able that one bearer should attempt to carry a patient unaided, but emergencies may arise in which this is necessary. For short distances a patient may be carried in the arms of a strong man, or one that is conscious and able to help himself to a certain extent may be carried astride of the bearer's back.

For unconscious patients two methods may be employed: carrying across the back and across the shoulder. For the first method, the bearer, turning the patient on his face, steps astride of him, facing toward the head, and with hands in his armpits lifts him to his knees, then clasping hands over the abdomen, lifts him to his feet; he then with the left hand seizes the patient by the left wrist and drawing the left arm about his (the bearer's) neck holds it against his left chest, the patient's left side resting against his body, and supports him with his right arm about the waist.

The bearer with his left hand next seizes the right wrist of the patient and draws the arm over his head and down upon his left shoulder, then shifting himself in front, stoops and clasps the right thigh with his right arm passed between the legs, his right hand seizing the patient's right wrist; lastly, he, with his left hand, grasps the patient's left and steadies it against his side, when he rises (Fig. 281).

FIG. 282.—Patient across Shoulder.

In the second method, the patient being raised and supported in the erect position as in the first method, the bearer clasps his hands about the patient's waist, shifts himself to the front, facing him, and stooping places his right shoulder against the abdomen; he passes his right hand and arm between the thighs—securing the right thigh—and with his left grasps patient's right hand, bringing it from behind under his (bearer's) left armpit, when, the wrist being firmly grasped by his right hand, he rises (Fig. 282).

The first method is more comfortable for the patient, but the second method has the great advantage that the bearer's left hand is free so that he can descend a ladder. It is in fact a fireman's method, and is much better adapted for carrying a patient who is asphyxiated, but otherwise uninjured, than a wounded man.

The ambulance is a four-wheeled vehicle, which provides transportation for eight men sitting or for two recumbent. In some ambulances there are two tiers of litters so that four recumbent patients may be transported. In the more approved ambulances, the regulation litter is used, the litter upon which the patient was originally placed being pushed into the body of the vehicle from the rear. A variety of styles is now in use, and since a board is sitting at the time at which this article is written for the purpose of deciding what model shall be finally adopted, no attempt will be made to describe in detail the present vehicles.

For a full account of the drill of the hospital corps the reader is referred to the manual of drill entitled "Drill Regulations for the Hospital Corps, United States Army," edition of 1900.

The methods which are practically employed in the transportation of the wounded are described in the article upon that subject. *George E. Bushnell.*

ARMY MEDICAL DEPARTMENT.—Admission to the medical corps of the United States army is by competitive examination. Any medical graduate of a college in good standing may appear for examination, provided he is a citizen of the United States, between twenty-two and twenty-nine years of age, and of sound health and good character. He must present evidence that he has had at least one year's hospital experience or the equivalent of this in practice subsequent to his graduation. The applicant should write to the Secretary of War requesting authority to present himself before an examining board, giving the date and place of his birth and the place and State of which he is a permanent resident, and enclosing certificates as to his citizenship, character, and habits from at least two reputable persons. He will then be informed when and where the examination will probably take place. Examining boards are convened from time to time to fill vacancies as they occur. For some years before the Spanish-American war a board was in session annually in September and October, in the Army Medical Museum building at Washington, D. C., to fill the vacancies occasioned by deaths, retirements, or resignations during the year. Boards may, however, be convened in other cities. One has now (February, 1900) been appointed to meet in Manila, Philippine Islands, to afford an opportunity of entering the regular service to volunteer medical officers and physicians on contract now serving with troops in those islands. When a board is convened in the United States, due notice is published in the medical journals, and candidates whose applications are already on file in the War Department are notified by letter to report in person to the president of the board on a given date. The expenses of travel and other personal expenses incident to the period occupied by the examination must be borne by the candidate.

