A REVIEW

OF

Swedish Gymnastics

BY

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A REVIEW OF SWEDISH GYMNASTICS.

THE term "Swedish Gymnastics" is usually understood to mean, in this country at least, a system of physical training designed to meet certain demands in the education of childhood and youth; and, since the question of its utility is at present largely or chiefly concerned with its use in schools, it will be well to begin our discussion with this phase of the matter.

If it is a function of education to train the growing individual for usefulness in life, physical education must demand attention in any proper scheme of educational work since the capacity for usefulness is so largely determined by the physical health of the individual. It is perfectly true that we find cases in which, owing to unusual mental power, success has been attained in spite of physical defects and even of moral defects. We see cases where success has similarly been attained because of moral qualities and in spite of very moderate mental power or of physical weakness. But such cases are the exception. If you study great masses of people, you will find that serious defects in physical power are almost certain to hamper life's work. That work may be done, but it involves a severe struggle. In a large percentage of cases it is not done, and life becomes a succession of failures. It is, after all, on the physical man that we build. The leaders in life's activities are almost without exception men of strong physical constitution; a large percentage of the failures are men of weak constitution; and any system of education which impairs physical vigor and leaves men physically unequal to the

work of life is unworthy of encouragement, — is, indeed, radically wrong.

The physical condition or health of a human being at any age until growth is completed is the result of a process of physical development. In actual life, Athene does not spring full-fledged from the brow of Jove, nor Venus from the foam of the sea. For one hundred and seventy-five thousand two hundred hours the most varied physiological activities have been at work to make the man or woman of twenty years; and, could we read but deep enough, we could see that the conditions which obtained during each of those hours have contributed their share to the final structure, the health, the possibilities of that living being.

Development, in short, is the result of three factors: —

1. *Heredity.* — It is not necessary to attempt a definition of this term. It is the expression of the structure and characters of the fertilized ovum from which all the cells of the body are derived. It gives us the living material upon which we must work in education, and at once determines the possibilities, the limitations, and, to a certain extent, the course of training.

2. *Environment*, both of the body as a whole and of each of its units, the living cells. This would include the external conditions of life and the chemical and physical characters of the blood. Under it we would include the food supply, the surrounding temperature, clothing, the care of the young by the parents, the hygienic conditions of the dwelling, bathing, and so on.

3. *Activity* of each cell and of the body as a whole. By activity I do not mean simply muscular activity; that is merely the activity of one kind of cell, — the muscle fibre. The discharge of a nervous impulse from a nerve-cell is a case of similar activity in another kind of cell; the process of secretion is similarly another case of activity in a gland-

cell; and so with each kind of cell in the body. Now we have satisfactory evidence in most cases that the growth of the cell is profoundly influenced by its functional activity, and cannot be complete without this activity. If a growing muscle fibre never contracts, it cannot develop into a healthy adult fibre. A growing nerve-cell which never sends an impulse over its axon cannot become an efficient nerve-cell. A growing pancreas which never secretes pancreatic juice cannot grow into a perfect gland. The classical example of this is the failure of the motor-cells of the cervical cord to develop when the arm has been amputated about the time of birth; under such circumstances the nerve-cells do not send impulses out over their axons, and accordingly take on characteristic degenerated forms. Moreover, within certain limits the efficiency of an adult cell is proportional to the amount of activity it has had during development; the muscle fibre which has been used is capable of doing work which one which has been used but slightly can never be trained to perform. "You cannot teach an old dog new tricks," is one way of saying that the greatest possibilities of training belong to the period of growth; and this is especially true of physical development. We can do for the physical man before the age of twenty-one what it is absolutely impossible to do between twenty and sixty.

The three factors, then, at work in development are heredity, environment, activity. Heredity should determine what education is to attempt and the general course which its operations should follow. Environment demands attention to the hygienic conditions of the home and the school, to clothing, feeding, bathing, etc. The greater part of the work of education, however, is directed toward giving such guidance to the activities of the body, and especially to the volitional activities, as shall produce the best physical, mental, and moral results. Now, if what

has already been said be true, it is clear that muscular activity is a necessary factor in the development of the physical man. Not only is it necessary to the proper development of the nervous and muscular systems, but, over and above this, in subsequent life, health is so intimately dependent on muscular activity, and muscular activity is so hard to maintain in a physically defective body, that some sort of physical training must go along with study in youth to make our educational scheme complete.

When we examine further into the matter, we see that not only does muscular activity play an important part in general in the development of the child, but that different neuro-muscular mechanisms develop best at different periods of life. Accordingly, the muscular activity of the child is directed chiefly toward the development of the mechanisms of accustomed movements, such as those of walking, running, and, in general, of movements which involve the use of large masses of muscles and produce co-ordination of these muscles. Later, activity takes on more distinctively the character of skilled movements, which cultivate manual dexterity, the more perfect use of language, etc. Going along with these, we naturally find the growth of the more complicated mental processes, this mental development generally, though not always, continuing in full force long after the motor mechanisms are acquired.

Nature, however, does not make the adult man as a machinist does a piece of mechansim, by completing one thing before beginning another, and then, when every part is complete, putting all together into a harmonious whole. The curve of work on each mechanism would overlap the curve of work on other mechanisms; but the maximum points of these curves would be different.

A moment's consideration of the previous discussion brings out clearly the fact that the mental education of the

child begins at the time when his physical development is still going on, and that the work of the school-room is a direct hindrance to normal physical development. The child must give up his play in order to learn his lessons. He must sit still, and that, too, in what are frequently unsuitable desks, made without reference to the proportions of his body. It is, indeed, very doubtful whether the highest physical development is ever consistent with the best mental training; the boy as he leaves our schools can never be capable of the same endurance that we find among more uncultured peoples who live under otherwise favorable surroundings; nor is there any physiological reason why he should reach such a state of physical development, considering the work which he has to do in life. But it is not necessary that he should leave school with impaired health; it is not even necessary that he should be hollow-chested, stoop-shouldered; it is not necessary that he should have an awkward carriage; it is not necessary that he should be physically lazy, disinclined to take the very moderate amount of exercise which the maintenance of his health demands.

The mental training of youth, in other words, has introduced an unnatural physical environment, which, if not corrected, will in nine cases out of ten tell upon subsequent bodily health, and so in too many cases upon mental and moral health as well. If no attention were paid to mental training, if our children never went to school, physical training would be for the greater part unnecessary. It is, therefore, one of the main functions of physical education to correct the injurious effects of the unnatural environment created by mental education, and to do this without endangering the efficiency of that mental training.

