

THE TEACHING OF ARMY HYGIENE AS AN AID TO MILITARY EFFICIENCY.

ROYAL ARMY MEDICAL CORPS SCHOOLS OF SANITATION, AND INSTRUCTION
IN THE FIELD.

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MILITARY success depends upon many factors besides the "force of arms"; organization, transport, intelligence, supply and hygiene all play an important part. It is difficult to say that any one of these accessory factors plays a predominant part in determining the issue, but history has shown again and again the power of disease to decide the fate of armies. Up to the time of the late war statistics had shown an enormous preponderance of death and disability caused by sickness over that resulting from enemy action. This proportion had been disturbed by the increasing lethal power of modern offensive methods, but at the outbreak of the late war disease still constituted the greatest menace to armies in the field. Moreover, in view of the fact that such danger increases in proportion to the number of troops engaged, it was realized that both in the West and East—more especially the latter—sanitation was the key to success.

The responsibility for such precaution could not be confined to any one branch or grade in the Army; the need was universal as also was the responsibility.

The Army Medical Service could instruct, advise, exhort, but alone it was absolutely unable to cope with the problem, and regulations were made which emphasized the responsibility of all units and ranks, under their respective commanding officers, with regard to such matters.

In many ways also the Army was face to face with an entirely new problem. Hitherto war had been waged by a regular army specially trained for such emergency, and fully instructed in all matters relating to health under the abnormal conditions of a war of movement.

In the late war the regular was, to a large extent, replaced by the temporary soldier, a man whose life had been spent in office, workshop or mine, with all the conveniences of civilization to hand and a sanitary knowledge in inverse proportion to the rates which he had paid. Moreover, the type of warfare brought problems of its own; men fought in shell holes and in waterlogged trenches, they were compelled to live in "dug-outs" deep down in the ground, where all matters of conservancy and ventilation presented new difficulties.

The war was world wide, and men were fighting in the waterlogged wastes of Flanders, in the marshy valleys of Macedonia, in the wildernesses

of Mesopotamia, in the deserts of Egypt, in the hills and valleys of Palestine and in the tropical forests of Africa. Each sphere of operations presented its own set of problems, upon the solution of which depended the whole success of the campaign.

The teaching of experience is thorough and, for pioneer work, often necessary, but it is generally costly; and at the earliest possible date lessons learned in this hard school must be translated into lectures and demonstrations for the benefit of those who come after. One of the most useful lessons of the war, in preventive work, has been the value of schools and demonstration centres, where all ranks can be taught the dangers they are likely to encounter and the best method of dealing with such dangers. The system of education must be an elastic one and should embrace every unit and every grade in the Army.

Experience has shown that this system should include six distinct spheres of work:—

(1) *Routine Training*.—Schools of hygiene and cookery at home, with adequate camp training.

(2) *Special training* in sanitary supervision, water duties, incineration, entomological work, disinfection, etc.

(3) *Local Training*.—Demonstration centres in the field, showing the local conditions with reference to special dangers and difficulties.

(4) *Revision courses* in the field, given to men resting or temporarily withdrawn from the line.

(5) *Popular lectures* to men and officers, also propaganda work by means of pamphlets and posters.

(6) *Constant discipline* in all matters relating to sanitation in the field.

With such a system it has been found possible not only to enable men to fight in districts which might have proved veritable death traps, but even to stimulate to enthusiasm many who hitherto had regarded sanitation as synonymous with latrines, and water sterilization as the pastime of the faddist.

ROUTINE TRAINING.

Routine training in army sanitation must take place before the soldier goes overseas. It forms part of the general scheme of training, but as far as possible should be divorced from the more purely military side. A multiplicity of drills, fatigues and route marches during the course of sanitary training has proved a distinct obstacle to success in those schools where it has been allowed to encroach.

