MEDICAL PROBLEMS OF THE OPERATIONAL INFANTRY SOLDIER IN MALAYA

BY

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For the last two years* the author has been medical personnel research officer to the Army Personnel Research Committee. His field has been the problems peculiar to the infantry soldier. In 1955 he made a six-month survey in Malaya of the problems of the soldier engaged in jungle operations against the Malayan communists. After preliminary training in jungle warfare at the Far East Land Forces Training Centre, Kota Tingi, he took part in a number of operations, thereby gaining first-hand experience of the soldier's life in the jungle. The aim of this paper is to give a brief outline of the major problems encountered. The term "medical" has been interpreted in a very broad sense and includes anything peculiar to this type of warfare which adversely affects human performance.

Malaya is a peninsula stretching south-east for 400 miles from the southern border of Thailand towards Indonesia. At the broadest part it is 200 miles wide, and in area is about the same as England and Wales. Running almost the whole length of the country is a backbone of jungle-covered mountains rising up to 7,000 feet. Four-fifths of the country is a trackless evergreen forest: a hundred feet above the ground the trees make a solid roof of greenery shutting

* Written in 1956.
out both sun and sky. From the trees curtains of vine and creeper run down to the undergrowth to make a jungle so dense that a standing man is invisible at 25 yards. Water is usually plentiful, the country being covered with a dense network of streams and fast-flowing rivers. In many parts, especially near the coast, the jungle contains large areas of swamp, making the country even more difficult to penetrate. About one-fifth of the country, mainly on the western side of the mountain range, has been developed into rubber estates (which resemble large orchards), rice fields, tin mines, many small villages and a few towns. The climate shows little variation throughout the year. In settled areas on the plains noon temperatures average 90°F., falling to 70°F. at night. Winds are light and rainfall heavy, a daily downpour in the afternoon or evening, perhaps with a severe thunderstorm, being usual. These conditions result in a hot, humid atmosphere. Personal observation in the jungle indicated rather lower maximum temperatures, in the region of 80°F., with a rather higher humidity, as might be expected.

Since 1948 the Malayan communists have been waging a guerilla war in order to gain control of the country with its valuable tin and rubber industries. The original aim was for armed bands of communists based in the jungle to prey on the settled areas to such an extent as gradually to take control of the country. The campaign has tended to move the other way, the armed bands being forced deeper and deeper into the jungle and broken up into smaller and smaller groups. In 1955 it was estimated that not more than 4,000 armed communists remained of an original force of two or three times that number. These men are spread out all over the country in bands not more than twenty strong. Their elimination is the army’s principal task in Malaya; a difficult, lengthy and tedious one as the communists will not stand and fight unless local conditions are overwhelmingly favourable to them. Army operations usually take one of two forms. The first is the laying of an ambush in an area which intelligence reports indicate that the communists will be visiting. These ambushes may have to be manned continuously for weeks at a time before being successful. They require careful planning and immense self-discipline to maintain them in the absolute silence which is necessary. They are the most profitable method of eliminating communists.

The second type of operation consists of a systematic search of an area of jungle which is believed to contain communists, coupled with their elimination, before they succeed in making their escape. The usual plan is to move into an area of jungle without being seen by the local population (who include communist sympathisers in touch with the armed bands in the jungle), set up a base camp and carry out one-day patrols from that centre. To the individual soldier the returns from this perpetual patrolling would appear to be very small, though over the years a great deal of the country has been cleared successfully. It is estimated that it takes 1,000 hours of patrolling for every contact made with the enemy. Operations usually last about ten days but may extend up to a couple of months. The unit usually employed is the infantry platoon operating as an independent unit for the period of the operation. A common routine is for the
infantry company to be based on the jungle edge (in a rubber estate, for example), and to send its platoons on patrol continuously in rotation. To the individual soldier life consists of operations involving considerable physical exertion in a hot, damp, dirty forest environment, interspersed with short spells (usually not more than four days) of rest, re-training and re-equipping in the company base, which is usually a primitive temporary camp. Jungle operations tend to result in a monotonous existence, rarely disturbed by short periods of intense activity, when contact is made with the enemy.

