Review VIII.

*Army Hygiene.* By Charles Alexander Gordon, M.D., C.B., Deputy Inspector-General of Hospitals, Army Medical Department; Member of the Sanitary Commission for Bengal, &c. &c. 1866. Calcutta and London.

The subject of the work under our consideration and the mode of treating the subject adopted by the author claim the attention of the profession, more especially of those members of it who purpose undertaking the military branches of medicine. Many details of the practical working of the army medical service are succinctly given, being taken from the records of some of the most trying actions and services in which our army has been engaged. Several facts are also given from the records of the French, American, and other armies.

Dr. Millingen, it appears, proposed in 1818 to establish an army medical school, suggesting that professors "of the following branches of the medical sciences should be selected from the most able medical officers: namely, theory and practice of medicine, theory and practice of surgery, military hygiene, morbid anatomy, and botany."

The sound judgment of Dr. Millingen, that showed itself in his suggestions, was not acted upon until very recent times; it is at variance with some reformers of medical education, who would recommend the reduction of portions of the curriculum of study now enjoined in the classes of the several educating bodies of the United Kingdom. It appears to us that it would be unwise to lessen the number of subjects now taught in the medical schools, especially when the public generally are daily becoming more liberally educated. To alter the mode of teaching, we conceive, might be a more correct method of proceeding.

Dr. Gordon speaks forcibly of the frequent fatal effects of exposure, especially in tropical climates, to sun or rain, and the emanations from graveyards in cholera seasons, as seen among troops forming funeral parties.

Comparative exemption from cholera among the Bedouin Arabs is attributed to their not congregating in masses.

Cholera has attacked workmen, with great violence, who came upon the remains of a number of persons who had died of cholera, as reported by Dr. Moore. The latter author also instances another body of workmen who, in cutting through an old graveyard, came upon a spring of apparently pure water:
many who drank of this were, within a few hours, seized with severe cholera.

Dr. Gordon alludes to the site selected at Benares that had to be abandoned from its notorious unhealthiness, and the question, how far its state was owing to the decomposing dead within its precincts, as it was found to have been in former times a Mahomedan burial-ground.

The poisoning of camp-ground by cholera excreta, and the dangerous effect of using water percolating such soil, as well as the injurious properties of emanations from such ground, are mentioned.

Epidemics from different foci.—"The history of the cholera epidemic of 1861 in India sufficiently shows that this disease may have several distinct and independent points of spontaneous origin, and yet spread by infection and personal communication. It has now come to be ascertained, also, that the epidemic influence once brought into activity, travels by definite directions; and that for a body of troops to proceed within the sphere or line of progress of that influence, is, to a certainty, to subject them to be attacked by the malady.

"The most recent example of this occurred at Mhow, in the Bombay Presidency of India, where a detachment of troops having been so marched into the line of progress of the epidemic, they were all but annihilated by it."

The above deserves the consideration of the few members of the profession who hold views opposed to the infectious power of cholera.

Of the geological features of districts, coal formations and "trap" rock, as well as clay and alluvial soils, are most generally found to be those predisposing to cholera; whereas the disease is rare where laterite forms the character of the country.

Infection.—"Some writers have of late years stated a theory that there is in reality no specific infection in existence; that when other favouring circumstances combine with neglect of sanitation to bring into activity the hitherto latent morbific influence, that influence may manifest itself in the production of cholera, yellow fever, smallpox, scarlatina, or in other forms of zymotic disease, according to accidental conditions of locality and climate. Nor does this theory appear so vague as it may at first seem, if we consider the phenomena of some diseases, more especially those of a non-eruptive nature. Thus, in India the coincidence of epidemics of cholera and intermittent fever is often observed; and at some stations in that country—as, for example, Agra and Peshawar—the cold stage of the latter disease was on many occasions attended by diarrhœa, vomiting, and
collapse: so much so, that medical officers have stated, in their reports, the apparent affinity that seemed to exist between the manifestation of these diseases.”

