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The Well-Balanced Diet

Your primary source of fuel is food. The kind and amount you take in profoundly affect your power plant.

You can literally double your physical endurance by proper choice of diet alone. Or you can double it by exercise alone. This has been demonstrated over and over during the past thirty or forty years, both in laboratories and in everyday life. If you are not interested in making the most of yourself, there is no reason why you should pay the slightest attention to the recommendations in the following pages. And I am not going to try to convert you to the cause of strenuosity. As a matter of fact, I think it lucky for the people who aim high that most people have no aim at all. The world might be in a mess even worse than its present one if all of us devoted ourselves to the task of becoming Franklin Roosevelts or Einsteins.

There's small danger of such a crisis in American affairs. For despite magnificent efforts to educate us in diet and health, most of us waste and deplete our energies every day through bad diet alone. Look at that largest group of our

working countrymen. Not less than 88% of industrial workers are hampered by improper diet. Such employees and their families in five large cities were recently studied by Dr. Carey McCord and his assistants.* They found that of all money spent by these families on food, 78% is misspent—either on improper or too costly or otherwise “uneconomic dietaries.” The average worker’s diet is somewhat better than his family’s, partly because he benefits from well-planned menus at the company cafeteria. Even so, his food habits as a whole are appalling. Not only is his diet bad in quality, but in quantity, too. Over- or under-weight by twenty pounds or more is common among industrial workers; and at least part of it is due to their eating too much or too little.

Even before the depression set in, malnutrition affected at least twenty per cent of the population. Likewise before 1929, fully four and a half million school children were ill fed. Today the situation is immeasurably worse—and to a certain extent needless. For the Department of Agriculture has worked out an adequate balanced diet for a family of five costing amazingly little. (Write the Bureau of Home Economics for details!)

The diet of many Americans is far too high in protein content—that is, in meat, poultry, eggs, fish, peas, beans, etc. Adults, as a rule,

* “Industrial Hygiene for Engineers and Managers.” Carey McCord. Harper and Brothers. 1931.

should consume not more than 10 to 15 calories in protein of every 100 in the entire diet. We commonly eat two or three times as much. Such a high protein content over-energizes you. It increases your rate of metabolism and sets up profound unbalance largely because your energy output is too low, relative to intake, unless your work requires hard physical exercise. As you store up protein reserves, you become sluggish and gain weight.

Why recite all these sorry facts? To point out how important it is for you to refrain from the diet mistakes of most of your fellow citizens.

If proper food were made accessible to us at all times, every healthy human could trust his vital impulses to eat what he likes. The condition is, of course, contrary to fact. But see how it works out with other animals.

Every creature needs its own kind of balanced ration. It must have certain foodstuffs in some proportion: carbohydrates, proteins, fats, vitamins, water, and what not. Securing these regularly, it thrives. Lacking any one for long, it languishes or even dies. Now, in a state of nature, most animals seem to encounter difficulties now and then in finding enough of one ingredient; and they are forced to substitute another. They take "something else just as good" which really isn't just as good. The wild hog is usually a skin-and-bones affair chiefly because of such a shortage. Beside him the domestic hog,

well housed and fed copiously at regular intervals, is a shining success. Even more so is the fancy bred hog which receives a ration that has been computed to the last ounce by dieticians.

But now for a surprise. The fancy bred hog who has his food balanced for him scientifically does not thrive so well as the hog who has set before him in separate dishes all the needed components of a square meal. This was prettily proved by John M. Evvard, of the Iowa Experiment Station, first in 1910 and since then by thousands of hog farmers, who have saved themselves millions of dollars by using Evvard's cafeteria method. The hog that is free to eat just what he wants when he wants it grows faster and is healthier than any other. This same method has since been applied with equal success to other lines of animal feeding.

I cite the hog chiefly because we agree that he seldom exercises his consciousness much in matters of diet. When he steps up to his cafeteria and devours tankage, we may be sure he does this under some simple alimentary urge, not as the result of brooding over the relative values of carbohydrates and proteins. Now, the significant fact to note is that, over weeks and months, the animal adjusts his intake to a nicety by the internal mechanisms of balance which we can observe in his impulses toward this or that trough of food.

These impulses, so far as they can be analyzed, arise in local tensions just as the general

reactions of hunger follow definite tensions in the muscles at the upper end of the stomach. Inasmuch as they "follow through" with astonishing accuracy, we can draw but one conclusion. The tensions causing the impulses must themselves be caused by the specific shortages of food stuffs in the body tissues. The instant enough of one kind of food has been eaten to wipe out that shortage, the animal "loses interest" in that food.

