FIFTY YEARS OF HYGIENE IN THE BRITISH ARMY

BY

Brigadier A. E. RICHMOND, *C.B.E.*, K.H.S.

(Contributed by the Directorate of Hygiene at the War Office, the Hygiene Department of the Royal Army Medical College, Millbank, and the Army School of Hygiene, Mytchett.)

HALF A CENTURY has witnessed great advances in military hygiene and the object of this article is to afford a picture of the progress made.

In the earliest years of the period referred to the South African campaign was fought. The extremely heavy incidence of preventible disease with much resulting inefficiency on account of sickness which occurred is common knowledge.

This state of affairs was largely due to inadequate understanding of, and attention to, the principles of military hygiene. This is evidenced, as Brigadier G. S. Parkinson, *C.B.E., D.S.O.*, who served in this war recounts, by the comparative absence of facilities for the purification of water supplies, poor standards of shelter, inadequate arrangements for field ablution, bathing and laundering, primitive methods of disposal of waste matters with the use of open trench latrines and no covering of excreta, unavailability of satisfactory methods of dealing with flies and other insects, and the comparative lack of any means by which troops could be disinfested.

The feeding of the soldier in this campaign was poor and his rations consisted mainly of bully beef, biscuits, jam, tinned vegetables, tea, sugar, flour and bread, and fresh meat was rarely seen. Field cooking arrangements were, according to modern ideas, primitive.

It is a far cry from the South African War to World War II and the improved health of the British soldier in the latter coupled with great reductions in the incidence of sickness are evidence of the success which attends the adequate application of the principles of military hygiene.

Training in hygiene and sanitation was begun in the Army Medical Services when Edmund Parkes was, at the behest of Florence Nightingale and with the influence and blessing of Mr. Spencer, appointed Professor of Hygiene in the newly formed Army Medical School in 1860. He wrote the first Manual of Military Hygiene as a book for medical officers and made the subject an important one in the curriculum of the officers of the Army Medical Staff Corps. When, however, the testing time came in the South African War it was found that while the Army Medical Officers had been taught the principles of hygiene they had neither the power nor the material to put these principles into practice. As Surgeon-General Jameson said to the Royal Commission on the work of the Medical Services in the South African War: "If sanitation had been understood not alone by our officers but by the rank and file, by the regimental officers and by commanding officers, I think it would

have saved thousands of lives." That they had not the faintest idea of such principles was made plain by many witnesses before that commission, so, under the new young Director-General of the newly formed and powerful Royal Army Medical Corps, Lieut-General Alfred Keogh, the teaching first of all of sanitation and then of hygiene in its widest sense began.

At first it depended on the individual enthusiasm of medical officers. In 1905 an Army Manual of Sanitation, written for non-medical consumption, was published. In 1906 a school of sanitation was formed at Aldershot under the command of Lieut.-Colonel Firth. This school concentrated on the training of regimental officers and N.C.O.s in sanitation and in water duties. About this time as well, questions on sanitation appeared in all promotion examinations for officers.

So, between the South African War and the 1914-18 War, the principles of sanitation were taught to the Army as a whole and a certain amount of equipment for water purification and field sanitation enabled these principles to be put, at least partially, into practice as the occasion demanded. Between these two wars, too, ideas for the improvement of the general life of the soldier progressed considerably and resulted in better standards of accommodation, clothing and diet being provided; indeed the standards of accommodation set out in the Corps Journal of 1906 have not yet been achieved in some of the barracks still occupied in old-established military stations. During all these years certain names stand out as pioneers in military hygiene—Edmund Parkes, De Chaumont, Notter, Firth, Horrocks, Lelean, Parkinson and Richardson.

During the 1914–18 War training in sanitation assumed paramount importance and, in addition to the school at Aldershot, there were established several schools of Hygiene in Britain and one was set up at Helmieh in Egypt. The formation of Field sanitary sections under the Territorial Army filled a long realized gap in our hygiene organization. These units, staffed as they were by officers and men of experience, did excellent work in the training and supervision of hygiene in the field.

