varieties of volatile oils, and various coloring substances. A study of the formula of some of these reveals the fact that no serious attempt has been made in their compounding to produce an efficient mouth wash, but rather to place on the market one of small cost and designed to please the palate.

In certain forms of gastritis a saturated solution of potassium chlorate may be used as a gargle and mouth wash for a limited period.

It should be understood that there can be no question as to the necessity of properly cleansing the teeth if any degree of oral hygiene is to be obtained. It should also be understood that there is urgent necessity, as a primary step before the use of a mouth wash as a routine procedure, of bringing the mouth into as good an initial condition as possible, repair of decayed teeth being here also considered.

Every pharmacist *must* be keenly alert on the subject of oral hygiene, for it is certain to occupy a more important position—possibly even a central one on the future stage of practice of physicians and dentists.

Formulas should be carefully studied with the idea of determining their fitness or unfitness for the rôle they are to play and not be merely accepted as hand-me-downs from a book of formulas or from some doctor's file of recipes. It should be determined whether normal mucous membrane is or is not injured by their use; whether oral secretions are or are not affected by them, etc. In other words, specific information must be gained, to which may be added other increments from time to time and which may be offered for the "weal of the common cause" through our journals, which journals, by the way, must be read to find out what the other fellow has accomplished.

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THE FUEL VALUE OF FOOD AS AN INDEX OF ITS NUTRITIVE VALUE.

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It is generally assumed that the caloric or fuel value of a food is an index of its nutritive value, but this is true only under certain conditions and within certain limitations. It is true that the chief food elements produce body heat, and that heat is absolutely essential for the performance of the functions of the body, but it is true, also, that the proteids, in addition to supplying heat, supply the material out of which tissues are built, or when built, are repaired and maintained. Proteid deprivation of the body means tissue starvation.

Proteids can form heat, but fats and carbohydrates—being non-nitrogenous—can not form or repair tissues. In other words, no one food element—fat, proteid, carbohydrate, salts or water—is sufficient for tissue repair and heat production, a mixed diet being absolutely essential. Under certain conditions the proteids may form fat and carbohydrate during their metabolism, but it has been found practically impossible to maintain normal nutrition for any length of time on a proteid or fat-free flesh diet. To maintain nutritive equilibrium on such a diet, the usual amount of proteids must be largely increased, and when this is done the production of nitrogen-holding compounds is so excessive that they are eliminated with difficulty by the kidneys, accumulate within the body, and cause gouty diathesis, with all its untoward possibilities.

Brubaker (*Physiology*, 1909, 139) states: "As nitrogen is an indispensable constituent of the tissues, it is evident that neither fats nor carbohydrates can maintain nutritive equilibrium except for very short periods. On such a diet the tissues consume their own proteids, as shown by the continuous excretion of urea, though the amount is less than during starvation. An excess of fat retards the metabolism of proteids. The same holds true for the carbohydrates."

Hence, nutritive equilibrium is to be maintained only by the feeding of the right food elements in the right amounts to furnish sufficient heat for the proper performance of bodily functions, and the development or repair of tissues.

As to what constitutes the right food elements in the right amounts for the adult, the daily standards that have been generally accepted are given by Hutchison (*Food and Dietetics*, 1907, 28), as follows:

Proteid,	125 grammes;	calories, 125 × 4.1 =	512.5
Carbohydrate,	500 grammes;	calories, 500 × 4.1 =	2050.0
Fat,	50 grammes;	calories, 50 × 9.3 =	465.0
	675 grammes		3027.5

This standard is the minimum for a man of average build and weight doing a moderate amount of muscular work.

While there is little difference, practically, between the standard for fat, carbohydrates and proteids set by the older authorities, the older standard for proteid has been, as is well known, seriously questioned by Chittenden, who contends that it should be reduced one-half. But, whatever proteid standard may obtain in the future, it seems reasonably sure that the daily proteid needs of a body is largely an individual question, governed by the kind and amount of mechanical work done and the physical conditions of the individual performing the work.

