

were reported as having been sunstruck; but in the operations of the French army in Mexico insolation was rare, probably through the altitude of the region in which the campaign was conducted. Viry states that, on July 8th, 1853, two-thirds of a Belgian regiment were struck down by heat during a march; and that during the last war in Italy, on a hot July day, no less than 2,000 men of one division of the French army fell in the ranks from sunstroke. In 1878 the Austrian troops occupying Bosnia lost many men from this cause; one regiment on the march having 320 cases with 31 deaths, while the total number of cases of insolation during the campaign amounted to 2,131. Sunstroke is said to be particularly common in Germany, and it is stated that on May 21st, 1827, the troops manœuvring near Berlin were completely disorganized by heat—entire sections falling along the route and the cavalry losing many horses. During the recent war in South Africa the British lost many men from sunstroke. In our own service but little marching has, in the past, been done during the heated season, but during the ten years 1888-97 there were nevertheless 523 cases of heatstroke. During the campaigns in Cuba, Porto Rico, and the Philippines, the number of cases of sunstroke was very large.

It is excess of internal heat rather than sunshine which results in the phenomena known as insolation; and hence the condition may occur at night if the atmosphere, while hot, is saturated with moisture, and heat dissipation, as accomplished by evaporation of perspiration, is imperfectly carried on. Insolation rarely occurs at a high altitude and in a dry climate, no matter what the temperature. Laveran and Regnard have found that as soon as the bodily temperature exceeds 40° C. (104° F.) it begins to exercise a marked influence upon the nervous system, the effect being greatly increased if the head is exposed to the direct solar rays. Death results from primary stimulation and subsequent paralysis of the nervous system by heat. Exercise is a great factor in the production of heat-stroke. Animals made to undergo violent exertion succumb more readily than do those allowed to rest quietly—and in the army it is the infantry troops which are most affected, cavalymen being less liable to sunstroke than are their horses. Exercise greatly raises internal temperature, and Hiller found that the rectal temperature in soldiers after a hard march was that of a high fever. Anything which interferes with the loss of body heat increases liability to sunstroke; this including too heavy clothing, diminution of perspiration through deficient water supply, or lowering of the processes of evaporation through excessive humidity. If the atmosphere is both hot and moist, the loss of heat by the lungs is largely impaired; and in a marching column carrying with it a close atmosphere saturated with moisture, the men in the centre of the ranks are the ones most liable to sunstroke. The period of digestion is favorable to insolation; and debilitated or intemperate soldiers are the most in danger. Insolation is undoubtedly aided by the pressure of tight uniforms or of the belts and straps by which the soldier's load is suspended from his person. McCartie, in India, records a striking instance in the Chitral campaign of 1897, when sufficient coolies could not be obtained and part of the baggage had to be carried by native soldiers. Before the end of the march nearly all the men in the ranks were completely exhausted, and some had heat apoplexy, while their companions, carrying a much heavier weight but having assumed the light and loose native dress, were not in the least disturbed.

Some of the symptoms of heat-stroke are said by Notter to be caused by the reflected rays of the sun through the orbit. In the British service neutral-tinted glasses are frequently worn in the tropics, and were found of much value in the Egyptian campaign of 1882.

The advance to the condition of insolation is gradual, and its occurrence can be largely prevented by proper observance of sanitary detail. The march should be so planned as to avoid exposure during the heat of the day; and, if possible, the direct rays of the sun should not

fall on the men's backs while marching. The length of the distance ordinarily traversed in temperate climates or cool weather should be diminished, or rapidity of movement lessened. Usually, in hot weather, a march of ten miles must be considered a good day's work. The weight to be carried should be reduced to the minimum. In the tropics troops should carry nothing but the arms, ammunition, and canteen; a sufficient number of coolies, pack animals, or wheeled vehicles being provided to secure the transportation of the baggage and the remainder of the equipment. Troops should march in as open order as possible the better to allow access of fresh air to each soldier. Halts should be as frequent as possible, and at points well shaded, elevated, and airy. For such stops ravines, especially if dry or sandy, should not be chosen. During such halts the men should not lie down, since in very hot weather, particularly if the ground be bare, the soil is heated to a greater degree than the atmosphere. Soldiers should have plenty of water, and canteens should be replenished as often as a suitable supply is encountered en route. Where the supply of water is liable to be insufficient, special arrangements must be made for its carriage with the column. The use of alcohol before or during a march should be interdicted. The clothing worn should be suited to the climate or season, should be loose, and should well protect the head and back of the neck. Since sunstroke is by many believed to be due to the actinic solar rays, the lining of the hat and blouse with dark green cloth may be desirable. A heavy meal should not be taken immediately before marching. Company officers should watch their men carefully with respect to sunstroke. If a soldier looks pale, weak, and exhausted, he should be spoken to sharply, and if he does not respond clearly he should be told to fall out and rest or await transportation. By this precaution many cases of insolation may be avoided. When the condition of insolation has once occurred, the soldier is usually unfitted for further military service, being particularly liable to future recurrences. For the military service it may be accepted that "once sunstruck is always sunstruck."