DISEASES

Skin disease. Disease plays a much smaller part than in earlier campaigns in similar country, such as the Burma campaign of the Second World War. The predominant disease now is tropical skin infection which is almost universal in operational units, either appearing during, or being aggravated by, jungle operations. Practically every man suffers from skin disease of sufficient severity to require treatment at least once during his first year of service in Malaya. The majority only need treatment in unit lines whilst remaining on full duty; a small number are severe enough to warrant light duty for up to ten days, and a few have to be treated in hospital. This group of diseases makes up the largest single cause of hospital admission in Malaya. Thus the average figure for the twelve-month period August, 1954 to July, 1955, was 46 per 1,000 per annum. The corresponding number of new cases of skin disease in a unit was about 1,000 per 1,000 per annum.

Ringworm (usually of the feet) was the commonest disease seen, followed by secondary infection of abrasions or bites (scratches, thorns, mosquito or leech bites), furunculosis, bullous impetigo, and prickly heat. The individual soldier’s experience of ringworm tended to follow a certain pattern. After about three months’ service in Malaya it appeared as an infection of toes or groins or both, usually whilst on operations. Unless treated promptly, a generalised body infection resulted. Prompt treatment with a fungicide (usually Castellani’s paint or Whitfield’s ointment) controlled the condition, leaving a chronic focus visible between the toes. Thenceforth ringworm was liable to flare up whenever the man had been in the jungle for a few days, though subsequent attacks were not usually so severe and were easier to control, but no easier to eradicate entirely. Personal observation indicated that there was very little increase in the incidence of ringworm for the first ten days of an operation, but thereafter it was considerable in spite of fungicides. A few of these cases (5 per cent) would require immediate evacuation from the jungle, though the majority could be kept at full duty with treatment, but their lesions would not heal until after return to civilisation. Cuts, abrasions, and scratches on exposed areas of skin were universal and became septic almost without exception although they were rarely serious enough to put a man off duty. To try to reduce this, the experienced wore their sleeves down and buttoned at the wrist in spite of the heat. Furunculosis usually occurred in those areas normally covered by clothing,
and once present was a very difficult disease to control under jungle conditions, being liable to spread rapidly all over the body. The large jungle sores so common in the Burma campaign were not seen. The high protein content of the rations may have been an important factor in their prevention. Bullous impetigo did not appear to be such a serious problem as among troops in permanent barracks in base areas. The lesions usually started in the axilla with rapid spread to the chest and abdomen. Secondary infection of a pre-established acne was universal. Prickly heat appeared to be uncommon except in recent arrivals from Europe.

It is interesting to try to analyse jungle warfare and conditions to determine the factors responsible for the higher incidence of skin disease in the jungle. Most operations take place in an atmospheric temperature of 80°F. combined with a relative humidity in the region of 90 per cent. This means a high skin temperature and a constant film of visible sweat on the skin as air movement is very slight in the jungle. This is aggravated by the hard physical exertion necessary, the covering of most of the body by clothes, and the lack of sunlight. Unlike the local forest aboriginal, the soldier must cover most of his body for camouflage and protective purposes. In the present type of operation this means the wearing of damp or wet clothing for at least eight hours of the hottest part of each day. The foot endures an even hotter and moister micro-climate, being covered in damp woollen socks closely invested by calf-length canvas jungle boots with rubber soles. It should be explained that on most operations clothing and footwear become soaking wet within an hour or two of the start on the first day, from sweat, rain, or wading through swamps or streams. The soldier wears this wet clothing for working in every day, changing at night (after a bath in the nearest stream) into a spare dry set to sleep. The effect of wet clothing is aggravated by pressure of clothing and equipment, as shown by the frequent and early appearance of ringworm at the waist and on the dorsum of the foot under the laceline of the boot. The jungle canopy excludes practically all direct sunlight from the man on the ground. This makes the jungle relatively cool but excludes the beneficial effect of the sun in tanning the skin and evaporating sweat. The European develops a dirty white complexion after as little as ten days in the jungle. The incidence of skin disease tends to be higher in flat, muddy, swampy areas than in the hill country though the latter calls for much greater physical exertion. Apart from the higher temperature and humidity, dirt and a disinclination to wash in muddy water are probably important. The exposed skin and legs are subjected to constant trauma; abrasions, bruises, thorns, insect and leech bites are universal. Even with the utmost care the author was unable to avoid large numbers of them himself.

