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PHYSICAL TRAINING

Its Range of Usefulness
in Therapeutics

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Toronto

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PHYSICAL TRAINING—ITS RANGE OF USEFULNESS IN THERAPEUTICS.*

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ANY subject chosen for presentation to a body such as this must, in its recital, justify the course taken; it would be presumptuous to take up your time in relating well-known and generally recognized facts. It is the privilege and duty of the specialist to act as a scout going in advance of the main body. Alone he may spy out the enemy's country along only a narrow tract, but there is the more reason why his scrutiny should be careful in order that he may bring reliable reports to the advancing army.

In the thirteen years just passed there have come under my notice a considerable variety of cases which the general practitioner finds it difficult to deal with satisfactorily, and which have been treated with gratifying results by means of physical training. In some of the cases I am of the opinion that there is little or no room for discussion; in others, no doubt, the paper will arouse opposition.

The tendency towards urban life, the pressure of school work, the conventionalities of dress, the customs of society and the keen competitions of life have brought about conditions presenting a marked contrast with the physical status that existed when a very much larger percentage of our population grew up in the country, accustomed to the active duties of the pioneer. The need of physical education, scientifically pursued, is greater now than it was then.

The term, physical training, as used in this paper, is meant to have a wide meaning, including, not only work in the gymnasium, but out-door sports and games conducted under supervision. Its purpose is to advocate scientific methods of development such as will bring all the physical powers to a higher standard of efficiency in order that the individual may be better equipped to bear the burdens and do the duties of life with ease and enjoyment; and, especially, to show its application in cases that have congenital or acquired defects.

There is a marked tendency everywhere to make the athlete a specialist, as much so as is the professor of Greek or Hebrew; such an extreme development along one line is not the best equipment for meeting and performing the duties of life. It is not the highest gain to be able to run a mile in the shortest time or to be able

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to stand the most abuse in the prize ring; but it is of vast importance that the growing child should be able so to breathe as to inspire sufficient oxygen to purify the blood and assist in the physiological processes that are essential to the highest development of both mind and body; it is essential that the powers of co-ordination should be at their best so that physical units may act in harmony; it is important that disabilities and defects, congenital or acquired, should be remedied or improved so that the individual may not be hampered or weighted down in life's contests.

Physical training may be considered as general and corrective. Reference here is made only to the latter. It is assumed that the person put in charge of the physical training work has a good understanding of physiology and anatomy and of the principles underlying successful gymnastic training. Those who come to us are patients, and our study and practice in this work is that of applied gymnastics and athletics.

DEVELOPMENT.

Development is the result of three factors—heredity, environment and activity of function. We pass by the first without further reference. The second we try to determine as correctly as possible during the time that the patient remains in our care; and this feature of the work is of the utmost importance. The third opens to our vision the whole subject of education.

Without activity within physiological limits no cell can have a normal development. In the cervical cord the motor cells are imperfectly developed if the arms have been amputated in early infancy. The speech centre itself is not always developed in the left cerebral hemisphere; but, in left-handed persons, in the right hemisphere (Owen). If the eyes be removed from a new-born animal, the optic nerves and tracts cease to develop, and they degenerate so that the corpora geniculata, corpora quadrigemina, and the pulvinar on each side manifest a similar degeneration (Fawcett).

The inference drawn from these physiological data is that in order that any structure, whether it be bone, muscle, viscus or nerve, shall attain its highest development, it must be so educated as to perform its own function up to the limit of physiological well-being.

The purpose for which physical training was commenced in the Orthopedic Gymnasium was comparatively narrow. For a long time those who had devoted special attention to treating cases of spinal deformity had found the results unsatisfactory. Dependence had been placed almost entirely upon braces. Little had been done on this continent before 1887 to make use of corrective gymnastics, with a view to supplanting mechanical treatment by rational developmental methods. The first efforts had in view the treatment of such cases as those of lateral curvature, round shoulders, etc. Incidentally there came under observation patients who

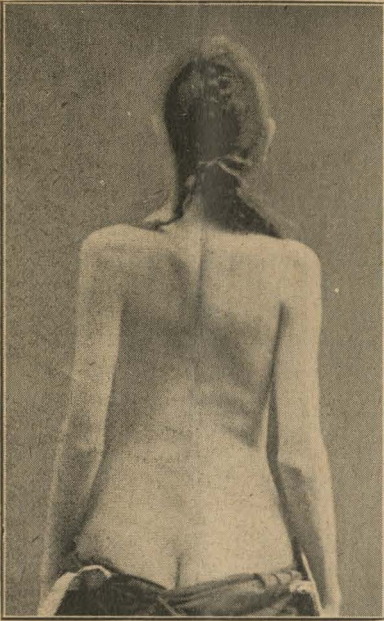


FIG. I.—L. R., 14 years of age. Figure at the right shows her standing naturally and without effort; figure at the left shows her best position, making an effort, after treatment for three months.