CONGELATION.—While sledging expeditions in the Arctic have been exposed without suffering to continuous cold of as great an intensity as -50° F., soldiers, on the other hand, have often been known to succumb to cold in comparatively mild climates and when the thermometer registered by no means a very low temperature. It may fairly be considered that accidents from this cause are relatively more frequent in the cold weather of temperate climates than in the far north, probably because of the more careful precautions taken for the conservation of the body heat under the latter conditions of climate.

Since the famous retreat of the Ten Thousand, when the rigors of climate destroyed more Greek soldiers than did the Persians, great cold has frequently exerted a strong influence upon military operations. Voltaire states that in the winter of 1709 a large part of the army of Charles XII. was destroyed by cold, 2,000 men being frozen to death during one march. In 1719, 7,000 Swedes, on their way to the siege of Drontheim, perished in the mountains between Sweden and Norway; while in 1742, in the retreat from Prague, 4,000 French soldiers died from cold and exposure. The sufferings of our own forces at Valley Forge, during the Revolution, are a matter of history; and in the destruction of Napoleon's army in Russia cold was by far the greatest factor. During the Crimean War, according to Viry, there were 5,290 cases of frost-bite with 1,179 deaths among the French troops; while among the English forces the numbers amounted to 2,852 and 463 respectively. Laveran states that during the Franco-Prussian War, freezing of the feet caused much suffering in the French army and there were many deaths from cold. In 1879, according to the same authority, a column of 755 men in the field in Algeria, at the end of March, had 60 cases of frost-bite, of which 19 died. In our own service, during the decade 1888-97, there were 648 cases of frost-bite reported, of which 141

occurred in 1888. It should be remembered, however, that but a small part of our forces were stationed in regions in which congelation was liable to occur to any extent, and hence the cases reported were necessarily furnished by a relatively small fraction of the whole army. The history of congelation in armies shows that a state of low vital resistance, brought about by unfavorable hygienic conditions, plays almost as great a rôle as cold itself; and it is a matter of common observation that freezing occurs by far the most frequently among such soldiers as are weakened by fatigue, sickness, and privation. During the Crimean War the temperature encountered was never very low, and a report made at the time suggests that the large number of congelations observed might justly be regarded as "gangrene owing to scorbutic tendency exaggerated by cold." On the other hand, troops which are well fed and warmly clad resist the most intense cold without injury, as has been repeatedly shown in our winter campaigns against the Indians of the northwest. In the Powder River Expedition of 1876, conducted during the three winter months, with the mercury never above freezing and often down to -40° F., Rosse states that in a force of 2,000 men but 31 cases of frost-bite occurred, while in the 350 Indians with the command no cases were reported. During the winter of 1890-91, when about 6,000 troops were constantly in the field against hostile Indians, only 62 cases of congelation occurred in the entire army.

The phenomena which precede the death of the soldier from cold, while on the march, are well described by Larrey: "The dangerous condition is shown in the pallor of the face, by a kind of idiocy, by difficulty in speaking, by feebleness of vision or perhaps total loss of that sense; and in that state they march for a greater or less length of time, conducted by their friends; the muscular action is weak, and the individual totters on his legs like a drunken man. This weakness is progressive and is a certain sign of the extinction of life. Separated from the column and abandoned to themselves, they soon lost their balance, fell into ditches covered with snow, a state of lethargy ensued, and a few moments terminated their miserable existence."

Muscular contraction is sometimes seen, particularly of the neck muscles, together with symptoms like those of catalepsy. According to Forestius, soldiers have been found frozen standing with their arms in their hands; and the same thing was observed by Larrey during the retreat from Moscow.

In the prevention of freezing, an abundance of nutritious and fatty food is second only in importance to sufficient and proper clothing. The extremities are usually the chief points of attack, owing to their relatively poor protection and distance from the main sources of systemic heat. The feet particularly are susceptible to frost-bite, a fact showing the necessity of warm protection and water-tight, loose, and comfortable footwear. To protect the hands, heavy gloves or mittens are essential. The latter are preferable, and the Japanese army uses a mitten with a single division into which the trigger finger can be slipped when desired. It is of advantage, in diminishing the effect of cold upon exposed surfaces, particularly when marching in driving snow storms, thoroughly to anoint the parts with some greasy substance, as beef, pork or mutton fat, or vaseline. Whenever possible, hot food or drink should be served out to troops on the march, unless the latter be short—stops being made and fires kindled for the purpose. In the Russian and Austrian armies, during cold weather, kettles filled with hot soup and enclosed in heavy felt are carried in wagons with the column. Even in the coldest weather the soup is said to remain warm for four or five hours. If a march must be made in extremely cold weather, it should be got through with as soon as possible without undue fatigue, the ranks being kept well closed up and straggling being prevented. In general, however, if an army is well fed, well clothed, and free from sickness, it can undertake a winter campaign with perfect safety, provided the distances to be covered are not too long.

