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In connection with the subject of the Hygiene of the Muscles we will this consider Attitudes. There are some muscular exercises involving every attitude which the body should have, except lying in a horizontal position. In this position there is no occasion for muscular exercise; that is the reason the muscles are at rest. While standing, sitting, or in any of the intermediate positions, there must be more or less muscular exercise.

When we reflect that a considerable amount of time is spent in the various attitudes of standing or sitting, we shall at once appreciate the fact that there must be a very important relation between attitudes and health. Especially is this true in relation to the young; while the muscles are developing, while the bones are solidifying; during this period, the attitudes which the body may assume, will have very much to do with reference to the formation of the physique. If bad attitudes are assumed for several hours daily, in the evening, for example, it must certainly affect the development of the skeleton, as well as the shape of the bones and the development of the muscles.

Let us study the effects of some of these attitudes, in sitting. First, I will call your attention to the evils of relaxed sitting: I think I am not exaggerating when I say that the majo-

ity of persons when taking a sitting position, take such a position as to allow the muscles to become relaxed. I think relaxed sitting may properly be charged with a large number of serious evils, evils which, when traced to their ultimate results, are very grave indeed,--much more serious than would at first be conceived. By a relaxed sitting position, I mean a position in sitting in which the muscles are not in forcible exercise; all the muscles become relaxed, allowing the body to drop into any position which the laws of gravity would naturally lead it into. The exact position which will be assumed by the body, when the muscles are in a relaxed condition, will depend upon the nature of the seat upon which the person is sitting. Suppose, for example, a person sits upon a stool in this way (illustrating); suppose a boy sits upon a stool, as boys and printers do sometimes , sitting in a relaxed position: this is the relaxed position of one sitting upon a stool. In this position it is evident in order that the center of gravity should be preserved, that the weight of the body must be equally distributed on each side of a vertical line, so the head drops forward, while the back falls backward; the body must maintain its equilibrium in relation to gravity, and consequently the back forms a curve backward and the head is thrown forward; the centre of the body is thrown backward while the arms fall forward, the weight of the body being thus about equally distributed on either side of a vertical line. That is the position usually assumed in sitting upon a stool.

Now if one is sitting in a relaxed position, as I said, the attitude which the body will assume, will depend upon the chair, and the way he sits in the chair. Suppose, for example, the chair has a wide seat, and that when a person sits in the chair, his legs reach the front of the chair before his back reaches the back of the chair; what will be the effect? Why, the body relaxes and falls down in the chair until the body is supported against the back of the chair, so that the body really reclines in the chair. This position might be called lying in the chair; so that if the chair has a wide seat, the majority of persons when sitting in the chair, are really lying down in the chair, because the weight of the body is reclined backward resting upon the back of the chair. Now if the chair is a very high one, if it has too high a seat, then the effect is very much the same as in sitting upon a very high stool. You see the effect of sitting upon a high stool (illustrating). The feet are not supported upon the floor. If the feet touch the floor, the body is dragged forward so that the pelvis is in front of the seat. Suppose this is one of these high chairs; now I try to sit with my thighs horizontally in the chair,--my feet swing over towards the floor; a person must sit upon the front part of this chair in order that his feet may rest upon the floor, so that his hips are some distance from the back of the chair. Now, as soon as the body relaxes, it either falls at once into the position of sitting upon a high stool, or reclines still more, until it reaches the back of the chair. These positions may be termed forward sitting, and

high sitting. When a person sits in a seat that is too wide, so that he must sit on the front part of the chair, in order that his legs may touch the front part of the chair, we might call that forward sitting; and if the seat is too high, so that it is necessary to sit forward in the chair, in order that the feet may touch the floor, that would be forward sitting. I might also remark further upon this point, that it is quite possible to sit in an ordinary chair in the position which I have called forward sitting; I think a great majority of people sit in that position,--sitting down on the front part of the chair, the body falling back into the chair. Sitting down on the front part of the chair invariably leads to a reclining position, and as soon as we take this position, the muscles of the body are relaxed, so we may have forward sitting in an ordinary chair (illustrating), as the result of sitting upon the front part of the chair. We may have forward sitting from the force of circumstances, by sitting in a chair with too wide a seat. Why? Because we are likely to assume a position which may be called forward sitting, in a seat that is too high, where the seat is also too wide. As the result of this relaxed forward sitting, we may have a posterior curve of the spine you see.

We have relaxed sitting under other circumstances, in a rocking-chair, for example. Now a rocking-chair is made for relaxation; no one would care to sit in a rocking-chair, if they were not completely relaxed by this means. That's the reason a rocking-chair has a high back, and the back of the chair is made

so as to nearly fit the back of the person sitting in the chair, fitted to receive the back, at any rate. You notice the back of the rocking-chair is made hollow, because it is expected that, as soon as a person sits down in the rocking-chair, he is going to allow the trunk to relax; ~~and~~ the back will be round instead of hollow, and we have this concave place ~~there~~ to receive this posterior curvature of the spine, which is created by the relaxed condition of the muscles.

Then we also have relaxed sitting in an arm-chair. An arm chair tends to relaxation in sitting; that is the purpose of the arm chair; I suppose the purpose of the arm-chair is to lead one to assume this relaxed position. How common it is to see a person sitting in an arm-chair in this position (illustrating) and leaning to one side or the other; this is the most common position for a person to assume in sitting in an arm-chair. No one sits upright in an arm-chair, like this (illustrating,) and with his arms equally balanced; he wouldn't take any comfort in that way, but he relaxes to one side or the other, as the case may be.

Now you will observe what occurs in these different forms of relaxed sitting,--in the ordinary chair, in the high chair, upon the stool, in the broad-seated chair, in the rocking-chair, in the arm- chair and in the easy -chair. We have not a sample of an easy chair here. The easy chair is a chair that is all upholstered and cushioned, so that when a person sits in an easy chair, he drops down into the cushions and almost loses himself as well as

of conscience, relaxing every muscle, and is reclining in the chair instead of sitting in it .

Now for correct sitting, we must have a correct chair. The chair must be so constructed that the seat would be, in width, just the length of the thighs, at any rate it would not exceed the length of the thighs, so that the hips will strike the back of the chair, and the legs will touch the front of the chair as the feet touch the floor. The height of the seat must be such that it will allow the feet to rest squarely upon the floor, at the same time that the thighs are supported upon the chair, and without too much pressure upon the under part of the thigh, so that the weight will be equally distributed between the feet and the thighs. If the seat is so high that it is only by pressure of the weight of the limb that the feet are barely able to touch the floor, then we have so much pressure in sitting in such a position, that the limbs will become numb, the circulation will be obstructed, and the person, in order to relieve himself of the pressure, will slip down in his chair in this way (illustrating), in order to get rid of the abnormal pressure. So a seat which is so high that the feet only lightly touch the floor, or even will permit the feet by pressure to squarely touch the floor, if it is so high that the ~~weight~~ greater part of the weight comes upon the under portion of the thigh, then, as I said, it will interrupt the circulation, and the limbs will be numb, and very soon the person will relieve himself of the pressure by slipping down upon the

chair so as to bring the whole fleshy portion of the body in contact with the chair, and just below the top of the chair. The seat must be of a proper width and height, and when a person sits down, he should bring his hips in contact with the back of the chair,--and even then, it would be possible to sit in a relaxed position. We sometimes see a person sitting in an arm-chair in this position: (Taking position). Sometimes we do see persons assume such a position as this, but it is so very stupid that it is not a very common position for people, except sometimes we see children sitting in that position--leaning against the back part of the chair. We must take care and support the upper part of the shoulders against the top of the chair, the central portion of the spine being curved well forward, with the hips touching the back of the chair, the shoulders supported against the back of the chair, the spine well curved and entirely free from the back of the chair. Sitting in this way, we are in a forcible position. But (assuming a wrong position), just the moment a person is sitting in this position, the muscles are relaxed, the internal organs are also relaxed and come down against the chest, the spine strikes the back of the chair, the shoulders and the hips come forward, and we have a complete relaxation.

Now let us notice what are the evils of sitting in this relaxed position in the ordinary chair, let us notice what the evils are. In the first place, we have this great fundemental evil, that we have the body in a perpendicular position, and at the same time, we have abandoned the supports by which the internal viscera

are naturally maintained in position while the body is in a vertical attitude. When the body is in a vertical attitude, it is necessary that there should be a contraction of all the abdominal muscles with those of the lower portion of the trunk, in order to keep the internal organs in position. The moment these muscles relax, then these internal organs must depend for their support, wholly upon the thin membranes which are intended to slightly fix and hold them in position; these membranes or ligaments are thus put upon a stretch by the weight of these various internal organs, and the moment a person in a vertical position abandons the support of the abdominal muscles, he abandons the means which nature has provided for holding the internal organs in position. So, in relaxed sitting, we have, first of all, a downward tendency of the internal viscera.. In the second place, in consequence of the loss of the anterior curve of the spine, the muscles of the back become relaxed, so that the spine, by the weight of ~~the body~~ the upper part of the body, is forced backward in this position (taking position). In this position, we have an abnormal condition of the spinal column produced, and, as the spine is curved backward in this way, the upper and the lower ends of the spine are approached towards each other in front, and that is the reason why the chest falls in, and why the pit of the stomach falls in, and that is why this natural convex curve of the body becomes concave; it is because the trunk becomes convexed backward, and by this change of figure, the trunk is naturally lowered ; the front line of the body , by this relaxed position, , becomes concave, and

the posterior line becomes convex, and the center of the trunk falls in, and there is a collapse at the waist by which we have an active force brought to bear, by which these organs which are now no longer supported by the abdominal muscles, we have a downward pressure of the internal organs in consequence of their own weight, we have these muscles forced down by the pressure of the ribs caused by the collapse of the chest, and the organs above are carried down upon those below, so that we have the downward tendency increased. We can see at once, from this fact, that there is great significance in the sitting attitude. So, in relaxed sitting we have a possibility of great evils, great harm may result simply from the relaxed position of the body in sitting . I think it is not too much to say, that the body when erect, or in any other position than the horizontal or the lying attitude, should never be completely relaxed from a forcible position; the forcible condition of the abdominal muscles, a contracted or an active state of the muscles should be maintained,-- this position should be always maintained, unless the body is in a completely horizontal position; we should never entirely relax the muscles, except when lying in a horizontal position.

Now notice: These are one of the evils which result from all these different modifications of relaxed sitting, when sitting in an ordinary chair. In forward sitting, we have the evils which I have pointed out,--falling in of the chest, shoulders thrown forward chin hanging forward, posterior curvature of the spine, the stomach and other organs carried down, in consequence of the relaxed con-

dition of the abdominal muscles, as an evidence of the embarrassed condition of the vital organs.

Among the results of this bad attitude, to which I have called your attention, may be mentioned the fact that the majority of persons who have been for a long time in the habit of sitting in this position, are certain to experience, after a very short time, a feeling of suffocation, a sense of oppression upon the chest, and so you will notice persons who have been sitting for some time in this relaxed position, you will notice that the head is thrown up with a deep sigh, and then drops back into the same old position again. I think it is not an uncommon thing to see persons sitting in this relaxed position while riding, forgetting to maintain themselves in an erect position of the body; by and by you will see the chest raised, and a big inspiration of the abdomen. That is nature's protest against this violence to her laws, and against this oppression of the chest and of the lungs, resulting from this abnormal attitude.

It is not a very uncommon thing, also, to see boys, and men particularly, after having been sitting for some time in this position,--you will see a boy straighten up and get his hands behind his head(in this way,) with his shoulders up, with his elbows high, and his hands behind his head, like "neck-firm" in Swedish gymnastics, and then taking a long deep breath. This is an involuntary movement. The purpose of this, is, to draw the ribs apart, and to lift the upper part of the chest, and by raising the arms, seize upon the pump-handles of the body and draw the

chest apart so as to free the lungs. Now when a person sits in this position, it causes the air to stagnate; the ribs are bound; the weight of the shoulders and trunk are thus thrown upon the ribs, and this, in addition to the ordinary pressure, they have to overcome; in consequence of this weight falling upon the chest the ribs are forced inward and the upper part of the chest is almost motionless,--the air does not pass out and in only to a very small extent; the only movement there is, is that of the diaphragm moving up and down in the lower part of the chest, consequently the air passes inward with very little admixture of the vital element, so that the greater part of the air of the lungs remains stagnant, and this quantity of air becomes so vitiated, that after a while there comes this involuntary effort to secure a large amount of air,--so we have the arms thrown up above the head and a deep breath taken which ventilates the lungs, and then, as I have said, the same bad attitude is taken again. .

Now in forward sitting in a chair with too wide a seat, we have these same evils as in forward sitting in an ordinary chair only they are aggravated, because there is more room between the back of the chair and the hips; there is more space, and consequently we have the same difficulties aggravated. And in sitting upon a stool, we have, possibly, a still greater compression of the chest, because there is no support whatever for the back. In forward sitting in an ordinary chair, the back meets with a support which prevents it from going back any farther; but in sitting upon a stool, as you can readily see, the person should sit erect,

in order to distribute the weight of the body equally on either side of a vertical line so as to meet the requirements of gravity. By reason of failing to observe this rule, there is a more complete curvature of the spine while sitting upon a stool than upon a chair. How many times we have seen boys and printers sitting upon stools in this way (illustrating.) You will see women very often sitting in this position on a piano-stool.. In this position we have all the evils of ordinary forward sitting greatly aggravated; chest more collapsed; spine more strongly curved backward, and chin thrown more strongly forward,--all these evils are aggravated by this method of sitting.

Now, in relaxed sitting in a rocking-chair, we have the evils of ordinary forward sitting, as a rule aggravated somewhat by the fact that the seat of the rocking-chair is usually wide, its back is high and the body is more completely relaxed, if possible, than by forward sitting in the ordinary chair. The body lies all along the line of the back of the chair, and the rocking-chair is made purposely so that the back of the chair shall fit the deformed back of the person sitting in it, the back of the person being supported along by the back of the chair. So here, as I said, is complete relaxation, and no effort whatever is made to hold the body erect, and the viscerae are certain to be carried down out of their proper place. The rocking-chair, I think, ought to be ruled out of civilized communities. It is not possible to sit in a rocking-chair in a healthful way. Now suppose,

for example, I should endeavor to sit up straight in this rocking-chair,--how much comfort would I take in sitting in this position (taking position): sitting straight up in a rocking-chair in this way. It would have to be done by resting my feet upon the floor while sitting erect, and that would be a laborious exercise; but an exercise, to be enjoyable, should not be laborious.. It would require a gymnast to enjoy a rocking-chair in an upright position. Suppose a person sits in a big rocking-chair in this position (with his body thrown back of the perpendicular), and he wishes to maintain this position: Now you see, in consequence of the body being thrown back of the perpendicular, -there is a stronger effort brought to bear upon the-ant rior muscles to keep the body erect, and very soon those muscles become tired; the center of the body breaks down, and the person has assumed a bad attitude. In order to keep the body in a correct position in relation to itself--with the chest forward, it is necessary you see , for the central position of the body to be holding itself out over space; the upper part of the body is supported backward,--it is precisely the effort to solve the problem of supporting the head upon the wall in this position (illustrating). If I put my head and body in this position I must put my foot out in order to keep my body straight; one cannot maintain this position long, for the muscles must be kept strained continually to keep the body from dropping down. We have the same problem to solve when a person tries to sit straight, and at the same time try to lean back in a rocking-chair; you have the

trunk reclining here, and you have to support this trunk against gravity continually ,so,that the muscles of the trunk will soon tire. I don't see how it is possible to use a rocking-chair without allowing the body to assum an unhealthy position. A small rocking-chair might be used in such a way as to do no particular harm; but a rocking-chair of that kind would hardly be considered as even an apology for a good old fashioned "easy rocking-chair."

Now, easy chairs, in which the body relaxes completely and lies down, as upon a sofa, is the cause of the same evils which I have mentioned. We have a relaxed condition which is appropriate only to a lying attitude. At the same time, we have a position of the body more or less nearly a vertical position, and consequently all the possible mischiefs which can arise from that position . In sitting in an arm-chair, the tendency is, to throw one's self upon one side or the other and rest upon one elbow or the other, or upon one hand or the other. The consequence is that we soon have a posterior curvature of the spine produced by the relaxation of the body, and not only this, but we have lateral curves, if a person supports himself ~~first~~ upon one shoulder more than upon the other. When sitting in this position, we have the shoulder raised, and the trunk inclined in this direction, which makes a very forcible effort to curve the spine in that same direction; the shoulder is raised, and the upper part of the body forced over at the same time, which makes a positive curve in the spine .

There is one other position which I ought to mention, which is sometimes assumed in sitting; this is not altogether an uncommon position (illustrating): the back of the person is supported against the back of the chair, and the feet are supported on something higher, on a desk or table, for instance. Notice what happens to the spine , when this position is taken and persisted in. Suppose a person is sitting in a chair in this way ; now he relaxes his body; now he gets his feet up; now you see the relaxation is still greater; the tendency then, is to slip forward more; then as you come forward in the chair, the spine is curved more and more; then the upper parts of the trunk are approached nearer and nearer the pelvis. I was reading, at one time, an English work on hygiene (quite an authority, awhile ago), in which the author recommends ~~that~~ the "American position in sitting"; which position was assumed, as he had been advised, by American students (reclining backward, with their heels up and resting upon something); ~~and~~ he recommends that position very highly, as a position which had been instinctively assumed, for the purpose of letting the blood run down from the heels to the brain, thus tending to stimulate and develop the brain. Well I suppose, for persons with small brains, this position might perhaps be useful,-- if a person had the ability to support both his heels and his head but if not, I think he had better sacrifice his heels than his head. But this position cannot be maintained very long, without a person's suffering from difficult respiration. Now this position, with the feet raised is worse than either of the others,

because the compression is greater, and the collapse of the front walls is more complete, so that the respiration will be more completely interfered with .

Now, as to the correct attitude in sitting: One should sit with the hips back against the back of the chair, with the feet squarely and fully supported upon the floor so that only a portion of the body rests upon the thighs upon the bottom of the chair; let the shoulders touch the upper part of the chair; keep the middle portion of the back free from the chair. In sitting in this position (illustrating), you see we have assumed a forcible position in sitting, and consequently a very healthy mode of sitting. Certainly there is great mischief done to school-children, in neglecting to adapt the sizes and forms of the seats to the sizes of the pupils. You not infrequently see, in the school-room, a small boy sitting on a seat with his feet hanging free from the floor, swaying his feet backward and forward. A child sitting on such a seat, is certain at length to become more or less deformed, if he spends many hours a day in school, because if the legs cannot touch the floor, the weight of the hips and limbs pulls the body forward, and the chest drops down; you will see such little ones, after a time , falling back in their seats completely wearied out; the muscles have become relaxed and weary, and now there is a collapse in the central portion of the body. I think that deformities of the body are very often begun in this way, deformities which follow the little ones through life. So I would say, that in every school and family, the seats should be

adapted to the children of the school or members of the family. There should be seats provided, by which each one all the way along from the little one up to the tallest one can sit with ease and in a healthful manner.