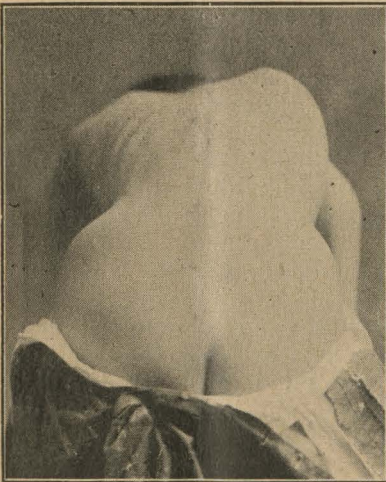


FIG. II.—L. R., girl 14 years of age, same as Fig. I. In this stooping position the rotation or twist in the spine is well shown in the figure at the left; that at the right shows that actual rectification took place even in the bony structures.

were suffering from other defects, such as flat-foot, pigeon-breast, paretic conditions, asymmetry from any cause, and frequently cases that might be considered to be in the pre-tubercular stage.

By way of illustration I will here give a brief clinical description of one case which might fairly belong to the last class referred to.

PRE-TUBERCULAR STAGE.

E. M., a girl, aged 14, under treatment by Dr. L. L. Palmer, for nasal catarrh, referred to me because she had a slight lateral curvature. On examination the girl is found thin and pale, the infra-clavicular regions depressed, especially that of the right side, though examination revealed no actual deposit. This girl remained constantly in the gymnasium for nine months, and occasionally came for the work during the second year, with the result that she improved very greatly in general health, acquired a large amount of thoracic development and mobility, increased in flesh and color, and maintained an excellent figure. It would seem no unwarrantable claim that the improvement which occurred in the curvature of the spine (which was very satisfactory), was yet only a small part of the gain made. It is no uncommon observation that young girls can show a difference of three to four inches between forced expiration and forced inspiration, and a few months' training sometimes shows a gain of one to two inches in thoracic measurement.

Klebs asserts that in the great majority of cases, tubercular infection of the lungs occurs in the posterior part of the apex (this being the most vulnerable point), as a direct result of a discharge of infected chyle into the vena cava. If this part of the lung apex be healthy, so as not to present a suitable nidus for the germs, they may pass on with the current of blood to find lodgment in some other area; but if the blood has been thoroughly aerated it may exert its bacteriological power over them, and may remove the germ by the action of the phagocytes. In the case of persons who have but little reserve power, and whose ready vulnerability presents a temptation to invasion by the bacillus, there is probably no agency that will so completely raise the individual to a higher standard of physiological efficiency, enabling him to offer greater resistance than such thorough deep breathing of pure, sun-warmed air as will open up every ultimate lung-cell, thus affording the fullest opportunity for protection by Nature's own means.

Nothing that is here stated is intended to advocate forced lung exercise, when inflammatory conditions have arisen as the result of tubercular deposit. It is wise to bear in mind constantly the distinction between a simple lowering of the physiological power of resistance and the actual existence of disease.

TWO VARIETIES OF SPINAL CURVATURE.

It will be well to point out here also that in the common term spinal curvature there are two conditions existent which differ

radically, and require to be carefully distinguished. In the one there is tubercular disease present which has produced more or less destruction to the bony column, and is analogous to the early deposit of tubercle in the lungs, and requires to be guarded from increased action just as does the lung which has become inflamed. The other variety is not accompanied by any inflammatory condition nor destruction of tissue, but is dependent upon some cause or causes which produce simple deformity without disease. It is this latter variety that may be treated successfully by the means here advocated.

OBJECTIONS TO TREATMENT BY BRACES.

There are three strongly marked objections to be urged against any brace or jacket for the correction of lateral curvature of the spine.