Guard duty is particularly dangerous during cold weather, and sentinels should be kept on post not more than an hour at a time, or a running guard may be established. When relieved from sentry duty, soldiers should not be permitted at once to lie down, but should be required to pace briskly around the fires until numbness has worn off. Under stress of severe weather men should be told off to keep up the fires.

SNOW-BLINDNESS.—The glare of bright sunlight upon fields of snow produces the condition known as snow-blindness, particularly when troops are subjected to prolonged marching toward the end of winter or in the early spring in cold climates. Since in our service soldiers are ordinarily housed in barracks during cold weather, the admission rate for this cause is usually low. Where field service is required in winter the rates are much increased; and during the winter of 1890-91, when our troops were engaged against hostile Sioux, there were 133 admissions to sick report from this cause. In a company fifty strong marching sixty miles in Montana during three days of March, 1894, nearly the entire command was rendered unfit for duty by reason of snow-blindness.

The condition may usually be prevented among soldiers by smearing the eyelids and upper part of the cheeks with a mixture of charcoal and grease; but when exposure is constant some further protection is necessary. For this purpose dark goggles, fitted in frames covered with chamois skin, have been recommended. The "snow-eyes" of the Esquimaux are made of light wood with the bridge resting on the nose, like spectacles, and presenting narrow transverse slits for the passage of light. These are said to be superior to goggles as a protection, can be readily made by the men, and are not liable to the accident of fracture. Under any circumstances where snow-blindness is to be apprehended, the men should be marched in close column and each soldier directed to keep his eyes on the dark clothing of the man in front of him, the leading rank being changed frequently to the rear.

DISEASE DUE TO IMPROPER DIETARY.

SCURVY.—*Occurrence.*—Scurvy, from time immemorial down to a comparatively recent period, has been the scourge of armies, especially during campaign. In the thirteenth century scurvy ravaged the hosts of the Crusaders; and it appears to have been almost continually present during active military operations until within the last score of years. The history of its epidemics could be multiplied almost indefinitely. At Thom, in 1703, during the Spanish siege, 6,000 men died of scurvy. During the Napoleonic wars it crippled the efficiency of the French troops in Egypt; in 1801, and in 1807 and 1808, it ravaged the garrisons in Prussia. In the war of 1812 it was noted as largely occurring among our troops; and Rosse states that among 1,016 United States soldiers marching to and garrisoning Council Bluffs in 1820, the number of cases of scurvy was 516, and the number of deaths from this cause 168. The disease occurred among our troops, to some extent, during the invasion of Mexico; and for the eighteen years prior to the outbreak of the Civil War the average annual admission rate was 26.3 per thousand strength. During the Crimean War 23,365 cases of scurvy occurred in the French army; the Turkish force was almost destroyed by it, and the cases in the British army amounted to 17,557. In the various base hospitals at Constantinople, according to Marvaud, there were treated in 1855 no less than 14,879 cases, of which 1,407 died; in 1856 there were 10,295 cases with 1,509 deaths. It was present during our Civil War, and its recognition was a surprise and shock to professional ideas preconceived from practice in civil life. In spite of all effort to the contrary, there were 46,913 cases of this disease during the period 1861-66, giving an admission rate of 19.80 per thousand. There were during the same time 771 deaths directly ascribed to scurvy; but, obviously, no record of its well-known influence in bringing other diseases to a fatal termination

was to be made. After the conclusion of the Civil War the disease prevailed to a great extent among troops serving at frontier stations, there having been 887 cases in 1868 and 211 cases in 1869. There were 115 cases in 1871, after which the rates for this disease fell rapidly on account of the greater facilities afforded troops for procuring vegetables—both by better means of communication and from the gardens which were gradually established at military posts. In the first few years after the Civil War there were several minor outbreaks of great severity.

During the Franco-Prussian War, while the number of cases of scurvy was not great, a general scorbutic tendency was thought to have done much to increase the mortality of the troops. Rosse states that in the Russian army, in 1873, the number of cases amounted to 5.3 per cent. In the Russo-Turkish War of 1878 it was present in both armies. In our own service, for the decade 1885-94, there were 27 cases, of which 18 occurred in 1888 and 5 in 1889. From 1892 to 1898 inclusive, only a single case was reported. The addition of fresh vegetables to the ration, in 1890, was undoubtedly most potent in removing the scorbutic predisposition previously existing among our troops. In the British service a few cases, in spite of all precautions, are constantly present; particularly among troops in India, in which for the decade 1887-96 the rate of admission was 7.4 per thousand. The admissions for the decade 1888-97, for the entire British army, were .4 per thousand. In the German army in 1897 there were reported 74 cases of scurvy and purpura. Coustan states that, in the French service, a number of minor outbreaks have recently occurred among troops stationed in Algeria. For the Russian and Austrian armies, the rates of admission per thousand strength have lately been as follows:

