FOOD FACTS AND FADS

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FOOD FACTS

FOOD CHEMISTRY

Before a comprehensive criticism of food fads of the recent past and present can be undertaken, at least the fundamental facts relating to foods must be stated. The body is composed of inorganic and organic material. In the former group are found water and various salts; in the latter, proteins, carbohydrates, fats, and substances which are formed in the body from the decomposition of these materials. Both organic and inorganic materials are indispensible to life, and, as long as life exists, these materials are exhausted and must be replaced constantly.

The term food has been given various definitions. It may be called a substance containing available potential energy. But certain poisons are foods by such definition. Alcohol, morphine, and caffeine are oxidized in the body, thus liberating energy in the form of work or heat. Yet these can not be accepted as foods. By the same definition, water, salts, and oxygen are not foods since they carry no energy into the body. Yet their absence is incompatible with life. All foods have one characteristic in common: all have the power to repair waste or to contribute substance to the growth of the body. (1) Perhaps the most complete definition is given by Coleman: Food is a palatable mixture of foodstuffs capable of maintaining the body in an equilibrium of substance, or capable of bringing it to a desired condition of substance. The ideal food is one which will fulfill all requirements, but at the same time burden the body with a minimum of labor. All substances which are not foods, when taken in suffi-

cient amounts, shorten life when they enter the cell protoplasm. Food must contain all the materials of which the body is composed.

Foods may be variously classified. As above, they may be divided into organic and inorganic materials. The organic may be grouped as coming from the vegetable or animal kingdoms. In the vegetable foods carbohydrates predominate, while the majority of proteins are obtained from animal foods.

Proteins are complex organic compounds containing carbon hydrogen, oxygen, nitrogen, sulphur, phosphorous, and iron. Their formulae are varied and of high molecular weights. They are chiefly composed of amino acids united by carboxyl and amino groups. The protein nitrogen is the most important element as it is the only form of that element available for physiological needs. The complex protein molecule always contains a definite ratio of nitrogen. Proteins are found in living matters and always produced by it, more abundant in animal foods but available in large amounts in certain vegetables.

Carbohydrates are abundant in the plant kingdom but present in animal tissues in only small quantities. They are composed of carbon, hydrogen, and oxygen; the hydrogen and oxygen usually in the ratio of 2 to 1. They are classed in three groups, the monosaccharides, the disaccharides, and the polysaccharides, depending upon the number of molecules of $C_6H_{12}O_6$ present. The monosaccharides are dextrose and levulose; the disaccharides sucrose, maltose and lactose; the polysaccharides starch, dextrin, and cellulose.

Fats are found in both plant and animal kingdoms. The neutral fats as they occur in nature are esters of glycerol and fatty acids. Their formulae are complex but contain a higher percentage of carbon than other foods. They have a high caloric value but are incompletely oxidized by the body in the absence of carbohydrate metabolism. In addition to the true fats, there are substances known as lipoids or lipins, the exact nature of which is not known. Cholesterin and lecithin are included in this group.

A final group of organic substances of utmost value must be added. This is the group of vitamins, only recently discovered and chemically unknown. Because of their unknown composition, they have been designated by letters of the alphabet as they have been discovered A, B, C, D, and E. More recent work has shown vitamin B to have two components, called Bb by some authorities and vitamin F by others. The absence of these substances has been found to be the etiological factor in certain pathological and nutritional conditions.

The inorganic foods, water and salts are obtained from organic food or taken separately. The important elements in the salts or in combination with other foods are sodium, potassium, magnesium, calcium, chlorine, iodine, sulphur, iron and phosphorus.

FOOD PHYSIOLOGY

Foods taken into the body are changed physically and chemically before they can be utilized by the body, except in rare instances when pure food is administered intravenously. Physical changes begin in the mouth where the food is broken up by mastication and mixed with the saliva. The motor function of the stomach continues this physical change, and, as the food is moved through the alimentary tract, it is altered by the movements of the intestines and diluted or concentrated by secretion or absorption of the intestinal mucosa. An important physical change is produced by the additions of bile. Finally the residual is excreted as waste.

Chemical changes are produced by the various enzymes which are added to the food in the alimentary tract, by the secretion of hydrochloric acid, and by the alkaline bile from the liver. Saliva which is secreted by the parotid, sub-maxillary, and sub-lingual glands contains the enzyme ptyalin which converts starches into carbohydrates of lower molecular weights. Action of the ptyalin continues in the stomach until inhibited by the increasing acidity of the stomach contents.

The stomach secretes two enzymes, rennin and pepsin, in addition to the above mentioned hydrochloric acid. Rennin and pepsin have been grouped separately, although there have been considerable disputes as to individual identity. To rennin is ascribed the function of coagulating milk, while pepsin performs the initial cleavage of the protein molecules. Both act in an acid medium. By experimenta-

tion it was found that dilutions of pepsin twoo great to show proteolytic activity still exhibited rennin-like activity in coagulating milk. Perhaps future experimentation will show only a xingle enzyme to be present.

Food as it leaves the stomach is mixed with the alkaline bile which saponifies the fats, making them more easily and completely digested, and neutralizes the acid to favor activity of other enzymes. The intestinal enzymes are several in number, including amylose for digestion of carbohydrates, lipose for digestion of fats, trypsin and erypsin for digestion of proteins. Trypsin, lipose, and amylose are secreted by the pancreas in response to hormone stimulation. Trypsin is in an inactive form, trypsinogen, which is activated by a secretion, enterokinose, of the intestines. In addition to erypsin, the intestine secretes nuclease which digests nucleo-proteins, and invertase which changes the sugars to a form that may be utilized. The intestinal mucosa also contains a substance, pro-secretin, which is activated by the hydrochloric acid of the stomach contents to form the hormone, secretin. This is carried by the blood stream to stimulate the pancreas and the flow of digestive fluids.