The first is, that such mechanical appliances do not correct the deformity. In order that a brace may act efficiently it must be based upon the principle of the lever, and three points must be available for the application of the force—that for the weight, for the fulcrum, and for the power. Considering that the chief deformity in lateral curvature is, in nearly all cases, higher than the inferior angles of the scapulæ, and that patients will not tolerate a brace which will extend above the level of the shoulders, it becomes impossible to have three points at which to apply the force. Few who have made extensive trials in correcting spinal curvatures will claim to have had satisfactory success by the use of mechanical means. In my own observation I have not found one case in twenty on whom a brace can be wisely employed.

The second objection is this: The constant application of a force pressing upon the structures of the trunk produces atrophy and weakness of the muscles, and limits and discourages free thoracic movement. The air cells are not filled with the constantly changing air, the thoracic organs are hindered in their development, and the indications which exist for the treatment of persons thus affected are not met, but rather the reverse condition is brought about.

The third objection: It is natural to lean upon any artificial help to which one becomes accustomed. The individual learns to depend upon the brace, instead of cultivating his independent power of maintaining an attitude of erectness.

TWO VARIETIES OF LATERAL CURVATURE.

In dealing with lateral curvature it is well to distinguish between two classes of cases each of which presents its own distinctive clinical picture. The one is the patient who has had deformity from early life, and where the affection arose from lack of asymmetry in the skeleton, so that we have to deal with a case presenting actual bony deformity. The other is a case of postural deformity. This arises frequently from relaxed habits of stand-

ing and sitting, from the use of improperly constructed school furniture, etc.

POSTURAL CURVATURE.

In dealing, in the gymnasium, with the latter class, those who present simply a postural deformity, and who have little or no real asymmetry dependent upon skeletal deviations, free gymnastics are called for. The patients are ranged in a small class numbering not higher than ten or twelve upon the gymnasium floor, and are taught the correct method of standing, so that the attitudes shall be the best possible for the individual. This part of the work must largely be done with each patient alone, and a large mirror can be used with great advantage to help the patient to understand what it means to maintain an ideally erect attitude. Henceforth, throughout all the exercises, there is an effort made to have the patient return constantly to the ideal position just described.

FIXED CURVATURES.

In dealing with fixed curvatures something is required in addition to the training or educational method just referred to. The employment of force outside of the patient is necessary. With this object in view patients are allowed to swing freely, having the entire weight of the body suspended by straps passing underneath the chin and occiput. There are few persons who would be willing, at first, to have themselves thus suspended; but patients coming into the gymnasium, and seeing others swinging back and forth through an arc of twenty feet or more, soon realize that it causes no pain, but that it may be made a source of pleasure and amusement. The ceiling of the gymnasium is fifteen feet from the floor and we have an iron rod extending along the centre from end to end. Several ropes are suspended from this rod and brought down to varying heights, so that patients of different sizes may find a convenient point of suspension in such a way that the toes can barely be brought to the floor. Thus suspended six or eight patients at a time amuse themselves by swinging back and forth from one side of the gymnasium to the other. It will be seen that in this manner a considerable force is exerted to straighten the spine, the pull being felt especially upon the concave side and in the shortened ligaments of the vertebral column.

In the more strongly marked cases a still further application of force is made. While the patient is suspended a girth passes around the thorax similar to a saddle girth, and the patient is drawn away from the perpendicular line of suspension by passing a rope from the girth to a pulley placed on a higher level. The lateral pulling force is made in such a direction as to press the spine toward a straight position. Even a further force may be employed. It is well known that the rotation or torsion of the spine is the most difficult to correct. While the patient is suspended and the lateral force as above described is being exerted,

the arm of the director may be placed around the body so as to fix the pelvis, while the other hand is pressed forcibly upon the most prominent portion of the ribs. In this way a most direct power is employed for untwisting the distorted spine.

