Human Foods and Balanced Rations.*

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We are made out of carbon, oxygen hydrogen, nitrogen, principally, with a little iron, phosphorus, copper, sodium, potassium, calcium, etc. All these things are found in our foods, necessarily, for we are made out of food. But we cannot take pure carbon, nitrogen or hydrogen, and make anything much of it in the body, although we can use oxygen in its uncombined state as air. Almost all these things must be combined and prepared for us by plants taking them into their bodies before we can use them in ours (although we can also get them second-hand from animals). True, we cannot take a stalk of celery or a potato and replace a nerve or muscle with it. We must first break down the foods as we receive them, part way to their elements, using then, so to speak, the fragments to build up again into our bodies.

But besides building up our bodies, we use much of the food for fuel, to produce the immense heat we use to drive our body-engines. We have no individual furnace, with boilers over it and piston-rods connected, driving wheels or dynamos; we are, all over, furnace and boiler and machinery in every part, so small, so fitted into each other, so compact, and so dependent on delicate chemical and electrical reactions, that it has taken the life study of very many men to find out even what we know—a small percentage of the total facts. Fortunately, we are able to live, and probably have lived for many a thousand years without knowing the final details. If we had to know all about food, and what becomes of it in the body before we took a meal, the whole race would have stopped with its first ancestor, a day or two after he was born! However, some of the things we have found out seem to be more or less useful as general guides, and one of these deals with the value of different foods in a rather practical way, if you put a good deal of thought and care upon it.

It has been found, for instance, that a pound of coal will yield, when completely burned, just so much heat, varying with the kind and quality of coal, but always the same for the same kind and quality it is true we may not burn it completely in our furnaces or stoves; we may waste the heat we do get from it, letting most of it go up the chimney; or we may use the heat we do use for very trivial purposes. But so much carbon, the principal constituent in coal, always can yield just so much heat, whether we waste it or not. Just so with different foods. If we take a turnip, or a pound of meat and burn it carefully as we would burn a pound of coal in testing it, we find a certain amount of heat produced—far less than a pound of coal would produce, of course, but exactly the same otherwise. Turnips and meat would make poor fuel for a stove or furnace, because there is so much water in them, but once they are dried out, the rest of them burns well, as we find in garbage incinerators. Now, very careful and elaborate experiments have shown that when meat or turnip is taken into the body and burned, the exact amount of heat it would have yielded if completely burned in a stove or furnace is yielded in the body, less about ten-per-cent. wastage that can be perfectly accounted for. Knowing this, it is not hard to understand that long series of experiments have determined for nearly every kind of food the exact fuel value, and this forms a very fair way of classifying the relative values of these foods to the body. It is not a perfect way however; the fuel value of coal is very high indeed, but since we cannot eat coal, that fact

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