Such is the starting-point of the Swedish system, in common with most other systems. Whether it adopts the

correct means or not, it goes to work with the right object in view. Its purpose is not to train athletes, although it may be developed in that direction; it is primarily an attempt to conserve the physical man during his mental training, so that, when the period of schooling is over, he shall have a body physiologically capable of sustaining him in the work of his life.

Not only is its purpose correct, but its general attitude in approaching the practical problems is also correct. Its work, in other words, does not run to doing difficult feats on particular pieces of apparatus; the Swedes claim — and with justice — that they do not adapt their work to apparatus, but their apparatus to their work. Far be it from me to claim that this is a virtue found only in this particular system; but in certain other systems this point is not properly guarded; and in any system corrective exercises, to be effective, must be carried out under the guidance of trained teachers. It is a fact not fully appreciated, even among those who believe in exercise in general, that the best physical development comes from the proper use of very many different movements; that the use of one group of muscles going along with the improper use of other groups of muscles, although for the time being serving the general hygienic purposes of exercise, may produce anatomical results which can only be described as deformities; and that this is especially apt to be the case where movements are improperly executed.

Gymnastics, moreover, as developed in Sweden, has kept in view another matter of very considerable practical importance; it is necessary in our schools that comparatively large numbers of students shall receive physical training at the same time; and it is impossible to avoid this condition entirely, even with the most favorable arrangement of the study schedule. Largely for this reason the use of large and cumbersome apparatus, which occupies an amount

of floor-space entirely out of proportion to the number of students which it can accommodate, is avoided; and the work is done either by using free standing movements alone, or else these with the addition of work on apparatus which can be arranged along the walls or ceiling of the room, or can readily be removed, leaving the entire floor clear for the class drill.* The movements chosen at the same time exercise all the muscles of the body and yet can be carried out simultaneously by large classes. Thus we have introduced the gymnastic drill, which is employed not solely for its value as a drill, but because a single instructor can do effective work with a large number of students at the same time. This is a matter of great practical importance. The drill is far superior to individual gymnasium work. This is seen at once if one realizes the fact that, if physical training is to accomplish the very desirable end of producing correct proportions, form, and carriage of the body, the instructor must be able to observe quickly the work of a large number of students in every movement they make. With ordinary apparatus work, such as is used in most of our gymnasia, this is impossible, because fifty or a hundred different students are each doing a different thing. The drill likewise has the advantage of supplying an incentive to every student to do the movement correctly, in that others are doing the same thing at the same time. For these practical reasons the gymnastic drill, whether with apparatus or without it, is the ideal form of gymnasium work.

We often hear critics sneer at this feature of the system. In a recent article in the *American Physical Education Review* we read of "that nervously exhausting and deadening drill, known as the Swedish gymnastics, which, by the name of educational gymnastics, adds fatigue to fatigue

* The word *drill* is always used in this paper in a sense similar to its use in *military drill*, and never in the sense in which it is frequently employed in the literature of gymnastics, where it means a definite series of movements performed in unison by a class, as, for example, in a "dumb-bell drill."

by taking the initiative away from the child, and forcing him to pay constant and close attention to the orders of the teacher, that he may execute with precision entirely uninteresting and conventional movements." I have no disposition to underrate the value of spontaneous play in the development of the child. By all means encourage the child to play, and make this a part of the school day. Nor do I advocate undue attention to gymnastic work. I advocate giving only so much of this as is necessary to correct the physical or physiological faults resulting from school-room work. Nor do I deny that any drill, any gymnastic work, may be "nervously exhausting and deadening," this depending on the teacher, the main factor upon which the success of all gymnasium work depends; but, granting all this, I must insist that gymnastics, when properly used, can produce advantageous physiological results, which cannot be produced by play alone. It does not do to forget the fact that, while play will do for a savage or a kitten what we try to do for our school children by gymnastics, the material upon which the factor of play works in these cases has not been subjected to conditions which actively produce deformities or deficiencies. Superintendent Seaver well stated the purpose of school gymnastics as the antidote of the school desk. Take the most common example, that of stoop shoulders and contracted chest. Will it be claimed that these can be corrected by spontaneous play alone? Personally, I have seen too many cases which could not be brought into agreement with such a theory to allow me to accept it; and, even in many cases where play exerts a corrective influence, the same results can be more surely and more economically accomplished by gymnastics. And we deny absolutely that gymnastics need be a bore.

The last paragraph indicates the position of Swedish gymnastics in physical training, and this must not be lost sight of by those who would understand it. It will be

more fully shown in later parts of this paper that physical training presents two distinct although not mutually exclusive sides, — the general hygienic and the corrective. While Swedish work gives to a very considerable extent the general hygienic effects of exercise, it is primarily concerned with the corrective side; and it may be well to define clearly at this point what is meant by corrective gymnastics. The effects of the physically specialized life of the school, and, indeed, of most forms of specialization, manifest themselves in two ways, — in anatomical changes and in awkwardness or peculiarity of movement of the body as a whole. Strictly speaking, the term "corrective" should be used only with reference to that gymnastic work which attempts to *remove* anatomical and physiological faults. In point of fact, the exercises which are used to do this are essentially the same as those used to *prevent* the same faults; and no hard-and-fast line can be drawn between *remedial* and *preventive* gymnastics. It is therefore convenient to include the two under the single term *corrective*, which is thus used in this paper. It will subsequently be shown how gymnastics can have this corrective effect.

The most distinctive feature of Swedish work is the fact that it never loses sight of the corrective element. This is its primary purpose. Gymnastic movements which, though graceful in themselves, have a marked tendency to produce some anatomical fault, are rigorously excluded. Even those which, though not open to this criticism, only result in the ability to do some gymnasium trick of little or no use in practical life are relegated to a subordinate place. The basis of training of its teachers is kinesiology. The anatomy of the skeleton, the joints, and the muscles, is studied most carefully, not, as Du Bois-Reymond would have us believe, in order that the pupil may be conscious of what particular muscle he is contracting, but

because it furnishes the only means of understanding the effect of a definite movement on the skeletal parts, and so of estimating its corrective value. Such study is for the preparation of the teacher, not for the pupil on the gymnasium floor; it is not even necessary that the teacher should think of the kinesiology of a movement at the time he gives a command; but his use of a certain movement should ultimately, consciously, or unconsciously, rest on this basis.