Dr. Lovett, in a paper recently published, has shown how the spinal column, when hyper-extended, tends to make correction of the rotation during lateral bending. This principle is employed by us in the application of the girth, so that there are two forces at work tending to correct the rotation which is the most difficult element to rectify. The one is found in the hyper-extension and lateral bending, and the other in the lateral pulling by the girth

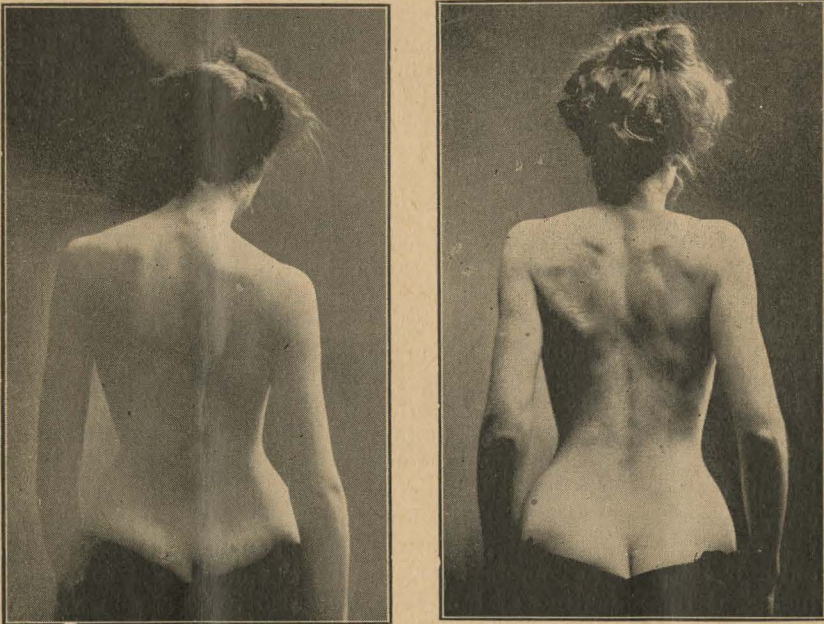


FIG. III.—K. D., 24 years. Figure at left shows natural standing attitude at commencement of treatment; figure at the right shows attitude which she could assume after treatment for two months.

applying its force at the point of greatest prominence of the deformity.

These various agencies, which are employed for stretching and forcing the deformed spine into a corrected or over-corrected position, not only do not produce atrophy, but they actually cause increased growth by stimulating the circulation; and they become a method of giving massage to all the structures of the trunk. It is difficult, by any ordinary methods, to give massage effectively to the deeper tissues of the spine. By the method above outlined, however, even the ligaments, fasciæ, muscles and bones are so influenced that there is a stimulation of the circulation and consequently an increased growth.

Of all the methods which have been practised for employing force to rectify deformities of the spine, I know of none where it can be so effectively and powerfully accomplished, without the production of pain or without the danger of causing any harm, as by the simple methods above outlined.

IMPORTANCE OF DIAGNOSIS.

A word of caution may not be out of place here. Occasionally we find patients, sent in with a recommendation to treat them in the gymnasium, who, upon careful examination, prove to be the subjects of organic disease of the spine. I have already pointed out that such active and forcible treatment would be entirely contraindicated in such cases.

It may be said that such employment of force can be continued for only a comparatively short time. Correction of the deformity, however, though it be only for an instant, implies that all the structures upon the concave side have been stretched sufficiently to permit of correction.

THE EDUCATIONAL ELEMENT.

At this point the element of training or education is called into play. After employing force as described, the patients are ranged upon the floor in small classes and each is taught to maintain the best attitude possible for that individual. In all work done as free gymnasium work, the patient is expected to return to this ideal attitude after every movement, with chest well thrown forward, shoulders held well down and backward and head erect. After every series of movements requiring muscular effort an opportunity is afforded for deep breathing. The utmost care is taken that in inspiration the lungs be filled to their utmost capacity, and that the patient shall learn to employ every lung cell so far as this is possible. Great stress is laid upon this point, not only to effect more complete aeration of the blood and to cause increased functioning of lung cells, but also for a reason which is more mechanical in itself, namely, that roundness and symmetry of the thoracic walls may be secured. In many of the deformities of the chest, such as pigeon-breast, it is not wise to apply any pressure from without to correct the deformity; and the only available means is that which is employed from within by the filling of the lungs to their utmost.

FLAT FOOT.