Absorption of digested food begins in the stomach. The amount of absorption here is small and most of it occurs in the small intestines. Carbohydrates are absorbed as simple sugars, proteins as peptones, proteoses, and various amino acids, while fats are absorbed as fatty acids and glycerol to be resynthesized or oxidized later.

Before leaving the subject of digestion, it should further be stated that the oxidation of carbohydrates is possible only in the presence of insulin, a hormone secreted by the pancreas. The complete oxidation of fats is not possible without the oxidation of fat. Therefore, in diabetes mellitus where insufficient insulin is produced by the pancreas, both fat and carbohydrate metabolism may be incomplete.

USES OF FOOD

Food, after its absorption, may be used as follows: (1) to yield energy, (2) to repair or build new body tissues, and (3) to regulate body processes. The protein molecule is the chief tissue builder. The body is able to synthesize some, but not all, amino acids from protein foods. Thus there are certain protein foods which are adequate, containing all required amino acids, and others which are inadequate. Gelatin belongs to the latter group, being deficient in tryptophan, tyrosin and cystin. Most foods contain a mixture of adequate proteins.

It must be borne in mind that the protein molecule is 50-60% carbonaceons and must be oxidized as carbohydrate. Thus in diabetics this portion may appear in the urine as sugar even though the diet is free of carbohydrates. Protein in excess of the body requirements is not stored but is oxidized and the nitrogen excreted in the urine as urea.

Carbohydrates are the chief source of bodily energy in the normal diet. Any excess is stored in the liver or muscles as glycogen or in the fat depots of the body as fat. Carbohydrates can not replace proteins in growth and repair of body tissues, but they are necessary for the formation of perfect protein molecules in these processes.

Fats are also a source of energy, and will spare proteins in this process. For when food intake is insufficient for energy requirements, the body begins to use proteins for energy. Fats are not equivalent to carbohydrates in ability to spare proteins. The excess

of fats may be stored either in a modified state or in the same composition as those ingested. Evidence that glycogen and proteins may be formed from fats has not been definitely established. Water is being given off constantly by the kidneys, skin, lungs and bowels. The intake must be sufficient to maintain body fluids in the face of these continuous losses. Deprivation of water accelerates protein destruction but will not increase fat destruction as is sometimes attempted in cases of obesity.

Salts are important in the structure of bone, muscle, and all body tissues. Their influence in control of osmotic pressure is important. They are indispensible in blood coagulation, nerve and muscle irritability, and preservation of the acid-base equilibrium. Carbonates, phosphates, and ammonium salts enter into this equilibrium which is regulated by kidney excretion and respiration. The hydrogen ion concentration in the blood is dependent upon the ratio of carbonic acid to sodium acid carbonate. The variations in blood P_h is very slight, and the blood must always be slightly alkaline, P_h of about 7.4

In addition to the regular classification of foods, there are certain stimulants and appetizers having little or no food value, per se, and not necessary for normal body functions. These are briefly listed below:

(1) Condiments
- a. Aromatics
- b. Peppers
- c. Alliaceous compounds
- d. Acids.

(2) Alcohol

(3) Tea and Coffee

(4) Cocoa

(5) Meat extracts.

The average adult male requires about 2500 calories of food to maintain the body in a state of equilibrium, more being required for greater activity. An infant requires a relatively high caloric intake because of the rapid body growth. The average diet contains 120 grams of protein, 500 grams of carbohydrate, and 60 grams of fat. The intake of fats and carbohydrates may be greatly varied, but protein intake should be above the minimum requirements of 2/3 gram per kilo of body weight. In diabetes where low carbohydrate intake is maintained, the food requirements are supplied by an increase of fat. In such cases the fat may be increased to equal twice the carbohydrates plus one-half the protein; or expressed by the formula $F = 2\ C + \frac{1}{2}\ P$. The source of these food materials is not important in itself, but it should be remembered that the ideal diet is one that meets with all the requirements while imposing a minimum of labor upon physiological processes.

In addition to the energy requirements, the diet must contain the necessary vitamins and inorganic compounds. The fluid requirements vary with season, individual, and activity. The ordinary mixed diet will provide the necessary minerals. With a diet including fresh vegetables and fruits, the necessary vitamins will be provided.

DIETS IN DISEASE

Diabetes mellitus is without question the disease which has been alleviated most by the application of dietetic principles. While the administration of insulin is necessary in many cases, numerous others may be controlled by diet alone, and every case should have a regulated diet. The dietetic measures in this disease include (1) the administration of sufficient calories, (2) the administration of sufficient protein, (3) the recognition that carbohydrates and about half of proteins require insulin for complete oxidation, (4) the recognition that complete oxidation of fats occurs only with simultaneous oxidation of carbohydrates , in the ratio of 2:1. By first establishing a balanced diet which meets the requirements of the body and then studying the blood sugar and urine to establish the amount of insulin required to assimilate this diet, the disease may be controlled. If the carbohydrate intake is greater than can be metabolized with the insulin supplied either artificially or by the pancreas, the blood sugar will rise and glycosuria will occur. If the intake of fat is greater than twice the amount of carbonaceous material oxidized, ketone bodies will appear in the urine and acidosis develop. Numerous attempts have been made experimentally to treat diabetes without the injection of insulin by the hypodermic needle. Experiments have shown some success with the oral administration of synthalin, but the status of this work is still experimental. (2)

In genito-urinary diseases there has been considerable discussion about the relative merits of high and low protein diets. Experiments have shown that high protein diets may cause kidney damage. (3)

Formerly all diseases of the genito-urinary tract were treated by a low protein diet, on the basis that they were less irritating. At present it is acknowledged that the protein of the diet is relatively unimportant in gonorrhea, but that it is important to avoid stimulants and irritants. In nephritis with heavy albuminuria it is important to consider the loss of protein in the urine and supply this in excess of the minimum requirements. (4) A recent article states that in certain cases of chronic nephritis with oedema a high protein diet is beneficial. This is explained by the formation of urea which acts as a diuretic. A low salt diet is important in impaired kidney function. Usually if food is eaten without seasoning the salts are limited sufficiently.

