EATING FOR EFFICIENCY

WE ARE ALL TRYING to be efficient nowadays—even when we don't quite know what it means. Efficiency apparently may be attained in more ways than one, and Dr. Eugene Lyman Fisk, who uses the above title in an article contributed to *The Sunday Magazine* (August 4), would seem to imply that we may even reach it by eating. In this case, however, what the writer means by the term is doubtless such efficiency as may be due to the ingestion of food alone. There are other kinds that are not to be acquired so simply. Dr. Fisk starts off with a declaration that in spite of the so-called aerarians, who assert that we can get along on nothing but air, man does occasionally need a scrap or two of food. He asserts:

"The man who fasts is really an autophagous cannibal, living on his own flesh. The fact that it does not pass through his digestive apparatus is a mere detail, softening down the gruesomeness of the operation. The fasting faddist consumes first his fat, if he has any, the little fatty cushions behind his eyeballs being the last to disappear. All things being equal, about forty per cent. of the body weight can thus be consumed, and then the 'channerin worm' gets the rest. If the fasting faddist is consistent, and takes no water, his wormship arrives within twelve to twenty days; with a little water on the side, the obsequies may be postponed from forty to seventy days.

"The law of the conservation of energy is a fearful nuisance to faddists; but it still holds. Whatever a man's soul may be, his body is part of the material universe, and is composed of elements found not only in other animals, but in the trees and rocks, and in the very ground under our feet. Twelve of these elements—carbon, hydrogen, oxygen, phosphorus, sulfur, sodium, calcium, potassium, chlorin, magnesium, and iron, in various combinations of atoms, molecules, and compounds—make up the human body. . . . . .

"What is a food? A food is a substance that is digestible and nonpoisonous, which can be assimilated and furnish either energy or building material for the body. Even after the body has matured, building material is still required to replace cells that are constantly being destroyed or broken down, and, so long as life lasts, fuel food is required for the production of energy. The principal structures of the body are composed of very complex substances containing nitrogen, and termed proteids. A certain amount of fat, which is composed of carbon, hydrogen, and oxygen, is also present in the bones, and forms a cushion and support for various organs and tissues, notably the skin, thus softening the lines of the human form. Water, gases, salts, iron, and certain complex organic compounds complete the constitution of the body.

"Now, you can no more build or repair proteid tissue with bricks of fat, sugar, or salts than you can build a granite mansion with straw. Food must bring to the body not only the elements that enter into its structure, but in such form that they will reach their destination and fit in where they belong. . . . The points to be decided in selecting a diet are:

"(1) Digestibility. (2) Availability for energy, growth, or repair. (3) Cost. It is important to know not whether our food is animal or vegetable, but how much proteid, fats, starch, salts, etc., we were getting in digestible and assimilable form.

"Thin people lose heat rapidly, owing to the large surface exposed in proportion to the bodily weight, and require sufficient quantities of carbonaceous foods, fats, cereals, and vegetables, especially if much muscular work is done. On the contrary, fat people, who do not lose heat readily, and are overburdened with the products of carbonaceous feeding, should limit these foodstuffs in their diet. Proteid foods may also be utilized for heat production and energy; but not so readily as the carbonaceous foods.

"Digestion of the starchy foodstuffs begins in the mouth. About thirty thousand years ago, before man learned the art of cultivation, starchy foods were doubtless thoroughly chewed and digested in the mouth, owing to their tough fiber and the absolute necessity of grinding them thoroughly.

"The soft vegetable foods that we now use are hurriedly swallowed, and land in a stomach absolutely devoid of starch-digesting facilities, there to remain undigested until passed into the intestines, where starch digestion is resumed. Man has survived this tax on his adaptability, as he has survived many others; but that is no reason why he should continue a physiologically expensive habit. By thoroughly chewing the starchy foods, they are not only well digested and prevented from burdening the stomach, but the mere act of chewing, combined with the taste and thought of food, causes a flow of digestive secretions in the stomach, termed by Pawlow the 'appetite juice.'

"Pawlow and others have demonstrated that the pleasant anticipation of food excites the flow of saliva and contributes to a successful meal. The close association of successful digestion with odor, taste, and the collateral pleasures of dining can not be questioned. Mr. Fletcher's system, when properly understood and not carried to illogical extremes, has the support of known facts in physiology, not to speak of the careful experiments of Chittenden and Fisher, showing the increased endurance of subjects who followed this system for many months under rigid control. To give the Fletcher system a fair trial, one must not let the mind dwell on *chewing*, but keep thoroughly *tasting*. This is really the essence of Fletcher's system."