At an early period in this work it became manifest that weakness of the feet and of the leg muscles, producing what is commonly spoken of as flat foot, weak foot, weak ankles, could be most successfully and scientifically treated by methods which would increase the power of the groups of muscles holding the feet in a correct position. Even the normal foot when the individual

stands at rest has a tendency to turn over in such a manner as to allow the inner malleolus to come nearer the ground, thus producing pronation of the foot. In persons who stand much and have a predisposition to flat foot, the inner groups of muscles comprising the tibiales and the long flexors have become taxed beyond the limit of their reserve power and the foot gives way to the strain upon the ligaments, and the disabilities and pains of the flat foot are experienced.

Special boots, flat foot plates, and other mechanical devices are certainly of great importance in rectifying the deformity and lessening the pains of flat foot, but especially in children and adolescents the best results and the most scientific treatment is found in strengthening the group of muscles which hold up the arch and the inner border of the foot. The benefits to be derived, however, from training, are not limited to increasing the power of the structures at the inner side. Great gain ensues from educating the patient to hold the foot in walking and standing in such a position that the weight-bearing portions which come into contact with the ground shall be more directly under the body. In numerous cases of children and youth a lengthened period of education in this way has quite cured the deformity and has enabled the patient to hold the foot in good position without the use of any mechanical assistance.

In the treatment of flat foot I would name the therapeutic agents in order of importance, thus: 1, physical training; 2, properly constructed boots; 3, flat foot plates or other mechanical means; 4 operative measures in extreme cases.

CHOREA.

A few words concerning the treatment of chorea. My first experience in treating this disorder in the gymnasium occurred in the following manner. I was consulted in the autumn of 1892 regarding a boy of eight years who had lateral curvature of the spine. He was advised to come for treatment in the gymnasium but did not present himself for nearly three months afterward, and in the meantime had developed chorea. Believing the proposed treatment for the curvature in no way contraindicated he was placed in a class doing light work, mostly free gymnastics, none but himself having chorea. In all class work implicit, prompt obedience to the word of command given by the directress is insisted upon; but, at first obedience was, for this boy, impossible; he could not make the required movements. No special attention was paid to this fact and he was permitted to do the best he could and was so placed in the class that he could see and imitate others in front of him. After the first lesson it was quite evident that the inco-ordination was less marked and that he was gaining control of his unruly members. In less than a week—exercises were carried on every day—every sign of chorea had disappeared;

and so long as he remained under observation there was no relapse. In this case no other treatment was employed.

Since that time several other cases have incidentally come under our observation only two of which, however, have been such as to permit of satisfactory observation so as to note final results. Both of these were girls of about thirteen years of age, who had been afflicted for periods of one and a half and two years respectively. In both of these cases results have been most gratifying. The cure of the disease was not accomplished nearly so quickly as in the boy, but from the first, manifest improvement occurred not only in the control of the muscles which was acquired, but in the improved color and general condition of health. Each of these remained under treatment several months, and at the present time one of them presents no trace of the disease while the other manifests a slight uneasy and anomalous motion of the feet.

But few references are made in literature, so far as I can determine, to the treatment of this affection in the way here advocated. The most extended reference to the subject that I find is that by Le Grange in his work, entitled "*La Medication par l'Exercices*," 1894, p. 425. He says: "It is in affections marked by defective co-ordination of movement that exercise has given its best results, and especially in chorea or danse de Saint Guy. . . . In simple chorea, when the child has a measure of control over its movements, simple floor exercises, rhythmical and executed to the word of command, afford the nerve centres a form of discipline to which the child's members yield obedience, and the will gradually resumes control over the muscles."

Reference to the subject has been made by Wirt, of Cleveland, and by Somerville, in the *Scottish Medical Journal*.

Although nearly all of our ordinary books say that rest and medication are the only means of successfully coping with this disease, yet it seems to me that physical education is a very rational method, especially when the acute stage has passed and the disease has become chronic.

HYSTERIA.

One of the most interesting series of observations that we have been able to make in this work has reference to hysteria. In dealing with this affection of protean form one fact has impressed itself upon me more than any other, the necessity of obtaining absolute control and of exercising wise discipline in the case of patients thus affected.

