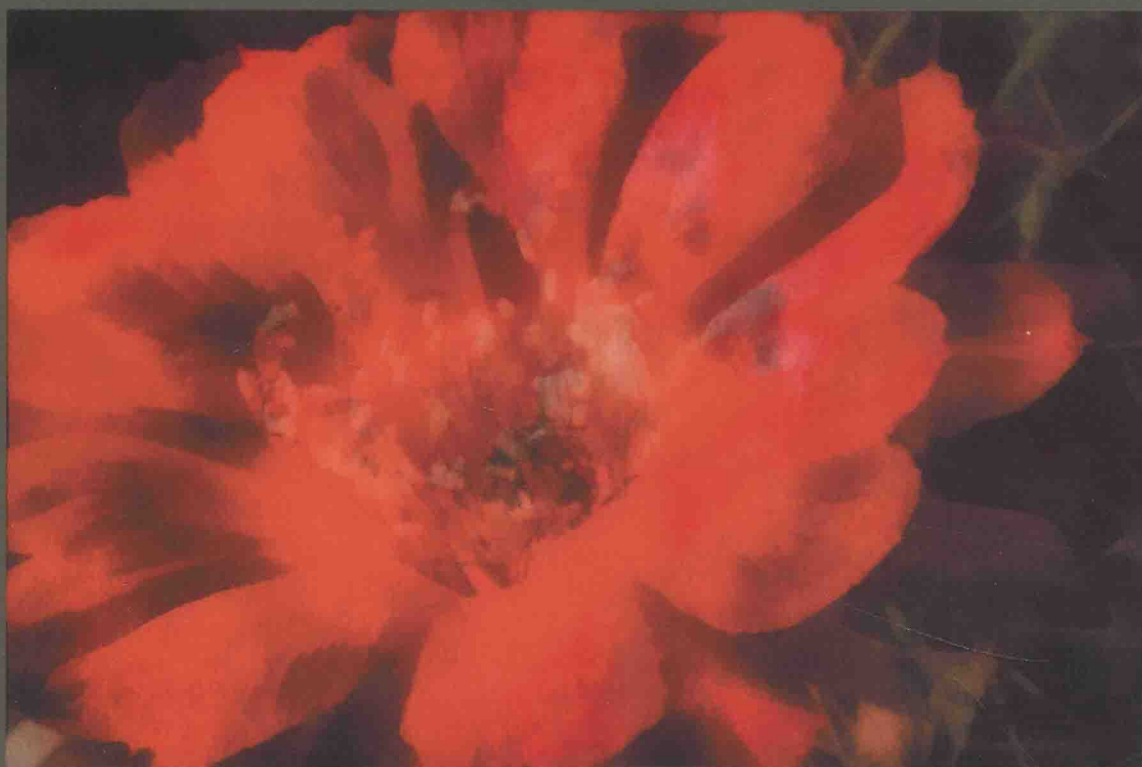


A NATURAL METHOD OF PHYSICAL TRAINING

MAKING MUSCLE AND REDUCING FLESH WITHOUT DIETING
OR APPARATUS
EDWIN CHECKLEY



A NATURAL METHOD OF PHYSICAL TRAINING • EDWIN CHECKLEY

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I.

THE BUGBEAR OF TRAINING. THERE are two points which writers and talkers about physical training are almost always ready to bring forward when discussion arises as to the present status of our race—they tell us to look at the ancient Greeks and at the animal kingdom. They tell us the ancient Greeks attained certain proficiencies in the field of athletics, and developed a remarkably perfect physique, which the artists delighted to reproduce. They show us the muscular perfection of brute creatures, their general health and comfortable relations with life.

These points are in the main well raised. The example of the Greeks was in all respects one toward which the attention of modern peoples may always profitably be turned. The Panhellenic games were an inspiration to the rising generation. They made physical vigor fashionable. And they were not merely an isolated incident in the life of the Greeks. These Panhellenic games were simply the flowering of a superb system of training, which was so far as it related to the work to be done in those tremendous conflicts of the arena. Physicians and law-makers alike realized the importance of athletic exercise. Lyscurgus scattered free training schools, and his successors followed up, in one way or another, the example set by this remarkable governor. The people paid extraordinary honor to the athletic heroes. A man who won more than one prize at the same Olympiad was modeled in marble by the best sculptor of his state. We are reminded of our own times in the accounts which tell of the large fortunes made by those who achieved some especial glory at the games.

But the conditions of life among the ancient Greeks were wholly different from the conditions of life with which modern men and women are struggling. The athleticism of the old Grecian race

was cultivated under very favorable circumstances. The Grecians not only led a more outdoor life than our northern races, but their mode of living, in respect to public and private festivals, entertainments and social movements, made the development of the physical man much easier than it can ever be with us. These differences do not make it less proper for us to look to the Greeks, but we should remember the necessities arising out of these differences. It is for us to study out the compromise which must be made. Properly made, this compromise will represent a new and sufficient ideal.

It will pay to remember that there has been a good deal of exaggeration in stories of Greek prowess. Undoubtedly we are in possession of some fairly accurate figures concerning the feats of the old athletes, but there are many absurdly false estimates of the early running, jumping and throwing. The Panhellenic games brought forward men who had been in training for great periods for special feats. The honors awarded were so great that no amount of training and exertion were considered too considerable. Given the same training our modern athletes would greatly surpass the Greek records. If the modern horse is quicker than the ancient, the modern man is quicker also. Our all-round athletes would, I am sure, have astonished an audience at an Olympiad. And as for the matter of physique, there has been equally great exaggeration on that side. Plato tells us that the sculptors took considerable liberty in departing from the actual form of the model. Everything points to a relative inferiority in the ancient races; yes, even in the worshiped Greeks. No one should doubt that the world is producing men of finer form than it has hitherto produced, and that it will continue to do so.

If we consider the other allusion to the brute creation we shall find many things to rebuke and instruct us, but many things also that indicate the possi-

bility of exaggerating the relative physical superiority of the beasts. Man, is physically the most magnificent of all animals. His muscular system excels in versatility that of any other creature. He can stand variations in temperature, in forms of covering, in kinds of occupation that are impossible to the lower animals. Considering the things he is in the habit of eating, and the other trials he places upon his system, we can only marvel at the splendid manner in which he is proving his physical superiority to all his other neighbors on this planet.

The significant thing in connection with brute creatures is that they do not have athletics. The lion keeps his marvelous strength without extraordinary effort. And so with other beasts. Their natural habits keep them in condition, and sometimes their natural habits do not seem to fully explain why they are so strong and so healthy. As a matter of fact, beasts are not, of course, always so strong as they would be under training, but by not training they escape other difficulties, of which I will speak a little later on. If we are to take any special lesson from the lower animals, it must be that the best strength is that produced under natural habits.

This brings me to that bugbear of "training." To a certain number of people athletic or special physical training is agreeable. In fact, few who enter it find any kind of training without some exhilaration. But the proportion of people who do any training at all is very small, while the number who might, if the proposed training did not come in the guise of hardship, is unquestionably considerable. The course of exercises prescribed to many an ambitious victim of physical weakness is altogether too heroic, and even those who are fairly strong, and who would like to develop and maintain their strength, are frightened off by the systems put forward as necessary. Elaborate apparatus is one of the symptoms of an elaborate system. The little fellow who went a-fishing was certain he could catch bigger fish the further he went away from home, and the designers of health lifts and chest expanders, boxing machines and rowing

appliances seem to feel that the glitter and elaboration of their machinery will tempt and benefit the purchaser in proportion to their size—and complexity.

It is undoubtedly a fact that certain artistic formulas for training have a fascination at the outset. Their ingenuity seems to promise an opening of the mysterious roao to health. The novelty itself is something to count upon. And machinery has a certain charm while it is new. You pull this and push that so many times a day and you get to be a little amateur Samson. You already feel the muscles expanding. Those biceps especially draw attention, as if they were the synonym of health and strength. But the mystery vanishes after a while and something or other is always interfering with that half hour at the machine. It is put off for a day, for two days, for a week. Interest gradually evaporates and the biceps are allowed to go to the bad again. The illusion disappears and is gone.

And then the corpulent subject is attacked with that terrible legend—"Diet." Leave off eating so and so, is the order, and your paunch will gradually and beautifully disappear. The so and so, of course, is always exactly what the corpulent subject most enjoys. But the worst of it all is that, in spite of obedience, after a terrible struggle, to the awful ordeal, after the discomfort and weakness of implicit reliance on a certain system of eating, there is only a loss of a few pounds out of many and no material change in the general form or condition. At the first halt in the rigid dietary discipline there is complete relapse in flesh.

These ordeals bring "training" into very bad repute. Sometimes they do actual injury. The youth who enters the gymnasium at college, starts out on a career of violent training—general as well as special—finds himself exhilarated for a time. His special strength increases, but his false start on the great material lines tells against him in after years, when a little weakness around the heart and a sudden lightness in the head tell a story of bad beginnings and false discipline.

There is something radically wrong in these harsh and extravagant methods of training. The average man does not care to be an athlete in the accepted sense. If he has means to squander in appliances he does not have the opportunity to use them as directed, and the most slavish adherence to the rules somehow does not have the expected effect. The lifting and striking power may be gradually increased and the chest expansion slightly improved, so far as measurement goes, but there is something wanting. Anything that interferes with the galley-slave labor at the apparatus sets back work. The strength of the man so "trained" has no reliance on itself. It is superficial—only skin deep, as it were. The training will not "stay put."