Analysis of the different daily proteid standards, however, discloses one remarkable fact, and this is that, excepting Munk, the authorities usually quoted—Wolff, Voit, Rubner, Playfair, Moleschott, and Atwater—all set standards which differ most widely as to the amount of fat (35–125 grammes), to a much lesser degree in the amount of carbohydrates (450–550 grammes), while the percentage of proteid is almost uniformly 18 percent of the total amount of food prescribed. The Munk standard calls for but 16 percent of proteid, and the Chittenden standard calls for about 8 percent. While the direct results of Chittenden's experiments—and they are comparatively recent—seem to support his views, the *remote* consequences of his proposed radical reduction of the proteid standard remains to be determined.

Whatever may be the daily proteid needs of the average adult, it is very evident that the proteid needs of a growing child are radically different, because, in early life, the body is undergoing constructive development and has a far larger need, relatively, for tissue-forming material, whereas in adult life sufficient proteid only is required for maintenance and repair.

The percentage of muscular tissue in the new-born is 25.05 percent of the body weight, and in the adult 43.4 percent. The weight of the muscular tissue of the new-born is about 776.5 grammes, and of the adult 28,732 grammes (McMurrich), or, in other words, the increase in weight of muscular tissue is from 1.7 pounds at birth to 63.3 pounds at maturity.

McMurrich states further, that "The greatest increment of weight is that furnished by the muscles, the percentage weight of which is one and three-fourths times as great in the adult as in the child. The difference does not, however, depend upon the differentiation of additional muscles; there are just as many muscles in the new-born child as in the adult. The increase is due merely to an enlargement of organs already present. The percentage weight of the digestive tract (2.1–2.06), pancreas (0.11–0.15) and lungs (1.75–1.50) remains practically the same, while in the case of the skeleton there is an appreciable increase (from 13.7 percent to 17.48 percent), and in that of the skin and subcutaneous tissue, a slight diminution (from 19.73 per cent to 17.77 percent."—(From "The Development of the Human Body," J. Playfair McMurrich, 1907, 508.)

These facts are cited to show the vital importance of sufficient proteid in the constructive development of the infant body. The fuel value of a food is not wholly an index of its nutritive value. It is true that all food elements produce body heat, except probably salts and water, and that heat is essential for the performance of body functions, but it does not follow as a logical sequence that the heat so produced is always from the right food elements in the right amounts. We may have, for example, a food that is rich in fats and carbohydrates and deficient in proteids, and hence be lacking in one of the chief—if not the chief—function of a food, the construction and repair of tissues.

If it be true that the fuel value of a food is an index of its nutritive value, then it should follow that foods of equal fuel value should be interchangeable in nutritive value; and to show the fallacy of such a view it is only necessary to note the fact that the fuel value of cows' milk (100 grammes equal 70 calories) is practically identical with that of human milk (100 grammes equal 68.975 calories), and that these are both practically identical in fuel value with a mixture of one part of condensed milk with about four parts of water.

In these products it should be noted that the food elements are all in *different* relative proportions, and while practically identical in fuel value, they are not interchangeable in nutritive value.

In other words, it is obvious that the formula of a food must be based not only upon the number of heat units the food will furnish but also, in the case of infants, upon its value in the constructive development of tissues. Otherwise we may have a food that has an excessive amount of fat and carbohydrate and a deficiency of proteid; and when such a food is fed for any length of time disturbances of nutrition will result and the tissues will become pathological instead of physiological.

In brief, all food—whether for infants or for adults—should be properly balanced in nutritive value, so as to insure sufficient body heat and sufficient tissue development or repair; and in the determination of such formulas the individual factor is one of the most important.

The action of foods in the body, especially as affected by individual conditions, needs to be studied more in detail, just as we have studied in detail the actions of drugs, physiologically and therapeutically; and if this is done their possibilities of usefulness in the dietetic treatment of disease will be greatly enhanced.—*Dietetics* (1909, 40).