Now a few words in reference to correct standing : The same evils result from relaxed standing that result from relaxed sitting,--only these evils are, if possible, aggravated, for, in standing, the body is in a more nearly vertical position than in sitting; in sitting, the body is not always in a vertical position, consequently the downward drag upon the viscera is not so great; but, in standing in an erect position, the internal organs--the stomach, liver, and the other internal organs--are vertical in relation to the rest of the body, and hence a downward drag upon them is as great as it can be , when in a standing position. Now, if the abdominal muscles become relaxed, as is always the case in relaxed standing, when these abdominal muscles relax, then the position of the internal organs will be the same as if they were hanging over into space, because the abdominal muscles afford them no support. Relaxed abdominal muscles invite a falling forward of all the internal organs of the bowels and of the trunk.

. We have quite a number of varieties of relaxed standing; it is a very common thing to see persons while standing , supporting themselves upon one side or the other. We cannot have forcible standing, when we have supported standing,--we cannot have supported standing without relaxed standing. When we support one of the limbs against the wall, for instance, that is relaxed standing; support-

ed standing is always relaxed standing. One requires no support when his muscles are not relaxed. Now one might, while standing with all the muscles forcibly contracted,--while standing in this position, he might place his hand upon an object without supporting himself upon it; he might take hold of this chair without supporting himself by it; but just as soon as he comes to throw a portion of his weight upon the chair, just at that moment the muscles are relaxed, because it is only by a relaxation of the muscles that he can leave a perpendicular position, and the muscles are contracted by returning to a perpendicular position. In order to lean one's weight against a chair, he must relax the muscles, so that he ceases to oppose the action of gravity. Now in leaning upon something else for support, you see exactly what happens: this object against which he leans, the chair, for instance, takes the place of the action of the muscles which have been acting in keeping the body erect, but when I lean against the table, the table helps keep my body in an upright position because it affords it mechanical support. Now when I lean upon this table to keep my body from falling over, what have I done? Why I have abandoned the use of the muscles, and instead of relying upon their action, have leaned upon the table, so that the table now takes the place of the action of the muscles. Now the muscles which contract upon my bones and chest to hold them upright, are also contracted for the purpose of holding my liver

and other organs in place; when I no longer depend upon those, and lean for support upon some object, that object takes the place of the muscular activity which is the natural support of the body, and not only so, but it also takes the place of the muscular activity by which the internal organs were kept in position before. Now the fact that I relax myself completely, and seek something for support, is evidence of the necessity of seeking something for support; so if I wish to stand in a relaxed position, I am going to support my body against the wall, the table, by a chair, or by the aid of a cane, and when I thus relax my muscles and rely upon this support, I should at the same time supply the same amount of mechanical support--a bandage, or something which will take the place of the muscular support of the abdominal walls, which no longer exists. I want you to see this point clearly.

Now, supported standing is always, or nearly always, relaxed standing. One-sided standing, is a very common form of standing. When a person gets tired, he relaxes his muscles by dropping his weight upon one limb for awhile, then the weight is transferred to the other limb,--he stands first upon one leg and then upon the other. How often do we see boys and girls standing in this position while in class reciting at school assuming all possible attitudes,--first leaning their weight upon one side, then upon the other side, assuming a great variety of forms of relaxed standing. All these forms of relaxed standing are productive of mischief, not only in reference to the deformities which result from

the relaxation of the internal organs, but in reference to the misshapen forms of the body, and if these positions of relaxed standing are assumed for a long time, it will certainly modify the form of the physique very materially. There is a very common form of relaxed standing which is particularly observable among students, and that is what I think we may call black-board - standing; I have not seen any name for it, but I think it may properly be called blackboard-standing. A pupil is sent to the blackboard, and he commences his work up high on the board, so as to have plenty of room; so he stands upon one foot for a while, and his body swings to that side; then he stands upon the other foot, and his body sways to the other side. This results in double curvature of the spine. I have treated some of the worst cases of double curvature of the spine that I have ever known, which were produced by this blackboard-standing. How common is this attitude at the blackboard? One hardly sees any other attitude at the blackboard; the hips are thrown over to one side, while the pupil stretches up while doing his work, and the opposite hip is then thrown far over to the other side; now the result of this constant throwing the hip over to the other side, is a curvature of the spine. When I take this position, one can almost see the curvature of the spine under my coat. Now in reaching up this shoulder in this way, it pulls the spine over on that side, on the upper end, so that it is sure to produce a curved spine. The curvature becomes evident in a moment, as soon as you raise your hand and throw yourself into this attitude.

Then we have another form of incorrect standing which we might call heel-standing; instead of standing with the weight properly balanced, we have the weight of the body resting wholly upon the heels; this is a sort of heel-standing; the knees are relaxed, the whole body is relaxed, the shoulders are dropped and the person stands wholly upon his heels, the hips are thrown backward, the chin is thrown forward, --and that is heel-standing. You will see the majority of people standing in this way; the great majority of persons you will find standing with their weight resting over the heels; I think heel-standing may be said to be the most ordinary form of standing among persons who have not had physical training, who have not given attention to the matter of physical culture.

Well now, what is correct standing? Correct standing is forcible standing. I am sorry that we have not here a model of a horse which we have over at the Sanitarium; I want you all to go and look at it; it is in the library, or just across the hall from the reception parlor (in the small parlor, up over the mantel). I would like to have you notice how all his muscles are set, a good strong curve in his spine; the whole muscular system is active; it is what one might properly term forcible standing. It is such as you will always see in a fine animal, in a strong horse for example; notice a fine horse when he comes out of the stable in the morning; you will see him stand with a nice strong curve in his neck and back, every limb firmly planted; that is forcible

standing. You will never see a fine animal stand in any other way, except when it is tired. Now in forcible standing, the animal's muscles are all energized,-- we might call it energized standing; I like that expression better than I do "forcible standing", because the term "forcible standing" suggests the idea of violence,--violent standing,--but that is incorrect, so we will call it energized standing. Now when we see this fine animal in the morning with his strong curves, beautiful curves in his neck and back, his feet firmly planted, and his muscles well set up, and see that animal after it has been driven 15 or 20 miles very rapidly; when he comes back and the harness is thrown off, his head is hanging down, one knee will be badly flexed, he stands upon one foot, the curve in his spine is lessened, and the animal has an entirely different aspect from what he had in the morning. What is the matter with him? His head hangs down, but he does not hold it down,--he simply does not hold it up; and why doesn't he hold it up? It is because his nerve-centers have become tired,- his muscles have become tired, he has become exhausted, and he simply neglects to hold his head up; he neglects to energize his muscles, and allows himself to fall into a relaxed position. Well now many human beings take the attitude of the tired horse, when they should be exhibiting a very different attitude. It is very natural to suppose that a man completely exhausted, a tired laboring man going home from his work at night, would assume a relaxed position; we would expect him to be in a relaxed

condition; but in human beings, a man or woman who has not been exhausted by labor has no business to be constently assuming the attitude of an exhausted animal. When we are tired, we are excusable, perhaps, for relaxation, but when we are not exhausted or wearied by work, we ought to be able to hold ourselves erect, and in an energized attitude.

What will be this energized attitude? And what will be the position of the body, when one assumes that attitude ?-when we stand correctly ; in an energized condition of the muscles. In the first place, it will be with the weight of the body balanced over the balls of the feet, and not over the heels, so that if a line were drawn in front of the ears, it will pass down just in front of the shoulders, and strike the balls of the feet, as you see illustrated by this figure: Notice this line,--how it is drawn just in front of the ears, and passes down in front of the shoulder down through the center of the hip, and strikes at the ball of the foot, just about two thirds of the distance from the heel to the forward end of the foot. Now in the ordinary individual, that line would fall here,--somewhere about this point (indicating on chart.) Then, in correct standing, as I have said, the weight of the body should be balanced over the toes. If you went to know how that feels, just balance a while on the balls of your feet; if you wish to remain in that position, just let the heels drop without letting yourself go back,--just imagine your nose is against the wall while you are letting yourself

down until your heels touch the floor. (Class exercise this movement.) The chest will be forward, a good strong curve in the back, the chin will be drawn in,--not too much drawn in, however, but just drawn in naturally, the head will be erect, and a person can stand in this position much more easily than he can stand in one of the assumed relaxed positions which are so commonly taken by persons while standing; it is very much more tiresome to stand on one foot in this way, or in this way (positions), than it is to stand in an energized way. Why is it more tiresome ? Because when we stand in this relaxed position, the lungs are compressed, and hence take in but a limited supply of oxygen, the blood becomes impure, and the person standing in this position will nerve a sigh, and change over to the other side, until he is tired again, when he heaves another sigh and then moves over to the other side. How often we see persons changing their attitudes in this way. Now suppose a person stands in an energized position; a person has no occasion for doing anything of this kind; the full supply of oxygen which he takes in, keeps his blood pure, keeps his muscles supplied with energy, so that he does not tire so readily, and one can stand for a long time in this energized position without difficulty.

Now you must not get an exaggerated idea of what this energized position is. (Illustrating.) One would not be expected to remain standing in an energized position like this for any great length of time. It is hard work to stand in such a position; it is a sort of military attitude which a person could not maintain

for a great number of hours without being exhausted; there is too much energy put in the muscles; this is an excessively energized position. For the proper position, a person should take the attitude in which he feels at ease. At first there will be a little strain in the back, because the muscles of the back have been in the habit of being forced back in this way, and the cartilages of the vertebrae are a little more compressed on one side than they are accustomed to be, when a person takes this energized position.

But you ask, "How can I know when I have an energized position?" I will show you how you can determine: Stand against the wall,--or better, stand against the door, because the door has no base-board; stand against a vertical panel of the door; see that you have a perfectly plain surface; first place your heels back against the door,--you will be astonished at first to see how far back you have to go, to get your heels against the door,--you will be astonished to find how far forward your heels have been from what they ought to have been; then bring your shoulders against the door; then place the back of your head against the door: now you have touching the door, your shoulders your head, your hips and your heels,--these are all touching the door--all touching the same surface. Now bring your arms out so (demonstrating) keep the elbows right where they are, simply bending the arms forward,--the "forward-bend" position, keeping the elbows right by the side and keeping the head against the wall; now pry the shoulders away from the wall,--keeping the heels and the hips

against the wall, pry the shoulders out, by throwing the head back as far as you can; then bring back the head and bring in the chin, but keep the hips and the shoulders right where they are; you will find that the tendency will be, that when the head goes back, the shoulders will go back also; but pry the shoulders forward, keep your hips right here, and throw your arms forward, and thus you will obtain the correct attitude.

But this should not be overdone. It is painful to see a person going about in an excessively correct attitude, as I have seen some persons do, who want to be very correct; they assume an attitude in which the weight of the body rests over the extreme tips of the toes instead of resting over the balls of the feet. This position is such a forced and unnatural one that it attracts attention. The proper position is the one in which the person appears at ease. (Positions.) Now this is a correct position,--at the same time it is not a strained attitude.(Position.)

Now a few words about walking. The hygiene of walking is-

Now a few words about walking: The importance of walking is very important, as walking is one of the most common of exercises, although a very gentle exercise,--perhaps the least vigorous of all the various exercises in which we can engage. Moderate walking is an exercise which requires the least expenditure of energy, walking at a moderate pace and on a perfectly level surface; still it is an exercise of sufficient importance, so that it ought to be taken in a correct attitude.

First, I will call your attention to a form of walking which might be called relaxed walking, or a swaying gait. -I am astonished, by the way, to see how little attention has been paid to this matter of walking. I have sought through everything in the nature of medical works to which I could get access, to find something upon this subject, to find some careful study of the subject of walking, and I don't find it. We have some general directions about walking, but they are generally wrong, because they are born after the old-fashioned Prussian military walking, which were wrong, and have been abandoned by the French and others who have taken advanced positions in reference to military methods of marching, etc; but I have found nothing on the pathology of walking, and last year, I had a lot of our patients go out by the side of the Sanitarium, and set them to walking, and while they were doing so, I had a lot of instantaneous photographs taken of the various positions assumed in walking. I took about a hundred of those pictures, and made a careful study of them, and I found among them

some eight or nine different styles of bad walking, and I will call your attention to them as they have appeared to me .: In the first place, I will mention relaxed walking. This is the natural gait of the tired man, or the tired horse; the tired horse's head swings up and down, as he returns from the labor of the day; he does not carry his head firm and vigorous, and with a strong curve in his neck, but his head hangs down or swings up and down, and he goes swinging and swaying along in his gait, as he moves along; and it is exactly so with the tired man. Now a person who has a relaxed style of walking always walks in that way; he walks like a tired horse, or a tired man,--he walks like a tired man when he is not tired. We will not find fault with a man for walking in that way when he is tired; but the man who walks tired when he is not tired, gives us the impression that he is "constitutionally tired." But we see a great many people walking in this way,--in a relaxed, swinging, slovenly kind of walk (illustrating by walking). How many different kinds of people have you seen walking in this way--with a swinging sort of a gait. When this gait is a little exaggerated, it becomes a teetering-gait-you will see some persons going along with this sort of teetering-gait. I saw one man once whom I envied very much, or, if I did not envy him, I was very unhappy at any rate, because I could not get his picture, he would have made such a picture of this typical style of walking.

There is another form of gait, which is the result of physical weakness, which I might term a swaying-gait. The swaying-

of the waist.

gait is due to weakness of the muscles of the sides.— Now observe the movements of such persons in walking; as the person moves first one foot forward and then the other, — the tendency of the body is to follow the moving foot : now if a person has a weak waist, we will see that his body is continually following the momentum of his foot, so that we have the body swaying first one way and then the other, which constitutes this swaying gait. (Illustrating.) This swaying gait is very common; it is due to weakness of the muscles of the waist. Why? Because it is the duty of the muscles of the waist to antagonize this tendency of the body to follow the foot; the trunk should be kept going forward in a direct line, whereas the foot moves to one side ,--the right foot moves to the right side , and the left foot moves to the other side; now when the right foot moves forward, the trunk has a tendency to follow it--to go off toward that side--and it is the duty of the muscles of the opposite side to restrain the trunk from going off in that direction,- to prevent this swaying, and this momentum of the trunk to one side--and when the muscles of the trunk are well developed, they will prevent it , so that the trunk will be held erect, although the feet are moving forward alternately, and the body will be carried forward in a direct line instead of following the feet from side to side .

Then we have the opposite of this walk, which is what might be termed the mincing gait. You will not infrequently see this style of walking in ladies; you will see smart clerks walking off

with this sort of gait (walking with "mincing-gait.") This is a stiff, awkward gait, with no flexibility, with the knees stiff, with the hips stiff, attended with no graceful sinuous movement of the body which gives grace to the walk; it is not relaxed walking,--it is forcible walking, and forcible walking is not relaxed walking,--but this style of walking is without any natural, graceful elasticity of step.

Then we have a sort of wriggling gait, a style of walking which I don't think you will see so often among young men clerks; it is more likely to be observed among young women clerks. This gait I think is due to a certain style of fashionable dress by which the movements of the limbs are hampered. This style of dress I think is called "tie-backs" (pin-backs), or something of that kind. The limbs are so restrained by this style of dress, that there is really no opportunity for natural walking, and as a result, we have a sort of twisting, or wriggling gait--wriggling about, while trying to move along, and it is impossible for them to get along in any other way, while wearing that style of dress.

Then there is another form of gait which is not uncommon,--I think we might call it the wandering-gait. It is a style of walking in which the person does not walk in a straight line, but is continually deviating from a straight line; you will see him first on one side of the sidewalk, and then on the other side; if you were not acquainted with him, you would think he was a little tipsy, perhaps. This is due to a want of power in the co-ordination of the muscles. It may be that it arose at first from natural

awkwardness when young; the child had perhaps endeavored to walk ~~walk~~ when it was not well able to do so, and it has grown up with the same awkward, wandering gait that the little one first learned, when it first learns to walk, and it never gets out of the awkwardness of childhood.

Then there is the downcast-walk. You will sometimes see persons walking along and looking down. This is a bad gait, because the chest is compressed, the shoulders are almost always thrown forward in this gait. There is another fault to be found with this kind of walking, and that is, that when the head is thrown forward and the chest is compressed, the individual has a downcast, weak expression.

Then we have a conceited gait, in which persons sometimes carry their heads so high, that they don't see where they are going; sometimes they will stumble up against objects which they had not observed, by reason of holding their heads too high. One gentleman ~~of~~ whom I now recall to mind,--I have sometimes seen him going up steps, or up stairs; his head was so high that he stepped backwards two or three times before he got to the top; he overbalenced, and so went beckward at times, instead of forward.

There is another form of walking, which is really detrimental to health, which we might term "heel-stepping,--bringing the weight of the body upon the heels; we can tell the walk of such a person, when he brings the weight of his body upon his heels in walking. It sounds like this:(Walking). You hear first the

heel and then the toe. This the almost universal gait among the people in Dutch countries, and in some portions of Italy where they wear wooden shoes . It is impossible to walk in any other way with these shoes. This shoe is held on the foot by the toes; wooden shoes cannot be laced up, so they must be kept on the feet by curling the toes under. Now you can readily see that it would be impossible for a person while holding his shoes on with his toes, to walk in any other way. So there is a tremendous clatter of these wooden shoes every morning, when the people go to their work; it makes a very curious rhythm. This form of walking is very harmful, for the reason that it brings a concussion, ~~brings~~ a concussion of the spine at every step.; at every step there is a jar; instead of striking upon the sole of the foot, so as to allow the spring of the foot to be utilized in the step, we have the whole weight of the body thrown upon the heel, and a jar produced, which is carried up to the spine. A person very soon gets tired, especially in walking upon the pavement,; they become exhausted by the continual jar upon the nervous system.

The Straddling-gait, though not a very common form of gait, yet it is a form of walking which is conspicuous. When a person happens to have this unfortunate gait, it is very noticeable, and it is almost always indicative of weakness. It may result from habits of walking contracted in early childhood, but generally it indicates weakness. We have a number of patients with us at the present time, who, as we might say, medically, broaden their base when walking; that is, the feet are separated too much. The

purpose of this, is to secure a better equilibrium. If such a person were to undertake to walk on a line, he would fall over. He must separate his feet a little, in order to maintain his balance. Now this style of gait may be natural to persons who are not diseased, as the results of early habits, but which has resulted in weakness of the limbs. When a person has been long in bed, if you ask him to stand upon his feet, he always puts his feet a little ways apart, in order to support himself a little better. If you ask such a person to stand with his heels and toes together and when he tries it, he finds that it is quite impossible for him to do so. So a natural straddling-gait indicates general weakness of the muscles employed in walking.

Another very bad style of walking, is one in which the toes are thrown out forward—a pigeon-toed style of walking. Very curiously, this is the style of walking which is to be found among savages, among the tribes of our North American Indians, for example: you will generally notice Indians generally walk with their feet straight, while the toes are turned in. This is a very common fashion of walking with children; you will see little children almost always starting out to walk with their toes turned in; this does not attract attention to children, but it is noticed in older people, although not conspicuous in children. There are two things which induce this form of walking; one is a weakness of the muscles of the outside of the leg, the duty of which is to turn the feet outward. Another cause of this tendency, is, the wearing of shoes with high heels; it is almost impossible to avoid

walking in this manner, when the heels are elevated too high; so that when you see persons wearing high-heeled shoes, they are very likely to throw the toes in while walking. This is a deformity which may be corrected. The question has arisen whether it is not natural,--more natural indeed-- for one to walk with the toes straigh forward, or with the feet parallell, than with the ~~toes and~~ feet diverging. Mr. Ellis, a man who has had quite good opportunities for observation, ~~has~~ wrote a book some years ago upon the subject of Beauty,--I think the title of the book was, "The Art of Beauty"--in which he strongly advocated walking with the feet parallell, instead of with diverging toes. It seems very singular that an intelligent man should recommend such a thing and yet this author made a very elaborate argument to show that this is the only proper way of walking; and he brings forward, as an evidence of the correctness of his theory, the fact that the North American Indians and many other persons walk with the feet parallell

he claims that you have more freedom for it, and more spring for it, with the feet parallell. I am sure Mr. Ellis never experimented with a French doll with moveable joints; it is next to impossible to make one of these dolls stand upright with its feet parallell; it is not nearly so easy to make it stand up with its feet straight out; you have perhaps tried that experiment. The fact that savages walk with their feet parallell, is probably due to ~~the~~ single circumstance, which is their habit of following narrow trails; it is probably due to the fact that they have so habitually accustomed themselves to following a very narrow trail, that they narrow their base in walking, bringing the feet as near together as possible, and thus they acquire this peculiar method of walking.