The truth is that there can be no proper training that does not educate the whole system of the man. The muscular system of a man is not made up of chest and biceps. It is a wonderful and complex organization in which one part is intimately related with the other, and if the system as a whole is not kept in mind the building up of the arms will not increase the permanent strength or permanent health. Men become proficient at punching a sand bag who do not know how to simply carry their own body. They have spent their time in training, as it were, from the outside. One of our modern philosophers has said that we invent fine railroads, but we are forgetting how to walk. This is very true. We are forgetting how to stand, and, above all—fatal error!—we are forgetting how to breathe.

There are what are known as "conversational methods" of learning languages. I suppose these are very good methods. They are supposed to lead the student into a language without first learning the grammatical rules. In athletic training of the simplest kind there can be no profitable way of skulking around the first principles. We must breathe properly or forfeit all chance of ever becoming really strong, of having the kind of strength that wears well. We must stand properly if we wish to give the body and its muscles a chance to become what we wish them to be-

come and what they must become to be at their best. The kind of training that starts in to load certain parts of the body with hard muscles, overlooking the simple elements of general strength, is an error that sometimes proves more than a harmless mistake.

In the chapters which follow I shall try, without elaboration, to outline the general principles of the muscular machinery and my system of developing that machinery into comfortable and healthful perfection.

IT. HOW TO CARRY THE BODY. JOES it, then, need to be told how the body "must be carried? Most certainly. It might be asked, Does a person not naturally carry his body as comfortably as he can? And the answer is that a person very seldom does. It may appear that this is being done, but the fact is not so. Some people naturally develop a habit of proper carriage, but they form a decided minority. Without guidance the chances are that a child will grow up into bad habits of holding himself together. His spine will be left to do things it was never intended to do. He will sit, stand and walk without proper reliance on muscles that were intended to make all his movements easier. He will collapse while sitting, rest on his heels, perhaps, while standing, and breathe so perversely that any unusual exertion reveals the fact that only a limited series of muscles are brought into play, while the lungs are but half developed.

It is of the utmost importance, then, at the very outset that a person should do those things properly which occupy so large a percentage of the habits of his life. If there is a reflex action from correct habits of sitting, standing and breathing, to say nothing of other actions, it is quite clear that the formation of a correct habit will bring a certain percentage of added strength and health with no conscious exertion. It is like having money out at interest. The income does not seem to be worked for.

In fact, it is stating a simple truth to say that a man or woman should get good health and sufficient strength and perfection of form in the ordinary activities of life, if those activities, however

meagre, are carried on in obedience to right laws. This truth is one of far-reaching yet unsuspected importance. There is a prevailing impression that this, that and the other mode of life prevent the development of a strong body, a superstition that one cannot be strong without athletics, and violent athletics at that. Men carelessly retard and injure their physical system during, say, fourteen and a half of their waking hours, and then hope to counteract all this by fifteen minutes' work on a few muscles of their body, and generally not on the muscles that are most injured by the carelessness of the day.

It is a fact not very often taken into account that *clothes*, in their modern form, have a serious tendency to interfere with the right development of the body, to hinder muscular action and to generally hamper the physical system. I do not speak now of such special features as the corset, but of clothing in general. Unless the tendency is specifically checked, most wearers of fashionable attire will find themselves yielding to the tailor's or dressmaker's measurements. The stiff high collar worn by so many men rather helps the general poise of the head but is a dangerous obstacle to the healthy development of the neck muscles. The shoulders are, perhaps, particularly influenced by modern clothes. A man with low, sloping shoulders holds himself in a position to keep his suspenders from slipping, and accommodates himself to the habit of his coat. Then the conventional "cut" of trousers interferes with easy sitting, walking and stooping. Men sit so as not to "bag" or wrinkle their trousers, just as women, during the reign of the bustle, sat in a lop-sided fashion to accommodate the mysterious and ugly appendage. In many other ways people of both sexes, and scarcely oftener in one sex than in the other, are allowing their physical stature and habits to be strongly influenced by clothes.

Instead of so doing it is a duty to carry the body correctly, to move and act in every particular with reference to the health and beauty of the body without thinking of its covering. If the cover-

ing interferes either ignore the interference or select the covering differently. Let the clothes fit and protect the body, and not allow the body to seek the favor of the clothes. I have said nothing of shoes, whose wretched form so often weakens the body by discouraging exercise and by impairing the circulation. Small and ill-fitting shoes have done as much damage in the world as corsets. They have made cheerful people peevish and strong people indolent, if not weak. Have shoes large enough to give your feet abundant freedom.

To get out of the ordinary activities of life all possible strength and health let us first learn to *stand*. A literal drawing of the actual standing position of twelve persons chosen at random would present a curious spectacle. The distended abdomen and more or less flattened chest would prevail in a majority of the dozen. It would be safe to say that in eleven out of the twelve the bone structure of the body and not the muscles would be found doing most of the work of keeping the body upright. The incorrect position, more or less characteristic of a great many people, and not by any means representing an extreme case, is shown in the accompanying illustration. The abdomen is here pushed forward into disagreeable prominence, or rather the body is allowed to settle on the legs as it may, thus rounding the shoulders and protruding the abdominal region.

This attitude is just as common among women as among men, and perhaps more common. For one thing, corsets, while theoretically holding the body up, encourage lassitude of the waist region. And then women are liable to affect a "willowy" style of standing and moving. Many girls seem to think that there is a kind of feminine charm in a lackadaisical manner.

Now the fact is that the bone structure of the body should not be forced to perform the work thus thrust upon it. The muscles should hold the body in position. Upon them devolves the task of holding the trunk erect, of keeping the proper relation between the spine and the pelvis (the bone structure from which the backbone springs) and the up-

per leg bones where they join the pelvis, forming what is called the hip joint. It is worth remembering that the height of a man may be materially affected by the manner in which he carries his body. If he uses the muscles of the hip and abdominal region and of the back instead of allowing his trunk to settle down, he may be certain of establishing a better height than if he did otherwise, and this height will be permanent.

The spine may be relied upon to give a certain support to the trunk. This may go without stating, but the multitude of muscles associated with the spine are intended to perform the greater part of the work in keeping the body in position. As the rudder guides a boat or reins lead a horse, so the muscles direct the posture of the body. They not only direct but largely support the body, and this should be remembered in standing and in every other position and action.

The correct position in standing is sometimes curiously exaggerated by the protrusion of the chest to a grotesque and unnatural degree. Figure 2 may be taken as an example of the position sometimes seriously recommended. There is no naturalness, force or beauty in such a position. The author's views of the correct position are indicated by Fig. 3. As will be seen by this illustration, the lips, chin, chest and toes should come upon one line, with the feet turned at an angle of sixty degrees. In such a position the body acquires its greatest ease, its greatest endurance and its greatest readiness. The chest, the wall covering the great boilers FIG. 2.

Exaggerated standing position, distorting spine and chest.

FIG. 3. Correct standing position, showing natural and forcible carriage of the body. of the body—the lungs—is given the greatest prominence, while the abdomen is carried more modestly than most people are inclined to carry it. The shoulder, hip and ankle joints are also kept upon one line. The neck is carried erect so as to bring the collar-bone into a horizontal position. Notice the difference in the carriage of the head between Figures I and 3.

The point of what I have urged is this:

The muscles must be used in the support of the body—and airof the muscles that rightfully should. This does not imply greater labor, but less. What begins by a conscious effort will soon end in a habit—will become an exhilaration. What often passes for fatigue of the muscles is simply irritation arising from impeded circulation of the blood brought about not by the use but the cramping or non-use of muscles.

This numbness or irritation from impeded circulation is particularly liable to result from bad habits in sitting. In sitting, as in standing, the muscles must be brought into play, and precisely in proportion to the extent in which they are used will be the absence of fatigue in sitting. It is not to be maintained, of course, that a person should continually sit bolt upright. This would, for a person compelled to sit during a great many hours each-day, entail great fatigue. Some of the muscles may be relaxed and the position modified for short periods, but the muscles should never be so relaxed as to drop the trunk upon the spine, leaving its own bone structure to hold it up. Those who have dropped into this roundbacked position will testify to a peculiar weariness in the lumbar region of the spine, what is called the "small of the back." To rise or sit upright and stretch the arms and body affords a great relief. This is not because the muscles have been tired, but because they have been benumbed by failure in the circulation. A proper maintenance of muscular action will keep up the healthy circulation and make it easier to sit for a considerable time without fatigue.

The cultivation of the muscles in the region of the abdomen and the lower part of the back will naturally have the effect of making it easier to sit, as every gain in the strength and extent of a system of muscles builds up a power of involuntary action. In relaxing the trunk the well-drilled army of muscles will be found to have acquired a power to hold the body up with little perceptible effort.

In walking, keep face and chest well over the advanced foot, and preserve the

habit of lifting the body with the muscles and by the inflation of the lungs. Of this I shall speak further in connection with the subject of breathing. Avoid a mincing step. Take a free, firm and easy stride, avoiding any hard jarring motions, keeping in mind during every movement or exertion the function of the muscles to support and move the body.

I say "keeping in mind" because I believe that the mind should not be above co-operation with the body. In fact, unless it does co-operate with the body the body cannot be strong and healthy, and if the body is not strong and healthy what can the mind expect to be? In recent years it has become something of a habit with a good many well-meaning people to say high sounding things about the superiority of the mind over the body, the essential insignificance of the body, etc. Is it not time to emphasize the influence of the body upon the mind? Are we not constantly confronted by instances of the mind's dependence upon the body?