A properly constituted school should be capable of dealing with classes drawn from any grade; sanitary specialists should be brought into touch with the most recent work from various fronts; medical officers should receive lectures and demonstrations dealing with their duties in the field; sanitary sections be instructed in the principles and practice of hygiene and elementary brickwork, metal work, carpentry, sketching, etc.; officers,

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non-commissioned officers and men be taught the essentials of field sanitation. A well equipped school should show samples of equipment, foot-gear and clothing; working models of all appliances necessary for sanitary work under every conceivable condition of climate and campaign; food models illustrative of the rations issued under various conditions, also of the different types of unsound food which may demand attention from the medical or commanding officer. There should be a field exhibit showing incinerators, field ovens, latrines, etc., built as far as possible to the actual dimensions; there should be smaller models and diagrams for use in the lecture room. Plaster models and pictures illustrating the various conditions which may be met with—trenches, camping grounds, fly breeding places, etc.—are also of great value.

The course of training at such a school varies with each type of class, from the intensive training of men and officers devoted to purely sanitary work to the short course of lectures and demonstrations given to combatant officers. The fact that the combatant is responsible for carrying out the details of sanitary work must not be lost sight of, and the training of the rank and file must be detailed, even if elementary.

The battalion medical officer is the sanitary adviser to his Commanding Officer, and it is therefore essential for all army medical officers to be well grounded in the principles and practice of army sanitation; they must also be convinced of its importance. Occasionally, in the late war, the work of disease prevention was hampered by the supercilious contempt for sanitation assumed by certain junior medical officers as a cloak for their profound ignorance of the subject. A knowledge of elementary brick work, metal work and carpentry is invaluable to medical officers in the field; and it is also important that they shall be able to interpret correctly and intelligently simple plans and diagrams. These subjects should be included in any course of sanitary training for medical officers. Men and officers for special sanitary work in the field should have a similar but longer course of training: the officers will have to carry out work which corresponds to that of a medical officer of health at home, while the men are to all intents and purposes sanitary inspectors. One of the most important qualities for such men is tact, and every effort must be made during the course of training to emphasize this point, remembering that the possession of this quality has an important bearing upon the fitness of a man for the higher non-commissioned ranks, a point which is frequently decided during the course of training.

In permanent schools established for training under peace conditions a more extended course may, with advantage, be given for revision purposes to senior officers; for those destined to become sanitary specialists, the syllabus should be somewhat similar to an ordinary course for the Diploma in Public Health examination, but modified to suit military conditions. A school undertaking this work needs a much more elaborate equipment for bacteriological and chemical study.

Tropical medicine and hygiene are so closely united that it has been found an advantage, in training medical officers for the tropics, to include the clinical side with the preventive.

This brief summary of the constitution of schools for routine training may be amplified and illustrated by reference to three schools which have been engaged in this work during the late war.

The Duke of York's Headquarters, Chelsea.

(1st and 2nd London Sanitary Companies.)

Repeated and eloquent testimony has been borne to the value of sanitary sections in the field. Many of these sections were trained and equipped at the Duke of York's Headquarters. The type of man enlisted in these companies in the early days of the war was admirably suited to the work: sanitary inspectors, school teachers, architects, surveyors, plumbers, carpenters, and many others with every qualification for success, were enrolled. Sections were urgently needed for the divisions going overseas and the work of equipment and essential instruction in purely military matters considerably limited the opportunity for special sanitary training. Fortunately this disadvantage was, to a large extent, neutralized by the previous knowledge of the men under training. As time went on, however, the supply of experts became exhausted and men were enlisted who were ignorant of the work and often unsuited for it. Under such conditions the only hope for success lay in thorough and enthusiastic training, with the power of excluding those whose mental condition rendered them entirely unsuited for this type of work. It also became of vital importance that, as far as the military situation would allow, men should not be removed before the course was completed; much inefficiency in home camps and abroad was due to this cause.