Gout may be successfully treated by diet, but the important factor is not protein as was once presumed. The diet should be restricted in nucleo-proteins, which contain purin bodies, and the xanthine compounds. These substances in metabolism form uric acid which in turn is responsible for the deposits of ureates causing the symptoms.

In acute diseases with high fevers it is important to supply a sufficient caloric intake. Metabolism is increased in these cases and unless food is supplied, the patient soon begins to utilize body protein and fat. The store of glycogen is quickly exhausted, and body fat is soon used in excess with a resulting acidosis which may be more injurious than the disease itself. Pre and post-operative cases should be supplied with carbohydrate food. Orange juice is readily absorbed and may be given a short time before the surgical pro-

cedure. Postoperative cases may require intravenous glucose.

In operations on the lower bowel or rectum the surgeon may desire to avoid the formation of feces for several days. A recent editorial (5) discusses the value of these low residue diets. Lean meats may be used as a basis, with the addition of rice, boiled eggs and sugars. Fruit juices, tea and coffee may be used in small amounts. When trying to prevent a bowel movement milk should not be given. Best results are obtained with small, frequent feedings of fairly dry food. In acute diseases where bowel movements are unimportant, a more easily digested diet may be used, but a high caloric intake maintained. At one time typhoid fever was treated by almost complete starvation. At present typhoid patients receive a high caloric bland diet.

Another large group of disorders in which diet is important is the diseases of the gastro enteric system. The general principles involved in treatment of cases unable to handle a normal diet is the use of an infantile type of diet, gradually changing back to normal. In cases of peptic ulcer the acidity of the gastric contents must be reduced by neutralizing the acid present. This is accomplished by using frequent feedings and alkaline powders. At the same time the diet must be non-irritating and easily digested. The Sippy diet based on these principles employe frequent feedings of milk and cream and alkaline powders, gradually adding eggs, toast, cereals, custards and other bland foods. In the treatment of liver disorders the elimination of fat from the diet is a customary practice.

Perhaps no disorder has been as much discussed as constipation. This might almost be called a universal complaint at the present time. It has been found that the habitual use of cathartics merely aggravate this condition, and that diet is the best therapeutic measure. To be successful such a diet must contain a high residue. Cooked vegetables which leave a large amount of undigested cellulose may be successfully included. Cellulose may also be added in fruit or bran. Bran has received greater publicity than any other food advocated for this purpose. It has long been used as a laxative in feeding cattle. Experiments have been performed using cellulose from paper pulp and crude bran fiber.(6) These were found to be equally laxative, but not equal to the use of whole bran. The bran of wheat is feces-forming, e.i. the feces formed are much greater than the amount of bran fed.(7) Kellogg, while a faddist in many respects, does incorporate some science in his theories and experimental work. He states that the popular fear of roughage is unfounded, that coarse foods rarely irritate, but merely titillate the bowel. He believes that the diet should be such that the bowel will evacuate three times a day, preferably after each meal.

A complete knowledge of dietetics is necessary for the successful treatment of obesity. By limiting proteins to the minimum requirements, and carbohydrates to the point that will just control acidosis, the body fat will be utilized for further energy requirements. Protein intake must be kept to the minimum requirements or body tissues will be destroyed for available energy.

In the last few years a new empirical use of diet has been found in the treatment of epilepsy. A starvation treatment lasting for several weeks has been advocated in this country.(8) This disease has been so resistant to therapeutics that the public welcomes any new ideas. Many special diets have been advocated. They may benefit by placating the frequent gastro-enteric upsets. The salt-free diet may aid in the elimination of bromides. Cases have shown improvement during fasts, but attacks always recur when the fast is broken. Unfortunately the patient cannot fast indefinitely. However, the treatment may be of value in emergency cases.

In fasting, ketosis is produced and this was believed to be responsible for benefit shown by the cases. With this belief as a basis, cases were treated by a high fat or ketogenic diet at the Massachusetts General Hospital.(9) It was found that on such diets, children could be kept in a state of ketosis over long periods of time during which there was a marked reduction or cessation of epileptic attacks. At present this is the most valuable therapeutic measure available in treating epilepsy.

Some recent dietetic research has been directed toward the influence of diet on tumor growth.(10) Two groups of rats, one fed on oat-milk diet and the other on oat-olive oil diet, were inocculated with sarcoma cells. Those fed on the oat-oil diet constantly lost weight following the inocculation, whilethe others gained. Autopsies done at the same time showed a weight loss in the oat-oil rats of from 15.5 to 46.8 per cent. The others showed a weight gain of

16.8 to 50 per cent. Tumor growths in the milk-fed rats averaged 5.4 times the weight of tumors from the other group. They also showed differences in consistency and extent of metastases. The authors believe that their work is an indication of the necessity for clinical studies on the optimum tumor diet in man. Undoubtedly, in the future there will be a diet "cure" for cancer, perhaps founded on scientific data.

Faddists have long proclaimed that their special diets would prolong life. Most people have been satisfied to remember that "Methuselah ate what he found on his plate, and he lived for a thousand years".

It is only recently that science has been studying the effect of diet on longevity (11). Nutritive conditions may be influenced by heredity and environment, but food may influence longevity. Rats of the same heredity and environment were fed on adequate diets, one group receiving milk in additional amounts. The life of this group was prolonged 10 % - a seemingly significant figure.