Children automatically select their articles of diet with somewhat the same precision as that shown by the hog, provided they are supplied with the correct ingredients properly separated and available at all times. The difficulties in self-feeding mostly reside in the methods of supply, not in the children. Food is badly prepared, wrongly mixed, or not made continuously accessible. Or, worse yet, bad food is made available along with good food. Whenever the conditions of the Evvard test are fulfilled, the human being behaves quite as intelligently as the hog.

Every move, then, made by humans to achieve these conditions is a step toward the proper regulation of energy intake. One of the most hopeful advances today is the steady outflow of disgusted city dwellers to small towns and farms. Here they can grow their own vegetables and some fruits, constantly available in wide variety for family consumption. Chickens, a cow, a vegetable garden and a few fruit trees

for every American family might produce a race of super-men!

Lacking such luxuries, how be sure your diet is adequate?

Sometimes only by experimenting. Many victims of true malnutrition are unaware of the specific unbalance. They feel depressed, and attribute their woes to creditors, family, or boss, when perhaps they suffer from Vitamin A deficiency. Or they feel fatigued, indifferent, and listless, due perhaps to nothing but improper food.

Strange as it seems, loss of appetite often accompanies malnutrition. The body in need of food loses interest in it. Then it swings into a vicious circle indeed! If your appetite is poor and you do not feel the need of medical attention because of serious upset, check up on your intake of Vitamin B. One of the most characteristic effects of a shortage here is the failure of appetite. The deficiency is supplied through more whole grains, milk, eggs, fruits, and vegetables. Artificially refined foods, if taken in too large quantities, often lead to Vitamin B deficiency, too.

A well-balanced diet should include milk, if you tolerate it, fruit, and green leaf vegetables in liberal quantities. Milk supplies Vitamins A, C, G, and calcium. Fruits and vegetables are good sources of at least two of these four requirements. (Here we must add a footnote: Experts differ on almost all phases of human

diet requirements. Changes and new discoveries occur daily. Today's meat may be tomorrow's poison. Take no diet dictums too literally. Be sure your food is varied, and that you eat the right quantity. Be guided by your weight, which should be stable, and your feeling of health. Don't be a diet faddist.)

Vitamin and mineral content are the first diet essentials.

The important Vitamins A, C, and G are high in the following foods:

Vitamin A Raw and canned spinach
Carrots and carrot tops
Escarole
Tomatoes
Peppers
String beans
Green peas
Pumpkin
Yellow sweet potato
Butter
Cream
Eggs

A shortage of this vitamin, which can be stored up in the body, leads to a general weakened condition and low resistance to infections, as well as to other more or less serious upsets.

Vitamin C Oranges and other citrus fruits
Tomatoes
Cabbages
Lettuce

According to Sherman,* the daily amount of Vitamin C necessary to prevent scurvy, which results from its deficiency, is about the amount found in an ounce of orange or grapefruit (raw or canned) or lemon juice or canned tomato or raw cabbage or onion, or in about a pound of cooked cabbage or potato, or in a pint of milk. For a good, not minimum, Vitamin C supply, drink a pint of orange juice with the juice of one lemon, and eat between a quarter to half a head of lettuce or its equivalent in raw cabbage every day.

Vitamin G Milk

Cream and ice cream

Dried yeast

Beef and veal liver and kidney

Lettuce

Turnips and turnip tops

Deficiency here leads to something akin to pellagra or premature senility.

Opinions about Vitamin D are controversial. It is available in egg yolk, whole milk, and butter fat. Whether it should be supplied in cod liver oil is open to question. Its equivalent is formed by exposure to sunlight at 30 or 35 degrees above the horizon. Found in ultra-violet rays, it is received in large amounts in direct sunshine under clear weather conditions in high altitudes, or at the seashore, or in the snowfields of high mountains when the sun is well up.

* "The Chemistry of Food and Nutrition." Henry C. Sherman.

(Don't be surprised to find some of these statements refuted.)

Next, see that your diet contains enough calcium.

Calcium makes "pep." Where get your calcium? From milk, best of all. It contains about 25 times as much as beef steak or white bread, pound for pound. This explains why so many dieticians prescribe some kind of a milk diet for so many varieties of ill health.