The course of training included lectures, demonstrations, practical classes in water duties, etc., drills, fatigues and other military work. In the early days of the war a definite syllabus of routine training was very difficult to carry out, owing to the fact that recruits were coming in daily, and the demand for fully trained men often necessitated the adoption of emergency and intensive methods of training. This instruction very largely fell to the lot of the officer chosen to command the section, frequently a civilian health officer with little previous experience of army methods. Such a man was well grounded in the principles of disease prevention, but needed help in adapting his knowledge to new conditions, and the series of lectures on "Sanitation in War," delivered at the R.A.M. College and subsequently therefrom issued in book form, was of the greatest assistance in translating his previous ideas into the more robust requirements of active service conditions. The fact that the recruits were absolutely ignorant of ordinary military subjects, such as discipline, drills, marching, etc., presented a great problem, and often this knowledge had to be gained at the expense of sanitary training. There can be little doubt

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that men destined for sanitary work should receive the necessary military training before passing to the school of sanitation. If both are taught together there will always be a tendency for one or the other to be neglected. The history of work at this centre also emphasizes another point. Work in a sanitary section is skilled work, work which demands a very high grade both of physical and mental fitness; the later tendency to regard men of a low grade, not only physically but even mentally, as suitable, lowers the status of the work and also defeats the whole scheme of sanitary organization in the field. For members of a sanitary section to fulfil their functions, it is essential that they shall be regarded as experts, instructors and advisers, and not used for ordinary fatigue work; but this will never be possible unless careful discrimination is used in the selection of men for sanitary sections.

At a later stage in the war men were sent to the school in batches, and it became easier to maintain a definite routine of training with the assurance that a man would have time to complete his course of training before being drafted overseas.

An exhibition of incinerators, field cookers, and other apparatus used in the field, was erected so that men could see types of the actual appliances used. Demonstrations of these models were given to all men under training, and classes of combatant and medical officers visited the school to receive practical instruction.

Such training as was received could only be regarded as preliminary to actual instruction in the field: a man may see a Horsfall incinerator and have its structure and working fully explained, but until he has actually carried out the work of assembling and management, his knowledge can only be of the most rudimentary type. One of the great defects in teaching during the earlier part of the war lay in the fact that facilities were not provided for sections to actually put into practice the lessons they had learned until the fully equipped section left headquarters for its work in the field. Many officers and men were absorbed by divisions as advisers on camp sanitation and matters of general hygiene in the field, when they had scarcely seen a camp, and many had never previously slept under canvas. The theoretical knowledge was there, and could be quickly applied to camp conditions, but it would have been far better had practical camp training been included in the syllabus, more especially in view of the importance of first impressions to any unit assuming a position of authority.

School of Army Sanitation, Leeds.

This School was established for training American medical officers, serving with the British Army, in the details of British field sanitation; it was also used for teaching men intended for sanitary duties in the field, and proved of value as a demonstration centre for specialist sanitary officers, and others. Especial stress was laid upon the value of visual teaching,

and, as far as possible, every type of sanitary appliance used in the field was shown.

The course for American medical officers was very limited in time owing to the exigencies of the campaign, and for this reason the type of teaching seemed to be specially suitable. Lectures were freely illustrated by diagrams and models, and were so arranged as to group the various diseases etiologically. Such a classification may present many scientific difficulties, but for the study of the prevention of disease it is invaluable. There is far too great a tendency to regard sanitary measures as belonging to a system totally divorced from medicine. By such separation the subject loses distinction, and is looked down upon; it is only when the close relationship between hygiene and disease is realized that the best results can be obtained. The syllabus was divided into sections, as follows:—

(a) *Dealing with the prevention of disease not due to parasitic invasion.*—This section included diseases due to exposure (trench foot, sunstroke, bronchitis, “rheumatism,” etc.; diseases due to improper food (beri-beri, scurvy, food-poisoning, etc.); diseases due to equipment or clothing incorrect in itself or in the method of use (sore feet, heat-stroke, etc.); diseases due to poisons, such as nicotine or alcohol. The whole question of rations and equipment was considered, and models were shown illustrating field rations, the vitamine problem, blown tins and other food matters. Samples of equipment, footgear and clothing from every front were shown, and the method of wearing was demonstrated.

(b) *Diseases caused by living organisms were divided into four sections.*—(1) *Diseases spread by actual contact*, such as scabies, gonorrhœa, syphilis and smallpox. This portion of the syllabus was introductory, and included a consideration of general preventive measures, such as diagnosis, notification, isolation, treatment and disinfection, in addition to special preventive measures applicable to each disease.