After the 1914-18 War came the complete reorganization of hygiene work in the Army. In 1919 Sir William Horrocks became the first Director of Hygiene and the first really scientific assessment of the output of energy by the soldier was carried out, with a natural corollary of a change in attitude to his training, his rations and diet, his clothing and equipment. Professor Cathcart and several officers of the Corps including Major-General (then Captain) D. T. Richardson played a large part in this basic work. The minimum value of the ration at home was based on a diet which yielded 3,500 calories, equipment was designed to cause minimum effort to the soldier carrying it and uniform was designed for maximum comfort and usefulness. All this had its marked effect on training which was based on the definition of hygiene as the science of maintaining and promoting the health of the soldier and the prevention of disease.

Meanwhile the Army School of Hygiene continued to impress the principles of Hygiene on the Army as a whole and on the medical services in particular, and to train the R.A.M.C. to take over the new units—Field Hygiene

and Field Sanitary Sections—for their work in war. Coupled with the gradually increasing central activities of the school reference to and development of the teaching of hygiene in the Hygiene Department of the R.A.M.College, Millbank, have been great advances in methods of decentralized instruction and training in hygiene, and better methods of propaganda with special emphasis on the production of suitable films.

As a result great success has been achieved in promoting hygiene throughout the Army, and prominent among those who have acclaimed the importance of the progress made in keeping the fighting man fit and free from disease have been Mr. Winston Churchill and Field-Marshal Montgomery.

Physical training which is of such great moment in the inculcation of physical fitness in the Army has progressed apace in the last three decades and the Army School of Physical Training in particular, and the Army Corps of Physical Training in general have been responsible for the valuable progress made. Research into the subject of physical training has at the same time been assisted by the advice and supervision of specially selected specialists in hygiene who carried out much basis research work.

During the half-century under review there has been an ever-increasing appreciation of the great importance to health and efficiency of an adequate system of medical categorization.

In 1914 the declaration of war resulted in a flood of volunteers for Army service, and despite the instructions issued to practitioners concerned in regard to the physical requirements of the Army, the most diverse results were obtained and the general standard was most unsatisfactory.

In March 1915 Standing Medical Boards and in July 1915 Travelling Medical Boards, were instituted in order to attain some degree of uniformity and they were instructed to classify men as:

A—Fit for service at home or abroad.
B—Temporarily unfit for service abroad.
C—Fit for service at home only.
D—Unfit for service at home or abroad.

In December 1915 a more extensive classification of recruits was introduced which consisted of five main categories with certain sub-categories, and was coincident with the abolition of examination by civil medical practitioners and the general introduction of Recruiting Medical Boards.

Following upon the coming into force of the Military Service Act in January 1916 a further new classification became necessary and this consisted of those lettered categories which afterwards became so widely known, viz. A, B, C, D, and E. Category A comprised men fit for general service, i.e. able to march, see to shoot, hear well and stand up to active service conditions and, at the other end of the scale, Category E included men unfit for service in Categories A, B and C and not likely to be fit within six months.

Eventually the Ministry of National Service took over recruiting for the Army and Air Force and the medical boards concerned placed recruits in four numbered grades according to physical condition. When they joined the Army they were placed in military categories corresponding with those grades

and posted to units accordingly. This system is the basis of the method of medical classification adopted in the 1939–45 War.

In February 1940 instructions were issued with a view to the better utilization of man-power within the Army and Army categories were increased and further subdivided. It was at the same time laid down in detail as to the categories of personnel which might be accepted in the various Arms.

It was realized as time passed that in many cases the medical category gave very little indication of the type of man to whom it was applied and did not include information as to his mental and emotional make up. As a result of this the Personnel Selection Procedure as now known was introduced, the object being to recommend the soldier for training in an appropriate arm for employment in it, according to his aptitude.

The wartime methods of medical categorization have now been replaced by the PULHEEMS system. Under this system stress is laid on functional capacity to work rather than on the effect of anatomical abnormalities in restricting a man's ability to work. It is generally agreed by all concerned that given a reasonably accurate functional assessment of a man's ability to work a more correct allocation to suitable employment becomes possible, and it is hoped that in future there will be very much fewer, if any, square pegs in round holes within the Services.

The system referred to is also being adopted by the Navy and the Air Force so that all three Services will be on the same basis in this connexion.