What I would like to emphasize is that the mind and body are dependent upon each other. The mind cannot get out of the partnership, however much it may wish to do so. It must stay, and it must do its share or suffer, and generally suffer keenly. The further our civilization advances the more complete this interdependence becomes. Under our fashion of living the body seems to require greater and greater attention from the mind, and the increasing mental strain assumed under our restless, hurrying life makes a greater and greater demand upon the vitality of the body. It is quite clear, then, that we are not in a position to talk about breaking the partnership.

Of course this conscious use of the muscles will not continue to be as great as at the outset. In time the proper management of the body becomes largely unconscious and involuntary, but need never become wholly so.

III. HOW TO BREATHE. *f* T the time of this writing the newspapers / contain comments on the illness and death of certain prominent athletes. The winner

of many prizes passes away at the age of twenty-four. Lung weakness seizes upon other seemingly stalwart types of "trained" men. These are startling facts. They form a significant comment on some modern methods of drilling the machinery of the human body. If men are to gain muscle at the expense of their life, it is plain that people will soon begin to look askance at training methods of every kind. What is the difficulty? Why has training become dangerous? Why do lung and heart troubles assail in after years the enthusiastic followers of highly active sport?

The answer seems to me to be this: That modern "training" has become a "straining" system that is frequently not only indiscreet but dangerous. It is dangerous not only because of its useless violence and hardship, but because of the pernicious theories upon which it is founded. It begins on the outside instead of the inside. Greater than all its other evils is its neglect of the lungs.

When we stop for a moment to consider the tremendous importance of the lungs it must become apparent that any neglect of these great central boilers of the body is the worst kind of neglect. The office of the lungs is of the very highest importance. This importance is incidentally acknowledged by many writers and teachers, but the development of the lungs is left to take care of itself, it being assumed as a general thing that all exercises tend sufficiently to expand the lungs. To be sure, great stress is occasionally laid upon the expansion of the chest, but the assumption too frequently appears to be that this expansion is a matter of external muscular development. The theory is on a par with the general superficiality of the average system of training. The strength of special parts in a steam engine, and even of bands on the boiler, will not prevent weakness and possibly an explosion if the material of the boiler itself is without strength. Hard layers of muscles on the chest do not improve the permanent strength of the lungs.

It should be clear that the enlarging and strengthening of the lungs can be satisfactorily accomplished only by the

exercise and special training of those organs themselves—in other words, beginning on the inside. This truth lies at the very bottom of natural physical training.

To learn to breathe is to learn the ABC of physical health, and it is of special importance that this education of the lungs should precede the education of the gut muscular system, for the natural increase of lung strength and chest room is retarded by methods that begin work on the outside first.

What I have to say on this point will become clearer by consultation of Fig. 4, which shows the manner in which the rib system incloses the chest. It will be seen that there is a joint in the ribs as they approach the centre of the chest. From this joint forward to the central strip of bone substance, called the *sternum*, the ribs are made of a flexible cartilage that is readily developed under exercise. Breathing distends the ribs and cartilage in the most effective way; indeed, in the only effectual way. To distend the chest by hollowing the back and throwing back the shoulders is merely a make shift, while breathing creates a genuine tendency to expansion. The dotted line will indicate the manner in which the rib-structure distends under the interior pressure from the full lungs.

The general position occupied by the lungs is shown very well in Fig. 5, where showing area of flexible cartilages—they are represented

Dotted line shows proper direction.

«f expansion. by the shaded parts.

The dotted lines on each side again illustrate the chest expansion under full breathing.

It will be noted in Fig. 5 that the lungs do not extend downward beyond the space between the fifth and sixth ribs. This may suggest the reason why the abdomen should not play so prominent a part in breathing as it so generally does. The diaphragm muscle, which separates the region of the lungs from the region of the stomach and liver, has the power to assist the lungs in receiving and expelling the air. But its power has been so greatly abused that the

lungs and chest muscles have been left to do very little of the work that properly belongs to them. The unfortunate habit of abdominal breathing, as it is called, is particularly common among men. The use of the corset, and other reasons, have produced among women a habit of breathing with the upper part of the lungs, a habit that has been to that extent fortunate. Lung diseases are less frequent among women than among men. Women breathe less air than men, but they breathe it in a better way. Men generally exercise the lower parts of the lungs nearest the assisting diaphragm, leaving the upper parts, that first receive the air, in a state of relative weakness and susceptibility.

In my opinion the diaphragm has properly no greater necessary use in expanding and contracting the lungs than the ribs themselves. In other words, the action of the diaphragm should be sympathetic without being initiatory. The lungs have their own muscular power, and this power should be fully exercised.

The simplest preparatory exercise is full, long breathing. While standing or sitting in any proper attitude, with the chest free, take in a long breath until the lungs seem full, taking care at the same time not to harshly strain the lungs or muscles. Hold the breath thus taken for a few seconds, and then allow it to slowly leave the lungs. By consciously breathing in this manner the lungs will be enlarged and strengthened and the breathing will become slower. Normal breathing, when the body is at rest, should not include more than ten breaths in a minute. I, myself, get along very comfortably with not more than six, sleeping or waking. During exercise of an ordinary character the breathing will naturally increase to fourteen or fifteen breaths in the minute.

At the outset long breaths will be a conscious exercise. But the reader must not assume that he cannot develop an unconscious habit because the exercise seems at the start to require attention. Take long breaths as often as you think of it. You may not think of it more than once or twice a day at the beginning.

Then you will find it easy to remember every hour or so, and then twice or three times an hour, until finally the habit is formed, and the old short, scant breath—a mere gasp in many people—is entirely abandoned. How soon, and to what extent this habit may be formed will depend to a great extent on the constitution of the person, but the principle is of universal application. A long breath will be found to represent strength, and strength that endures. From the elephant, who breathes eight times in a minute, to the mouse who breathes one hundred and twenty times in the same period, brute creatures are almost uniformly found to possess strength in proportion to the length of the respiratory movement. Curiously enough it is the animal that most closely resembles man—the monkey—who, in confinement, first succumbs to disease of the lungs.

In all lung exercises endeavor to inflate the lungs upward and outward instead of downward. Carry chest and lungs as if the inflation were about to lift the body off the ground upward and forward. The feeling of buoyancy given by this habit is not an illusion by any means. It is genuine.

There are certain movements which combine the respiratory with muscular exercises. Such a preliminary exercise is indicated in Fig. 6. Take the correct standing position and place the hands together (locking the thumbs), as shown in the drawing at *A*. Raise the hands, keeping the arms straight, and at the same time take in a long breath. When the arms are raised as high as your muscular condition will allow without bending the body in any way, slowly lower the arms again, emitting the breath as they descend. Repeat this a number of times. When the shoulder and chest muscles are in good condition, you will be able to raise the arms straight over the head without bending the body.

For another exercise combining respiration and muscular action assume the same position, raise the hands slowly while taking in a breath and when they have reached a position over the head hold the breath while they are brought

slowly down to the sides. Then slowly release the breath. Again, place the hands over the head as in Fig. 7, and as they are brought to the sides on a perfect line, draw in a breath corresponding in duration to the time occupied in dropping the arms slowly. Release the breath gradually.

For a final exercise in this department the preliminary position is shown in Fig. 8. Having brought the elbows on a level with the shoulders, and the hands on the same line, extend the arms, with hands together as if in the act of swimming, taking in at the same time all the air the lungs will hold. Holding the lungs full, bring the hands around on an outer circle to points on a level with the shoulders, and then slowly empty the lungs while bringing the hands to the original position.

These exercises will be found easy yet exhilarating, and will fill the double office of strengthening the lungs and developing the shoulder and chest muscles. Practice them after rising and before fully dressing in the morning, and again before retiring at night. It should not be difficult to find some opportunity for this practice some time again during the day. These movements should not be performed more quickly than ten times a minute.

It is well not to overdo these or other exercises at the outset, since, by unduly tiring the muscles, the pleasure of exercising on the ensuing day will be largely destroyed by a sense of pain. Nothing is gained by straining.

IV.

MUSCLES AND WHAT THEY DO.

BEFORE passing to the general training of the muscular system it cannot be inadvisable to pause for a moment and consider what a muscle is and what it is capable of doing. I have more than once seen men, speaking of their power to strike a blow, proudly touch the bunch of muscle on the top of the upper-arm, as if that supplied the power in striking, when, in fact, it is the muscles on the back of the arm that supply the force by which the arm is straightened. Incidents of this kind furnish a reminder that very few people realize the charac-

ter—the structure—of muscles, or understand clearly the functions they perform. Indeed, judging from the systems of training now so common, and the conduct of athletes in general, it seems questionable whether a knowledge of the muscles, their needs and application, is even as well diffused as many have supposed.

Generally speaking a muscle is formed of a mass of small fibres running parallel with one another, and possessing a power of contraction more or less great, according to their health and training. This power of contraction draws closer to each other the two ends of the muscles, and by so doing brings the bones to which the two ends are attached that much nearer together. The muscle is attached to the bone by white, unelastic cords called tendons. These tendons are so strong and so securely fastened to the bone that the sudden contraction of the muscle in pulling is more liable to snap the bone than the concussion of a fall itself. Muscles, indeed, break a great many bones in one way or another.