The physical examination comes first in order, and is as carefully made as if the candidates were applicants for enlistment in the ranks. Those who fall below sixty-four inches in height are rejected. Each candidate is required to certify that he labors under no mental or physical infirmity or disability which can interfere with the efficient discharge of any duty which he may be required to perform. Slight errors of refraction which can be corrected by glasses and which are unaccompanied by ocular disease do not cause rejection. The preliminary or mental examination is conducted by questions written and oral on arithmetic and physics, the history and geography of the United States, ancient and modern history, and general literature. Candidates claiming special knowledge of the higher mathematics, ancient or modern languages, drawing, analytical chemistry, or branches of the natural sciences are examined in these subjects as accomplishments and receive due credit according to their proficiency. The professional examination includes anatomy, physiology, chemistry, hygiene, pathology, and bacteriology, materia medica and therapeutics, surgery, practice of medicine, obstetrics and the diseases of women and children. Examinations are also conducted at the bedside in clinical medicine and surgery, and demonstrations and operations on the cadaver are required to be made by the candidates. At the conclusion of the examination, which lasts six or eight days, the merits of the candidates in each of the branches and their relative merit as determined by the results of the whole examination are reported by the board, and in accordance with this report the surgeon-general recommends the appointment of the successful candidates to fill existing vacancies. Those who fail at this examination may be allowed to appear again after one year, but no third trial is permitted.

Ordinarily the first duty required of the young medical officer is attendance at the army medical school during a session of five months, November to March, to fit him for his future duties and responsibilities. The school was organized in 1893 by Surgeon-General Sternberg. The faculty consists of: (1) A president who is responsible for the discipline of the school and who delivers a course of lectures upon the duties of medical officers in war and peace, including the requirements of Army Regulations regarding property responsibilities, recruits, discharges for disability, sick reports, rights and privileges of officers and customs of the service; (2) a professor of military surgery who teaches operative surgery, the care and transportation of wounded in time of war, and the administration of hospitals; (3) a professor of military hygiene who gives practical instruction in the examination of air, water, food, and clothing from the sanitary point of view; (4) a professor of military medicine; (5) a professor of clinical and sanitary microscopy who gives laboratory instruction in bacteriological work, and (6) an instructor in hospital corps drill and company management.

After graduating at this school the young medical officer is assigned to duty at some military station. His rank, pay, and emoluments are those of a first lieutenant of cavalry for the first five years of his service and of a captain of cavalry for the remaining years of his service in the grade of assistant surgeon. In addition to the fixed pay of his rank he is entitled to an increase of ten per cent. for every completed period of five years' service until a maximum of forty per cent. has been reached. Thus the pay of a newly commissioned assistant surgeon is $1,600 per year, or $133.33 monthly. At the end of five years he is promoted to the rank of captain and receives $2,000 per year, but as he is entitled to a ten per-cent. increase of this by virtue of his five years of service he receives $2,200 per annum, or $183.33 monthly. At the end of ten years the service percentage entitles him to $2,400 per annum and after five years more to $2,600. By this time deaths, resignations, and retirements among those above him will have brought him up toward the head of the list of assistant surgeons. On his promotion to the grade of surgeon with the rank of major, the pay of which rank is $2,500 per annum, he receives $2,250 if he has been fifteen years in the service and $3,500 if he has completed twenty years of service. The monthly pay of the lieutenant-colonel, colonel, and brigadier-general is respectively, $333.33, $375, and $458.33. These sums include the forty per cent. increase for length of service.

At the present time the medical corps consists of one surgeon general with the rank of brigadier-general, six assistant surgeons-general with the rank of colonel, ten deputy surgeons-general with the rank of lieutenant-colonel, fifty surgeons with the rank of major, and one hundred and twenty-five assistant surgeons with the rank of captain or lieutenant, according to their length of service. When an officer reaches the age of sixty-four years he passes from the active to the retired list, and each of those formerly below him on the active list gains a step upward in lineal rank toward the next grade. Retired pay is seventy-five per cent. of the pay received by officers of the same rank on the active list.

