Over my fireplace at the Royal Army Medical College hangs a portrait of Doctor Edmund Alexander Parkes, M.D., F.R.C.P., F.R.S., first Professor of Hygiene in the Army Medical Practical School when it opened at Fort Pitt, Chatham, just 100 years ago. This wise and kindly man was to create a system of instruction in military hygiene that found acclaim among his contemporaries and has stood until our times. In this he worked from three basic propositions: first, his subject was of profound military importance; second, although his class was to be composed of qualified medical men, selected by open examination as being “thoroughly grounded in all branches of civil surgery and medicine, including midwifery,” it was recognized that their studies hitherto would have largely neglected sanitary science in general and military hygiene in particular; and third, this very necessary study could be usefully pursued only in a military environment. The importance of these points would have already been quite clear to Dr. Parkes. He had given evidence to the Royal Commission on the quality, knowledge and further education of army medical officers and is said to have been consulted by Sidney Herbert (Jenner, 1876) about the constitution of the new school. In 1855 he had gone to the Crimea at the request of the Government to organize and superintend a civil hospital, which he sited at Renkioi, to relieve the pressure on those at Scutari. Here he had the opportunity of renewing his study, begun during his service in India as Assistant Surgeon to the 84th (York and Lancaster) Regiment, of the importance of military sanitation and the consequences of its neglect. It was in Renkioi that Florence Nightingale made his acquaintance. She became so impressed with his knowledge and understanding of the sanitary needs of the army that she later nominated him for the post of Professor of Hygiene in the new school and had much correspondence with him over its syllabus. It was Miss Nightingale who wrote that formerly medical officers “certainly had never been instructed in the most ordinary sanitary knowledge, although one of their most important functions was hereafter to be the prevention of disease in climates and under circumstances where prevention is everything” (Cook, 1914).

That newly joined medical officers, however thoroughly grounded in general medicine, needed further and special education to fit them for military practice, was no new idea. Neal has told us how in 1798 John Bell had urged the establishment of one “great school of military surgery” and how this led up to the foundation of a Regius Chair of Military Surgery at Edinburgh University. Dr. Robert Jackson had advocated in his celebrated treatise of 1805 the establishment of an “Army Medical Practical School” and recommended a system of education for military medical officers, including instruction in sanitation. At the instigation of Sir De Lacy Evans
and other general officers a Chair of Military Surgery at Dublin was endowed by Government in 1851 and to it was appointed Dr. Thomas Jolliffe Tufnell who had begun a course of lectures in the subject in 1846. As Deputy Inspector General Thomas Longmore, the first Professor of Military Surgery, pointed out in his address at the opening of the Army Medical Practical School, the term "Military Surgery" covered also military hygiene, tropical medicine and other subjects connected with military medical service. In one important respect, however, these University Chairs failed to meet the recommendations of Robert Jackson. He had urged that the proper study of these subjects must be in a military environment and had suggested the Isle of Wight, with its depots of recruits and invalids, as a suitable place for an army medical school. He added that London, with the Guards and troops quartered there as well as the pensioners in Chelsea, might come to be a better situation and noted that Dr. Pineckard, deputy inspector general of hospitals, had "some years ago" proposed that the regimental hospitals of the Guards be combined into a brigade hospital which could become a "School for the education of medical men intended to serve with the Army." In view of the subsequent moves to Netley and to Millbank these early suggestions for the siting of the army medical school seem prophetic. They were made because their authors understood that study amongst soldiers well and sick, young and old, recruits and veterans, would be "infinitely more instructive than anything that is seen or learned in hospitals, not military."

For many years, then, thoughtful men had seen the importance of army medical officers being well versed in sanitary science and military hygiene; they had recognized that instruction in these matters was wanting in the civil schools and hospitals and had urged the establishment of an army medical school where they could be taught amongst the subjects of their study—soldiers in health and sickness and the circumstances in which they serve. Now these principles had been clearly stated by the Royal Commission in 1858 whose recommendations had at last been implemented by Government and the War Office. The Commission was especially insistent that the military specialties including hygiene could be properly learnt only after joining the service, studying in a military environment and amongst soldiers.

