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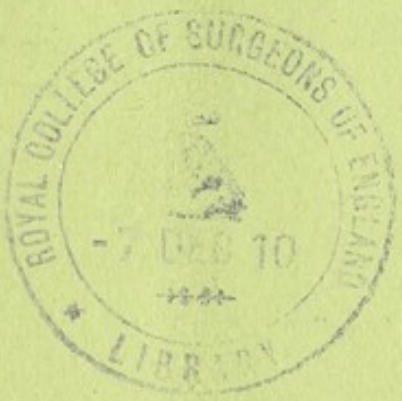
By

De FOREST WILLARD, M.D.



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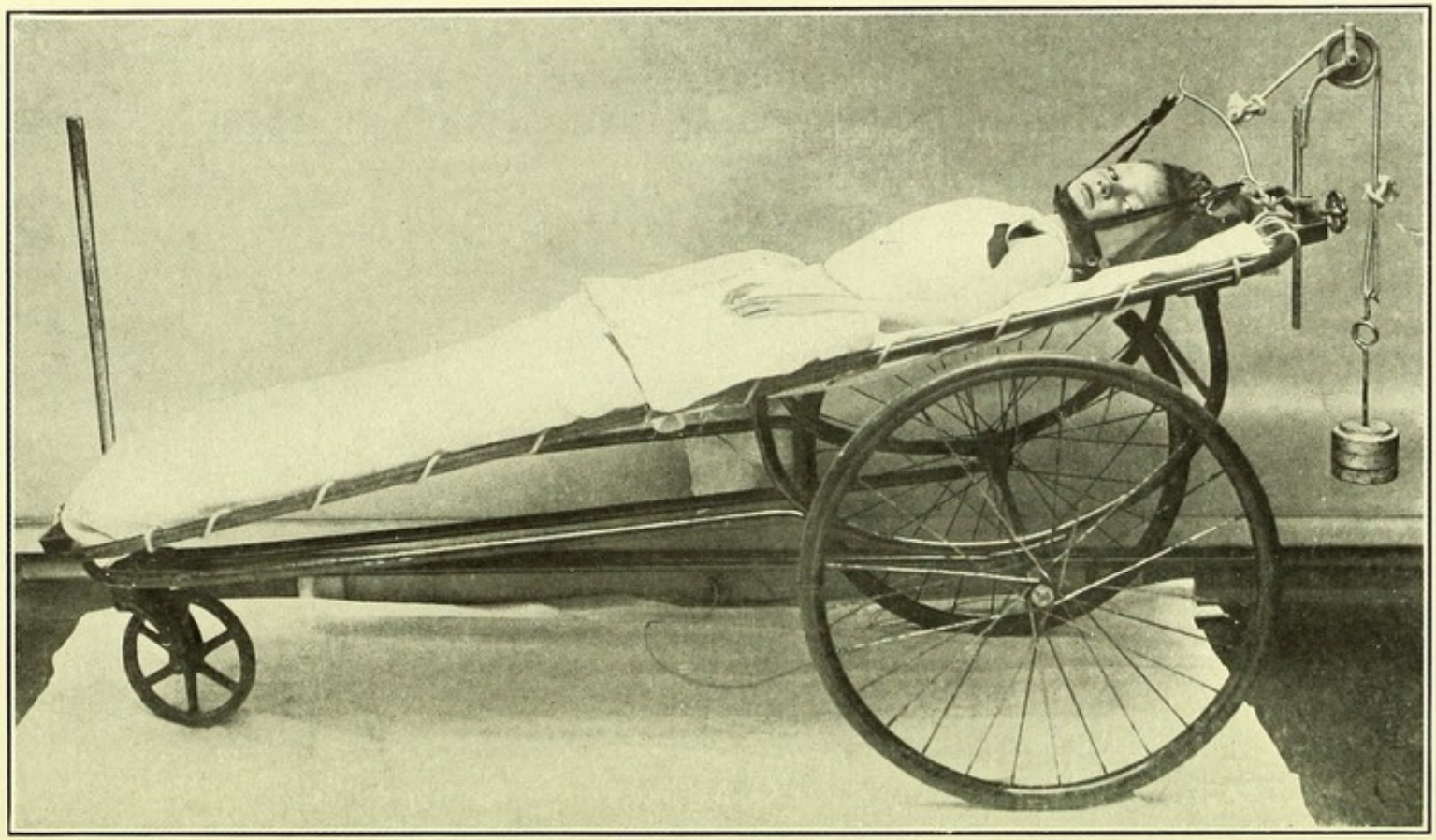

Fig. 1.—Wheeled litter for tuberculosis of the spine.