Many readers will complain, at this point, that they dislike milk and cannot bring themselves to drink much. Very well then! Disguise it in the form of cheese, or better yet in your favorite cooked form, such as custard or soup thinned with much milk (say an oyster stew or clam chowder or a purée of peas or a potato soup). Mary Rose, in "Feeding the Family," shows many ways of disguising milk in palatable dishes.

Here are some other foods high in calcium. See that your diet contains one or more of them with fair regularity. First of all, cheese. This much maligned food has come in for more than its share of criticism. Many believe that it causes constipation. As a matter of fact, its nutrition value is among the highest of all foods. It is not only high in calcium, but in phosphorus and Vitamin A content as well. Next, eat almonds, dried beans, egg yolk, all containing much calcium. Include, for variety, oatmeal, rice, carrots, peanuts, and walnuts. These foods do

not, of course, exhaust the list of calcium providers. For a more detailed discussion of this as well as every other phase of diet and nutrition, read Henry C. Sherman's excellent study, "The Chemistry of Food and Nutrition," from which many of my own points are drawn.

Why emphasize the importance of calcium so much? First, because the American diet is probably more deficient here than in any other chemical element thus far studied. An investigation of the diets of two hundred families revealed that on an average they showed a margin above absolute requirement of 140% in protein, 80% in phosphorus, but only 60% in calcium. Secondly, calcium corrects upsets in the inorganic equilibrium. Don't worry about taking too much. No serious disturbance results from liberal calcium consumption by healthy people. A shortage, however, of either calcium or phosphorus may lead to grave consequences.

For adequate phosphorus in your diet, eat some of these foods regularly: cheese, egg yolk, dried beans, whole wheat, peanuts, oatmeal, walnuts, carrots, milk. Phosphorus is found, too, in potatoes, especially near the skin, and in seafood.

Caffeine, in fully eight out of ten people, not only releases energy for all varieties of work but improves the organizing of energy. Unlike most stimulants, it produces no subsequent depression nor decline of working ability. In some individuals—like myself, for instance—the good

effect is noticeable within five minutes; but in most, it does not develop until after fifteen minutes or half an hour. Large doses, in excess of four grains, commonly bring on light tremors; but these wear off soon. Both the speed and accuracy of such complex tasks as typewriting are improved by drinking coffee that has been properly brewed. The improvement persists many hours; in some people as long as eight or nine. If my own experiences may be taken as a guide, the higher mental functions, such as imagination, memory, and reflective analysis, pick up their stride most briskly under the light lash of the drug. I have often measured my performance here and find it always varying directly with coffee consumption, up to certain obvious limits. Up to eight cups a day—three for breakfast, three for lunch, and two at tea time—"head work" ran on faster and more smoothly; but beyond eight cups no gain occurred, rather a marked loss of efficiency.

Two warnings! Individuals differ enormously here, and so do brands of coffee (no less than the cooks who prepare each brand). I suspect that most people who declare themselves harmed by coffee have not done as I have: they have not experimented with all brands on the market and with all methods of preparing coffee. Strange as it may seem, I find not more than two standard brands which I can drink without serious upset; yet other people cannot endure the brands I prefer. Again, as any coffee expert will

squares with the well-established fact about the depressive insanities, one of whose regular symptoms is a greatly diminished urinary secretion. It is also what any physiologist would expect; for active kidneys scour the body of poisons and so go far toward holding it at a high level of vitality, which is always accompanied by a feeling of health and most often by a general good nature.

This suggests that people who display ill temper or sullenness while at work ought to try the effects of copious drinking of water, in any desired form. It would be too much to say that this alone would suffice to improve the emotions and attitudes; but it would be an easy, safe and fair experiment.

Alcohol seems to stimulate. But it merely breaks down the higher controls in the brain, thereby letting energy "run wild." The heightened activity of the slightly intoxicated person is nothing more than uncontrolled activity. It is like the rattle of an alarm clock whose main-spring ratchet is lifted out of gear, releasing the spring quickly. Slightly alcoholized people do not generate more energy; nor do they escape fatigue. Their energy merely runs to waste faster than when they are sober.

Their *feelings* of heightened activity are, of course, correct. But it is a mistake to infer that they are lifted to a higher level of organization or action. They sink to a lower pattern of energy. Work is done, but it is crude work.