The muscles of the body are arranged for the most part in complementary groups, by which they act together, pulling and relaxing as the case may be. Thus in the limbs the muscles which straighten the bones are called the *extensor* muscles, while those that bend them are called *flexor* muscles. The *biceps* on the front of the upper arm are *flexor* muscles, because they pull up the fore-arm. To straighten out the arm again the *triceps* on the back of the arm exercise their office as *extensors*. In the same manner the *flexors* of the leg are on the back and the *flexors* of the hand are on the palm. The *ac m Bones*.

M1 Muscular fibres.

m Tendons, uniting muscle to bones.

AX Points at which tendons attach to bones.

companying illustration (Fig. 9,) will give an idea of the manner in which the biceps act in bending the arm. The tendon joins the forearm not far below the elbow joint, thus giving the muscles a very quick leverage on the arm. With so

short a hold, however, this muscle requires great power. Of course in flexing the arm, the forearm muscles—which, in their turn, are united with the upper arm—are also brought into play. When the muscles on the front and back of the arm are both drawn at once the limb becomes rigid. The same remarks apply to Fig. 10, which shows the chief muscles that carry the body on the toe. The bone of the heel forms a sort of lever upon which the contracting muscles in the "calf" of the leg operate

In order to feel any of the muscles to the best advantage establish some resistance—such as a weight in the hand to discern the flexors—and a pressure downward against some obstacle to watch the action of the extensors—the muscles on the back of the arm. The function of the muscle is thus to *pull*. Every movement of which the body is possible is brought about by the *pulling* of one or more muscles. The pulling is, as I have said, accomplished by the contraction of the muscles, and this power of contraction is inherent in them. It belongs to their very nature; for while our will generally telegraphs through what are called the motor nerves what it wishes the muscle to do, the muscle will contract under certain circumstances without any order from the will. Indeed, if a muscle is removed from the body it will still contract under stimulus from pinching, or from the sting of acid. Of course it is the duty of every healthy being to keep the muscles as perfectly under the control of the will as possible. The partnership between the brain and the muscles should be complete and continuous. It may be set down as an absolute truth that no one will become unconscious of his body in the right sense until he has first become thoroughly and intelligently conscious of every part of it.

m Bona. m Muscular fibres. m Tendons. uniting muscles to bones. A.A.I.A. Points where tendons attach to bones.

Now the contractility of a muscle, the power it has to shorten and draw its ends closer together, depends on the extent and condition of the *fibres*, the bulky part of the muscle as distin-

guished from the hard and uncontractable tendons. These fibres, looking, when highly magnified, like a bunch of red worms all stretched in the one direction, form the *meat* of the body as distinguished from the bone and gristle. In fact, the muscles make up in weight more than half the bulk of the body. From this it may be judged without argument that the health of this machinery is of very great importance to the *A-Unravelled Fibrillae. J. ,h-Rupiund Fibre. M/ health of the body.*

The muscles are not implements which may or may not be used and cultivated according to the taste and pursuits of the person. They must be used and developed or the body will fall into ill-health. They are more than half of us and must be taken into consideration in a serious and intelligent manner.

The chief reason why the muscles must be *Tcept* in use is that their health directly effects the circulation of the blood, and upon the perfect circulation of the blood physical health is greatly dependent. The moment a muscle is put in action the blood dances through it with increased speed. As it develops, more and more blood is called to supply it. In its greatest heat it is greatly charged with blood. It is for the same reason that *all* of the muscles should be called into play in the general carriage and use of the body, for if the activity of certain muscles quickens and improves the circulation, and the disuse and ill-health of other muscles disturbs the circulation in another part it is quite plain that the general circulation will be at a loss. The result will be coldness in the feet and hands, and a constant danger to the weaker organs of the body. A sluggish circulation, resulting from the disuse of large areas of the muscular system, means many terrors to the unfortunate victim. Neuralgia and kindred complaints are a frequent result of inactivity and confinement. The first step toward a cure of such ills should not be drugs, but studious deep breathing and exercise.

People are frequently astounded by the great strength of an athlete. The trained man, lumpy with muscles and glowing

with health, lifts some tremendous weight and carries it for a distance. The feat, incredible to the hearer, is scarcely comprehended even by the spectator. What does it mean? Are the athlete's direct lifting muscles so much beyond the normal in power?

The truth is that the athlete's effort is successful, not so much because his individual muscles are greatly superior to the same muscles in the normally developed man, but because he *uses more of them*. The majority of people do not know half the muscles they own. If they unexpectedly make use of a muscle long left out of account and in a half dead condition, it gives them a twinge, they are frightened off. They rub it with arnica and endeavor never to use it again. They lift, carry, stoop, reach and climb with scarcely a majority of their muscles. Of course, in a violent exercise like some forms of dancing, a large proportion of the muscles are brought into play, but many of them only slightly and only under such exceptional conditions. It is in an understanding of the scope of the muscular action in a given movement that a man will secure power in that movement.

Take the case of a blow with the fist. In a gymnasium a number of young men will gather near a suspended sand bag. One after the other will hammer at the object forcing it to swing at various angles. The owner of perhaps the stoutest arms only sends it out at right angles. Then steps up a young man of comparatively light-weight and triceps inferior in bulk to those of many of the others. This young man strikes a blow at the bag and it bounds clean over the point of suspension. How did he do it?

In the first place the young man knew the right moment in the extension of the muscles at which to make contact with the bag; but particularly he knew how to throw all of his muscles and all of his weight into the blow. He used every muscle he possibly could, down to the tendon Achilles in his heel, and he made every one do all it possibly could.

The continuous health and use of all the muscles will thus not only have the effect of securing that great boon to the

system—a free circulation—but it will give an incalculable advantage in every muscular effort. The body acquires not only greater power, but greater ease and grace. It acquires in general the great sustaining power of distributed responsibility. A man or woman who holds the body erect, or in any necessary posture, with the aid of but a few trained muscles, possibly supported by a few others that are occasionally called into play and that soon tire, grows fatigued much sooner than one whose weight is carried by a well-drilled army of fibres, fully supplied with stimulating blood.

When it comes to training the muscles, their relation to the blood circulation should never be overlooked. That this relation is continually overlooked in modern athletic training I need scarcely say. It is very well understood that modern training is too often engaged in making muscles "hard," as if their mere hardness was a sign of the most valuable condition. To be sure a man covered with hard muscles will often display great immediate power, but not of endurance, and of after health he can have little chance.

The highest state of health and power in a muscle will always lie in its flexibility rather than in its hardness. A man trained until his muscles "feel like iron," is really in a dangerous condition. He soon gets out of "training," and is then immediately at a loss. His muscles feed upon his vitality, and, especially when he has passed middle-life, threaten his general health. A man so "muscle bound," as the saying goes, is not in possession of a power. The power owns him.

On the other hand, a man who keeps his muscular system in a state of comparative softness and high flexibility can not only summon great strength, but his powers of endurance are surprising. He is, too, easily kept in training. Natural exercise will preserve his condition, and he is at any time ready to train for special effort, if that is necessary, without shock or inconvenience.

Muscular exercise, however slight, results in a waste of tissue in the flesh fibres, and this waste is carried off. Dur-

ing repose the blood returns new material, and the stimulated action increases the area of blood circulation and enlarges the muscular mass. When exercise is properly conducted this waste and renewal go gradually and easily forward, preserving complete health in the parts and steadily increasing the resources. But when the exercise is unnecessarily violent the destruction of tissue is injuriously carried on. The process of repair cannot so nicely supplement the waste as in the case of reasonable exertion. And when exercise is introduced infrequently — after periods of almost complete inaction—it cannot atone for the sin of collapse. It will not do, as I have suggested, to sit, stand and move badly for ninety-nine one hundredths of the time and then hope to make things come out even by one per cent. of right exercise.

The muscles will have the greatest health, strength and "staying" power that are kept flexible and full of blood by continuous use in every day life. To expect them to keep healthy by an infrequent fifteen minutes at some machinery, is as unreasonable as to think of preserving the comfort of the stomach with one meal a week.

THE JOINTS AND THEIR DEVELOPMENT.

THIS is not a surgical treatise and my desire is to spare the reader or student as much as possible of dry, scientific detail. But the most common-sense view of this training matter, especially if we are to work from the inside, demands that we should constantly keep in mind the structure of the body. We have a certain physical system to work on. That is our foundation, and it will be of no avail to ignore either the limitations or the possibilities of that system.

I have never believed that the creator had this or that *intention* about the body. If the creator had any definite intention about the physical machinery of man, it was that that machinery should be of the utmost service to man, and that it should be made all that its owner can make it. What we really mean when we speak of intention is that the splendid mechanical arrangement of the bones and mus-

cles seems to have an especial adaptability to this or that function. I have already spoken of the beautiful versatility of the human physique. Man's bone structure gives him a scope of movement nowhere equaled among the lower animals. This is because man's intelligence has taught him to aid his own development in every useful direction. The horse, for instance, with its short collar bones and undeveloped lateral muscles, has all of his power in forward and backward movements, and almost none in movements to one side or the other. Everyone has noticed how difficult it is for a fallen horse to raise himself. The horse has only developed the muscles that are most useful to him in the service of man. Man finds so many uses for his own joints and muscles that he is continually bringing them to a higher state of versatility.

But he by no means uses his bone system as it might and should be used. He gives only a half-use to his joints as he gives only a half-use to most of his muscles. This is very largely because he usually has but a very slight knowledge of the actual location and capacity of his joints. He bends his spine in stooping as if there were no hip joints in his anatomy. It is often remarked that man first ascertained the location of his stomach when an indiscreet meal brought confusion in that locality. Most of us forget about the joints until some novel slip or movement gives the unused machinery a twinge, and then, instead of following up the lesson and making that joint serviceable, we are very liable to avoid any further service in the offending part.