At present the only prophylactic measures available are early treatment, daily washing, and the use of foot and body powder to dry up the skin. Personal experience indicated that these measures were insufficient even if conscientiously carried out, which was not always possible owing to lack of time, fatigue, or lack of water. A jungle operation is always a race against time; the maximum possible period must be spent in searching for the enemy and it is rarely sufficient.
This means that the time set aside for domestic duties is reduced to a minimum. From the end of the day’s work at about 4 p.m. to dusk is about three hours. During this time the evening meal must be prepared individually, and eaten, weapons cleaned, personal hygiene (which includes washing and changing into dry clothes) carried out, medical treatment given, and instructions issued for the next day. Next morning, work will commence within an hour of dawn to make the most of the coolest part of the day and of the time available.

Three other factors influence the incidence of skin disease. These are the type of socks worn, the standard footwear used when out of the jungle, and the primitive living conditions of the company base camps. The standard army woollen grey sock is in general use in Malaya. This may become a reservoir of ringworm capable of reinfecting the wearer’s feet. It is difficult to disinfect without actually destroying the sock. The sock has another defect which to a certain extent reduces the importance of this: it tends to shrink very rapidly under jungle conditions, often to such an extent as to be far too small to wear after as little as ten days’ use. Trials of nylon and terylene socks (which are believed to be capable of sterilisation by boiling and to be shrinkproof, but otherwise identical with wool) are now being undertaken. The standard army footwear outside the jungle is woollen socks, leather boots, woollen hosiops, and short woollen puttees. A hotter covering for the foot is difficult to imagine, especially as the hosiops are usually dyed a dark colour. There is need for a cooler form of footwear such as the chapli or sandal for all occasions except work in the jungle, ceremonial parades, and guard duties.

Company base camps are usually tented, with corrugated-iron shelters for cookhouse, dining hall, and sanitary annexes. In most cases a piped water supply and cold showers are available; sanitation is usually borehole or deep-trench system. Laundering is done by hand by local labour giving up to two washes per week. The simplicity of these conditions may answer the question as to why skin disease in the tropics is so common in the soldier (whether engaged in jungle operations or not; though its incidence is much higher in the former) and so rare in the civilian who lives in much better surroundings. Unfortunately, these camps must of necessity be simple as they are moved fairly frequently for operational reasons.

Malaria no longer presents the major problem it did during the last war because paludrine provides an effective measure of control. Investigation of so-called “paludrine resistance” in army units indicated that it was not being taken as frequently as directed. Insect repellent is used only where mosquitoes are troublesome, such as in swamps and rubber estates, and not as an anti-malarial measure. The face veil and gauntlets are frequently employed by ambush parties lying up in mosquito-infested areas, but are not otherwise in general use. Mosquito nets are sometimes used where the mosquito menace is severe, such as in swamp country, but are considered too heavy for general use. Gurkhas provide an interesting exception here, frequently carrying one net between two men and using it as a means of keeping warm in the hills at night. This method does not appeal to the European soldier!
Intestinal disease provides no real problem because the jungle soldier is operating far removed and well upstream from villages and towns, which are the chief sources of infection. This is just as well as the Malay villager uses the local stream as both water supply and latrine.

Leptospirosis has appeared as a major medical problem and is almost entirely a military one, confined to the soldier operating in the jungle. It is now well known to him and probably the disease he fears most, although the incidence tends to be somewhat exaggerated as he labels any serious febrile illness leptospirosis. Because of the lack of prophylactic or specific treatment it remains a serious condition. In 1954 there were 150 proven cases with two deaths. The disease usually entails a period of three weeks in hospital, followed by two weeks' convalescence. Case incidence showed a close relationship to operations in muddy and swampy areas. It is believed that infection occurs either through an abrasion in the skin when washing or wading in infected water, or by drinking unsterilised water from an infected source.

Scrub typhus is still an important cause of morbidity with an annual incidence of about 120 cases. The use of mite-repellents and treatment with chloromycetin have robbed the disease of the formidable reputation it enjoyed in Burma during the last war. Investigation in Malaya indicates that many cases were associated with failure to carry out the mite-repellent drill correctly. For example, failure to use mite-repellent at all from ignorance or laziness; failure to re-impregnate frequently enough on lengthy and wet operations, and the clothing received as replacements whilst in the jungle not being impregnated before use. The present method of impregnation is laborious and requires frequent repetition. There is room for a more persistent and more easily applied repellent. The other important measure used in Burma is not employed nearly enough. Men do not as a routine sleep off the ground in a hammock or on a platform of saplings as do the communists. Apart from the value of this in preventing scrub typhus, it is by far the most comfortable and dry way of sleeping in the jungle. It is quite safe in this type of warfare as the enemy rarely attacks a camp.

