force was given twenty-four hours for the usual fatigues of making a camp, a work very burdensome to the weary men. Rain fell without ceasing, and continued so for the first month, increasing the discomfort greatly, particularly as the lack of time and facilities made any drainage work impracticable. The uncleared jungle country was very hilly, covered with clumps of bamboo, but the camp sites were usually in low-lying places, which made the conditions even more miserable. Accommodation was restricted to tents, always wet and muddy, and always overcrowded. Clothing was soon ruined, and boots soon fell to pieces, and blankets were always insufficient.

The food varied in different areas, but was almost consistently bad. The ration supplied was rice, 12 ounces per man per day, dehydrated potato, and other very unpalatable vegetables and dried fish. Fresh food was not supplied and the diet was deficient in protein and fat, but after a long period had elapsed, meat was provided, though by that time many

men had succumbed to illness enhanced by malnutrition. Special food for sick was extremely difficult to obtain; though occasional purchases could be made from barges passing through it was often impossible for the men to be free to do any buying. All rations had to be carried over steep hills from the river, and this alone was a burden for men already tired from working. The usual reduction of the diet of the sick intensified the difficulties: when supplements such as eggs, towgay, peanuts, gula malacca and tinned fish could be bought, and when even a few ounces of yak meat could be added the results were encouraging. Cooking facilities were most inadequate, containers and utensils were insufficient, and the difficulties of using mud ovens under improvised shelters were great.

Hygiene was of low standard, and it was most difficult to maintain personal and communal sanitation of even a primitive kind, owing to the prevalence of dysentery, the swarms of flies and the lack of tools and materials for necessary construction. Only the resolve of the camp commanders and the work of those sick who were not forced out to heavy labour could maintain even the standard achieved. The men worked from early morning till night, and if their place of work was distant or if the demands of the engineers were heavy they sometimes did not return till midnight.

The Japanese command at Changi which administered this group of camps seemed to try to overcome difficulties, but control was remote and ineffective. Lieut-Colonel Oakes found that most of the camp guards were reasonable, and the officers at the local headquarters were courteous. Nevertheless the forces working in this group of camps were subjected to the poorest of living conditions, inadequate diet and were expected to perform heavy labour by engineers who were inexorably concerned with a flow of labourers, regardless of consequences. The components of "H" Force, like others under similar administration, lost their cohesion, though their officers managed to obtain some administrative changes, which ensured better relations between the guards and the members of the force.

The main body of the force enlarged and improved the camp at Malaya Hamlet, though, not unnaturally, the men, suffering from depression and fatigue, were resistant to further demands on their scanty energy, and not always easy to handle.

Early in June some hundreds of stragglers had increased the number in the camp, and one-third of these were sick; fortunately the guard commander was willing to reduce the size of the working parties. On 16th June Major Fagan reported a case of cholera; strict precautions were taken at once, and all men were inoculated. Cholera broke out amongst the coolies in the Hintok area, but efforts to limit it failed, and it spread to the prisoners. It was strange that the Japanese, though afraid of the ravages that cholera could cause, never applied the ordinary measures of proper isolation and control of movement from infected areas.

At the end of June over 200 more men arrived in the main camp where men ill with various complaints were increasing daily. At Tonchan South also nearly half the A.I.F. members in the officers' party were ill. At

Malaya Hamlet deaths were increasing from cholera; as many as ten bodies were cremated at a time, or buried in community graves when the Japanese later forbade cremation. By 3rd July 400 patients were in hospital and 200 had cholera, and a week later only 120 men were available for work; 80 of these were day workers, the remainder worked at night.

The death rate remained high till the end of July, but dietary supplements, particularly meat and eggs were more liberal, and the weather was improving. At Malaya Hamlet camp 217 men died, 111 being A.I.F. and 106 British troops.

Parties including unfit as well as those able to travel were sent north to the Hintok jungle camp and the Hintok river camp; some of these came from Tonchan where there had been much serious illness. Issues of boots and clothing were made at this time at Malaya Hamlet and were of special value to the men sent to Hintok.

At Tonchan South the lot of the officers' party was particularly hard, as its members were not fit for the exacting work demanded of them, and malnutrition and exhaustion made them prey to infection. Among those under Major F. Ball's command were 188 British, 68 were Australian and 37 Dutch. Numbers of these officers were older men who had not even been considered as members of up-country parties. From May to September a Netherlands party was at Tonchan spring camp; this party, though badly affected by dysentery, was unusually fortunate in being untouched by cholera. Captain C. A. Kuypers, the medical officer, attributed this to intensive inoculation of the Netherlands force in the N.E.I., and to the valuable asset of good spring water in the camp. Tonchan camp, under command of Lieut-Colonel T. H. Newey, suffered severely from cholera; the commander remarked of this and the sub-camps at Hintok that the nutrition of the men was already seriously impaired by poor diet and their stamina by fatigue before the full force of the epidemic struck them.

In the Tonchan camp the "H5" battalion stationed there had its burden increased by the arrival of the officers' party at Tonchan South, as so many of this group were unfit. Newey, recognising the menace of poor sanitation in a camp of Tamil labourers, offered the help of some of the officers and men of his regiment who could speak Tamil, but the Japanese refused permission. However, a joint cholera hospital was organised for the treatment of all parties in the immediate area with some success.

The Hintok camps suffered severely from cholera, especially at the peak of the monsoon season. The Hintok valley camp was better supplied with food than some, though cooking arrangements were inadequate. Had the Japanese organisation been better planned a more equitable distribution of food could have been assured, using river transport. Though milk and other food extras were later obtainable they were unfortunately unable to correct irreversible changes in many of the sick men. The Hintok camp was in a very bad position at the foot of a limestone cliff and all food had to be carried four miles from the river camp, the last half mile necessitating a climb over limestone rocks and then up a thirty-

rung bamboo ladder over the rock face constructed by Major F. A. Woods. The working parties had to travel this route night and morning; the sick men were bound to bamboo stretchers, and at night were often lowered by rope by the light of a bamboo fire at the foot of the cliff. When cholera was at its height the sick could only be housed in shelters of split bamboo which were not waterproof. This wretched housing was at least better than the first isolation camp there, a few tattered tents in a swamp. Late in July the valley camp was evacuated to the river camp. Many very sick men were forced to make this four mile journey to the river. Seventeen out of 110 walking sick died in forty-eight hours, and 26 other seriously ill men had to be carried in pouring rain. All of them died later.

A small detachment of "H" Force including officers was later sent farther north to Konkoita. The camp site was excellent but feeding was at first bad and working conditions were very bad. The march to Konkoita imposed a severe burden on the men; one died of cholera on the road. At the end of August the Japanese ordered a general move of the force to Kanburi. In September a party was left temporarily at Malaya Hamlet to clear up the camp, and the remainder were sent to Kanburi; Newey also brought a party of about 200 from Konkoita to Kanburi camp in November.

The general medical conditions prevailing in "H" Force resembled those already described in "F" Force, and the same difficulties were encountered in attempting to organise preventive measures in the camps.

The efforts of the non-fit men, who were not forced out to work contributed greatly to the hygiene of the camps, as the men working on the railway usually had no daylight hours in which they could do camp work, had their tired bodies permitted. Even washing of clothing had to be done in muddy streams in the dark. Sick parades, as in other hard-driven bodies of troops on the railway, could only be held before the men left in the morning or at night after they returned. The camp hospitals were of the usual pattern, with sick lying on bamboo slats close to the muddy ground. In emergency the need of supplies was most keenly felt in those camps distant from a supply base at a railhead, such as Tarsau. In emergencies too, such as an outbreak of cholera, the work of the camps was intensified. The Japanese would not consent to an occasional period free from work during which the camps could be cleared up. Even the burial or cremation of the dead increased the burden on those remaining well. It was only when necessity drastically reduced the number of possible workers that the demands of the Japanese were relaxed. Even when the decision was made to send the sick to a hospital near Kanburi the movements involved inflicted hardship on many of the patients. The patients from five to six camps of "H" Force were sent south prematurely in July, when the proposed "H" Force hospital was not ready: for the next month they were accommodated in a hospital camp under the care of Lieut-Colonel Toosey of "D" Force.

Medical supplies to the camps were limited. Some supplies were brought to the "H" Force headquarters camp, after considerable difficulty, but access to the store and transport to the camps were always troublesome. Dressings were always scarce, but supplies of quinine were adequate. Yeast tablets could be easily obtained, so too could other substances of dubious value, such as opium pills and creosote.

The conditions prevailing during the cholera epidemic have been described. Major Marsden pointed out that the coolies, a constant focus of infection, worked on the same jobs as the troops, and were responsible for a widespread contamination of the camp areas, in which the earth, the vegetation and the working tools alike were soiled. The death rate from cholera was estimated at 70 to 80 per cent, and most of the survivors died later from other diseases. Notwithstanding the routine practice of sterilising all mess gear before eating, dysentery was widespread: it was predominantly bacillary. Beriberi affected 60 to 70 per cent of the troops, and was aggravated by infectious disease: no rice polishings were ever supplied in spite of protests. Malaria spared no one, and though dangerous attacks were rare, its effect on debilitated men was further to depress their powers of resistance.

As the elements of "F" Force spread out over the northern working camps towards the Three Pagodas Pass, those of "H" Force were concentrated in the camps in the Konyu area, including Hintok to the north and Tonchan and Tarsau to the south. Some of the medical officers of the 2/2nd C.C.S. were associated with the work of the camp hospitals in this area; Dunlop, Moon and Corlette in particular worked in this central group of camp hospitals until with the completion of the railway the prisoners of war, or their remnants, began to move to the southern group of base hospitals. Moon went to Tamarkan, which was opened in May 1943, close to Kanchanaburi, and there administered the hospital until it was evacuated to Chungkai hospital in December 1943.