OPEN-AIR TREATMENT OF SURGICAL TUBERCULOSIS.

By De Forest Willard, M.D.,
Philadelphia.

The facts presented in this paper for discussion are intended to encourage, not the trained sanatorium expert, but the family physician, in his fight against early tuberculosis of the bones and joints. Such a physician may have carefully tested the effect of this method in tuberculosis of the lungs, yet it may never have occurred to him that a tuberculous joint requires the same form of treatment.

It is upon the family physician that we must depend for the early recognition of these tuberculous conditions, in order that he may at once combat them or refer the case to a trained specialist. The first few weeks of a tuberculous infection offer the golden opportunity for arrest and abortion of the invasion, and of cure with good function mobility. It should always be remembered that the onset of joint tuberculosis is insidious, and usually without violent symptoms. Early diagnosis in hip or knee or spine disease, as indicated by brain recognition of occult pain, as demonstrated by muscular rigidity—the guarding of the joint—is, therefore, of prime importance. To diagnose a slight intermittent limp, accompanied by fixation of the joint, as a case of rheumatism is absolutely unjustifiable, since rheumatism of a single joint in a child without positive symptoms practically *never* exists.

Not until physicians learn that an enormous percentage of lifelong deformities of hip, knee, spine, etc., prolonged suppurations, and loss of life are due to their careless and ignorant diagnosis of "rheumatism" will these dreadful results cease. Ninety-five per cent. of joint tuberculous cases are criminally treated for rheumatism for weeks or months, when a five minutes' examination of the naked child would have convinced the medical attendant that a serious disease was threatened.

For thirty years, even before Koch's discovery of the tubercle bacillus, I have persistently advocated and practised the fresh-air method of treatment for tuberculosis of hip and spine, and have never known it to be without benefit.*

At the outset let it be definitely understood that the employment of

* Willard: Trans. Amer. Med. Assoc., 1880. Jour. Amer. Med. Assoc., July, 1903.

the open-air treatment for surgical tuberculosis in no sense implies that either surgical or mechanical measures are to be neglected in the slightest degree. Aspiration, injection, incision, erasion of the diseased focus, excision, amputation, any of these measures may be necessary in individual and advanced cases, but both before and after operation the surroundings of the patient will have much to do with cure. Mechanical protection, immobilization, traction, fixation, and rest are also essential requisites. As an important accessory to these surgical and mechanical measures, however, pure fresh air taken into the lungs in 25,000 daily doses should certainly commend itself to intelligent physicians in preference to three doses per day of nauseous drugs, which may interfere with digestion rather than improve it. This adjunct should no more be neglected than should an abundance of food, sleep, and rest for oxygenating, vivifying, and renewing tissues, improving digestion and circulation.*

Tuberculin and serum injections; vaccine therapy, regulated by the opsonic index; immunization; Bier's hyperemic congestion; bismuth injections, all have a limited but less important place.

The results of open-air treatment are more positive in tuberculosis of the bones and joints even than in lung diseases.†

Many cases formerly requiring the knife are now successfully combated and often cured without open suppuration, and oftentimes with decided improvement in function. I recall a patient whose hip had been excised, and on whom three or four subsequent erasions had been performed for persistent suppuration, with amyloid liver and spleen and kidneys, and a dozen discharging sinuses, and in whom further operative interference was deemed inadvisable, yet who recovered with closed sinuses after a short residence at the seashore, and when seen, ten years later, was in excellent health.

Tubercle bacilli die if exposed for a short time to the rays of the sun. Laboratory experiments show that bacterial proteids are broken up by direct sunlight, so that the nitrogenous elements after exposure exist in soluble form.‡ Tubercle bacilli thrive in darkness, confined air, and filth; they die in sunshine, and are inhibited by cold fresh air and by increased general health. To expose the patient and even the affected joint to the direct rays of the sun is therefore beneficial. The benefit of sunshine upon plants, animals, and men is too well known to be ignored. Every plant and tree turns to the light. Even the arrest of the ultra-violet rays of sunshine by glass in the windows may have an influence.