MEDICAL COVER

The chances of being killed or wounded by enemy action in this type of warfare are very small; the incidence of accidental injury and disease which requires evacuation from the jungle is a much bigger and constant problem. Until the advent of the helicopter the problem of maintaining effective and yet economic medical cover was wellnigh insoluble. It was impossible to provide sufficient skilled medical staff to accompany all of the many platoons operating daily throughout the country. The moving of a casualty to hospital might involve several days' march through very difficult country, followed by several hours by road or rail. The helicopter has changed all this. Serious cases can be lifted straight from clearings (of which there are now many) direct to hospital, usually within a couple of hours. If necessary, doctor and emergency equipment can
be brought to the patient in the jungle. Routine platoon medical cover has therefore been much reduced. One member of each platoon is trained in first-aid by the R.M.O. or the supporting field ambulance and acts as medical dresser in addition to his other duties. He carries a haversack of dressings and fungicides. In addition, the platoon commander and his section commanders each have a small first-aid kit ("J" pack) which contains morphine syrettes, codeine, sulphonamide tablets and elastoplas dressings, together with instructions for dealing with major emergencies. These have proved invaluable. The platoon commander can consult his R.M.O. by wireless; to simplify this the doctor is often flown over the platoon's position in a light aircraft, carrying on a consultation by wireless, or is taken by helicopter to see the case. Another but rather hazardous method of providing medical aid has been developed from the Special Air Service medical officers who are trained parachutists and have on occasions been dropped by parachute into the jungle to reach casualties far removed from helicopter clearings. Casualties in jumping personnel are heavy. The aim is to land in a tree and then drop the remaining one to two hundred feet by means of a line carried for the purpose. The danger is that the parachute does not always catch securely in the tree and the parachutist drops freely anything up to two hundred feet to the ground. In passing it may be mentioned that helicopters are extensively employed for lifting troops in and out of the jungle, thus saving a great deal of physical effort and enabling much deeper penetration into the jungle. Their major drawback is that they may reveal the presence of troops to the enemy.

HEALTH AND HYGIENE

Individual fitness for jungle operations. Working in the jungle demands a high standard of physical and mental fitness. Physique itself must be adequate but need not be that of a superman. Defects of locomotion and skin disease are the commonest causes of temporary rejection for jungle operations. The permanent wearer of spectacles is also at some disadvantage because of the liability of his lenses to steam up. Stature is also important, the tall man being at some disadvantage in moving through the thick jungle. Mentally, jungle operations are depressing by reason of their monotony, apparent lack of success (the rare contacts with the enemy always raise morale sky-high), the hot humid climate, and the feeling of being continuously enclosed by an overhead curtain of trees. For success, noise must be reduced to a minimum whilst in the jungle. The soldier is therefore trained to carry out all conversation in a loud whisper and not to phonate. The naturally talkative young soldier finds this extremely difficult and somewhat of a strain. The author on the other hand, found that the habit, once acquired, was very liable to continue when back in civilisation, with amusing effects on his companions. Actual fear of the jungle appeared to be rare. This may well be due to the sound preliminary training given, the slight risk of being killed or wounded, and the ready contact with the outside by helicopter in case of emergency. One aspect which was sometimes forgotten was the need for regular spells of leave, especially for the
junior officer and N.C.O. This type of warfare provides excellent training for the junior leader, but staleness is inevitable after months of jungle operations. The jungle soon discovers those who are unfit to lead; luckily these are few, but they do occur in spite of the present extensive personnel selection procedure. Age appears to bear an important relationship to fitness for jungle operations. The optimum would appear to be about 25 years with a maximum of 35 years, though there are notable exceptions. Under 25 the man lacks maturity, whilst over 35 he lacks staying power; he is slower on the march, tires more easily, takes longer to recover after an operation, and is unable to carry as heavy a pack or climb hills with such ease.

The problem of National Service affects the campaign in Malaya as elsewhere. Jungle warfare demands team work by every platoon engaged if it is to be successful. The British platoon is always changing as men leave for demobilisation and are replaced by others; the man is just becoming an expert in jungle warfare as he is returned home. The results therefore do not always measure up to those obtained by the Gurkhas, for example, and lead to the British soldier perhaps unfairly being compared to his disadvantage.