Dunlop's working party of some 850 was at Konyu and at Hintok for some time, at Hintok Dunlop and Corlette encountered the most severe outbreak of cholera. Though no bacteriological confirmation could be obtained there none was needed, as the clinical picture was distinctive with the urgent fluid loss, the "rice water" stools, and the cramps, leading to swift dissolution unless treated energetically and promptly. The extemporisations at Hintok included water stills made from stolen petrol piping and bamboo. The mortality, 42 per cent, compared more than favourably with that in other centres, where it was usually over 50 per cent: in Tarsau a small epidemic broke out among sick men on special diets, and over 80 per cent of them died.

Hintok was later reinforced, and Lieut-Colonel McEachern became camp commander, thus allowing Dunlop more freedom for medical duties. These working parties saw a good deal of the "H" Force camps in the neighbouring areas; it was noticeable to all working in these camps that under the remote control of the Japanese administration from the Malayan headquarters the most terrible hardships were suffered.

The A.I.F. working battalions "O", "P", "S", and "T" with total strength of 1,727 on 12th August 1943 had 1,290 in hospitals at Hintok camps, Konyu and Tarsau.

The final episodes in the trials and journeys of "H" Force are its transfer to Kanburi base area, and the withdrawal of the force from Thailand. Late in July 1943, following strong representations from Lieut-Colonel Humphries, the Japanese announced that the force would be sent to a hospital near Kanburi, but as already told, the first moves were made before a hospital was ready, and the sick were looked after in a "D" Force hospital camp. When the hospital at Kanchanaburi was ready sick were admitted there, and found that the diet was at first much better than that supplied in the central railway working camps. There was a good canteen, and a special diet kitchen was established with excellent results.

At the end of August new attap huts were completed at Kanchanaburi village near Kanburi. At first there was bad overcrowding, but the arrival of Major Marsden, S.M.O. of "H" Force with a party of nine medical officers and sixty orderlies from "L" Force greatly improved matters with their much needed help, for there were 800 patients in eight huts, most of them seriously ill. Lieut-Colonel Benson of "L" Force arrived also and took over command of the hospital.

On 9th September Humphries arrived with a further detachment of "H" Force, and these men built a camp for the fit, a few miles away. Sick continued to arrive, and twenty-eight wards were soon filled with sick from "F" and "H" Forces. From "H" Force 2,296 patients were treated. The great increase in patients brought about an unfortunate deterioration in the diet, in spite of constant protests.

On 8th November 1943 Newey travelled to Kanburi with some 200 men of "H" Force: treatment on the journey was inconsiderate, particularly with regard to meals but when the remnant of the force was sent back to Singapore on 8th, 9th and 10th December they were treated well by the Japanese in charge.

After the return of the survivors to Singapore numbers showed a substantial improvement in health, but of the 1,057 patients sent from Kanburi to Singapore half were known to have died at a later date. As Newey pointed out, the short period of plenty came too late to save men already weakened by starvation.

The result of the privations, starvation and overwork suffered by the men of "H" Force is shown in the following table, which was incomplete at the date of compilation:

	Total	Left behind	Dead at 10/12/43	Percentage died
All officers . .	421	6	26	6.27
British O.Rs. . .	1,719	38	627	37.30
Australian O.Rs. .	627	12	165	26.83
Dutch O.Rs. . .	503	6	33	6.64
Total	3,270	62	851	26.53

These figures may be compared with the approximate A.I.F. figures for "F" Force:

Strength of A.I.F.	3,662
Deaths up-country	892
Missing up-country	13
Remained up-country	534
Deaths after return to Singapore	32
Returned to Singapore (December 1943—10th April 1944)	2,223
Percentage died (approx)	25

"K" Force

A combined medical force known as "K" Force left Changi by order of the Japanese on 25th June 1943. Its function was said to be the care of sick prisoners of war in established hospitals, and its members would, so the Japanese stated, be returned to Changi in four months. Major R. Crawford, J.V.F. commanded the party, which consisted of thirty medical officers and two hundred orderlies. Major B. H. Anderson was in charge of the A.I.F. section, in which there were five medical officers and fifty medical orderlies. Information reached Changi that the destination was Thailand, and that cholera, dysentery and malaria were rife among the prisoners of war already there. Therefore in spite of orders that general medical supplies were not to be taken, a supply of essential drugs and surgical equipment was packed, with reserve rations and Red Cross supplies for the sick.

The force reached Kanburi after a slow uncomfortable rail journey of eight days, made rather more tolerable by the Japanese guards who permitted local purchase of food by the troops. Fortunately the officers had split up essential drugs such as sulphapyridine, atebrin and quinine between themselves and carried them on their persons, for the rest of the medical supplies were confiscated. The Japanese officer commanding the sanitary corps of the railway construction group addressed the men, stating that the Allied forces were being used as a labour force, and that there had been much sickness and many deaths. To ensure their competence to prevent this he set them an examination; failure to pass this would mean their employment as coolies. Dental officers were graciously advised to mark their papers as "dentist" and do their best. In spite of the technical nature of some questions, and the protests which had been lodged against confiscation of supplies all members of the party passed with honours! The medical portion of the equipment was also returned.

One section of the party left next day by train for Wanye, to an area near a filthy coolie camp, and half of this section was sent on to Nieke. Another section was retained at Kanburi, under Major Davies, and one at the Kanburi airport.

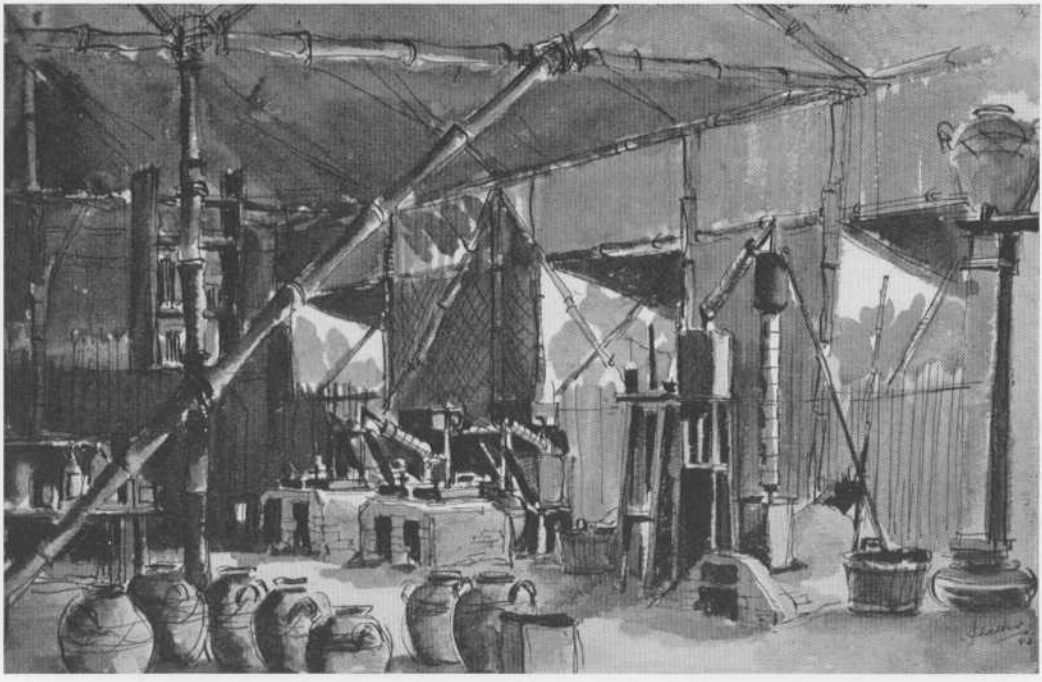
The first period of the experiences of "K" Force was occupied by work in coolie camps in these areas of the railway. After that the general south-

ward movement began, and later reference will be made to the activities of the force at Kanburi, when the base hospital there assumed considerable importance.

The officers of "K" Force soon realised that they, like "F" and "H" Forces were theoretically under the Japanese Singapore command, and that their conditions were worse than those controlled by the Thailand administration, since liaison between these commands was virtually lacking.

From July till November 1943 "K" Force worked in coolie camps to which they were attached in small parties, usually consisting of a medical officer and four other ranks, trying to stem the rising tide of disease with few or no supplies. Not all the officers in "K" Force were permitted to do medical work even for coolies; some were detailed for cookhouse and other camp duties, and acted as bath coolies for the Japanese. The medical personnel always dug graves in the camps; in the camp at Nieke huge graves were needed, five hundred coolies being buried in one section. The coolies themselves were appreciative of the efforts made to alleviate their hard lot, and were generous in helping the medical party to improve the diet of its members, and even made gifts of food. The mutual assistance served to lessen the risks of vitamin deficiencies; the mainstays of dietary supplements were kachang ijau, peanuts and eggs. The coolies themselves realised after considerable propaganda that food was the best investment of their earnings, even though prices kept rising. Nevertheless, beriberi and other deficiency states appeared and were a cause of death in association with infectious disease. In spite of supplements the rations for some months were very bad indeed, often drawn from the coolie kitchens or if possible cooked by the men themselves. Accommodation was very poor, gross overcrowding and with negligible shelter from monsoonal rains. The poor sanitation of these camps was a terrible menace, as the coolies had no idea of preventing their muddy living areas and tumbledown shelters from contamination with rotting food and excreta, which attracted countless swarms of flies. To these acts of neglect were added needless acts of cruelty: Japanese medical orderlies had been seen administering chloroform intravenously to random patients in coolie hospitals and watching the convulsions preceding death.