The therapeutic value of vitamins in nutritional disorders has been indisputably established. Avitaminosis is responsible for xerophthalmia, beriberi, scurvy, rickets, certain conditions of sterility, pellagra, and possibly acrodynia. Vitamin dietetics are now being widely used in prophylaxis and therapy. While breast milk was long considered to be a perfect food, science has demonstrated it to be deficient especially in vitamin B (12). Therefore, food substances rich in vitamins should be given to the infant early in life.

Of these cod liver oil, orange juice and egg yolk should be fed as early as the second or third month and fresh vegetables added after the sixth or seventh month.

Perhaps spinach has been the most widely used of vegetables as a supply of vitamins and much has been written for and against its use. Its use has been increased six fold due to education. Scientfic research has shown it to have the highest content of all foods in vitamin A, being better than butter, weight for weight. It is equal to milk in vitamin B and also contains vitamin C. In addition to vitamin content it is an important adjunct in the control of constipation. (13)

Environment has been an important factor in forcing certain races to choose diets which have been markedly deficient in vitamins. In conditions of poverty avitaminosis is prevalent. The American Indian shows the far-reaching effect of environment in producing deficient diets. The primative tribes are described as fine physical specimens, in contrast the present generations show a race rapidly approaching extinction. Conquest by civilization has changed their entire environment. Much of the downfall may be attributed to dietary changes. While the early diets were largely carnivorous, the present diet is entirely inadequate in fruit, vegetables, butter, milk, and eggs. Blindness is prevalent which may indicate a lack of vitamin A; poor teeth and bowed legs may be attributed to calcium deficiency or absence of vitamin D. 5% of the deaths are caused by tuberculosis and respiratory infections, possibly indicating a deficiency in vitamin A. In fact, the diet is sufficient to account

for all the physical deterioration. In contrast to other factors which may be contributing to these conditions, the diet is easily altered and improved. (14)

Another recent discovery has been the use of liver diets in the treatment of anaemias. Most startling results have been obtained in severe cases of pernicious anaemia by the oral administration of liver or liver extracts. Other work has shown the value of liver in secondary anaemia, later attributed to the presence of certain copper salts.

Prejudices established by faddists against certain foods are being gradually broken down by experimental dietetics. Bananas, nuts, roughage, drinking water with meals, and even pie have been rescued and placed on the dietary. And now attention has been turned to the field of fried foods. The digestion of fried potatoes depends upon the amount of fat used in their preparation. They may even be more easily digested than when boiled because higher temperatures used will more thoroughly cook the starch. In experiments on the normal human stomach it was found that fried potatoes, unless seeped in fat, were no more likely to cause digestive disturbances than those prepared by boiling.

F O O D F A D S

PATIENT FOODS

The development and publicity given to food fads has been closely allied with that of medical nostrums and quackery. Many of these have been gradually barred from the best publications and the use of the mails. Many publications still remain through which the pseudo-scientific claims of many of these fads may be flaunted before a susceptible public. At present patent foods receive the greater share of publicity in publications.

A patient food is a substance which is manufactured by artificial means from natural food products and intended as a substitute for these foods. The patent foods are usually sold by druggists instead of grocerers, though many patent foods are sold at all grocery stores. Most of them exist today because some one has found that it pays to produce them, after persuading the public through advertisements that they are necessary to the sick room or the individual's well being. With the possible exception of certain infant foods, there is no justification for their existence today.

The possible indications for the use of patent foods are given by Hutchinson, as follows: (15)

1: Anorexia. The only patient foods of value in cases of anorexia are the meat extracts. These have no food value and are not superior to skillfully prepared foods which are nourishing as well as appetizing.

2: In cases where there is difficulty in chewing or swallowing. In such

cases, natural foods, milk and gruels, cannot be surpassed in value by patent foods.

3: In cases where there is interference with digestion and absorption. The foods advocated in these cases are predigested materials and peptones. However, unless the motor function of the stomach is completely lost, natural foods will be utilized if properly selected.

4: To increase the ingredients of the diet. Diet may be more readily enriched in any one constituent by the use of natural foods. There is no protein more concentrated than dried meat, sugar is pure carbohydrate, oil and butter cannot be surpassed in fat content.

5: The cost. There is no argument in the economic field. No patent food is cheaper than natural food of the same quality.

6: Where natural foods are absent as in infant feeding. At the pretime patent foods for infant feeding must be accepted as essential in certain cases. But such foods should never be advertised to the laiety and should be administered only under a physician's supervision. They can never be considered a perfect substitute. In most cases fed on glucose and cow's milk, the results are fully as good asthose obtained by feeding patent foods. The committee reporting on proprietary infant foods before the 76th session of the American Medical Association (16) summarized the situation as follows: (a) It is impracticable at present to dispense with proprietary foods for infant feeding. (b) For the protection of infants it is necessary to control the advertising of these foods, first in medical journals, and second in lay publications. (c)The problem will best be solved by education of medical students in simplified infant feeding.

(d) Propaganda should be introduced showing the dangers of artificial feeding, especially without medical supervision. (e) Further co-operation should be established between the medical profession and the manufacturers of these foods.

Diabetes received more than its share of attention by patent foods. When the chief concern in treating diabetes was to reduce carbohydrate intake, a number of "diabetic foods" appeared on the market. The government defined these foods as having "not more than half the glycogenic carbohydrates as the normal foods of the same class". Thus "diabetic flours" came into vogue. With further scientific studies it was found that sugar could be formed from proteins. The government has removed its official definition, believing "diabetic" leads patients to think the food has curative properties, and now such foods are restricted by the Food and Drug Act.(17) Since diabetes can be controlled by the use of insulin and a balanced diet of common foods, there is no justification in prescribing high priced "diabetic foods" which may contain fifty per cent or more of starch.