The extremities of two or more bones forming a joint are covered with cartilage, which, as I have said, is a solid but softer substance than bone, and one whose smoothness and elasticity keep the ends of the bone from wearing. As in the case of all other material of the body, this cartilage is in best health when the function it has is evenly and naturally exercised. The cartilage is covered with a thin layer called the *synovial membrane*, and the joints are continually oiled and kept in working condition by a fluid called *synovia*. Then a

series of tough bands, called *ligaments*, hold the heads of the bones in proper position.

Joints like those at the knee and ankle are called hinge joints, while others, like those at the shoulder and hip, are ball and socket joints. One is constructed very differently from the other but both are operated on the same principle and have the same general conditions of health and strength.

The joint itself, if we were to mean the bones merely, has all the flexibility that the surrounding ligaments and the connecting muscles will give it. That the difficulty of bending is not in the bones but in the ligaments and muscles about the bones will be illustrated by the fact that one has little difficulty in placing the knee against the chest. But stand upright and endeavor to carry the chest toward the knees and the operation is found to be very difficult. Or endeavor to lift the stiffened leg toward the chest, and it will be found impossible to acquire the whole distance. This is because the muscles and tendons have not been trained to sufficiently accommodate themselves to the severe relaxation. When the joints are not fully trained by use the same difficulty will constantly arise and even in the minor movements.

The ligaments are necessarily made to hold the bones very firmly. If they did not cases of dislocation would be much more frequent than they now are. When a bone becomes dislocated the ligaments and muscles draw the points of union past each other. In the case of the shoulder this is not a very serious affair, for that joint, being relatively in a state of high flexibility, may usually be reset without great difficulty. Many contortionists can voluntarily dislocate one or both of their shoulders by muscular action, and restore their position without difficulty. But in the case of the thigh, for instance, the situation is very different. A visitor to a hospital will often observe a patient lying with one leg extended on a support ending in a pulley and weights. The weights, sometimes of many pounds, are "tiring out" the contracting elements about the joint. When they are sufficiently "tired" by the pro-

longed pulling, and acknowledge themselves beaten, the head of the dislocated bone is placed in position and the muscles again acquire the necessary contractility.

It is thus important that in developing the muscles of the body the office of the joints should be kept in mind. The bones are not insensible material but contain a blood system, a life and sensitiveness equal to that of the other parts of the body. They are, in fact, as much dependent upon exercise for health as the muscles. Moreover, a bone may be increased in dimensions by exercise, so that the chances of increasing the height and building-out the frame by carrying the body in the best manner will be aided by the actual growth of properly exercised bones.

The proper use of the hip joint is, perhaps, most frequently ignored. As I have suggested the bones of the spine are continually strained, the chest contracted and the abdomen distended in an effort to save the hip joint and the muscles affecting its use from performing the service that belongs to them.

By frequent and easy practice the hips may be made what they should be—the natural hinge in the middle of the body. Begin by ascertaining with the finger the location of the hip joints. Place the middle finger of each hand on the corresponding hip joint—at the exact locality of the hinge—and the thumbs of each hand on the edge of the hip or pelvis itself. Now bend forward and the relation of the pelvis bone to the leg joint will be readily perceived by the touch of the thumbs and fingers. The action of bending is, indeed, a backward movement of the hinge of the body and not a forward movement of the head as the beginner generally assumes. Let the conscious movement be in the hips, and preserve the natural relations of head, neck and back. Repeat several times the motion of bending from an upright position to a point as low as possible *without bending the back*. At the outset a stick of any sort—a broom handle if you choose—may be held with one hand upright against the spine, head, hollow of the back and foot of spine, all touching,

while the stooping over is tried several times, until the straightness of the back is secured, and it becomes plain that the hips

illustrating the bone system of the body as seen in the incorrect and correct standing positions and the manner in which the proper use of the hip (or pelvis) and back muscles may increase the height and symmetry of the body. The figure to the right is that of a man naturally two or three inches shorter than the figure to the left.

are doing all the bending. When the motion is first tried the pupil invariably arches the head and neck, and perhaps hollows the back.

For the purposes of this practice guard against any movement of the back or neck, and the value of these fine hip hinges will begin to appear. Repeat these movements with the hands raised above the head. Then bend forward as far as the hip joints will allow, throw the shoulders up and forward, and touch the floor with the tips of the fingers, without bending the knees. The latter movement is a familiar feature of the military "setting up" drill and is of great value. When first attempted it is generally found difficult, though some persons, with no special effort, easily bend in this way. After repeated practice it will be found possible not only to touch the floor but to hold the fingers there, then to touch and hold the second joint of the fingers and finally, perhaps, even the palms.

The action of the shoulders in this movement brings up the importance of developing the shoulders. The power of the shoulder movement in itself is surprising. Stand upright in the correct position and lift the shoulders as high as possible, lowering them afterward as far as they will go. Now bring them forward and draw them back as far as they can reach in each direction. Repeat these movements and endeavor to keep the shoulders flexible and vigorous. By training the shoulders the clavicle, or collar bone, with the other bones and muscles involved, increase the width and general bulk of the shoulders.

A special exercise for the develop-

ment of the shoulders with the muscles of the back and sides is this: Stand sideways near some vertical surface, like the wall of a room, at a point sufficiently distant to allow the hand when extended to easily touch the surface. Now move an inch further away and touch the surface again without altering the position of the feet, legs or pelvis (Fig. 13.) A second time move an inch and this time there will be some difficulty in reaching. Repeat the movement until the surface cannot be reached, then do the same with the other arm and shoulder. The effort to reach will draw out and straighten the shoulders, and it will be discovered that the shoulders can be made to have a distinct lateral extension. Stand with the back to the wall and the arms extended and make a pencil mark at the ends of the second fingers when the shoulders are most contracted. Now reach out as far as possible each way, and the difference in reach will be found, at the end of a few of the exercises just given, to steadily increase. After a few months of reasonable practice with the shoulders the tailor may, if it has been his practice, be requested to leave out the cotton padding in the coat.

There is a complementary action between the shoulder and hip that is well illustrated in the act of stooping. An effective method of stooping is shown in Fig. 14. The first bending is of the knee. Then the hip hinges work and the body bends forward—partly move the shoulders, by which the hand is easily brought to the ground without the wrenching of the spine and the discomfort of both lungs and abdomen. In such movements the tendency is to distend the abdomen, but in this and in all similar movements the abdomen should be *contracted* and kept under muscular control.

In the same manner when seated do not reach over a table, for instance, by curving the back, but by throwing forward the shoulder. If this does not bring the hand near enough the object, bend at the hips. The great value, of a flexible shoulder in reaching is shown by the fact that, with the spine firmly held against the back of a chair, the hand

may, with practice, be oscillated in a direct forward reach from two to six inches.

I have thus far but sketched the value of a proper training for the joints. In another chapter I shall take up a series of exercises bringing both joints and muscles into play.

VI. EXERCISES FOR MUSCLES AND JOINTS. *Full* exercises of the joints involve certain / exercises of the muscles, but there are some that involve simply a relaxation of certain muscles with only sufficient tension in others to keep the body erect meanwhile. Such, for instance, is this useful exercise for the attainment of flexibility in the pelvic region or the region of the hips:

Take the correct standing position, then relax the muscles so as to permit the whole weight of the body to fall on the left leg, allowing the right leg to bend and the right hip to sag down as far as it may. Now transfer this weight to the right leg and allow the left hip to drop as loosely as possible. This would be a very bad position to stand in, but the exercise of transferring the weight from one side of the pelvis to the other, gives increased flexibility and vigor to the muscles and ligaments of this region, and will give increased elasticity and endurance in walking. On the first occasion the exercise should be repeated slowly, and might last one or two minutes. After renewed practice it will be found easy to drop rapidly from one hip to the other without inconvenience and to prolong the exercise for four or five minutes.

The training of the spine should be carried on with the training of the pelvis, from which bony framework it rises. In pointing out that the spine should not be bent in every stooping and reaching movement, the theory was not that it was to its disadvantage to bend, but that the habit of bending forward needlessly hampered the lungs and digestive region. The spine itself should be thoroughly exercised, for the same reason that other regions should be kept in reasonable activity.

To give the spine a flexibility necessary to the comfort of the body it should

be frequently moved in all directions consistent with its structure. Under proper cultivation the spine has great versatility of movement. Between each of the bones of the spinal column are disks of "fibro-cartilage," as the anatomists call it, a substance which operates as a cushion between each section of vertebra and constituting a continuous safeguard against accident to the great bone centre of the body. These cushions form actually about one-fourth of the spinal column, and they not only render the column susceptible of modification, so far as its lengthening or shortening is concerned, but they make it possible for the column to twist vertically to a considerable extent. Numerous ligaments, forming a beautifully complex structure, hold the whole system of bones and cushions in position, and the stout muscles of the back hold an intimate relation with them. It is these ligaments and muscles that require to be treated in the exercise of the spine.