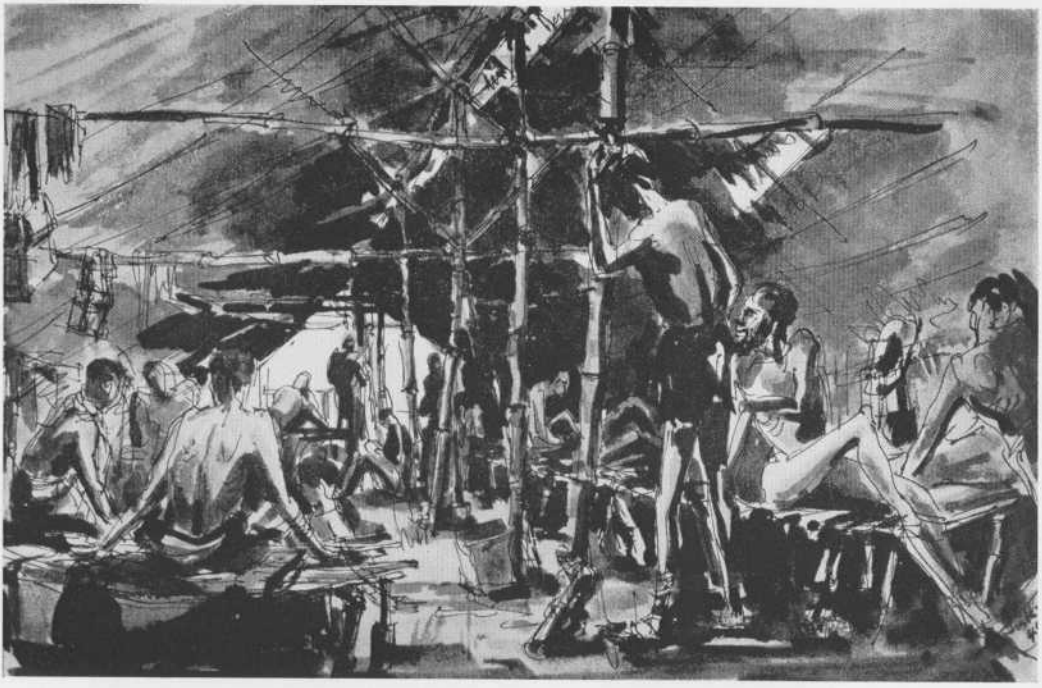
Surgical dressings could be obtained only by boiling strips of clothing removed from the dead. Banana plant fibre provided some bandages, and rock salt, permanganate of potash and river water provided the material for treating injuries, tropical ulcers, and cholera. Bamboo provided the usual range of building and furnishing materials and utensils. When the railway was completed the conditions gradually improved, and with the lessened strain on labour more help was obtained from the Japanese to improve the hygiene of the camps. The weather was better with the passing of the monsoon, with which passed too the cholera. Hospital huts could then be built and isolation huts provided for infectious diseases, medical supplies were obtainable, anti-fly measures took effect, and the appalling death rate of fifty to sixty per week in a camp averaging 1,000



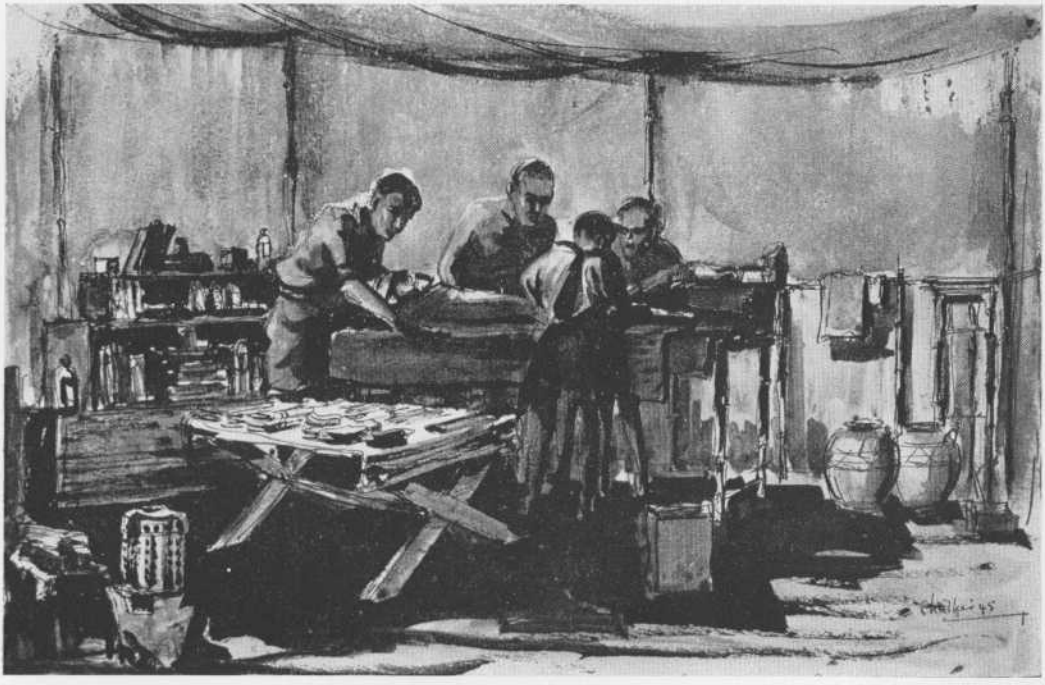
(Drawn by J. Chalker)

Alcohol Distillery, Nakom Paton.

Selarang Barrack Square Incident, September 1942.



Chungkai Base Hospital, Thailand. *(Drawn by J. Chalker)*



Chungkai Operating Theatre. *(Drawn by J. Chalker)*

in strength fell to two or three per week by the beginning of 1944. The Japanese medical corps became very active at this time in inoculating all members of camps, whether prisoners of war, coolies, or even native Thais living in kampongs along the line. Most of this work was of course done by the members of "K" Force in the camps where they were stationed. Early in 1944 the Japanese trained Malayan dressers for three months, and introduced them into the camps to replace British orderlies. This was not of much advantage, as the new trainees had only rudimentary knowledge, and those orderlies they replaced were worked as coolies. Deficiency diseases like beriberi were still a real danger, and caused loss of life.

Coolie base hospitals were even established in appropriate areas, and the most severely ill in camp hospitals were evacuated there, though the railway was seldom available, and during the long waits for trains many men lost chance of recovery. Thus the death rates at base hospitals increased.

While only slight headway was being made with the exceedingly grim and unpromising tasks of the latter part of 1943, "K" Force members had consolation in being able to mix a little with their colleagues in the prisoner-of-war groups and camps on the line. They acted too as medical officers for outlying detachments of the prisoners of war, whose own medical officers they could relieve to some extent. This was favoured by the movement which went on during the constructional phase of the railway, and the coolies' medical officers appreciated the hospitality and friendship of the British and Australian camps.

In September 1943 when a sick camp was formed at Kanburi for the men of "F" and "H" Forces, much help was given by Captain T. G. Hogg and orderlies from "K" Force, which with "L" Force did much of the pioneer work in that camp.

For short periods too, Major Davies and Captain Hogg worked in a Japanese laboratory at Kanburi, doing routine bacteriological work for the camps in the area, and some help was also given by "K" Force members in small Japanese hospitals. Captain J. L. Frew, A.A.M.C., and Captain Wallace, I.M.S., who had previously done anti-malarial work in the Nieke-Sonkurai area also worked with a Japanese mobile bacteriological unit for nine months. They were able to work with freedom, and carried out valuable diagnostic and investigational work for both prisoner-of-war and coolie camps of the area.

The second period of "K" Force activities was between August 1944 and April 1945, during which the accurate Allied bombing of Japanese targets caused a deterioration of the rations and general conditions of the prisoners of war.

On 6th April 1945 "K" Force was transferred to the Thai prisoners of war administration, and members of the force arrived at Tamuang, where they found a great improvement in conditions. Rations were better, and Red Cross supplements were distributed for the use of the sick. At Takri, however, conditions were poor and health standards fell accordingly. "K" Force's observations with the prisoner-of-war groups showed that malaria

was universal, and dysentery very common. In general, deficiency disease was common in isolated groups of men, particularly "wet" beriberi; the vitamin *B*2 deficiency states were very common in 1943 and again just before capitulation, but never so severe as in Changi during 1942. "K" Force lost only two of its men by death during its sojourn in Thailand.

"L" Force

This combined force worked chiefly in association with "K" Force. It was commanded by Lieut-Colonel H. C. Benson, R.A.M.C.: with three officers and seventy other ranks of the A.I.F. under Major H. L. Andrews, A.I.F. "L" Force left Changi on 23rd August 1943. The usual information was given that the force would work in well equipped hospitals and no medical equipment need be brought. Some general equipment was carried.

After a rail journey in closed trucks they arrived at Kanchanaburi, in Thailand on 29th August. Here they found some fifty members of "K" Force engaged in labouring work and camp fatigues. Major Andrews made a formal protest to the Japanese, stating that medical personnel were being used for non-medical work, and that their employment on civilian work was in defiance of international conventions, and that "L" Force, asked for as a definite force, should be retained as such. This protest was made in view of the immediate steps being taken to sub-divide the party. As a result Andrews was sent up to Nieke, but forty-five of "L" Force remained in the base camps, with some of the British personnel, and were used to staff the hositals. It would appear that the Japanese themselves recognised the evil reputation that the up-country camps had earned. The base camps were, in the troops' phrase in the "egg belt", where chance of survival was greater. The chief coolie hospitals where "K" and "L" Forces worked in 1943 were at Wanye, Kinsayok, Konkoita and Nieke, in addition to the base at Kanchanaburi. Later some of the members of these forces were moved into camps in Burma, but were transferred south when the general movement began.

Major Andrews found that in the later period of work, in 1944 medical and surgical supplies improved, though such items as plaster of Paris, catgut and instruments were almost unobtainable. He was able to borrow Japanese army clasp knives for surgical use: these had a small saw-blade which could be used for amputations. The Japanese medical officers were uninterested in coolie patients and hospitals, and, as previously mentioned in speaking of "K" Force, the Japanese-trained Malayan dressers showed almost equal apathy.

"L" Force was able to give valuable assistance to the sick of "H" Force on their arrival at Kanburi, and their medical officers and orderlies provided a timely service for these exhausted men.