**Acclimatisation.** The present programme gives the newly arrived soldier a period of four to six weeks’ training before he is committed to operations. During this time he is trained in the technique of Malayan jungle operations which includes instruction in jungle living and personal hygiene. Physical exertion is gradually increased during this period until at the end he takes part in a training operation of three or four days’ duration in the jungle. Heat exhaustion is liable to occur during this training period and a careful watch is kept, stress being laid on adequate fluid and salt intake. A few mild cases do occur in spite of these measures, but rarely severe enough to require treatment in the medical centre. The reinforcement arriving in Malaya by air (three and a half days’ travel from Europe) presents a special problem. For the first seven to ten days he is adjusting to the rapid climatic change and alteration in his diurnal rhythm (Malaya is seven and a half hours ahead of G.M.T.). During this period he is often unfit for training, but once the adjustment is made he is much fitter than the man who has come by sea. This leads to the interesting problem of how to produce airborne reinforcements fit to fight the moment they land in the tropics.

Heat exhaustion in the jungle appears to be rare except under conditions of extreme exertion. It was observed by the author in two sets of circumstances, one during an operation which involved much climbing in the hills, and the other when very heavy packs (100 lb. or more) had to be carried on a special operation. It is worth noting in this connection that the wet bulb temperature in the jungle approaches but does not appear to exceed the critical 83° F. In open, unshaded country the position is very different, the risk of heat exhaustion being very much greater. On operation this is reflected in the exhausting effect of travel through open country such as scrub, *lallang* (high grass), and large clearings in the jungle. For this and operational reasons the experienced soldier always skirts such clearings.
The soldier's pack. Reducing the weight of the equipment the soldier has to carry and improving the way he carries it have exercised both military and scientific authorities for many years. The problem appears to involve a vicious circle: as soon as the equipment is reduced to the physiological optimum, then there is a military requirement to increase it again by the addition of extra items. This is what has happened in Malaya. The man must carry everything he requires on his back. The country is too thick for animal transport; the man must usually carry all his food, mess-tins to cook it, spare dry clothes for sleeping in, poncho for making a bivouac, arms and ammunition, and a mass of small items such as washing gear and insect-repellent. Considerable thought has been exercised locally in Far East Land Forces to reduce the weight of the load carried and make the method of carriage as comfortable as possible. Every item thought necessary has been carefully reconsidered both officially and unofficially. Unfortunately, this has often meant that items used for personal hygiene have been discarded by individuals; for example, shaving gear and foot powder. In one unit visited by the author, the only spare clothing carried by one man was a pair of shorts and sand shoes. The individual wrapped himself up in a piece of parachute cloth to sleep at night. For medical reasons this appeared unsound as it was frequently associated with fibrositis, though the saving in weight was quite considerable. Efforts have been made to replace heavy items by lighter ones with the same or similar function. Two examples will illustrate this point. The machete is an essential part of the jungle soldier's equipment: for clearing camp sites; for making a path through the undergrowth on occasion; and as a close-quarters weapon, for the bayonet is not carried. The standard machete is too heavy and too long (length 17½ inches) and it is being replaced by a smaller and lighter model. The poncho is essential for bivouac making but is rather heavy, 4 lb. when dry and perhaps half as much again when wet. Individuals have replaced it by a length of light impermeable plastic, suitably coloured. This may not last quite as long as the poncho, but its weight is not more than 2 lb. The standard load carriage equipment is the 1944 pattern with haversack. It is not usually worn as originally designed. The haversack is carried like a rucksack supported loosely from the shoulders by looped straps, being carried as low as possible so that as much of the weight as possible is taken on the loins rather than on the back and shoulders. The remaining equipment, such as the machete, water-bottle, and ammunition pouches, are carried on the waist-belt unsupported by braces and pouches as in the standard assembly of the equipment. The advantages of this assembly are that the pack can be removed rapidly if contact is made with the enemy, the weight is kept low and as near to the centre line of the body as possible where it is the least fatiguing to carry, there is no constriction of the chest by braces or pouches, and the weight of the braces is saved. Unfortunately, the haversack is too small to carry everything; some of the larger items are therefore strapped beneath the poncho. This involves careful and time-consuming packing to ensure that everything is included and that items such as spare clothing are packed in such a way as to keep dry. The Bergen rucksack is occasionally available as an alternative and is
much sought after; everything can be packed quickly and kept dry; it is comfortable to carry though it does induce a rather unnatural posture, the wearer having to lean forward as he walks in order to maintain his centre of gravity. Whatever type of pack is used, it must have a smooth posterior silhouette otherwise it will continually catch in overhanging vines and creepers.