Year.	Russia.	Austria.	Year.	Russia.	Austria.
1892.....	1.7	1.7	1895.....	1.5	1.4
1893.....	1.9	2.3	1896.....	1.3	1.0
1894.....	1.7	1.2	1897.....	1.2	1.0

Through a better knowledge of its etiology, scurvy is now quite rare among troops. Its insidious character, however, favors a possibly unnoticed invasion, its infrequency renders it unfamiliar, and the very knowledge of the means possessed for its prevention gives a false idea of security. It is a mistake to regard scurvy as being attendant solely on the unhygienic conditions of past centuries, long voyages, famine diets or special cases of privation. The dyscrasia, for troops in the field, is rather to be regarded as merely latent and requiring but a temporary interference with the distribution of supplies, and a brief subjection to depressing influences, to render its existence apparent; though not necessarily in the aggravated form with which the continued action of its cause characterized it in former times. The imminence of scurvy, where a proper nutritive standard is departed from, should be fully appreciated by the sanitary officer.

Cause.—Scurvy is due to an illy balanced dietary in which fresh vegetables and their salts are deficient. Salt meat, and fresh meat which has undergone putrefactive changes but is still eatable, are considered to favor the occurrence of scurvy. As predisposing causes may be mentioned excessive fatigue or overcrowding of quarters. Cold and humidity are also powerful factors, although scurvy is by no means uncommon in warm climates. Besides these, depression of spirits, nostalgia and lack of exercise play no unimportant parts. As illustrating the latter point, an instance is given in which a number of prisoners of war were removed on board ship and fed on exactly the same diet as those on shore. The prisoners on ship contracted scurvy—those on shore did not.

Scurvy, occurring in the military service, usually at once assumes an epidemic character, through the reason

that large numbers of men are at the same time exposed to the conditions to which the disease owes its origin. From this fact, scurvy was long thought to be contagious. The disease is a great respecter of military rank and rarely occurs in officers, a fact due to their better nutrition and lessened exposure to depressing conditions. It has a marked tendency to attack convalescents—and may frequently be associated with other diseases, to whose attacks it imparts additional severity. In the Crimean War, typhus occurring in a scorbutic patient was said to have been uniformly fatal. Winter is particularly the season when scorbutic manifestations appear, this being the season when fresh vegetable material is scarce and troops are largely confined, through the inclemency of the weather, in the vitiated air of their quarters. Sometimes, however, scurvy occurs in the autumn. This was the case at the Crimea, when, in a period of three months, 500 cases occurred among the French troops.

While the symptomatic diagnosis of scurvy is not a subject for discussion, it may be here remarked that scurvy, in the military service, is usually seen in the early stages, at which time it not infrequently simulates muscular rheumatism and is liable to be mistaken for the results of simple exposure to wet and cold. The characteristic symptoms of the disease are later manifestations. Among the conditions not infrequently present as a result of scorbutus are acro-dynia and hemeralopia, or night-blindness. Both have prevailed epidemically in armies. Hammond noted the presence of hemeralopia among our troops in Kansas and New Mexico, and even as late as 1884 it figured in the returns for the army. During the Crimean War both French and English were attacked, and after the capture of Sebastopol the number of hemeralopics was so great in the French army that certain regiments could not furnish the necessary number of men to mount guard. The condition has repeatedly been caused to disappear by improvement in the character of the food supplied. In this connection, mention may be made of ulcerative stomatitis, which, formerly common in armies, is now rare. This affection undoubtedly depended upon a scorbutic tendency and lowered powers of resistance resulting from malnutrition. Coustan mentions 19 epidemics of it as having occurred in the French army between the years 1793 and 1877.

Prevention.—Scurvy is entirely avoidable, and its existence is a reproach to the sanitary officer. The disease would rarely occur if the character of the food supplied corresponded with the natural cravings of the individual, and it is only where the use of a restricted and improper diet is required that its occurrence is possible. At the present day its existence is evidence of lack of sanitary administration or short-sighted economy—either being inexcusable. The prevention of scurvy is accomplished by the administration of citric, tartaric, malic, acetic and lactic acids or their salts. These are best given in the juices of fresh, succulent vegetable material; fresh fruits, tubers, roots and leaves being better than seeds, while the leguminosae have no antiscorbutic virtues. The raw potato, onion and tomato are especially valuable. Fresh cabbage is excellent, being better than sauerkraut. Radishes are also valuable. Where such vegetables can be obtained in abundance scurvy will not appear. For troops in the field the dandelion and lamb's quarter are frequently available, and may be boiled and eaten as greens. The yellow mustard and cresses can be used as salad, while the young shoots of the poke-weed serve an excellent purpose as a vegetable. In some regions the so-called scurvy grass, or cochlearia, will be found. Woodhull especially recommends the agave as an antiscorbutic. To prepare it the leaves are cut off close to the roots and cooked well in hot ashes. The juice is expressed and taken, either raw or sweetened, in the proportion of one to four wineglassfuls several times daily. The white interior of the leaves may be eaten. All the varieties of the cactus are useful, in the absence of other vegetable material, in the prevention of scurvy. In general, fresh vegetable matter of any

variety can be used with advantage, provided only that it has no harmful qualities. Made into soups, nearly all are tolerably palatable.