"The medical officer should therefore not only be thoroughly conversant with sanitary science, but with the mode of its application to the preservation of health under every possible variety of circumstance and character. . . . It is in a military hospital alone, and from professors specially qualified to communicate it, that the probationer can acquire the knowledge which is indispensable to the proper exercise of his profession in the Army. The habits and temper of the soldier are formed by the peculiar life which he leads, and the discipline to which he is subjected must be thoroughly understood by the medical officer."

What kind of a syllabus did Parkes prepare to make the most of the opportunity thus given him? No better description can be found than these words of his colleague Longmore in the address already quoted:

"Instruction will be given in all the causes which specially affect the health of soldiers, whether diet, clothing, habitation, education, habits, and mode of life, their peculiar duties in time of peace, or situation and circumstances in time of war. The methods of determining the quality of the water the soldier drinks,
of the air he breathes, and of the several articles of his food, detecting their deficiencies, adulterations, or impurities, will be described and demonstrated; and each candidate, in turn, will repeat, in the laboratory the processes he has heard described in the lecture room. The principles of ventilation, warming, draining, cleansing, and of all architectural arrangements which may render his barrack healthy or unhealthy, and the best means of remedying these when faulty from original construction, will be explained and illustrated.

"In addition to the subjects I have already named, the professor of hygiene will consider the effects of military exercises, and the advantages of a regulated system of gymnastics; the conditions connected with particular soils and geological formations; camp diseases and army epidemics, their causes and management, and the preventive measures necessary to be adopted to meet the various sources of these and other diseases, whatever their origins may be. The effects of military life in Great Britain, in the colonies, in campaigning in various climates, in bivouac tents or huts, on board transport ships, will also be shown; and the sanitary regulations required for the preservation of the health and efficiency of the soldier in each condition explained; and to make the course more practical, in addition to the illustrations afforded by diagrams and models, the professor proposes to accompany his class in visits to barracks, transports, encampments, etc., whenever an opportunity of doing so shall be available."

Of later years some have tended to equate hygiene with cleanliness and sanitation with disposal of waste and even to imply that such mundane affairs are hardly worth-while subjects for study by qualified medical men. It is apparent that the giants of those days, taking a wider view, balanced their opinions more firmly.

In 1863 the Army Medical School moved to the newly opened Royal Victoria Hospital at Netley where the hygiene laboratories were housed in appropriations behind the hospital, and in the following year Parkes published the first edition of his Manual of Practical Hygiene. This book was devoted particularly to military hygiene, but in compliance with the request of many, the fourth edition (1873) was enlarged and re-written in a form adapted for civil Medical Officers of Health. After Parkes's death three more editions were edited by his successor as professor, Surgeon Major F. S. B. F. de Chaumont; M.D., F.R.S., and an eighth edition edited by the third professor, Colonel J. L. Notter, M.D., was published in 1891. This work therefore covers the period during which the microbial origin of infectious disease came to be accepted and the causative organisms of many diseases were indentified. It is fascinating to trace, through the successive editions, the gradual shift of emphasis in teaching as new facts came to be accepted. Curiously enough, the transmission of disease by micro-organisms in water was not recognized until very late in this period. In the 1887 edition of Parkes's Manual, De Chaumont discusses the role of "Bacteridia" in the causation of infectious disease, but attributes water-borne disease to the presence of harmful chemical poisons, of animal origin but not living. He mentions that Koch connected cholera with a comma-shaped bacillus, but records that an Indian Office committee reported that they did not think the connection positively made out. In 1896, Notter and his assistant (later to become the fourth Professor and the original Editor of the Journal of the R.A.M.C., Colonel Sir Robert Firth,
Army Health

K.B.E., C.B., F.R.C.S.) published their *Theory and Practice of Hygiene*. Although based on Parkes's *Manual* this was much altered in character, being written principally as a textbook of public health, with special chapters dealing with the sanitary needs of the Army and Navy. In this work it is accepted completely that an attack of an infectious disease implies "the action of microbial life or the products of microbial life" and further that the microbe "was the progeny of a similarly endowed parental microbe." The demonstration in water of the actual bacteria associated with certain water-borne diseases is called "recent," cholera and enteric fever being cited as the two diseases in which the connection is generally recognized as certain.