The problem of the substandard recruit must be mentioned here. It was a big one prior to the recent war and in 1936 a physical development centre for dealing with this type of individual was provided initially at Aldershot later at Canterbury. Another centre of this kind followed shortly in the Northern Command.

In the earlier stages of World War II it was obvious that a similar policy was necessary and a centre for 400 men was set up in July 1942. Ultimately we had three centres and these dealt with something like 35,000 men during the course of their existence. Of the first 4,000 who attended physical development centres approximately 81 per cent were raised in category and of these 69 per cent were brought up to category A1. Of a recent sample of 2,000 men examined it has been found that 75 per cent remain in category A1 after two years.

There is now one centre at Chester which caters only for the recruit who is a potential A1 soldier. It has a capacity of 1,800 trainees and deals with some 10,000 men annually. The length of the course is eight weeks and there is a special selection procedure at Primary Training Centres by which only those men who are really suitable for this special course are sent to attend it.

Although activities of the kind referred to are a very recent development in the half-century we are considering, they have produced invaluable results and must be regarded as a very definite step forward.

Much has been achieved since the South African War in improving shelter for the soldier whether it be in peacetime barracks, or tents or bivouacs in war. Not only too has basic accommodation been improved but ancillary accom-

modation and amenities have also been brought into line with the standards now considered necessary for a healthy way of life.

The change is evident in the siting and design of barracks. In the olden days their location was apparently determined by the need to concentrate troops in towns in order to be able to quell civil disturbances. The barracks themselves were grim structures, too much in keeping with their unfavourable surroundings, two or three stories high, poorly lit by day and by night, with little facility for recreation and much more like prisons than homes.

In short, there was everything about these barracks to drive a man outside their walls in an effort to find amusement and diversion, even in the types of locality where available pleasures were of a sort to do harm, rather than good, to a man.

There has been a gradual evolution in the type of barracks built since the middle of last century, with improvement in design, but unfortunately we still have to occupy many of these obsolete buildings.

(*a*) Hollow square with barrack block built around a square—used before 1860.
(*b*) Pavilion type with separate buildings spread out.
(*c*) Half-battalion type with large connected buildings—built about 1900.
(*d*) Unit type.
(*e*) Cubicle type—designed to give each man a cubicle.
(*f*) Sandhurst block type—1933.
(*g*) Militia type—pavilion one story type.

We have now broken away from the old conception of barrack and lines and aim at a military camp, on the lines of a model village, on a well-chosen site in the country, not too far from the amenities of a town, with its own recreation fields, married quarters, shopping centre, church, etc. The conception aimed at is that of a pleasing, healthy self-contained community where the soldier can work and play and which will be sufficient to cater for the average tastes of the ordinary man.

Modern barracks are very carefully planned so that the relative position of one part to the other gives rise to the least inconvenience to the occupants of the camp. Consensus of opinion is in favour of a pavilion type of building as it is more attractive to look at, much lighter in every way, more saving of labour and considerably quieter than a storied edifice. It is in these respects that the Militia Barracks are an improvement of the Sandhurst Block.

It is very important that a clear separation should be made between administrative offices and living quarters as the soldier must accept the latter as his home and the aim is to make it natural and easy for him to do so.

Apart from the accommodation in brick and stone much attention has been given to the design of hutments, and also of tentage and of the lower grades of shelter, inseparable from Lines of Communication or Forward Areas in war. As a result improvements have constantly been developed.

In much the same way conspicuous progress has been made in adapting the clothing and equipment of the soldier to his comfort and efficiency.

By the end of the last century it was recognized that clothing should be

designed more in accordance with physiological demands than for martial effect. It was realized that health, comfort, and efficiency were intimately affected by clothing and that it should protect the wearer against heat, cold, and wet, and should allow freedom of movement.

In the South African War we find these ideas put into practice and a change made from the old red coat to the Field Service dress of khaki. The results obtained more than justified the change. The soldier was clothed in a uniform adapted to the conditions under which he was serving. The following extract from an article by Lieut.-Colonel R. J. S. Simpson in the Corps Journal (1909) on Effects of Heat during the South African War shows what considered opinion thought of the change:—

"On the whole the Service dress could hardly have been improved upon; it was eminently suited to the climate. At the beginning there was a tendency to too close fitting, and the helmet was generally worn, but these two faults were eliminated very early and the felt hat in particular was found to be better suited to the climate than the helmet."

