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THE ELIXIR OF LIFE

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THE "ELIXIR OF LIFE" is defined as an aromatic, sweetened substance containing great medical properties, embodying the quintessence or inmost principle of life, which will quell the pains of disease, preserve the characteristics of youth, and prolong life indefinitely. For ages sorcerers and alchemists dreamed of and searched for the elixir of life, and in more recent history scientists and philosophers have speculated as to its possible existence. There have been some diligent scientific attempts to find some substance that would induce rejuvenation in human glands and tissues and thereby restore or prolong youth. But failure has followed failure and the hope for an elixir of life has dwindled into a tragic dream, as each succeeding generation sees the constant and ever increasing degeneration of man. As disease progresses, as senility slowly but surely grinds away human happiness, as death approaches, so does the desire for a magic elixir persist, but without any real expectation of fulfillment. Today we have relegated the elixir to a superstitious world of the past—a world of imagination—which can have no place in the reality of modern life.

There is no magic medicine, no panacea nor cure-all for all human ailments. There is no method of prolonging youth or life indefinitely. But in a limited sense there is an elixir of life, embodying most of the qualities which an elixir is expected to possess. Its physical properties are well known to science and it is within the reach of everyone. It is aromatic and sweet, contains definite medical properties, possesses the vital principle of life, tends to prevent and remedy disease, prolong youth, and increase the span of life. Its effects are rapid in development, high in intensity, and widespread in area of influence. It is capable of producing a profound biological change in human life within a single generation. These statements are backed by scientific evidence in the fields of biochemistry, physiology, biology, and medicine, and they are subject to direct verification through the accepted methods of science.

The elixir of life is so very common, so easily available, that it has constantly been forgotten in the search for more elusive and mysterious substances. Man is not prone to look

into the simple nutritive substances of nature for the possible solution to his physical troubles. Yet, that is precisely where the elixir of life is to be found. In natural foods, unchanged by the hand of man, are the life-giving factors which determine the state of human health. The raw material of nature provides the answer to the biological problems which confront us. It becomes important, then, to consider the science of nutrition as the medium through which these factors may be considered and analyzed.

The science of nutrition embraces the total relationship between food consumption and human health. The nutritionist looks upon the human body as a chemical laboratory whose efficiency of function depends almost entirely upon the chemical balance of the body cells and tissues. Chemical action supersedes bacterial action and controls the latter in both its normal and pathological state. The correct amounts of all chemicals and chemical compounds, properly balanced and combined, assure effective physiological function and prevent the development of disease. They furnish the fuel to yield energy for bodily activities; they supply the structural material for the growth of all tissues, and they serve to maintain the body's self-regulatory system and the physico-chemical conditions within all cells, tissues, fluids, and body parts to directly or indirectly control the processes of life.

Up to the present time most nutritional research has centered upon a study of the effects of different modes of food processing and preparation. Studies have been made on the effects of dividing foods into fractions—consuming some of the fractions and discarding others—as constitutes the process of refining. The preparation of different grains and sugars has thus come under close scrutiny. Many recommendations have been made in virtue of according discoveries, and refined foods have thus come under strong criticism in the field of nutrition.

A mode of food preparation, employed both in certain refining processes and in the culinary art of the kitchen, is the application of heat to foods. This was first considered on a theoretical basis, as pertains to the loss of certain nutritive factors under exposure to heat. Later nutritionists followed a less narrow line of research and studied the question of cooking from its practical aspects. They carried out animal experiments, and their conclusions were given further clarification through observations of animal life by biologists and zoologists. In addition, a number of physicians have applied nutritive knowledge on the effects of cooking to clinical practice, and the results give a clear picture of this

phase of nutrition. Incidental facts and reports, given in many texts and journals of nutrition and medicine, tell the story of heat-processing foods as it is related to human health.

Correlation of these important facts in the science of nutrition has been inadequate, however, and as a result few dietitians and physicians are familiar with sufficient data to enable them to make application of the knowledge in their practice. The layman is equally unfamiliar with the necessary facts and hence fails to apply them in his own life. As a result most nutritional thought has, and continues to be, centered upon the selection of foods, with little thought as to the preparation of foods. The different foodstuffs have been divided into classes, depending upon the source of supply, and recommendations have been made on the basis of "balancing" the diet correctly between the different food types. This has been the essence of nutrition in practice, both for preventive and therapeutic purposes. People have thought far more of *what* they should eat than they have of *how* they should prepare the foods they do eat.

From the standpoint of modern nutritional science, this state of thought is based upon fallacy and tends to lead to much confusion in the planning of nutritional regimes. Selection of foods is of worthy consideration, but it falls far short when not combined with adequate knowledge of how the respective foods should be used. Actually, far more research has been done on the effects of different methods of food processing, particularly heat-processing, than has been done on a comparison of different food types in an identical physical state. Often, when different food types have been compared, no thought has been given to the different conditions under which the foods have been prepared. Consequently the designation of "protective foods" in modern nutrition pertains more accurately to foods in a certain and earlier stage of processing than it does to foods of a certain type and source.