It might be thought that such important discoveries and new concepts of the causes of infectious disease and their means of spread would have vastly changed the character of the subject and the content of the syllabus of hygiene, but this is not so. In the successive editions of Parkes's *Manual* only two chapters, "Prevention of Common Diseases" and "Disinfection," are much affected. The reason is that, important though these advances were, they concern only a comparatively small part of the vast field. In a subject involving the study of the physical, chemical and biological environment of the soldier, as well as his behaviour within that environment, concepts had altered about only some part of the biological environment. This view is supported by examination of the syllabus of instruction in the *Regulations for the Guidance of Candidates attending the Army Medical School at Netley*. We are able to compare the Regulations of 1866 with those of 1898. By far the greater part of the course is occupied with the study of the physical and chemical environment of the soldier and his behaviour therein; the approach to this study and the matter considered did not alter greatly over the three decades. The new concept of infection affected only a small part of each syllabus; so far from increasing the time spent on infectious disease, recognition of specific living causes, by simplifying study, brought it to occupy a smaller part of the whole. The next decade was to see the discovery of the role played by arthropods in an increasing number of infections and again the effect on the broad scope of hygiene was less than might have been supposed, only the study of the biological environment being seriously altered in character. However, the introduction of the subjects of insect control and disinfestation did result in some expansion rather than simplification of this part of the syllabus.

In 1901 successive recommendations by the Royal Commission on the South African Hospitals, by the Broderick Committee set up to consider the re-organization of the Royal Army Medical Corps and by the newly constituted Army Medical Advisory Board, resulted in a decision that the Netley School should be absorbed in a new College to be erected at Millbank where a general military hospital was being built. A Royal Warrant embodying these recommendations appeared in March 1902 and thus gave effect to the proposal made by Dr. Robert Jackson nearly a century ago and by Inspector General Pinckard before him. The last complete course of the Army Medical School at Netley closed on 29th June, 1902, with a prize giving and address by Earl Roberts. The hygiene and pathology departments were the first to move to London, finding temporary accommodation in laboratories rented from the Royal Colleges on the Embankment, whilst their student officers were put up in a hotel (Macleod, 1906). When the Royal Army Medical College opened in
In the new College, as well as the long established course for Officers on Probation, a course was run for Captains before promotion to Major. This senior course lasted six months and in 1912 was extended to nine months. It came to be recognized as one of the most thorough and important post-graduate medical courses (Macpherson, 1921). The Royal Commission of 1901 had recommended the appointment of "properly qualified officers of the Royal Army Medical Corps to undertake sanitary duties," a practice which had been discontinued against medical advice (Lovegrove, 1952). It seems likely that the special training of these officers was also undertaken at the College, although no record of this has been found. It was in this period before the First World War that Colonel (later Brigadier General) Sir William Horrocks, K.C.M.G., C.B., who had been Assistant Professor in the Department of Hygiene (1897-1903) and was for over 30 years Editor of the *Journal of the R.A.M.C.*, revolutionized the treatment of water in the field by developing the cloth filters and subsequent sterilization by one part per million of residual chlorine over a contact period of 30 minutes. Professor G. Sims Woodhead (1914) suggested a test for measuring the deviating power of a water using iodine and starch as an indicator. The practical adaptation of this for field use was incorporated in the test box which came to bear Horrocks's name and has only recently been superseded. The regimental water cart which embodied these techniques was developed under Horrocks's direction.