Colorado, California, Arizona, and New Mexico undoubtedly owe their

* Wilson: Penna. Med. Jour., Jan., 1906. Halsted: Amer. Med., Dec., 1905.
† Bradford: Boston Med. and Surg. Jour., Jan., 1906.
‡ Vaughn: Jour. Amer. Med. Assoc., 1908, section, Diseases of Children.

reputation largely to the extra hours of sunshine and the time permissible for outdoor life. Tuberculosis increases when climatological conditions compel individuals to be confined in dark, close rooms. Cold inhibits bacterial development, but does not kill. It is beneficial in proportion as it stimulates muscular activity, appetite, sleep, circulation, and increases oxygenation and vital cell-resistance and nutrition. Its benefit is largely dependent upon the purity of the air and the hours per day that can be spent out of doors in its influence. Even a temperature at zero is not injurious if proper clothing is provided. Other surgical conditions requiring fresh-air treatment are tuberculosis of the glands, kidneys, testes, prostate, peritoneum, etc.

The combination of sunshine, fresh air, rest, and fixation of a diseased joint during the active and painful stage when confined to bed is important to prevent the addition of mixed inflammatory infection to the tubercular process. In young children this treatment is best accomplished by placing the little patient upon a canvas-covered stretcher frame of bamboo, wood, or gas-pipe, from which it need not be removed day or night. Even a nursing baby can thus be gently cared for with the least possible movement of the diseased area. An older child can also be thus carried about the house by one or two persons, lifted upon a go-cart or wheeled litter or express-wagon, or placed on trestles or stools on a veranda or under a tree without changing the horizontal position or removing the pulley extension, or interfering in any way with an open-air life. When the painful stage has passed, ambulatory treatment on crutches can be commenced, the involved joint being fixed and protected by gypsum, leather, or binder's board splint or steel apparatus, with high cork shoe on the well foot.

For the wealthy, the problem is not difficult. The mountains, the seashore, the Adirondacks, the dry sunny slopes of the Rockies, the hills and plains of Europe and other countries, with comfortable sanatoriums and the advantages of change of location, are readily obtainable, and under judicious advice and treatment by a wise orthopedic surgeon hundreds of joints can be saved from life-long deformity. California has a large reputation in the treatment of tuberculosis, but it is, of course, necessary, as in Colorado, Arizona, and other sections, that judgment should be used in the selection of a proper region. California is such an enormous State that extreme diversities of heat and cold, dryness and dampness, are to be found. In the northern citrus belt, high upon the Sierras, 100 miles from San Francisco, many tuberculous patients find not only healthful surroundings, but are able also to maintain a profitable existence.

As 90 per cent. of the cases, however, are poor, the financial question presents a most serious problem to be solved in the treatment of this class. Children with bone or joint diseases in the large cities, with parents barely

able to earn enough to supply food and clothing, probably consumptive and living in closely crowded quarters, must be removed to healthful surroundings if lives are to be saved. Also the large number of adolescents and adults with tuberculous bone diseases must be provided for. When they are dependent upon their own exertions for a living, or have others dependent upon them, to advise them to go to Arizona or Colorado is to recommend the impossible.

Orthopedic Hospitals.—For this class, orthopedic hospitals of large accommodations, thoroughly equipped with appliances, and attended by surgeons specially conversant with the needs of these cripples, are all important. In addition, each State should provide surgical sanatoriums of large size, in carefully selected regions, at both mountain and seashore, and separated from lung cases.

Hospitals for children with tuberculous bones and joints should be separate from general surgical wards, as the great danger in suppurative cases is from the mixed infection, which destroys so many lives. The presence of this class of cases among fresh osteotomies, tenotomies, and other clean wounds, is also dangerous. Dressings saturated with tuberculous pus should be at once burned or disinfected. Adolescents and adults of this class should also be separated from general surgical wards. Another important reason for orthopedic hospitals thoroughly equipped and attended by surgeons especially trained for this work is the fact that these patients, being usually chronic cases, are apt to be neglected in the rush of active general surgical work.