Subsequent to the South African War a special committee was formed to report on the physiological effects of food, training and clothing on the soldier. Its fourth report was rendered in 1909 and emphasized the necessity for comfort of clothing and equipment if efficiency was to be maintained. It recommended that clothing should be adapted to suit the particular conditions under which the Army might have to serve. For instance, shirt-sleeve order should be adopted where men had to work under warm conditions.

In the first World War (1914–18) the British Army took the field clothed in khaki designed with the experience learned on active service a decade and a half before, and on the research carried out between the wars.

Under the diverse conditions under which British troops had to serve during that war a great impetus was given to the provision of special clothing and equipment to meet the various needs—the range varied from shirts to sheepskin jackets, from boots to British Warms. The puttee, though much criticized, remained as an article of issue. During the period, however, the load carried by the soldier increased from 61 lb. to 80 lb. and this intolerable burden more than offset the advantages of the more comfortable clothing.

As a result of the criticisms levelled at the carriage of these very heavy weights, by men who themselves often weighed only 130 lb., research was carried out by Professor E. P. Cathcart and others into the maximum load that could, without loss of efficiency, be carried by the soldier. At the same time, the design of clothing and equipment was carefully scrutinized to see what improvement could be made from the physiological standpoint. The outcome of this work was the production of a new active service uniform in 1931 which was the forerunner of our present battle-dress. Parallel with the production of this new uniform, a new form of web equipment, meeting physiological requirements, was produced, and the load to be carried by the soldier was drastically cut down.

In the second World War the basic uniform and equipment of the British soldier proved itself to be thoroughly sound. Special types of clothing were

designed to meet extremes of cold and heat, and the particular needs of airborne and other special types of troops.

Much research still remains to be done and new problems are arising which are being given considerable thought and attention.

Concentration should now be given to advances made in the purification of water supplies in the field.

For many years before the end of the last century it was known that clarification and sterilization was necessary to make unsafe water fit to drink and all progress made in the past fifty years has been concerned with improved methods of applying these two basic principles in varying circumstances.

During the South African War, water was filtered by means of the Berkefeld and Pasteur Chamberlain filters which were difficult to maintain and too fragile for use on active service in the field. Sterilization was carried out by heating and boiling, and the usefulness of the apparatus devised for this purpose was limited by great weight, high fuel consumption and small output.

Thus it was almost impossible to provide the soldier with a safe water supply, and it is not surprising that the incidence of enteric fever rose to 100 per 1,000 per annum.

Sterilization by means of chemicals had been considered, but as Dewar stated in his essay on The Sanitation of Armies in the Field on Active Service (1907): "No reagent has been discovered which fulfils all the requirements, namely, rapid action as a disinfectant, moderate cost, convenience in use, portability, stability of composition and the leaving of the treated water in such a condition that it is neither unwholesome nor unpalatable."

Dewar concluded his essay with a table of twenty-four substances considered for use as water sterilizing agents. The following extract from this table is interesting, and perhaps amusing, in the light of present-day developments:

C. CHLORINE (GAS)... ...	The taste and smell remain. Transport and storage difficult.
F. IODINE (VAILLARD'S METHOD)	Sterilization complete in 10 minutes. It is claimed that smell, taste and appearance are ultimately normal.
V. CHLORINE (AS SODIUM HYPOCHLORITE) ...	Hunermann's process. Apparently not quite reliable.
W. CHLORIDE OF LIME ...	Traube's process. Unfavourably reported upon.
L. BRANDY AND WINE ...	Slow and unreliable.
B. POTASSIUM PERMANGANATE	Objectionable, since taste and colour persist.

In the decade between the South African War and World War I improved methods of water purification were elaborated at the Royal Army Medical College and at the School of Hygiene, Aldershot, and during this period the pioneer work of the late Major-General Sir William Heaton Horrocks provided the basis for real progress. Improved filters were developed, first compressed sponges and earthenware candles, then a metal reel around which layers of flannelette were wrapped; the latter was the precursor of the Cloth and Reel Filter which was used successfully throughout World War I and in some theatres in World War II.