Now what is the correct method of walking? I think I have mentioned to you some ten different kinds of incorrect walking,--and I might perhaps mention still another style of walking, in which the toes are widely divergent. You will see this in certain forms of disease; and very often you will see it in gardeners. I have noticed that it is quite common among some old English gardners who have been accustomed to use the spade for a number of years; there is a very great divergence of the toes among this class of laborers. So there are some ten or eleven different kinds of bad walking.

Now what is the correct style of walking? In correct walking, the weight of the body must be balanced over the toes,--

over the balls of the feet; and then the relation of the feet to the limbs should be remembered; the toes should be separated at an angle of about 60°,--we need not be exact about that, however, but the heels should be brought pretty closely together, while the toes should be separated by about six inches. Now, in walking, the feet should be moved directly forward; the foot does not move in its own direction, but directly forward; if the foot is moved in its own direction, we will have a straddling gait, but the foot must be moved directly forward, and when it is planted down upon the floor, it should be placed so that the heel will touch the floor only a very brief interval before the toes; the whole flat of the foot should touch the floor as nearly as possible simultaneously. It is not possible to plant the toes upon the floor first in walking (as Delsarte teaches us to do) It is really absolutely absurd for a person to say, "Plant the toes first in walking". How could a person walk in this way, for example? (Illustrating.) He would make, upon the street, very much the same appearance of a horse with the "string-halt". So he will not strike the toes first, in correct walking, but, instead, the heel will strike the floor a brief interval before the toes, but the interval should be very brief; the heel and the toe should strike the floor as nearly together as possible.

It must be observed that in walking, the body is constantly thrown forward. This incline of the body, we call "forward-falling"; the body falls forward, and the foot is placed for-

(Lecture No. 5, con.)

ward, so as to keep the body from falling down.. Now in walking, gravity does the most of the work; we simply lean forward and grav ity will make us fall, and we bring the foot forward to prevent the fall. Now I will raise myself on my toe and force myself forward (walking). It is hard work to walk in that way, because you have to do all the work of propulsion, instead of inclining the body forward and letting gravity help you; because in ordinary walking, we have nothing to do but to lean forward, and to save the body from falling. If we keep this in mind, we will also observe that when the body is placed forward in this way, the weight of the body is half way between the two feet; when the body leans forward, and the foot is planted upon the ground, the weight of the body will be found about equally distributed between the two feet. Now as the body falls forward, the leg intercepts it a little and prevents it from falling, and braces it; then we have the body placed between the two feet. Then we lean forward again, and then we have the other foot brought forward, the foot going a little faster than the body, and saving the body from falling again; but when the foot is planted, the weight of the body is about half way between the two feet . Now walking in this way is easy, and the weight of the body received upon the foot, and so the body gets the benefit of the spring of the foot. Nature has made the foot with an arch: that is what the instep is for. . The person who is flat-footed, gets tired out easily;

but when the weight rests upon the heels and the toes, we have a spring by means of this arch in the foot, because when the foot strikes upon the heel and toe, there is a little spring, which prevents the jar which would arise from throwing the weight upon the heel.

We will continue this subject to-morrow evening.

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A T T I T U D E S ,(con.)

J. H. Kellogg, M. D.

Two of the most incorrect styles of walking may be called the elbowing gait, and the shuffling gait ,both of which are deviations from the normal mode of walking. I think likely you have noticed persons when in training for, or who are engaged in some particular occupation, tradesmen, carpenters, etc, who have little use of the extensor muscles, the flexors being mostly exercised; you will see a man of this class with his arms flexed, elbowing his way along the street; you will know his trade almost as soon as you see him, by his style of walking; this is the elbowing gait. The shuffling gait is due to pure shiftlessness of character; it is wholly due to neglect and carelessness on the part of the individual in not lifting his feet from the walk as he shuffles along . Now, in a natural and correct style of walking, one limb is active while the other is passive; the active limb swings forward while the passive limb supports the body, the weight being gradually transferred to that limb and the body inclining also toward the active limb; and when the other limb is thrown forward, the body leans in that direction, and the weight is transferred to that limb, first to one side and then to the other side; it is a very slight movement and a natural one .

I must say a word now, in reference to stair-climbing, when we elevate ourselves from one level to another by means of stairs. In San Francisco the streets differ in altitude, so that there is a change of level of 40 or 50 feet in going the distence of a single block: but it is only in stair-climbing that we have to lift the body from one level to another. The correct mode of climbing stairs, is to hold the trunk of the body nearly erect; keep it as nearly as possible in line with the legs, and then do the work with the legs, resting upon the toe of one foot as the foot is raised; you raise one foot while resting upon the other; your body is thrown slightly forward: then one foot is planted, while the other leg becomes active, and so of the other foot, the body being raised by the legs. Generally, the weight of the trunk is carried by the use of the lumber muscles--by the muscles of the back; when you throw the weight of the body over in this way (illustrating), the weight of the head, shoulders and trunk, is suspended by the muscles of the back. That's the reason the back becomes so tired by stair-climbing. If the trunk is kept erect, the calves of the legs will become tired, but not more tired than if the body were inclined forward while climbing the stairs. By taking this position (illustrating it), another set of muscles is brought into play, and, necessarily, if one undertakes to stand in this position for any great length of time, he becomes tired very soon. Now in stair-climbing, one must use his leg-muscles when he takes this position, and in addition to this, he must bring into requisition the muscles of his back, so that he has two

sets of muscles engaged in hard work, whereas, there should be but one set of muscles used,--the leg-muscles. We do not need to put the back-muscles under strain, as I have said; if we do, there is a double exhaustion,--a strain upon the muscles of the legs, and an unnecessary strain upon the muscles of the back.

It ought to be mentioned here, that running up-stairs is an exceedingly harmful and injurious practice; young men and women ought to be especially cautioned on this point. I think young women are particularly prone to the luxury of running up and down stairs; there is no possible excuse for this; the amount of time that is gained is but little; but persons will start and run up stairs and then walk slowly along the hall and on the upper floor, so that but little if any time is gained. There seems to be no reasonable excuse for this. If the house were on fire, and the person were running to get out of it, or if their friends were any of them sick and they were running for a doctor, there would be some excuse for running along the hall, and running up or down stairs, but to start at the bottom of the stairs and run up stairs, and then walk slowly along the hall after they get up, is the height of absurdity.

If you were to pull yourselves up 10 feet perpendicular by means of a rope, pulling youselves up hand over hand, you would find it no small work; you would find there was a good deal of work about it; so in climbing a long ladder; by the time you get to the top of it, you will realize that you have done considerable work. Now , in climbing a stairway, you have done just as much work,--if you have raised yourself through a height of 10 feet, you have

done precisely the same amount of work as if you had raised yourself 10 feet perpendicularly. If you reduce the time, by running up-stairs, you reduce the time occupied in lifting yourself through this elevation from one floor to the other, and you will, by so doing, greatly exaggerate the fatigue,--not the amount of work, but the exhaustion and fatigue induced by the work. The amount of work is just the same, but the amount of fatigue is considerably less, when one ascends the stairs in a slow and careful manner, throwing the work upon the legs. Please remember that in climbing stairs by the correct method the work of the legs is no greater than when one climbs the stairs incorrectly, and one saves strength and energy by holding the body perpendicularly, because you save this extraordinary strain upon the back which is induced by throwing the body forward. The principle applies here, which I will refer to shortly, and which I will not mention now,--and it applies to all forms of exercise.

There is an error, too, in going down-stairs, as well as in going up-stairs. Many persons, when they go down-stairs, go thumping down-stairs upon their heels, every step going down upon the heel (we ought to have a stairway here with narrow steps to illustrate this), every step strikes upon the heels and the person makes a great noise in going down-stairs in that way. Now, instead of going down stairs in this way, the weight of the body should be received upon the ball of the foot, in letting the body down from one elevation to another,- it should strike upon the ball of the foot, rather than upon the heel, because there is

a spring in the foot, and it is put there on purpose to lessen the severity of the jars which are transmitted striking of the bones. If one strikes upon the ball of the foot, with this spring in the foot which gradually yields to the weight of the body, the body is brought down upon the heel softly and easily. Nature has put a cushion upon the heel, in order to lessen this amount of jar somewhat, but it is not sufficient to entirely relieve the jar, when one throws the weight suddenly upon the heel.

Now I must call your attention to a few points in relation to the general hygiene of exer

Now I must call your attention to a few points in relation to the general hygiene of exercise, which I think are important. In the first place, exercise must be regular and systematic; it ought to be our business to take our daily dose of exercise; we need it, just as we need daily supplies of food and of drink, and just as we need to take sleep each 24 hours. In the same way we ought to take, every day, a proper amount of exercise. When I was a medical student, there was another gentleman, a student in the scientific department of college, who roomed at the same boarding-house where I did, occupying a room adjacent to mine, and I became quite well acquainted with him; he was a very pleasant and gentlemanly young man. I noticed one Sunday, and for several Sundays in succession, that he had a curious habit of going out behind the house and getting up onto aquite a high bench, and making a tremendous jump, and then he would come in with his face red and puffing and sighing, and throwing himself upon the bed, he remained quiet the rest of the day,--and for that matter, the rest of the week, with the exception of his short walk to his recitations. Seeing that he kept up this curious habit, I asked him one day why it was that he went behind the house every Sunday and got onto that bench and made a big jump. Well he said in reply, "I am very busy; I am trying to take some extra studies, and I have not time to take any great amount of exercise, and so I walk out every Sunday and take this jump; I exert myself to the utmost in this way; dont you notice how tired I am; how breathless and panting I was when I came in",--he called my attention to the

fact that when he came in, he was completely exhausted; he took his whole exercise at once. I laughed at him, it seemed to me so absurd to take exercise in that way. I asked him how he thought it would do to take his breakfasts and dinners for the whole week on Sunday, or to take one big meal for tthe whole week, and so save the time he would use in eating his breakfasts and dinners during the week. He couldn't see the force of my reasoning, and continued his practice. Although it is somewhat laughable, yet we see many doing that; the active business man has no time to take exercise every day,--it takes too much time; he has not time for exercise once a week, even; he has really no time once a month, but about once a year, he spends two or three weeks; he goes off on a hunting or fishing excursion, or something of that kind, and has a litle spree; but he generally comes back with his muscles all tired out. I tried that myself, when I didn't know any better, twelve or fifteen years ago. I went out to Colorado, and after I had been hard at work for a time, I thought I would take a little vacation. I got onto a pony and started for the mountains that I saw in the distance one morning before breakfast. But distances are very deceiving in Colorado. I thought I could walk there before breakfast; but when I had walked about half way, I got pretty tired, and the sun got up, and it was pretty hot, and I got to a ditch. I asked a gentleman, "How wide is this ditch?" It looked to be about three or four feet wide, and he said it was about three or four feet wide, and I said, "I don't believe it;

I believe it is a half a mile wide, for I started out this morning to find these mountains, and they looked to be about a mile away, and now I have traveled five or six miles and am only half way there". When I had gone that distance, I gave out, and made the rest of the way on the pony and on foot. The next day, I took another ride of a still greater distance. The next day I started for Middle Park. The next day, I rode thirty of forty miles. In the course of about a week I reached home. After I got home, I thought I had had a positive reeruiting up, but the next morning, I found that my temperature was 103°. I had had vigorous exercise in the mountain air, but from the manner in which I took that exercise, I found myself worse off than when I started. I felt as bruised and sore as though I had been thoroughly pounded; but it taught me a lesson, and I concluded that I had been doing exactly what my fellow student had been doing--taking my exercise at one big jump. This is the method pursued by the majority of business people; they imagine that by taking a little outing of a week or two, they are going to atone for the neglect of exercise during the whole year. This is the greatest possible mistake .. It is better to take exercise for a month in the way I took it, than not to take it at all; but the proper way to take exercise is to take it every day,--regularly.

Another important fact in reference to exercise is, that all the muscles should be brought into play; in exercise for health we should take pains to exercise every muscle of the body; the entire muscular system should be brought into activity. If a person exercises but one set of muscles, it produces deformity, as I have shown you. I had an illustration of this to-dy : a lady who had a curvature of the spine , and came into the office, whose muscles had been so paralyzed that she has but little use of her arm; when her arm became painful, she put it in a sling, and the consequence is, that the muscles, not only of the arm but of the shoulder,--those muscles which lie between the shoulders and the shoulder blades--have all wasted away from lack of use, and not only this wasting away, but the atrophy which naturally follows from the inflammation of the nerves and not only that, but in consequence of the change arising from the lack of use of the right arm, the muscles on that side, which are naturally stronger in a healthy person, than those on the left side--all these muscles of the trunk became weak, so it is not surprising that this lady had curvature of the spine. Now, upon which side would the curvature be ? (A voice: Toward the left side.) Now what is it that keeps the spine vertical? Here is a bundle of nerves on this side which act like the string upon a bow. If the string were on this side of this stick, it would bend it in this direction. Now if there were a string on each of the stick or bow, one being stronger than the other, which would be the convex side of the bow, if the weaker string were on this side ? (Class: The opposite side.)

Now suppose we had a string on each side equally strong, or drawn equally tense, then the bow would not be bent on either side . But if one string were stronger than the other, on which side would the convex side be ? (Class: On the weaker side.) Yes, the convex side is toward the weaker side. Now this patient had a weakness of the muscles on the right side, and a consequent curvature of the spine,--on which side would the convex part be. (Class: On the right side.) Yes: the convex side indicates a weakness of the muscles on that side; the muscles on the strong side bend the spine to that side, and render the opposite side convex; so in the case of this patient, we find the convex curve on the right side. . Hence we see that the muscles must all be exercised equably. Unfortunately, the majority of persons in taking exercise, use but a small number of the muscles. A person, for example, goes out walking; he does not use but a few muscles, because it is relaxed walking; the muscles of the spine are not used much, except to balance the body and keep it from tipping over. The muscles of the legs are used in walking , but in ordinary walking, we see but a few of the muscles used, because the individual neglects to bring all the muscles possible or proper to be used, into play; he energizes only those muscles which are most directly employed in exercise, instead of bringing in the collateral muscles which might be employed . On the other hand, a person using an energized walk, uses all the muscles of the body; the muscles of the body will be used to keep the body erect; the muscles of the spine, as well as those of the head and neck, will

all be brought into exercise. Simply energized standing or sitting, is better than the ordinary desultory exercise which the majority of people take now and then when going out to take a walk occasionally. Such exercise as people usually take, when going out for a walk or a ride, amount to nothing, compared to daily and continuous exercise in energized standing or walking.

It is not necessary for a person to take violent exercise daily, in order to keep himself in good health; even very moderate exercise, if a person takes enough of it, is sufficient to maintain a healthy state of the muscles of the body. So far as exercises go in contributing to general bodily health, I think the experience of most trainers and gymnasts in general--the experience of those who give attention to physical culture--demonstrates that moderate exercises are better than those more severe Violent exercise, such as hard lifting, swinging heavy clubs, handling heavy dumb-bells, heavy gymnasium work, etc., has the effect of producing hard muscles, but it is not hard muscles that we want; hard muscles are not active muscles; hard muscles will enable us to strike a hard blow, or lift a heavy weight, but what one needs is strong and elastic muscles; hard muscles are the result of severe exercise, while strong and elastic muscles are the result of moderate exercise, continued a long time, and executed with a moderate degree of rapidity.

Now as the result of violent, hard exercises, we have various classes of specialists among athletes; one can do a great amount of lifting; another of running Dr. Winship I believe lifted something like

2900 pounds. And then there was Mr. St. Cyr, the remarkable Canadian, who lifted 3993 pounds--I think his lowest lift was 3?00 pounds--and he calculated that he would be able to lift 4500 pounds before finishing his experiments; he had tremendous lifting capacity, but I am very sure he was not very fleet of foot, for he weighed two or three hundred pounds; he had enormous muscles, hard, firm muscles, but his muscles had very little elasticity. Now that is not a very useful kind of muscular capacity; the useful kind of muscular capacity--the best kind of exercise--is that which makes the muscles strong and flexible. So that, to ascertain how hard the muscles are, is not the most satisfactory way of determining their vigor, because the muscles might be very hard and yet not have a very great amount of vigor. Really, something depends upon the amount of nervous energy which one is able to send into the muscles, as well as upon the size and hardness of the muscles; it depends also upon the receptivity of the muscles to the influence of nervous energy. One often sees a person who is able to lift more than another man with harder muscles, simply because he puts more effort into his muscles, he imparts to them a more vigorous impulse, and elicits from the them a more vigorous response. It has been noticed that men who have such hard muscles, and are able to accomplish such great feats of running or lifting--particularly in running--in work which requires very hard muscles, that those men are short-lived, for example, there was Mr. Charles A. Bennett who was able to lift 967 pounds of pig-iron with his hands; Mr. St. Cyr has done better

than that, by lifting nearly 600 pounds with his fore-finger. This Mr. Bonnett of San Francisco lifted 14 tons in a minute's time; that is, he lifted iron enough in a minute to amount to 14 tons; he used to play with a 158 pound dumb-bell, and swing a pair of ten pound Indian clubs, swinging them 4300 times in less than an hour; he turned 255 summersaults in 10 minutes. But he lived to be only about 35 years old. He used up the vital capacity of his muscles, & that the vital forces of the body, which we might call the household force of the body, gave out, and he was not able to keep on any longer. Mr. Richard Penwell was one of the strongest men in America some years ago; he used to put up a two hundred pound dumb-bell with ease. He was an invalid all the latter part of his life, because he had squandered his vitality in trying to make a few big muscles. It seems that this sort of exercise is not conducive to health or longevity, but it is moderate exercise, in which all the muscles take a part, which is most conducive to health.

The rapid runners of Abyssinia (?) are remarkable for their activity. I think I mentioned to you the other day, that the chairman of a sporting-club in this country collected, sometime ago, statistics of the ages of those who had performed great feats in running, and he could not find one who was over 30 years of age at the time of his death, in the whole list. Dr. Winship died at an early age, and in fact there have been none who have been very remarkable for their muscular feats of a special charac--

ter, who have lived to a very great age.

Another principle which is very important, is, that the muscles should be used properly: A great many people do not know how to use their muscles; they get tired out in their work, because they don't know how to use their bodies. Others can do the same work without becoming so much fatigued. You will sometimes see a frail person accomplishing much more than a robust person will do, simply because he knows how to use his muscles to good advantage; he does not waste his energies. This principle should be borne in mind in the use of the body. We have a good illustration of this principle in stair-climbing. If a person goes up-stairs in an upright position, he uses his legs only; but if he bends over in this way (illustrating), he brings into play the muscles of his back, as well as those of his legs, and thus doubles the amount of energy expended. One can put himself in such an attitude in stair-climbing, as to bring a strain upon the muscles which need not work. . Muscular work means energy used, and it should be used as needed, and in a useful way .