L. D., aged 22, referred by Dr. Reynolds, of Mount Forest; farmer's daughter; said that she had been unable to work for six years; that she had suffered with pain in the back and head and inability to exert herself; for three months previous to consulting me she had been confined to bed unable to help herself; her mother had been an invalid for ten years and is said to be suffering from spinal disease. This young woman was brought to my office on a

stretcher, and upon requesting her to stand up and disrobe that I might examine her spine, her aunt said she was unable to stand or even to hold up her head. By insisting upon her doing as I requested, she did stand up and was examined; but I was unable to find any evidence of organic disease. Within a half hour she walked up two flights of stairs to the ward in the hospital. At once she was taken into the gymnasium for an hour each day, and work, at first light but increasingly difficult, was given until she was able with the other patients to do all the ordinary work. Treatment was continued for a period of six weeks, at which time she

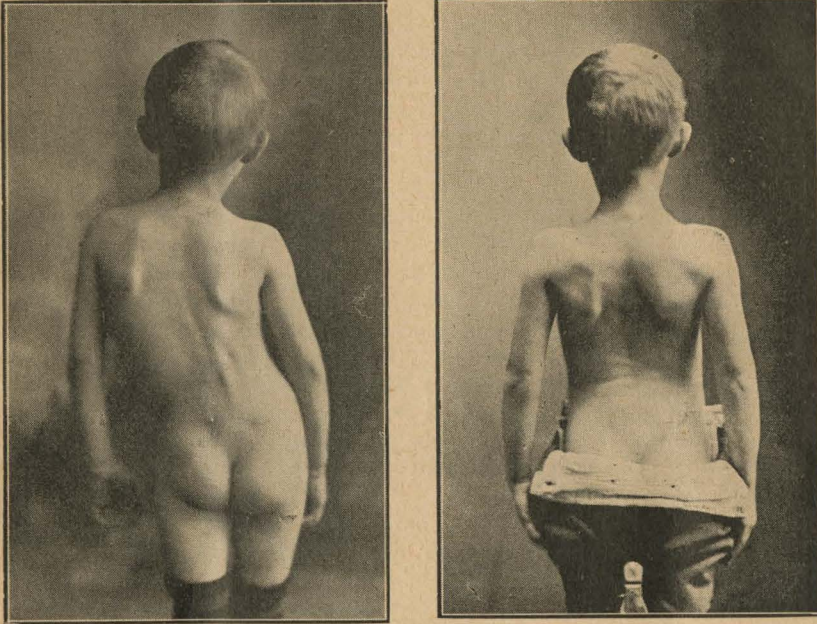


FIG. IV.—F. T., 5 years old. Paralysis of body muscles from anterior poliomyelitis which causes the deformity. Received treatment at first by recumbency, and for a short time afterwards in the gymnasium. The figure at the right, however, shows the boy's condition two years afterwards, and illustrates well the natural tendency toward recovery in cases of infantile paralysis.

was spoken to very plainly regarding her condition and tendencies. She returned home and has now for a period of nearly a year continued well and is working hard.

E. G., referred by Dr. Coventry, of Windsor; a young woman aged 18; rather anemic and of nervous manner. At fourteen years of age she complained much of headache and backache and of general lassitude, so that she was kept from school most of the time. During four years which have elapsed both she and her family have considered her unable to work, and during this time she consulted a gynecologist, who removed one ovary; an orthopedic surgeon,

because she was lame and believed to present symptoms of hip disease, who assured the family that she had no joint affection; and a neurologist, who said he believed her condition was one of hysteria.

At the time of examination, in April last, I found her very lame, walking with a limp that was very different from any that I had ever observed. Although she was very lame, and had been so for some years, yet there was no evidence of any inflammatory condition of any joint and but very trifling atrophy of the limb. Whenever any part of the leg or foot was touched the entire limb was thrown into violent and erratic convulsions (I do not know what better term to use, so irregular and so extreme were the excursions of the limb). The heart presented a systolic murmur; otherwise there was no evidence of organic disease. I expressed the opinion that the case was one of hysteria and advised that the girl come into the Orthopedic Hospital in order that she might be completely under control. Having carefully instructed the directress that all work given to this patient in the gymnasium must be done with the greatest care, beginning with the simplest forms of movement, gradually calling into exercise the individual extremities and seeing that excuses were not accepted in place of work, she commenced training at the beginning of June and continued until the 30th. While under observation during this time the only real cause for lameness that I discerned was an undue pronation of the foot, which I am disposed to think arose from her manner of walking for so long a time. At the end of the month the limp had almost entirely disappeared, her health and color had greatly improved and she had been taught to place the unduly pronated foot and to walk with it in a correct position. The highly satisfactory gain continues until the present. She has continued to improve during the two months of vacation.

