

Science In The News

By WALDEMAR KAEMPFERT

Body Mechanics

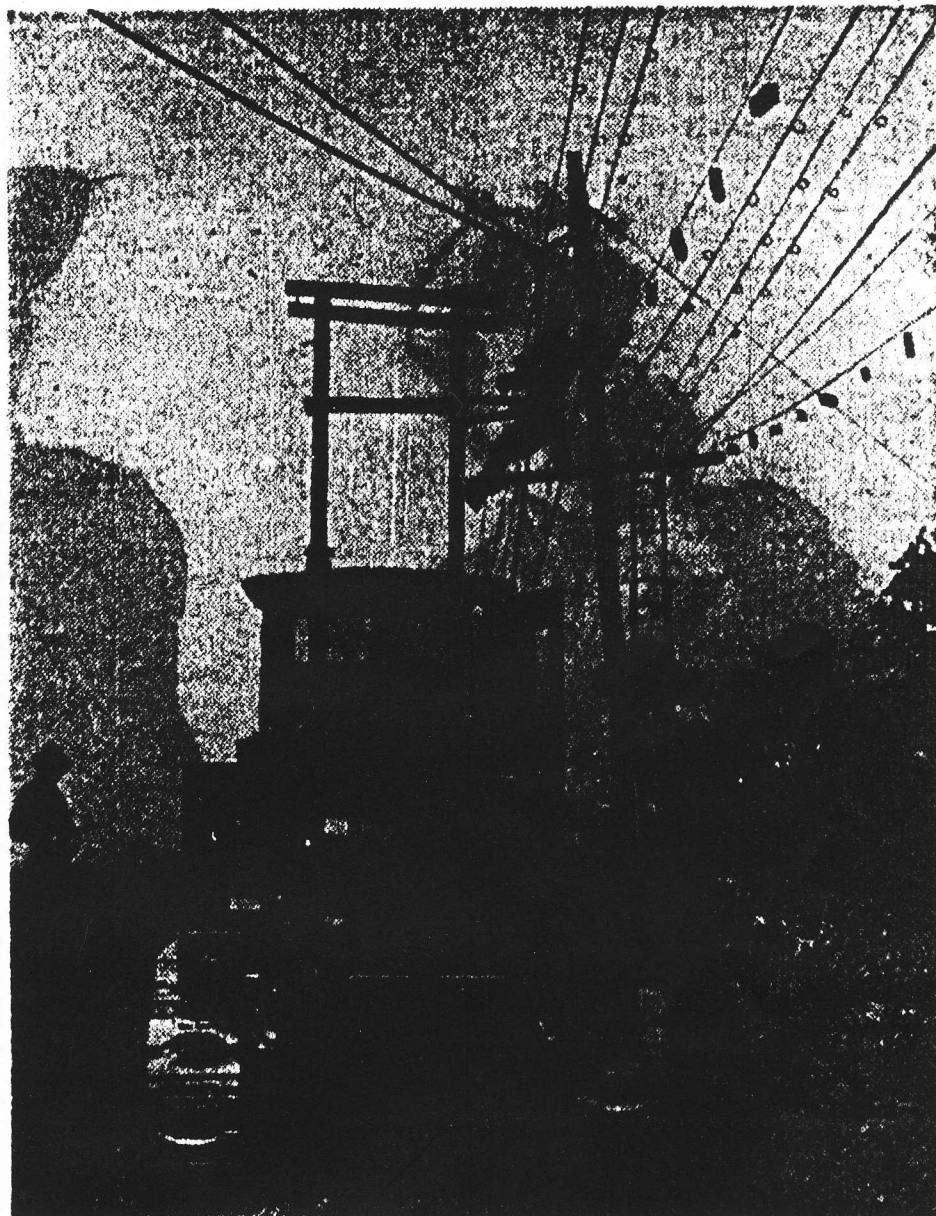
So far as this observer knows, Dr. Lulu E. Sweigard (New York University) is the first teacher of what is still called "physical culture" who supports her somewhat revolutionary ideas about what she calls "body mechanics" by X-ray pictures of 500 persons—evidence that cannot be refuted. Rigid research and long experience have convinced her that many of our popular set-ups for relaxing and "streamlining" the body are not only senseless but self-contradictory.