Another reason for observing this principle in exercise, is, that when the muscles are used improperly, we are very likely to suffer serious injury. If the muscles are used in such a way as that but a few muscles are used and brought under an unnatural and unusual strain, while other muscles which might operate, are not worked at all, serious injury may result; we may have a sprain of a joint , a fracture of a limb or a laceration of the

ligaments, or the ligaments are so stretched and strained that they remain forever afterwards stretched and weakened. The muscles also may be ruptured, as the result of unnatural exercise--exercise in unnatural positions. A very conspicuous example of exercise taken in a bad way, and by the improper use of the muscles is work in which one must bend forward (in this way). Now, if one bends at the waist (bending down in this way), the muscles of the back are put under an unreasonable strain, while, at the same time , the muscles in the front part of the body (the viscera) are brought into an unnatural condition, and the lungs are compressed so that there is a diminished amount of respiration, while it should be increased; the movement of the heart is also interfered with; the stomach, liver, and the rest of the internal organs are crowded down out of place, but , most important of all, the large nerves and blood-vessels which lie at the back part of the abdominal cavity,— these are all brought under pressure, when one puts himself into an abnormal and strained position. In bending forward or backward, these organs are all put under pressure, so that when one bends forward (in this way), bending at the waist, the blood rushes into the head, the veins of the temple are distended, and there is an intense congestion in the head, so that we may have pulmonary apoplexy, a rupture of the blood-vessels, or cerebral apoplexy or rupture of the blood-vessels in the brain. It is really dangerous for one to put himself in these improper attitudes. Now, in bending down, if one uses the hips, which are the

natural hinge of the body,--if one bends at the hips instead of bending at the waist, these difficulties which I have mentioned do not occur; we have no compression of the chest, and no disturbance of the normal relations of the internal viscera. The reason why so many bend at the waist, I suppose, is because that is the weakest part; so that it is the easiest thing in the world to double over at the weak spot. If there is a weak spot in a piece of timber, that is where it is going to break; if there is a weak spot at one end of this pointer, that is the point where it is going to break or bend over. If you have a stick and make a fulcrum of it and hold the stick at the strongest part, it will lop down at the other end. Now, if one bends at the hips, all these evils are avoided. In Holland and Belgium it is common to see women at work in the harvest-fields bending forward in this way (bending at the hips), working upon the ground with their hands all day long, without the slightest difficulty. One may see the Dutch women in their native land working in this way, without suffering from cerebral congestion. I remember the first time I saw women working in that way, I said to myself, "What terrible headaches they must have, bent over and working with their heads so near the ground;" but upon inquiry, I found that they suffered no inconvenience in consequence of working in this manner, simply because these important organs of the body had room to act in the normal way. Now, I dare say there is not one ~~here who is an~~ in a thousand American woman, who can bend over and touch the floor with their

hands. If you find an American woman who can reach her hand within a foot of the floor, bending at the hips, she is doing remarkably well. Exercise should be taken in such a way as always to maintain correct attitudes. Whatever exercise you take, remember to keep the body in correct form.

Another evil which arises from the neglect of this principle, is, that if exercises are taken with the body in a bad position, that kind of exercise brings the muscles into play in a bad way. If we use only one set of muscles properly, the chest will be kept in an improper position; if they are used in this way, the chest will be in an abnormal position, and the muscles will be confined in that position. Exercises taken with the body in an abnormal position will also serve to perpetuate evils which ought to be corrected. The first thing to be noticed, then, in taking exercise, is that the body is kept in a correct attitude all the time, no matter what the exercise is ,--whether it is an exercise of the legs, arms or trunk. Keep the head and the trunk in line with one another; if the head is moved, the trunk must be kept in line,--and the head must be kept in the proper position in relation to the trunk all the time . I remarked that I didn't think there was more than one woman in a thousand among civilized women who could bend over and touch the floor with their hand, bending at the hips; but I hope we shall not induce the thousand women to try it, for it would be positively dangerous for the average civilized woman to undertake such an experiment.

Another point which I think important in exercise, and to which I have not seen attention called , is the importance of uni-lateral exercises . Most exercises in calisthenics and gymnastics are taken bi-laterally,--both sides of the body are used at once; if it is an exercise of the arms, both arms are used; if it is an exercise of the fingers, all the fingers are used; if it is an exercise of the flexors and extensors, both arms are used at the same time. I am quite sure this is an error, for the reason that it does not give to the brain that kind of training which it ought to have. If you will observe the young child who is just beginning to use its hand, you will notice that whatever it does with its hand, it does with its fingers; when it shuts its hand, it shuts the whole of its fingers; they always use their whole hand. The little boy or girl appreciates the difficulty of moving his or her fingers independently when first beginning to play on the piano. It is easy for them to make the thumb and little finger go down alone, but it is not so easy to make ~~each of~~ the little down independently of the other fingers other finger go alone, and some of you will remember that it was especially difficult to make this fourth finger behave itself while ~~each of~~ the other fingers were ~~are~~ not employed; the thumb and little finger will behave all right. There is a disposition of the muscles to use the thumb and fore-finger, and to play all the notes with these; but the fourth finger is terribly clumsy and difficult to use and to make it do its work independently; so when one of the other fingers comes down, the little finger comes down

with it, and it is hard to strike the note with the little finger alone, but after long practice, the fourth finger gets emancipated from the others. The same thing is seen in the child learning to write; when the child is learning to write, it moves its head and its eyes and its tongue, and the corners of the mouth twist around, following all the crooks and turns of the letters. This is because the muscles are linked together in an association of activity, and it is very hard for the child to segregate the different groups of muscles, and make them act independently. We have many illustrations of association in muscular activity; we see it in the muscles of the eye; we see how difficult it is to close one eye without closing the other eye. Try it . Some of you do it very well, and some of you cannot do it at all. It is also difficult to wink with one eye, and not wink with the other eye at the same time . How difficult it would be to smile with one side of the mouth and keep the other side sober. I have heard of people laughing with one corner of the mouth, sometimes, but that is next to impossible; it is only people who are paralyzed on one side, who can do that. This is because of the association of the muscular movements. We sometimes have a curious illustration of this in disease. I remember very well of a patient some years ago, who was completely paralyzed upon one side of the body; he had absolutely no use of his left hand and arm, or of the left leg; his left leg would drag after him while walking, and his left arm lay helpless by his side . You have seen

this man (Johannes ?) When he lifted one hand, both hand and foot would go up; and whenever he sneezed, both his right arm and his right foot would spring up from the floor. This is due to the association of the muscular activities in the body, as I remarked. Now there is a great advantage in having this association broken up. It is fortunate for us that this association exists, because it enables us to set both sides of the body in operation at the same time , by a single effort of the will. But it is sometimes important to have the two sides of the body more independent of each other. The skilfull pianist must have both sides of the body under complete control; he must be able to run up one side of the key-board, while running down the other side; he must be able to move one hand rapidly while the other hand is moving slowly, or much less rapidly than the other . As an illustration: you can see how difficult a thing it is to move one hand up and down while the other hand is moving in this direction (illustrating). You see your hands get mixed up. Touch the top of the head with one hand, and at the same time move the other in front of the chest (in this way). Why is it so difficult to do that ? Simply because it is difficult to do one thing with one hand, while doing a different thing with the other; those movements require the action of different sets of muscles at the same instant. Now beat the head in this way, and move the other hand like this,--I cannot do it (Laughter). I cannot do that without practice; I can move this hand, but I can't move them both together; my left hand has not been so much emancipated as the

right. Now in order to accomplish the emancipation of the different groups of juscles from the slavery of co-ordination or co-ordinate movements (that is, a sort of slavery by which one side is compelled to do exactly what the other side is doing), to emancipate the two sides of the body, there should be unilateral exercise . I have sometimes given exercises in Swedish gymnastics, for the purpose of accomplishing this very thing, exercises which I think you have seen; exercises of moving one arm down, and the other in this way. Now you are using different sets of muscles in this exercise, and when you exercise quite rapidly , you will find that it requires much effort; it is very much more fatiguing than an exercise in which both the arms are moving the same way ..

If one has not been very much accustomed to exercise, he ought, of course, to begin his exercises very slowly and carefully, and, if possible, before beginning the exercises, he ought to have his strength tested; he ought to be measured; he ought to have his whole body measured carefully,--chest-measurements, waist-measurements, arm, thigh, and leg measurements. Then he should have the strength of each group of muscles tested, so as to know the strength of his flexor and extensor muscles, and all the different groups of muscles. I have prepared a chart by means of which a person can compare himself, and ascertain somewhere nearly as to his status as regards his strength in general, and as to the status of each particular group of muscles. I think you have

seen the charts. If you saw a line passing straight through the chart, you would know by that, that the person's muscles were symmetrical, and that he has only to exercise them, in order to their full development; but if you find one striking up above and then down below, running in a zigzag manner across the chart, as we usually find them, what does that mean ? It means that some of the muscles have been developed enough, while other muscles are abnormally weak, and you understand that these are the ones that especially need exercise. So the chart is especially useful for a person who is studying to acquire a good physique . But a chart of measurement is of very little use, except in giving an idea as to symmetry of form; it does not tell a person what he needs in regard to hygienic requirements; it may tell him that his limbs are abnormally small, but it does not give a very adequate idea of his condition as to strength, because we find that small muscles are strong; it does not tell us whether his flexor muscles need development, or whether his extensors need exercise; it does not tell us which particular group of muscles need to be developed, except in a very general way; but a strength chart shows at a glance, just where a peron's weak points are, and just where are his strong points, so that work can be focussed upon points where it is most needed, and where it will do the most good.

Another matter which it is very important to give attention to, in the beginning of a course of exercise, is, the avoidance of too great fatigue. There must be a sufficient amount of fatigue

to make one healthfully tired; if one does not use a muscle enough to make it tired, it won't grow. Nature isn't going to do anything unnecessarily. If the muscle is already strong enough and large enough to do what is necessary to be done, , nature isn't going to make it any larger. Nature will not take the time and trouble, and use up material in building up a muscle to make it large and strong, when there is no great length demanded of it. You must make a demand upon the muscles for greater strength than they have, or they will not be made any larger. So the little desultory exercise of going out for a little walk occasionally, swinging dumb-bells, or doing little light work in the gymnasium, amounts to nothing in the way of development. The exercise must be taken with sufficient vigor to produce some fatigue, but the exercise should not be carried to so great an extent as to produce fatigue-fever, so that the patient finds himself feverish the next day, feeling sore and lame , and feeling as if he had taken a severe cold feeling exhausted, lame , and used up. Such a person is very much in the condition of a foundered horse. This is what I would call consecutive fatigue, -fatigue which follows some hours after the exercise. The fatigue which is experienced from the exercise should be recovered from in a very few hours; it should not require several days for recovery.

The majority of persons, in taking general exercise will find, as soon as they begin to take gymnastic exercises, special exercises for health , or general exercise which brings the muscles

of the body all into activity, will find, the next day, that in some spots he is stiff and sore and lame; he will have a general lameness in the back, thighs, or something of that kind. What does that mean? It means that those nerves which have been exercised, had previously been idle, and have remained so until they had become weak, and now, when they are brought into a state of exercise, the activity was more than they were able to support readily, and the soreness that you feel is the result of this unusual activity. A great many people are alarmed and disturbed by this condition of the muscles after exercise; they become alarmed and discouraged, so that they stop exercising, saying, "Why, this exercise is having a bad effect upon me; I am not feeling as well as I did before I commenced taking the exercise; I find myself so lame and tired that I think I have done myself harm." How many, many times I have been told that by persons who imagined they were going to have some trouble with their backs in consequence of their exercise; they would say, "I wouldn't have taken that exercise for any amount of money, if I had known what the effect was going to be:" I have been told that scores of times,-- "Why, my back is sore and lame after taking that exercise". This was simply because those muscles of the back had not been used in a long time. I remember of advising a lady at one time to take a walk for exercise. After about a week, she came into my office and said she, "Doctor, that walk nearly killed me." "Why, what has it done?" "Why it gave me a terrible backache; it has un-

done all the good that has been done for me since I have been here, and I shan't get over it; I wouldn't have done it for anything, if I had known what the effect was going to be." The cause of this lameness, was, that she had not been doing anything of that kind for some time . . "Well, doctor, what shall I do?" "Why, go and take another walk". (Laughter.) Said she "Can't you do something for my back ? My back is weak." "Take a walk." So I continued to prescribe a walk for her. I told her, finally, that walking was the only remedy that I knew of for a weak back,--and that is the only remedy that I do know of--exercise of the biceps, or of any other part of the body that is weak- -careful exercise is the only means by which you can make it stronger.

I remember of another patient who had been in bed for a year. I wanted her to get up and take a walk; and said she,"I am not strong enough to get up yet." She had been taking massage, etc. Said she, "I have been up on my feet, but I must get a little stronger before I can take a walk". So I tolerated this state of things, and she waited a whole year to get strong enough to walk, but one can't get strong enough to walk while lying in bed, and the only way to do it, is to get up and walk,--and she found it so. We mustn't be discouraged or disturbed, if we find a weak muscle complaining at the first attempts at exercise. This complaint of the muscles should really be an encouragement,--the weakness, and the stiffness and lameness even of a muscle, should be an encouragement . Why ? Because that is the first stage of

the process by which nature is going to make the muscle stronger; this soreness is the result of nature's sending more blood into it,--an unusual quantity of blood has been sent into that muscle, so there is a physiological and healthful congestion of the muscle, and not a dangerous one, after exercise; there is not going to be any inflammation of that muscle; there might have been, if the exercise taken had been carried so far that there was consecutive fatigue; but the soreness of the first attempts at exercise, is really nature's first effort to make the muscles stronger. What is to be done ? Not to stop exercising, but to exercise more and more; do the same thing tomorrow; do the same thing the next day, and the same thing the next day. At the most, one should not rest over a day in taking exercise, for then the muscle may lose the benefit of its exercise. If one waits until his soreness is done with, he must begin right back at the commencement, and the same exercises which made his muscles sore before, will make them sore again, and he will not make any progress in this way, whereas, if he takes exercise today, and tomorrow takes exercise again, this congestion of the muscle will build up a little more tissue than before, and the next time, the muscles will take on a little more tissue, and so the level of muscular activity and vigor will be gradually raised, until , in a short time, the soreness and the stiffness, and all the uncomfortable symptoms will disappear. It is very important to understand this, because we often find persons complaining of injury from a little exercise

which has only made a little soreness and stiffness of the muscles.

But there are some symptoms and pains and soreness in some parts, as the result of exercise, which should be recognized,--I refer to internal soreness. External soreness, for example, those pains which are all recognized on the outside, the soreness of a calf of the leg or of a shoulder, or of some of the muscles of the back, or some soreness in some external part,--if this soreness which you feel as the result of exercise, is something which you feel in some part which you can grasp in your hand, you need not be at all afraid of it ; but if it is an internal soreness, if this soreness, for example, is deep in your side; if you have a terrible pain in the middle of the body, or the lower abdomen, or some other place in the interior of the body after exercise, and if it is a continued pain, that should be a warning, that you should not take that kind of exercise again, unless you approach it by slow and carefully graduated stages. Pains of this kind, after a person has been exercising violently, may mean that a ligament has been stretched and torn, and if such exercise is persevered in, it may result in an elongation of this ligament, and great injury may be the result. Violent exercise, such as horse-jumping, etc., may cause the jarring of a kidney out of position; and there is a sickening pain attendant upon this kind of exercise, which should be a warning that some injury has been done. When these internal pains result, such exercises should be forever afterwards avoided. Superficial pains should cause no anxiety, but

internal, deep-seated pains after violent exercise, should receive careful attention. Indulging in too violent exercise is not infrequently the cause of serious injury,--hernia, for example; the abdominal wall, for instance, which held the internal organs in place, ~~will~~ may be torn open in some places by violent pressure, and perhaps a portion of the intestine forces its way through the muscular fibers; and then, we may have, as the result of this violent exercise, congestion of the brain, or epilepsy of the brain, a ruptured vessel and a fatal hemorrhage or some other serious injury; varicose veins of the legs are frequently the result of such exercises, as well as hemorrhoids and other similar troubles.. Sometimes the valves of the heart are torn in this way; the tendons or ligaments which hold the heart, spread out, ~~and~~ are broken by the action of the heart produced by violent exercise; so these exercises should be avoided.

A warning which should always be recognized, is the sighing which follows exercises of excessive rapidity,--running, for example--which put one out of breath. If the exercise is so severe that a person must not only breathe hard, but also causes sighing, this sighing means over-taxation of the respiratory apparatus, and is a warning that that exercise should not be repeated. This sighing is caused by an automatic action of the nerve-centers of the spine, and is an indication of excessive work. The action of the heart may be very rapid without danger, if its action is regular; the heart may beat 170 times a minute, without injury,

provided the movement is perfectly regular, and provided the heart action soon subsides to its normal rate, there is no harm done; but if the movement is not regular, and if the heart does not readily subside, the symptoms should be regarded as forbidding the exercise which has induced this symptom.