M. D., aged 29, who, three years ago had a carbuncle situated near the coccyx, referred by Dr. Meade-Sirrs. In giving her history she speaks of "abscess of the spine," and says that some bone came away after incision. The cicatrix presented does not indicate that there had been anything more than a small carbuncle. During three years, however, she has worn jackets and braces, has been advised change of residence for her health, etc. Her invalidism continued up to the time when I saw her in May last. She then complained greatly of pain in the spine, and said that she was unable to work. Careful examination revealed no sufficient cause for the complaint made. All the organs were found in a healthy condition, her color was good, she had but little fat and her muscle was slight. She was immediately subjected to the usual discipline of the gymnasium with results as gratifying as in the former cases.

Let the brief recital of these three cases suffice to show the purpose of the work in the case of patients thus affected. It is not claimed that the special work done has any specific influence. I desire to emphasize here two features of the work. First, the directress who is in charge is a woman of good judgment, of tact.

and firmness, and follows out strictly the directions which are given. Taking these patients into the hospital whenever this course is found practicable we obtain control of their lives, and do not allow a trifling matter to stand in the way of carrying out whatever regulations are deemed important. We obtain a very absolute control over the doings of these patients for a considerable length of time, and thus help them to act with good common-sense until they have been enabled to see the folly of their former course, and become inspired with confidence that they can conduct themselves in a rational manner.

DR. WEIR-MITCHELL'S TREATMENT.

Up to this point the treatment differs little from that advocated by Dr. Weir-Mitchell. The "rest cure," however, falls short,

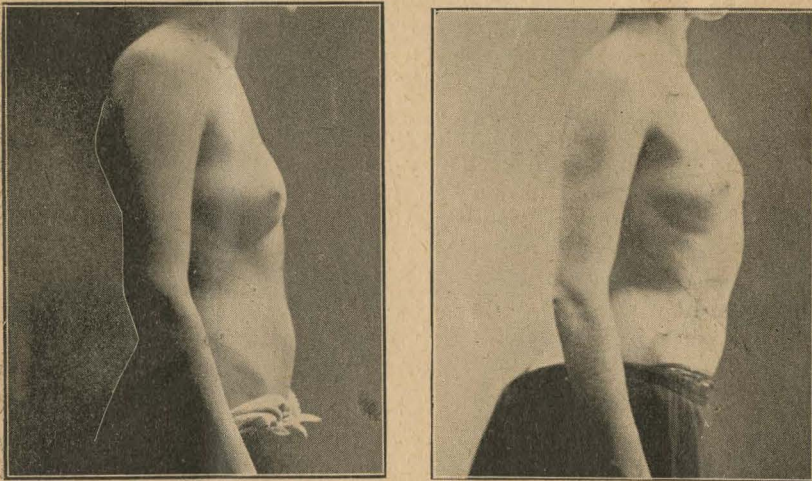


FIG. V.—F. S., 29 years. Shows improvement in attitude which could be effected in two months' training.

inasmuch as it is too negative in character. Systematic training to self-reliance and renewed confidence are needed to render the cure effective. Though the patient should regain health it is soon found that life is not a negation, but that its problems must be grappled with in a positive manner and solved. Massage, good diet, etc., are important, but in order to establish permanent results the volition must be called into exercise.

The training continued regularly every day affords us an opportunity to exercise the necessary discipline, to bring into exercise and co-ordination the faculties and powers tending to produce rational behavior in a healthy individual. It is highly important, in the first place, to make a correct diagnosis, and, afterward in following out the work, it is essential that the person in

charge of the gymnasium shall proceed with tact and firmness. In the case of one young woman who was subject to "spasms" and great nervousness, when displeased or crossed, these attacks came on while at work in the gymnasium, and she had me sent for. I did not go to see her, although in the building at the time, but sent word that she must do her work as usual, and that no attention must be paid to her attacks. After this course had been pursued for some days these attacks disappeared, and she improved rapidly.

WEAK-MINDED AND BACKWARD CHILDREN.