We quote the above at length, and will add that allusion is made to the points of resemblance between yellow fever and cholera. He refers to the researches of Pettenkofer, of Alison, Monfalcon, and Barker, on fomites, pointing out the necessity for considering the “fomites of each different kind of epidemic” as “ever-existing entities,” and to be guarded against accordingly: and he goes on to show the great value of preventive measures against epidemic disease.

Camping out, as at Bermuda in 1864, has been frequently sufficient to stay the fatal progress of yellow fever and other diseases.

The Indian Cholera Commission, 1861, ascertained that of the soldiers stationed in the North-Western Provinces, the temperate and the intemperate appeared equally liable to attacks of cholera; but the disease was much more fatal among the latter than the former.

Rest and Sleep.—“We should bear in mind, that in the case of soldiers as well as with other classes, excessive labour demands excessive rest. This was a maxim of Napoleon, and daily experience confirms it. On a campaign, it may be difficult or impossible to obtain for the soldier that amount of rest which sanitary requirements demand. In ordinary circumstances, however, it may be attained by diminishing night duties as far as is practicable.

“Duties that involve deprivation of the night’s rest exert more than any others a pernicious effect upon the health: the physical powers having thus insufficient time to recover their tone after severe exertion or arduous duty, undergo decay, and thus the soldier, while yet a young man, becomes what is called ‘worn out.’

“On home service a soldier ought not, as far as sanitary considerations are concerned, to be on night duty oftener than one night for four he is in bed; nor in India oftener than one night in seven at least.”

Propagation of Infection.—“As remarked by Dr. Millingen, contagious diseases that have proved most fatal have frequently been traced to intercourse with prisoners of war. It is important, therefore, that they should not be put up with troops, or even march with large bodies of them.”

Clothing has been known, as in China, &c., to have been the means of spreading smallpox and other diseases. Cholera has been often traced in India to troops meeting large bodies of pilgrims.
The comparative freedom of the Bedouin Arabs from cholera, attributable to their not congregating in masses, is mentioned.

This writer quotes Dr. Hammond, Surgeon-General of the United States Army, on the carriage of disease so readily conveyed by means of clothing, furniture, walls, and especially bedding. Hospital gangrene was only removed from the New York City Hospital by taking down the entire walls. The fact of the 'Dreadnought,' and other vessels, having to be abandoned on account of the tenacity with which the infection of erysipelas and other diseases clung to them, is stated by Dr. Gordon.

An outbreak of smallpox at Quebec occurred on the opening of a cemetery where a large number of victims of that disease had been buried years before.

In tropical countries, ferruginous soils are connected with deadly fevers, calcareous salts with goitre, and swampy alluvial districts with enlarged spleen and general cachectic habit of body. Again, soil and water impregnated with salts of soda, as Aden, and the desert tract, including Mooltan, Delhi, and Lahore, where suitable vegetables are consequently wanting, produce scurvy in an endemic form. Haemorrhagic dysentery seems to spring from this form of disease. A vegetable and meat diet does not ensure immunity from scurvy, if sameness of diet, bad cooking, arduous work, fatigue, want of sleep, dirt, crowding, mental despondency, &c. (so common to troops in a hard-fought campaign), concur. Dr. Gordon very properly states that the knowledge now possessed on these vital points should arm us against such dangers in future, and that we should modify the combination of circumstances so as to prevent or moderate the scorbutic taint in an army. The natives of India use the _Phyllanthus emblica_, and the Americans the _Chenopodium album_, the _Rumex acetosella_, pickles and sourkraut, vinegar and molasses; while the French benefited greatly in the Crimea by using a salad of the dandelion with vinegar. Though elevated ground is most generally highly advantageous in a sanitary point of view as a site for barracks, it is not always preferable to lower positions. The author mentions Gibraltar as an instance of an elevated position being unwholesome: in this statement we cannot wholly agree, inasmuch as the soldiers' quarters are not much elevated, at least if compared with the greatly higher parts of the rock, the débris of vegetation from which is so constantly washed down to the lower parts of the locality, on which stand the men's quarters, the town, &c.; on the contrary, when disease carried off great numbers in the barracks and town, the fatality ceased on the formation of a camp on Windmill Hill.
To the consideration of the great importance of hill stations in India, Dr. Gordon most properly devotes a long chapter, pointing out how the rarefied and damp air of the much-elevated hill stations frequently causes disease of the chest and alimentary canal in men debilitated by disease or exhaustion in the plains. The great value of these stations in a large class of cases is also well stated, and judicious suggestions are made relative to those most fitting for hill stations.