The later movements of "K" and "L" Forces did not conform to the original intention, which was to return them to Singapore, and eventually their separate identity was lost. However, in improving the standard of medical care for civilian labour they benefited the hygiene of the camps

in general, and they also helped in establishing a large base hospital for prisoners of war. "L" Force alone of all the forces sent to Thailand, did not suffer a death among its own members.

2. *BASE HOSPITALS*

Japanese hospital arrangements in Burma and Thailand fell into three phases. The first of these was from August 1942 to September 1943 when the appalling conditions in the railway construction camps caused degrees of illness beyond the capacity of the utterly inadequate organisation provided in the jungle hospitals. The sick population of the camps was so greatly in excess of anything the Japanese had expected, and the system of evacuation was so poorly developed and chaotic that hospital bases in relative accessible areas became necessary. Labour concentrations in Burma called for hospitals in Burma; consequently the Japanese chose sites at Tavoy, Thanbyuzayat, Retpu and Kohn Kuhn (55-kilo). The conditions and medical work in these areas have been described earlier in this chapter. When "F" Force was brought up to the northern group of Thailand working camps hospitals were developed there, most of them quite inadequate. At the Sonkurai group of camps such hospitals were set up, and also at Takanun, but in addition a new base was established at Tanbaya in August-September 1943. Tanbaya was much nearer the Burmese railhead, and housed many of the sick of "F" Force.

During this first phase the need for hospital bases at the southern end of the line also became apparent; mention has been made of the establishment of a hospital at Konyu and Kinsayok, in the central camp group, and in a number of areas in the southern group, such as Non Pladuk, Chungkai, Kanburi and Tamarkan.

With the completion of the railway in October 1943 the second phase began. This saw the establishment of a hospital at Tarsau, at the southern end of the central group of camps, but within the jungle belt. During this period from September 1943 to March 1944 the relatively fit men who were employed on maintenance work on the line were looked after at the nearest camp hospital, and the more seriously ill were concentrated in the hospitals, where great resource and energy eked out the meagre facilities and supplies provided by the Japanese. By this time the pressure of the captors was slightly relaxed, and the captives' organisation was able to achieve some degree of success in its medical work. The third phase lasted from March 1944 till the end of the war; during this period some of the working forces, or their remnants, were returned to Singapore, and the sick were concentrated in hospitals which, though still crude and insufficient, were characterised by greater cooperation and less interference. These hospitals were sited towards the southern end of the railway, and have been described, not unjustly, as "face saving". The gradual movement of medical centres to the south was associated with considerations of supply and communication, and they represented a definite advance on the shocking standards previously seen in camp hospitals. At the time of capitulation of Japan there were still large base hospitals at

Chungkai, Tamuang, formed by fusion of three other camp hospitals, and Nakom Paton, the huge hospital terminal which housed as many as 8,000 derelicts from the railway project.

Reference has been made to the hospital work during the first two phases, and this may be now amplified in some directions.

Takanun, about 140 miles from Bampong like most of the hospitals in the central region suffered severely from cholera, and the mortality rate was high. Its daily average of patients was usually about 500 to 600.

Konyu held from 1,000 to 2,000 patients, many were seriously ill, and many died from various causes. It was at first built on a low bank of the Menam-Kwa Noi River but flooding necessitated its movement to higher ground at the beginning of the 1943 monsoon.

Kinsayok, about 107 miles up the river from Bampong, was about the same size as Konyu and was rapidly reduced in numbers once the line was completed, but was retained as a maintenance hospital camp till the end. In September 1943 there were still 2,000 to 3,000 prisoners of war in the area. It was a bad site in wet weather, and the accommodation then consisted of the usual tattered tents and hovels which let in the rain. The Japanese agreed to erect new huts, and these, with new and more hygienic sanitation lessened the ordeals and dangers of the patients appreciably. Rations and purchased food supplements helped to improve conditions, and canteen supplies could be obtained from the barges, as the river flowed past the camp. Relations with the Japanese were reasonable, but as in other camps some of the Korean guards were cruel and violent. Members of "D" Force from Changi helped the supply position by bringing some of the scanty stores they had brought with them, and some drugs could be bought locally.

Some primitive surgical work was possible, using instruments carried by medical officers. When the new buildings were erected improved access to the patients was provided in wards by using longitudinal platforms for the sick, with passages between, though the Koreans doing the work often refused to conform to the agreed plans. A small earth-floored operating hut was provided, and a special ward kitchen was organised. Lieut-Colonel Dunlop, who introduced these changes, acted as commander and senior surgeon and Major Corlette was in charge of the medical inspection division, and Major Bennett, R.A.M.C. was registrar. A camp fund with common subscription rates was formed: this organisation made good use of its slender resources in purchasing necessities from friendly people of the country, and did much to alleviate the conditions of the sick. The willingness of the Japanese at this stage, October 1943, to conform to less primitive and unreasonably bad standards of prisoner treatment was an early indication of a change in outlook. At the same time, it meant that increasingly difficult problems were to be solved at the base hospitals. The barges passing down the river to the hospitals in the south carried dismal human derelicts, too crowded for the use of stretchers, reeking with dysentery and septic ulcers. The battle with disease began in the

camps and camp hospitals along the river, and it was continued in the established hospitals farther down.

We may now turn to some further aspects of the work methods and experiences of some of the larger base hospitals, which have already come into the story of the movements of the large labour forces, such as "F" and "H" Forces.

At Kanchanaburi, a village near Kanburi, as we have seen, Lieut-Colonel Malcolm, R.A.M.C. started a hospital in January 1943. This area was, like numbers of others, known only too well to those who marched and staged there from Bampong. In the middle of the 1943 monsoon nearly a thousand patients were there, most of these evacuated from the jungle camps and camp hospitals. In the early stages of construction and organisation there were many obstacles to surmount, but in August 1943, though the problems were more serious, the Japanese gave practically no assistance. Drugs were almost entirely expended, skin diseases were very common, typhus appeared, as well as cholera and diphtheria, and tropical ulcers were severe and numerous. There were hardly any dressings to use on these ulcers; the best results seemed to follow cauterising the lesions with pure carbolic. Major de Soldenhoff and Lieut-Colonel MacFarlane performed appendicostomy as an adjuvant to the treatment of inveterate amoebic dysentery and reported excellent results. Except that the Japanese were not cooperative their treatment of prisoners here was reasonable, but the same could not be said of the Korean guards. On 18th December the hospital was closed; hygiene was then becoming an increasingly difficult problem on account of restrictions of space.

In July 1943 the first movement began in the transfer of sick from "H" Force to Kanburi, as part of the plan to send the remaining men of "F" and "H" Forces to southern concentration areas on completion of the railway. The staging camp at Kanburi had been, as we have seen, in a state of utter neglect: at one time Captain V. Brand, who was unable to march, was retained there to look after 500 seriously ill men. Fortunately hygiene was greatly improved by constructional changes and tightened discipline, and the camp had not been attacked by cholera. Major E. A. Rogers had also persuaded the Japanese administration to allow recovery of medical supplies left at Bampong, and to provide additional accommodation.

Further work was done on the hospital camp in the Kanburi area by detachments from "H" Force, and by some members of "D" Force. In August a party of "H" Force was moved north to Konkoita, but work in the rest of the force practically ceased except for camp duties. The first parties from the mountainous areas in the north arrived at the "H" Force hospital at Kanchanaburi on 27th August. There had not yet been time to prepare full accommodation in the hospital camp and the first arrivals had to shelter in attap huts erected only twelve hours previously. Though these huts only accommodated sixty men without crowding it was found necessary to put 100 men in each hut as the succeeding parties arrived. Many of the men were completely exhausted when they reached Kanburi,

and as many as 800 sick men many of whom were seriously ill could only be given a minimum of attention by a hospital staff consisting only of one medical officer, one nursing orderly and two non-medical N.C.Os., supplemented by volunteers from the less seriously ill. Fortunately Major Marsden, S.M.O. of "H" Force and a party of nine medical officers and sixty orderlies from "L" Force arrived, and improved the situation greatly, though medical supplies were very scanty and the diet of hospital rations was crude for sick men. The strain of the long journey by barge or train was severely felt by the sick, and the effects of their previous privations was made manifest by a continuing high death rate from malnutrition and inter-current infections. On 9th September, Lieut-Colonel Humphries, the commander of "H" Force arrived with ten officers including Major Fagan the surgical specialist and 154 fit O.Rs. It was then possible to build a camp for fit men two and a half miles from the hospital. By the end of September there were only about 100 men in the "fit" camp, the remainder of the force being in hospital.

A little later the move of "F" Force from Tanbaya hospital in Burma and Shimo Sonkurai and other camps in the vicinity further increased the hospital population at Kanburi. During October the demands on the parts of the force still left in working camps were abated, but with notable inconsistency the Japanese made prisoners carry back railway gear from Nieke to Taimonta and Konkoita. Further, when the first party of 500 men, those who were the most physically fit, were assembled for travel to Kanburi only enough trucks were provided for fifty men and the remainder had to march to Nieke to join a train there. Orders were also issued that 400 patients from the camp hospital at upper Sonkurai should march to Sonkurai and on to Nieke, but after strong protests this direction was cancelled. Eventually, on 26th November all the men of the force in this area were entrained, without regard for arrangements made for care of stretcher patients. A small detachment was left to look after a few dying men.

Meanwhile the move of patients from Tanbaya was proceeding in parties of 200 on successive nights. By 24th November all had been placed on trains with the exception of 218 who were too ill to withstand the long journey, estimated at fifty-six hours. No stretcher patients were taken. Thirty-three patients were accommodated in each truck; most of the trucks were open. Ten officers and 310 O.Rs. were left, including 5 medical and administrative officers and 96 O.Rs. for medical and general work. Seventy-six of the patients belonged to the A.I.F. When the main hospital party left Tanbaya there had been 665 deaths, made up of 45 per cent of the British and 21 per cent of the Australians in the total population. In spite of all the medical care that could be given this hospital illustrated the causes of deaths in such bases; poor diet, lack of drugs and the effects of previous bad conditions and hardships.