This characteristic of Swedish work is at once its greatest strength and its greatest weakness. It is its greatest strength because no other physical trainers can show such theoretical knowledge of kinesiology or such successful practical application of that knowledge in corrective work. The Swedes have worked out this part of the subject with singleness of purpose, and they have made the field their own. On the other hand, it is its greatest weakness. At times individual teachers have forgotten that corrective work is not the whole of physical training. It has been pushed to a needless extent and, at times, to the exclusion of outdoor work, which is more attractive and which also produces an amount of endurance which indoor corrective work cannot. Nor can there be any doubt that these corrective exercises have at times been given in a manner that strongly suggests an operation in orthopedic surgery without anæsthetics. There is a right way and a wrong way of doing all things; and it would be strange indeed if some teachers had not taken the wrong way, and failed to infuse into their work that personal element of interest and enthusiasm upon which its success very largely depends. I will even go farther, and say that there are few fields which offer such opportunities for the successful exercise of all the qualities of a bore as does that of Swedish gymnastics. This follows from the fact that it is systematic, and anything systematic is peculiarly liable to such abuse.

But this is no valid argument against the use of the system. Is it a valid argument against the study of the English language and literature that so many of its teachers do most fearfully and wonderfully bore their pupils with it?

Having dealt with these more general features of the problem, we may now pass to the consideration of these which have to do with the system itself. And, first, let us say that the Swedes are right in having a *system*. The "day's order" is the point of most attacks. Some critics seem utterly unable to understand that anything systematic should be anything but monotonous; and so it would be, were each day's work like that of each preceding day. The "day's order," however, involves no such idea. Apart from the fact that, as the pupils work more and more in the gymnasium, new exercises are introduced, — a thing not easily done, by the way, with large numbers in the ordinary apparatus work, — the "order" only affects the general classes of movements; and within each class of span-bend, heave, back, abdominal movements, a very large amount of variety is possible, and, in point of fact, is utilized in the work of different days. There can be no doubt that a poor teacher can make a Swedish drill an insufferable bore; but a poor teacher can make anything a bore, and usually does so.

One of the main points of physiological interest is the matter of progression, as seen from day to day and in the day's order itself. As to the former, all must agree that in any course of training one should begin with simpler work; and, as the body improves in physical condition, more and more difficult work should be attempted. This is the essence of training. The heart, the vaso-motor system, the respiratory system, the mechanism of heat regulation, and the nervous co-ordination of the more fundamental positions and movements must all be trained by

use to work together. Pupils can do the more difficult exercises properly only as they have become fitted to do them by having experienced the benefits of simpler work. It is not my purpose to show how the Swedish system does this, as I am not aware that any one has denied that it is capable of any degree of refinement in this kind of progression. I shall linger long enough on the subject only to say that any system of physical instruction should make clear the necessity of this factor of training if the greatest benefits are to be obtained from muscular exercise at any time of life. Many a man loudly, but ignorantly, proclaims that exercise does not benefit him, simply because he began with a fifty-mile bicycle ride or a hard bit of mountain climbing.

Coming to the second kind of progression, the day's order itself, let us say again that, even if the particular sequence of movements adopted is not required by the nature of the case, it is better in general that the majority of teachers shall have some system to guide their work. It is putting it very mildly to say that very few teachers of gymnastics will ever have that commanding genius which will enable them to conduct classes upon the basis of general knowledge of muscular exercise; few even have that originality which would enable them to work out for themselves a rational method of work in physical training. Even if there were no system, each teacher would inevitably evolve one; in other words, most teachers would soon fall into certain ruts; and it is simply a question whether you are going to have a system which represents the ruts into which the individual mind has more or less unconsciously fallen or a system which is the result of organized effort, both on the theoretical and on the practical side, for many years. In other words, the work of the teacher of gymnastics is the practice of an art; and it is obviously better that accumulated experience should form the basis

of work, even though we grant at the same time that every effort should be put forth to encourage independence and originality.

The Swedes insist that their system is based on correct physiological principles. This may or may not be true. Advocates of the system should, however, avoid making the statement that, as a matter of history, it was deduced from the physiology of the human body. The fact is that the Swedish system of gymnastics was for the most part developed to its present form before modern physiology was more than in its infancy. Ling died in 1839, and it was not until 1860 or 1870 that the several discoveries of physiology began to be co-ordinated into a satisfactory body of scientific knowledge. No doubt Ling and his successors made good use of the physiological knowledge they possessed; no doubt they constantly endeavored to work from physiological knowledge as a starting-point; no doubt they subjected their work to the best physiological criticism they could give it; and no doubt a great deal of this was good physiology, and produced good results. But, granting all this, it is not wise to claim that the system was deduced from physiology. It is an art; and, whatever use may have been made of pure science in its development, yet, if it is successful, that success is quite sure to be due to practical experience of results,— the true test of any art which deals with the human body. A bridge can be built on the basis of scientific knowledge alone, but only because we know all about its parts and can calculate exactly what each one can do; it is quite conceivable that a civil engineer should design a new kind of bridge which introduces entirely new features for sustaining the weight, and yet know beforehand that the structure will do exactly what he expects of it. That is one of the highest triumphs of exact science. But the science of the workings of the

human body, or physiology, has not yet reached such a degree of exactness. Much less had it reached it in Ling's day. It is with gymnastics as it is with medicine. Physiology suggests, and often its suggestions are correct. It aids in interpreting results, and so may be an indispensable aid; but, after all, a physician does a certain thing because he has done it before and found that it produced the effect he desired. And the practical teacher of gymnastics gives certain movements because, although what he knows of physiology may have suggested them, and although he feels more confident in using them, because he believes they are physiologically correct, yet, after all, he uses them because he has tried them in the past and found that they work. And, if the Swedish system is worthy of confidence as a practical method, it is because it rests ultimately on this basis.

I have spent the time I have in emphasizing this point because I know that incorrect physiological claims have been made in support of certain things done. Various writers present us a body of so-called physiological knowledge which, to say the least, does not commend itself to physiologists; and I may as well tell you frankly that, if an uncandid opponent of the system should desire to make fun of it, he would find ample occasion for doing so in many of the physiological statements which have been given in explanation of its day's order. I have seen this done myself, and that with most pronounced success.

But any one who should make this a reason for rejecting the system in part or in whole would only advertise his own lack of common sense. The Swedish system of gymnastics, like every other system, is not what is written in books, but what is practised on the floor of a gymnasium. As I have said, it is an art which has been developed with a certain end in view, and is built upon practical experience of results. If good results are achieved, the system

is sure to rest to that extent on a sound physiological basis.

Now the Swedish system does achieve good results. Comparison of the entering Junior and the graduating Senior classes of this school proves this,— not a comparison of the two classes during the drill hour in the gymnasium, but more especially off the gymnasium floor; and I have never seen it questioned that the results obtained in Sweden are eminently satisfactory, at least from the point of view of corrective work. What, then, are the strong points of the system which enable it to produce its physiological effects?