At the outbreak of war in 1914 teaching at the College ceased, except for occasional special classes; the Professor of the time became Deputy Director of Hygiene to the British Expeditionary Force in France, and the remainder of the staff were employed in research, development and testing of apparatus, chemicals and techniques. Work done included the analysis of the nutritional values of various foodstuffs, the calculation of dietary needs of patients in hospital, the development of vitamin tablets, devising means of disinfection and testing the efficiency of insecticides against lice, and the development of plant for large scale purification of water in the field. During the war the Department moved to Professor Starling's Physiology Laboratories at University College to free their own laboratories for use by the anti-gas committee under Horrocks. The story of how our defences against chemical warfare were developed speedily and so successfully as to outmatch and overtake the enemy's lead has been told by Lelean (1920). Colonel P. S. Lelean, C.B., C.M.G., F.R.C.S., D.P.H., became professor after the war, but in 1914 he was given the task of organizing the Royal Pavilion in Brighton to receive Indian patients from Southampton where they had been crowded after a fire in a hospital ship. Starting work on a Saturday with hastily mobilized Boy Scouts and other volunteer helpers, he had the Pavilion and Dome ready for patients by the Wednesday. It is amusing to read that his first task in fitting this royal residence for use as a hospital was to clean it out and lay linoleum. Lelean's arrangements were such as to receive the commendation of the Secretary of State and Sir Walter Lawrence, His Majesty's Special Commissioner in charge of Indian Troops' Welfare (Lelean 1915). This was an outstanding example of a not unusual event—a military hygienist turning his hand to an administrative task with considerable success. It was during the time at University College that
Major Stanley Elliott joined the department as Chemical Analyst and began his long years of faithful service to this College during which he has made so many contributions to our knowledge and methods, notably in the sphere of the treatment of field water supplies. He gave us the Millbank bag and the Neutral Red test which replaced Horrocks's test in 1956.

After the war, the Department returned to its old premises and teaching was resumed at the College. Senior and Junior Medical Officers' Courses were held and Specialist officers studied for the Diploma in Public Health. The excellent chemical class room afforded them ample space to learn and practise the analyses which were then such a feature of the training for the Diploma. Classes were also held for R.A.M.C. tradesmen training as Laboratory Assistants. On the outbreak of the Second World War in 1939, regular teaching at the College again ceased and the Department was largely given over to research and development. In 1940, as a result of bomb damage to the building, the Department was evacuated to Mytchett, where it joined the Officers' Wing of the Army School of Hygiene until it was possible to return to Millbank in 1943.

Regular classes were resumed soon after the end of the War. The first post-war Senior Course was in 1946 and Junior Courses started again in 1951. The two courses are at present run in one, and instruction in the Department is in basic military hygiene although visits are made to civil installations such as water works, sewage disposal works, dairies, catering establishments and so on. Officers studying to be Army Health Specialists attend more advanced courses in military hygiene and have to pass the course examinations as a condition of classification as junior specialist and again for advancement to senior specialist. As these are the only tests of such officers' knowledge of military hygiene, the examinations, especially the second one, are conducted with the help of an External Examiner and are very searching. The College is recognized by the Examining Board in England for teaching for the Diploma in Tropical Medicine and Hygiene, the course being run as an extension of the Senior and Junior Officers' Course; instruction in environmental and tropical hygiene, nutrition, applied physiology and statistical method is given in the Army Health Department. The revision of the General Medical Council Rules governing the course of study for the Diploma in Public Health which was made in 1945 resulted in much less laboratory work being required. The chemical laboratories of the Department came to be correspondingly less used for teaching and the staff have been more and more employed on advanced biochemical tests and estimations on specimens sent in from Army Pathology laboratories all over the world. One half of the class laboratory was screened off and in it has been established a teaching display, taking the place of the historical museum, the decline of which was recorded by Neal (1957). The other half is still used as a class laboratory where officers' classes practise such things as water testing and purification and the measurement of air conditions, and in which classes of Laboratory Technicians are trained in Public Health work and biochemical techniques. The benches in this laboratory are also used for demonstration by the Department of Entomology and others.