Sun Porches, Solaria, Roof-gardens.—In the cities, hospital wards should be built to open south, east, and west, to admit both sun and air. At the south end should be built the most important part of the ward, *i. e.*, a porch sufficiently large to accommodate all cases confined to bed. If no thresholds are made, and if beds are provided with five-inch wheels, these beds can be rolled into the ward as necessary for surgical dressings, etc. The porch should be one-half covered, glass-inclosed in winter and provided with moderate heat, so that an abundance of cold air can be admitted.*

For patients lying in bed upon a porch the wooden wainscoting should reach in height to the bottom of the mattress, to keep out cold and wind. For twelve inches above this the sides should be of glass, to permit the child to look out upon the grass and trees, even when lying flat. Above this, every alternate glass sash should be hinged so as to open inward, and be fastened flat against its neighbor with hook, or else hinged above. If the frames are removed in summer, awnings should be erected to protect from wind and excessive sun and from rain during thunder-showers. This method will permit the use of netting to protect against mosquitos and flies, especially in

* Willard: Trans. Amer. Orth. Assoc., 1898, Orth. Dept. University Hospital.

malarial regions. One portion should be without roof, where diseased joints may be fully exposed to the direct sun-rays. Eyes can be protected by colored glasses or by a small doll's carriage green umbrella, attached to the head of the bed. Upon such a porch the children should sleep winter and summer, night and day, abundant clothing being provided. Separate screens or canvas curtains should be provided. The night nurse in charge can remain in a warmer room and watch the children through a glass partition, and when necessary, the bed can be rolled into the ward.

When such a porch is impossible in a city hospital, a roof-garden, one half covered, the other exposed, reached by elevator, is an excellent substitute, and will answer both for a sleeping porch and a day playroom. Private houses can be readily built with such an outing space. A balustrade to prevent accidents and glass inclosure in winter permit use during the entire year. If the hospital grounds are large, tents or shacks may be erected.

Sleeping out of doors, like all other matters, must be wisely and judiciously planned and provided for. At first every precaution must be taken to guard the patient from too sudden exposure and change. In the case of patients confined to bed, as in severe suppurative lesions of the spine or other joints, it is important that means for surgical dressings, cleansing, bathing, etc., shall be provided in a warmer atmosphere. It is for this reason that tent life is not as convenient as a porch or shack connected with a warm room into which the bed with large five-inch wheels can be easily rolled. If this is not possible, a small patient can be readily moved if laid permanently upon a canvas-covered gas-pipe frame, and placed upon a wheeled litter, go-cart, express-wagon, or cart. Cases able to move about on crutches or apparatus can be readily managed.

To be entirely in the open air is to avoid drafts and colds, but so long as thunder-storms, snow, rain, etc., must be provided for, the porch offers the best solution of the difficulties, especially for helpless patients.

A *canvas tent* theoretically is excellent, but practically it is very hot in summer days, even when covered with a fly, and unless floored and sides raised, it is damp in wet weather and does not give free circulation of air. In winter, if closed and provided with a stove, it is stuffy and ill ventilated. The disposal of feces and the arrangements for bathing, surgical dressings, etc., are also more difficult in a canvas tent for bed cases. The wooden barracks or shacks used at tuberculosis sanatoriums are much better. The best method in summer for convalescent cases who are old enough and well enough to become ambulatory would be to sleep in the open, with a tent in close proximity for escape during rain. A bed out of doors can be made much warmer by placing beneath the mattress several layers of wrapping or builder's paper, or even newspapers.

Convalescent Hospitals.—The site of convalescent hospitals must be selected with a view to healthful surroundings and for accessibility by skilled orthopedic surgeons.

An excellent type of this class is seen at Wellesley Hills, near Boston, as planned by Burrell* and others. These wooden shacks or barracks are inexpensively built, with glass sides and sunny playrooms, and open freely at the sides and roof.† The temperature at night sometimes falls to zero, but as the protection of the children is abundant, they are steadily improved in color, appetite, weight and strength, while hemoglobin is increased.‡ The clothing at night in the shack, if needed, is: shirt; Canton-flannel nightgown; red flannel jacket; long Shaker-flannel gown with hood; socks (or long boots made of eiderdown), reaching above the knees; six or eight blankets. There is no difficulty in keeping a patient comfortable with a temperature of 10° to 20° F. if abundant clothing and a nightcap are used. All that is necessary is that the nose be uncovered to receive the pure cold air. A down quilt is light and warm, and if perforated, does not induce perspiration.

Urination in boys is readily managed beneath the covers, and also in girls, if a small pus-basin is used. A skilful nurse can also change diapers quickly without exposure.

Extreme cold, however, is not important. It is fresh pure air that is needed, and this can be obtained by admitting it in abundance and yet tempering it by heat.