Like others who taught physical culture she used to bawl out "Stand straight!" "Shoulders back!" "Pull in your abdomen!" "Flatten your back against the wall!" Now she dispenses with the usual exercises that are supposed to correct posture and teaches the art of thinking of muscles in relation to the skeleton and of visualizing the body as an engineering structure.

"Each individual is a bundle of motor habits," says Dr. Sweigard, meaning the team-work of muscles that maintains the body's equilibrium. She holds that we do not properly use the brain's thinking power to coordinate the muscles. We strain and struggle to assume a better posture, exercise ourselves into a lather, repeatedly remind ourselves to relax, only to go through the habitual motions. Persistence of habit builds habit more firmly. Hence, well-meaning and conscientious victims of habit that we are, we accentuate our hollows and bulges instead of correcting them through relaxation. Our discouragement mounts with the years, with the result that it becomes harder and harder to change bad posture habits.

Just as an engineer must know what the possibilities and limitations of his materials are and what makes the crankshaft in a car run smoothly, so the athlete, or for that matter the business man who walks to his office for exercise, must see himself first as a bony framework to which muscles are fastened, with nerves branching out from the brain to every one of them.

So Dr. Sweigard approaches her



PHONE WIRES TESTED FOR STORMS

It is not always Winter at the Bell Laboratories field station at Chester, N. J., and so bricks are substituted for ice on experimental open-wire telephone lines to find out how well the wires will hold the extra weight they have to sustain during snow and sleet storms. Raymond C. Silvers states that a sheath of ice one inch in radial thickness adds a load of about 22 ounces a foot, or 200 pounds on a 150-foot span.

The "sail" increases the danger of collapse.

nervous center in the brain with innumerable motor cells in the nervous system. What goes on in the then of the body as a whole and relate these images to the imaginary empty suit. Some ideas are

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problem as if it were one in mechanics, one, moreover, which concerns an organism that can think and feel. Mind is important to her. Because the body has a mind, it can change its muscular ways. What she really trains is the mind the way it must think to bring about better control of the body.

Extends Pavlov Theory

The psychologist will note at once that Dr. Sweigard has extended Pavlov's conditioning of reflexes to the conscious. It will be remembered that Pavlov sounded a bell whenever a dog fed. Soon the dog's mouth began to water at the mere sound of the bell, though no food at all was presented. His reflexes had been "conditioned."

Pavlov went far in his experimenting. For example, he conditioned a dog to behave in a predetermined way by throwing a disk of light on a wall or a floor. When the disk was changed into an ellipse the dog became "nervous" and bewildered. In fact, some dogs almost went mad.

The reflexes thus affected were those over which the dog (and we) have no control—reflexes which are not influenced by the thinking part of the brain but by parts that govern purely automatic action, such as the preparation of saliva for eating, the tensing of muscles in combat or the winking of an eye at an impending blow.

If the automatic reflexes can be influenced by training in this way, why not actions over which we have conscious control? Acting on this theory Dr. Sweigard decided that she could condition thinking about posture and thus obtain results that are usually beyond ordinary physical training.

X-Ray Serves as Guide

That the muscles and the skeleton are a single engineering structure is evident enough from an X-ray picture of your body. Look at such a picture and you see that the bones are curiously disconnected. They are neatly fitted together, but so far as the picture shows there is nothing to prevent them from falling apart.

It is the muscles that hold them in place. Nearly every bone in the body can be moved—some bones more, others less. The leg and arm bones are levers moved by muscles. Even the bones of the shoulders are levers with limited movement.