Research at the Royal Army Medical College was carried out on the sterilization of water with chloride of lime, and by the summer of 1914 the Mark V watercart was ready for trials; in this cart water was clarified by the cloth and reel filter and sterilized with residual chlorine one part per million.

Early in World War I the Horrocks Test was introduced; a little later came individual methods using tablets of acid sulphate of soda and oil of lemon which were issued to cavalry units. In 1915 the Poisons Test Case and methods of removing poisons from water were introduced.

The process of chloramination was developed between World Wars I and II, and it is used to-day in the Mark III Mobile Water Purifier which has a capacity of 3,000 gallons per hour.

Other forms of mobile purifiers, including power driven filtration were also developed with capacities ranging from 400 to 4,000 gallons per hour and Stellar and Meta-filter candles with kieselguhr powder instead of cloth and reel.

For greater speed of sterilization superchlorination was later devised, and gross chlorination was introduced to cover circumstances in which the Horrocks' Test could not be applied.

With modern warfare came the need for efficient apparatus for use by individuals and small parties; to meet this need the individual sterilizing outfit, Millbank Bag, the pannier packed transportable filter and the Midget Stirrup Pump Filter were produced.

Thus, the soldier of to-day can be assured of a safe water supply, whether he is working alone or in a large unit. It is pertinent to mention here the great contribution made to this desirable state of affairs by Major Stanley Elliott, *O.B.E.*, who for many years has worked on this subject at the R.A.M.College, Millbank.

Research and development in water purification is co-ordinated by an Inter-Services Advisory Panel on the purification of water supplies in the Field.

There has been a revolutionary change in the feeding of the soldier during the last fifty years, a change which has been vastly influenced by the increased understanding of the importance of the diet as a factor in the health of the soldier.

After the South African War it was realized that it was necessary to do more than give the soldier ¾ lb. of meat and 1 lb. of bread per day, with a cash allowance of 3d. to enable Company Commanders to purchase the other items of the diet. It was realized too that the use of the barrack room, where the soldier slept, as a place to feed in, was a deplorable custom, also that food was so badly cooked in many units, that men, being unable to eat their rations, relied on beer, cheese and pickles for their sustenance.

In 1909 the first research was done into the nutritional requirements of the marching soldier. This was the first effort to replace the empirical method of assessing the diet of the soldier by estimating his energy requirements.

By 1941 the ration, in theory, gave a diet of approximately 4,500 calories but the description of outbreaks of beriberi and the references to scurvy in the reports on the health of the British Army overseas in 1913 show that there was still a long way to travel.

The horrors of Mesopotamia and Gallipoli with the incidence of beriberi and scurvy in these areas during the 1914–18 War called for drastic action and brilliant work was carried out in the R.A.M.College at Millbank. Professor Starling became Lieut.-Colonel Starling and directed the Hygiene Laboratory at the College; with him he brought Captain Plimmer whose brilliant and painstaking work in the analysis of foodstuffs was carried out in the same laboratory. Miss Chick and Miss Hume at the Lister Institute carried out their pioneer work on B_1 and the antiscorbutic properties of various foods. These workers in collaboration with the R.A.M.College produced a satisfactory formula for marmite which was then issued to troops overseas. An efficient method for the preserving of the antiscorbutic properties of lemon juice was also discovered by these workers.

Immediately after the 1914–18 War research into the energy expenditure of the soldier was begun in earnest by Professor Cathcart of Glasgow who took under his wing as assistants many officers of the Corps, notably Captain D. T. Richardson and Captain W. Campbell. At last dietetic requirements were based on adequate scientific data! With this change in the quality, quantity, and proportions of the food issued came the newer knowledge of vitamin requirements and that knowledge was diligently applied.

The cooking and serving of the soldier's diet progressed just as quickly. In the early 1920s the first Inspector of Army Catering was appointed (Major R. G. Leggatt a former officer of the Corps) and under his guidance the ration of the soldier was adequately cooked, attractively served and, consequently, was fully consumed.

The success of these efforts was shown in the report on the Health of the Army for 1934 where it is stated that the average gain in the weight of Army recruits during the period of training at their Depots was 9 lb. As the recruits came from a population where lack of employment was rife and under-nourishment common, it was a great achievement.