On their arrival at Kanburi all the men were exhausted, even those relatively fit from the working camps. The advance party was not permitted to make arrangements for the reception of succeeding groups for

whom adequate accommodation was often not ready. The parties arrived irregularly, frequently at late hours, and the journey took much longer than the expected time. By the time the whole of "F" Force had arrived 100 more men had been admitted to the hospital prepared by "H" Force. Some of the sick remaining in Tanbaya were transferred to Kanburi in December, but the rest of the survivors did not return till April 1944. When all the sick of "F" and "H" Forces had arrived twenty-eight wards of the hospital were fully occupied with men suffering from malaria, beriberi, tropical ulcers, dysentery and related diseases, and skin lesions. From 28th August to 8th December 142 deaths occurred in "F" Force and 264 in "H" Force.

As the numbers in hospital grew rations became worse; Lieut-Colonel Benson, R.A.M.C., the officer commanding the hospital made frequent complaints that the ration as received was on starvation level, and the men were dying of malnutrition. Firewood was always insufficient and had to be supplemented by purchases from the camp funds.

Soon after the two forces arrived in Kanburi the Japanese representatives announced that two parties of 500 fit men from "F" Force would be required for work at an indefinite destination to which they were soon to move. This was manifestly impossible without including some sick; the second party could only be made up by using a preponderance of Australians. On 2nd December the men of the first party went by train to Bangkok docks where they stayed a week, and on 10th December sailed as "deck cargo" on a 4,000 ton steamer, which disembarked them at Singapore on 14th December after a reasonably comfortable journey. The other parties were less fortunate and travelled by train in the usual discomfort. One small party went to Sime Road Singapore with "H" Force, and the remainder were sent to Changi. So "F" Force returned to familiar surroundings, and pleasant reunions, but leaving over 1,000 Australian dead along the Burma-Thailand railway.

"H" Force, with the majority of its patients, 1,057, was sent from Kanburi by train on 8th, 9th and 10th December, leaving sixty-two seriously ill men behind. These men, some not expected to survive, were transferred to "F" Force in Kanburi. The rest of the force, one-quarter of its strength lost by death, arrived at Sime Road, Singapore, where the force as such was dissolved and came under other administration.

After the end of 1943 the policy of concentration of base hospitals was more consistently applied. Small numbers of relatively fit men were left on maintenance work; and were gradually subjected to less pressure by the Japanese. The remaining hospital camps in the northern and central sectors became less important. Takanun, 140 miles from Bampong, was closed in April 1944. Tamarkan, opened about the same time, under the administration of Major Moon, A.A.M.C. but in December 1943 its patients were transferred to Chungkai. By January 1944 most of the prisoners of war were concentrated in the Kanburi area, where there were three camps, Tamarkan, Kanburi (1) and Kanburi (2). Working parties were small, and the rights of the sick were more respected. The hospital

in Tamarkan held 1,500 patients when the evacuation of the Burmese camps was concluded, while the camp in Tamarkan had a strength of 4,500. Lieut-Colonel Hamilton S.M.O. of "A" Force, arrived there in March 1944. Later, in May, Hamilton incurred displeasure by making a just complaint to the Japanese camp commander about guards who had beaten the sick at Takalin, and was sent as medical officer to Non Pladuk with a small party of men who the Japanese considered were undesirables.

Tamarkan was one of the better base hospitals; though the accommodation was the usual bamboo platform type of hut, with 250 patients to a hut, there were a number of amenities established. A canteen, was, however, difficult to run, as most of the officers had had no pay for some months. Patients with infectious diseases were isolated, and care was taken not to introduce cholera into the area. In July the hospital reached its peak of over 2,000 patients; it seems incredible that a Japanese medical orderly who had only the qualifications of a rice labourer was "in charge" of the patients. After this man left a better order of things began, dietary additions made an improved though still inadequate ration, some drugs were obtained from various sources, and a small operating theatre was equipped. Particularly precious was a supply of emetine enough to treat all the patients with amoebic infections. This and other therapeutic successes did much to raise morale. Major Moon commanded this hospital during part of 1943 and did excellent work there. In December the staff from Tamarkan was moved to Chungkai and Kanchanaburi; the patients were transferred to Chungkai.

Before proceeding further with the story of the southern group of hospitals some of the developments in the large hospital at Tarsau will be described, as these illustrate administrative and technical methods evolved to give the sick a better chance of survival.

Tarsau was the main base for No. 4 Group of camps for prisoners of war in Thailand, which held 13,786 men. It was established in November 1942, and treated 15,029 sick with 805 deaths up to the date of its closing in April 1944. The patients lay closely crowded on bamboo platforms in huts made of bamboo and attap, which were constructed by the prisoners themselves in a jungle clearing on the river, overlooked by rugged mountains. By permission of the Japanese Lieut-Colonel Dunlop visited Tarsau several times to see how the Australian patients in his area were faring. Between May and August 1943 the Japanese pressed the labour forces ruthlessly, and the sick and death rates rose alarmingly. Lieut-Colonel W. Harvey R.A.M.C. in command was, however successful in obtaining some help and concessions from the Japanese, and though the huts were leaky and decrepit, and the sanitation incredibly bad, a reasonably good operating hut was provided with a built up bamboo floor and table. A microscope and a few other facilities were also provided, but surgical equipment was extremely meagre.

Dunlop found pre-Listerian conditions in the wards, but the problem of spreading infective gangrene, which was then rampant, was tackled after

a conference with the staff. A system of sterile irrigation of wounds and ulcers was set up, orderlies were drilled in procedure and efforts were made to buy carbolic and iodoform at any price. Harvey was unable to secure enough water containers, without which mess gear could not be sterilised, but Dunlop promised to send all assistance in money or kind as it was possible to collect in the area. A little later Harvey as S.M.O. decided that Dunlop should administer the hospital, and the Japanese commander agreed.

Determined efforts were made to secure enough material and labour to rebuild defective huts, to provide better accommodation for the seriously ill, to extend and improve the sanitation, and to organise the duties of the wardmasters. As the nights became cold great hardship was caused to patients who had no blanket: the Japanese helped somewhat by providing mats and rice sacks. The Japanese gave some help in certain of these projects, but despite sympathetic consideration they did not supply essential drugs and dressings. Better treatment of the alarmingly destructive and lethal septic ulcers was devised, chiefly by improvisation, and small quantities of flavine and sulphanilamide were obtained. Dietary supplements were investigated, and despite the high cost, purchases of eggs, condensed milk and fruit were made from the Thais. At the end of 1943 there were 450 men needing special food; in the interests of all patients improved methods of serving food were introduced, and bakery ovens were improvised from officers' tin trunks. Concerted effort also produced a supply of ward and hygiene equipment.

A few cases of cholera were occurring in Tarsau, and the consent of the Japanese was obtained for the establishment of isolation quarters, special measures were taken to prevent spread of infection, and stills were pressed to their capacity to distil water.

The causes of death were examined; it was found that infections, particularly of the digestive system accounted for the greater number. In order to clarify the position an improved records system was drawn up. Further representations to the Japanese was successful at this time in obtaining a supply of drugs; very little emetine was produced, but the dire need of this drug was met by the use of more devious and courageous methods.

Clinical study was encouraged among the staff, and amenities of occupational and diversional kinds were established in the interests of the patients. One useful feature was the promulgation of periodic hospital bulletins which explained the needs of the establishment and the efforts being made to supply them. Even in technical matters such as treatment of scabies, appeals to the patients themselves produced good results. The amount of suffering and invalidity saved was considerable, and this was not only due to organisation, but also to the good work of the staff, particularly Captains C. Vardy, J. McConnachie and J. Street of the R.A.M.C.

When Tarsau base hospital ceased work in April 1944 both the sick and the relatively fit men, unless returned to Singapore, were being con-

centrated more and more in the southern areas, where another and important factor in the disposition of base hospitals now arose, bombing of the railway line by Allied bombers.

Air Raids. After the work of the railways camps was centred on more southerly areas the line proceeded to completion without repetition of the early air raids on the Burmese bases. As the Allied air forces were able to use long range bombers from airfields strategically convenient for attack on the southern part of Thailand, so the risk of damage to the railway increased. The prisoners of war themselves knew enough of the conduct of the war to comprehend what this meant to them as well as to their captors. On 6th September 1944 Non Pladuk was severely bombed, and unfortunately over 100 prisoners were killed and some 400 wounded. Several raids on Non Pladuk immediately followed, in the third of which railway sidings and workshops, and machine shops were destroyed with nine deaths.

On 29th November Tamarkan was attacked and eighteen men were killed and sixty-eight wounded. On 2nd, 8th, 10th and 13th December railway sheds and dumps were damaged at Kanburi, and more important, the railway bridge was paid special attention. On 8th December mass air raids were made from the Burmese border to Kanburi, killing 41 out of 111 casualties. The concrete railway bridge at Tamarkan was repeatedly attacked, and prisoners were hurriedly assembled to undertake repair work. Eventually the bridge was destroyed in February 1945 and only a wooden bridge left which also underwent repeated damage needing constant repair by the working parties.

After the raids of December 1944, air activity increased in frequency and continued attacks were made on the line until the capitulation of the Japanese eight months later. In fact, raids in the vicinity of the prisoner-of-war camps were frequent events after the big raid on Non Pladuk. The effect of this bombing was manifest in other directions than those of material damage. At first the Japanese refused to sanction measures of preservation such as slit trenches but this policy was soon changed, although guards would sometimes refuse to allow workers to take cover. Demolition bombs caused damage in some of the camp areas, and low level attacks also caused casualties through machine-gun fire. The sick naturally felt the strain of these attacks and some showed evidence of anxiety states. Tamarkan became an uncomfortable place for a hospital, and when in February 1945 the camp was evacuated to Chungkai great relief was felt. Changes in camp siting were in the first place related to the movement of the various bodies of prisoners of war; early in 1944 for example the headquarters of Nos. 3 and 5 prisoner-of-war branch in Thailand was at Tamarkan, and after being moved to Chungkai this was again moved in June to Tamuang. Resentment was felt against the Japanese when they refused to allow men to go to cover, especially when unnecessary casualties were caused. They also refused to permit a red cross flag to be displayed over the hospital when a request was made after a heavy raid at Tamarkan. In target areas camps were moved,

or closed or transferred to other sites for reasons connected with air attacks and the actual and potential damage they caused. The prisoners of war might easily have suffered more casualties in some areas, especially when pattern bombing was used, and they had occasion also to appreciate the accuracy with which specific targets were found without more serious human damage.