(2) *Diseases spread by mouth-to-mouth infection*—“droplet infection”—such as pulmonary tuberculosis, cerebrospinal meningitis, pneumonic plague and measles. This section included matters connected with ventilation and billeting, in addition to special problems connected with each disease.

(3) *Diseases spread by excrement.*—This group is of special importance to army work, as it includes many diseases which in the past have caused disaster to armies in the field. The danger of typhoid fever, dysentery and cholera can scarcely be overrated, whilst many worm diseases are spread in a similar manner. In this section are included sanitary measures of such importance that there has been a tendency for the casual observer to limit his sanitary outlook to this section alone. The whole question of water supply, storage, transport and purification finds its *raison d'être* in this group of diseases. Latrines, urinals and destructors are designed so as to limit their incidence. Fly destruction, dust suppression, food protection and general cleanliness are also measures directed against

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this class of infection. Inoculation is utilized to fortify the individual resistance against any possible breakdown in the scheme of sanitary prophylaxis.

(4) *Diseases spread by means of biting insects.*—A group of ever-increasing importance in military work in the East; which includes malaria, typhus, relapsing fever, phlebotomus fever, trench fever, plague and other diseases of less importance from a military point of view, such as sleeping sickness. Preventive work in these diseases depends chiefly upon measures directed against the insect vectors; abolition of breeding grounds and protection of the individual.

All of these sections were dealt with in lectures and demonstrations illustrated by means of diagrams, pictures and actual working models. In addition, a lecture was given upon the executive and administrative side of the work in the field, with special reference to available personnel and means of getting work done.

The demonstration centre, where all practical classes were held, consisted of an indoor and outdoor exhibition. The former was so arranged that it illustrated all the various points mentioned in the lectures. Plaster models showed areas, billets and camps on the various fronts; pictures showed insect breeding places; diagrams illustrated sanitary appliances. Cases of specimens and coloured illustrations showed most of the important insect vectors of disease. Wooden and plaster models of incinerators, latrines, destructor centres, bath houses, etc., were shown, and all apparatus used for the purification and examination of water was demonstrated and actually used by the class. Models of disinfectors in common use, and other details connected with this work, were included.

Clothing and equipment for every front was shown, and three dummy figures, equipped for the East, the West and for the Murman coast, demonstrated the method of wearing the clothing issued.

In the food section, amongst other things, were exhibited measures for preventing beri-beri, germinating cereals, blown tins of various sorts, and hay boxes for trench or billet.

A room was devoted to tropical work, and included mosquito nets, mosquito-proof bivouacs and other appliances specially devised for the tropics.

In addition to the exhibits, files were kept in which were summarized all the orders, circulars and memoranda dealing with sanitary matters issued for the various fronts up to date.

The field exhibition was divided into three areas:—

- (1) A Western area.
- (2) An Eastern area.
- (3) A trench area.

The Western Area.—This was divided into seven sections and, as far as possible, showed every type of sanitary appliance used on the Western front. Innumerable variations have been invented, types are constantly

“improved” or modified, but still the main principles remain. As far as possible the examples erected could be said to represent standard types upon which modifications could be based.

The first section of this area was devoted to *improvisation*: an example of how waste material could be used for sanitary work. A hut constructed entirely of waste tins contained apparatus of every kind—bunks, stoves, etc.—made from scrap material.

The second section exhibited a model cook-house with contents; field ovens, grease traps, etc.

The third section was devoted to water work and showed wells, water-cart, improvised chlorinators, etc.

The fourth section illustrated types of destructors from the simple turf incinerator to the Horsfall, covering all the main points in construction and management. Manure incinerators were also included.

The fifth section dealt with latrines and sewage disposal. Shallow trench latrines, deep pit latrines and receptacle latrines were shown, with examples of bad types. A model urine pit, with various types of trough, was included in this group. To cover the training for home camps, a complete drainage system was installed and a model sewage disposal scheme with sedimentation tanks and filters. “Herring-bone” and other systems for surface disposal were also shown.