Barracks, or Shacks, or Bungalows, or Cabins, or Lodges.—For two persons well enough to assist themselves, the simplest and most effective form of shack is a small light wooden structure raised on supports, and with all four glass sides hinged at the upper border, to be raised outwardly so as to act as sunshades by day and to be open at all times except in rain or snow. Inside nettings will protect from mosquitos. An open porch can be added. Newspapers or rubber cloth beneath the mattress will add greatly to the warmth of the bed. A nearby earth-closet is, of course, convenient. An adjoining tent furnishes a good bath-room for the summer. For extremely windy nights in winter, inside denim or Japanese curtains can be arranged.

Industrial Schools.—In the Widener Industrial School for Crippled Children in Philadelphia the children spend a large portion of the time day and night in the open air; good food is given, and teaching is conducted as much as possible out of doors. Outdoor sports and occupations are encouraged as much as possible. The improvement in flesh, color, and health

* Burrell: Trans. Mass. Med. Soc., June, 1903.

† Thorndyke: Orthopedic Surgery, 219. Adams: Boston Med. and Surg. Jour., 1906, cliv, 71.

‡ Bradford: Tuberculosis in Massachusetts, 1908; Report Mass. State Com., 1908, pp. 99–114.

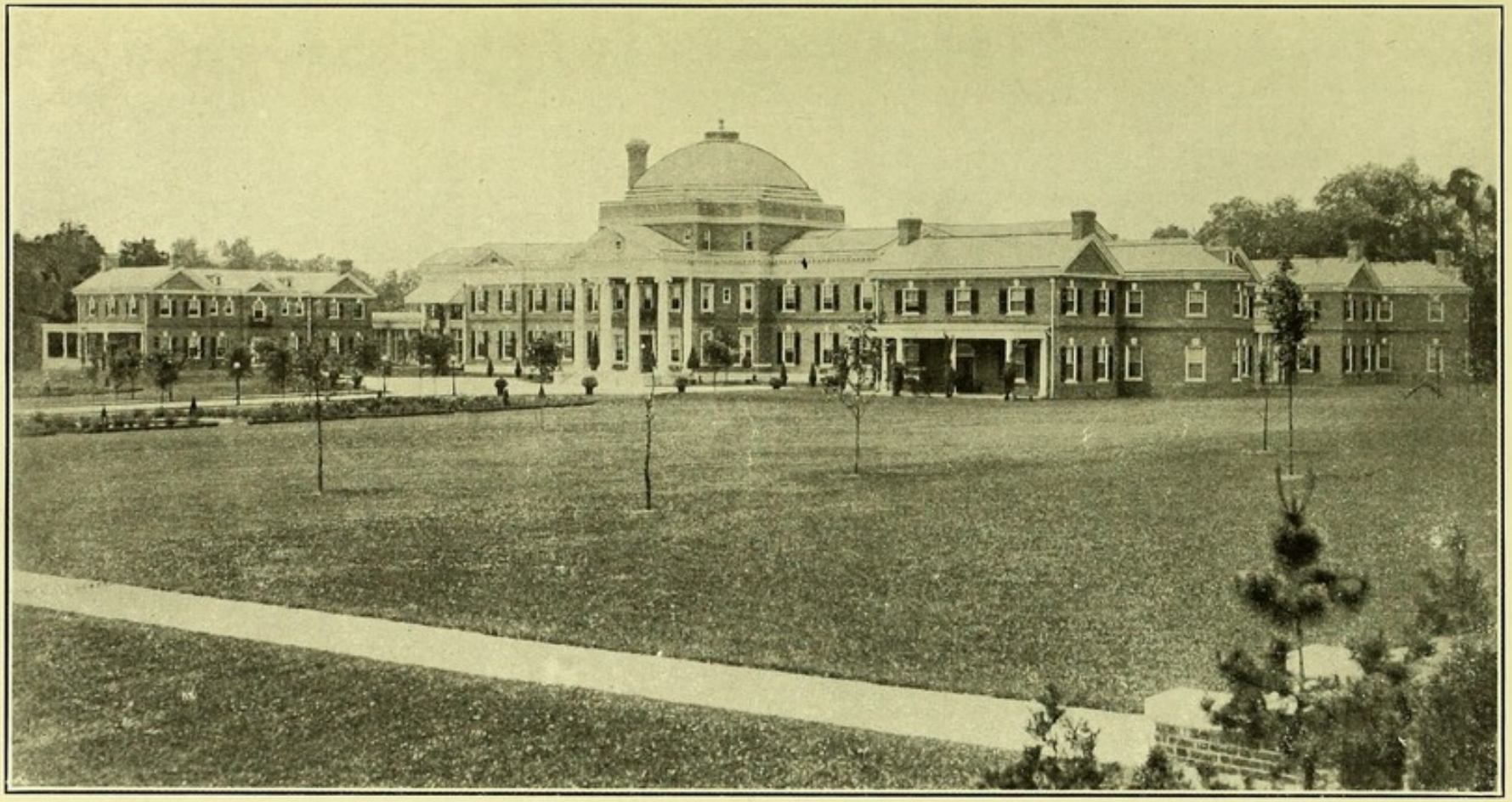

Fig. 2.—Widener Memorial Industrial Training School for Crippled Children. Administration building, main building, cottages—looking southwest.

is remarkable. Although the school is on the outskirts of a large city, 30 acres of ground are occupied. For a winter playground a large area is asphalted in order that it may be quickly cleaned of snow and dried. For shelter, a pavilion with glass roof and sides gives full access to the sun, and toilet-rooms for girls and boys are provided. The school provides hospital treatment with educational and manual training until the cripple arrives at the age of twenty-one, or has secured a self-sustaining occupation.

Forest Schools.—For feeble children, forest schools should be inaugurated where instruction can be given to the children with their lungs filled with pure air and their brains supplied with well-oxygenated blood. Undoubtedly, learning under such surroundings would be both rapid and attractive. Studies in natural history, of birds, animals, trees, plants, rocks, etc., would be simple and easy, and dangers of contagion would be lessened and a more vigorous youth-life secured for both sexes. The pallid city child under such conditions would soon evidence renewed color and vigor of resistance. To the teachers, also, such a system would add greatly to their physical being and their brain alertness and interest. Protection from rain would be the only question to be solved during the summer months. Seats and desks could be covered with a tent. The German Waldschule are a good type.