Other features of the Fletcher system, however, Dr. Fisk thinks, must be followed with caution. The suggestion to eat "any old thing" at "any old time," so long as one wants it, may lead to serious dietetic errors. Another danger in the system is the rejection of indigestible waste material by which the total quantity of food taken is reduced, and the needed mechanical stimulus to the intestine is not afforded, so that constipation results. The low proteid diet resulting from the Fletcher system is regarded by Chittenden as responsible for most of the beneficial results. Most authorities advise that the proteids should not exceed one-fourth of the food taken. Chittenden would reduce this proportion about one-half. We read further:

"Some indirect support to the low proteid and low calory diet is afforded by life insurance experience. A calory, or heat unit, is the amount of heat required to raise one kilogram of water one degree centigrade. The standard dietaries, calling for about thirty-five hundred calories a day for men of average build and weight, are based upon the fact that such dietaries will maintain the average weight under ordinary conditions. But, as elsewhere pointed out, the lowest mortality among assured risks is found, after thirty years of age, among those who are somewhat below the average weight. It may reasonably be assumed that such people either consume less food or take more exercise than the average individual, which would fully justify the plea, not only for lower proteid content, but for lower fuel values. The scales tell the story. A diet that will keep the weight just a trifle below the average shown in standard tables may be regarded as physiological. In special diseases, particularly neurasthenia and tuberculosis, this principle, of course, does not hold good."

GO-CARTS AND BABIES' EYES—A warning to mothers is put forth by *The Lancet-Clinic* (Cincinnati, August 10) against the form of child's collapsible go-cart now in very general use, which it asserts does not afford sufficient protection to the eyes. Says this paper editorially:

"There are annually sold more than one hundred and fifty thousand of this form of child's vehicle. At this time there are more than three hundred thousand babies being nursed in these carts. We call attention to the leather hood or top on these vehicles which does not adequately protect the eyes of the child. The child lying on its back, with its eyes directed toward the sky, the strong light of the sun causes it to close its eyes for protection. This wearies the baby, disturbs its waking hours, and undoubtedly causes headache, which in turn makes the baby cross, feverish, and sick. The doctor is called and, not knowing the underlying cause of the illness, is apt to make an incorrect diagnosis, again adding to the baby's misery. We would advise mothers to correct this trouble by safety-pinning a heavy piece

of dark green veiling to the front and back ends of the hood, allowing the ends of the veil to fall full under front and back of hood."

TO TEACH HUMAN PHYSIOLOGY FROM ANIMALCULES

INSTRUCTION in elementary biology by means of the study of very primitive living forms is advocated by Dr. George V. N. Dearborn, of Tufts Medical School, Boston. Such instruction is often introductory to that in human physiology designed for students of medicine, and Dr. Dearborn believes that such students should begin at once to observe and study the workings of normal organs and tissues in normal animals, rather than nerve-muscle preparations and other "unnourished and abnormal mechanisms," as he calls them. He regards certain animalcules as just the thing for the purpose. They are "vital units"—whole creatures, instead of detached parts; they are easily obtainable and are fascinating objects of study on account of their relative transparency. Dr. Dearborn maintains his thesis in an article printed (in English) in the *Biologische Centralblatt* (Leipsic, May 20), and now just issued as a separate pamphlet. He writes:

[The] "synthetic tendency in physiology, and in biology in general, applies not alone to discussions of the parts of a single animal, but also to the pointing-out of the unification and inherent similarity of all that lives. . . . To-day, as we never could before, . . . do we realize how universal and how minute is the unification of parts into the unit of vitality, the animal, and how much alike, essentially, all animals are. . . . . .

"The fundamental doctrine and many of the facts of mammalian physiology can be demonstrated in animals far below the mammals in complexity and vastly smaller in size. Vital mechanics uses relatively few really different ways and means. The protozoa and especially the small crustacea and rotifers are for the purposes of elementary physiology far more similar to man than their size-contrast would imply. . . . . .