The sixth section was devoted to disinfection and disinfestation and, included a dug-out hot-air chamber, Thresh disinfector, field sterilizing box. In association with this section a “Washington Lyon” was also demonstrated.

The seventh section was devoted to questions of ablution and sullage water disposal. A special tank for the treatment of sullage water with bleaching powder, lime or acid sodium sulphate was constructed. An improvised shower bath and system of disposal pits were also shown.

The Eastern Area was arranged in a similar manner but showed appliances specially applicable to Eastern conditions, clay ovens, cold storage chambers, a dug-out larder, Serbian barrels for disinfection, native latrines, etc.

The Trench Area was occupied by a small section of trenches, as seen on the Western front, which included a front line trench with pit latrines, receptacle latrines, dug-outs with rat-proof food safes, refuse receptacles, etc., also a communication trench and an abandoned side trench with refuse disposal area.

At the conclusion of the lectures and demonstrations the American officers were taken to a camp where they could see the various details of sanitary work actually carried out. There is of course no finality to such a scheme of visual training, but the above summary indicates the lines upon which such work may be undertaken. Demonstration

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camps and centres have been much used during the war and their proven utility justifies a somewhat detailed description.

The other type of class dealt with at this school consisted of privates and non-commissioned officers destined for sanitary work at home and abroad.

A course of lectures was given on the theory and practice of sanitation in the field, with demonstrations of the various processes employed; these lectures followed the sequence of the medical officers' course, but were more elementary in theory and more detailed in practice. All details of construction of sanitary structures were taught practically and, in addition, every man received instruction in elementary brickwork, woodwork, metal work and drawing. Three days were devoted to each of these subjects and at the end of the course a written and practical examination was held. In addition to this examination, small *viva voce* classes were conducted each day at which notebooks were inspected, an excellent method of estimating the attention paid to lectures and demonstrations by each individual. The course had to be a very hurried one, but five or six weeks was sufficient time to give an intelligent man a grasp of the main essentials of the work.

The staff of the School consisted of one officer, a sanitary specialist who had served on the Western front; one serjeant, an expert builder and sanitary inspector; one corporal, an old soldier who was expert at metal work; one lance-corporal, a carpenter; and four privates, a builder, an architect, an artist and a clerk. In addition, there was a fatigue party which varied in number between eight and twelve.

In addition to the classes mentioned, men were trained so that they could form a nucleus for the establishment of similar schools, and special classes were held for various British officers who came to the school for instruction.

Of necessity the Leeds School could only be regarded as a temporary war time measure, and a more complete and permanent School of Hygiene was subsequently established at Blackpool, where for some time an excellent course on Field Sanitation and Tropical Medicine had been included in the training for Royal Army Medical Corps officers.

The Royal Army Medical Corps School of Hygiene, Blackpool.

This School was established in response to the urgent demand for specialized training in preventive work, more especially for medical officers selected for work in the tropics. The School is designed on ambitious lines so that all types of preventive work, both elementary and advanced, can be taught. Medical officers of all grades receive instruction in tropical medicine, both from a clinical and prophylactic point of view; they are also taught the general principles and practice of hygiene, including practical bacteriology and the analysis of food and water. Apparatus of all sorts is

demonstrated and there is an exhibition on similar lines to the one already described, but in a more advanced stage of evolution.

In addition to the classes for medical officers, there are others for privates and non-commissioned officers who are selected for special sanitary work. It is needless to enter into further details with regard to this Centre, which may be summarized as a school for teaching tropical medicine and hygiene, with special application to the demands of military life, and for special training in general army sanitation.

These three examples illustrate well certain stages in the development of sanitary education and emphasize the importance of practical training for men upon whose shoulders rests the burden of sanitary responsibility under the strained and uncivilized conditions incidental to warfare.

SPECIAL TRAINING.