I will now say a word or two with reference to the clothing for exercise. In the first place, the clothing must be loose, so as to give the body opportunity for unrestrained activity. It is necessary that men should be lectured upon this subject, as well as women, for men often wear their pantaloons buttoned too tight, or wear belts about their pantaloons, or worn heavy suspenders drawn tightly over their shoulders, so there is not room for movement of the arms;--indeed I believe that a man now-a-days, does not have so good a chance to dress in a healthful manner, as women do, for the attention of the world has been fixed upon the improvement of the dress of women for the last quarter of a century, and to such an extent that a dress has been devised for women, which must be nearly perfect,--and which is calculated to allow her body perfect freedom and activity; but the poor men have been neglected /(Laughter.) It has been supposed that the dress of men was good enough, and so we are left to wear these miserable old suspenders,--I wish I could be emancipated from suspenders and go back to the old-fashioned waists and jackets that my mother made for me when I was a small boy. I don't know of any way to get a dress which will be wholesome, and give the

body such freedom of movement as women can get by the dress- reform movement, or by some such means, for it is impossible, with my ordinary dress, to touch the floor with my fingers. With women, it is perhaps more necessary that attention should be called to this matter, for the dress of the average woman is by no means so healthful as that of the average man. While it is possible for woman to dress even more healthfully than man (and we are waiting for some smart woman to invent a better dress for us), while it is possible for women to dress in a perfectly healthful manner, yet the average woman does not avail herself of the opportunity. I suppose that women who are sensible in this respect are more numerous in this immediate vicinity than in any other place on earth; there is not so great unanimity on this subject in any other place, as in this immediate spot; this is a sort of sanitary heaven. When we undertake to teach physical culture outside of this place, we find this unhealthful dress in the way; and when we undertake to practice gymnastics, the same thing is true of dress. Such a dress as the ordinary woman wears, is absolutely dangerous,--and I want to impress this upon your minds, that you must consider that you would be doing a vast deal of injury, if you were to undertake to teach a class of ladies, instructing them in physical culture, without first of all exacting from them a solemn promise that they will adopt a dress which will be loose at the waist, and which will give freedom of action to the shoulders and legs;--and most important of all, is freedom of

movement at the waist. When a woman wears a tight corset, or clothes buttoned tightly about the waist, and then undertakes to bend forward and touch the floor, it is absolutely dangerous. I knew a lady who broke a rib, while trying to perform the feat of touching the floor with her hands, without having her dress properly arranged. The strain of this forcible constriction is very great, and in bending forward, this strain is greatly increased; the strain has already been as great as the body can bear, and now by forcing the body over in this way, and bringing the muscles of the trunk to bear in this way, serious injury may be done, and, as I said, it is positively dangerous, and I should consider it wicked even in a high degree, to encourage a woman to take physical exercises in her ordinary dress. The high-heeled shoes also should be abandoned, and shoes without heels should be worn. The clothing next the body should be flannel; flannel has the property of absorbing and rendering insensible the large amount of moisture produced by the body, whereas cotton and linen do not absorb so readily; it absorbs, but it holds the moisture in such a form that the clothing is wet; it throws the moisture off in evaporation more readily than woolen garments. A cotton garment, as you know, can be made much moister than a woolen garment; the woolen takes up the water hygroscopically, which the cotton does not do; it absorbs the water into its meshes, but it does not take it up quickly or chemically, so that it soon renders a person subject to injury by evaporation. I think rubber boots and shoes should also be avoided,--and even rubber soles of shoes, for the

reason that they cause perspiration of the feet, and injury afterwards results by taking cold; for it does as much harm to get the feet wet by perspiration, as it does by wading in water or walking upon a wet or muddy pavement and getting the feet wet ; one should remember that,--that he will take cold just as quickly by the feet becoming damp by Perspiration, as in any other way., hence rubber boots and shoes, and rubber soles should be avoided,--unless they have been artificially dried. The same remarks will apply to the Mackintosh, which is a great source of danger in this direction : if there is the least suspicion of a rain, it is so convenient to throw on a water-proof garment, and persons will cover their garments all over with water-proofs to keep them dry; but one must remember that this Mackintosh keeps the perspiration in; it prevents the throwing off of perspiration which the skin is continually producing, and it is retained, so that the body becomes wet with its own perspiration. The skin absorbs more moisture from a Mackintosh than even on a damp day. If one employs a Mackintosh when taking exercise, he should, on throwing it off, immediately take a bath. Why ? Because his clothing is covered with moisture, and this touches the body; it is just the same as though you had been out doors in the wet, and then had come in and allowed the evaporation to go on until you were chilled,--for you will be chilled just as quickly from these perspiration-saturated garments, as from the evaporation of a rain-saturated garment.

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Now a word in reference to the best time of day for exercise.

The question is often asked : "Doctor, what is the best time of dy for exercise?" Well, if you are fat, and want to be thin, you should take youp exercise before breakfast, because exercise before breakfast will use up the reserve tissues much more rapidly than if taken after a meal. The patient will sometimes say, "Why doctor, do think we should take a walk on an empty stomach?" No, I should think that would be a bad place on which to take a walk, and it is a bad way to take a walk; as a rule it is not a good plan to take exercise on an empty stomach, because the body becomes more quickly exhausted when exercising with the stomach empty. The experiments of Dr. Lombard show that when he was exercising his finger, if he took a little food, within from ten to thirty minutes after eating, his strength was increased, ~~20 or 30 %~~ Now this fact rather upsets our old ideas as to the benefit derived from food not being realized until the next day after eating it, because it indicates that the food has done some good already; one can hardly imagine that any food has been digested in so short a time, but there may be some food digested as soon as that. The saliva acts upon the starch, the starch is converted into glycogen, and it is entirely possible that this may some of it have found its way into the muscles, and so have restored energy, and replaced glycogen which had been used up.; at any rate, it has been shown, that to take a small quantity of food increases strength very quickly, and we have come to understand that when no food has been taken, and we have been "walking on an empty stomach", our energy

is reduced; but if one wants to gain strength by exercise, then the best time to take it would be when the strength is at its maximum, and when the muscles can be brought into the most vigorous activity. Very curiously, it has been found that the strength of the body--the capacity for work varies with the barometer, this is also one of Dr. Lombard's observations. He first observed that his strength was the greatest at 10 A. M., and at 4 P.M. his strength was the lowest; at 6 o'clock P.M. he found that his strength had somewhat increased, it was a little greater than it was at 4 P. M., and this led him to make further observations, and he found that he had still another maximum period of strength at 10 o'clock at night, and between that hour and 4 A. M. his strength greatly diminished until its weakest point was reached at 4 A. M., and from that time his strength increased to its maximum at 10 A. M. He did not know at that time, that there was a diurnal change in the barometer. If you will observe the barometer, you will notice that at 10 A. M., it is at its highest point; it then falls until 4 P. M., and then it rises again until 10 P. M., and then it falls again until 4 o'clock in the morning and then it is the lowest. That is the reason the majority of people die in the morning,--because the barometer is the lowest, and all the vital processes of the body are the lowest at the same time. In the same way the muscular strength and vigor of the body is at its lowest ebb; it is lowest when the barometer is lowest, and highest when the barometer is highest. So that 10 o'clock in the morning

is the best time for exercise, for the strength is then the greatest. I dare say that the averag individual does not need to give attention to this matter especially, but the invalid must make every condition as favorable as possible, and take exercise when the barometer is the highest, and when he has the greatest vigor of body and muscles , and the greatest disposition to exercise. When the air is strong and bracing, we are really stronger and can do more work. In extremely hot weather, Dr. Lombard found that his strength diminished, and in cold, bracing weather, his strength was increased. And yet, extreme cold diminishes the strength by rendering the muscles less able to respond to the impulses sent to them from the nerve-centres. A great amount of humidity reduces strength, as shown by Dr. Lombard, and we have common observation which is familiar , in riding for a time on a warm, damp day in Summer, when the air reins is so thick that one can hardly breathe. This is not because the air is so thick, but because it is so thin, that you have this sense of breathlessness, while the horses froth and foam, and become wet with perspiration, and are covered with foam, when taking the least exercise. One thinks this is because we have combined the two elements heat and moisture, which have lessened the muscular energy. The reason of this is, that hot air will retain a larger amount of moisture than cold air. A temperature of zero contains about half a grain of moisture per cubic foot, it contains about half a grain, or one drop; air at 25° contains two drops of water when saturated; at 50 f ur drops per cubic foot; at 75,° eight drops; so that the air

when saturated will contain, doubles with the addition of every 25 degrees; so starting with one drop at 0°, we have 2 drops of water at 25°, 4 drops at 50°, 8 drops at 75°, and 16 drops at 100°. So that in every warm day with a temperature at 100° just before a rain when the air is saturated with moisture, the amount of moisture which it would contain would be just 16 times as great as the same air would contain at 0 when the air is saturated with moisture. So we have here a fact which affords a good reason why strength is lessened by warmth and moisture combined. Dr. Lombard does not seem to have been cognizant of this fact, but it was an observation made long ago, that the lungs are not able to throw off carbonic acid gas and to take in oxygen readily, when the air is saturated with moisture; it is with difficulty that this interchange of causes is made--throwing off carbon-dioxide (CO_2) and taking in oxygen, when the air is warm and is saturated with moisture. When we breathe air at 0 it is warmed in our lungs, and its temperature is raised to 75° or 100° before it gets out of the lungs, and this gives it the capacity of absorbing about 16 drops of water per cubic foot, but it is but one drop, and it is not saturated, it is dryer when it goes into the lungs. The air may be saturated out of doors and become cool so that it snows; it would not snow, if the air had not become saturated with moisture, and yet, in-doors the air may be dry and drying everything up, and it becomes hungry for water by raising its temperature. So that when warm air, saturated with moisture is taken into the lungs, they are not able to throw off the CO_2 and to throw off the deadly organic poisons which the lungs eliminate; ~~which~~ they are organic

poisons and they are always associated with moisture. Dry air takes away the moisture and the most deadly poisons and ptomaines which Dr. Brown Sequard has pointed out ; the moisture of the air cannot take up this moisture, and hence these poisons are left with it. So we have heat and moisture combined which render the air very illy calculated to support muscular activity, and poisons and CO_2 accumulate in the blood, and these poisons paralyze us and we feel weak and languid on such days.

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SWEDISH GYMNASTICS .

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The special characteristic of Swedish gymnastics is that they are executed without apparatus of any sort.; the body itself is the weight that is to be lifted. When one exercises with Indian clubs or with dumb-bells, he has a dead weight upon which the muscles act; but in Swedish gymnastics, the body itself becomes the weight, and the work is done by putting the body in various attitudes which will cause the muscles to lift the body or a portion of the body .

Swedish gymnastics, although known as "Swedish Gymnastics ", have really existed for many ages. We find the elements out of which the system known as Swedish Gymnastics was created among the Chinese. I have in my library, a work on Gymnastics, in the Chinese language, that was written nearly two thousand years ago. It was sent to me by a friend in China (I will show it to you as soon as it can be brought down from my library.) The book itself was not printed 2000 years ago, but was written about 2000 years ago. The system of exercises exhibited in this work, as you will see by looking at these diagrams, is very similar to Swedish gymnastics. Here are the three different positions of Chinese gymnastics. This position is called, "Wy-Ho-Hon-Choie." I had it interpreted for me when I was in Chinatown, San Francisco. These are exact reproductions (referring to them) of the

drawings which I found in this work, made by Chinese artists. You see these first exercises are not very much different from the exercise known as "Cross-A" in Swedish gymnastics, only it is a little more difficult. The second position, you see, with the hands stretched at the side, is in "Cross-C", only the palms are forward instead of downward. The third position is a very difficult one; the arms are stretched above the head (in this way). Perhaps you would like to try the experiment, so as to see how it is (Position by Class). Here are these two volumes which I promised to show you (exhibiting them). The Chinese begin at the back side of the book to read; everything is reversed in China . Here is where it starts; they begin to read at the bottom, and read to the top of the lines which are perpendicular. From this account, it appears that these exercises were practiced in the Wy dynasty 2275 before Christ. Here is the first figure; it is twofold, and it is exactly duplicated here in the drawing on the blackboard. Here are the three positions. This position is by no means an easy one (illustrating). This position is known as "Star-grasping"; the Chinese name for it, is "Chook-Sing-Wan-Dow." This is one of the most interesting of the exercises represented here. It is called "Star-grasping," because the eyes are looking up, and ~~the~~ hands are ready to grasp a star, and the other hand is brought behind, this position bringing the muscles of the trunk into active play . You see there is a twist in this exercise (illustrating). This movement brings the muscles of the trunk into more active play than ordinary "trunk-twisting" in

Swedish gymnastics.. It is two twistings combined,--a half upward stretch, and lateral twisting at the same time.

The next exercise is a very interesting one; this is called "Chung-Chow-Ling-Chee. This exercise begins as described in the text here. The translator wrote out this description for me, without knowing what it meant: place the hands together in front; extend the hands forward; turn the palms down; close the hands and extend at the sides, like the wings of a bird (illustrating.). Bring the elbows to the side firmly, and press against the sides as in carrying a package. Now suppose you were carrying a package in your hands with your elbows pressed against your sides (illustrating) you would have something like a swimming exercise. This is very much like swimming exercise, and I think it is the origin of many Swedish gymnastic movements.

Here is the "fall-out" movement, partially combining "star-grasping"; it is not quite so high (illustrating),— Head-bending and twisting; arms-upward-stretch; this arm is "upward-stretch,"... with the fall-out position at the same time.

Here is a very hard position; it is called by the Chinese "Defense-against-nine-knives"; that is the Chinese method of describing this position.

Here we have "Knee-bending"; this is described here as a method of falling to the ground. There are other methods which I will show you upon another occasion. Here is another hard exercise,--much more difficult than you get in Swedish gymnastics (illustrating it.).. Here is still another one (illustrating it.)

This exercise was preparatory to the exercise of turning a summersault. Here is another exercise, which is touching the floor. Cross the hands in this way (illustrating) close up the hands in this way, then place them upon the floor, turning the head up. If you try that exercise, you will find that it is a little more severe than bending forward to touch the floor,--very much more severe.

I might mention further,, that there was a Chinese work on gymnastics, which was translated into the French language about a century ago, and this work doubtless fell into the hands of Peter Lingg, who is now known as the author of Swedish gymnastics. He was born about 1766; he was a lieutenant in the Swedish army, was a teacher of fencing, and early in the present century, about 1805-6. he began the development of the system known as Swedish Gymnastics. He continued his work until about the year 1839. He died in 1839, at which time his system was pretty thoroughly developed. About 1813-14 , the government of Sweden became so much interested in this system of exercise, that they erected a building, and established what they called "The Central Institute for Gymnastics" at Stockholm, Sweden. Mr. Lingg was placed in charge of the Institution, and he remained in charge of it until his death .

The Greeks (and I might mention other nations also), as well as the Chinese, have had something of this same system of exercises. The Greeks, for example, had their active and their passive

exercises. Some of their exercises were using the spade, driving four horses at once,--and this they considered a very active exercise; and they practiced very much in chariot driving as a means of development of physical strength: holding weights in their hands with their arms extended,--holding weights at arm's length so long as it was possible to do so ; climbing hills; climbing ropes; walking, and stretching the legs,--walking somewhat after this fashion (illustrating); something like "walk-C" in our walking-drills; walking on the toes, and walking in the deep sand, or in the soft earth, or other modes of exercise. These are all effective exercises, and they were practiced by the Greeks in very early times. They had also their passive exercises, of which Oseiribos gives us an instance, -of rocking a child in a cradle, or tossing the little one in the nurse's arms. This was a passive exercise which was considered healthful. Riding was considered a healthful exercise. They had a regular system of exercise which was very nearly developed among them.

Out of these various elements Mr. Ling constructed his Swedish gymnastics. In Sweden this system has become so popular that it is now practiced in all the schools of Sweden,--in every city, town, or country school, even in small, private schools, as well as in the public schools, in boys 's schools, and in girls' schools (for these schools are separate), every institution of this sort in Sweden is provided with Swedish gymnastics. These institutions are scattered all over Sweden; the whole people are so thoroughly convinced of the utility of Swedish gymnastics, that

they are considered as really a Part of one's life. Every boy and girl that goes to school is trained in Swedish gymnastics. A very careful supervision is kept over this work in Sweden. Prof. Hartelius the director of the Central Institute, visits every school during the year; he is liable to drop in at any moment: the teacher does not know when the director is coming, so that he cannot make any special preparation for him, and if he finds a teacher who is not up to the mark in gymnastics, that teacher is immediately dismissed, and cannot teach school again, until he has taken a post-graduate course at the Institution at Stockholm. It is considered absolutely essential for a teacher to be able to train students in gymnastics, as well as to be able to teach them in grammar, arithmetic, geography and other subjects which are usually taught in schools. Certainly this ought to be a means of great good to the Swedish people; and we may see the benefits of it among the Swedish people. I am sure I saw more handsome, fine looking men on the streets of Stockholm than in any other city of Europe. I think there is no class of people who are so finely developed as the Swedish people,--and we may find the evidences of the benefits of this system even among those who are ground down by hardships and poverty.

Swedish gymnastics aims at equable development of the whole body. It does not endeavor to make the muscles large and hard,--it does not seek to make a large hard muscle -but it seeks to make the muscles strong and elastic. This system of exercises aims to expand

the cavities of the body, the chest and the waist, and to lengthen the levers of the body. These are the two great objects of this mode of exercise; it is a system of exercise which requires constant attention. One can swing Indian clubs in a very routine sort of way, but he cannot practice Swedish gymnastics--toe-standing, deep-knee-bending, and head-twisting alternately right and left, without thinking about what he is doing. When one undertakes exercise of this sort, he is obliged to co-ordinate his muscles. You remember when you first tried this exercise, deep-knee-bending, with alternate rotation of the head from one side to the other. If you were not careful, you found yourself tilting one way and the other; you were not able to hold the whole body under perfect control. How many of you can do that exercise now, without wobbling or swaying the hips back and forth. This exercise is one of the best means of securing good muscular control. One may practice calisthenics, dumb-bells, lifting-weights, or almost any forms of ordinary forms of light weight gymnastics, without acquiring good co-ordination of the muscles, but he cannot practice Swedish gymnastics and acquire any great skill in them, without developing his co-ordinating ability; so that is one of the excellent things which Swedish gymnastics accomplishes.

The use of heavy gymnastics tends to make the muscles hard, but at the same time, they have a tendency to make the body stiff and ~~burdensome.~~ cumbrous. One observes this in animals which are employed for heavy work,--the cart-horse, for example; he cannot run very

fast; his joints are cumbersome; his muscles override one another and restrict the movements of his limbs. So in athletes the muscles by their rigidity and excessive developement, restrict his movements. In South America, the travellers are carried over the mountains on the backs of porters,--even over places which are inaccessible to the feet of animals. One traveller who weighed 150 pounds together with his baggage which weighed some 40 or 50 pounds more was sometime ago carried by a porter 20 miles, the porter only stopping to rest once, leaning his back against a rocky wall in doing so. The traveller asked the porter if he wouldn't get down,--"O no" said the porter, "I wouldn't dare to try to bend down to unload." His knees were so stiff that if he bent down and unloaded the man, he was afraid he would be unable to regain his perpendicular again with his load. The poor man though very strong, was like a mule whose knees were stiff; the muscles of his limbs had become enormously strong, but his knees had become stiff and rigid. This is one of the effects of heavy gymnastics. So that men as well as animals may be strong--exceedingly strong, but at the same time may be wonderfully lacking in flexibility. Swedish gymnastics aims to secure the greatest possible latitude for the movement of our limbs, as well as elasticity and strength of muscles. Swedish gymnastics if sufficiently practiced, and practiced for a sufficient length of time, renders the body strong, and graceful in movement and carriage, while heavy gymnastics are useful only for the purpose of developing certain sets of muscles. Swedish gymnastics are therefore superior to

heavy gymnastics, as it is a means of developing the whole body. I think there is no system of gymnastics so efficient in modifying the vital processes as the Swedish gymnastics. The arm movements, the chest movements, and exercises of this sort act powerfully upon the respiratory organs, and thus we have respiration greatly aided. Other exercises act upon the abdominal organs and aid the digestive organs; the vital processes of the body are stimulated to activity and wonderfully aided by these exercises, and to a far greater degree than by any other system, as a system. The system of Delsarte, for example, may be termed æsthetic gymnastics. It is a most excellent means of cultivating physical expression, and of cultivating co-ordination, but it lacks something in the energized movements; there is not a sufficient amount of energized activity to effect powerfully the vital processes of the body. Swedish gymnastics supplies, in this respect, what the Delsarte system lacks. The Delsarte system is not intended as a mode of healthful exercise, but as a mode of developing expression, and the ability of the body to express its sentiments.

One of the best elements of Swedish gymnastics, is the fact that ~~the~~ progression is most constantly carried out, in every part of the body. Even the turning of the hand has its own particular place in a graduated system of gymnastics, whether the course of exercise begins with the child or with the adult. .It begins with the simplest primary means, and gradually progresses from these

simple movements to the most difficult. I think the following primary movements may be considered as the fundamental movements or positions in Swedish gymnastics. I will give these to you to study, as a foundation.