Ample evidence of the sound work done in the inter-war years is shown by the universally excellent diet which was provided in the late war, for troops in all theatres under most varied circumstances and climates. Praise was given by all ranks for the way in which an ample and varied ration was always forth-coming wherever they might be.

That the food provided was physiologically adequate was manifested by the almost complete absence of nutritional deficiencies during this period.

Shortages of world food and difficulties in the distribution now present the hygienist with the problem of making the best use of such items of such food as can be made available for the soldier's diet.

Disinfection may be dismissed in a very few words as there have been no revolutionary advances in this sphere during the last fifty years.

In the South African War disinfection was carried out by means of steam; and chemicals, including carbolic acid and lime, were used to a limited extent; similar methods of disinfection are used to-day, and although more efficient steam disinfectors and improved chemical disinfectants have been introduced there have been no radical changes.

However, in the sphere of disinfestation great changes have occurred and the advances of recent years have been revolutionary.

During the period of the South African War the word "disinfestation" does not appear to have been used, neither does the practice of disinfestation appear to have been in vogue to any material extent. Fortunately, climatic conditions were unfavourable to the spread of typhus fever and other louse-borne diseases.

World War I presented a different set of circumstances to menace the health of the soldier, and one of the most important of these was the ever-present danger of louse-infestation and the resultant diseases.

Typhus ravaged the Serbian Army in 1914 and caused 25 per cent of that Army to perish; the Allied Armies were riddled with lice, and trench fever was an important and common casualty producer. Thus the problem of disinfesting whole divisions arose—men, their clothing and their bedding.

Many disinfestors which could be improvised with comparative ease were invented; Lieut.-Colonel G. E. F. Stammers, R.A.M.C., devised the "Serbian Barrel Disinfestor," and Lieut.-Colonel Lelean the "Sack Disinfestor."

Hot-air apparatus was used extensively, including "Orr's Hut" and the "Russian Pit."

Disinfestation *en masse* required the setting up of special centres involving considerable expenditure of personnel and equipment, and in addition to disinfestation of clothing and bedding, the cleansing of the man himself necessitated facilities for bathing, haircutting, dressing and drying.

In hospitals the disinfesting apparatus used was similar, although heavier in type, to that used for disinfection in the South African War; lighter types were developed for mounting on wheels for horse transport or steam lorries.

The name of Thresh will long be associated with this period.

At the outbreak of World War II the position with regard to disinfestation was much the same as it was at the end of World War I.

Until 1944 the Millbank Hot Air Disinfestor, the "T.O.T." and the Field Portable No. 3 combined with the use of mobile bath units were the chief methods of dealing with infested troops.

With the re-discovery of DDT a complete change in the picture occurred. Elaborate disinfestation centres, heavy steam and hot-air apparatus and the like disappeared, as it were, in the twinkling of an eye, and were replaced by tins of AL 63 Mk. III which the soldier could carry in his trouser pocket.

Having been passed rapidly through laboratory and field trials DDT was pressed into service with speed, so that it arrived on the scene in time to assist in dealing with the typhus epidemic at Naples in 1944.

Methods of impregnating clothing with DDT were later devised, so that troops who took part in the invasion of Europe were better protected against louse-borne diseases than any army in history. The result was that not one British soldier died of epidemic typhus in Europe, in spite of the high incidence in places such as Belsen where the inmates were dying from the disease at the rate of hundreds per day.

With DDT the disinfestation of Ps.o.W. and displaced persons became a

relatively simple matter, and three men with a mechanically operated dust-gun could disinfest 120 persons per hour.

DDT has dismissed as a health hazard lice, fleas and bed-bugs along with a host of other arthropods of medical importance.

New uses and methods of application of this and other similar insecticides are still being devised, and the long-term implications have yet to be fully appreciated.

Turning now to progress in regard to facilities for bathing, ablution and laundering in the field, the soldier of to-day is in a far better position to maintain a high standard of personal cleanliness than was his predecessor of fifty years ago, and the provision of facilities for ablutions and laundering has kept pace with advances made in the sphere of health education.

Fifty years ago mobile laundry and bath units were unknown; static Army laundries were all too few and were mostly limited to serving hospitals.