Many patent foods have been advocated because of the purity of their constituents. Purified foods have been tried experimentally, feeding casein, sucrose, and salts with liver, yeast and lettuce to supply necessary ingredients.(18) These purified foods proved efficient, but why trouble to purify foods when natural foods are fully as good?

POPULAR FADS

The diet of primitive man was undoubtedly controlled to a large extent by his environment. His conditions may be compared with those of uncivilized races today. He no doubt ate what food was at hand at various seasons of the year. And there is no question about the fact that he ate his food raw before the discovery of fire. There are faddists today who believe man was intended to eat only raw food. Friedberger (19) suggests that man invented cooking because cooked food is more palatable and more can be eaten without satiety. He suggests that cooked food may be harmful and that cooking food is comparable to the use of alcohol and tobacco. In his experiments he offered rats both cooked and raw eggs. The cooked albumen seemed to have a toxic effect, but invariably the rats selected cooked eggs, developed avitaminosis and died. Other experiments have been published in (20) which rats were fed on raw, cooked, and over-cooked foods. These rats gained best on over-cooked foods. Until the matter is more definitely settled, the public is safe in considering the matter as a fad and cooking foods where there is any indication for doing so.

The human diet has been controlled to a great extent by taste. Those foods which were pleasing to the palate were eaten and others excluded from the menu. Recently the question has been raised as to the advisability of allowing instinct to guide the choice of foods. Dietary deficiencies in various parts of the world, while influenced by environment, may be taken as evidence that choice of food should not be left entirely to instinct. The survival of the fittest indicates

that primitive man and animals were successful in selecting food by instinct. With present economic, geographic, and social restrictions, both animals and man are not always able to exercise dietary preferences.(21) In experiments animals have shown ability to select proper diets, but with advanced civilization and culinary arts, man is unable to trust his taste. Scientific knowledge must enter into the dietary regime. Both qualitative and quantitative factors must be considered, the former being more difficult to control. Experiments with animals which were offered an abundance of food, show that these animals will select sufficient to keep the body weight constant. Where there is a qualitative deficiency, a search for the missing essential is sooner or later initiated.(22) Sometimes the appetite is lost before the symptoms of deficiency are manifested. In applying such tests to infants, Davis(23) offered newly weaned infants a wide range of foods, unseasoned and unaltered except by cooking in some cases. These infants seemed capable of selecting a diet without qualitative or quantitative deficiencies. They were omnivorous and showed unusual and unexpected preferences. The experiments further indicated that the didt of a child is not so limited as was once thought.(24)

The place of iron in the diet has received wide publicity. Much pseudo-science and quackery have been presented, and the slogan "Have you had your iron today?" has been used to advertise many foods. Special iron preparations of a secret nature have been offered as the key to athletic prowess. These advertisements have distracted the public attention from the natural sources of food iron. The adult

man requires about 15 mgs. of ion in his daily diet. The average diet contains from 14-20 mgs. The surplus of iron is not great and the intake should not be left to chance. Therefore, attention should be centered upon the natural food iron, ignoring the advertised preparations. Analysis of foods gives their iron content in the following descending order: dried legumes, green leafy vegetables, dried fruits, nuts, cereals, poultry, green legumes, roots and tubes, non-leafy vegetables, fish and fruit. (25) Vegetables low in chlorophyl are low in iron. Juices of fruits and vegetables contain less than the solid parts. Parsley contains the greatest amount of iron. In the future it may replace the much advertised raisens and bran.

The relative values of brown and white breads have received much publicity in recent advertisements for certain flours. There is some scientific knowledge on both sides of the question. Brown bread has a higher caloric value while white bread has a greater assimilability. At present the use of dark bread is increasing. Experiments with rats showed a greater gain in weight on a diet of brown bread. Zwiebach caused a constant weight loss. This loss of nutritive value was found to be due to the double baking process. (26)

Famous baths where mineral waters were used internally and externally for the treatment of all diseases have been in existence for many centuries. In many cases the empirical use of mineral water has been substantiated by chemical analysis. In other cases the absurd claims have been disproved by science, and the fads disappeared. Where there is no scientific justification of the therapeutic value,

other circumstances must not be over-looked. A patient who enters a well managed spa, has his regimen radically altered, his diet is changed; he is benefited by physiotherapy and psychotherapy; rest - the best therapeutic agent- is obtained; the entire environment is healthful, while the waters themselves may have no effect.(27)

Food fallacies have often been handed down from generation to generation, mostly as superstitions without any definite background. These may be detrimental to health but are usually harmless aphorisms expressed by grandmothers. One of these dietary superstitions claimed that tomatoes thinned the blood. This was perhaps due to the natural color and watery consistency of tomatoes. Today tomatoes are accepted as an important food and are no longer feared because of effects on the blood. Another old idea was that oranges caused acid stomach. It is known that the stomach contents are always acid normally, except immediately after eating a large amount of food; also that, while oranges taste sour, in the body they are utilized as alkalies. Again, it has been claimed that milk and acid fruits when eaten together will curdle on the stomach. Milk is normally curdled as soon as it is mixed with the acid stomach contents.

Fish is often referred to as a "brain food". There is no justification for this superstition. Fish is protein food and has no special ability to build brain tissue.(28)

VEGETARIANISM

Vegetarianism is a system of living which teaches that the food of man should be derived directly from the plant world. Meat has been the point of attack for many food faddists, and other fanatics have offered many reasons for abstinence from meat. In certain communities vegetarianism is an economic necessity but that does not excuse the faddists who would force this restriction on the entire world. Densely crowded people inevitably and invariably become vegetarians. Perhaps the Chinese are the most prominent of such people today. Their present diet consists almost entirely of native plants. The fact that they rarely have appendicitis is attributed to a meat-less diet.