1. In the first place, standing: Standing is the primary and the fundamental position in Swedish gymnastics,--correct standing. We will begin at the feet. They must be placed at an angle of 90°, and why ? Because this gives a larger base to support the body, and also because in the movements of the feet--foot-placing, fall-out, etc., the foot is already placed in the proper position for moving in its own direction. . If the feet are only placed at an angle of 60°, ~~your feet~~ they must be placed a little farther apart for the fall-out, which is at an angle of 45°; one half of the front line and side line of the body should be in this same angle, and the other half in the rest of the right angle so that the feet would be 90° apart, each foot 45 from a line drawn straight up from the body so that the angle of the two feet is 90°. While the feet are at this angle, the heels must touch. Next, the legs : The knees should be well set back, and the muscles of the legs energized; the hips should be well set back, because by setting the hips well back, the proper curve of the spine is secured. The head must be so placed that a line started just in front of the shoulder, will fall at the balls of the feet. The shoulders must be drawn back,--not drawn up in this way (illustrating), as the majority of persons will do, when you ask them to put their shoulders back; they must be brought back to a level

without being elevated at all, and without strain; the head must be poised vertically upon the shoulders, and the chin well drawn in. So much for correct standing.

Now, starting from this position, correct standing, we have a variety of standing positions,--in fact the primary positions may all be considered as standing positions,--nearly all of them may be so considered. The first and simplest of them is wing-standing, the hands upon the hips, the thumbs behind, crossing the hip bone, elbows in line with the shoulders and with each other, and the wrists straight; the wrists should not be dropped down in this way (illustrating); many persons fall into this habit; the wrists should be straight; this energizes the arm; when the wrists drop, the shoulders also will drop; if the wrists are energized, the shoulders are energized. This is energized standing. Keep the shoulders in the same position; the whole body is kept in the same position,--wing-position--there is no change. The position is not like this (illustrating); this is radically wrong. The fundamental thing to observe, in teaching Swedish gymnastics, is to insist that every position shall be exact; every position should be exact. Any exercise taken in a wrong position, is damaging instead of beneficial. Next we have" think-standing," where the hands are placed at the forehead, and the elbows on a line with the shoulders. Next we have shoulder-standing: The body, shoulders and chest are all kept in the same position, but in taking this position, the arms are brought up, and then brought forward. In shoulder-standing the hands are placed at the top of the

head and clasped together, the elbows not allowed to fall forward in this way, but still kept back in line with the shoulders, and the whole trunk kept in an energized position.

Next we have "neck-firm" (illustrating.) Here you see we start at the hips and stop at the back of the head--"hips firm"--we have now, "wing-standing," "think-standing", "shoulder-standing", and now, "neck-firm". "Think-standing", and "shelter-standing" are not ordinarily used, though they can be used if a person wishes to carry out the whole course. You see the work of the exercises greatly increases--hip-standing, "think-standing, shelter-standing, hips-firm, or neck-firm" standing--

Q. (Eld. Wakeham:) Is that called "rest-standing?"

A. Yes, that is the proper name for it,--rest-standing, with tips of the fingers touching the back of the neck. There is a gradation, you see all the way through; but commonly we only use the wing-standing, and the neck-firm-standing.

Next, the arms begin another series of positions, the first of which is "bend-standing", with the body and feet in the same position, the elbows being kept right where they are at the sides without moving the elbows at all. The arms are simply flexed forward, until the tips of the fingers slightly approximated, touch the shoulders. The constant tendency is to change this attitude, to curl the fingrs up, or to turn the elbows out, or to commit other faults; but the arms must be kept right where they are; the fore-arm bends forward until it touches the shoulder in bend-standing .

Next we have what is termed for convenience, "Cross-A" . In this movement, the arms are first brought forward, and then the elbows are raised to a level with the shoulders, and the fingers with the palms down; the hands should be at the height of the shoulders, the ends of the fingers touching, and the elbows well brought back; this is "Cross-A.".

Now for "Cross-B": The palms of the hands are turned inward; the elbows are in the same position, the fore-arm forming a right angle with the arm.

In "Cross-C" the arms extend sideways with the palms down. Cross-C is reached in two ways: if the order is "Arms sidewise stretch," it would first be, forward-bend, sidewise stretch. If the order is "Arms sidewise rest," the arm is simply raised slightly from the side, until the arms are in line, as high as the shoulders, and stretched out as far as possible,--the arms should be stretched out just as far as possible. In every movement in which the arms or legs or any part of the body are stretched , it should be stretched just as far as possible; this increases the length of the levers of the body; this stretching out of the arms stretches the muscles of the body, and maintains their elasticity. If the order is, "Arms sidewise fling"," the arms are brought forward into the "Cross-C" position; if the arms are simply rotated with the palms up, this is "Cross-D." The arms are half-flexed in this position, because the fore-arms must be vertical, and the arms must be in line. These are the different crosses.

Then we have the "Reach-stand." The arms are brought up ~~here~~ here, (illustrating), the same as in "Cross-C"; the arms are brought forward and then thrust out straight; the palms must be turned out at the height of the shoulders, the width of the shoulders apart, and the fingers kept together. If the order is, "Arms upward rise", the arms are slowly raised to this position. If the order is , "Arms forward fling,", the arms are brought suddenly into this position.

In "Stretch-stand" the arms are first brought forward, and then straight up. Old persons can seldom do this, because their muscles are so much developed that they hold the arms down, but by continued effort, the arms can be kept straighter and straighter. In children they can be easily developed, but there are few men who can reach their arms straight up, because the muscles of their shoulders have become so much developed. Here is work that is difficult to do. Now let the young ladies put their arms up: ~~there is scarcely one in the whole audience.~~ (Arms up). There is scarcely one in the whole audience, that has not the arms up straight. This is because the shoulder-muscles are not quite so strict, and do not hold the arm down. It is the shoulder-muscles that hold the arm down. A man can reach his arm down just as straight ~~as well~~ as a woman, but when he comes to raise it up, he cannot get it exactly in line with the fore-arm, because of the great development of the muscles. Stretch-standing is reached in 5 different ways.. If the order is "Arms upward stretch,", it is always in this way, (illustrating). If the order is, "Arms sidewise-rest," upward

stretch", then they would come up in this way (illustrating). If the order is, "Arms-sidewise -stretch," then they would have to come up in this way, the arms being raised until you come near the horizontal plane, and then the palms are turned up, and the arms brought up as nearly as possible to "Arms-sidewise-fling" (illustrating.) In "Arms-forward-rise," the arms rise to the proper position, and then they are slowly lowered; then "Arms-forward-upward-fling," and then the arms are thrown at once into this position .

When the knees touch, and when the toes are brought together, we have what is called, "Close-standing." You are most of you familiar with these terms, I hope, but I thought I would run them over with you. Close-standing is an exercise for the rotary muscles; it exercises the muscles which are attached to the legs and thighs, particularly. This closing the legs is a useful exercise for correct standing. When you have a class who are not in a proper position, they are out of line; their feet are not at a proper angle. You draw their attention to their feet by a few such exercises as these . .

In "Stride-standing", the ~~heels~~ feet are placed one foot-length from the heel; you can turn your foot and see where the toe would come,--turn one foot until it is directly outward from the heel, notice where the toe is, and then place the heel there; the foot must be separated so that the ~~heels~~ feet are two foot-lengths apart. This exercise is usually taken with the heels too near together. In this position, turning first one foot and then the

other in this way, the feet are brought to the centre of the line, being all the time kept at the same angle.

We have another position known as "Walk-standing?". We have "A-walk-standing, in which one foot is moved in its own direction two foot-lengths from the heel (this exercise is not usually taken until one has advanced quite a distance in the course); the knees are not bent at all; we don't put the feet forward in this way (illustrating), nor in this way (illustrating), but we move the feet forward in this way (illustrating), letting the weight of the body fall exactly midway between the two feet; the body must be kept exactly poised between the two feet .. We have right A- walk-, and left- A-walk., the foot is moved directly forward two foot-lengths,--pretty well forward, keeping its direction all the time, so that the weight of the body falls half-way between the two feet, this is B-walk .If the foot is crossed over the other foot, so that it is carried into the plane of the opposite foot in this way (illustrating),, this is C-walk. The right foot is two foot-lengths in front of the heel of the left foot, and in the same direction with the left foot. When the foot is carried forward in its own direction, that is A-walk; when it is carried in the direction of the other foot, then it is C-walk; when it is carrid directly forward, that is B- walk.

We have another form of walk-standing, which is termed "C-walk-standing.—I have just given you an incorrect statement: C-walk-standing is with the feet close together, and then one foot

is carried two foot-lengths forward (illustrating); it is a hard exercise. In A-walk-standing, the foot is moved in its own direction, and in B-walk-standing, the foot is moved directly forward, as I have stated. In D-walk-standing, the foot is moved forward, and carried into the plane of the other foot.

Next, we have "Toe-standing", with which you are all familiar. The order is, "Heels-raise". In this exercise, the heels are to be kept together; that is a point to be kept in mind in heel-raising. Now, generally, in raising upon the heels, the tendency is to separate them, but the moment the heels are separated, the shoulders come forward, and, naturally, the knees flex slightly; whereas, if rising upon the toe, if the heels are kept together, this act keeps the spine forward and the whole body energized. Remember, the heels must be kept slightly together. Now try this experiment. (The class rise). Take a proper standing position, feet at right angles; now, "Heels-raise", and hold this position a moment. How many find their heels together ? (Hands up.) I see some of you didn't put your heels together. Now, "Heels-sink"; take seats ! Please bear this in mind in this exercise, that the heels must be kept together; if they are not kept together, the body at once gets out, of position.

"Knee-bend-standing" is another of the fundamental exercises. In this exercise, the knees are bent until the legs and the thighs form a right angle. This is knee-bending. Then there is "Deep-knee-bending; the knees bend until the body sinks as far as possible.

Half-hook-standing: The knee is simply raised forward, the body inclines slightly toward the left side. If the right knee is raised so that the weight will fall over the left foot; and the opposite occurs in case the left foot is raised; the body is still inclined to the left side, and then the knee is raised with the toe bending down; raise it until it forms a right angle; the knee must be kept perfectly straight,--no wobbling about, but the body must be first poised, and the knee brought directly up the toe pointed down, so that the foot will be suspended. This is half-hook-standing,--sometimes called "Half-crook-standing." We have "A-half-hook-standing", then there is "B-half-hook-standing". Each foot is raised, and the leg is then thrown forward as far as possible; first, raise the knee; throw forward the leg; flex the leg for a return position; the leg should be made to form, as nearly as possible, a right angle with the trunk of the body and the other leg.

Bow-standing is simply to have the body bent backward; the bow is made by the body from the heels to the back of the head; the whole body is bent, the head not changing its relation to the trunk. This position is produced by throwing the center of the body forward so that the head and the heels are approximated, but the muscles of the neck and shoulders are kept firmly set.

In "prone-standing", the body is bent at the hips, the muscles of the back being kept rigid, (illustrating). When this position is carried as far as possible, then it is downward-bending; the muscles of the back are kept perfectly rigid, the arms are stretch-

ed up and the body is bent forward as far as possible; that is downward-bending; but you must get below the horizontal plane. One needs a gymnastic dress to do this exercise properly, in order to strike the floor without bending the back. It requires long training for persons to accomplish this exercise, unless they begin young.

Stoop-standing: In stoop-standing, one begins with forward-bending, (illustrating), as in prone-standing; then after the body is thrown forward a certain distance, the muscles of the back relax, the shoulders and the head drop down, and then we have the "stoop-standing." Stoop-standing is never taken, except after bow-standing, or backward-bending. After the backward trunk flexions, there should be, immediately following it, the stoop-standing, and this stoop-standing should not be taken at any other time than after the backward -bending, because the muscles of the trunk are greatly compressed in backward bending, and if this ~~is~~ have continued for a long time, the result might be injurious ; so, in order to relieve this strain, the bow-standing should be immediately followed by stoop-standing, so that the abdominal muscles and organs may be relieved of the strain.

The "A," "B," "C," fall-out are derived from the walk-standing., the space between the feet being three foot-lengths instead of two. In "fall-out-A", the foot is carried forward three foot-lengths, the knees are bent, and the shoulders are kept parallell with their positions before, and the trunk of the body is kept parallell with the leg; the plane of the shoulders must be parallell

with the plane of the shoulders in the standing position; this is the exercise (illustrating it.), with the head trunk and leg kept in line ; the tendency will be to take this position, but the head and neck-muscles must be well contracted, and the trunk must be kept firm, so that when the body is carried forward, the head, trunk and leg will be in line. In the "B-fallout-" the foot is carried directly forward in the same way as before--three foot-lengths ; and in "C-fall-out" we start with close-standing; put the foot out thre foot lengths, keeping the rear of the heel upon the floor,--it is not easy to do.

One more fundamental position is prone-falling: In prone-falling, one falls upon the floor, sustaining the body upon the ~~heels~~ hands and the feet,--sustaining the body by the hands either inward or outward; one falls upon their hands in this way (illustrating); they sustain the body upon the hands and feet, the head trunk and legs being kept in line, so that there is an incline all the way from the head down to the heels. This exercise is very seldom used; it is not very serviceable; it is only used in advanced Swedish gymnastics. It is rather a hard exercise, and intended only for advanced students.

Starting from these different primary positions, a very great number of combinations may be made. For example, we have 27 different fundamental standing positions. Now we have 5 different trunk movements,- forward-bending, backward-bending, right-and-left-lateral bending, flexion, and rotation,--indeed we have six,

because we have rotation to the right and to the left. Now if we combine these different trunk movements with the 27 standing positions we will have 162 movements. Let us see how many different movements we may have : We have 12 different arm movements; combining these with the standing positions we have , by multiplying 162 by 12, 1964 movements,--

Q. (A lady.) Do you call downward-reach one movement ?

A. Yes,--that will make 13; multiplying 162 by 13, we have 2106 different movements. Now we have six head movements --forward bending, backward-bending-, lateral right-bending and left-bending then we have rotation_right, and rotation_left. Multiplying 2106 by 6 , we have 12636 different movements, all of which we get from these fundamental positions, and we shall have a much larger number than this as soon as we introduce other combinations.

So you see we can have an almost infinite number of physical exercises, and this renders the Swedish system the most fertile in resources of all systems. There is no ~~other~~ system which combines such a vast number of positions and such a vast variety of exercises as the Swedish gymnastics. There may, indeed be hundreds of thousands of different exercises, when you come to figure up all the different possible combinations, but I have given you the only ones which are necessary. You see by combining the few simple exercises which I have given you, we have more than twelve thousand different exercises, and by just keeping these fundamental positions in mind, you will have all these different positions at command. This fact gives this system a superiority over all

others in another way,--the readiness by which it can be kept in mind, and kept at command for usefulness .

Now these exercises are all classified; these twelve thousand exercises (and you can imagine many more) are all classified into different exercises for regular use. These classified exercises, are, first, introductory exercises, or "order-exercises," as they are sometimes termed; they consist of a few simple movements for the purpose of getting the muscles under command, getting a proper standing position; also a few respiratory exercises which I think should always be included in these introductory exercises which bring the air-cells of the lungs into full and active play.

Then the second class of exercises ;- backward flexions: ~~In~~ these backward flexions of the trunk are really exercises of the abdominal muscles. The muscles of the back should be used at first, in order to give the movement a little start; after the movement is started, the back muscles no longer need to act, but the abdominal muscles must hold the trunk from going too far back. So backward-bending is an exercise for the abdominal muscles; when you bend backward, it is not the back-muscles but the abdominal muscles that are at work. In the second class, the movements are called "heave-movements". The purpose of these movements is to expand and develop the upper part of the chest. All exercises in which the arms are brought into play,--all the exercises in which the arms are actively employed and are well stretched, are heave-movements. Four of these are balancing movements; half-hook-standing is a balancing movement. These balanced-movements are

always slow movements, and they are exceedingly valuable. They are made to follow the heave-movements.

Next we have the shoulder-blade-movements,--exercise of the muscles which lie between the shoulder-blades; by these exercises the muscles are made to act vigorously. The movements, crosses "A" and "B" are particularly shoulder-blade movements; it is impossible to hold the arms in the position "cross-B", without exercising the shoulder-blade muscles, as well as many others. Movements in which the arms are carried upward from their original position to the horizontal position, -to the cross-C position, or the cross-D position, are shoulder-blade movements.. These exercises are particularly useful, as shoulder-blade movements are movements in which the arms are placed in a half-arching and a half-stretching position, and then made to alternate with these position. (Illustrating.) These are powerful shoulder-blade movements, and when these exercises are made somewhat more complicated, we have the shoulder-blade muscles brought into still more active exercise.

6. The sixth class of movements are back-movements,--movements which bring into play the muscles of the back. These are forward flexions of the trunk . . The arms being placed at the back of the neck, the order being, "neck-firm", forward-bend to prone-standing": in this position we have a powerful exercise of the muscles of the back and shoulder-blade muscles which flex the back. Lateral movements of the trunk,--side flexion and rotation

to the right and to the left--lateral flexions of the trunk and rotating to the right and left; thus we have rotating and flexion combined. These exercises bring into play the muscles of the trunk.

8. ~~There are eight~~ Classes of ~~movements~~ exercises which are jumping-movements,--forward-jump, backward-jump, etc.

9. ~~Nine~~ Classes of exercises which are slow leg-movements, placing the feet in various positions, known as "foot-placing". In the foot-placing series of exercises, the foot may be placed as follows: It may be placed in its own direction, then moved backward, and then forard again, and then crossed, and these same exercises are then taken backward in the direction of the opposite foot, and then directly backward; then the foot is thrust backward in its own direction. These foot-placing movements are taken slowly, as well as the fall-out positions which are sometimes employed with them or in place of them.

10. In No. 10, we have another class of exercises which are respiratory exercises, the simplest type of which is, arm-raising,--arm-raising -sidewise--arms-circumduction either in a small circle or in a large circle. These movements may be combined with some of the slow movements, such as knee-bending, either in the ordinary standing position, in the stride-standing position, or in the "A" walk, or in the "B" walk, or close-walk. These breathing exercises may combine with these leg-movements.

One of the most useful of these combined movements, is heels-

raising, arms-raising and deep-knee bending, combined with breathing,--arms raise, knees bend, heels raise,--etc; now we breathe in as the arms rise and the heels rise. Hold the breath while in deep-knee-bending; let the arms rise as the heels sink. This is a most useful exercise for the respiratory organs. These exercises are useful in taking what is termed in Swedish gymnastics, "a day's order for work". This is one of the advantages of the Swedish system,--that the various exercises composing a day's order are arranged in such a manner that one exercise counteracts any possible baneful effects which might follow the preceding exercise. Preparations are made in every exercise for the succeeding exercise. See how this works: First, we have introductory exerices which bring the muscles under control, and secure a correct standing position. The breathing exercises which bring the lungs into full play, and which brings to the long-distance runner the condition of "second-wind." They have the effect to get the muscles all into active operation.

Next we have backward flexions of the trunk, these exercises immediately followed by stoop-standing. These exercises repeated a few times bring the muscles of the trunk into very active play, and gets the heart to palpitating a little faster, and thus it begins to excite the circulation. Now if we immediately follow this exercise by heave-movements, by arms-raising, arms-upward-fling, for a number of times, together with arms-upward bend- and upward-stretch, repeat these a number of times, and by

the time this exercise is concluded, the heart and the lungs will be excited and the respiratory movements will be quickened. Now it is important to have another class of exercises which will slow down this heart- and lung movement and prevent fatigue of the cardiac and the respiratory muscles. So we have the balance-movements coming next. These balance movements are slow movements, in which the excessive activity of the lungs is restrained. In raising the knee and balancing, one restrains his breath; he is able to do so in this way. One could not hold the knee up, standing in this position and bending at the same time . So this effort to restrain breathing, quiets down the lungs, and quiets the heart; so the balance-movements come in naturally, you see, after these active movements and active arm-exercises.