The whole subject requires the attention of the authorities, being one of importance in a national as well as in a sanitary point of view.

The opinions of Jackson (who wrote in 1804), of Chevers, Parkes, Jeffreys, Sutherland, Sir Ranald Martin, and of the Sanitary Commissioners, are quoted to show the great necessity existing in India for the proper construction of barracks.

"Entire isolation of the floors from the soil is essential to health in tropical climates.

"In India it is not safe for men to sleep within the sphere of night malaria proceeding from the ground within the limits of night fogs.

"The floors of barracks and hospitals should be raised several feet above the soil, on arches, the height varying with the nature of the locality. In low, flat localities, troops as well as the sick should always sleep in upper stories."

"According to the Royal Commission, the ordinary width of a barrack-room should be 20 to 24 feet; and under no circumstances whatever should more than two rows of beds be placed between opposite doors."

Verandahs are not recommended in India, as impeding both light and ventilation.

The walls should be of thin stone or brick masonry; if thick, they absorb much heat by day, and radiate it proportionately at night.

Old bricks, which are often saturated with organic matters, must on no account be used. (The recent local outbreak of cattle disease at Islington is a strong fact in proof of the great risk of employing old bricks, as Dr. Ballard considers he has traced the attack to some old bricks which belonged to the former cowshed in which so many fatal cases occurred in the previous epidemic.) Dr. Roscoe's experiments indicate the passage of carbonic acid gas through hard and well-baked bricks.

The Sanitary Commission for Bengal recommend a plan for barracks in India, a ground plan for which faces the title-page. According to it, the front occupies a line 1260 yards, the depth one of 631 yards; roads may be made so as to afford free means of communication between the different buildings. In another
part of the work the necessity for well-made raised footpaths is pointed out. Free perforation is allowed by the intermediate spaces between the several buildings; the quarters for the married are placed at the flanks, and in rear of those for single men; and all out-buildings, as plunge-baths, skittle-alleys, ball-courts, forge, &c., have suitable positions allotted them. When it is remembered that no less than £10,000,000 are to be devoted in the next ten years to the erection of suitable barracks and hospitals in India for the men by whom that great empire is held, it will be seen how necessary it is to execute the works on the best principles and in the most efficient manner.

Under the head of Clothing, the great disadvantage (amounting on one occasion even to disaster to an expedition) liable to arise from the use of too heavy clothing in a hot climate is mentioned: again, the injurious effects of cotton, or other too light material, in the rains or in a variable climate, is dwelt upon.

Civilians in such climates have long used light woollen clothes, as in Calcutta, Hong-Kong, West Coast of Africa, &c., during the rainy season.

The flannel waist-belt supplied to troops in India is a most valuable prophylactic.

The use of flannel under-clothing is as ancient as the armies of Rome. Although many most eminent physicians have in almost all ages advised the use of flannel under-clothing, there are those who consider it possesses the disadvantages of increasing the susceptibility to impression, and of retaining contagion.

The great value of the soldier having a piece of violet or green silk gauze to shade the eyes when necessary, will be appreciated by those who have encountered a tropical wind, and dust or sand.

Dr. Gordon regards the stock and the beard objectionable; he would, however, allow men on duty to please themselves in regard to the beard when on active service. He dwells upon the cummerbund or girdle of thick folds of cloth as a valuable preventive of illness.

Cotton socks, if good and often changed, are far more comfortable than woollen. This writer follows Dr. Parkes in speaking of the frequent defects in the boots supplied to troops, and the vast importance a suitable and well-fitting boot is to the soldier. The varying requirements of season and country should also enter into the regulations regarding the supply of soldiers' boots.