Sanatoriums.—Sanatoriums for surgical tuberculosis should be entirely separated from institutions designed for phthisical cases. They should be provided by each State at both seashore and mountain; should have large accommodation, but with many small wooden buildings. The surroundings should be healthful, and if possible in a pine forest region.

Pennsylvania last year appropriated $1,000,000 for the establishment of tuberculosis sanatoriums and dispensaries. One-story cottages, 27 by 24 feet, to accommodate eight patients, well ventilated and arranged with protection from storm, were erected. The cottages will face southeast to secure the greatest possible amount of sunshine on all four sides. Surgical tuberculous cases will, of course, be separated from lung patients. Exercise, amusements, and work will be appropriately regulated to the capacity of the individual.

Sanatoriums have now been largely established, however, for medical cases in Pennsylvania, New York, Vermont, Massachusetts, New Jersey, Iowa, Missouri, Maryland, and in other States; but separate institutions for the surgically tuberculous are only now being located.

Sanatoriums are of especial value in the early stages of joint or bone tuberculosis in proportion as they educate patients to lead a regulated and healthful method of life in the sunshine and open air, day and night; to take a proper amount of health-giving food; to sleep much and to give absolute rest to the diseased area. God's sunshine and God's pure air,

wherever obtained, with regional tissue rest, are more potent than all other forces combined.

Sanatoriums for joint cases require smooth grounds, as many patients are upon crutches or splints and cannot move about except upon level firm surfaces, thus preventing life in the woods, where the ground is soft and rough.

When surgeons and patients realize that 25,000 doses of pure air per day are infinitely better than three doses of nauseous drugs that impair appetite and digestion, then will the control of surgical tuberculosis be well advanced.

Probably the most improvement would be gained in the mountains for six months in summer, the winter months being passed at or near the seashore in warm regions, where ample porches and smooth boardwalks would permit a constant open-air life.

As cleanly surgical attendance is necessary, each sanatorium should be provided with an aseptic operating room and an equally clean room for surgical dressings.

Sleeping Tents and Canopies.—Sleeping tents and canopies are useful for patients who cannot secure an outdoor porch.

Another method is by the *window tents* that are now largely manufactured. These tents are so arranged at the window that the patient's head is outside the door, while the body is within,* or a cot can be so constructed on wheels that the head of the patient can be pushed outside the window line at night, and withdrawn in case of rain or snow, or an awning (without fringe) may be placed over the window. The window can be brought down close to the body of the patient and air excluded from the thorax by a loosely tucked blanket or by flannel. A woolen nightcap is desirable.