World War I brought with it many problems concerning ablutions and laundering; men often wore the same clothes for many days and nights on end, and hot water for ablutions was usually a luxury.

In many formations nearly everyone became louse-infested.

Accordingly "disinfestation centres" were established, so that men returning from "the line" could be given a bath, haircut and change of clean clothing. Some attempt at mobility was made by establishing these centres in railway trains, and in the years 1917–18 something resembling the mobile laundry as we know it to-day was produced.

In spite of these efforts the soldier of World War I found it no easy matter to keep really clean in person and clothing.

In World War II a very different state of affairs pertained.

Early in 1940 mobile laundry units took their place in the Field and mobile bath units, and combined laundry and bath units soon followed.

Large static military laundries were established in Base areas and on the L. of C. and performed invaluable service.

Wherever therefore the soldier had to serve facilities were provided to assist him in keeping personally clean. Admittedly, in the stress of modern war these arrangements were not always ideal, but advances had been made.

At the present time, the R.A.O.C. maintains ample installations to cater for the soldiers' needs regarding laundering in places where contracts cannot be made with civil laundries.

Static laundries are established in most theatres; improved types of mobile laundry and bath units have been evolved, so that now we have a unit which can meet the laundry and bath requirements of 18,000 troops weekly.

Soon it is hoped to see air-transportable laundry and bath units so that, in future operations, the soldier will receive closer support in this important personal matter than he has ever had before.

A small type of mobile bath apparatus for unit use has in fact been recently developed.

In times of peace, ablution facilities are limited by the availability of hot water, wash-basins, baths, soap and towels and the latter two items are limited

in accordance with economic requirements of these austere times. The scales of wash-basins and baths have however been increased recently, and, at long last, *hot* ablution water is now regarded as a necessity for the soldier instead of a mere luxury.

In war, as distinct from peace, the Army becomes on the whole responsible for its own sanitation and cannot depend upon the good offices of Local Government and other authorities to deal on its behalf with the innumerable problems arising in connexion with the disposal of waste matters.

The difficulties in this respect which have beset military hygienists in the past are well summed up in the following extract from the Report of the Royal Commission on the South African War: "Regarding hygiene and sanitation, Tommy doesn't understand it and his officer regards it as just a fad."

Much loss of man-power was attributable to primitive methods of waste disposal, especially human excrement.

Open trench latrines, with squatting poles, were a common sight; established urinals were not in evidence.

Refuse was dumped promiscuously around camps, and animal carcasses were staked to the ground and left to decompose. At this stage, although military hygienists deplored these conditions the practice in units was to leave such matters to "bad drills and cripples of a battalion who were considered good enough for the privies and middens of the insanitary past."

The period 1914 to 1939 witnessed a rapid advance in methods of waste disposal. Standard types of latrines were used in World War I, and flyproofing was stressed; in addition, standard appliances for refuse and sullage disposal became part of unit equipment (Horsfall, Bailleul and C.I. incinerators, fæces destructors, and grease traps).

Experience gained in many different theatres in World War II has resulted in further improvements in our methods of waste disposal.

It is probably in connexion with the prevention of insect-borne diseases, particularly malaria, that the most spectacular advances of recent years have been made, and it is hardly necessary to emphasize the great achievements of the war years. It suffices to say that, with the development of DDT and similar insecticides, improvements in methods of spraying and in equipment for personal protection including repellents, and with the introduction of suppressive mepacrine it is now possible to employ a force in the most highly malarious area in the world with every confidence that the casualty rate from malaria can be kept within very low limits, provided the discipline of the force from the point of view of hygiene is good.

Sandfly fever, dengue, and other insect-borne diseases may also now be regarded as having been brought under control by the new methods now available.

Considerations of space do not permit of further details, but methods of prevention of scrub typhus which have been so successfully developed, as also the modern conception of the correct manner in which to tackle the problem of venereal disease, must not be overlooked.

In order to assess the impact of advances in hygiene and preventive medicine

during the past fifty years on morbidity rates, it would be necessary to compare situations which are identical in all relevant respects save that of date. This would be difficult enough for a civil population. For an Army, which is by its very nature subject to considerable changes of location, living conditions, age-composition and other relevant circumstances, the path is beset with pitfalls.