America's best known beer consumer, the distinguished Dr. Mencken, issues excellent advice. Says he:

"Never drink beer, or any other alcoholic drink, while any work is to be done. It slows down the revolutions of the psyche. This is what it is for. Save it until evening, when you want to relax and forget your troubles.

"Never drink beer without eating something with it. The naked stomach wall sucks up alcohol too fast, and the slow, creeping, consoling effect is spoiled. Don't try to get it down too fast. . . . The most reliable virtuosi recommend a tempo of one liter an hour. Let it be that or less. After a couple of hours take a walk around the block, then you will be ready again."

Admirable wisdom! But how hard for the jazz-paced young American to follow! To loiter a full hour over a liter of suds is to take the 3.2% alcohol into your system only a trifle faster than if you were to spend the same time stuffing yourself on freshly baked bread.

Must you prepare for hard work requiring sheer strength or agility or speed? Then take considerable malt sugar, for it is turned into blood sugar faster than any other edible and cheap carbohydrate.

Tests made by Donald A. Laird, of Colgate University, support this practical advice. He fed his willing victims plain milk, milk with maltose in it, and milk with sucrose; then he put them all to work and measured their results.

The workers who drank plain milk fell

off in steadiness of hand to a mere 46.3% of their normal when fresh. Those who drank milk with sucrose, a "lefthanded sugar," fell off to 53.9%. But those who imbibed milk with malt sugar, a dextrose, were 74.6% as steady of hand at the end of the gruelling.

So too with dexterity and speed of performance. While the plain milk drinkers and the milk-and-levulose drinkers fell off in these abilities, the malt sugar men actually improved, so that, at the finish, they rated 104.5% of their showing at the start.

How does this happen? Ask a chemist. He will tell you that in the stomach malt sugar breaks down into two molecules, both dextrose, or righthanded sugars; but sucrose breaks down into one righthanded and one lefthanded molecule. The righthanded molecules pass fastest into the blood and become glycogen, or blood sugar. And there you are!

Many people (but not all) can tap their muscular energies better by adding considerable phosphate to their diet, beginning at least twenty-four hours before the start of heavy labor. The classical demonstration of this is Embden's tests on soldiers, in 1921. He fed them, along with their usual diet, 7.5 grams a day, using dibasic sodium phosphate ($\text{Na H}_2\text{PO}_4$) mixed with 95 parts of water and 4 parts of sugar. He checked up on soldiers put to work for one hour in a treadmill, then later on many more while out on

forced marches. And always the same result stood out sharply.

On days when phosphate was in their systems, they exerted themselves to a degree much greater than on other days. The tapping of energy usually began about six hours after taking the phosphate. It reached its peak on the next day. On forced marches the soldiers receiving phosphate were fresher than the others at all times. They were more alert when at rest. But the most striking effect, says Embden, was psychic. Soldiers deprived of phosphate were "dumb from fatigue at the day's end, while the phosphate-fed shouted and sang gaily." Some men had difficulty in sleeping. They were overstimulated. But this was not general.

Later studies by other physiologists suggest that the effect of phosphate is cumulative. Many small gains in muscular activity from day to day result in a distinct step-up of power flow. There is, however, no tremendous improvement; and one reason may be that the normal human body contains plenty of reserve phosphates in the bones. The supply cannot be tapped quickly; hence the phosphate treatment serves only to get the worker under way on a hard job and, above all, to remove the mental effects of fatigue. Dibasic sodium phosphate can be almost immediately used by the muscles.

Here, then, is the practical bearing of the matter. To get the best possible start in work

requiring muscular exertion in excess of what you are accustomed to perform, you will probably do well to try out the phosphate diet. Be sure to start at least one full day before the strain begins. Keep up the diet as long as it seems to serve its purpose. But do not expect to notice a greatly prolonged advantage.

Tremendous differences in the time required for tapping energies by various chemicals have been observed. A cup of coffee may speed you up in a few minutes. Phosphates start working only after six hours. Injections of cortico-adrenal extract pick up very slowly and do not reach their maximum effects until after nine or ten days, as a rule. But perhaps the best illustration free from technicalities appears in a well-calculated change of diet in a person suffering from some complex malnutrition. Here the first few days may develop no perceptible results. At the end of a fortnight a turn for the better is marked. But several months may pass before the patient feels ready for strenuous work and can undertake such without harm.

It is almost certain that some changes in bodily energy involve so many stages that a year or longer is required for their consummation. Remember that all such events are chemical; and that the velocity of chemisms is still one of the darkest corridors in all the halls of science.