"Sending the patient to the country" will accomplish but little unless locality, environments, and food facilities are carefully considered by the surgeon. Many country houses are notoriously unhygienic in their surroundings. Abundance of sunshine, good food, pure air free from dust and smoke, and a life of moderate and systematic exercise that will tire, but not exhaust, are good rules.

Home Treatment.—When it is impossible to remove the patient from home, conditions can be greatly benefited by a wise and judicious system of supervision. The coöperation of surgeon, nurse, and visitor is important in the instruction of patients as to detail of daily life. Frequently it is impossible, among the poor, to secure outdoor sleeping. Under these conditions the best obtainable quarters will be a room with as many windows as possible for the night, and a southern exposure, if feasible, by day. Unfortunately, it is often impossible for the family to supply sufficient heat or bed-clothing in winter, with the result that all huddle together in close quarters. Careful

* Harris Window Tent; Walsh Window Tent, Morris, Ill.; Do-wah-jack Portable Co., Chicago.

instructions as to habits, food, air, etc., will change doubtful cases into hopeful ones. The diet must be nutritious and easily assimilated,—milk, eggs, meat, bread; as much butter as can be afforded (in place of cod-liver oil), fruits, fats, proper hours of rest, etc.

Fresh air at night can be secured by placing the head of the bed at an open window, the head being protected by a handkerchief or nightcap. The body can be shut off from the head by curtains tacked to the sides and top of the window, or supported on wire or wooden frames, and tucked about the neck and chest.*

For a patient in a family of even moderate circumstances in the country or in a village, with space between the houses, or even on the roofs or the yard of city houses, much can be accomplished toward providing an outdoor life. Any sunny room or yard or open porch covered with roof or awning offers excellent facilities. A cheap balcony, with awning, a flat roof or a flat platform over a sloping roof, can be constructed at slight cost.†

The principal difficulty is to provide against thunder-storms and wind in summer and rain and snow in winter. On account of this a porch is better than a tent, as screens and awnings are more easily adjusted. A child, if confined to the recumbent position, should be continuously on a bed-tray or frame for convenient moving. A tent in a yard is useful, but if closed, is no better than a room. For movable cases a nearby shade tree is refreshing in summer. An army tent, 7 x 7 feet, with fly, can be procured for seven or eight dollars. An open shack is useful, but is not so easily moved for summer and for winter use as is the tent.

Day Camps.—Even day camps situated within easy access from the larger cities are serviceable according to the degree to which they can be utilized. Even a few hours of breathing pure, healthful, life-giving air is infinitely better than living continuously in crowded alleys and rooms.

Walking cases of joint tuberculosis can be benefited just in proportion to the hours that they can be brought into contact with hygienic surroundings; *i. e.*, provided the joints are protected against traumatisms en route. Sanatoriums, if properly located and scientifically conducted, should yield 10 per cent. better results than day camps, and the latter 10 to 20 per cent. better results than home treatment, especially in tenements.‡

Food.—One of the important elements of the outdoor life is its stimulating effect upon appetite, nutrition, and assimilation. Any medicine that interferes with digestion should be omitted or regulated. Creosote, if administered, should be given in pepsin or in peptonoids. A few drops of ether will correct the regurgitations after cod-liver oil. Pepsin is valuable

* Jour. Amer. Med. Assoc., Dec., 1907.

† Jour. Amer. Med. Assoc., 1907, xlix, 9, 755; Boston Med. and Surg. Jour., Feb., 1906.

‡ The early labors of Bennett, Hutt, and others are yielding excellent fruit.

in assisting comfortable retention of food; so are the mineral acids and nux vomica—the latter much better than strychnin. Milk, buttermilk, whey, junket, custards, koumis, eggs, raw or heated in a glass of boiling water, meats, especially fat, and in some cases the concentrated beef and alcoholic foods, will be found useful. Syrups, cod-liver oil, etc., are very apt to disturb the appetite. Butter in large quantities, for those who can afford it, is better than cod-liver oil, much pleasanter, and less liable to disturb digestion. When milk is distasteful, its relish can be cultivated by adding a pinch of salt or by feeding the child a bowl of bread and milk daily, a tablespoon being used, so that the mouthful should consist of a large amount of milk, not merely soaked bread, as is the case when a teaspoon and small cup are used.