The medical services dealt with the casualties of these air raids as quickly and adequately as possible. When Tamarkan was raided the whole staff did excellent work, and in one of the later raids eight orderlies rescued two seriously wounded men while the camp was under fire. When the hospital was evacuated a surgical team, Major Hobbs, Captain Simpson and six orderlies remained with the rear party till the movement was complete. At Chungkai later some severe wounds needed surgical treatment, in one case amputation was necessary.

Wounds from bombing raids in the southern camps were usually dealt within one to five hours. Sometimes the interval was longer when wounded were brought in from outlying camps, occasionally as long as several days owing to the entire lack of equipment at more distant working camps. Even these delays did not prevent recovery in most instances, though suppuration was common. Most of the traumatic surgery was performed under spinal or local anaesthetics, but the Japanese provided small supplies of ether and chloroform after the air raids. This work and even the most primitive ward routines were carried out with difficulty increased by the lack of ordinary conveniences. For example, in February 1944 hot water was only obtainable at one point in a hospital serving over 2,000 sick men.

Some further account may now be given of the medical work carried out in the hospitals at Chungkai, and Tamarkan, established since 1943, and Tamuang formed later by fusion of three hospital camps farther up the line.

Chungkai was one of the first hospitals established towards the Bampong end of the railway, and had to cope with large numbers of men who were severely malnourished and suffering usually in addition from several infective conditions, the aftermath of the working camps of 1943.

Chungkai was opened as a working camp in September 1942; its base area was at Bampong, and there was no hospital, the sick being treated in living huts. In October Major Black R.A.M.C. became S.M.O., but only in November was a hospital area put aside, and huts were built in a low-lying site liable to flooding. Major Pemberton, R.A.M.C. arrived with a surgical team and began work in a primitive theatre. By the beginning of 1943 more medical staff had collected and the Japanese began to send patients from up-country camps. Major Black left to go as S.M.O. to another camp, and was succeeded by Major Reed, R.A.M.C. By March the hospital was grossly overcrowded, and had to deal with an epidemic of diphtheria for which no antitoxin could be obtained with the result that out of fifty-seven men ten died. By May over 1,000 patients were being treated in Chungkai, with grossly inadequate drugs and dressings.

In June 1943 Chungkai became the hospital base for all the up-country working camps south of the Burmese border, and received ever growing numbers of sick men, herded into train trucks or crowded on barges, hungry, wet, emaciated and often dying. Their state did not always protect them from brutal treatment by Korean guards. The conditions in the skin and ulcer wards, where 1,000 patients out of the 2,000 in-patients in hospital were crowded, were appalling. Men were dying from deficiency diseases for which little could be done. In the middle of the month cholera broke out, and after great efforts the staff persuaded the Japanese that cholera was in their midst, and managed to isolate the sick and to stay the spread of a general epidemic.

As in Tarsau successful organisation raised funds for the surreptitious purchase of essential drugs and supplies, and extra food. Such amenities as could be devised were provided, and a remedial department was also established. In August the hospital area was flooded; only one-quarter of the establishment was habitable, and in the midst of the most unfavourable conditions for any critical medical or surgical work cholera reappeared. Major A. L. Dunlop, R.A.M.C. acted as physician and also as registrar, and carried out much valuable work in organisation. By September there were 2,000 patients to be cared for: it was not surprising that in October 257 died. Captain Markowitz carried out work of a high order both in surgery and in extemporising methods and instruments, and performed over 100 amputations for ulcers. In January 1944 Lieut-Colonel E. E. Dunlop, A.A.M.C. took over the command, and as the peak period of difficulty passed was successful in introducing a rearranged scheme of hospital finance and a comprehensive diet scheme. As the large hospital base at Nakom Paton had now been built the Japanese transferred 1,000 sick patients there. In May Lieut-Colonel Dunlop left for the central group of camps, and Major Pemberton returned as S.M.O. In July the Japanese issued a liberal supply of drugs from the American Red Cross, of great value, but too late to save many who had died untreated. The hospital was now flooded again, and the Japanese selected patients for transfer to Tamarkan, and officially at least, closed Chungkai. However patients still needing treatment were kept more or less secretly in battalion huts. The bombing of Tamarkan produced an ironical situation, as the Japanese then re-opened Chungkai, and built a new theatre and administrative block. Chungkai was thus of use again, and during late 1944 and early 1945 received many patients from the drafts sent up-country for maintenance work; most of these men had malaria; for which drugs were insufficient in supply. In June 1945 Chungkai was finally evacuated, the remaining patients going to Tamuang.

Tamuang was late in its organisation, June 1944 and exemplifies the third and final phase of the Burma-Thailand experience. This phase began about March 1944 and lasted to the capitulation. The incidence of severe illness fell, owing to the lessened strain on the prisoners of war, the food supplied was somewhat better, general restrictions were relaxed to some extent, and the general set-up of hospitals showed a "face-saving"

attitude on the part of the Japanese. Extemporisation and organisation of medical and surgical work allowed a higher technical standard, even though the surroundings were still extremely crude.

Tamarkan, Chungkai and Tamuang. During the final phase of medical work in Thailand the conditions were fairly similar in Tamarkan, Chungkai and Tamuang, though all did not operate for the same period, and Tamuang, the latest built, showed special evidence of some change in the Japanese outlook. The following account of these conditions embraces certain features of the work carried out in the base hospitals of that period. Early in 1944 the daily ration was about 2,300 Calories, with 50 grammes protein and 20 grammes fat, and often the figure was still lower. This was offset to some extent by local supplements, by which about 2,600 Calories could be provided. Most of the useful dietary additions such as kachang ijau and pork fat were expensive, but where the sick required special nutriment they received even a better diet than others in the camp.

The nature of the diseases occurring in the early part of 1944 and the later part showed some differences. Dysentery and nutritional diseases were very common in the early period so too was benign tertian malaria and severe tropical ulcer. Amputation through the thigh or leg had been done on about 120 patients in Burma, but this was seldom necessary in Tamarkan. In the second half of the year malaria assumed a dominant role, owing to the scarcity of quinine, and most of the infections were of the malignant tertian type. For this reason cerebral malaria, blackwater fever and severe anaemia were more frequent. Pellagra and beriberi though still common, assumed a milder form. Skin diseases were less troublesome, and the septic ulcers became less severe. Diphtheria, which at an earlier stage had been prevalent in large tropical ulcers, and at one time called for a special isolation ward, was becoming uncommon. In April 1944 all the men with amputations, and those incapacitated or suffering from chronic diseases were transferred to the base hospital in Nakom Paton.

In July some stores arrived from the American Red Cross; atebrin and iron were then available for the first time. Emetine and sulphaguanidine also arrived, much to the benefit of dysenteric patients. The emetine though in small amount only, supplemented that made by Captain Van Boxtel from ipecacuanha.

Pathological work was carried out by Sergeant F. H. Atherton; he found the principal malarial vector to be *A. barbirostris* which bred just outside the camp, and made the microscopic diagnosis of malaria on a large scale. Dengue was also found in Tamarkan and other camps, due to breeding of the *Aedes* in drums of water. Stool examinations showed 20 per cent of *Ankylostoma* infection and 50 per cent of *Strongyloides.*

The work on blood transfusion carried out in the hospital bases in 1944-1945 was of particular value. Captain Van Boxtel and Lieutenant Roberts, non-medical officers performed successful transfusions on a large number of men, using first the defibrination method introduced by Captain

J. Markowitz and later the citrate method. Grouping was checked with test sera obtained from volunteers and with cross matching.

Operative surgery was performed in these hospitals under sketchy but quite effective conditions. Floors were usually of earth, though in one instance bricks were used. Smooth bamboo matting was used to make movable skylights and walls which could be washed, and netting curtains excluded insects. The table was made of wood in the camps, and sterilisers and autoclaves, stills and metal splints were made from the drums and similar materials to hand. Instruments brought from Singapore were carefully guarded and looked after: a few had been taken by the Japanese; the only other source of supply was a welcome supplement from the American Red Cross in July 1944. Urgent abdominal operations were performed and those required for tropical ulcer, subcutaneous abscesses which were very common, and empyema. Non-urgent operations were seldom performed at first, except those for haemorrhoids and other anal conditions which were common owing to the prevalence of dysentery. Later in the year the arrival of some surgical supplies made it possible to perform various non-urgent operations. The Japanese also began to insist that men with hernia should either work or be operated on. The results of these deliberate procedures were very satisfactory without trouble from wound infection. Tropical ulcers still demanded some radical operations, such as excision of tendons or muscle, removal of sequestra, or even amputation. However these later experiences pointed strongly to the influence of nutrition, for the men when better fed had less trouble with extension of the necrotic process to deep structures, such as bones, joints, tendons or muscles. Good results were obtained in less severe forms by removal of sloughs and the application of iodoform. McGuire's solution of copper sulphate, carbolic acid and water was also found useful after cleaning or excising the ulcer.