1. Every group of muscles in the body is given its appropriate functional activity. We have thus produced the effects of use upon these muscles and upon the nerve-cells which innervate them. The various neuro-muscular mechanisms become more perfect machines, capable of doing the work demanded of them at any time. In connection with this valuable secondary effects are produced upon other organs, such as the aid to peristalsis with abdominal movements, the increased efficiency of the respiratory mechanism, etc.

2. Closely connected with this is the correction of faults of posture by properly chosen contractions of the various groups of muscles in the body. The muscles adapt themselves to the work of the skeleton, and the skeleton adapts itself to the work of the muscles. Thus the dorsal muscles of the neck will lengthen and the ventral muscles shorten, when the weight of the head is allowed to bend the neck forward. When the pectoral muscles are exclusively used and the pull they exert on the shoulders is not corrected by contractions of the muscles of the back, the latter group of muscles lengthen, while origin and insertion of the pectorals come closer together. The result is round shoulders,

the skeletal parts accommodating themselves more or less to this condition. When the erect posture is not carefully maintained and improper curvatures of the spine result, the antagonistic muscles and ligaments of the spinal column likewise acommodate themselves to the changed condition, those on the concave side growing shorter and those on the convex side growing longer. Consideration of these deformities show that they are produced in two ways, — by improper positions and by the use of one set of muscles with concomitant disuse of their antagonists. In both cases one set of muscles becomes longer, — *i.e.*, origin and insertion come to lie further apart, — while the other becomes shorter, — *i.e.*, origin and insertion come to lie closer together.

The trouble is corrected, first, by such work as will passively stretch the shortened muscles and ligaments; in response to which stretching, they lengthen. Thus the correction of the fault of round shoulders begins with the stretching of the pectoral muscles by contractions of the back muscles or by other means. In addition to this, we must strengthen by use the muscles whose antagonistic play maintains the proper relation of the skeletal parts, the purpose of this obviously being to make such muscles sustain the continuous contraction demanded of them without undue fatigue.* Mere difference in the strength of antagonistic muscles will not of itself produce skeletal deformity. Such deformity is apt to result, however, when this difference of strength goes to the extent that one group of muscles is too weak to sustain efficiently the work de-

* Not only does a fatigued muscle exert a less powerful pull than a fresh muscle, but the feeling of effort under these conditions becomes an unreliable indication of the amount of work done. If a dynamometer be arranged so as to record the work done at every moment of the effort, and not merely the maximum pull, it is found that, toward the last, when every effort is being made and, to judge from our feelings, with more or less success to add one pound more to the record, in point of fact the muscle is not doing half the work it did at first; and, when we remember what an important part these afferent impulses of the "muscular sense" must play in guiding the work of the antagonistic muscles which maintain proper position, it at once becomes clear what a difference it makes whether or not we rely for such work upon muscles which are strong enough to sustain it.

manded of them. When they fatigue in this way, exactly the same thing happens as in a "tug of war," when the greater fatigue of one side gives the victory to the other. These considerations also make it clear that, where both antagonistic muscles are too weak and consequently relax their support to such skeletal structures as the vertebral column, skeletal deformities may result, even when the muscles in question are of equal strength. Undoubtedly, many cases of improper curvature of the spine have their origin in this cause.

Whether or not this is the complete physiological explanation, there can be no doubt that such deformities, when not too grave, can be corrected in the manner indicated; and it is in this field that gymnastic work in our schools does what play alone cannot do. When, for example, stooped shoulders have been acquired by faulty position, spontaneous play gives no stimulus to bring about that contraction of back muscles which will correct the fault. Indeed, in many cases play only accentuates the fault because of the natural tendency to use the stronger muscles and to disuse the weaker ones. This must be especially true of unregulated play; and, even with supervision, attention cannot, in general, be given to the manner in which a movement is made. Play is, therefore, not a practical method of corrective work.

3. The work not only trains the neuro-muscular mechanisms of isolated movements to a high degree of efficiency, but also trains these mechanisms to work together. In other words, it trains the power of nervous co-ordination of movements. Just as the separate cells of the body become more efficient by being used, so these cells learn, as it were, to work together by performing as accurately as possible those movements which call for their co-operation. Hence the stress which is laid upon balance movements and also upon the *proper* execution of movements

involving considerable co-ordination. Awkwardness is, for the most part, only another name for the bad habits formed by doing things in the wrong way. It is avoided or corrected by doing them in the right way.

Every effort is made, moreover, to facilitate this correct performance of more or less complicated movements; and it is partly for this reason that the element of undue fatigue is avoided. The same rule is insisted upon in one of our most successful methods of language study. The lesson must not exceed fifteen or twenty minutes, and must be interrupted as soon as fatigue shows itself. The correct idiomatic use of the language is acquired by the *correct* repetition of the idioms of the language; *i.e.*, by the acquisition of habits which can be acquired only by correct use; to attempt to speak these idioms when one is fatigued with previous study means that a large percentage of them will be incorrectly given, with the result that, if bad habits are not acquired, the mental path of easiest conduction for the correct habit is no longer the clear and unmistakable one it should be. Precisely the same thing is true of what may be called the grosser movements of the body. To do them correctly is to blaze a clear and unmistakable trail of nervous conduction. To do them incorrectly is to confuse that trail with misleading signs which must be unlearned.

A very striking feature of the highly co-ordinated movements used in the Swedish gymnastics is the fact that so many of them are performed with one or both feet on the ground and supporting the weight of the body. Such is the case with all balance movements. The significance of this is at once seen when it is remembered that it is exactly this co-ordination which is of greatest use in every-day life. An equally great sum total of co-ordination is required by the more difficult feats on the horizontal or parallel bars or the trapeze; but the skill thus acquired is useful, for the

greater part, only in the performance of similar tricks on such pieces of apparatus. I can personally recall cases of men who were most excellent athletes of this kind and yet whose gait was anything but graceful. Now it is a legitimate demand on any gymnastic training in schools that it shall produce not only correct proportions of the body at rest, but also graceful carriage of the body in locomotion; and the principle of training by use shows us clearly that this is to be accomplished chiefly by the use of movements and positions in which, the weight of the body being supported on the feet, equilibrium must be maintained in difficult positions.

4. The need for training to do the more difficult work is kept in view. Students attempt particular movements only as they are provided with the proper physiological agents therefor by previous work. The exercises, in other words, progress from the simpler to the more difficult, and are so chosen that the former directly prepare for the latter. No other work compares with the Swedish in this respect.