Rations. Rations are one of the major limiting factors in determining the length and scope of jungle operations. With the present packed rations the soldier is unable to carry more than five days' requirements at a time without excessive fatigue and risk of heat exhaustion. The usual routine is for the man to march into the jungle with food for five days, and then be resupplied every further five days by parachute. This system has the disadvantages that supply dropping gives away the position of the troops to the enemy and that time is required to clear an area of jungle for the dropping zone. The rations commonly used by British troops are the U.K. packed individual 24-hour ration, the U.K. packed five- and ten-men compo packs, and the Singapore packed individual 24-hour ration, with individual hexamine tommy cookers issued to scale. Nutritionally all these rations are excellent. The author carried out a number of nutrition surveys on troops who had been living on these packs for periods of up to two months and could find no evidence of malnutrition, nor were there any complaints of insufficiency.

The disadvantage of all these rations is their weight, for at least 4 lb. of food is required daily by each man. The rations contained much tinned food and naturally attempts have been made to produce lighter packs of dehydrated foods. So far these have not been successful because of their inadequate nutritional value and poor palatability. There is a field for research here. Another approach to the problem has been to see whether man can live off the jungle. This has not proved a practical proposition for a group as large as a platoon. The aboriginal who is a permanent forest dweller supplements his hunting and fishing by clearing areas of jungle and planting them with some easy-growing carbohydrate food such as tapioca. In order to gather sufficient for his needs he has to hunt for most of the day, which is impractical for troops who have other duties to carry out. The communists originally arranged food supplies from villages adjacent to their jungle lairs. These have been interrupted in most areas and they have had to resort to arrangements similar to those of the aboriginal.

The soldier's taste in food shows interesting changes from Europe. The carbohydrate items (Service biscuits, steamed puddings, jam, dehydrated potato, and sometimes sweets) of the U.K. packs are not popular and often discarded, being replaced by locally purchased rice. Tinned stews are commonly curried, and there is also a greater demand for tea rather than cold drinks such as lemonade. To cater for these changes the Singapore pack was introduced. It substitutes rice for biscuits, eliminates jam, and includes curry powder and extra tea, milk and sugar.

Water purification. Water purification in the jungle is performed by each man using the individual water sterilising outfit and the two-pint water-bottle.
Filtration is rarely done unless the water is muddy, when an improvised filter may be made from cloth or gauze. The Millbank filter bag is neither used nor well known, and as filtration is not always necessary in Malaya, the bag would soon be considered a luxury and would be discarded unless the local supplies were muddy. Water sterilisation is by no means universally carried out. The reasons advanced for this were the low incidence of water-borne disease (even when leptospirosis is included), the unpleasant taste of chlorinated water, and lack of confidence in the Halozone tablet owing to its instability in tropical climates. To save weight only the bottle of sterilising tablets is carried, the detasting tablets and outer tin being discarded. There is a requirement for a sterilising agent which is stable in the tropics and is packed in a more suitable container than the present bottle. It is understood that this is being developed, using Chloramine B in place of Halozone.