Extemporisations which have been mentioned more than once in other places, were a feature of the work in the base hospitals. At their inception these institutions, at their best crude in the extreme, had none of the ordinary facilities for work of even the most rudimentary standard. The prisoners helped themselves by giving from their scanty pay for local purchase of material, and from their personal possessions if any. The convalescent and lightly sick were encouraged to make articles for common use. Even with some repetition no account of the hospital work at this stage would be complete without listing some of the articles made, such as the following: trays, buckets, bed pans, commodes, urinals, sterilisers made of tin and mud, oil lamps, tables, brooms, mugs, ladles, basins, funnels, irrigating apparatus, charcoal, pneumonia jackets, pillows and mattresses made of rice sacks and straw, surgical and orthopaedic apparatus, such as splints, pulleys, suspension gear, stretchers, special beds, leg rests, kitchen implements such as vegetable scrapers, boxes for instruments, clogs, fly traps, and hygiene apparatus such as fly-proof lids for latrines and disinfectors. Special instruments were devised ranging from those used for dressings including bamboo needles, to retractors and suc-

tion pumps and even proctoscopes, and the ophthalmoscope made by Major Hazelton. Catgut and alcohol were also made in the camp.

Apparatus for physiotherapy was made and used in special rehabilitation departments. The making of artificial limbs in Changi has already been described. This ingenious work was duplicated in several hospitals, and limbs were made and worn with success ranging from a simple pylon model to more elaborate types. Artificial eyes were also made. The establishment of hospitals workshops was designed to meet the need for equipment, which was second only to that of food. In the hospital bulletins a special appeal was made to patients to contribute material, and to patronise the arts and crafts centres set up as part of a rehabilitation scheme for long-term invalids. Woodwork, carpentry, tailoring, cobbling and tinsmithing were the main activities, and articles so produced were sold at low prices. Actual appeals for material at Chungkai may be quoted:

> There is a desperate shortage of such essential materials (for artificial limbs) as screws, wire, sorbo rubber, elastic and rubber bands, old braces, soft leather or webbing. Artificial eyes can be made from white mahjong pieces: more of these are required.
>
> The following articles are urgently needed: tins and containers of all sorts, solder, flux, nails, wire, screws, sorbo rubber, scraps of clothing, hose tops, old socks, string, webbing, scraps of leather, rubber tubing (for transfusion purposes), glass bottles of all sorts, glass tubing, canvas, elastic or rubber bands or strips, tools of all sorts. Nothing is too old. Nothing is too small.

During this later period, despite some general improvement in the conditions, deficiency disease still showed its menace. Even those men who had lived in base camps for months showed nutritional deficiencies in increasing numbers. Beriberi was not so common as those states due to lack of the *B*2 part of the vitamin *B* complex. Definite signs of a spastic paresis in the lower limbs were seen, and recognised as one of the results of the pellagroid group of deficiencies due to lack of the vitamin *B* complex.

During the later months of 1944 and up to the time of the Japanese capitulation there were further evidences of a changed attitude towards the prisoners of war. Some attempt was made by the Japanese to assist in stemming the wastage of life and health, and incidental to these efforts was the display of external marks of consideration. This was seen in Tamuang to which base camp the patients from Chungkai were removed in April 1945. "Window dressing" was now a policy of the Japanese. The hospital was rebuilt, new kitchens were constructed, of a degree which was elaborate compared with anything seen before in the railway camps. Even brick structures were built, gardens were made and flowering plants brought specially from Chungkai and elsewhere. At the same time the jungle camps remained on the previous poor level and death rates there showed no lessening. Though general conditions improved and restrictions were relaxed at these big terminal hospitals in 1944, the Japanese still showed in other places that their hostility to the sick and their opposition to any measures adopted by the prisoners for their own well-being were grim realities. Their frequent stultification of constructive administration,

their demands on the unfit, and their addiction to unnecessarily harsh parades and checks on prisoners were not far in the background. Even in Tamuang, not long before the end of the war, patients were discharged forthwith on arrival by a Japanese medical officer and made to work. A little later the medical sergeant directed that the number of patients then in hospital must not be increased. However the spirit of the men, even of the sick, was high and all possible measures were taken to foster this in hospitals where it was only too easy for suffering to be the one common bond.

Dunlop describes the early months of 1944 as "a period of terrible aftermath of the railway construction" and the concentration areas as "cities of sickness". In Chungkai as in Tarsau he found it valuable to publish bulletins which acquainted everyone with the current facts and the progress made. In these bulletins stress was laid on the growing need of dietary extras, which in turn needed money for local purchase. The officers made handsome contributions from pay for this purpose, and it is of interest to study a sample balance sheet of the self-contained financial efforts of the prisoners of war to help those in want (see appendix). By these means it was possible to provide special diets containing milk, sugar, eggs, vegetable soup, rice, meat and fruit, according to supplies and the patients' needs. Welfare officers, officers in charge of wards and ward-masters were acquainted with all details of the diets and the need for strict supervision. Death rates showed an immediate decrease with the introduction of such new diets, and although at the period under present consideration, when the heavy hand of infection and privation was still laid on thousands of patients in hospital, many men were in a very precarious state of health, a definite advance was achieved.

Nakom Paton. We now turn to the establishment of the largest of all the hospital camps, Nakom Paton. From the later part of 1943 there had been rumours in Burma of a large hospital to be built near Bangkok to house up to 10,000 men suffering from serious or chronic maladies. At the end of January 1944 some 150 convalescents and medical staff moved to Tamarkan and thence to Nakom Paton. Major Fisher comments that they were "disappointed but not surprised to find no hospital", just a working camp of 1,500 prisoners of war. Three months of labour lay ahead of the prisoners, who with the help of native labourers built a hospital of fifty huts each designed to hold 200 men, allowing a space of one metre per man. The medical orderlies shared in this work, and levelled sites, did general navvying, made roads, dug drains and transplanted trees. Timber and attap were available for building the huts. Latrines were on an improved model, cubicled, with squatting holes over concrete lined trenches 4 feet deep. It was necessary to empty these trenches to a 30-gallon tub which had to be carried to a cesspit. Cookhouses were built on an allowance of one per 1,000 men: they had concrete floors, water tanks, fire places and kwallies (cooking vessels). The water supply was inadequate but was later improved by sinking deep boreholes: the water of course required boiling. An elaborate canteen hut

and a concert platform were welcome amenities. One of the greatest drawbacks of this establishment was the flat nature of the site which in fact had been used as padi fields. Some huts were untenable in wet weather and acute discomfort was unavoidable for some patients. Nevertheless the area was healthier than most of the other hospital sites, and the stagnant water in wet seasons did not seem to increase the incidence of malaria. The preservation of trees, pools and other natural landscape features enhanced the appearance of the site. The accommodation for lightly sick and convalescents proved satisfactory on the whole, as judged by local standards; the provision of wooden floors was a definite advance. For seriously and gravely ill men, however, it fell far short of even the most rudimentary requirements. Wooden platforms were the only beds provided, and the huts were sometimes overcrowded. There were no hospital beds, no bedding, no linen, no towels, no washing utensils; other human amenities designed to make the lot of the seriously ill more tolerable were absent, except for what could be contrived by the ingenuity of the prisoners themselves. On 5th March 1944 Lieut-Colonel A. E. Coates was asked by the Japanese authorities to take over the command of Nakom Paton hospital, and he was appointed as Chief Medical Officer, also holding the position of consulting surgeon. On numerous occasions he pointed out to the Japanese the many shortcomings of the hospital, and on 22nd November 1944, in a report made at the request of the Japanese medical officer, stated that even one clean and dust-free ward of 100 beds properly equipped would have been adequate for urgent needs. At the time of this report no washing utensils had been supplied and there were very few facilities for ablution or for disinfestation.

A separate medical and surgical block was one of the show features of Nakom Paton, with a large wooden hut divided into an operating theatre with concrete floor and large enough to hold three tables; a blood transfusion room with three tables; specialist departments, dispensary and the office of the chief medical officer.

The medical centre was reasonably adequate; its use was really restricted by the limitations of technical resources, though these, as in other hospitals were greatly expanded by extemporisation. The operating theatre had a concrete floor and flywire windows, but there was no skylight, the lighting was very poor, and only improvised oil lamps were available at night. One microscope was supplied and was in constant use by the pathologist's staff, who carried out a good range of pathological and biochemical work so far as the limits of equipment and material allowed. Patients began to arrive in April 1944, and continued in batches of about 1,000.

The staff of Nakom Paton at June 1944 included the following officers: Chief Medical Officer and Consulting Surgeon, Lieut-Colonel A. E. Coates; Medical Adjutant, Captain C. Vardy; Consulting Physician, Major W. E. Fisher; Consulting Pathologist, Lieut-Colonel MacFarlane; Consulting Psychiatrist, Lieut-Colonel Barrett; Consulting Physiologist and Transfusionist, Captain Markowitz; S.M.Os. of ward groups, Lieut-

Colonels Malcolm, Barrett, MacFarlane, Larsen and Dunlop; Pathologist, Major A. T. H. Marsden; Dentist, Major Clarke; Specialists in Ear, Eye and Skin Diseases, respectively, Captain McConnachie, Major Hazelton and Captain Wright; Anaesthetist, Lieut-Colonel MacFarlane. There were in addition a number of other medical officers working in the wards. The work of the hospital was also assisted by an advisory committee and several other special committees, and as other departments became necessary, such as workshops for general and orthopaedic purposes, and a physiotherapy department, other appointments were made.

The surgical department could undertake all ordinary work; the lack of instruments and material was partly made up by pooling equipment and by extemporisations. A total of 896 operations was performed at Nakom Paton, with a mortality of 18; these included 5 craniotomies, 3 laminectomies, 8 drainage of liver abscess, 2 thoracoplasties, and either appendicostomy or ileostomy was performed on 25 patients. Herniotomy was performed 114 times by order of the Japanese, and by using a tested antiseptic technique and employing interrupted cotton sutures and as little catgut as possible good results were obtained. Catgut was successfully made in the laboratory.