Wherever the authorized issue of vegetables is scanty, the supply should be increased, from outside sources, by every means possible. Dried vegetables are antiscorbutic, but much less so than the fresh; the vegetable acids being probably decomposed by heat and keeping. When the vegetables are desiccated and compressed, a considerable proportion of these acids and their salts are removed, and what remains is too often largely cellulose. It is said, however, that our forces in the expedition to Utah, against the Mormons, owed their preservation from scurvy largely to the use of desiccated vegetables, at a time when nothing else of an antiscorbutic nature could be obtained. The use of fresh vegetables should never be superseded by the preserved article when the former can be obtained. Fresh fruits, especially lemons, limes, grapes, oranges and acid fruits generally, are excellent antiscorbutics. Even unripe fruits are better than none, and diarrhoea may at times be hazarded for the sake of their valuable properties. Dried and canned fruits are also of advantage. Preserved lime juice has been much used on shipboard in the prevention of scurvy. It has long been employed in the British army and navy, and forms part of the British field ration, in the proportion of half an ounce daily, in the absence of fresh vegetables. Excellent results have long followed its use, and it could be adopted with advantage in our own service for similar conditions. Good beer and wine appear to have decided antiscorbutic value. Spruce beer has been made and used with advantage. Vinegar, one-half to one ounce daily, should be used in the cooking or taken with pickles; it was much used as an antiscorbutic in the armies of antiquity. It has long been known that those who eat large quantities of under-done fresh meat, even though a limited amount of vegetable material is used, escape scurvy. This antiscorbutic quality of meat is largely destroyed by cooking, probably through the splitting up, under heat, of the lactic acid which it contains. It is a matter of common observation that Indians and Esquimaux, who may eat no vegetable material for considerable periods but who habitually use meat either raw or in a partially cooked condition, are not affected with scurvy—and the same is true of whites who follow their example. At times when scurvy was very prevalent in our western garrisons, the hunting parties sent out to procure fresh supplies, living largely on under-done flesh, were notably exempt from this affection. The value of raw meat as an antiscorbutic has been repeatedly noted by Hayes, Kane and other Arctic explorers. Kane wrote: "Had we plenty of frozen walrus I would laugh at scurvy." Pemican, prepared with fat, sugar, raisins and currants, is an excellent antiscorbutic for cold climates and is much in vogue with travellers in the far north.

Where fresh vegetables cannot be obtained, the administration of the vegetable acids, especially tartaric and citric acids, combined with an alkali, is highly desirable to prevent the occurrence of scurvy. Since the disease is favored in its occurrence by confinement, impure atmosphere, cold, dampness and mental depression, any unfavorable conditions of this character should be remedied and every effort made to elevate the physical and mental tone of the soldier.

DISEASES DEPENDENT ON MILITARY SERVICE.

IRRITABLE HEART IN SOLDIERS.—A well-defined group of symptoms, for want of a more scientific designation known as "irritable heart of the soldier," has received considerable attention from military and medical writers in this country, notably from Taylor and Da Costa. The condition is one which was long practically found only in soldiers, but is now not infrequent in athletes and is common in bicyclists. At the outset the trouble is purely functional in character, but when the exciting influence is long continued it is capable of ulti-

mately producing organic lesions. Many different degrees of the affection are therefore observed.

The condition usually occurs in young and untrained soldiers, especially when weakened by disease or privation, during the occurrence of forced marches and particularly in warm weather. The general symptoms may be indefinite, but the soldier usually complains of pain in the chest and inability to carry his equipment on the march without losing his breath. The pulse is weak, intermittent and dicrotic, and there is the general appearance of exhaustion. Often there is dizziness, which may be more pronounced at night. In more pronounced cases there are gastric disorders, the mind, memory and voice are temporarily enfeebled and the walk is weak and uncertain. Slight murmurs may be noted, and there is usually dilatation of the cardiac chambers, often excessive. The right ventricle is the one usually dilated because of its thinner walls and the greater proportionate strain to which it is subjected. The action of the heart may be seriously impaired or even paralyzed through the stretching and separation of the muscular fibrillae. Permanent and serious impairment of the cardiac function at times results, though the symptoms of heart strain may disappear as long as active exertion is not required. A number of cases immediately fatal through cardiac paralysis have been noted, although the condition must be regarded rather as chronic than acute.