Insect and similar problems. Insect repellent becomes less persistent in a hot, humid climate, and lasts about three hours instead of the usual eight. It is difficult to see how this can be improved as heavy visible sweating is responsible for washing away the repellent. Flies become a problem in jungle camps which are occupied for more than two or three days at a time. The danger points are the latrines and refuse pits as facilities and time are rarely available for making deep-trench latrines. The most satisfactory system seen was the daily digging of shallow-trench latrines. A number of units did not even do this and indulged in defecation in the surrounding jungle, which is dangerous from the point of view of hygiene and security. Men have been shot by the communists when carrying out such a practice. Hornets are commonly encountered and are very aggressive, especially in the vicinity of their nests, which are therefore best avoided. Apart from the painful sting, severe anaphylactoid reactions are not uncommon with multiple stings and were seen on two occasions by the author. Both patients required evacuation out of the jungle. The leech has a fearsome but unjustified reputation with the British soldier. Its bite may be the site of secondary infection and it has been known to cause obstruction by invading the urethra. Serious haemorrhage even after being bitten by the giant bull leech was not seen, but was reported by other observers. The liberal use of mite- or insect-repellent to the boots before going out on patrol each day was fairly effective protection. Other simpler measures included rubbing the footwear in carbolic soap or smearing it with some acid fruit such as fresh lime. Red ants are common and usually collected by brushing against a bush which has been invaded by them. The bite is unpleasant enough to demand the instant shedding of all clothing and the removal of the insects. In the flat swampy areas, large horse-flies abound and give rise to painful bites. Insect-repellent gives some protection. The normal prey of these flies is thought to be the wild pig as there are no horses. Scorpions are relatively rare but may be expected in dead trees and old huts. Snakes were seen infrequently and were no great problem. Of wild animals only two caused any real concern: the Sladang or Malayan wild buffalo, which is always best avoided, and the wild elephant, which has attacked man on a number of occasions, usually with fatal
results. The Musang or jungle cat is a frequent night visitor to jungle camps, looking for food in the refuse pits. It has an unpleasant bite but rarely attacks. It is trapped for food, though the meat is rather too strong for European taste.

CONCLUSIONS

In spite of the great advances in preventive medicine during the last few years there are still a number of major problems to solve. In Malaya tropical skin disease would appear to be the most important. The requirement is some relatively simple measure which will make the European skin immune to ringworm and secondary infection in a hot, humid climate. Preferably this should not depend entirely on individual human effort to be effective. This requirement might be even more important in major war in the tropics. Conditions in Malaya now are relatively mild when compared with those which might be expected in such a war. Men would not be able to wash daily; they would not be able to change into spare suits of dry clothing at night; it is unlikely that they would be able to sleep above the ground; and they might well have to march much greater distances than they do at present. Suggested lines of approach are the production of a systemic immunising agent against ringworm, or the employment of some substance similar to Undecylenic acid in action, either impregnated into clothing or applied as a paint or dusting powder.

Leptospirosis provides a big field for research. The ideal requirement is a specific immunising agent, although this may be difficult to achieve as no fewer than twenty pathogenic strains of leptospira have been identified in Malaya. The production of a specific therapeutic agent analogous to chloromycetin for the treatment of scrub typhus would appear more hopeful of success.

The rapid acclimatisation of airborne reinforcements to the tropics presents an interesting problem for the future. Conditioning in hot-houses may be the answer.

Malaya has indicated the need for a new water sterilising agent which is being developed. The ideal load-carrying equipment for the soldier has still to be found. The requirement in Malaya is somewhat specialised, but gives the pattern needed for guerilla and other special operations in the tropics where normal supply services are not available. The simplest and most useful modification to the present equipment would be the replacement of the present haversack by the large pack originally designed for use with it. This is in general use by the Malayan Police Field Force and on personal trial was most satisfactory.

As in Europe, there is need for a much lighter packed daily ration to make the soldier less dependent on his supply organisation and, in Malaya, to extend his range of action. The problem will be to maintain nutritional value and palatability. Dehydrated foods present the greatest promise as water for reconstituting is plentiful in Malaya. There is considerable room for improvement of repellents. The insect-repellent requires to be more persistent in a humid tropical country, and the mite-repellent should be easier to apply and more persistent than dibutyl-phthalate.
As regards personnel problems, the question of staleness, especially in leaders, is important, regular leave being a most valuable antidote. The relationship of age to fitness for jungle operations is also interesting and one which merits further study. Another personnel problem which has not been discussed but which often creates difficulties is the housing of families of regular soldiers of operational units. Because of lack of accommodation, the family may be forced to live some considerable distance (often over 100 miles) away from the husband, and only be reunited for a few days every six weeks or so.

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**Book Reviews**


Truth is stranger than fiction. To a surgeon, and in particular to one who may have visited Yugoslavia since the war and knows something of the country and its peoples, this book is fraught with interest. To any reader it is a remarkable story, and tells something of the birth pains of a new country in the hands of a terrible enemy. Apart from the story it tells, between the lines there is much food for thought for those who have come to distrust politics and politicians.

A. G. D. W.


This work is from the office of the Surgeon-General, Medical Department, United States Army, and is the official record of orthopaedic surgery in the Mediterranean Theatre in the last war. Nothing more need be said except that it attains the accustomed high standard of such publications and should be studied by all interested in military orthopaedic surgery.

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