In medical wards a wide experience was gained in the manifestations of malaria, chronic dysentery, and amoebiasis. Essential drugs were often lacking, but in the later periods supplies of invaluable drugs such as emetine were available partly from the Japanese, but chiefly from the American Red Cross. Pulmonary tuberculosis was fortunately not common in the camp, among Australians it was rare. Active treatment by artificial pneumothorax was carried out in suitable cases, but tuberculous disease did not respond well under the prevailing conditions, in spite of special dietetic care.

The special departments were very busy and did most valuable work: 25 per cent of the whole camp strength were treated in the skin clinic alone. The pathology department was obliged to make potassium salts from wood ash for some tests, and also made Benedict's solution. Test meals could be done, using syringes instead of burettes, and other simpler biochemical tests. Major Marsden made a useful investigation into the reliability of microscopic diagnosis of amoebic dysentery. Post-mortem examinations were invariably carried out until the Japanese forbade them without special permission.

Continuous interest was maintained in rations. Though the diet was much better than in other camps of the earlier period there were still important deficiencies, especially in first class protein, fat, and vitamins, in particular vitamin *B* complex. The Calories ranged from 2,700 to 3,100; total protein from 50 to 85 grammes, fat from 18 to 51 grammes. An efficient organisation provided supplements to the ordinary hospital diet, and for special diets by the use of special funds, and the British and Australian Red Cross representative Mr Keith M. Bostock gave valuable assistance in this regard. Food extras also arrived from the American

Red Cross. Notwithstanding this, deficiency diseases were still a reality in hospital patients, many of whom had suffered irreversible changes.

On Christmas Day 1944 special efforts were made, towards which the Japanese made a special grant. The canteen produced attractive delicacies, and the cooks prepared a remarkable series of meals, with meat, eggs, several vegetables, sweets and Christmas cake. Services were held, and at night a pantomime was staged. The celebrations included the entertainment of the Japanese officers at luncheon.

Early in 1945 more restrictions were imposed on the camp because of the altered military position, but the prisoners of war were well aware of the reason, and the hospital work went on without hindrance. One technical feature of the medical activities of Nakom Paton deserves special mention, the quality of the scientific side of the work, as evidenced by the high level of the clinical meetings which the British, Australian and Dutch medical officers held regularly. The minutes of these meetings recall the best standards of a teaching hospital.

From 25th March 1944 to 16th August 1945 the admissions and discharges were as follows:

	British	Australian	Dutch	American	Total
Arrived	4,363	1,868	3,190	90	9,511
Discharged	3,271	1,085	2,328	58	6,742
Died	71	21	59	2	153

In August 1944 the camp strength reached a peak of 7,353; by August 1945 it had fallen to 2,868. This huge organisation ran efficiently, and combined the efforts of the different nationalities composing it smoothly and with enthusiasm for a single cause, that of the well-being of the men committed to their care.

THE FINAL PHASE

In spite of the more cooperative attitude of the Japanese in the base hospital camps there were many instances of lack of consideration, as well as humanity, and reasonable degrees of consistency. Some of these have been mentioned, but more striking was the treatment of several parties of prisoners of war during the last six or seven months of the period of captivity.

On 19th December 1944 a party of 200 British and 200 Dutch were taken by train by night from Tamuang base camp to Wampo, a camp memorable for the labour involved in the erection in seventeen days of a 400 yard long wooden bridge which clung to the cliff some 20 feet above the river. They were marched with heavy loads to a jungle camp where they did heavy work under extremely bad conditions. For nearly six months they suffered from lack of food, rest, clothes and shelter; 80 per cent of the men suffered from malnutrition and malaria, and 13 per cent died.

In April 1945 a party of 1,011 left Nakom Paton including over 600 British, half of whom came from Non Pladuk, 120 Australians and 211 Dutch with 6 medical officers. The men from hospital were selected by the Japanese medical officer, who showed no regard for their physical condition. This party formed the Mergui East-West Road force, and suffered hardship and neglect as the result of which over 250 men died.

Even worse was the march from a camp of some 2,000 prisoners at Nakom Naiyek to Pitsanloke. In May 1945 an advance working party of 200 English troops with Captain J. A. Mark R.A.M.C. and a few orderlies was marched off north to an unknown destination. A fortnight later a main party of 700 English and 100 Australians was formed, with a medical attachment consisting of Captain T. le G. Brereton, A.A.M.C., Lieutenant C. J. Poh, S.S.V.F., and eight orderlies. The men in this party were far from fit; many of them were suffering from chronic amoebic dysentery, relapsing malaria and tropical ulcers. They had to push in hand carts loads taken only part of the way in lorries, and could only cover ten miles in the heat of the day, spending each night without shelter in heavy rain. They felt keenly the shortage of safe drinking water. Sick were carried on the cooks' trucks or on litters. They met Captain Mark's party at Lopburi. Medical supplies were obtained here with money given by the men themselves, and the invalid party benefited from treatment, though there was no quinine and they suffered from exposure and hordes of mosquitoes. There was no train; so the less unfit section of the men marched on. Carts for cooking broke down, and small groups of men cooked their own rice. On 13th August the remains of the invalid party moved by train to Pitsanloke where the men were under shelter and had some days of rest. The other parties arrived by foot after some days. One man had died from smallpox, and another was brought in suffering from the same disease, from which he died. On 22nd August a Japanese colonel told them that hostilities had ceased, and thereafter the food improved, and clothing and drugs, including quinine were obtained.

Of the original 1,000, 985 men reached Pitsanloke. Five died on the march and three others died out of ten who were returned ill. Some 880 men marched the full distance of 370 miles in about eleven weeks. Captain Brereton considered the death rate surprisingly low in view of the conditions, and attributed this to the fact that the men were hardened and immune to prevalent infections, and to their faith that the end was in sight.

During the last months of captivity the maintenance of discipline in the camps was most important. In Nakom Paton it became known that the collapse of Japan might be expected in August or September 1945, but it was difficult to predict what might happen, and provocation was undesirable. In March 1945 the officers were concentrated by the Japanese in Kanburi but the warrant officers and non commissioned officers were valuable in maintaining discipline in Nakom Paton. A secret organisation was set up when the end was soon expected; Lieut-Colonel Dunlop was placed in charge of a body of guards selected from the prisoners of war, and a trusted N.C.O. was placed in charge of each section of huts, with

a few seniors who acted as block and hut sergeant majors. On 14th August the Japanese ordered a day of rest in the base camps and again on the next day. In Nakom Paton as soon as the Japanese commandant informed Lieut-Colonel Coates that the war was over these N.C.Os. took the place of the Japanese guards, and in the matter of minutes the huge hospital compound was under the control of the ex-prisoners, who after due rejoicing awaited the actual day of their liberation. Even in the midst of so great an emotional crisis discipline was maintained. The news did not come so promptly to all areas. At Tamuang the Japanese ordered a concert on 16th August at which the announcement was made by the prisoner-of-war commandant. In Tamuang, as in other base camps, the dramatic change was made without incident, though even two months earlier some tension was felt when the Japanese began to build machine-gun nests. In some of the more remote parts men did not hear the tidings for days.

One immediate material advantage of the cessation of hostilities was the release by the Japanese of Red Cross drugs and clothing in the hospital bases, and men in some camps found supplies in the Japanese stores waiting for just such a day. In Nakom Paton Colonel Coates and his senior officers visited the Japanese camp on the day after the surrender, and offered their help for the many sick; the Japanese colonel feelingly declined assistance.

In this story of three and a half years of endurance we have been, of course, more intimately concerned with the Australian forces, and chiefly with the efforts made by the medical services to protect them from illness and death. That these efforts were not more successful was not due to lack of quality in the work carried out by the medical services of the A.I.F. and other national forces, who worked together in one cause. If the story has in it elements of repetition it is because of the constantly recurring menaces of sub-nutrition, oppressive hardship and infectious disease. Against these trials of the flesh and the greater trials of the spirit the forces on the whole kept their heads high. There were times when courage flagged, especially with the sick. Now and then the patients and others needed encouragement to eat unpalatable food, and there were those who in extremity like Hezekiah turned their face to the wall and would have died; sometimes the will to live flickered and failed, but in the main the greatest asset of the medical services was the spirit of the men themselves, and in particular of their leaders. There were a few who would stoop to meanness and degradation, but the dark places of the heart revealed in the hours of extreme trial are small compared with the light that shines. It is appropriate here to pay special tribute to the orderlies, both trained and untrained in medical work, and the willing volunteers who in performing the most menial, trying and dangerous tasks for those whose health and lives were in the balance sometimes gave their own lives.

APPENDIX

Statement of Income Expenditures Tarsau Hospital Thailand (These sums entirely raised by prisoners of war)

Estimated Income and Expenditure for November and December 1943

Expenditure Tarsau Hospital	November	December	Income	November	December
To Drugs	115	200	By Officers' Subscriptions	3,388	3,330
Foodstuffs Ordinary Diets:			Hospital Fatigue Pay	480	500
@ Stg. 2,268		1,690	Hospital Canteen	750	550
Special Diets—			Sundry Income	105	50
@ Stg. 4,210	6,478	6,200	Contributions from Outside		
Hospital Equipment	223	250	Camps	980	700
Soap issues to patients		200	Estimated Deficit	2,468	4,848
Sundry Expenses	124	50			
Convalescent Depot at Stg.	831	988			
Expenses for patients north of Tarsau	400	400			
	8,171	9,978		8,171	9,978

Note: The Gross Income from the Hospital Canteen is estimated at *Tcls*/1,000 and *Tcls* 800 for November and December respectively but *Tcls* 250 1/4 from each month has been allocated towards Christmas expenditure.

Tarsau Messing	November	December		November	December
To Grants to Cookhouses:			By 10% from—		
Camp Cookhouses	1,552	1,862	O.Rs'. Pay	1,394	1,550
Officers' Cookhouses	288	303	Officers' Pay	1,469	1,486
Convalescent Depot (@ 2½ stgs)	828	988	Estimated Deficit		117
	2,668	3,153			
Estimated Surplus	195				
	2,863	3,153		2,863	3,153