As a result of an examination of a body of soldiers who had marched a distance of fifty miles, Teissier noted that the apex of the heart was displaced outward, that its breadth was increased, and that the venous circulation was impaired. The action of the heart was short and irregular, and a well-defined cardiac murmur was present. The arterial pressure was considerably lowered. Similar results were observed by Coustan. According to Taylor, at the battle of Corinth, during the Civil War, of two companies which had engaged in a lively reconnaissance one-fourth of the men returned in a state of complete exhaustion, while three men had dropped from the ranks from cardiac syncope and were supposed to be dead.

The condition is brought on by great physical exertion, particularly in the absence of preliminary training, and especially in such men as may be affected with latent cardiac weakness, not discoverable on ordinary physical examination. The habitual use of alcohol and tobacco appears to favor it, but syphilis has not been shown to play a part in its occurrence. Restricted respiratory function should be regarded as an important exciting cause of heart strain, and its occurrence is largely favored by the mechanical compression of the chest wall by tight clothing, belts, and the weight and mode of carriage of the equipment. With modern improvements in these respects the affection has become less frequent.

Coustan states that cardiac irritability not rarely occurs in cavalry soldiers, especially inexperienced riders mounted on hard-trotting horses.

Irritable heart generally has a good prognosis so far as the individual is concerned—but even under the most favorable conditions the soldier is usually disqualified for future hard service; for the same influences which originated the affection will operate even more powerfully in a weakened organ.

Should a soldier on the march present symptoms of heart strain, any tight clothing should be loosened, his equipment removed and he be furnished with wheel transportation. Continuance of exertion in such a case can result only in serious permanent injury to the individual. The treatment is symptomatic, with rest as an essential feature. Prophylaxis depends upon the elimination from the military service of soldiers who at any time show symptoms of cardiac weakness. The length and rapidity of marches should be kept within reasonable limits, and soldiers, especially raw troops, should not be forced to perform tasks beyond their powers except under pressing military necessity. The weights carried should be as light as military conditions permit, and should be properly disposed upon the person. Any constriction of the chest should be avoided.

FEBRILE EXHAUSTION.—A so-called "fever of exhaustion" has been described by Coustan and others. The affection often occurs in troops during campaign or hard marches, especially in warm weather. It occurs chiefly in infantry after rapid marching, but mounted soldiers are not infrequently affected. Recruits are particularly liable to its occurrence. The symptoms are somewhat variable, but include a remittent temperature, a tendency to adynamia and marked nervous depression. Usually there are headache, insomnia, restlessness and severe lumbar pains. The urine is scanty, red, and turbid, but becomes clear in about twenty-four hours. The muscles which have been excessively fatigued are sometimes sore to the touch for several days. Diarrhea is a prominent symptom, and during a severe march the alvine discharges of the men become noticeably frequent and watery. Vomiting not rarely occurs. The condition is generally regarded as being due to an excess of acid produced in the muscles under the influence of muscular work, and in its action on the muscular fibres it diminishes their contractility. The local pains are thought by some to be due to minute lesions occurring in the muscles as a result of excessive use, and resembling those which occur from prolonged massage. The substances given off as a result of muscular work may affect the nervous centres in the production of nervous depression and fever; while the diarrhea probably depends upon relaxation of the mucous membrane and upon the large amounts of fluid drunk to replace the losses by perspiration.

The prevention of this affection obviously depends upon proper conduction of the march. The treatment includes rest, with sometimes warm baths.

FEIGNED DISEASES.—No reference to the diseases of the soldier would be complete without mention of the intentional simulation of disease—not uncommonly observed in the military service, and for the detection of which medical officers are constantly on the alert. The feigning of diseased conditions of mind or body has always been a favorite method with all classes of people for securing betterment of condition, relief from distasteful duty or the evasion of punishment, and this is particularly the case among soldiers, whose medical assistance is gratuitous and whose pay and subsistence are assured without the necessity of securing them by constant personal effort.

By far the most elaborate and persistent efforts at deception are those which occur in time of war, when recruits endeavor to escape draft or to avoid duty on the firing line. In time of peace the conditions simulated are usually simple, and the claims as to their existence are not long continued. Sometimes, however, as where an effort is made to secure discharge from the service, the symptoms feigned are extremely complex and are maintained with great pertinacity. The disease selected for simulation, and the persistency with which its symptoms are exhibited, are for the most part determined by the familiarity possessed, or thought to be possessed, by the malingerer with reference to it. In general, some morbid condition the symptoms of which are largely subjective, as muscular rheumatism or neuralgia, is selected. Another condition not infrequently simulated is that of involuntary nocturnal enuresis, and this fraud, with the above, is especially difficult of demonstration. Among the affections feigned may also be mentioned various fevers, diarrhea, dysentery, chorea, epilepsy, hysteria, hemorrhages, apoplexy, imbecility, insanity, coma and even death—in fact, the diseases simulated belong to every department of medicine. Not infrequently such a varied array of symptoms is presented to the medical officer as would scarcely suggest any known affection. The degree of success of the attempt at simulation naturally depends upon the skill with which it is executed, and this is influenced by a more or less comprehensive knowledge of the symptoms of the affection selected and the degree of natural cunning possessed by the malingerer. Usually the imitation is imperfect and readily to be detected; but occasionally an instance is found in which every effort to prove the case to be fraudulent, even where it