An exercise of a simple but effective character is acquired in this Way: After assuming the correct standing position, extend the arms until the hands are brought on a level with the shoulders. Holding the arms and shoulders upon a straight line and keeping the arms directly opposite each other, as if actually held in position by a long pole passed across the back of the neck and held in position by the thumbs (this plan may be followed if desired), swing the arms and shoulders in unison, first in one direction and then in the other until the line of the arms, at the extreme tension of the swing, is as nearly as possible at right-angles with the first position. Swing in this way at the rate of about twenty movements to the minute until the muscles of the shoulders and back feel tired. The greatest flexibility will be found in the upper region of the spine—a slight flexing of each section of the vertebrae, giving an aggregate twist that will, with practice, become considerable. If the arms do not swing the shoulders with them, the exercise will have little value. And it is to be remembered that the hips should, during the exercise,

keep their natural position and not swing with the shoulders.

A variation upon this exercise is illustrated in Figs. 15 and 16. In Fig. 15 the arms are brought to a position at right-angles with their original line, the hips in this case being turned slightly. Now, keeping the arms rigidly opposite each other, bend the left arm downward, at the same time bending the left knee only, and touch the floor between the two feet, as shown in Fig. 16. Raise the left hand until the arms resume the position of Fig. 15, and swing the arms about until the right hand occupies a forward position. Bending the right knee (the left being kept rigid), the floor may now be touched in the same manner with the right hand. These positions may be alternated at the rate of about fifteen changes to the minute. The exercise is an excellent one.

In the two movements just described keep the face directed toward one point in front of the figure. By so doing the neck will be given some work to do and will be strengthened in all repetitions of the exercise. To further strengthen the neck—and a development of the neck muscles will prevent many a headache that arises from no other cause but muscular fatigue—stand with the back against a wall. Without moving any part of the back or shoulders away from the wall, move the head forward and back a number of times, keeping the face on the same vertical line as when the back of the head touches the wall. Then practice a side to side movement of the head, *without altering the vertical line of the head*, as in Fig. 17. In this second movement it will be found very difficult at the beginning not to roll the head, but be content with a slight movement at the outset, and in time it will be found possible to oscillate the head several inches without altering the vertical line.

The great advantage of movements of the neck, in which the head is managed independently, is an increased control of all the muscles in this region of the body. It is thus not merely the *exercise* of the muscles that all these movements are designed to accomplish, but the *control* of the muscles, so that every muscle

may, in so far as that is possible in ordinary training, be under reasonable control. The value of such perfection of control I cannot reiterate too frequently. The exhilaration, the increased local strength, and the increased general health, are certain to render control worth the effort.

An exercise of much value in perfecting the poise and suppleness of the body, and in strengthening the legs, is illustrated in Fig. 18. Assume the standing position, with the hands at the sides. Draw the arms backward until the hands are about eighteen inches from the vertical line of the body, relax the leg muscles and drop quickly into the position shown in the drawing. As the body descends, bring forward the hands, and by continuing their swing the balance of the body will be better preserved while it sinks and rises again to the first position. The natural elasticity of the muscles will tend to send the body upward again after it has dropped upon the heels, and the movement may be repeated, according to the condition of the muscles, from three or four to a dozen times. Remember to keep the body above the hips perfectly upright during the exercise.

Another exercise benefiting the legs, hips and chest: Place one foot before the other as in stepping, rise on the toes (or, properly speaking, the ball of the foot), and springing slightly transpose the relative positions of the feet so that by a regular repetition the effect will be as of a still walk. The arms may be swung in sympathy with the movement. During the exercise practice a long and steady breathing—with the lips closed, of course.

It will be observed that while some of these exercises place considerable tax on the agility of the muscles, there are none of them violent. Dozens of other movements pursuing the same line of development will readily occur to one who enters upon practice. My purpose is always to lead the pupil by gradual steps to the point where he or she shall feel a perfect familiarity with and mastery of all the muscles of the body. When this has been accomplished, in

connection with the development of the lungs, the pupil is ready for the heavier athletic training, with which this book is not concerned, and with which all but a small number of people have neither the time nor the necessity to be interested. Even sedentary people will find many ways of amplifying in practical exercise the foregoing special exercises for the lungs, muscles and joints. Yet it is necessary to avoid violent experiments. In lifting anything whatever, endeavor to bring all the necessary muscles into play. The action will require a certain amount of thought, for in a spasmodic effort it is easy to seriously strain a few muscles left to do an involuntary service. In fact, a failure to concentrate effort in the right manner often does an injury, when the movement intelligently made exhilarates without straining or "winding" the person.

In his recent scientific work on the "Physiology of Bodily Exercise," Dr. Lagrange emphasizes this point: "Exercise," says the writer, "performed without moderation or rule induces all forms and degrees of fatigue, and exposes the human machine to various injuries which we have described as the accidents of work. On the other hand, muscular work performed in gradually increasing quantity and according to the rules of graduated training, brings about a progressive adaptation of the organs in the performance of more and more violent exercise. It improves the human motor by giving to all its machinery a greater strength and ease of working. Such are the results of exercise considered as an abstract factor and reduced to the *quantity* of work represented by it. But it is only by a mental effort that we can isolate the work done by the system from the organs concerned in the performance. Now these organs are not the same in all cases, and do not work in the same manner in all forms of exercise. Thus, the practice of different exercises produces different effects on the system. Hence the use of a rational classification of the different exercises, and the necessity of making a choice from among them in accordance with the effects desired."

Light exercises and exercises that vigorously tax the strength each have their place and value. The point is that they should not be misplaced. The exercises given are designed to *awaken* the muscular system, to give it flexibility and readiness, and it will be found when the training on these lines has been carefully advanced, that a heavy demand on the muscles has no terrors, that the general strength has been splendidly increased in a degree entirely out of proportion to the increased size of the individual muscles.

VII.

THE TREATMENT OF OBESITY.

LET me have men about me that are fat," says the Caesar of Shakespeare's play. But then there may be too much of a good thing. There is a happy mean between the "lean and hungry" proportions of Cassius and the too ample outlines of the Leicester gentleman who, early in this century, carried to his grave a body weighing 789 pounds. In our own day, with all the hurrying and scurrying brought by the Nineteenth Century method of living, a large number of people suffer from an accumulation of fat, and the treatment of persons so afflicted receives much attention and calls up many ingenious schemes and suggestions.

The most popular method of combating corpulency is by dieting. A thousand and one pamphlets and patent medicines bear promises of salvation for the afflicted fat. Many a worthy person has suffered the agonies of semi-starvation in an effort to reduce his weight, and has sometimes succeeded in getting rid of a few pounds. Many others have chosen to "eat and drink" if they cannot "live and be merry," preferring the inconveniences and dangers of corpulency to the tortures of a greatly restricted diet.

So long as certain articles of food are recognized as having greater properties for producing fat than others, it is plain that dieting may have some influence on the quantity of fat accumulated. But it only succeeds in reducing the formation of fat, and does nothing toward getting rid of fat after it is formed. In a person otherwise healthy this can only be

done by exercise—not merely abstract "airings," which fleshy people sometimes consider exercise, but locally applied exercise, intelligently and conscientiously pursued.

Regarded rightly obesity is simply a disease and must be specifically treated like any other disease. When the natural functions of the body proceed without interruption there can be no accumulation of fat. It is only by the failure of some natural process that fat increases beyond the desirable point.

In the growth of the body-materials fat is accumulated and consumed again just as steadily as coal is burned in the engine, or as the chemical ingredients of an electric battery are gradually exhausted. This fat feeds the muscles—every muscular effort producing a certain amount of combustion. If the muscles are not exercised, the fatty substance, which would be burned up and carried off by the action of the muscles, steadily accumulates.

The accumulation of fat under the absence of exercise operates against its owner in more ways than one. Not only does it increase his weight, retard his movements by increasing bulk, and interfere with his breathing, but it unduly heats the body. The blood of a fat person is likely to become overheated, and is difficult to cool. Thus these excessive layers of fat, operating like so many excessive layers of clothing, are a constant menace to the comfort and the health of the body.

Exercise directly attacks superfluous fat. How much fat may be superfluous depends upon the constitution and temperament of the person. Under the most vigorous training some people retain a good deal of fat. They are by nature plump. But their fat is no detriment to them. They move with as much ease and as little breathlessness as other people. The quantity of fat to be lost under exercise thus depends upon the individual, but will always, of course, be considerable in proportion to the amount accumulated without exercise and under the unrestricted influence of the disease at its height.

Exercise not only reduces fat but it

reduces it in the most direct and effective way. In half an hour of vigorous exercise a man may reduce his weight by a pound or more. The rapidity with which fat may be burned off in the activity of the muscles is often, indeed, surprising. This dissipation of fat is local; that is to say, it disappears in localities in which muscles are active, and in proportion to their activity. Thus people will accumulate fat in accordance very largely with their personal habits. People who sit a great deal, yet have occasion to use their arms considerably, will be found with arms having proportionately more muscle and less fat than their legs. Others who are on their feet a great deal, but take little exercise, are often found with relatively slender and muscular legs, while body and arms are very fleshy.

A large number of people, while of seemingly proportions in other respects, grow an abdomen that is exceedingly ugly and becomes in time a great inconvenience. This is because, while the general activity of the person is considerable, their abdomen is kept free from muscular action. The worship of the stomach renders people who like to live well extremely jealous of anything that disturbs the region of the stomach and digestive organs. Perhaps eating-excessively renders them continually cautious about bending, and at the first signs of a protruding abdomen in a person otherwise slender the protrusion is patted and petted as a kind of symbol of health, when, in fact, it is sometimes, if not very often, a threatening sign. It is at least a prophecy of too much fat, and as such should be looked at askance.