This all finds important correlation with our concept of the elixir of life. Essentially raw food constitutes the elixir of life. Used as a small fraction of the normal diet—perhaps ten per cent or less—it is often sufficiently potent to preserve life and is capable of sustaining the state of health seen in civilization. Used in greater amounts, it provides correspondingly more noticeable and effective results. Used as the exclusive source of nutriment, it becomes an elixir of extreme potency which effects an astonishing transformation in physiological efficiency throughout the body.

In this treatise we shall consider raw food in all of its ramifications and uses. The purpose is to determine both the

theoretical and practical value of raw food in comparison with the same values for heat-processed food. Our guides in this determination are strictly scientific and involve in their final conclusions only the established facts which have found general acceptance in the science of nutrition. The analysis as a whole may show the way to a practical and effective mode of human nutrition, as well as indicate the therapeutic possibilities and medical properties of raw foods.

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RAW FOOD IN CHEMICAL COMPOSITION

THE VALUE OF FOOD in animal and human nutrition is dependent largely upon its chemical composition. The essential nutrients of food are proteins, carbohydrates, fats, minerals, and vitamins. Hormones and enzymes also play a role of some importance. When the body receives adequate quantities of these nutritional factors, with minimum quantities of toxic and non-usable factors, the body responds favorably and functions in a state of health. As the proper balance is altered, with decrease of the necessary nutrients, and increase of the toxic substances, the body fails to operate at optimum efficiency and various manifestations of disease tend to develop.

The application of heat to plant or animal substances tends to produce marked changes in chemical composition. These have been carefully determined in accurate tests by many nutritional scientists. The data on the subject is voluminous and covers the majority of common foods and the majority of elements and activators in nutrition. The effects of cooking may then be determined, and to some degree measured, insofar as they relate to the destruction of essential nutrients and the consequent impairment of the food in question.

ENZYMES

The presence of enzymes determines the "life" of foods. Enzymes are catalysts manufactured by the living cells of plant or animal tissue to carry out the chemical processes which are necessary for the cells to continue their existence as a living force. When the enzymes of a seed are destroyed, the seed has lost its potency for growth and is described as being "dead!' Indeed the status of being "alive" or "dead" in all foods may be defined according to the presence of enzymes. Some of the more common enzymes found in raw food are protease, lactase, lipase, diastase, catalase, salolalase, peroxidase, aldehydase, phosphatase and amaylase.

It is noteworthy that all enzymes are heat-labile. Indeed, they are destroyed at temperatures which have little effect on some minerals and vitamins. Enzyme destruction starts at

about 118 degrees F, and by the time a temperature of 140 degrees F. is reached, all enzymes have been lost. Thus the comparatively low temperatures used in pasteurizing milk, and in cooking other foods by the most advanced low-heat methods, still destroy every enzyme found in food. As all of the inter-related chemical reactions of living matter are controlled by enzymes, the destruction of the enzymes during all cooking processes may lower the quality of food and render it less suitable for the sustenance of life in the human body.

MINERALS AND VITAMINS

Of great importance in consideration of cooking is the loss of minerals, which occurs in varying degrees in all cases. Many of the minerals are water-soluble, and hence they are dissolved out of the food into the cooking water, which in turn is usually discarded. Phosphorus, calcium, iron, iodine, sulphur, copper, and the trace minerals are those usually lost in this way. The total loss may vary from as little as five to ten per cent to as high as nearly100 per cent, depending upon the mineral in question, the food being cooked, the amount of water present with the food, the temperature, and the length of the heating process. The average loss under the usual commercial methods of preparing vegetables is about 50 per cent of the minerals originally present in the foods. When vegetables are lightly steamed the average loss is only about one-third this much. With the "waterless" cooking utensils, which distribute the heat evenly throughout all sides of the container and thus prevent burning with little or no water, the loss is also reduced. When large amounts of cooking water are used, but served with the food, the consumer still receives the soluble minerals. It is believed that certain minerals may be damaged by heat even though they are not lost. This is due to the change brought about in their physico-chemical state which renders them less soluble and hence less assimilable by the body.

Vitamins are lost in the cooking process in two ways. Some, such as carotene and vitamins A and C, are destroyed when the plant enzymes cause the vitamins to combine with oxygen, thus inducing oxidation. Certain others are not destroyed, but they are soluble in water and hence dissolved out of the food. Vitamin D and some of the B complex vitamins are lost in this manner. The amount of heat necessary to reduce the vitamin content of foods is not great. Even the comparatively low application of heat as used in pasteurization of milk destroys much of the vitamin A and enough (25 to 50 per cent) of the vitamin C to eliminate the

milk's antiscorbutic qualities. Of the B vitamin group, much of the riboflavin, pantothenic acid, and pyridoxine, about half of the inositol, and most of the folic acid and thiamine are lost when foods are cooked in the usual manner. As is the case with minerals, the losses are less, though significant, if the food is steamed. In all cases the less heat applied and the shorter the cooking time, the less is the total amount of loss.