5. Full and free respiration is always insisted upon. In many forms of physical exertion there is a tendency to diminish or even suppress entirely for a time the respiratory movements. At times, of course, this is absolutely necessary, as when, in lifting heavy weights by the arms, the thorax must be made rigid to assure a firm point of origin for the working muscles. The condition is even then, however, objectionable from the standpoint of the organism as a whole. Probably one of the chief benefits of muscular exercise is brought about through the accompanying increase in the breathing movements. We cannot at present positively affirm or deny that this is because of the increased amount of oxygen taken to the tissues,*

* We have good reason to believe that merely increasing the ventilation of the lungs does not increase the percentage of oxygen in the blood nor the amount taken up by the tissues. The tissues do not take more oxygen because more enters the lungs. On the contrary, their consump-

although such an explanation is frequently given with an assurance which betrays complete ignorance of some well-known physiological literature. It must be remembered, however, that the respiratory movements produce other effects upon the organism than ventilation of the lungs. They aid in the return of blood to the heart; and they are an important factor, if not the most important factor, in causing the flow of lymph in the lymphatics. Thus their increase during muscular exercise aids the heart at a time when it is apt to be overworked, and increases largely the flow of lymph, not from the working organs alone, but from all organs of the body. This is not the place to describe the physiological importance of the lymph flow. Let it suffice to say that there is good reason to believe that a good, steady lymph flow from an organ is an important condition of its healthy nutrition, and that the increase of lymph flow from all organs of the body brought about through the increased respiratory movements is one of the chief agents through which muscular exercise favorably affects the body as a whole.

It is, therefore, quite conceivable that the breathing movements may be sufficient to supply all the oxygen needed for muscular work and to remove the large amounts of carbon dioxide produced thereby, and yet not be the aid to the circulation of blood nor to the flow of lymph that they should be; and, if this be true, it is a proper function

tion of oxygen is conditioned upon the amount of chemical change taking place in them; and this, in turn, is largely dependent upon their work. It is almost certainly, moreover, a mistake to assume that during muscular exercise *all* cells of the body profit by a quickened circulation and a more ready access to oxygen; the percentage of oxygen in arterial blood being practically constant, the amount of oxygen offered any organ will be determined by the amount of blood flowing through it, and not by the ventilation of the lungs; indeed, we know that, in general, the blood supply to internal organs is distinctly *diminished* during muscular exercise, in order to compensate for the increased supply to the muscles and the skin. Whenever there is an increased amount of blood flowing through an organ, more oxygen will, it is true, be offered to its cells, but it will be taken up by them only as their chemical processes call for it. We have, moreover, good reason to think that the mechanism of respiration, including the heart, provides, under ordinary conditions, far more oxygen than even the working tissue can use. The blood leaving an organ frequently, if not generally, has half the oxygen with which it entered the organ; and this remains true even when the organ is working, the increased blood-flow being more than sufficient to compensate for the increased consumption of oxygen.

of physical training to train the power of full and free respiration under all possible conditions. It is a matter of common experience that there is a marked tendency to insufficient respiration whenever work presents the least element of effort. I have seen this frequently among bicyclists in going up even slight inclines; they seem to put all their energy into volitional muscular contractions and to have little left for respiration; respiration is, as it were, held in abeyance until the effort is over; and then they must stop to "puff and blow." Now it is just as easy — nay, easier — to maintain full and deep respiratory movements during the performance of most work; and, when this is done, there is less of subsequent fatigue. Moreover, as I have attempted to show, the general hygienic effects of the exercise are most probably enhanced by this deep breathing. It would, indeed, seem that all considerations point to the advisability of gymnastic training cultivating the habit of deep breathing; and, whether the Swedes give the correct reason for the practice or not, it is a fact that its importance is everywhere recognized in their practical work. The mobility of the ribs is kept at its maximum, the capacity of the thorax is enlarged where that is possible or advisable, while the special respiratory exercises do their part in training the breathing mechanism to the full measure of its working capacity.

6. The carrying out of definite movements with accuracy and precision is a training in volitional control. It increases the efficiency of the mechanism of skilled movements. One who has had such training in carrying out great numbers of movements at the word of command can do with the muscles what it is unlikely that he would be able to do otherwise. The body becomes more "supple," which means largely that the number of its possible movements is largely increased, or, more correctly expressed, the number of its possible movements is not reduced as life ad-

vances, and we tend to limit the movements of the body to the few which some sedentary occupation calls for. It prevents the narrowing of the field of volitional control, and it is especially important that the field of volitional control shall not be narrowed during the period of development.

To prevent any misconception, it may be well to state clearly that this increase of volitional control does not mean that a person can at once perform some new kind of work as well as those who have become accustomed to that work by long practice. Almost all special kinds of work involve the more or less constant use of certain groups of muscles, or else, as in swimming or rowing, they involve the acquisition by practice of a co-ordinated nervous mechanism of accustomed movements. A man with such complete volitional control will have to strengthen still more the muscles which rowing, for example, involves; he will also have to acquire the nervous mechanism of the movement; but he can learn to row accurately and easily sooner and with less expenditure of effort than can a man without such volitional control.

This effect is of psychological importance. Health depends on exercise, and whether we are inclined to take exercise or not depends partly on the use we can make of our bodies. Exercise is necessarily monotonous to the man who has but few muscles to use, few movements to make. There is an impulse to take the exercise that health demands when the individual has the conscious power which comes from volitional control of many movements. In other words, there is a love of movement, natural to the child, and a priceless possession from the hygienic point of view to the adult, which we should never allow to slip away from us.

7. In a later portion of this paper we shall have occasion to discuss the relations to each other of the two pur-

poses of physical training, corrective work and the general hygienic effects of exercise, as well as the extent to which the day's order fulfils the latter purpose. We may here anticipate these discussions, however, merely to say that Swedish gymnastics, properly done, produce in a high degree those general effects of exercise which favorably affect the health of the organism as a whole.

I must not be understood as saying that each of the above seven objects is accomplished only by Swedish gymnastics. Some of them are distinctive, while others are not. The essential characteristic of Swedish work is that it aims at and secures in a remarkable degree all these results; and I believe that the secret of its success is to be sought here rather than in minor details of the "day's order," which is simply the practical method adopted of achieving these physiological ends.

The exact form of the "day's order" is not simply the expression of a physiological idea. Certain things are done because they are the most feasible under given conditions. Moreover, in gymnasium work there is a psychical as well as a purely physiological element; and nothing can be worse than to neglect this in practice; a class is not put directly to executing back or lateral trunk movements; the effect of such a course upon the interest of the class in its work had better be left to the imagination. It is, moreover, only partly for physiological reasons that each movement is given at the time when it can best be performed or least interfere, by introducing the element of fatigue or otherwise, with the proper execution of other movements. Any explanation of the work must therefore take account of other considerations than those which are purely physiological.