"As old-time physiologists, perhaps some of us have never realized the exact status of our science in the mind of the people at large. The antivivisectionist people have seen to it well that the 'average' man and most women and children shall consider physiology a matter of (necessary) blood and forbidding 'internal workings' far beneath their proper interest. We have scarce had a fair chance as yet to do our relatively new science justice in the world's keen range of reputations, nor have we had time (so full of life is our subject-matter and so teeming with interest) to popularize physiology and so give it its becoming place in the hierarchy of human sciences. To do this, however, is more than our privilege, it is our duty, in order that many minds, many more than at present, may each contribute its possible mite to the advancement of biologic learning. Moreover, it is part of the intelligence-birthright of every human being to understand how he is constructed as a mechanism and how this mechanism works. Only thus can he give his body, at once trainer, temple, and servant of his soul, fit and necessary care. This present work is a step, however short and shuffling, toward this great end."

The study of these small living creatures, the writer reminds us, is attended with the minimum amount of trouble and expense. The material required is always obtainable, in summer and in winter and anywhere in the world. These animals have an almost earth-wide distribution and are easily gathered from pools and streams, or a few cents for postage brings most of them within easy reach of such few schools as might not care to maintain the simple jar-aquaria for breeding them. Says Dr. Dearborn:

"They come in such countless numbers so readily that whoever made a business of supplying them could not conscientiously, one would hope, charge for them more than the smallest public class could easily pay. . . . Instead of ill-smelling animal-rooms expensive to maintain, containing unhappy large animals often both hard and expensive to properly feed, the animalcules are kept in more or less attractive glass aquaria that need contain no more than a few liters of water each for use of large classes. Many of these little animals maintain themselves year after year. . . . . .

"No one with a quirkless brain can nowadays fail to justify vivisection by competent scientists, but many, none the less, men as well as women and children, savants as well as fools, dislike to do this work, especially for purposes of routine class-instruction. This repugnance to blood-shedding and mutilation is obviously a necessary human feeling worthy to be cultivated rather than blunted. . . . Strangely enough the size of the animal is a factor in the determination of the strength of this feeling of repugnance to mutilation found in all normal human beings, while another of its determinants is complexity. Men of culture who would hesitate to kill a mouse or to drown a puppy have no such feelings ordinarily in regard to ants, however wonderfully efficient in their complex living, or in regard to the medusoids, however large and conspicuous. Thus the animalcules, unlike dogs and rabbits and frogs, may be adequately studied by young or old, without a prohibitive feeling of repugnance to the destruction of life. This circumstance is both justifiable biologically and ethically and practically convenient for teaching purposes, and gives the animalcules an advantage for scientific purposes not easy to exaggerate."

Dr. Dearborn reminds us that laboratory physiology in any form worthy of the name has been heretofore excluded from high schools, academies, and the academic departments of colleges, particularly of women's colleges. He believes that his suggestion offers a way in which this grave omission may be rectified.

SECOND AND THIRD CLASS MUMMIES

ONE MAY PAY as much or as little for a funeral as he pleases. In some countries undertakers plainly advertise that a funeral may be of the first, second or third class, according to the price. Recent archeological studies by Drs. Ruffer and Rietti indicate that something of the same sort may have existed in ancient Egypt. These two archeologists have examined two mummies, attributed by Prof. Flinders Petrie to the period of the Persian occupation, twenty-two to twenty-four centuries ago. The mummies usually seen and described are those of kings and their households, and are of course first class. The ones studied by Ruffer and Rietti were of lower grade. We read in *The British Medical Journal* (London, August 10):

"The first of the mummies now described seems to be an example of a second-class embalming. The viscera appear to have been extracted in a very summary way, and the body pickled until the flesh shrank to the bones; the external surface and the internal cavities were then treated with hot gum, the excess being allowed to escape from the interior of the body through a hole in the perineum, afterward plugged with rags; the limbs, as they were bandaged, were made up into a semblance of the human form by packing with more rags. In the mummy examined there would seem to have been disease of the dorsal vertebrae, the nature of which could not be ascertained; the dorsal vertebrae appear to have crumbled during this summary process of embalming, and the embalmer in order to retain the form of the body replaced them by a stick resting just below and behind Poupart's ligament on the right side and on the first rib above. This mummy was of an adult, perhaps aged, for the wisdom teeth were present and many others had been lost during life. The second mummy was evidently an example of third-class embalming. It consisted of the skull and a long crate made of the ribs of palm-leaf containing the bones of the trunk and limbs thrown casually together, but more or less in place. . . . . .

"The authors believe that this body was first buried in soft moist earth until all the soft parts had disappeared, and that the bones were then gathered together and roughly placed in the crate, some care, however, being taken to arrange the bones so that in outward shape when bandaged . . . the whole resembled a human mummy. They consider that it was an example of a cheap mode of preparing bodies for burial resorted to by those who could not or would not afford an expensive form of embalming."