For the normal individual meat is not easily given up. It is a palatable, concentrated food, easily digested and assimilated. Those who advocate giving it up have different reasons. First, there are those who argue the moral or etheral side of the question or the sentimentalist who can not bear the thought of the poor pigs anguish in the slaughter house. Taylor considers this argument. In addition to the food problem, the world would be faced with the problem of clothing without fur or leather. He says that without meat the production of legumes and grain would have to be doubled, that the cultivated area of the world is not great enoughto produce plant albumen to meet the albumen needs of the people.

Second, there is a group of people who exclude meat because of religion. These people base their preference upon chance references in the scriptures, or follow the customs of the dark ages.

In religious sects of today, the exclusion of meat is mostly a matter of self-denial rather than an attempt to improve health. The Seventh Day Adventists, the Traffist order of the Roman Catholic Church, and the Dadupanthi Sadus of the Hindu faith abstain from meat entirely. The Roman Catholics exclude mammalian flesh one day a week. The Salvation Army encourage a smaller eating of flesh foods.

Third, those people who uncritically follow pseudo-scientific facts and exclude meat in the hope of attaining strength, health, or beauty or in the hope of improving some pathological condition. The abstinence from meat because of belief is a religious question and cannot concern the medical profession. But the pseudo-scientists with their diets arranged on fancy rather than fact, should interest the scientific mind.

The first vegetarians were the mythological Hyperboreans, who lived beyond the North wind. They lived on crops which grew without rain and were harvested without labor. They used meat only as an offering to the Gods. Vegetarianism was a complete success. The people lived a thousand years or more; in fact, becoming tired of prolonged life, they were forced to commit suicide, leaving only modern advertising to exploit the meatless diet.(30)

The scriptures contain many references to the meat to be used for food, - only the flesh of animals which have a cloven hoof or chew a cud may be eaten. Early christians seeing the heathen Romans feast upon the fatted calf, went a step farther and excluded this animal from the diet. There is also evidence for the complete ex-

clusion of meat. "And God said, Behold, I have given you every herb bearing seed, which is upon the face of the earth, and every tree in which is the fruit of a tree yielding seed; to you it shall be for meat." (Genesis 1:29).

There are scattered references to vegetarians throughout history. The pyramid builders of Egypt struck because they did not get enough leeks and radishes. Lettuce is mentioned in Exodus as a favorite relish. The Greeks regarded meat-eating as barbarous. The Roman legions received rations consisting of a loaf of bread and a measure of wine, a custom which has survived unto the French Army. The use of garlic to season this diet still persists in all Latin quarters. (31)

The vegetarianism fad first came into existence in the middle of the nineteenth century. It was founded on superstition and ignorance, but it gained strength because many people believe anything of a medical nature regardless of the scientific backgfound. Vegetarianism in general excludes, "fish, flesh, and foul". Some faddists go farther and exclude all animal prpducts - milk, eggs, and milk products. Others are more lenient and define a vegetarian as one who does not make habitual use of flesh foods in contra-distinction to the habitual user.

The advocates of vegetarianism include many prominent people. Shelly writes of The Golden Age when

"Never again may blood of a bird or beast
Stain with its venomous streams a human feast."

Shelley

George Bernard Shaw is perhaps the most famous. He excluded meat entirely for aesthetic reasons, classing meat eating with the use of alcohol and tobacco. Miss Marie Corelli of literary fame refused to eat meat because of her aversion to killing. (No doubt she wore shoes of leather and perhaps featherw in her hat). The Countess of Warwick chose vegetables in order to retain her beauty. Rijane, Sarah Bernhardt, and Cleo de Merode, famous French actresses, excluded meat in order to reduce. Auguste Rodin, a famous sculptor, and Madame Maeterlinck (Georgette Leblanc) found that vegetarianism improved their work. Princess George of Greece, the Grand Duchess Serge of Russia, and Madame Dienlafoy, were converted to orientalism and excluded meat because of religious feelings.

Following the advice of Dr. Chittenden of Yale and Horace Fletcher, of whom more will be said later, many others took up the cult. This list included Ella Wheeler Wilcox, Upton Sinclair, Florence Morse Kingsley, and Edwin Markham, Wu Ting-fang, Chinese Minister at Washington claimed that vegetarianism improved him so much that he expected to live 150 to 200 years. Senator La Follette claimed that he ruined his stomach while going through the university and a vegetable diet was all that enabled him to do his work. (32)

The scientific and pseudo-scientific facts for and against vegetarianism will next be considered. Some arguments suggest mental deficiency, while others demand scientific answers. Science grants that it is not a physiological impossibility to live on vegetables, but granting the possibility does not presume superiority. For the aver-

age individual, a satisfactory vegetable diet is difficult to manage. Recent experiments with rats in China have shown that it is not possible to obtain optimal nutrition with a purely vegetable diet.(33)

Slonaker has been experimenting with meat and vegetable diets on rats for several years.(34) His early experiments showed meat eating rats to have an efficiency 7½ times greater than those fed only on vegetables. After eight years of work he concluded that meat is essential if the human race is to continue. Vegetable diets shortened the life of rats 30 and 40 per cent in males and females, respectively. After withdrawing meat from the diet, males lost 35% of their weight and females from 25 to 28%. By the third generation the power of reproduction was lost.(35) No doubt there is a vitamin factor involved which was not known at the time of his experiments.

Physiological functions and anatomical structures of the human body have been much discussed as evidence of the proper human diet.(36) Read believed that vegetarianism would cure intemperance. (Prohibition Agents may be forced to try this method to aid enforcement of the 18th amendment). He stated that meat gives an initial stimulation followed by depression, which was relieved by alcohol.

The human digestive system has been compared with that of lower animals in an attempt to show the type of diet for which it was intended. Comparison seems to point toward a mixed diet. The human alimentary tract is not as complex as that of herbivora, but is more complex than that of carnivora. This might lead to the assump-

tion that humans were intended to be omnivorous. Others claim that the teeth and structure of the jaws are so similar to the apex that a vegetable diet should be followed. But the apes do not refuse meats and insects, eggs and small animals are used to make up the diet of these animals.