Specialization is the cry of the present age, and many branches of sanitation are specialties. The sanitary expert cannot be expected to be a specialist on every branch of work—engineering, water supplies, sewage disposal, dietetics, entomology, bacteriology, chemistry, statistics, etc.; very much less can the sanitary assistant or inspector be expected to accomplish such a feat. Men who will have specialized work to do need special training in that work, and the place for such training is not the general school of sanitation, it is some place where he can have individual personal experience of the work as actually carried out. A man may learn the whole theory of the chlorination of water by chlorine gas, he may study the regulating apparatus, and work through all the details of elaborate charts and diagrams, but it is only by actual experience with the water column that he can hope to be in a position to undertake definite responsibility. The same may be said with regard to specialization in mosquito work, surveys, drainage, and so forth. A certain amount may be learned by hearing lectures, examining dried specimens, looking at models and photographs, but it is only by definite training in field work, mosquito collection, mosquito breeding and general practical experience under a skilled entomologist that true efficiency is reached. The importance of this specialized education has been appreciated during the late war and an ever increasing effort has been made to satisfy the demand.

At Brentford, where so much ground has been broken with regard to chlorination on a large scale, men have received practical instruction in the work of a water column; here they have been able to follow the whole process and carry it out under the supervision of an officer whose experience in this branch of work may be said to be unique.

At Sandwich the War Office established an Entomological School, with every facility for carrying out such work. The locality was suitable for field collection and every appliance required for further research, such as breeding ponds, mosquito cages, constant temperature rooms, etc., was

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supplied. Here officers and men have been able to familiarize themselves with all the up-to-date methods and requirements of such work under the supervision and instruction of a skilled entomologist.

In the Southern Command, where the work of incineration had reached a stage of perfection commensurate with the enthusiasm and skill of those in charge of the work, many men received an unrivalled practical experience in this branch of sanitation.

The central school can give detailed training in the duties appertaining to the water cart, the Clayton fumigator, the pressure disinfector; but such education cannot be regarded as complete until the pupil had studied the working of each appliance under the varied conditions of difficulty and high pressure which are encountered in actual practice.

In the wider field of sanitary administration, the specialist needs practical specific training for the special field of work for which he is chosen; and the need for such training, at first little realized, has been increasingly acknowledged, so that men of tried experience in civilian work have been given opportunities of seeing that work adapted to military requirements, before assuming posts of responsibility. This was not always recognized during the war and occasions have arisen when civilian Medical Officers of Health, ignorant of the practical application of their work to military conditions, have been placed in positions of authority even over the heads of men who have made a life-long study of military hygiene. Such anomalies are bound to lead to inefficiency and discontent and it is essential that every civilian Medical Officer of Health shall be fully instructed in the military application of his sanitary principles before he is placed in a position of authority in the field.

There are always certain centres where special work may best be seen and the details learned with the greatest rapidity; time given up to visiting such centres is well spent, in that it enables full use to be made of past experience; errors can be avoided and successful measures adopted. Such special visits form a very important link in the chain of sanitary education and much of the success attending this work has been the result of those in authority appreciating this fact.

LOCAL TRAINING.

After a man has completed his general training and, if necessary, his special training, he is in a position to be sent to the district where his ultimate work will be done. This district may be at home or abroad; if abroad, it might be in a Western war area, where conditions approximated closely to those at home, or it may be to an Eastern area, where an entirely new environment will be encountered. To fit him for work under such conditions, it is necessary for him to appreciate the difficulties with which he is likely to be faced, and the conveniences at hand for dealing with such difficulties. The nature of the country, the insect fauna, idiosyncrasies of

the natives, conditions of water supply, material available, difficulties of transport, and many other problems have to be inquired into. In the West, though the conditions approximate more closely to those at home than in the East, still there are details to be learned with regard to trench life in different areas, special orders, available material, etc., which make it advisable for those engaged on sanitary work to supplement the knowledge already obtained. In the East this is absolutely essential, and to satisfy this need demonstration centres were established at the various bases where all men and officers passing through could quickly learn of the special dangers to which they would be exposed and the various methods which had been found available and suitable to overcome such dangers.