is a moral certainty that such is the fact, meets with only negative results. In most instances, careful questioning and observation suffice to expose the fraud. In other cases it often becomes necessary, while apparently agreeing as to the reality of the affection, to confine the patient to bed, place him on low diet and administer disagreeable potions. Under such treatment recovery is usually rapid. Where rheumatism or neuralgia is simulated the use of the actual cautery may be advisable, but in general every case must be treated according to circumstances. At times the inconvenience and suffering unhesitatingly endured by the malingerer are truly remarkable.

The prevention of malingering can be largely accomplished by careful investigation of each case on the part of the medical officer, whose knowledge of the personal character of the individual, gained by contact or by inquiry of his company officers, will largely aid him in arriving at a correct conclusion. Men of unstable or undesirable character, who present no objective symptoms of disease, should in general be promptly returned to duty. Where conditions are such that the fraud can be definitely proven—which, unfortunately, is rarely the case—the offender should be tried by court-martial and severely disciplined. In general, the personality of the medical officer is a factor of no small importance in determining the amount of malingering in a command.

Edward L. Munson.

CAMPANULACEÆ.—(The Harebell or Lobelia family.) This family, of some two score genera and more than a thousand species, is of greater interest through its poisonous species than through its medicinal value. Its plants represent every habit, though the most of them are herbs and there are no large trees among them. The juice is milky and the flowers are mostly showy. They inhabit all except very cold countries. Of the three sub-families, the first, *Campanuloidæ*, is much more closely related, in composition and properties, to the distinct family *Cichoriaceæ* than to the remainder of its own family, and it appears, from various considerations, to be a mistake to class these and the third sub-family, *Lobelioidæ*, in the same family. The *Campanuloidæ* are not poisonous, but, on the contrary, produce numerous wholesome and nutritious roots, containing inulin, and some of their fruits also are edible. Of the *Lobelioidæ*, on the other hand, one or more species will be found recognized in almost every country as deadly poisons. The poisonous constituents are chiefly alkaloids. As poisons, they are classed as acrid narcotics, and act generally like *Lobelia inflata*, which see.

Henry H. Rusby.

CAMPHOID is a substitute for collodion made by dissolving 1 part of soluble gun cotton (pyroxylon) in alcohol containing 20 parts of camphor. It is a thick, colorless liquid which dries very rapidly, and when painted on the skin leaves a thin impervious film. It may be applied as a protective, or as a vehicle for iodoform, chrysarobin, tannic acid, etc.

W. A. Bastedo.

CAMPHOR.—*Camphora*, U. S. P., Br. P., $C_{10}H_{16}O$. A stearoptene imported in a crude state and purified in this country, by sublimation. The tree from which camphor is obtained is a member of the order Lauraceæ, and was named by Linnaeus *Laurus camphora*. Nees and Ebermair classed it with cinnamon as *Cinnamomum camphora*, and later Nees separated it into a special genus as *Camphora officinarum*. It is a large tree, of slender habit, with long, horizontal, smooth, green branches, and a hard, light-colored, very fragrant and valuable wood. The alternate evergreen leaves are dark and shining above, lighter, glaucous-green beneath, ovate acuminate entire, three-nerved. Flowers minute, greenish-yellow, in small axillary panicles. Perianth thick, six-lobed stamens, nine with four-celled anthers opening by valves. Staminoides six. Ovary free, one-celled, one-seeded. Fruit about as

large as a pea, surrounded by the persistent perianth tube. This tree grows extensively and abundantly in Formosa and the Japanese islands, from which places all the camphor of European and American commerce is obtained; and in Central China. It has also been transplanted and flourishes in most tropical or sub-tropical countries of both hemispheres.

Camphor is also obtained from other sources. The best known are the Borneo and Ngal camphors. The former is collected on the islands of Borneo and Sumatra from *Dryobalanops camphora*, the latter from *Blumea balsamifera*, which grows abundantly throughout China and India.

The increasing demand for camphor in the arts, particularly in the manufacture of celluloid and smokeless powder, is directing attention to its production, as the demand is exceeding the natural supply. To replace this deficiency the manufacture of artificial camphor is being improved, and the market will probably be supplied with camphor prepared from some of the turpentine, quite independently of the present source.



FIG. 1097.—Camphor Tree, Flowering Branch. (Baillon.)

constituent, or more properly, an oxidation product of the essential oil of camphor, which is abundantly present in all parts of the plant. Very frequently the camphor is found in a more or less pure state beneath the bark, having separated from the oil. It is separated from the leaves, smaller branches, and chopped wood by a crude method of sublimation, in which impure condition it is exported. In this country it is refined.