The exercises of the day's order may be classified as follows: —

1. Introductory movements, which include order movements and movements of the extremities.
2. Span-bending movements.
3. Heave movements.
4. Balance movements.
5. Back movements.
6. Abdominal movements.
7. Lateral trunk movements.
8. Running, jumping, vaulting, and games.
9. Slow-leg and respiratory movements.

The common nomenclature is retained as far as possible, although certain objections may be made to it. Indeed, the names are denotative rather than connotative; and, so long as this is understood, there is but little objection to the use of the common terms. I have, however, dropped the old term "leg movements," and substituted therefor the more accurate term, *movements of the extremities*. The old term is not only misleading, but is associated with certain very questionable physiological explanations, and should be abandoned.

Postponing for the moment the description of these classes of movements and the reasons for their sequence, we may classify the exercises of the "day's order" from the physiological point of view, as follows: —

1. Activities of limited motor mechanisms	Span-bending, Heave, Back, Abdominal, Lateral trunk, Extremities
2. Activities involving a high degree of general co-ordination	Balance
3. General bodily activities of considerable intensity	Vaulting, Jumping, Running, Games

The order movements have been omitted from this classification because they are not of physiological importance;

likewise, the slow-leg and respiratory movements, because of the very special function for which they are used. The purpose of the first group is to correct or prevent deformities; of the second, to give ease and grace of carriage; of the third, to produce as far as possible the general hygienic effects of exercise. Finally, the three groups overlap to a very considerable extent.

The term *activity* is used to emphasize the fact that it is not simply the muscles which are being trained, but the nervous system as well. Indeed, it is more than this; for still other organs, notably those of the vascular and respiratory systems, take part in such muscular work.

The course of the day's order and the reasons for using each kind of movement at its particular time may then be given as follows: —

1. *Introductory Exercises.* — Included under this head are a great number of movements which have previously been classified under *order movements* and *leg movements.* The term *order movements* really denotes the purpose rather than the character of the movement. They have been described as "intended to attract the minds of the pupils to the approaching gymnastic work; to induce them to assume that fundamental position and carriage best suited to the physiological interests of the body, from which other gymnastic movements start and to which they return before a relaxed position of rest is assumed." There can be no question that a large number of exercises do actually serve this purpose, and that the ordinary drill begins with them; and I can see no objection to the continued use of this term to indicate the purpose of many of the introductory commands of the day's order. On the other hand, as has been pointed out, the term does not describe the character of the movement as do the others; nor do order movements constitute a well-defined class of exercises. To the term *leg*

movements I have two objections: it gives a false impression of the real character of the work, and it is connected historically with what is quite indefensible physiology. With regard to the latter objection, I have no intention of discussing the point here. The purpose of this paper is not to discuss what has been written about the Swedish system, but to describe what it is in actual practice on the floor of the gymnasium. I shall therefore confine myself to the statement of what is done during this part of the day's order and the physiological results achieved thereby. As to the former objection, while it is perfectly true that leg movements are used and form a large percentage of the work done, yet it is also true that movements of the neck, shoulder, and arm, are used often simultaneously with those of the legs. The former have, no doubt, been regarded as order movements, and, as used, serve this purpose; but they serve other purposes as well. The stretching of the shoulder muscles, for example, which is the most prominent characteristic of the various "arm extensions," has a very important corrective effect upon the form of the shoulder region; and, while it may be claimed that this is included in the statement about order movements that "they are intended to induce the pupils to assume that carriage best suited to the physiological interests of the body," yet we should then be compelled to include in the same category span-bend, heave, and back movements, — in short, all activities of limited mechanisms which correct faults of posture and carriage. Moreover, these leg movements would then not form, as a matter of sequence, a separate class from order movements; and, finally, the movements of the upper extremities play their part — and a very considerable part it is — in the redistribution of blood, which has been improperly attributed to leg movements alone.

It seems to me that we should describe more accurately what is done by grouping both under the head of *introduc-*

tory exercises, which have two objects in view: first, to serve the general purpose of order movements; and, secondly, by calling into use the largest muscular masses of the body, to produce, without undue fatigue, some of the most important results of muscular exercise, among which may be especially noted a marked redistribution of the blood, more going to the working muscles and the skin and less to abdominal organs. Such work is not so specialized as that which immediately follows, and for this reason is most suitable for beginning the lesson. Incidentally, it serves corrective purposes, both in the training of simpler motor mechanisms and also to some extent in co-ordination.

2. *Span-bending movements*, which consist of certain backward flexions of the trunk which have the effect of straightening the thoracic region of the spine, of vaulting the chest forward, and of increasing the chest capacity and mobility of the ribs.

3. *Heave movements*, which consist of various exercises in a hanging position and others which have the effect of expanding the upper part of the chest by lifting it upward. Incidentally, they also develop the arms and upper trunk muscles. Heave movements follow span-bending movements, because they are more vigorous in character; and it is claimed that, as a matter of experience, they are apt to produce a certain amount of soreness in the abdominal muscles, which is for the most part avoided, if they are preceded by span-bending movements.

In these first three movements a considerable amount of work has been done, the intensity of the work increasing to a maximum in the heave movements. This work involves — indeed, is the result — of katabolic muscular changes which produce heat and discharge on the lymph and blood large quantities of waste substances. The body reacts to these conditions, and the general physiological results of exercise follow. These are directed primarily to getting

rid of waste products; incidentally, they provide food and oxygen for the anabolic processes which at once begin to make good the loss of muscular fuel substance. In order to get rid of the heat, the cutaneous arterioles dilate, and the secretion of perspiration is greatly increased; these agents are aided by the increased volume of air heated in the lungs and the increased evaporation of water from the surfaces of the respiratory tract. The temperature of the blood rises slightly, though perhaps not more than a degree centigrade. In order to get rid of the carbon-dioxide, the breathing movements and the rate of the heart-beat are increased; the circulation through the lungs is consequently quickened, but it is a mistake to assume that the amount of blood flowing through all organs of the body is increased. In point of fact, the arterioles of the intestine, the kidney, and probably the liver and spleen, constrict, thus diminishing the blood-flow through them. It is probable, though not proved, that the blood-flow through the brain is usually somewhat increased, though at times it may be unchanged or even diminished. In all these vascular changes the cardiac, the vaso-constrictor, the vaso-dilator centres work together, so as to maintain the aortic pressure at the normal height or somewhat above it. The pumping action of the contracting muscles aids in the flow of blood and lymph away from them; and the augmented respiratory movements, by increasing the aspiration of the thorax, aids the return of blood and lymph from *all organs*. Especially important is this effect upon the lymph-flow, since an increased lymph-flow from an organ means increased circulation of lymph in the tissue spaces around the cells, and hence a more equal and rapid distribution over the surface of the cell of the food material and oxygen derived from the capillaries, and a more effective return of waste products to the capillary wall for removal. Other organs are thrown into activity to complete the oxidation of

certain katabolic products of muscular activity; and the presence of an increased amount of some of these products in the blood changes the chemical character of the blood, and so the environment of all cells of the body. It is, moreover, not improbable that, so long as these are not present in excessive amounts, the changes thus produced may favor the healthy life of other cells; muscular activity would, from this point of view, produce an internal secretion; but the matter needs further experimental study.