The faddists emphasize the fact that certain bacteria and parasites may be spread by meat. The tubercle bacillus, the tape worm, and the trichina are the chief offenders. But present laws require federal inspection of all animals slaughtered and suspicious meat is not sold for food. In addition, meat should be cooked and when this is properly done bacteria and parasites are killed.

The uric acid theory of disease presumes that the meat in the diet is responsible. Purins are also present in beans, lentils, asparagus and oatmeal, a fact which is overlooked in the eagerness to make meat the offender.

Cancer has been attributed to meat eating, the faddists pointing out that barbarians have less cancer than civilized races. There are so many other factors present that it is stretching a point to place the credit on a vegetable diet.

Meat eating has been held responsible for moral degeneration and evil disposition. The faddist claims that meat eating will bring about the temperament of the ferocious tiger. To refute this idea it is but necessary to consider the friendly airedale, obviously carnivorous, and the ferocious bull, exclusively herbivorous. The morality of Jesus, Moses, David, and Solomon, all of whom ate meat,

cannot be disputed. The Eskimos of today live almost exclusively on meat and are the most peaceable of people.

Finally the faddists argue that meat is injurious to health. Again it is only necessary to refer to the Eskimos. Stefanson, an artic explorer, lived on meat for nine years and stated he never felt better. Attempts have been made to introduce vegetables into the Eskimos diet; in these attempts the people have become prematurely old and extremely constipated.(37) Buttner stated that people eat meat first because of superstition, believing it to give them strength, and second, because of its stimulating affects. He claimed that the "primers of physiology" were perpetuating the idea that man is omnivorous. He objected to meat because it contains purins and poisons caused by the animals exhaustion at the time of slaughter. He claimed that the antolytic changes were processes of decay, and that right minded people would not eat rotten food. He proposed vegetables as a cleaner food, overlooking the fact that raw vegetables have often caused epidemics of disease.

In closing the subject of vegetarianism as a fad there is no better statement of the situation than the following quotation from Damrau(30) "Vegetarianism is nothing more than a burlesque on dietetics. The vegetarian lecturer resembles a clown strutting about in a college president's cap and gown." Neither an exclusive animal or vegetable diet is physiologically superior.(38)

No other food fad ever reached the height attained by

vegetarianism. Numerous others have existed with a small following and brief mention will be made of them.

The non-uric acid diet which was offered as a cure for all conditions from colds to physical weakness. At present the low purin diet is advocated only in gout, as was previously mentioned.

There are those faddists who would live exclusively on fruits, and others who exist on nuts. Still others choose only uncooked vegetables and another group lives on milk. One meal a day and two meals a day diets have been advocated. But all of these fads have been only a passing fancy except for a few followers.

FAMOUS FADDISTS

FLETCHER.

During the past decade or two several individuals have been prominent in spreading propaganda for their particular fads. The ease with which the public may be reached by printed word makes the work easy and the difficulty of proving fraudulent intent makes the game relatively safe. Few faddists believe their own fads. Perhaps Horace Fletcher received wider publicity than any other single individual and his fad at one time took the country almost by storm. He was a layman, and his fad was known as Fletcherism or the chewing craze. All foods, liquid or solid,were to be retained in the mouth until all taste had been extracted. Material eaten was to be swallowed only reflexly. Thus only food in a liquid state was swallowed, and the residue of solid material was removed from the mouth. Other requisites were waiting for a true appetite, eating only what appealed to the appetite, and concentrating attention on eating.

With this method of eating, Fletcher submitted to scientific experiments. His body weight remained constant, even with a protein intake far below the minimal requirement. He was able to do unusual physical exertion. The objections raised to this method of eating were loss of time, lack of sociability, and the offensiveness of constantly removing refuse from the mouth; all of which Fletcher calls trivial excuses when life and health are st stake. His book "The New Glutton on Epicure" is over half taken up by testimonials and confirmations, many contributed by J. H. Kellogg of the Battle Creek

Sanitarium. (The Battle Creek institution has always had a reputation for following scientific and unscientific dietary fads).

Fletcherism maintains that how people eat is more important than what they eat, obviously a fallacy. There is an old german proverb: "Gut gekant ist halb verdant." (Well chewed is half digested).(40) Certainly this fad markedly relieves the work of the rest of the digestive system. Under this regimen the bowels move only once every 7 to 10 days.

Fletcher even advocated his fad as a cure for alcoholics. He stated that when alcoholic beverages were retained in the mouth until the flavor was lost, there were no intoxicating affects and the desire for them was soon lost.

John D. Rockefeller was once a strong adherent to Fletcherism. Child's Restaurants of New York were converted, the menus carrying all instructions on how to Fletcherize. The system lasted three weeks; the cash register good indigestion and heart failure and Child's nearly went bankrupt due to the waste of time.(41)

The system was advocated as a prophylactic and therapeutic measure in disease. The entire idea involved is expressed in the following:

> "Eat some what less, but eat it more,
> Would you hearty be beyond four score,
> Eat not at all in worried mood,
> or suffer harm from the best of food.

While rapid eating and poor mastication are serious

offenses to the digestive system, Fletcherism goes to the opposite extreme. Ptyalism is a disease, and Fletcherism might be called artificial ptyalism.

