

Graduating Thesis 1899
by
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The Science of Nutrition.

Outline

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V Classification of Food Principles.

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b. Carbohydrates.

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VII Relation of Nutrition to Civilization.

VIII The Need for More Widespread Knowledge of the Science of Nutrition.

This science deals with the underlying principles of food substances, their value and use. It may fall under two main heads, the one having for its field the investigation of the food supply and the habits of the people, the other dealing with the relation of Physiology and Chemistry to Food and Nutrition. At the beginning of this century, various philanthropic efforts were made in France and Germany to better the condition of the poor, and these investigations show that this is a broad field for work, and that the Science of Nutrition embraces not only a thorough understanding of Physiology and Chemistry, but also of Sanitation, Hygiene and Dietetics. Thus we find that altho no one has

formulated a definition for this subject, nevertheless, it is a broad science and one upon which many other sciences are dependent.

In dealing with the relation of Physiology to this subject, we find that the human organism, as well as any mechanical apparatus, is torn down by activity, but unlike the machine the body has facilities for counteracting these destructive changes. These facilities are embodied in the action of bodily Nutrition. This process is very complex. It consists of the processes of taking food into the body its mastication and insalivation, followed by deglutition and the digestion in the stomach and intestines. After the food is digested it is in such a form that it can be assimilated with the tissues of the body. The waste tissues are transformed into heat and mechanical energy.

Chemistry is very intimately connected with the processes of digestion and assimilation. In order that there may be a thoro understanding of these changes, a person must understand a few

of the fundamental laws of Chemistry. Many times it is chemical change that determines whether food shall be digestible or indigestible. The heat of the body is produced by combustion, which is also a chemical change.

Many foods are improved by certain chemical processes, which change the flavor and digestibility. These are known as "ripening" processes. Modern sanitation requires a knowledge of Chemistry; in fact there is no department of this science, that is not connected with Chemistry.

The constant abuses, of this most important of sciences, are not confined to the understanding of Chemistry and Physiology. Domestic Science Clubs, organized for the purpose of teaching women the true art and nobility of home life, are disdained, and many of our housekeepers prefer the science of political economy or the Browning Club to that most noble of all sciences. Many careless housekeepers, ignorant of the principles underlying the proper regulation of the home, leave their houses in charge of still more

ignorant servants. Among the wealthy, there is a tendency to purchase the most expensive foods under the misapprehension that they are the most nutritious. Large quantities of this expensive food are transformed into "bad feeding" in the process of cookery. These foods are often highly seasoned with detrimental condiments. The various food principles are not combined in the right proportions. Haphazard methods in the kitchen lead to haphazard habits thru out the entire household. Many persons thinking to economize, purchase foods of an inferior quality, simply because they cost less money. Experience and experimentation have plainly demonstrated that this is not economy. Adulterated foods are often thus worked off on unsuspecting customers, and these are, at least, unwholesome and many times very detrimental. One of the most prevalent mistakes in the choice of food substances is the purchase of the cheap baking-powders. No mixture that relies upon prizes to secure its purchase can be recommended. These inferior compounds contain alums

and other substances which are very injurious to the digestive organs. This is one of the reasons why the warm breads so often cause severe stomachache trouble. Many of the canned goods are preserved by means of injurious acids. The kitchen is, in many cases, an illy ventilated, dark room sought only as a place of drudgery and oblivion. There is a lack of appliances and conveniences for making the work pleasant. There is no feeling of harmony between the mistress and servant. We see in all the departments of science, a displacement of the unregulated by systematized labor, and if the American kitchen and the American home, are to stand, the present unregulated method must give place to scientific management.

In order to regulate the use and preparation of food, we must take into consideration the fact that the different parts of the body are composed of different materials. This may be easily shown by comparing the composition of the bone with that of the muscles or nervous system, taking

note of this difference, we clearly see that the elements adapted to the repair of one part of the body, are or may be, entirely unfitted for the reconstruction of another part. It is absolutely necessary that the elements needed for the various tissues be supplied in the daily diet. In order to maintain perfect health, these elements should be supplied in proportions relative to their use in the body. Here it is that the United States department of Agriculture always shows itself the friend of the public. Investigations, and experiments have been made, and various dietaries arranged, based upon the chemical composition of food. These show the need for different proportions of the various food principles, under different circumstances. It is by these investigations that the purity of the different brands of food has been tested. The most expert chemists, and the best facilities possible, are used in this work. Any food that receives the government recommendation is above the average in

quality.