Camphor occurs "in white, translucent masses, of a tough consistence and a crystalline structure, readily pulverizable in the presence of a little alcohol, ether, or chloroform; having a penetrating, characteristic odor, and a pungently aromatic taste. Specific gravity, 0.995 at 15° C. Very sparingly soluble in water, but readily soluble in alcohol, ether, chloroform, carbon disulphide, benzoin, and in fixed and volatile oils. It melts at 175° C., boils at 204° C., and is inflammable, burning with luminous, smoky flame. On exposure to the air it evaporates more or less rapidly at ordinary temperature, and, when moderately heated, it sublimes without leaving a residue" (U. S. P.). The solubility of camphor in water is about 1 part in 1,300; this is increased by the presence of sugar, magnesia, carbonic acid, and spirits of nitrous ether. When camphor is mixed with menthol and similar products, in definite proportions, the two substances become a liquid. The following are some of the combinations: camphor 1 part—with menthol 3, with thymol 1, with chloral hydrate 1, with salol 1.5; camphor 2 parts—with naphthol 1; camphor 4 parts—with phenol 12 to which water, 1 part, has been added. With certain resins and gums, camphor forms a soft mass of pilular consistence, which lasts for a variable length of time according to the gum selected. Guaiac, asafetida, galbanum, benzoin, and tolu are some that are of pharmaceutical importance.

The oil of camphor of commerce is separated during the first sublimation and is obtained as a thin fluid, varying in color from a light yellow to a reddish-brown according to age. It has a strong odor and taste resembling those of camphor. It is very variable in character, the

percentage of camphor that may be present is uncertain, some samples being entirely free from it. The oil is not of much therapeutic value in this country, although thought much of in China and other Eastern countries, where it is employed not only for its remedial properties but also as a turpentine in the preparation of india ink and varnishes. It is also used as an illuminant. Its action is similar to that of camphor, and it is recommended in the same conditions in doses of from gtt. i. to gtt. iij.

Camphoric acid, $C_{10}H_{16}O_4$, is a product of camphor that is of much therapeutic interest. It is an oxidation product of camphor, and may be prepared by heating camphor with nitric acid. The acid forms in small colorless needles or plates, odor faintly aromatic, taste acid and bitter, very sparingly soluble in cold water, more soluble in hot, soluble in alcohol and ether. Ten per cent. of alcohol added to hot aqueous solution prevents the acid from being deposited on cooling. This acid has long been known, but it is only during the last few years that its therapeutic properties have been utilized. Its chief use is in the treatment of diseases of the respiratory tract and as a preventive of night sweats. For the latter purpose it promises to be one of the most valuable additions to our materia medica.

Compared with atropine, its effect is more certain and more prolonged, while it does not produce the difficulty in swallowing, dryness of the pharynx, disturbed sleep, and vertigo, which often accompany the use of the latter drug. Its mode of action differs from that of atropine, as its beneficial effect is thought to be due to its power of destroying the ptomaines in the blood which cause this distressing symptom.

The dose as an anhydrotic is gr. xxx. at bedtime, or gr. xv. during the afternoon and the same dose repeated at bedtime. The action is not rapid, and in some instances no effect has been noticed until the following day. The effect of a single dose often continues for several days. The reports of cases treated show beneficial results in a great majority of them; it does not in any way interfere with the appetite or digestion, and in most instances a quiet sleep follows its use. As the taste is somewhat disagreeable, it is best administered in wafers or capsules.

In diseases of the mucous membrane of the respiratory tract, camphoric acid is used by applying locally and as a spray. In acute coryza, pharyngitis, and laryngitis, a half- to one-per-cent. solution may be used every three hours, or tampons saturated in the solution may be introduced into the nasal cavities; in ulcerated throat, a solution of two to six per cent. may be applied. This drug has no corrosive action; it possesses antiseptic properties and produces contraction of the blood-vessels of the mucous membrane.

Internally, it is also used for intestinal diarrhoea of a catarrhal character, and where intestinal antiseptics is desired, the dose is from gr. v. to gr. x.-xv. It is excreted by the kidneys and renders the urine clear and acid in two or three hours.

In cystitis, when the urine is alkaline, it has proved of benefit. In this condition it is also used as a wash in a half of one-per-cent. solution. The bladder is to be irrigated twice a day, about an ounce of the solution being left behind.

Camphor is absorbed from the skin and mucous membrane, and is found unchanged in the blood and the various organs and tissues. The kidneys do not excrete it unchanged, but it is thought to be excreted by the lungs and skin. In its action camphor is antiseptic and stimulant, with a sedative effect following the primary stimulation. This action is exercised upon the surface when applied externally, and when administered internally, the same effect is directed to the mucous surfaces with which it comes in contact. In the stomach it stimulates the muscular coats, adds a sense of warmth, and reflexly stimulates the heart and abdominal circulation. After absorption its action is directed to the cerebral and spinal centres through which it influences the heart and vascular system.