CHRISTIAN

Eugene Christian with the self-conferred degree of F.S.D. was a salesman first and then in the hotel business. Later he began manufacturing fad foods and developed the"Christian Natural Food Company." Ten years ago he began selling a special type of bran and established a correspondence course in applied food chemistry. This course conferred a diploma and the degree F.S.D. (Doctor of Food Science), all for $100. In follow-up letters the price was finally reduced to $10.00 and graduates were able to diagnose and treat all digestive disorders; no knowledge of chemistry was required. Then he began selling a course in Scientific Eating, first offering it for $10.00 and finally reducing it to $3.00 There were twenty-four lessons, entirely without scientific information. Those who purchased his first course were hounded by letters urging them to buy his "Encyclopedia of Diet" They also received offers of diagnosis and treatment for $45.00

In 1922-23 he advertised a new discovery which would reduce obese women in two weeks. This was a rubber cup to be applied to the desired portion of the body for three minutes night and morning. In 1924 he began to advertise a product known as Vita-Pep. This was 11% alcohol and was said to contain pepsin, renin and Vitamin B. The public was urged to buy it at $45.00 for six cases (6 gallons) and the

competition with bootleggers was no doubt keen.

His latest efforts were in mail-order diagnosis and treatment. By filling out a questionaire and sending it to him with $60. the patient received three months treatment. Such activity was short-lived in most states.

Dr. Harvey W. Wiley says "When one examines his (Christian's) dicta in the light of real science, the wonder grows beyond expression that it is possible for anyone to make so many inaccurate and misleading statements in so small a space." (42)

BRINKLER

This "Food Expert" ran another "mail-order" business for years. He sold nostrums in the form of advice, pretending to treat and cure diseases by prescribing a special type of diet. His diet cured "catarrh", which was caused by improper eating. But "catarrh" included all diseases: appendicitis was catarrh of the appendix, pneumonia catarrh of the lungs, etc. "The means of restoring health is by correcting the selection, combination, and proportion of foods to suit the individual's varying needs, according to rules of the natural system of eating, namely - the Brinkler System". At this time Brinkler was located in Washington, D.C., advertising as a food expert, and giving the impression that he was connected with the government. The postal authorities caught him and closed the mails to his propaganda. He then opened up a school in New York. Instruction in dining room and class room was given for two weeks for $300.00, or by mail for $50.

He no longer treats disease but teaches "the effects of foods in different combinations and proportions to suit the reported activities, physical and mental of the pupil."(42)

TILDEN

J. H. Tilden(43) through his "health school" in Colorado, taught that all diseases were due to toxaemia; toxaemia due to enervation; and enervation due to improper diet. Bacteria were secondary invaders. His work in this line was not long or extensive and in 1924 he sold his school and continued to do mail-order diagnoses on a small scale.

YERGIN

Yergin, after being at the head of several fad schools and food companies, started the Cooperative Food Company in Chicago in 1920. This company sold patent foods and made a specialty of "Dr. Yergin's Pus and Pain Chart" at ten dollars. This chart told the diet necessary to cure every pain, but all diets included foods sold exclusively by the company. The company later became religious and predicted the end of the world in 1924. However, they continued to sell stock in the company.

YOGHURT

With the advent of the sour milk cure several years ago, The Yoghurt Company was interested chiefly in selling tablets supposed to contain Bulgarian bacilli, with side-lines in "anti-constipation

cookies", vegetable compound and vegetable bouillon. Later it developed "Flesh Builders", "Physical Culture Candies", and "Magic Soup". As these food fads lost popularity a system of "cures" and "treatments" were developed. For inveterate cases they advised the Phoenix cure - furnishing all necessary food except a few vegetables and fruits over a period of three months for $36.00. For the common case they had the Mineral Salt Treatment for $15.00, for cases of short duration the Vitamin Treatment at $8.00, for the asthenic type the Flesh Builder Treatment for $10.00, and finally a Healthy Skin Treatment for $5.00. These treatments were entirely prescribed diets.

In addition to mail order business the organization maintains a sanitarium, "The Temple of Health", where every pathological condition is treated. They claim to have a cancer cure which will succeed in any case.

FLYNN

W. Earl Flynn began life as a Methodist preacher and evangelist. Ill health interfered with his work and he was informed that his bowel condition could not be cured. He then developed his health system and proceded to cure himself increasing in weight from 108 to 171 pounds. He has traveled over the United States and Canada, giving his evangelistic health talks under the name of "Daddy Flynn", usually with church patronage.

(44)

In Flynn's book he gives faith, diet, and exercise as the secrets of health. His information on food chemistry and human phy-

siology is fundamentally correct, but he becomes radical when he argues against eating meat. His dietary cures are numerous and unscientific. His exercises are chiefly calesthenic and chiropractic adjustments but cure all manners of conditions. "Health as well as disease is a habit."

Brief mention may also be made of a few of the other faddists who are too numerous for detailed accounts. Mc Coy (45) was a great believer in fasting and published a bood "The Fast Way To Health". This he filled with interesting fallacies and European folk lore.

Mc Ferrin (46) had an unusual method of obtaining money. He toured the country giving free lectures to women organizations, following these lectures by a course in dietetics for which he received $15. a number. In addition he charged $2. for letters of information; his "Corrective Dietary List" brought $5.00; his"Special Diet for the Unborn" brought $10.

The exploitation of experts in dietetics caused the United States Department of Agriculture to issue a public warning several years ago. This is still applicable:

"In view of the wide spread of literature and advice of so-called "diet experts", it seems desirable to warn people against adopting the dietary recommendations of those without real scientific standing in the community. Some of the advocates of freak diets are sincere, but are themselves deluded; while others are fakers who seek to make monetary gain by advising peculiar systems of diet. Neither

class can offer trustworthy advice. In most of the recommendations of these self-established "experts", there is hardly a shadow of reason though they may seem plausible."

If the deductions of many food faddists accepted as facts were really operative, it would be difficult to explain how the human race had survived. The race would have expired soon after man began to choose his diet and cook his food. The contrary is true, as civilization has advanced from the time man began to cook and otherwise prepare his food.

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