Hospital accommodation, so deficient in the army prior to
the Crimean war, cannot be laid to the account of the medical staff of the army, as representations were frequently made by it to the authorities without effect; it is but fair, therefore, observes our author, to allow credit to the service for exertions made by it in the right direction by Dr. Hennen and others years ago.

Pavilions are recommended by the Barrack and Hospital Commissioners in India. There should not be placed under one roof more than sixty or seventy sick, with their attendants. A convalescent ward should be provided, with accommodation for about 25 per cent. of the patients. An ophthalmic ward, with separate lavatory and separate basin and towel for each case, should also be provided. Wards for special cases should also be provided, as well as for infectious diseases.

The wards on the upper story should contain 2730 cubic feet, and on the lower 2340 cubic feet, per bed.

The dry system of conservancy should be carried out in the privies, of which latter there should be indoor and outdoor provided. The author laments the necessity of pointing out so many measures as requisite in Indian hospitals, which are still so sadly deficient in what we have touched on in this Review, and in many other details given in the work; and he quotes Dr. Parkes on the same subject.

The foundation of every hospital should be laid on dry ground, covered with concrete, and have an arched basement, so as to admit a free circulation of air underneath the ward-floors; the latter should be not less than four or five feet from the ground; and in malarious districts the sick should always be on upper floors.

Double verandahs are not allowed to barracks or hospitals by the Commissioners. They recommend twenty-six feet as the width for the wards, and from 1500 to 2500 cubic feet of air for each of the sick. A ward is recommended to hold twenty to twenty-four sick.

The example of some hospitals at St. Petersburg, wherein were wards without direct light, and which only yielded a fourth part of the recoveries when compared with patients treated in light rooms, should always be borne in mind when arranging the windows of a hospital. The great importance of officers' hospitals is mentioned, and can easily be conceived, especially in time of war; it has been often brought under the notice of the Government. The necessity of allowing a liberal diet and extras, of having trained hospital attendants, and of providing at Calcutta an establishment to answer some at least of the purposes that Netley does, is treated of at some length.

Potable water should be limpid, unaffected by the addition of
lime-water, chloride of barium, nitric acid, oxalate of ammonia, or hydrochloric acid. Beans and peas should be readily boiled in it, and soap readily dissolved.

Several other important matters connected with water supply and quality, with baths and bathing, and the connection between impure water and cholera, fever, dysentery, &c., are treated of. Several useful rules for finding water in any district are given; also some for the formation of filters, pumps, conduits, reservoirs, tanks, and for the general analysis of water.

Respiration—the impurities of the atmosphere from crowding, from combustion, organic matter, emanations from sewers, churchyards, brick-kilns, marshes, &c., are duly considered.

Dr. Jackson's statement in favour of ventilation is quoted; it was as follows, and was written in reference to the Peninsular War:—"It has often happened that in the history of the late war more human life was destroyed by accumulating sick men in low, ill-ventilated apartments, than by leaving them exposed in severe and inclement weather at the side of a hedge or common dyke."

Recent wars, as that between the French and Austrians in 1859, and the civil war in America still more recently, quite justify Dr. Jackson's statements, and show that judicious transport was safer than a crowded hospital.

The great value of thermantodotes and tatties in cooling the air in barracks, &c., in India is insisted upon; and such means well repay any expense incurred in their maintenance by the increased health and comfort of the men.

Overcrowding, or Ochlesis.—Captain Hall, in his work on the Esquimaux, describes the horrible fetor that exists within the close, ill-ventilated huts occupied by these people; and any person who has been in the Himalayas has, no doubt, experienced a feeling of nausea while passing the doors of the Hillmen's huts from a similar cause. The accounts of the progress of the Indian plague, or mahamurree, which devastated the hilly parts of India in 1851 and 1852, are replete with examples of the evils that occurred from the combined effects of over-crowding, want of ventilation, and inferior diet.

In concluding our notice of Dr. Gordon's work, we would add our commendation of it, as containing much most useful matter, and well worthy the attention of the authorities, as well as of that of the medical profession.