Nevertheless, as far as the three major wars of the last half-century are concerned one very striking fact emerges from a survey of such information as is available.

During the South African War, the *Enteric Fever group* was responsible for an average incidence of more than 100 per 1,000 strength per year among British troops (representing 1 in 7 of all hospital admissions); in World War I it accounted for an average annual rate of 7 per 1,000 in Egypt and Palestine (1916–18) and of 1·4 per 1,000 in France and Flanders (1914–18); in World War II the average annual incidence was less than 1 per 1,000 in all active theatres. Such a dramatic decline reinforced as it is by figures for the peace years, is most unlikely to be vitiated by the circumstances enumerated above.

For a better assessment of long-term trends, it is undoubtedly more profitable to direct our attention to the comparatively static conditions of peace, where we can deal separately with certain reasonably well-defined geographical areas. Even here, comparison between different years is liable to be to some extent misleading since the composition of the population at risk may change radically and other vitiating factors may be operative.

A survey of major diseases in the United Kingdom and in two reasonably comparable Commands—India and the Middle East—in the years given in the table below brings to light certain broad trends which are sufficiently striking to merit confidence.

INCIDENCE OF CERTAIN DISEASES PER 1,000 STRENGTH AMONG BRITISH TROOPS: 1897-1947.

	U.K.		*India*		*Middle East*	
	Enteric fever	*V.D.*	*Malaria*	*V.D.*	*Enteric fever*	*V.D.*
1897	31·8	127·5	364·1	422·5	6·7	161.2
1902	16·7	110·1	253·8	209·6	18·4	103·5
1907	13·1	71·9	153·8	89·9	5·3	161·4
1912	2·7	56·4	82·4	55·5	9·4	110·7
1917	——	——	——	——	——	——
1922	3·0	35·4	175·4	84·7	1·9	113·4
1927	3·0	21·4	138·8	56·8	0·7	60.5
1932	3·4	11·2	84·1	37·7	1·4	41·9
1937	0·8	12·8	44·5	40·4	0·9	44·2
1942	——	——	——	——	——	——
1947	0·7*	21·3	17·2	69·2	2·5	19·6

*Relates to 1945.

Turning attention to the figures for the average Constantly Sick per 1,000

of strength the reduction between 1897 and 1947 is very marked as the following table shows:—

	U.K.	*India*	*Middle East*
1897 ...	38·0 ...	101·4 ...	54·6
1947 ...	27·7 ...	28·7* ...	15·5

*Rate for 1937

The comparatively small reduction in the U.K. is partly attributable to the Long Term Treatment Scheme and to the evacuation of long-term cases from overseas to home hospitals.

It is, finally, interesting to compare the total hospital admission rates per 1,000 of strength in 1921 and 1947 in the Commands mentioned below, particularly as 1947 stands in relation to World War II is much the same situation as 1921 in regard to World War I, and to observe the very much lower figures in the later year.

	U.K.	*Germany*	*Middle East*
1921 ...	434·5 ...	691·0 (1) ...	741·8 (3)
1947 ...	226·4* ...	439·7 (2)* ...	364·0*

*These figures should in the absence of final corrected figures for the year be regarded as approximate only.

(1) Rhine and Silesia. (2) British Zone, B.A.O.R. (3) Egypt and Palestine only.

It is regrettable that comparisons of a more statistically accurate nature cannot be made, but there can be little doubt that morbidity rates in the Army have become increasingly and materially lower as the application of the principles of military hygiene has improved and our knowledge of the subject has increased.

Limitations of space dictate an end to this review of hygiene in the British Army during the past fifty years.

Perhaps, however, enough has been said to afford an indication of the progress made.

Preventable disease is still too great a factor in the filling of our hospital beds and no relaxation of effort in the prevention of disease and in improving the methods by which we try to encompass this can possibly be afforded.

The increased tempo of modern warfare, however, and the much greater complexity of methods of waging war, as also of weapons, equipment, vehicles and military *matériel* of all kinds entail higher degrees of mental and physical health in the soldier than has ever been the case before. Under such circumstances more attention must be directed to the study of health as compared with that of disease.

The main objective of hygiene—*mens sana in corpore sano*—remains the same as ever, and it is to the attainment of this end that our efforts in the Army must be directed to the fullest possible extent.