Instead of coddling the abdominal region it is a duty to keep this region as much alive with good muscles as any other part of the body. Where muscles are healthy excessive fat cannot live. Thus the most direct way of removing fat from the abdomen is to establish a healthy system of muscle there. As the muscles grow the fat diminishes. A man may box and fence, and even walk, without losing his terrible abdominal accumulation; but if he centres his efforts at muscular exertion on the ab-

domen itself the fat cannot stand the attack and will gradually disappear.

To regain muscular control of the abdomen after the control has once been lost is no easy matter. The ability to contract the abdomen observed in persons properly conditioned seems wholly impossible to a person with much fat. It is only by slow degrees that this control can be regained.

The reflex action of health in the abdominal muscles, and the proper exercise of these muscles in connection with those of the spinal and pelvic regions, will be immediate and considerable. All the digestive tonics that were ever invented cannot compete with muscular activity in the digestive region as a means of driving away ills in this region. As a direct means of accomplishing this end the treatment of the abdomen itself is obviously better than exercising in a general way, and infinitely better, of course, than the most heroic system of dieting.

One who follows conscientiously the exercises outlined in the preceding chapters, and who preserves a general activity of the muscles of the body, can never become corpulent, and for those who have just begun to acquire more than a proper or comfortable proportion of fatty material in the body, these general exercises will be sufficient to check and repair the damage. But in this chapter I have in mind those who are too corpulent for comfort and whose immediate concern is in reducing their weight. For these the following series of exercises has been arranged: *First*—Contract the abdominal muscles and endeavor to draw the abdomen in and out, without breathing, until entire control of the muscles is secured. If at the beginning it is found impossible to use the muscles in this way press in the abdomen with the hands as far as possible, and while holding it thus, take several long breaths, resisting any temptation to allow the abdomen to move with the breathing. Pursue this plan until the abdomen can be drawn in and released by the action of the muscles and without the assistance of the hands.

Second—Take the correct standing po-

sition (as nearly as may be possible), and straightening the arms bring them forward and upward as far as they may be carried without hollowing the back. In reaching loosen all the muscles of the shoulders that will allow the fullest extension of the arms. The reach should be made forward and upward without removing the heels from the floor, and should be accompanied by a long breath. The motion should be repeated about ten times in a minute and will be found to have a very beneficial effect on the neck, shoulders and chest, while strengthening the lungs. FIG. 20.

Showing fatty abdomen as distended in bending without control of muscles.

Third—Clasp the hands over the abdomen, drawing it in to the utmost; take a long breath and bend at the hips until the body (without bending the back) is at right angles with the legs as in Fig. 21. Straightening again, the breath should be released without relaxation of the abdomen. This motion should be repeated ten or fifteen times in a minute. Its influence will be valuable in establishing a control over the muscles.

Fourth—Swinging exercises, as explained on pages 73 and 74. *Fifth*—Swinging and bending exercise as described in Figs. 15 and 16. With a person of much flesh it will be impossible to touch the floor as in Fig. 16. But stoop in the general direction shown by the figure, and carry the movement as far as may be possible. Before stooping contract the abdomen, especially avoiding the tendency to distend it in reaching over. *Sixth*—Lie flat on the back, with the hands across the abdomen, take a long breath, and raise the legs (with knee joints stiffened) until they reach right angles with the body. This must be practiced without arching the back or allowing the pelvis to leave the floor. *Seventh*—Lie in the same position with the feet under the edge of a sofa, or some other object that may hold the feet against the floor, and, without the assistance of hands or elbows, raise the body into a sitting posture, at the same time contracting the abdomen. *Eighth*—In the standing position: Raise one knee after the other in exaggeration of the ac-

tion of going up stairs, keeping the body meanwhile perfectly erect, and practice until the knees can strike the chest. The exercise will be very beneficial in reducing flesh on legs and abdominal region. *Ninth*—Dropping on the heels as described on page 79. *Tenth*—Bending and touching floor as described on pages 63 and 65. A person of much flesh can only attempt this movement, but repeated practice will steadily increase the ability to bend. Have in mind here, as in all other exercises, to keep muscular control of the abdomen. Such habits will gradually diminish its size. *Eleventh*—Neck motions as described on pages 71 and 78. *Twelfth*—Lie face downward on the floor—or, in consideration of that protrusive paunch—get on the hands and knees, then extend the body on hands and toes as in Fig. 22. Keep the body perfectly rigid—not permitting the abdomen to sag and not bending the hips upward to lighten the strain on the muscles. To take this position for a few seconds is all that very heavy persons will be able to do at the beginning. The exercise itself consists in lowering the suspended body by the bending of the arms until the face touches the floor, and the effort should be repeated until this movement can be accomplished several successive times.

All that has been said in previous chapters about the carriage of the body will apply with equal if not greater force in the case of corpulent people. Persistently subdue the abdomen and give the prominence to the chest. Walk with the whole body, and do not move as if afraid of jarring some internal machinery. Give the hips free play, and in walking—the more of this the better—practice the contraction of the waist muscles. In this way a continuous training—the only training that is effectual—is kept up, and the result will be immediate and lasting.

It is to be remembered that all the fat of the abdomen is not superficial like most of the other fat of the body, but is largely internal. Yet this internal fat is susceptible of reduction by pressure and exercises, and should not be encouraged to increase in bulk.

VIII.

TRAINING FOR WOMEN.

It has already been suggested in these chapters that the exercises outlined applied as well to the training of women as to the training of men. I do not think any of the exercises described need be forbidden the gentler sex. The muscular and bone systems of men and of women are so much alike that what is good exercise for one is, except in cases of particular weaknesses, good exercise for the other. There are, however, certain of these exercises that women, especially if their health is not fair, should enter on with caution. This is all the admonition that need be made. Avoid the chances of shock to the pelvic region. Avoid also the chance of strain. If an exercise seems to make a great demand on any of the muscles, acquire perfection in that exercise by degrees, being content to gradually acquire control of the stiffened fibres and joints.

This suggestion would be unnecessary if so large a proportion of woman kind did not neglect the simplest principles of bodily health. The "weaker" sex would occupy no such position of relative weakness if natural laws were followed. If women must, as is so freely claimed, remain physically short of man's strength, there is no reason why the disparity should remain so great as it often is. Where women lead an active life their strength and endurance comes remarkably close to the strength and endurance of the other sex, and in the control of their own systems may readily under development excel the other sex. In other words, tradition has more to do with the "weakness" of women than has nature.

It is very doubtful whether very much can be done for the development of physical strength and the higher health in women until something is done toward materially reforming women's clothing. I think I hear the reader say, "More harping on dress reform!" But the harping must be kept up until the shackles of badly designed clothing are stricken from long suffering woman-kind. Then profitable training may begin.

At the very threshold of healthful development is the obstacle of the corset. Yes, I know that the corset is not so tight as it used to be. Perhaps women no longer lash their corset lace to the bed-post and throw their weight against it. But even a snugly fastened corset is an injury. Is not the proposition to remove the corset met by the suggestion that "we could not hold ourselves up without it?" There lies the mischief. A corset that supports the back, that keeps the back from supporting itself, is antagonizing the first principle of physical development—the perfect muscular possession of the body. It is quite clear from what I have said about carrying the body that any such system can make no terms with the corset. For the corset as a bust support there are now a score of excellent substitutes. Women might reasonably distrust all "supports" save when there is no evasion of this method. In very slender women, with slight bust measure, nothing aids development like honest chest expansion and the strengthening and enlarging of breast muscles. The entire region of the chest is rendered flabby and unhealthy by any support of the central region of the body. On the other hand, fleshy women tempt increased flesh in refusing to develop the torso muscles, by incasing themselves in e nervating corsets that "hold them up" and foster increased fat. so seldom indulge themselves in as high reaching. The average woman is not dressed so as to be able to reach over her head. The result is that very few women know the luxury of muscular freedom in this direction. Reaching may be wrenching, and women should not, in acting upon this suggestion, rashly strain themselves in any way. High reaching with both hands, upward and forward, is very beneficial for both slender and fleshy people. This exercise is actually combined with the breathing exercises given in the chapter on breathing. It should be frequently tried and will be found very strengthening.

In the case of the bust it is of importance to remember that there is here, as in all other parts of the body, a muscular system. The muscles of this region are,

of course, almost invariably unlocated by their owner, and most supports soon leave them unused also. Now, by persistent effort a control over these muscles may be established until it will be possible to voluntarily contract and relax them, with the result that a sunken and flabby bust maybe made full and firm. Thus, unless she is absolutely deformed, there is no reason why a woman should not develop and mold her emire form by simply acquiring muscular control of the parts deficient in contour. The gaining of this control requires a distinct effort of will, but the results surely justify the effort.

One of the direct results of corset wearing is the curving of the spine, the tendency to hollow the chest and protrude the abdomen. The accompanying illustration preaches a better sermon than could be put in words.

It has already been said that the corset has forced women to breathe somewhat better than men, but women are not less under the necessity of cultivating deep breathing—long breathing. They are early rendered breathless. The disappearance of the corset and cultivation of more pliant and vigorous bodies would tend to encourage more vigorous breathing. Fortunately there is every reason to believe that the corset is going out of fashion. A great many physicians, by way of rebuke, perhaps, to exaggerative remarks by those who have sought to fight the corset, are inclined to pooh-pooh the idea of its dangers. Of exaggeration there has been plenty, but the truth remains that the corset has exerted and does exert not only a direct deforming influence, but an indirect deforming influence on the whole body. It threatens the very basis of health, a ready circulation of the blood. The distended abdomen FIG 23.