Next we have the "shoulder-blade exercises, and we can begin again with the exercises upon the upper part of the body,--first, its ligaments. Next comes movements of the back,--backward-flexions.. After this we have movements of the upper part of the chest which excite the breathing organs and the heart. Then comes exercise of the legs, down at the other end of the body, and these slow leg-movements always have the effect of quieting the heart and the lungs.

Then come back to the upper part of the body,--to the shoulder-blade movements, in which the muscles between the shoulder-blades really act like a powerful heave-exercise upon the other movements. . These shoulder-blade movements are followed now by

the opposite sort of movements from what we had before,--back-movements, prone-standing, commonly done with the hands upon the hips, wing-standing, and wing-prone-standing, as it is termed. By this time the exercises have become a little more vigorous; the heart and lungs begin to act a little bit, and we must have a little slower movement, and this we have in the lateral movements,--right-and left-bending, lateral-bending, keeping the head in the proper position in the twistings of the trunk. These are slow movements which quiet down the heart in some degree.

The next movement is a more active one,--jumping exercises, in which the muscles of the legs are brought into active play; all the muscles of the trunk are made active, and the heart and lungs are brought into a very vigorous activity. by these jumping movements ; so that we must immediately follow these exercises by slow leg-movements and foot-placing which quiet down the heart and lungs, and finally end up the exercises with respiratory or breathing exercises which rest the body, purify the blood, and put the individual into the best possible condition for rest. If the exercises are taken in this order, the patient will not complain of fatigue, when the muscles which have been constrained by a backward movement, are relaxed by a forward movement immediately afterwards. When we are going to use the muscles of the upper part of the chest, we must precede that exercise by the stretching of the abdominal muscles, which secures a freedom of the movement of the chest, so that the muscles of the upper part of the chest

are not so much stretched as they otherwise would be., in the execution of the heave-movements. So that all through the exercises, each successive exercise undoes the evil which a previous one may have done, either by quickening the lungs and heart, or resting the lungs and heart, as the case may be .

One of the greatest uses of the Swedish gymnastics, is its utility for women and children. There is no system of exercise so valuable for women and children as Swedish gymnastics. It is useful for children because it secures the greatest equable development of youth or of children, and it is impossible to injure them by carefully graduated orders of the Swedish gymnastics, and the benefits of this were shown by Prof. Hartelius, who states that he has never seen a case of spinal curvature in children who had taken Swedish gymnastics from childhood up.; that he had never seen one case of spinal curvature. Prof. Hartelius has a great number of such cases under his treatment; it is a large portion of his professional work. When I was studying Swedish gymnastics with him ten years ago, I assisted him daily in the treatment of a great number of these cases of spinal curvature: the students were always expected to work, and he had a number of patients constantly under treatment, and I learned from him the very interesting fact that there was not a single case of spinal curvature in children who were reared in schools where Swedish gymnastics were carefully carried out. Since that time, Swedish gymnastics have been introduced more and more thoroughly in Sweden, until now they are to be found in every school in that country.

Women are particularly benefitted by these exercises because they reach the weak points in the bodily structure of women,--points which are likely to be neglected in their every-day work. Women are more or less sedentary in their habits, and the muscles of the trunk are weakened in consequence of these sedentary habits, and with but little exercise; and the vicious modes of dress which civilized women have adopted, confine the muscles of the trunk so that they are not able to act freely. Swedish gymnastics comes in here as a physical savior for women, in this respect. Women complain, on abandoning their old modes of dress, that they can't stand up; they have depended so long upon artificial stays, that their muscles have become weakened so greatly by these disadvantages , that they really need something as a support on abandoning their old modes of dress; but here, as I said Swedish gymnastics comes in as a physical savior, for the purpose of developing especially weak muscles. How many thousands of women complain of weakness of the back; their backs are so weak that they have to have them propped up. Now the Swedish gymnastics will do the very thing necessary for these weak backs; they will make these weak muscles strong, and support and strenthen the abdominal muscles and organs,--liver , stomach, and kidneys which have been carried out of their proper positions through weakness. and pressure.

I think we need a thousand missionaries to go out and preach the gospel of health,--the gospel of physical culture; it should be preached in every city , village, town and community in the

United States. I am glad some of you are interested in this subject, and I hope you will get a sufficient understanding of this subject, that you will not lead those to whom you teach very far astray. It is possible to teach much error, however, in teaching Swedish gymnastics; and it is very important to get as near the truth as possible on all these questions, and I hope you will be able to get a good hold of this subject at this time,--although I am aware that you are under a sort of "cramming process" just now--still I hope to get the most of this subject into a book after awhile, and then you can study it at your leisure,--which I hope you will do .

SANITARIUM PARLOR LECTURES, Jan. 14/92.

How to Dress Hygienically.

J.H.Kellogg, M.D.

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Good morning, ladies and gentlemen: I believe I promised to talk to you this morning about the hygiene of dress. I think this is a question that ought to be publicly discussed; it is getting to be a question of a good deal of interest to civilized people. The fact has been discussed, and I think it is coming to be recognized that there is a serious modification being made in the human figure. Many civilized people, -- civilized women at any rate--are deformed. I am going to show you some diagrams pretty soon which I think will assist you in awakening a conviction that the average civilized woman is deformed ,--and the cause of this, I think, must be attributed largely to the civilized dress.

Let us consider what the human figure is: I think the assistance of a skeleton will be advantageous,--here are the soft parts, the nerves and tendons and various organs contained within the cavity of the body. The skeleton is the foundation or frame work. Now by means of the skeleton and the muscles connected with it, several cavities are formed , so you might say there are two great cavities--the skull and the trunk . The cavity of the trunk is divided by a membrane partition called the diaphragm, which lies between the chest and the abdomen. Then we have another artificial division,--the pelvis. So that really there are two great cavities in the body,--the skull and the truncal cavities, because the diaphragm moves up and down in such a flexible manner, and is so completely moveable, that whatever affects one cavity affects the other;

whatever increases the pressure in one cavity increqses it in the other, so that we may say that these two cavities are one, and there is in the body, as I said, the cavity of the chest, and the cavity of the skull.

The cavity of the skull contains the brain: The brain may be said to have an extension in the spinal cord , which sends out branches ramifying to all the various organs of the chest and the abdomen. We have a very important set of nerves called the sympathetic nerves, which lie chiefly within the trunk. The Spinal cord is within the spinal canal, protected by the bones. The sympathetic nerves lie within the cavity of the trunk, and constitute a very important part of the organs which occupy this part of the body.

Now let us notice the way in which these organs are arranged within the body, or the truncal cavity of the body. First, on top we have the lungs, then the heart beside the lungs. There are large bloodvessels which you see here; here are the large veins and the large arteries; here are the vessels which convey the blood from the heart, and retnnn the blood to the heart. Then we have below this the diaphragm,--a moveable organ , which, as I said, moves up and down,--which I can illustrate better with this model. Here is the diaphragm, and here is the trunk. (Pointing out different organs of the body.) Here you notice the stomach lies right up under the diaphragm, andxhxxx the liver also lies under the diaphragm. Then there are the bowels. Herevare the liver and the kidneys, which lie right under the liver. Notice the arch of the diaphragm here, also the stomach in position. Just behind the stomach is the pancreas another organ which lies crosswise. Notice that the liver when in posi-

tion comes entirely above the lower border of the ribs. Here is the last rib, and the liver lies entirely above this lower border. Also notice that the liver lies chiefly upon the right side, extending very nearly to the opposite side, but it does not quite reach the left side. Below the stomach and the liver are arranged the bowels, bladder, and other organs which fill the pelvis.

Now please notice the shape of the body,--the conformation of the ribs. Here are the ribs;you notice that they are connected with the breast bone,--seven of them, (counting ribs,)--

the five lower ribs are connected with these seven ribs by cartilages--with the exception of the two lower ribs, which are floating ribs, which are connected with a single cartilage. By this means the ribs are all connected to the breastbone, so that all except the lower two ribs are connected with the sternum, three or four of the lower ribs being connected with a single cartilage, --instead of each one having a seperate cartilage each connected with a single one, and this cartilage is flexible; they occupy the lower half of the chest cavity--that portion which encloses the abdomen. Here are the lungs coming down to this point here. Now this portion of the organs in the chest which includes the stomach and the liver and the other important organs which lie in this arch of the lower half of the truncal cavity are moveable.

Now notice the outlines of the body . You see there is a genuine curve here,--this model represents the Venus de Milo; (exhibiting model.) You notive that these curves are not abrupt. The figure bends forward and that makes a slight de-

pression of the epigastrium, but there is not a marked protrusion of the abdomen, only very slight.

Now as to the influence of dress: I have given you here a very rough outline of the body and of the direct influence of dress upon the body. I have stated to you that most civilized women are deformed, and I think we will find the principal cause of this deformity in dress. Now let us see how dress may affect the body in deforming it: I have a number of outlines here which I have prepared for the purpose of showing you some of the consequences of unhealthful dress. First I will show you this female form;(referring to chart.) This is an outline of a correct figure. You will see that thee is a strong curve in the back and that the anterior line of the body is a convex line; there is no dipping in here at the waist, no "waist furrow," as it is familiarly called,--I am constantly saying to my assistants, "put down the waist furrow",--there is a flattening of the chest right here, (indicating it.) Now you would not suppose that these were the same persons;(exhibiting figures) This is a "before" and this is an "after," picture. This is the effect of gymnastic exercise. In this case the person has suffered from constriction of the waist. This represents the result of several months gymnastic training and correct dress. I show you this for the purpose of showing you what a correct figure is. Now how does bad dress effect this change? I am satisfied that bad dress does effect this change because we find that by correct dressing we have the figure corrected. This

This represents the young woman who had become crooked before she discovered it. These mothers know the course that is usually pursued with reference to the figures of girls about ten or

twelve years of age,--here are the outlines of such a girl;this is a convex line--you will find the same large hips, but when the young woman comes to be twenty years of age, for example, then the figure begins to get out of shape,--it begins to dip in at the center,and then these deformities which you see here begin to appear right away. (Indicating.)

Why is it possible that dress should have such an effect upon the figure? It is done, first, by the breaking down of the body by the constriction of the waist. Now let us notice how the constriction of the waist breaks down the figure: In the first place, simple constriction of the waist, you see, would change this line and that would cause a dipping in at the waist line by simple compression. Notice the compression of the ribs here at the sides and in front where they are most compressible, but this has the effect of throwing the spine backward. The compression of the ribs would have the effect to force the spine back because the greatest strain would be brought upon the ends of the ribs not attahhed to the breastbone; the upper ribs are pressed against the breastbone so they are not so easily pressed back but when this compression of the ribs is brought to bear upon them the spine is thereby pressed back. So you find, as a result of waist compression here, a hump of the spine . You will find also as a result of compression of the waist, a posterior curvature of the spine. The spine you know is made up of separate joints, and is extremely flexible so as to make it possible for it to move about and to turn and twist it in every possible way , but any compression of the waist ribs which are attached to the sides of the vertabrae

has the effect of producing a curve; instead of a strong anterior curve up, you get a strong posterior curve; (referring to chart.)This spine as represented here is not correct ; it is borrowed from our anatomies, but it is wrong. Anatomists study the human frame as they find it, and not as it ought to be,- for instance in gray's Anatomy, in the description of the human figure it is stated that in man the outline of the waist is a convex line, and that of woman is a dipping in at the waist and a protrusion at the abdomen. This is not correct, for I have often found that this is not the case. Savage women do not have this waist furrow,--this abnormal prominence at the abdomen which you see here. This protrusion of the lower abdomen is in part due to the compressed chest, and the consequent posterior curvature of the spine . You noticed that when the spine is curved back, the hips are thrown back, flattening the deformed waist at the middle. Now constriction of the chest produces just this deformity .

Now these exterior deficiencies are significant of still greater consequent changes within. The simple change of the outside contour of the body may not appear very material or very important, of themselves, but these external changes are significant of far more important changes within the body. These putside chahges are not esthetic or graceful but ~~and~~, as I said, are not themselves of any great significanee, but the result of the internal changes are of ~~the~~ most serious significance, How? Because in consequence of these internal ~~xkx~~ deformities the organs cannot do their work well. To illustrate: Suppose you take a clock and take a wheel out and lay it away some where else,--do you suppose that clock will keep as good time as before? It might run on, after a fashion, but it would run either

too fast or too slow,-- but it would not go right; it is so with the body, to some degree. Each organ has its own peculiar place as well as its own particular use in the body, and it cannot perform its functions ~~nearly~~ as efficiently when it is moved out of its place as when it is in its proper place. Suppose you laugh too hard, or yawn too freely, and dislocate your jaw,--it might slip out of place by that means,--what would be the result? You would have to laugh or yawn all the time,-- the mouth would be entirely open, so you could not move it freely and it could not do its work well. Suppose the shoulder is dislocated,--the shoulder makes the same movement after it is dislocated but you cannot make your hand move as you wish with the shoulder in this condition,--its movements are limited. The same thing is true of any internal deformity or displacement. If the heart is displaced it cannot do its work so well as wehn in the right place . If the stomach or any of the internal organs are out of place, serious consequences will necessarily follow.

Now let us notice some of these consequences: Suppose for example that there is a compression of the chest,--let us notice for a moment what its effect upon the lungs would be . When the waist is constricted the lungs, which had formerly been free to expand in a downward direction, as well as in all other directions; it cannot expand because this constriction of the waist prevents the diaphragm from coming down as it should. (Referring to diagram.) Now you notice that the diaphragm is arched; the borders of the diaphragm are attached to the lower border of the ribs. Now when these ribs are all drawn apart you can readily see that it flattens the diaphragm. (I will make a diagram so as to be sure that you comprehend this.) Suppose I have a line that is arched in this way. Now if I separate the two ends and bring them out here, it is evident that the

arch will be lessened--it will be flattened--like this;(illustrating.) Now it is exactly so with the diaphragm,--the lower borders of the diaphragm are attached to the ribs, and when the ribs are pulled apart then the diaphragm is flattened. Now suppose this represents the chest cavity,--you can see at once that the chest cavity would be increased not only by the separation of the sides at the bottom; but also by lowering the diaphragm--(I will represent this by different colored chalk.) We will suppose this represents the size of the chest cavity before the diaphragm is lowered and before the ribs are expanded. (I have drawn this in white.) Now after the ribs have been separated and the diaphragm lowered,--when the ribs have been drawn apart like this--the space is added below,--so much space is added below, and so much is added at the sides--so that the cavity of the chest isincreased. Now suppose the sides of the chest at this point are fastened so that they cannot expand,--suppose we constrict them by placing a band around them so that they cannot expand,--when the chest undertakes to expand itself, what sort of a movement will it have to make? It will have to make this sort of a movement, (illustrating it;) and the consequence is that this extra space is lost,--all this space at the sides and besides this there is a considerable space lost because the diaphragm cannot come down, and so the gain in space by the sinking down of the diaphragm is mostly lost.

When the chest is constricted the lungs cannot act freely; they are crowded up into the upper part of the chest and retained there. But a still worse mischief results in consequence of the inactivity of the lungs ; not only the lungs suffer, but the heart suffers. It is a part of the duty of the lungs to help the heart in its action; the lungs help the heart; the heart

takes the blood into itself, and pumps the blood out through the arteries. Now the lungs do the same thing, only the lungs are a more powerful suction pump than the heart,--I think I can make this clear to you : Suppose here is the chest cavity,- suppose this represents the side of the chest; here is the heart inside. Now the heart has a large vessel here, through which it sends the blood out, and a large vessel there through which it draws the blood in. The lungs have a small opening here through which the air comes in and out; this is a small opening. You can readily see that when the sides of the chest expand, so that there is a diminution of the pressure in the chest it will have a t tendency to draw the air in, and it does so. We get the air into the lungs, not because the air is forced in, but because we make more room for the air by diminishing the pressure of the chest, and so the air comes in. It is just as though we had a pair of bellows here, and I separated the handles; when I separate the handles ~~here~~ the cavity here is larger and the air comes in to fill the space. It is a very common saying that "Nature abhors a vacuum"; that is not philosophically true in every case, but it is true that when you make room for air, air comes in; when we enlarge the chest the air comes in to take the place supplied for it. There is a little time elapses while the air is coming in to fill this space,--just as there is when drawing the handles of the bellows apart. When the ribs are expanded the air begins to flow in; at the same time this expansion of the chest is operating upon the blood outside of the chest and the blood flows in;~~m~~-the same suction which operates upon the air operates upon the blood also so when the heart is distended the venous blood flows in, so the lungs act as a

suction pump for the blood. Now see how marvelously ingenious and useful this arrangement is,--here is the diaphragm, (referring to diagram,)here is a little opening through which the vein comes leading the blood up from the lower part of the body. Now this passes right through the diaphragm into the chest, and here is the heart abpve it, through which this communicates. When the chest is expanded it squeezes the blood up through this large vein into the heart. Now notice where this vein is located,--you see it passes right up into the liver. Here is a vein which is connected with the liver at this point . This vein is called a hepatic vein. This is the vein that carries the blood into the general venous system,carrying it through this large vein. So you see that the effect of this pumping action on the part of the lungs is most strongly exerted upon the liver, and the liver the especial benefit of this pumping of the lungs,-- and not only the liver, but the stomach--there is a venous system which runs out from the liver to all the vessels of the bowels and thestomach and the spleen and the pancreas.

This large vein that you see here ramifies all around,--wherever these arteries, (represented in red,) go. This vein is called the portal vein which carries the blood to the liver, entering also the stomach, the spleen, and the pancreas. So this pumping process helps the heart, stomach, and bowels. Here is the large absorpent tract of the alimentary canal and the twenty feet of large ad small intestine s. Here is the stomach, and through that surface a ll the food passes,--and I used to wonder, how it got through. It could not soak through,-- the blood does not soak through into the skin, etc.,--and how does the food soak in? Or, how doesit get in,--I used to ask myself,

I could not understand it. The physiologists now tell us that it is done by a process called "osmosis." I knew that when a man was in a bath substances soaked out of him, and I did not see why they should not soak in,--in other words, I did not see why "osmosis" would not work one way as well as another. But the matter was explained to me that there is a pump here, sucking the blood in all the time, and that this great suction pump, the lungs, is not only drawing the blood in from the heart and liver, but this suction extends farther back,--it draws blood in from the stomach and liver, and it draws food in from the stomach into the blood. So this force reaches as far as it can, operating especially upon the stomach and intestines. Then the way the food gets into the system,--it is pumped in.

Here is another little arrangement,--the mucous membrane. The whole mucous membrane is covered over with these little "villi" as they are called,--a gentleman told me the other day that" the villians in his stomach were making him a great deal of trouble." These little "villi" or small projections,--each one has a small pump inside of it; There is a small lymphatic tube running up into this mucous membrane, and the food is crowded into this little tube, then the little villi contract and force the blood in ,--it is like the process of milking a cow, only it works this way-- it works upward. This little villi contracts and forces the fluid upward, because there is no other outlet, and thus it gets into these large vessels. Then the great pump--the lungs--operates to keep the vessels open clearing the blood out all the time, at the same time these millions of little pumps keep at work taking up the food and forcing it into the arteries, while the large pump--the lungs--

send it up into the heart,--and the heart, the great force pump, drives it into the blood--so it is a pumping process all around. Here then are three sets of pumps,--first the small pumps in the intestines; then the large suction pump, the lungs, and then the force pump, the heart--two force pumps, the one suction pump,-- the force pump pumping the food into the blood, and the suction pump, bringing the blod up to the heart, and the force pump forcing it back into the tissues again.