Medical officers in addition to their pay proper are furnished with an allowance of quarters according to rank either in kind or by commutation if there is no suitable government building available. When travelling on duty without troops an allowance of four cents per mile is provided, with reimbursement of money actually expended for railroad or other fare. In changing station, transportation is provided also for professional books and papers and for a reasonable allowance of baggage. Forage, stabling, and transportation for two horses are allowed to each officer. Groceries and other articles may be purchased from the subsistence department and fuel from the quartermaster's department at about cost price.

The hospital at every permanent military post is well provided with books, instruments, and apparatus for chemical and bacteriological work.

The stations of medical officers are changed every two or three years or according to the requirements of the service. The surgeon-general, in making assignments, considers the record of each officer so that no undue share of arduous duty or service at stations remote from the United States shall fall to any one officer.

Leave of absence on full pay is allowed at the rate of one month per year, and this when not taken during the year may be allowed to accumulate to a maximum of four months, which at the end of four or more years may be utilized as one continuous leave. Absence from duty on account of sickness does not involve loss of pay. Permanent disability incurred in the line of duty entitles an officer to be placed on the retired list.

Toward the end of his fifth year of service and prior to his promotion to the rank of captain the young medical officer is examined on his knowledge of Army Regulations, and the practical work, medical, surgical, sanitary, and official, involved in serving with troops. Again, when medical officers with the rank of captain approach the head of the list of officers of their grade they are usually assigned to duty as attending surgeons and examiners of recruits in the principal medical centres of the United States to enable them to become familiar with the practice of the leading physicians and surgeons and to attend medical lectures, meetings of medical societies, etc. These assignments are made for one year only in order that as many medical officers as possible may be enabled to avail themselves of the advantages thereby afforded. An examination follows to test their knowledge of the advances made in medicine and surgery during the years which have elapsed since their promotion to the rank of captain. Surgeons and officers of higher grade are not subjected to examination for promotion.

A brief *résumé* of the history of the army medical department finds an appropriate place in this article. The army of the Revolution had at first only regimental surgeons and their mates or assistants. The Provincial Congress of Massachusetts Bay required each candidate for a position in the medical department of the army to be subjected to a close examination by qualified medical men; and there was nothing *pro forma* in these examinations, for it is on record that no less than six of a set of fourteen were rejected on account of failure to come up to the standard. This system of examination for appointment has continued throughout the intervening years and is in force at the present time. After the fight at Breed's Hill a general hospital was established at Cambridge for the care of the wounded. Subsequently, general hospitals were established at Ticonderoga, N. Y., and at Williamsburg, Va. To provide these with the requisite medical officers, surgeons were appointed who belonged to no regiment, but to the hospital department in general as staff surgeons. This arrangement aroused a strong feeling on the part of the regimental surgeons, who protested against the removal of their sick and their reduction to the level of dispensary surgeons for the slighter ailments of camp. They claimed the right to take care of their own sick, and they were supported in this by a majority of the regimental and company officers. It is interesting to observe how mankind forgets its experiences. More than one hundred and twenty years afterward, during the Spanish-American war, the same clamor was raised by regimental surgeons of volunteers, their colonels and company officers, against the establishment of division hospitals and the necessary disestablishment of regimental hospitals as incompetent to meet the exigencies of active field service, although this incompetency had meanwhile been proved during the long years of the civil war.

To allay the jealousies between the two sets of officers, a bill was passed for the establishment of a medical department based on the organization of the British service. It provided for so many officers with high-sounding titles that General Washington is reported to have criticised the proposition thus: "The number of officers mentioned in the enclosed plan, I presume, are necessary for us because they are found so in the British hospitals." Experience during the remaining years of the war of the Revolution simplified the organization by removing many of the high-titled functionaries; and there seems no reason to doubt that had a little longer time been given, the establishment would have been resolved into a corps of medical officers taking rank each by seniority in his grade and assigned to duty in accordance with his rank.

For some years subsequent to the successful close of this war the army of the United States consisted of troops enlisted for short periods, with no provision for medical service other than that afforded by regimental medical officers.