This illustration excellently exemplifies the influence of corsets on the carriage and vigor of the body. The fact that corsets are loose enough not to interfere with the breathing will not prevent the deformities naturally resulting from any contrivance for "holding up" the body. When the body holds itself up the spine becomes strong and grace-

ful in curvebustles are unnecessary, the abdomen is not protruded, the chest strengthens, the bust is enlarged by the development of muscles, as well as by the better arch of the breastbone, and the general grace and health of the body is immensely increased. Fleishy women will reduce their weight by increasing the activity of the muscles that should support the body.

men so shocking to women, and the great increase of flesh on the legs and feet, are often directly due to the seizures of the corset. The corset is naturally a constant obstacle to free play of the body, to facility in stooping and turning, and tends generally to curb the exercise of the sex.

Among women who have borne children, and particularly among women who have reached or passed middle age, the distended abdomen often brings much distress. Nothing certainly could be uglier, more utterly destructive of grace or distinction in manner. Tightened corsets, that ludicrous last resort of the corpulent, only increases the difficulty. The only direct and effective way of fighting this corpulence is, as I have said in the preceding chapters, by getting muscular control of the abdomen. Cast aside the corset and practice the contraction and expansion of the muscles while holding the breath, and follow all of those exercises that keep active the muscles of the pelvic and abdominal region. Do not be afraid to bend the body.

There is no beneficial exercise that women

Women are often ridiculed in their efforts to throw a ball. They have defended themselves by arguing that their collar bone is shorter than man's. The statement is true, but women are more hampered in all such efforts by their want of familiarity with their shoulder muscles than by any brevity of the clavicle. Practice thoroughly the exercises tending to develop the shoulders and to increase the extension of the arms—not for the sake of being able to throw a ball, but for the sake of the comfort and strength derived from increased versatility in the shoulder.

An allusion has already been made to the vicious tendency of badly fitting shoes. Women are unquestionably nearer an abandonment of the corset than of the tight shoe. They admit that the Venus de Milo has a large waist. But artists who are generous in the waistline are slow to wean from the curious tradition that the smallness of a foot is a mark of beauty. Probably ninety-five per cent of women of all classes are suffering from small or badly designed shoes. Small shoes discourage walking and standing, and those who stand and walk little can never have a graceful carriage. If shoes are big enough the height of the heel will be a less serious affair.

It is a blessing to a large number of women that flowing skirts conceal the fact that they walk very badly. "Small shoes" is written as plainly as it could be written in the gait of the average woman. The direct influence of tight shoes on the circulation is very great. When we consider the indirect influence, induced by the retarded exercise, it is hard to credit the perverse vitality of this wretched superstition.

Women should walk more. They should not take a cab or a street car to travel half a dozen or a dozen streets. Their endurance in shopping is often a surprise to men. But the endurance is an illusion. Men intensely interested for the same length of time would appear as little fatigued. The fact is that women wreck their nervous system at "bargain counters." They should be able to bear the physical strain of standing, but their general strength is so poorly developed that they are actually unfit to do the feats they call on their nervous vitality to perform.

It seems particularly necessary to ask women in walking to turn the toes out. The intoed proclivity among women is very curious, and has increased the tendency to an inward turn of the knees. The value of an outward turn of the toes lies not merely in any theory of force, nor in the increased strengthening of the legs, but in the influence on the pelvis. An in-toed habit encourages a contraction of the forward pelvic region—an

effect whose undesirability need not be pointed out.

Women should, in fact, cultivate all the exercises that might give suppleness to their bodies. There can be no grace without suppleness. That complete flexibility in all the muscles of the body which the exercises enumerated have been calculated to secure is absolutely necessary to the charm of carriage which distinguishes one woman above another. Unused muscles, resulting from an absurd idea of the essential restrictions of a woman's position, are worse than no muscles, because they are irritated under tension and retard the movement begun by the muscles that are fit to use.

I believe I am the holder of somewhat radical views about the physical—not to say of the mental—possibilities of women. I have seen in China. I have seen in Germany, I have seen in England types of women, reared under certain conditions, that led me to doubt very much whether the long accepted physical inferiority of woman is indeed a fact. If it is admitted that there is no essential boundary to woman's intellectual possibilities, if she is no longer held to have an uneven chance with the other sex in matters of the mind, I think it is probably true that she has an absolutely even chance with man in the development of the body. I would ask those women who have, perhaps, rested too greatly on the tradition of necessary "weakness," to take this suggestion into consideration.

IX.

A WORD ABOUT CHILDREN.

When an adult undertakes to train himself, begins to gain control of his muscular system and to "get strong," a large part of his labor is expended in undoing the evil of his previously acquired habits. He has to unbuild before he can build.

The muscular system has here many resemblances to the brain. Indeed, the muscles have actually a memory distinct from functions of the brain. Muscular memory is a physiological fact, and a very interesting and significant fact. Thus in the same manner that first

impressions affect the brain most permanently, first habits in the muscular system cling most tenaciously to them. Habits of walking and carriage formed in childhood are very difficult to shake off. In fact, they are all but impossible to get rid of entirely save by serious mental effort.

Nothing is more important, therefore, than that children should be taught the general principles of right development. It is a mere makeshift to bring forward calisthenics. Nothing could be at the same time more amusing and more pathetic than to stand in a crowded classroom and watch the so-called exercises perfunctorily performed by the pupils during a few minutes of each day. But a small minority of the children give any vigor or meaning to the few insignificant movements of the arms. Most of the boys, and almost all of the girls, are found making merely superficial movements, with no sense of the meaning and no feeling of exhilaration. If anything has ever been said to the children about breathing, the chances are that no tangible impression of the matter has been portrayed. If anything has been said about the carriage of the body, the instructions have been confined to an injunction to "keep back the shoulders." In a nervous effort to keep back the shoulders children are often found with hollowed backs and shoulder blades driven in against the spine.

What is wanted, of course, is not backward carriage of the shoulders, although this has some utility, but a forward carriage of the chest. The shoulder should not be drawn back of the hip joint line. There is no force in shoulders excessively drawn backward. If they are far enough back to give the fullest freedom to the development of the chest, they are in a position to acquire all necessary strength.

Most children are wont to protrude the abdomen in standing, and when school begins the shoulders soon come forward. Teach a child to assume the correct position, giving up whatever time may be necessary to teach the proper line of chest and shoulders. It will soon forget about the correct po-

sition, but, when reminded by a touch or word, will soon learn to assume it, if only for a few moments, and the habit will gradually be formed. That the child should know how to stand correctly, and should assume the position at intervals, will of itself have a good influence.

Naturally, breathing is the most important of all features of training. Most children need very little studied exercise, but they all need specific and continued instruction in breathing. Nature has not provided for a natural development of the mind, and we have no right to assume that the body of its own accord, particularly under an artificial condition of life, acquires right habits of performing all its functions. Induce the children to take long breaths. Make them take a pride in swelling the upper chest and in drawing the abdomen in and out while holding the breath. Induce them to take deep breaths while dressing in the morning and again before going to bed, if not oftener. These habits develop by their own movement if once fairly begun. Lungs fully inflated at regular intervals will seem to call for inflation during these intervals, and involuntary deep breaths will, as I have said, gradually increase in frequency to the immense improvement of the child's lung power and general health. The *sternum*, or breast bone, is, in a child, not only divided into eight pieces, but its whole material is soft, and very little training will give a fine, swelling chest to a youngster that might otherwise grow up flat and weak in that region. Watch the child in sitting. It need not be kept stiffly seated upright. Children should know their position and should be able to assume it for a few moments on occasion. But they should be allowed the greatest possible freedom of posture and movement. If they bend over a table in sitting, teach them to bend from the hips and not from the middle of the back. In the end this proper position will give them much less fatigue. Do not restrict their variety of movement under false theories of propriety.

The superstition about women's relative weakness begins to show itself in

the training of children. Girls are ludicrously guarded against exercise that they need as greatly as boys, and at every critical period of their life thereafter they pay in suffering for the misguided consideration of those who had their training in hand. The so-called "lady-like" demeanor of girls is a thing to excite impatience. Girls brought up in strait-jackets of physical propriety—physical freedom will hurt nobody's "manners"—can never have the grace of deportment, the variety of poise, the readiness in emergency that will belong to girls of liberal physical training.

As I have said, children need very little studied exercise aside from the breathing, and nothing artificial is a substitute for outdoor sport. Nothing makes better lungs than running and climbing. Excessive running is as injurious as any other excess. But frequent and easy running is one of the finest of exercises. City children do relatively little running. Girls who run are liable to be accused of rudeness (!). But country children are less under the ban of either false ideas of decorum or of restricting surroundings. City children, who do not find fences to get over, do little climbing. If it were possible to give children climbing—and arm climbing as well as leg climbing—they would be tremendously benefited in the lung region and in their entire physique.

Children are particularly in need of diverse exercise. They should not be allowed to acquire hobbies, that keep them in one line of exercise to the exclusion of other useful movements. The natural tendency of the body is to distribute strength, but habits and surroundings are continually interfering with this symmetrical growth. If children are made to do moderate exercise at spading or shoveling or sweeping, the effect upon their back will be a reward for the efforts made by both trainer and trained. *Useful* exercise thus ranks above all others, because it means something and has a double influence.

It seems scarcely necessary to speak of the importance of proper clothing. Children that are so well dressed during play hours that they are constantly oc-