The alignment of the bones is as distinctive as the pattern of a fingerprint. Neither can be changed. But nerves and muscles can be trained to make the most of individual alignment and thus to acquire a correct posture and athletic grace and skill within the limits imposed by structure.

Though we all have similar bones, similar muscles, similar nerves, if we are normal, we each have an individual posture or pattern of skeletal alignment, which is an-

more effective than others because of different backgrounds of experience. However, each of us may use the tools best suited for us. Thus we learn how to achieve a better coordination and control of muscle action. Soon we sleep better, assume a better posture, play outdoor games more efficiently, exhibit more poise and acquire the ability to relax.

In Dr. Sweigard's laboratory each student has a table covered with a blanket. The head rests on a small pillow. There are also the usual gymnasium benches, which are used for work in the sitting position. A skeleton is indispensable to show what happens to bones as we stand, sit, or walk correctly or incorrectly. A triple mirror makes it possible to take a "before-and-after" glance, but never does a student try to change his posture while looking into the mirror.

There are no parallel bars, no rings to hang from, no poles to climb, no equipment to compel the assumption of a better posture. The only tolerated agency (other than surgical interference) to change motor habits is mental visualization.

Teaches "Constructive Rest"

The first thing that Dr. Sweigard teaches is what she calls "constructive rest." You lie down on the table. "Bend your knees and hips and place your arms across the chest without folding them," she says. You notice that your knees tend to fall apart. That is because of the tightness of the outer thigh muscles and of those across the back of the pelvis. Your feet tend to slide away because of muscular tension.

All this must be corrected. She braces and props you where you need bracing and propping, so that you can maintain the position most conducive to constructive rest. She will not object if you call this "relaxation." To her "constructive rest" implies something deliberate and she wants you to be aware of what you are doing in the way of relieving yourself of unnecessary strain.

From lying on your back with knees bent and arms lying across your chest you proceed to four-legged positions on hands and knees, to sitting and standing, to walking, to performing the motions of everyday life with mechanical efficiency. After that your training may proceed to dancing, swimming, boxing, anything that appeals.

Mental images are important because they train the mind to think of the means of correcting bad muscular action and because you can be made aware of your own improvement. "Think of yourself as an empty suit of clothes and let the suit collapse from arms and legs to the trunk," comes the order. Before you know it you are as limp as the suit and resting constructively.

As you progress you call up images of each part of the body,

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Must Study Many Phases

To Dr. Sweigard all imagery is not equally good. Imagery has nothing whatsoever to do with wishful thinking or "Coué-ing" the body into a better posture. Every image must meet certain requirements. It must have specific location. It must direct movement to harmonize with the architecture of the human frame. It must accord with principles of neuromuscular function. Not only must allowance be made for those postural difficulties which are typical of all of us but for difficulties which are peculiar to each of us.

Various movements are used in addition to the visualizing process, both to speed up change and to build power in the more efficient motor habits. Here, again, Dr. Sweigard differs from others in her field. She seeks quality of muscle action through its manner of performance. Every movement necessitates a change in the coordination of muscle action in the entire way, so that less effort is demanded than before, and every movement must achieve a better alignment of the body.

For this reason, movement is small in amount, frequently repeated, and invariably performed as actions in the body are visualized. Never is an appendage, such as an arm, a shoulder, a leg, allowed to do the work which should be done by muscles in the trunk.

It is imperative to note that Dr. Sweigard's "quality movements" are always made with an eye to efficiency, and never with the idea of using as much strength as can be mustered, as in the time-honored "work-out." Properly executed, all movements are accomplished with a minimum expenditure of energy.

According to Dr. Sweigard, posture, ability to relax, and characteristic movements are at the

mercy of motor habits. But there is a cheerful and hopeful side to all this. "As long as you can think, you can change your motor habits," is her dictum. Herein lies hope for the business man, the housewife, the crippled child, the high-strung person who cannot relax. You can never leave your body at home, while you go out for work or play. It must be educated and trained to serve you effectively and with a minimum use of energy in all situations. This is pioneer work in blazing new motor pathways in the nervous system.