In 1802 a new departure was taken in appointing army medical officers. The army at this time was so small that it was not possible for the few medical officers provided on a regimental basis to care for the sick of their commands, scattered as these commands were at various posts along the frontiers. Medical officers were therefore appointed to garrisons instead of to regiments. Additional troops levied in an emergency brought with them their regimental medical officers, and if the needs of the service required the establishment of general hospitals, surgeons of higher grade and rates of pay than the regular post surgeons were appointed for temporary service. In this manner the medical department was enlarged to meet the necessities of the army in the year 1812. During this war the only legislation materially affecting the department was a much-needed increase of pay for the regimental medical officers. Dr. James Tilton, who had been a hospital surgeon during the Revolution, was the chief of the department at this time with the title of "physician and surgeon-general." His management of affairs during the war appears to have given universal satisfaction. Many hospitals were established and broken up during the course of events, but all were well kept, fully provided with necessaries and competent for all the work thrown upon them. Some indeed, as that at Burlington, Vt., under the superintendence of Surgeon Lovell, Ninth Infantry, appear from the reports to have been model establishments. The regulations of these are extant, and it is readily seen that their high character was due to efficient administration, discipline, and cleanliness.

In 1818 a bill which organized the general staff of the army gave to the medical department for the first time in its history a permanent chief under the title of *surgeon-general*. To this position Surgeon Joseph Lovell was promoted on account of his excellent record. Hospital and garrison surgeons were consolidated under the title of *post surgeons*, and as these took rank after the surgeons of regiments, certain of the hospital surgeons who had served in high positions on important occasions had cause for dissatisfaction with the inferior status to which they were consigned by this arrangement.

The medical department was fortunate in having so able a man as Dr. Lovell appointed as its chief. He defined the duties of his subordinates, established an excellent system of accountability for property, improved the character of the medical reports, inspired his officers with the idea that as sanitary officers they had greater responsibilities than mere practising physicians and surgeons, and labored earnestly to have their pay increased and their official status raised in proportion to his views of the importance of their duties. He also established an equitable system of exchange of posts so that no officer would be retained unduly at an undesirable station.

In 1821 the finishing touches were given to the organization of the department by consolidating the regimental surgeons with the staff surgeons so that the corps consisted simply of one surgeon-general, eight surgeons with the rank and pay of regimental surgeons, and forty-five assistant surgeons with the pay of post surgeons; but as this number was insufficient to provide one medical officer to each of the military posts, the system of employing civilian physicians on contract was instituted.

Surgeon-General Lovell died in 1836 and was succeeded by the senior surgeon Thomas Lawson, then serving with troops in Florida.

Little of general interest occurred during the next ten years. The papers filed in the office of the surgeon-general during this period were arguments, opinions, and decisions on points connected with uniforms, rank, and precedence of medical officers and their right to enter into private practice in the vicinity of their stations. At last the concentration of troops on the Rio Grande and the probability of war with Mexico led to some changes. Two surgeons and twelve assistant surgeons were added to the medical staff, and ten new regiments were raised, each provided with one surgeon and two assistant surgeons. These were intended to be merely provisional appointments to be vacated at the close of the war. Ultimately, however, not only were the staff appointments made permanent, but ten additional assistant surgeons were authorized on account of the increasing needs of the department after the acquisition of California and New Mexico.

During the Mexican war the senior surgeons were assigned as medical directors and in charge of general hospitals; certain of the juniors were on duty at the hospitals and purveying depots, while the others served in the field as regimental officers with regular troops. Volunteer surgeons were on duty with their regiments, but some were occasionally detailed to hospital duties.

The additions to the numerical force of the medical department during and after the Mexican war proved insufficient for the needs of the many small garrisons into which our army became broken up; but although the surgeon-general repeatedly called attention to this, no increase was made until 1856, when four surgeons and eight assistants were added to the corps.