These are the general physiological effects of all muscular exercise, and their amount is proportional to the intensity of the exercise taken. It is to them that the "freshening" effects of exercise are due. The movements of the extremities, span-bend movements, and heave movements, therefore, in addition to the special corrective function which each performs, by calling into play large groups of muscles serve the additional purpose of "freshening up" the class without producing such fatigue as may interfere with the proper execution of subsequent co-ordinative or corrective movements; and it is only after these are given that the general physiological effects are pushed to their maximum point of intensity in vaulting, jumping, running, and games.

In accordance with this plan we now pass to

4. *Balance movements*, "which bring about a co-ordination of muscular contraction in all parts of the body, and by demanding equilibrium in difficult positions train the sense of correct and graceful posture." Movements of the extremities, back and lateral trunk movements, and others involve co-ordination of muscular contraction in all parts of the body, and hence are to that extent balance movements. The training of the sense of equilibrium, in other words, is not confined to this part of the day's order, but is merely its chief feature and special purpose.

Balance movements are introduced at this time for sev-

eral reasons. They make an agreeable change in the nature of the work, which in the immediately preceding movements has been confined to activities of limited motor mechanisms; since more of these follow in the various trunk movements, a certain amount of monotony in the general character of the work is avoided. Moreover, no muscles important in maintaining equilibrium on the feet have been worked very hard; and hence, in the absence of local and general fatigue, finer co-ordinative work can be executed. Finally, balance movements throw most work on the leg muscles, and hence to a certain extent rest the trunk, which, having been concerned in heave movements, has still to perform those movements which involve the various flexions of the spinal column. When the various balance movements have once been learned, they are profitably introduced elsewhere, and especially where fatigue is present; their use in that case trains still more the sense of equilibrium in difficult positions. It is clear, however, that they should first be learned under the most favorable conditions before being used under unfavorable conditions.

The previous corrective movements of limited motor mechanisms have to deal with muscles which act upon the upper ribs or with their immediate antagonists. After balance movements we pass to a group,— (5) *back*, (6) *abdominal*, and (7) *lateral trunk movements*, which produce flexions of the spine (dorsal, ventral, and lateral). Such movements not only train the use of the muscles concerned, but are also the chief means of correcting and preventing faults in the growth of the spine. This is especially true of back movements, which also correct the carriage of the shoulder blades. In addition to this, abdominal and lateral trunk movements, "by alternating increase and decrease of abdominal pressure, favorably affect the work of the digestive organs."

The comparatively short space devoted to the description

of these three classes of movements does not indicate their relative importance in the day's order. In point of fact, they are surpassed by no other class in corrective value. Through them we secure correct carriage of the trunk, depending, as this does, upon the proper play of the great groups of antagonistic muscles especially concerned in and strengthened by such movements; and it is the weakening of these muscles through disuse which is the chief cause of the tendency to "slump," against which a recent magazine editorial enters a timely protest, as being all too characteristic of American life.

The order in which they are given is, for the most part, immaterial.

8. *Vaulting, Jumping, Running, and Games.* — These exercises at the same time command a high degree of co-ordinated muscular action and constitute the most severe work of the day's order. The previous balance movements train the sense of what has been called "statical" equilibrium, or equilibrium of the body at rest. Vaulting and jumping, on the other hand, train the sense of "dynamical" equilibrium, or equilibrium of the body in motion, and in this case of motion which involves considerable muscular work.

It is hardly necessary to add that they are not features peculiar to Swedish gymnastics, and that they serve the same purpose, no matter by whom used. They form, in fact, an indispensable part of all gymnastic training. The greatest stress, however, should be laid on the proper execution of the movements. It is not, for instance, the height of the jump which is of importance, but the way in which it is carried out and the proper landing which follows. In addition to the co-ordinative value of these movements, they, together with running and games, involve rather intense physical work, and produce in the highest degree the general physiological effects of muscular exercise already described. These effects are allowed to "ap-

proach, but never to exceed, the limit where breathlessness in its graver form sets in."

9. *Slow-leg and respiratory movements.* — It is a well-known fact that, on stopping suddenly any very vigorous exercise, certain disagreeable symptoms are apt to result. These are characterized by a very evident heart-beat, at times grave breathlessness, and feelings of fulness about the head, in which the throbbing of the pulse can often be distinctly felt. These symptoms are most pronounced immediately upon stopping, — at least it is at that time that they most affect consciousness. For the present it is sufficient to understand that at times symptoms of distress follow exercise, and that in practically all cases which do not involve actual exhaustion, these symptoms are much less pronounced — so far, at least, as consciousness is concerned — if we do not stop at once, but gradually pass from the more intense work through less intense forms to rest. This is a recognized practice in the care of horses. No jockey is allowed to stop a horse immediately after the finish of a race, and it is hard to believe that the popular impression that such a course is more or less apt to produce temporary or permanent injury to the animal is entirely without basis in fact. It cannot be said that all severe work is sure to be followed by symptoms of distress, nor need we be surprised to find that these symptoms may or may not appear under what seem at first sight identical conditions. In a class of twenty people, perhaps not more than half would show marked distress after a given run, for the simple reason that the same work may be severe to one and easy to another; and in the same individual the same work may be severe one day and easy the next. But, granting all this, it would seem a safe course to avoid this distress as far as possible; we do not know that it is always harmful; but it looks suspicious, and we certainly do not know that it is never harmful. The history of many patho-

logical conditions of the heart and the circulation points too clearly to excessive muscular work as having to do with their causation to justify us in ignoring any warning that may accompany such work. It is for this reason that the severe exercises of the day are immediately followed by slow-leg movements (such as comparatively rapid marching), accompanied or followed by respiratory movements. The reason usually given for this — that "the accelerated action of the heart must be normalized" and "free respiration restored" — is unsatisfactory. The accelerated heart action will, in point of fact, come back to the normal if the organism be left to itself; and free respiration will also be restored. It seems much more accurate to say that these movements afford very great assistance to the heart in maintaining an efficient circulation. They thus prevent distress, and hence, no doubt, danger, while the organism is adjusting itself to the changed conditions of rest.