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Reported From the Field of Science

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other way of saying that we have a characteristic habit of standing, sitting or playing. And habit is not simply an expression of a pattern but the result of a pattern of muscle action.

If we acquire bad or good muscular and postural habits it is because we have ordered the right or wrong muscles to move or act. The choice is not made consciously. It is influenced by what is to be done—lifting a weight or batting a ball. After a time we are "conditioned," as the psychologists say, which means that we automatically go through the same motions to accomplish a given task.

Thus, in playing the piano and tapping out a letter on a typewriter we cease to think of how we run a scale or how we strike the letters because we have reduced to automaticity what was originally a series of conscious acts. In a word, we have acquired a habitual way of playing or typewriting. If it is a bad way it is hard to change. But it can be changed, and when it is changed, it becomes as automatic as the original bad way was.

Human Architecture Taught

The first step in Dr. Sweigard's method is to teach the fundamentals of human architecture. That is not very difficult. There are three masses to be considered—head, rib-cage, pelvis. These three are held together by the backbone. If the three are correctly aligned, posture is good; if not, it is bad.

Thinking and emotions influence muscle action. Dr. Sweigard makes her students think. The keynote of her method in changing posture and body mechanics is visualizing action as if it were taking place in the body. Nerve pathways connect the thinking center in the brain with innumerable motor cells in the

CHRONICA BOTANICA—Chronica Botanica, long an international clearing house for scientific, professional and personal news in agronomy, botany, forestry, horticulture and plant pathology, is now published in this country. Founder and editor of the publication is Dr. Frans Verdoorn, now a research associate at Harvard. Botanists will have to play an important part after the war in formulating policies that affect our natural resources. For this reason the Chronica Botanica, which does its best to keep up international relations in times like these, had to be transferred from Europe to the United States.

LINSEED OIL, ERSATZ—Hard up for linseed oil, Germany is turning to an ersatz. A new varnish has been developed which takes the place of genuine linseed-oil varnish. What the chemical composition of the substitute may be we have not been told, but it is known to contain 50 per cent of a fatty oil and a large amount of volatile solvent. Use of the substitute is compulsory for all exterior surfaces, except for those to which a primary coat of red lead is applied.

FATIGUE—Last year we read the glad tidings that we had only to mix a package of gelatin with orange juice and to drink the concoction around 4 o'clock to feel as fresh and bright as we were when we leaped out of bed in the morning with a heart ready for any fate. Now Dr. George L. Mason of Detroit tells us in The Journal of

the American Medical Association that if we felt fresher after a dose of gelatin we were simply fooling ourselves. Dr. Mason trained the extensor muscles of the forefinger of his subjects so that they could perform the maximum amount of work. He found that no more work was performed with gelatin than without it.

PLASTIC ARMOR—Dr. Kenneth Walker, a London surgeon, has produced armor against shrapnel which weighs about half as much as aluminum. He makes his armor from compressed fiber, paper or light plastics and claims that a two-ounce shield of it can be carried in the pocket as a partial protection against the infliction of wounds.

AGRICULTURE AND AUTOMOBILES—The farm has become an important source of raw materials for the automobile industry. It takes products from half a million acres to produce a million automobiles. Tires and brake-linings require 69,000,000 pounds of cotton and an equal amount of rubber; finishes and some plastics 500,000 bushels of corn for butyl alcohol and starch; solvents and anti-freeze liquids 2,500,000 gallons of molasses; upholstery, floor coverings, lubricants and anti-rust preparations 3,200,000 pounds of wool; mohair upholstery, 350,000 pounds of goat hair; solvents, paints and adhesives, 2,000,000 pounds of turpentine; packing and the like, 112,000,000 feet of lumber. We get all this information from Automobile Facts.

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