In many places in the East such centres were established largely owing to the energy of a Sanitary Section Officer with special knowledge of educational methods; and through these centres medical officers, staff officers, combatant officers and privates passed on their way to the front and were taught how to avoid dangers which, without such foreknowledge, must have seriously diminished their fighting value. Here they were informed what material would be available for sanitary purposes and what would be unobtainable; here they could see how such material could best be used for sanitary purposes; here they could see the improvised apparatus at work, and study details of construction and management. Eight such schools were established in Egypt and Mesopotamia alone. Full sized working models were shown of every conceivable type of sanitary apparatus and demonstrations were given. It was essential to make such courses short and graphic, but the value of such demonstrations far exceeds the actual lessons learnt, in that they induce an adaptable temperament and an improvising mind. The rigid methods of peace time are unsuitable for active service, and at such centres the mind is massaged into elasticity.

The temple of health had to be built upon many foundations: the chalk of Flanders; the sand of Egypt; the alluvial deposits of Mesopotamia; the marshland of Macedonia; the clays of East Africa, and the limestone of Palestine. By local demonstration alone could the mind of the sanitarian be adapted to such diversity of work.

In France also these local schools and demonstration centres were no less prominent. One amongst many, a school started in the winter of 1916, at St. Pol, will serve as a type. In 1917, an officer from the 2nd London Sanitary Company was appointed commandant, and the School was developed on progressive lines. Models and sanitary appliances of all sorts were installed, and lectures and demonstrations given daily. The teaching staff consisted of the D.A.D.M.S. (San.), the officer commanding a mobile hygiene laboratory, the officer commanding a sanitary section, the officer commanding a mobile bacteriological laboratory, and the commandant, assisted by four non-commissioned officers from a sanitary section which had had considerable experience of front line work.

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The courses were as follows:—

For non-commissioned officers and men: Construction of sanitary appliances, five days (Class of 25). Sanitation of front areas, camps and billets, five days (Class of 25). Water duties, two and a half days (Class of 15). These courses ran concurrently, and the men were housed and rationed by the School, thus obtaining a practical lesson in living under ideal sanitary conditions.

The teaching was conducted on classical lines. Construction classes were taught to make and improvise latrines, urinals, grease traps, meat safes, ablution benches, field ovens, etc. The sanitary classes were instructed in general sanitary duties and maintenance, including the digging of latrines and urine pits, soakage pits and surface water drains; also disinfection in all its branches, cook-house cleanliness, supervision of food, fat saving, the disposal of refuse and maintenance of sanitary conditions. The water class was instructed in general water duty, the Horrocks test, the poison test, boiling, filtration, etc., and in the care of the water cart and the use of the Service clarifier.

All classes also received lectures on personal hygiene, and were bathed and, when necessary, deloused. At the close of each course a short examination was held and certificates of proficiency given where merited.

Two courses a week were open to officers:—

- (1) A three-day course for medical officers.
- (2) A three-day course for regimental officers.

These courses included lectures upon the duties of officers in the field with regard to sanitary matters, lectures on water supplies and purification, disinfection and field sanitation in general, with practical demonstrations of methods of construction and management.

Special courses were also given for American troops, for Indian labour units and the few Siamese troops on this front.

The School consisted of an indoor and outdoor exhibit, and working models of practically every type of sanitary appliance were shown. In addition there was a small reference library.

Practically everything was improvised, an impressive object lesson for men who knew they would be called upon to carry out their sanitary work with a very inadequate supply of orthodox material.

By means of such a school, the fundamental lessons learnt at home receive their applications to special conditions, and a uniform standard of sanitation is provided for each district.

REVISION COURSES IN THE FIELD.

For many reasons it is important that sanitary teaching shall be carried further forward than the base. In the front line settled conditions give place to an ebb and flow, which menaces all hope of continuity; men are killed or invalided to the base, they are replaced from other less essential

branches or from drafts hurriedly supplied. Intelligent military men in a battalion are replaced by incompetents or weaklings, and water duty men are utilized for other work. This is undoubtedly a bad policy, but necessity is a stern task-master and frequently, during hard fighting, the military need seems to dwarf all sanitary requirements.