For general convenience, the food principles are divided into five classes. This division is upon a Chemical basis.

First in order may be mentioned the Proteids. This group of foods contains the albumenoids, casin, the gelatinoids, gluten and meat extractives. These substances contain a basic element useful in restoring the wastes of the system. Proteids form the basis of muscular and skin tissue. They are needed to a far greater extent than fats, for there is no substitute for them. The most essential element is Nitrogen. The nitrogenous principles are of both animal and vegetable origin.

The Carbohydrates compose a group distinguished by their chemical composition. The formula being six or a multiple of six carbon atoms and hydrogen and oxygen in the proportion to form water. These are the various kinds of sugar; also starch and a woody fibre, known as cellulose. They are mainly derived from the vegetable king-

dom. Their chief function is to furnish energy and heat. If they are in excess in the body they are stored up in the various organs as fatty tissue, and in the liver as glycogen.

The fats are very similar to the carbohydrates, containing the same elements but in different chemical combination. These foods serve to supply the required energy to the body and they are a great source of heat. Their action is much like that of the carbohydrates. Fats may greatly lessen the consumption of proteids, but, owing to the absence of nitrogen, they cannot take their place. The fats being abundant, furnish a great variety, for those who eat no animal food, as well as, for those who are not vegetarians.

Mineral substances are needed constantly in the body, altho only in small quantities. They are an absolute necessity in the blood corpuscles and aid in the repair of the bony materials of the body. They are obtained in the form of various carbonates and chlorides.

Last, but not least in importance, we come to water. The greater part of the bodily composition is water, and while this liquid is not a nutrient it must be taken into the body daily to supply the constant loss of moisture, and it acts also as medium for the transportation of food. Much of the mineral substance needed in the body is obtained from water. Of these five classes, the first three, proteins carbohydrates and fats are organics; the others are inorganic.

The application of heat to these foods is primarily for the purpose of cooking. Cooking is intended to be done with the heat so regulated as to transform the raw indigestible material into palatable food, that shall be digested with the least possible expenditure of energy. Modern scientific investigation has shown the result of different degrees of heat on the raw material. It has been shown that it requires a high degree of heat to break the cellulose walls of the starch grains and render

that carbohydrate easily digestible. The temperature should not be less than 212°F . This principle - known as the principle of the cooking of starch, applies in case of many of the vegetables and grains. If the proteins containing albumen are subjected to a temperature above 180°F , they are rendered tough and leathery, and are very difficult to digest. When cooked at a temperature below 180°F they are soft, nutritious and easily digested. This principle is known as the principle of the cooking of albumen. Here we are met with a difficulty in combining these two kinds of food. It is overcome by preparing the constituents separately, subjecting the starch to its long high temperature cooking and then combining the substances. We plainly see the need of an understanding of the principles of cooking, in order to render food hygienic.

The highest, noblest function of observance of the true science of Nutrition lie in its

influence on the morality of the race. Physicians have clearly shown that mental development is dependent upon physical conditions. Food and sanitation govern the health, and in order to have the best basis, we must pay due regard to proper nutrition. It takes a cheerful man to be a just man, and therefore we see the dyspeptic cannot see conditions and circumstances in the same light as the man whose mind is free from physical ill and distress.

Many of the crimes, for the punishment of which we have erected jails and reform schools, have had their origin in improper food supplies.

"If we would care for men's souls we must care for their bodies also." This has been proven many times. It is in childhood that improper appetites are formed, and in order to develop the better nature, we must surround the infant with the best hygienic conditions. This fact has been

well recognized and taken into consideration in orphan homes. But home is the place where the good ideals are most easily taught. In order to best elevate the morality and civilization of the nation, all homes should have, proper food, pure air, good sanitation, and intelligent, earnest mothers. The home should be the model, not the kindergarten.

It is very evident that we need an extension of this science. The leading political economists have recognized it as one of the great needs in the betterment of the poorer classes. Scientists have shown and proved that the knowledge is equally needed among the wealthy. Mission schools are being established among the poor, and Domestic Science Clubs among other classes for teaching the Science of Nutrition. Investigation shows however that there are many teachers of this science who are incompetent. Their method of instruction in many cases, wholly ignores the union of theory and practice.

And when you remember that over one billion of dollars is wasted annually in bad feeding, and that the faces of thousands of criminals but reflect the results of evils similar to those existing in millions of homes, you see that the vast need is not yet provided for and will not be until every teacher understands her work and every housekeeper realizes her influence on the welfare of the nation.