Surgeon-General Lawson died in 1861, shortly before the outbreak of the civil war. From the calls for large levies of troops and the feeling North and South that a desperate struggle was before the country it was evident that without large reinforcements the medical department would be unable to do its work successfully. At this time it consisted of one surgeon-general with the rank of colonel, thirty surgeons with the rank of major, and eighty-three assistant surgeons with the rank of first lieutenant and of captain after five years' service. In August, 1861, the addition of ten surgeons and twenty assistant surgeons was authorized. Some of this small staff corps took charge, as medical directors, of corps and armies, instructing the volunteer officers in the duties pertaining to camps and field hospitals; others acted as medical inspectors, aiding the directors in their work of supervision and education; some organized general hospitals for the sick that had to be cared for on every move of the armies, while others kept these hospitals and the armies in the field provided with medical and hospital supplies; the remainder were assigned to field service with the regular regiments and batteries.

Each volunteer regiment brought with it a surgeon and two assistants appointed by the governor of the State after examination by a State medical board. The senior regimental surgeon of each brigade became invested with authority as on the staff of the brigade commander, but as seniority in many instances was determined by a few days or weeks, it often happened that the best man for the position was not secured by this method. Congress therefore authorized a corps of brigade surgeons of volunteers, who were examined for the position by a board of regular medical officers. One hundred and ten of these brigade surgeons were commissioned.

In April, 1862, a bill was passed by Congress to meet the pressing needs of the medical department. This gave the regular army an addition of ten surgeons and ten assistant surgeons, and provided for a temporary increase in the rank of those medical officers who were holding positions of great responsibility. It gave the surgeon-general the rank, pay, and emoluments of a brigadier-general; it provided for an assistant surgeon-general and a medical inspector-general of hospitals, each with the rank of colonel, and for eight medical inspectors with the rank of lieutenant-colonel. These original vacancies were filled by the President by selection from the army medical officers and the brigade surgeons of the volunteers, having regard to qualifications only, instead of to seniority or previous rank. At the end of their service in these positions, officers of the regular force reverted to their former status in their own corps with such promotion as they were entitled to by the casualties of the service during their temporary occupancy of these war positions. About the time of this enactment Surgeon-General Finley, Lawson's successor, was retired at his own request after forty years' service, and Assistant Surgeon William A. Hammond was appointed the first surgeon-general with the rank of brigadier-general. In December following eight more inspectors were authorized. Their duties were to supervise all that related to the sanitary condition of the army, whether in transports, quarters, or camps, as well as the hygiene, police, discipline, and efficiency of field and general hospitals; to see that all regulations for protecting the health of the troops and for the careful treatment of the sick and wounded were duly observed; to examine into the condition of supplies and the accuracy of medical, sanitary, statistical, military, and property records and accounts of the medical department; to investigate the causes of disease and the methods of prevention. They were required also to be familiar with the methods of the subsistence department in all that related to the hospitals and to see that the hospital fund was judiciously applied. Finally, they reported on the efficiency of medical officers and were authorized to discharge men from the service on account of disability.

Shortly after this the corps of brigade surgeons was reorganized to give its members a position on the general staff similar to that of the army medical officer and to render their services available to the surgeon-general at any point where they might be most needed, irrespective of regimental or brigade organizations. They henceforth became known as the *corps of surgeons and assistant surgeons of volunteers;* and the appointment of forty such surgeons and one hundred and twenty assistants was authorized.

In the military service promotion should be the reward for duty well performed, but during the War of the Rebellion little incentive of this kind was offered to medical officers. Surgeons with the rank of major had nothing to look forward to. They saw their comrades of the line, formerly their equals or inferiors in rank, mount upward step by step. They saw at the same time that a medical officer on duty as a medical director had only this same rank of major, although responsible for the work of five or six hundred officers, one-third of whom had the same rank, pay, and emoluments as himself. Not until toward the close of the war did Congress recognize the responsibilities of certain medical officers by giving the rank of lieutenant-colonel to medical directors of corps and of colonel to the director of an army.