Another class of patients who can be greatly benefited is the weak-minded. It has been a matter of surprise to know how many children who were brought for advice, because at two, three or four years of age they could not walk, are found to be of varying degrees of idiocy. The large number whom we have been called upon to advise in recent years greatly aroused my interest in and sympathy for them, so that when a proposal was made to found a school for the education of these unfortunates in Toronto I did what I could to encourage it. In this way arrangements were made so that the pupils of the school should have an hour and a half in the gymnasium each day for five days in the week. As this work continued only a few months I am not able to judge from personal observation regarding results, but the works of Shuttleworth, Ireland and others in the Old Land, and of Seguin and Hamilton Wey in America are well known. "Physiological education of the senses must precede the psychological education of the mind."—Seguin, "New Facts," etc., p. 41, 1870. "The training of the muscular system to ready and regulated response is merely an extension of the sensorial training, and both these processes only precede and prepare the way for more purely intellectual training." "Education (for the feeble-minded) then starts on physiological lines, and is addressing itself to the culture of the external senses, and then to the co-ordination of muscular movement, and finally to the promotion, by imitative and other exercises, both of the manual and mental activities."—Shuttleworth, "Mentally Deficient Children," second edition, 1900.

Even after a few months of training I have seen marked advance in the ability to fix the attention, to walk with improved bearing and better co-ordination for the performance of various simple athletic feats.

PARESIS.

Some rather striking results have been noted in paretic conditions. S. C., twelve years of age had hemiplegia when two years of age. Though she had learned to walk, the right arm had remained without training and was never used by the girl. She remained with us six months and received daily training in the use of the right hand and arm. At the end of that time she could handle fairly well the stirrup in drawing the pulley weights; she could

lift various objects and carry them across the gymnasium; could pick up and carry a chair with that hand; and had an increase of sensation. The treatment given during this time for the hand and arm consisted in daily massage and education in the way of voluntary use.

In cases of anterior poliomyelitis, where the group of cells in the anterior columns of the cord have been considerably disabled but yet control a considerable number of fibres going to the muscles of the extremity, much may be done to increase the efficiency of muscular power by calling into action the volitional ability that still remains to determine the action of these muscles.

OUT-DOOR WORK.

In all suitable weather patients are taken out after gymnasium work and encouraged to engage in games on an adjoining lawn under supervision of the directress. The element of play is introduced even in the gymnasium as much as possible. In this manner monotony is avoided, and in practice we find it very unusual for any patient to express dislike for the work; in fact, parents tell us that the children look forward with pleasure to their hour spent in the gymnasium or on the lawn.

IMPORTANCE OF CLASS-WORK.

Reference has been made to class-work. Upon this I desire to lay emphasis. Some who advocate the treatment of deformities by special exercises deal with the patients singly and not in classes. Much individual work must be done, but by neglecting class-work some of the best elements of power are lost sight of. The tactful teacher will hold up before her pupils a lofty ideal, and will call forth a spirit of emulation to stimulate the efforts of each. Then there is the example and sympathy of those who are engaged in the same work and contending with the same difficulties. A class *esprit de corps* is soon established which greatly lightens the labor; and an opportunity is afforded to introduce games, thus relieving the tedium of the work, which being repeated every day, is liable to become irksome.

CO-OPERATION ESSENTIAL.

In every instance it is essential to success that the hearty co-operation of the patient be secured. A series of meaningless (to the patient) exercises prescribed on paper to be executed at home or elsewhere is as dead and useless as would be the prescribing of so much Hebrew Grammar. There must be an intelligent, educated, sympathetic instructor and leader, a personality who can inspire confidence and command respect.

Work done in a perfunctory manner is worse than useless. A lofty ideal of what is possible of attainment must be created; and

the greatest good for the patient is secured only when the most ardent efforts are put forth to reach the most difficult heights of the ideal.

SUMMARY.

To summarize briefly :

1. Special physical training is rendered necessary for the young by the conditions of modern life.

2. The work is made special and scientific having for its object the development and strengthening of every organ and faculty of the patient.

3. As we conduct this work it is mainly educative. Force from without the patient, however, is largely employed in such cases as cannot of their own volition correct the deformity.

To name affections benefited in the order in which good results have been observed I would place them thus: Hysteria, rotolateral curvature, flat foot, round shoulders, pigeon-breast, flat chest, anemia, parietic weakness, chorea, imbecility.

In this list I have placed hysteria first, because I have not known any method by which this condition, generally so unsatisfactory to deal with, has been brought so successfully under control.