A Centenary is a time for reviewing the present as well as recalling the past. As one compares the present syllabus with that of Dr. Parkes one sees many changes.
Some dead wood has been cut out; some growth has been pruned or trained in a new direction. Several old trees have been felled and new ones planted. Of these, some are already full-grown and flourishing, others still need to be carefully tended; the proper place and size of some of the newer ones have yet to be determined. Here and there we see old friends still standing as strong and firm as ever. Some even support parasitic growths, whose usefulness must be kept under consideration; we must not be drugged with honeysuckle, nor bewitched with mistletoe. But when one stands well back from the trees and looks at the wood one cannot discern any very great change in its appearance and outline or in the place it occupies in the general scene. The prime object of study is still the military environment and the soldier's work and behaviour within it. Parkes's three basic propositions are still valid. In campaigns and exercises over the world the profound military importance of the subject is continually being demonstrated by the consequences of its neglect. Despite improvement in the instruction of medical students in public health and social medicine the knowledge of these subjects shown by most newly joined medical officers is still far from sufficient and they lack entirely the ability to apply themselves knowledgeably to military problems. The basic study of the military environment can still be undertaken only within that environment. To study the circumstances of soldiers one must be among soldiers.

At the opening of the Army Medical Practical School at Fort Pitt in 1860, Mr. Sidney (later Lord) Herbert is reported as saying that there was "no opportunity of learning elsewhere much that would be taught in it," and the Royal Army Medical College is still unique among post-graduate institutions in this respect. In the Department of Army Health we have the privilege of providing a course of study which cannot be obtained in the civil medical schools. The Royal Commissioners of 1858 found that only from specially qualified professors could the probationer learn his profession in the Army. Believing that only service in the discipline of Army Health can qualify a man to teach this subject and hoping that our own training and experience has fitted us adequately for the work, we in the Department are resolved to provide a course, as practical and interesting as we can make it, which is strictly related to the military field and has as its purpose to equip a medical officer to "recommend to . . . officers commanding any precautionary or remedial measures . . . that may, in their opinion, conduce to the preservation of the health of the troops." This definition of a medical officer's primary work has also remained unaltered for a century in Regulations for the Medical Services of the Army.

The richness of our inheritance from Dr. Parkes has not been fully told. One of the things which makes service as a medical officer so well worth-while is that in the simple exercise of one's duty, one can do so much to help the ordinary soldier. The practice of military hygiene is full of such opportunity and we try to infuse our teaching with something of the spirit and humanity of the man who so richly earned the eloquent tribute paid to his memory by Baron Mundy, Professor of Military Hygiene at the University of Vienna, "All the armies of the Continent should, at parade, lower their standards craped, if only for a moment, because the founder and best teacher of military hygiene of our day, the friend and benefactor of every soldier, Edmund Parkes, is no more." (Orsborn, 1876)
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PROFESSORS OF MILITARY HYGIENE OR ARMY HEALTH

1860-1876  DOCTOR E. A. PARKES.
1876-1888  SURGEON MAJOR F. S. B. F. DE CHAUMONT.
1888-1900  LIEUT.-COLONEL J. L. NOTTER.
1900-1906  COLONEL R. H. FIRTH.
1906-1908  COLONEL A. M. DAVIES.
1908-1912  COLONEL C. H. MELVILLE.
1912-1914  COLONEL W. W. O. BEVERIDGE.
1919-1921  LIEUT.-COLONEL, P. S. LELEAN.
1922-1926  LIEUT.-COLONEL J. A. ANDERSON.
1926-1928  COLONEL P. H. HENDERSON.
1928-1930  COLONEL R. B. AINSWORTH.
1930-1933  LIEUT.-COLONEL N. LOW.
1933-1935  COLONEL G. S. WALLACE.
1935-1938  COLONEL W. B. PURDON.
1938-1939  COLONEL D. T. RICHARDSON.
1944-1946  COLONEL C. S. RYLES.
1943-1944  COLONEL T. F. KENNEDY.
1946-1948  COLONEL F. C. HILTON-SERGEANT.
1948-1949  COLONEL A. E. CAMPBELL.
1949-1953  COLONEL P. J. L. CAPON.
1953-1956  COLONEL R. J. NIVEN.
1956-1958  COLONEL J. L. GORDON.