As I have said, it cannot be claimed that these movements are necessary in all cases. They are probably unnecessary, for example, in very strong individuals, in whom vigorous work does not produce the cardiac acceleration seen in those not so strong; but they are advisable with the majority of people, and probably necessary with a large number. It must not be forgotten that the mission of gymnastics is not primarily to the athlete, nor is its chief purpose the training of athletes. In accomplishing the purposes of physical training outlined in the beginning of this paper, we have no reason to believe that the cultivation of great strength is necessary; nor, in view of the conditions of life among people to-day, is it desirable. The athlete is as much a specialist as the student of Sanskrit literature; and the great muscular strength and bodily endurance under physical strain which is his specialty is no more necessary for the health of the business man or student than is a thorough training in astronomy or physics to the athlete as

such. I am convinced that it is a mistake to attempt to cultivate a healthy sentiment for rational physical training among people generally by means of the athletic ideal alone. So far from encouraging the rational use of exercise by all, it certainly at times tends to discourage it, simply because the ideal is unattainable to the vast majority of men, and it is entirely out of place among women. The Swedes have avoided this error successfully. Without discouraging athletics, they recognize that the athlete is a specialist, and that there is a physical training needed by all classes, — by people who can never be athletes, the vast majority of whom react less rapidly and less perfectly to sudden changes in the state of the body as regards muscular activity than do those trained to the highest degree of physical endurance. Hence it is advisable with drill work with large classes "to warm up" to the more intense work more or less gradually, and not to pass immediately from this to rest.

Any account of the day's order fails to do it justice which does not emphasize the element of progression so skilfully carried out. In each group of movements the student passes to those requiring greater co-ordination and greater strength only after he can do simpler movements involving the same general groups of muscles. This is merely the principle of training, but nowhere is more attention given to it than in the system we are considering. Compare it, for example, with the method of giving directions to individual students for the use of apparatus for the next three or four months, and then giving new directions for more difficult work only after that time. The Swedish drill can stand this comparison and should invite it, for it is clear that only in drill work can any proper system of daily progression be carried out successfully in large classes; and daily progression in large classes is a thing which, it seems to me, we have a right to demand of any

gymnastic work which professes to be physiologically correct and practically available.

The mere recount of these groups of movements of the day's order certainly sounds uninteresting enough. In point of fact, it is only the skeleton upon which the system is built, and no more describes a day's drill with a good teacher than does the human skeleton betray the life of the human body. I have already said that a poor teacher can make a Swedish drill an insufferable bore. In fact, the ability to make gymnasium work attractive and interesting is absolutely necessary to any one who is to undertake that work. Swedish gymnastics will not be a success without this. But will any other gymnasium work be a success without it?

Critics of the system have made, it seems to me, two very great mistakes: one class has deluded itself into thinking that it has criticised the system, when it has only criticised certain physiological or other statements which have been made about the system; another class goes no further than the skeleton upon which the whole thing is built, and then pronounces the system itself "as dry as bones." Neither mistake would have been made, had the system been studied on the floor of the gymnasium and with reference to the aims which it seeks to accomplish.

In physical training two aims are pre-eminently important: —

1. The general effects of bodily exercise, including the acquisition of that amount of physical endurance which the special conditions of each individual life demand. I place this first, for it is the chief object of physical training.

2. Correction of physical faults, both deformities of the muscular and skeletal systems and deficiencies in the nervous control of the body. I have tried to show that this is rendered necessary by the specialization of life, and is especially necessary with that specialization which marks the

period of development, and which may be summed up in the two words, "the school desk."

The primary purpose of the Swedish system of gymnastics is the second of these objects. Its system of movements is based on a most careful study of kinesiology. It studies the effects of the innumerable possible movements upon the development of the body, — that is to say, upon form and carriage, — and it makes use of such movements as are known to be fitted to accomplish the corrective effects desired. It gives these movements in that way which will best insure with all members of the class their proper execution and greatest corrective value, — that is, in the form of a drill and to the word of command; and it gives them with constant reference to such progression, both in the work of each day and especially in the work of successive days, as to secure the effects of training without undue fatigue or strain.

It does not entirely satisfy the demands of the body for general exercise. No gymnasium work does. The Swedish system is not all of physical training; and, if some of its advocates have claimed that it is, such claims are merely the result of over-enthusiasm, and do not demand serious consideration. It starts with the assumption that corrective work is needed, and that this must be an essential part of all gymnastics; but it endeavors to give this in such a way as shall not sacrifice the more general hygienic effects of muscular activity. To what extent it accomplishes this depends largely on the teacher, partly upon the gymnasium facilities. It is not automatic: it will not succeed in incompetent hands; but, unless you are ready to deny the need of all corrective work in physical training, it does not demand qualities of its teachers other than those which all physical training requires.

We hear much to-day about the immense superiority of outdoor games to indoor gymnastic work; and there can be

no doubt that in most, if not all, our American colleges for men there is a marked tendency away from the gymnasium. Nor need we be surprised at this. When gymnasia were first built at our colleges, the entire work of physical training, apart from that of class and college teams, was confined to the gymnasium, which thus came to assume a rank of exclusive importance to which it was not entitled. Moreover, this gymnasium work has rarely, if ever, been under sufficient supervision. It is not too much to say that the American idea of a gymnasium has been an elaborate building with expensive apparatus. in which the innocent student in search of health might pull on various weights "with nervously exhausting and deadening monotony." Such has been the experience of the majority of men who have tried such work, and the tendency to the exclusive use of games is simply the unanswerable proof of the failure of the system. It is not a valid argument against well-directed gymnastics. In fact, both the gymnasium and outdoor games have special functions in physical training, and one cannot replace the other. On the contrary, one supplements the work of the other. For producing the general physiological results of exercise, outdoor work is immeasurably superior. Bicycle riding, canoeing, rowing, tennis, golf, skating, etc., not to mention the games of earlier life, should constitute and, as a practical matter, must constitute the chief means of physical training; but, while they well serve these more general and more important purposes, they are not conveniently used at all times of the year, and they have only limited corrective value; they do not remedy faults of posture, of carriage, of gait; and those interested in physical training should see to it that the welcome increase of interest in outdoor exercise does not produce neglect of the corrective work which the gymnasium alone can give.