Revision work can conveniently be carried on behind the front line during periods of rest. Classes are arranged at various centres, and all sanitary or water duty men are ordered to attend. By this means it is possible for the D.A.D.M.S. of a division to keep in touch with those directly responsible for executive sanitation, and to have some check upon the continuity of battalion personnel. At these classes all sanitary matters are reviewed practically, and with an eye to special local conditions. Separate classes are held for water duty men and sanitary personnel, and the former are specially instructed in the care and use of the water-cart and the performance of the Horrocks test. These revision classes are also valuable in encouraging the men in their work; there is a tendency for the combatant to look down upon all sanitary work, and it is easy for a keen lecturer to stimulate enthusiasm.

Special classes may also be held to meet any special emergency which may arise. As an example may be cited a water class held in a barn, before one of the great British offensives, to instruct the water duty men of the division in an improvised system of chlorination for tanks placed in the trenches to meet any emergency during the attack and preliminary bombardment.

Revision classes for officers are equally important, and these were frequently held in temporary schools in close proximity to the line. The value of models, however small and crude, can scarcely be overestimated; many of the revision classes owed much of their success to the fact that all important points were illustrated by small hand models, which could be easily transported from centre to centre.

The commanding officers of battalions were not, of course, included in such classes, but it is extremely important that they shall be kept in touch with new methods, and occasionally reminded of their sanitary responsibilities. To meet this need, an experiment was tried, which is certainly worthy of considerable extension. Under divisional orders the commanding officers attended a lecture, or, perhaps, it might more suitably be termed a conference, where a short dissertation was given on preventive work in as far as it specially affected them. At the end of the lecture there was a discussion upon the various difficulties which present themselves with regard to the work.

PROPAGANDA WORK.

There is undoubted scope for propaganda work of a popular type with regard to measures for the preservation of health. Popular lectures and posters are invaluable; whatever system is adopted must make a strong

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appeal to the imagination. Picture post-cards, posters, and leaflets have been freely used to impress the soldier with regard to the danger of flies, mosquitoes, and other insects, also in order to impress upon him the need for strict obedience in carrying out orders with regard to sanitation, quinine prophylaxis, etc. It is possible to command obedience, but it is easier with intelligent men to enlist active co-operation by appealing to their common sense. A certain degree of "abandon" in this branch of teaching is an excellent thing; a louse of normal dimensions may be sufficient to tickle a scientist, but, to impress the unreflecting, it should be painted in lurid colours, and of gigantic proportions. An accurately posed anopheles may be a scientific lesson, but, by the side of some of the French malaria propaganda posters, it fails lamentably to impress. In the same way popular lectures must be delivered by some one who can hold his audience, and even the fact that a man is a Fellow of the Royal Society does not guarantee this quality.

DISCIPLINE.

The best lesson of all in sanitary matters is the practical lesson of daily experience. Too much stress cannot be laid upon the value of example and strict discipline, so that the men automatically carry out the precepts they have been taught. It is quite possible to possess a very advanced theoretical knowledge of sanitation, and yet be most insanitary. The cynic has said, not without reason, "If you want bad ventilation, go to a lecture on hygiene or to a health office"; on many occasions, the billets occupied by sanitary personnel have been found defective in sanitary details of cleanliness and order. It is hopeless for an orderly officer to expect the company's cook-house to be properly managed if the cook-house of the officers' mess is neglected. The commanding officer, adjutant, and orderly officer must emphasize the importance attaching to sanitation by practice as well as by precept; by a strict attention to detail; so that from constant repetition, habits of cleanliness, etc., become habitual to the troops under their command. It is only by the establishment of a sanitary conscience in the unit that danger can be avoided at times when the mind is distracted by more pressing matters. To maintain this high standard under acute service conditions, routine inspections by men specially trained for this purpose are of great value.

Education is the foundation stone upon which the whole system of preventive medicine is based; but to have full value such education must be interpreted in its broadest sense, remembering that education does not end with the teaching of class or lecture room; but covers the whole range of human experience.