Now you can readily see what we have. To illustrate this, suppose we have a tank up here, and we will say we have a large number of small tanks down here. The small tanks are little ~~tanks~~ pumps that are fed in this tank. Now we have here another large pump, located up here, (referring to diagram,) which is a suction pump. Then we have over here a force pump,--here on both sides of them--on the same level.Here are these little pumps working all the while to fill this tank. They represent small pumps pumping blood into the portal circulation and they have a sort of reservoir ~~system~~ including the liver . The liver is usually half an inch thicker after ameal than before,it, as it forms a reservoir for the food. Now we will say that this tank is kept full; here is a suction pump which keeps it full, pumped out to this level; then this food is passed over from the suction pump to the same level of the force pump, and this force pump has to drive it through a series of pipes until it is used up; it may be a city water supply pipe, (for illustration,) which pumps the water all over the city but there must be a pressure in order to do that. Now if this pump ceases to work, the tank will get full and run over; or, if

it is a closed tank, we will have it bursted, and the water running out at the sides,--that is what has sometimes happened. So the lungs sometimes don't work properly,--these portal pumps become distended, and then we have maladies resulting,--torpidity of the liver, and various other diseases arise from this congestion --and not only the liver, but various other organs are involved. There are some other organs located in the pelvis which are affected by this congestion,--the rectum, the ovaries, and the other organs, become distended with blood--and excessive growth of the organs results from this congestion of the blood. Sometikes in riding out in the country you will see a field where the crops look thin; in some wheat fields you will see hollow places where the wheat is tall, while all around the wheat is puny. What makes the difference? Why the water has accumulated in the hollows, and the soil is being congested with water, so to speak, and the grain has an abnormal growth. So with the body,--if there is a congestion of blood there is an over-growth,--and enlargement of the liver, spleen, etc., and diseased tissues of the abdominal organs, ovarian tumors, uterine tumorw, fiber tumors, and various other growths which result from this abnormal congestion, which arises from an interference with the pumping of the stomach. These three pumps must always be in proper operation. Every time we go to dinner these three pumps operate, so we have these tanks always full, and if the suction does not keep the blood pumped out and carried to the heart, we have an accumulation in this tank,--this represents the portal system. This is one of the things which are frequently over-looked, and I am speaking of it now because you will probably not find it elsewhere. This constriction of the waist

is not a matter then which simply concerns the lungs , as so many think, but this matter of interfering with the action of the lungs is far reaching in its effects; it has a destructive effect of a very widespread character, because it effects the nourishing of the other organs that are contained in the abdomen. It is a notable fact that it destroys life very much more in women than in men. This compression of the chest affects not only the organs of the chest, but the organs of the abdomen.

I want to have you notice here, that right here in the waist line,--that is, if you have a waist line in the normal human form--but I don't think we ought to talk about the waist line; I think it is very doubtful if nature ever made such a thing as a waist line,--but just at this point where the waist line is ~~is~~ made,--men don't have any waist line, as women do--but women make just at this point where this waist line --it is just at this point, that the most of your vital organs are located, with the exception of the heart and lungs. The space here is filled with them. They are not so very important, however, for it sometimes happens in surgical operations that two or three feet of the intestines are cut off, and yet the patient gets along; sometimes the intestine gets invaginated,,--that is, turned within itself, and then three or four feet of them come off, and the patient gets along without them. We cannot get along without the liver or stomach, however, as some animals do. Some of the lower animals , as it has been shown by operations upon rabbits, can live after losing almost their entire liver, the liver growing on the parts that had been taken away. But we cannot reproduce our livers in this way. Here we have the

liver and the pancreas and the spleen, all behind the stomach, and just underneath we have the kidneys,--let us see how many there are,--the stomach, pancreas, liver, spleen, and two kidneys-- making six. We can spare the spleen sometimes, but these are very important organs, right where the constriction is applied so remorselessly. Just behind these organs is the solar plexus. There is a large mass on the other side, called the semilunar ganglia. Now this solar plexus is the abdominal brain; it has charge of organic life. If you should examine a fly under the microscope, you will find that the largest mass of nerve matter which they possess is located back of the stomach. The largest mass of nerve matter in the human being is located in the skull. But in some of the lower classes of animalls,-- insects, for example,--the brain is located in the stomach. Now this brain that has charge of organic life,--the brain of the organic life, is located near the stomach because it is the stomach, the liver, and the other chest organs, which are the most important parts of the organic life-- I should make an exception in the case of the spine--the small brain located at the extreme end of the body; where there is the largest amount of work to be done, there is the ~~the~~ largest amount of brain work. Here is the brain that manages this organic apparatus,--really working together, like an organic clock-- the liver, stomach, kidneys, and spleen, are all operating together; so this great brain lies behind these organs. Now any pressure applied to these organs compresses that sensitive brain just as well as it does the liver and the other organs. We think it is a terrible thing for the Indians of Washington

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Territory to put a flat board in front, and another behind upon the heads of their infants, binding them with a band, which produces flatness. We think it is terrible tortures that the mothers of Africa inflict upon their children and keep binding them down, until they are elongated in the organ of self esteem until they look like cones. We think the Chinese mother is exceedingly cruel to her daughters when she compresses their feet; but this compression of the abdominal brain is a more serious thing,--or at least just as serious--as the compression of the skull,--in fact I don't know but it is a more serious thing--because when the skull is still soft and flexible and capable of being molded in the case of infants, and it enlarges itself, and gets all the room it wants, but always in the case of this compression of the visceral organs there is an unresisting spine behind it, and here is an unresisting mass still in front, and all around it, and this inflexible band that compresses the liver with the other organs right against the abdominal brain which lies right behind it, and the consequence is, what great mischief is done to all these organs. The compression of the liver may cause it to become deformed. Some years ago I assisted at the post mortem examination of a fashionable young woman, who had been addicted to wearing her clothing tight, as all fashionable women do, and unfashionable women also. Women think it is feminine to keep their waists small, no matter what the consequences may be. It is such a disgrace to have the waist become small, that it must be kept small, at all hazards. Well, this poor lady had tried to keep her waist small, so she kept herself well laced, when she should have had plenty of expansion. In consequence of this her liver was crowded over to one side and then floated back again. But that was not so serious a case as I met in a New York Hospital, 17 or 18 years

years ago. We were studying all kinds of hard cases,--I was taking a special course, with other young men- and the professor would send cases into our room, (which was about the size of this room,) and I found one day a case that perplexed me. I found a hard lump in the abdomen of a woman, which would come up here and then go back down there; it kept moving about,--itxxx would come to a point as low as this, (indicating;) it was very moveable. It was not a tumor, because it could be moved about. Finally, I said to the young woman, " Do you wear your clothing pretty tight, sometimes? " "Well," said she, "I think I do;" "I tie my corset strings to the bed post when I lace up every morning." I said Iknew she laced tightly. The result of this was, that she had made a fissure in her liver--in other words, her liver had been cut quite in two by the compression and the constriction that had been practiced . Now you see this constriction was applied right against the liver, and the liver must be somewhere, so it kept moving about to keep out of the way. But women do not ask what is going to become of their organs, when they constrict their waists. Now this poor liver can not go up, because the ribs hold the upper part of the ches. solid, so it must go down; by reason of these bony cartilages, there was no way left to escape, so it had to consent to be cut in two, and one half went up, and the other half went down below where there was more room. Now this xxx poor woman suffered from a great variety of ailments, many of which were traceable to the abuse of her liver.

There is another thing that happens ~~to the liver~~ by reason of a woman's wearing tight clothing, and that is, the damning

up of the passages which carry away the impurities of the body. Here in the body is a whole system of sewers for that purpose. Everything that comes into the stomach is dissolved and carried into the blood and goes into the portal vein and goes into the liver, for there are some things that come into the stomach that do not belong in the stomach, and the liver is supplied with sewerage to carry these things off,-- it might be called a sort of "slop hopper " through which the system carries off the used up waste material. The housewife throws the dish water etc., into the slophopper, so the liver throws off into these sewers the imputities of the system. Now the compression of the waist has the effect to compress some of these little sewers, and the consequence is that the bile is dammed up. Now the liver is full of these little sewers, which must be kept open. If for instance you tie up your finger, the vessels are dammed up and the fingers get blue; so it is with the liver when the bile ducts are dammed up,--if it don't get blue, it gets green for the reason that the bile is absorbed because it can not get away, and finally the accumulation of the bile becomes so great that it gets into the blood again;, and it is the absorbed bile that tints the skin and gives it its tawny hue. It also tints the white of the eye,--the sclerotic.

It is the constriction of the liver that makes it necessary for a woman to use all kinds of cosmetics. Men do not use cosmetics,--they are utilized by women; their skins get so bad that they have to cover them up, to make them look better than they otherwise would.

Now it is not only the liver, that deteriorates from the constriction of the waist, but there are other organs that suffer

from the same cause,--here is the stomach that lies underneath the liver and hence under the liver compression; as a consequence, the stomach not being so firmly attached above as the liver is, it easily slips down. Here is the stomach, lying wholly above the lower border of the ribs,--here is the lower border of the ribs,, and there is the lower bprder of the stomach--the stomach lies entirely above the lower border of the ribs; here is the stomach in place, (model,) here is the lower border of the ribs, and the stomach lies right above this lower border. It is important to know where these internal organs are located. A lady told me the other day that she had terrible pains in her liver, and put her hand on the left side. (Laughter.) Not infrequently I have known people to locate their stomachs as low down as this point. (Indicating on model.) But here is where it belongs. (Indicating.) Now in consequence of the constriction here, you see the stomach is compressed. Now the empty stomach will get along very well, but here is a woman or a man whose stomach is compressed, but he eats just as big a dinner as though his waist was not compressed, and the waist is tighter than when the stomach was empty. When he gets up in the morning the waist will be big enough for that empty stomach, but when his stomach is filled up with a great quantity of foods, fluids, and solids, -the stomach holds two or three pounds, when in a normal condition, and sundry other articles are taken in, requiring it to hold a couple of pounds more. Now what is going to become of all that food? Here is a powerful process to force the stomach down where it can find more room and if you want to keep it down, you would not take a stone and hammer it down, but you are really wedging it down,--driving in

wedges, one after another, for each mouthful of food wedges the stomach down more and more, and stretch s it more and more,-- it can't go up; it can not expand laterally, and so it mst go down there, and the consequance is that the stomach keeps stretching down. The top of the stomach is attached, and it can not get away, and so it is compressed more and more, by the process of eating. The consequence of all this is,--displacement of the stomach. The consequence is deformity . It is not an uncommon thing, to find the stomach far away from home,-- I have seen it six inches lower than it ought to be,(and I am sure we can sympathize with them in such cases,)- In consequence of this.

(Now, as I said, this xx xxx consequence of the deforming influence of dress, means not simply deformity on the outside, but deformity on the ~~out~~side, as well,)- the spleen is crowded down, as well as the other visceral organs. Now I will show you these pictures. (Fxhibiting pictures.) In this case this

external deformity which you all redognize means displacement of almost every internal organ,--please remember that--that external deformity means displacement of almost every internal organ,--the lungs are compressed so they are not free to operate as usual; the stomach, liver, and other organs, are crowded downward, and the liver comes out over the kidney,-- there is a little hollow in which the right kidney fits into the liver,and so when the liver is crowded down, as it must be when the waist is compressdd, it crowds this rkidney right down there too. So it is not a very uncommon thing, to find the right kidney displaced . I examined one young woman 15 or 20

of age: she was very much surprised to find this to be the case, but I told her she had crowded the kidney out of place by crowding her liver down, and that this was caused by the constriction of her waist;for the liver being crowded down had crowded the right kidney down with it.I have found by keeping a careful record of cases, that about 1/3rd of the women who come to this institution have a displaced or a moveable kidney on the right side,--the left side is all right,because the pressure slips the other organs down in front of it, and it remains where it belongs, but this right kidney, under the downward pressure, or the avalanche of pressure, downward by the other organs yields and goes down.

But I mst say another word about the "Fall of the viscera," if you please. Here is the stomach,--notice all these branches of nerves all running down from this point,--running out all over the stomach. The upper ends of the nerves are attached. The stomach and all the other organs of the abdomen are floating organs; this is true also of the liver,--the liver is attached by the membranes, and then left to float--and that is true of the spleen and bowels--and the bowels float about at a great rate, too, sometimes. We have great activity of the bowels in this way, when they become diseased-- so much so that we can see it and feel it too.

These organs then are moving, floating, organs. "But why move don't they all ~~move~~ about ?" "Why don't the liver, spleen, kidney, and stomach, move about?" They do; they move with every breath,--every time we breathe, all the organs move up and down, and this movement is necessary for the health; this movement is a part of the gymnastics of the abdomen; it is by this constant movement that the blood is kept in circulaton; this movement is

for the purpose of preventing the stagnation of the blood in these organs; it is a very important thing, this respiration by the way of maintaining the health of the internal organs, but when the movement becomes extreme, then serious consequences are the result. You notice these large nerves running out from the stomach. Here are the bowels also,--here you see the blood is distributed to the whole of the intestines,--notice these large blood vessels;the same nerves go to the liver and the spleen. These white threads are nerves which enter and become part of the abdomen. These nerve centers here send out these nerves. Now this is an important thing which I wish you to notice,--and that is the fact that when an organ falls down below the normal position limit to which it may naturally move in the process of respiration,--when a organ gets beyond that limit it puts these nerves on the stretch. Now the stomach is usually up here,--that is where these nerves start. Now suppose the stomach falls down half an inch-- these nerves are stretched. Suppose you put a twenty five pound weight on your finger, and then try to hold it up,--you will soon be tired--Why? Because the nerves are stretched, so it is painful.. Just try it sometime, and see how the pulling on the nerve will give you pain. The only reason why it hurts, is because it pulls the nerves. Here is an experimen which you might try for the effe tt of putting the nerve on a stretch:--Lie upon the back and bring the leg forward so that the nerve is put on a strethh, and this is exceedingly painful .

Now the nerves that go to the viscera--stomach, bowels, and liver,--when these organs drop down these nerves are put onh perpetual strain,--pulling all the while. "Why," you say, "I do not feel it." Yes you do feel it, sometimes; sometimes

you feel it so much that you can hardly get around without someone to hold you up. I have met many persons who say, "Doctor, I can't stand on my feet; I feel as if I wanted to take my hands and hold myself together; I feel as though I was falling apart." This feeling is due to the stretching and the pulling on these nerves,-- that is what produces this sensation. But there is something more in this pulling and this dragging,-- there are certain nervous centers which by this means become congested and excitedThese branches which run off into the brain and that run into the spinal cord, that run into the skull, these are connected with all the nerves of the body and reflex movements are set up by this cause. Some time ago I found upon examining a patient who was suffering from a pain in the right leg, that the bowels were prolapsed and that this pain in the right leg was entirely due to the pulling upon the nerves by means of these prolapsed bowels, and this irritation was propagated to the right leg. In putting the bandage around the abdomen I took off the strain, and the pain was relieved. I have seen pain relieved by the application of an abdominal bandage, in many cases. Now this does not cure anything, it simply gives temporary relief, and the relief comes from the release of the pressure upon the abdominal organs from above, and the development of these organs so that they can remain in position .

This is a figure in which the body has been exercised in the gymnasium and there is a convex line in front; this figure is nearly correct. You see there is a deformity, but it is really not an uncommon one; please make a contrast between these two figures,--notice this one here--(this is not quite perfect; I will try to show you a more perfect one at another

time.) In this picture you notice that there is a general collapse of the front line of the body; here is a curvature here. This patient stood in this position, (illustrating,) the chest flat,, and the hips protruding-- which renders the abdomen too prominent. The liver was here, and the stomach was there, and they have fallen down to this point,--there is where they ought to be, and here is where they ~~are~~ were--(referring to diagram.) Now in this case, here was the stomach and here was the kidney, but the stomach ought to have been here, and the kidney ought to have been here, but they have fallen down to this point. In this case the stomach is prolapsed from that point to this point. (Exhibiting figure.)

Here was another interesting case,--a lady who had been ridiculed a little when she was young because she had such a ~~short~~ big waist. She found that she had a slightly enlarged spleen, but she was going to have a small waist at all hazards, and she found a way to do it, by crowding her spleen down, ~~and~~ from under her ribs, and getting it out of the way. She finally succeeded in doing this, after repeated efforts--she succeeded in slipping it out from under her ~~ribs~~waist; she said she felt it when it slipped out, and then she put on a band to keep it out . By constant constriction, the spleen got further and further away from home, until it got clear down in t is position --(indicating.)--when she came here, her spleen was way down here at the bottom of the abdomen. After examination, I thought she would have to have an operation. First, I found my tumor over here, and then I found it over here.. I then went into the history of the case.and found that it was the spleen that gotten away from home, and was wandering about and was trying to get home again. (Showing picture.)

In this case the liver and the kidneys were prolapsed and everything in this locality was out of place: (This is the same case;) here is where the spleen was, and here is where it ought to have been. Here is the stomach and liver, and here is where they ought to have been. (Exhibiting picture.)

Here is another case,--here is the kidney and the stomach, prolapsed. Here is where they were,, and Just notice this figure. (Showing figure.) Here is a fairly correct figure. Here is the spleen along this line,--The red line shows the line of the spleen,--it is all along the whole front line of the body. Now in taking a deep breath, the chest expands a little, drawing up all below, but this convex line continues all the time. This is a natural figure.This young woman Had always worn a healthy dress, and she had as healthy a figure as any woman ought to have, but it was nor deformed by an unhealthful dress.

This shows the effect of applying a corset to the figure that is partially correct,-- the convex line is there. When the corset is put on, the spine is curved backward and there is a osrt of a hump produced here,-- the spine is straightened, and the stomach is crowded down,at the same time there is a protrusion below in consequence of the organs being crowded down. So an abnormal method of breathing is produced by an imperfect dress.

Now I want to show yougone thing more,--I want to show you that what I have been telling you is recognized by everybody as being correct. I want to show you that fashionable people recognize what I have been telling you to be the truth. The Parasian fashion-makers all recognize what I have been telling you as correct,-- and I cah prove it to you in a minute. (Exhibiting figure.) Here is a figure which is pretty nearly

correct. The natural curves which are caused by the ~~xx~~ prom-
curved
inences of the body make the clothing hang in ~~xxxxiyxx~~ lines.
The dress hangs properly in front and behind and it looks all
right. Now in this dress there are no appendages of any sort.
There are no appendages of any kind, and the dress hangs
naturally. (Exhibiting picture.)

Now in this dress it is necessary to add several appendages in order to patch the figure up. (Showing chart of body.)

Now suppose this dress should go straight down here (Laughter.) You can readily see what the effect would be. Then suppose there were no appendages in the front here,-- you can readily see what that effect would be. But this whole thing is not the work of nature, it is the result of deformity,-- the breaking in of the front part of the body makes the deformity; straightening the spine produces undue prominence of the abfor-
domen.; the hips are thrown~~xxx~~ward and the prominence is increased, and so there must be something else up here in the dress to balance up the deficiency here, and then there must be something else added to balance up in front, so as to approximate the natural contour of the ~~xxdx~~ figure. Now as I said, this is a recognition of the ideal standard which we have in this figure here which does not require any of these appendages at all.