During this great war the work of the medical department was performed by the regular medical officers and the corps of volunteer surgeons and assistant surgeons, both commissioned by the President, and by the large body of regimental medical officers commissioned by the governors of States. In addition to these, civilian physicians were employed under contract, mostly in the wards of the general hospitals established in the vicinity of Washington, D. C., and other cities. Just before the close of the war another class of medical officers was authorized. Regimental surgeons whose regiments had been mustered out on the expiration of their term of service were offered positions as acting staff surgeons as an inducement to continue in the service.

The latter part of the year 1865 was devoted to the breaking up of the depots and general hospitals, and next year the medical department was again placed on a peace footing with a personnel consisting of a surgeon-general; an assistant surgeon-general with the rank of colonel; a chief medical purveyor and four assistants, lieutenant-colonels; sixty surgeons, majors, and one hundred and fifty assistants, captains and lieutenants. In 1872 provision was made for a chief medical purveyor, with the rank of colonel; but in the mean time promotions and appointments were interdicted, so that at this time the reports of the surgeon-general speak in urgent terms of the crippled condition of his department. In 1873 there were fifty-nine vacancies, and to meet the requirements of the service one hundred and eighty-seven surgeons had to be employed on contract. At this time Congress authorized the appointment of assistant surgeons, but cut off two of the assistant medical purveyorships and ten of the sixty surgeons, prohibiting promotion until the number became thus reduced.

In 1876 the arguments in favor of increased rank for the medical corps were favorably considered by Congress, for in addition to the existing grades there were authorized four surgeons, colonels, and eight lieutenant-colonels, but the number of assistants was cut down to one hundred and twenty-five. No change has taken place since then except that of conferring on the lieutenant-colonels and colonels the respective titles of deputy and assistant surgeons-general, to correspond with similar titles in the other staff departments.

During the Spanish-American war the medical department of the army consisted of the regular establishment, with United States Volunteer surgeons appointed by the President, regimental surgeons and assistant surgeons appointed by the State governors, and surgeons under contract with the surgeon-general. At the present time (February, 1900) the regular establishment remains unchanged. The medical officers of the United States Volunteer regiments now serving in the Philippine Islands are appointed by the President, the State officers having all been mustered out with their regiments. The insufficiency of the present organization is such that over three hundred and fifty medical men are now serving under contract. It is hoped that the present Congress in legislating for the army will provide for the needful increase of the medical department. *Charles Smart.*

ARMY MEDICAL STATISTICS.—Broadly speaking, the main causes affecting the health of troops are the manner of living, the environment, and the food supplied. The first relates to the occurrence of overcrowding, imperfect ventilation, want of cleanliness, and inattention to personal hygiene. The second is typified in the accidents arising from atmospheric or telluric influences, such as rapid death from heat and cold, the comparatively transient influences of the seasons, and the slower and more durable effects of climate as modifying diseases of a restricted habitat. The last cause concerns the diseases brought about directly or indirectly by vicious alimentation. There are no diseases peculiar to the soldier; but military conditions are frequently such, particularly during a campaign, that the germs of disease are widely disseminated among an especially susceptible body of men—and hence a larger number are attacked and succumb than would probably have been the case in civil life. In character, the diseases developed in the military establishment call for no remark unless it be their unusually severe type, the regularity with which outbreaks of some affections recur, and the frequent tendency of others to become endemo-epidemic. The prevailing diseases in armies are, naturally, largely acute; and a large proportion of them are zymotic and hence theoretically preventable.

The purpose of army medical statistics is to define the influence of military life upon health and to permit the ready appreciation and accurate comparison of varying conditions of service and environment in their relation to the well-being of the soldier. Since each case of sickness in the military establishment at once becomes a matter of official record at the hands of competent observers, it follows that statistics so obtained are not only more comprehensive but more accurate than those bearing on the occurrence of disease among civilians. Unfortunately for their general utility, however, they are based upon a physically superior class, always existing under restricted and unusual conditions and frequently in unfavorable surroundings, and hence deductions which may be drawn from them cannot be legitimately applied outside the limits of the military service. Unfortunately, also, owing to the different systems of nomenclature and classification of diseases which have prevailed in the past, as well as to other causes which will be referred to later, it is not always possible accurately to compare the