PROTEINS AND FATS

Cooking tends to coagulate the proteins of food and, with the exception of egg white, render them less digestible. Some of the sensitive amines are changed by heat, and others are destroyed. Both the cystine and cysteine are so denatured in the presence of heat and water that, according to Ragner Berg, they are "rendered valueless for nutritive purposes." The most important of all protein components, lysine, is destroyed by heat, as is the essential glutamine. Other protein factors are transformed and modified to lower forms and hence rendered less available to the body.

Cooking decidedly alters the fat of food and usually renders it less digestible. In the process of frying, the fat so permeates the food and surrounds the individual food particles that they do not readily yield to the action of digestive juices. For this reason foods which are fried in fat are very difficult to digest. If sufficiently high temperatures are used in cooking fats, free fatty acids develop which are not only difficult to digest, but are in some cases definitely poisonous. When vegetable oils undergo the process of boiling or frying the toxic irritant known as acrolein is produced. In this connection it may be pointed out that acrolein has often been described as a possible cause of cancer. Its name may be found in most medical lists of possible dietary carcinogens.

TARS

The formation of tars cannot be overlooked in considering the chemical effects of cooking. Tars are found in smoke and soot, and they form in any organic compound which is subjected to great heat over a sufficient period of time. Meat, eggs, potatoes, toast, and other foods which are scorched by heat until black forms on the outside may contain tar. Roasted coffee and coffee substitutes derive their flavor from the tars which form when the coffee beans or cereal grains are roasted.

It has long been known that sufficient exposure to the tars found in soot and smoke tends to cause cancer. The heavy consumption of tars found in certain cooked foods may be no less irritating and no less cancer-causing. Dr. Angel Roffo described the physical characteristics of tars obtained from roasted coffee beans as the same as those obtained from tobacco. He also found that both were carcinogenic when given to experimental animals. Thus the consumption of tars in certain roasted and over-heated foods ranks as a possible cause of cancer and other diseases in modern life.

ADDITIONAL CHEMICAL CHANGES

Many food factors other than those already mentioned may be impaired or lost in the presence of heat. Starch is partly hydrolyzed by heat, and the soluble sugars and dextrin of foods are polymerized to some extent. Peptic substances are also affected and undergo dissolution during the cooking process. The "anti-lameness" chemical of raw cream, discovered by Wulzen and Wagtendonk of Oregon State College, is known to be destroyed by either boiling or pasteurization. The "filtrate-factor" of certain vegetables, which controls the aging process of the body, is reported by Morgan and Simms to be easily lost when vegetables are boiled. Certain hormones, including those from the adrenal cortex, which have been successfully used in improving animal health, are thermolabile and are destroyed at the relatively moderate temperature used in pasteurizing milk. Other activating substances which may exist in food but have not yet been chemically isolated and studied may or may not undergo deterioration in the cooking process.

It may be that simply altering the physico-chemical state of food through the use of heat is sufficient to account for certain adverse effects resulting from using the food. It is known that the toleration point of both minerals and vitamins as are normally found in uncooked foods is much higher than is the case when these nutritive factors are given in purified form. The use of purified minerals and synthetic vitamins shows this quite clearly. Minerals and vitamins must be found in an organic combination with other food nutrients if they are to be used efficiently by the body. With rare exceptions we must rely on the plant to synthesize the minerals of the earth into combinations which are entirely non-toxic. Such combinations remain non-toxic when transferred to the animal as milk, eggs, or flesh. However, in the presence of heat certain nutrients are destroyed and hence the delicate chemical balance is altered. It is known that in the case of proteins the modification of the complex structure renders

some of the protein factors useless to the body. Even when calcium is not lost in the presence of heat it is often rendered less assimilable, as has often been pointed out by nutritionists in connection with pasteurization of milk. It is hence possible that many other minerals, and perhaps vitamins and other factors, may also be rendered either useless or toxic to the body, as the complex chemical combinations are broken down by heat.

Evidence of this is seen by the fact that leukocytosis, an increase in the number of white corpuscles of the blood, follows the exclusive consumption of cooked foods. Biologists have called this "digestive leukocytosis" and consider it a normal reaction to the digestive process. However, Dr. Paul Kouchakoff, of the Institute of Clinical Chemistry in Lausanne, Switzerland, conducted some 300 detailed experiments which indicated that leukocytosis was the specific effect of eating heat-processed foods and never occurred after a meal of raw food. Reporting at the First International Congress of Microbiology at Paris in 1930, Dr. Kouchakoff pointed out that temporary leukocytosis followed the consumption of foods heated about 83-87 degrees C. If certain types of raw food were added to the cooked meal, leukocytosis would be prevented, though when foods were heated above 100 degrees C., no amount of raw foods would prevent the condition. Likewise, when heat-processed foods which had also been subjected to complex manufacturing processes were consumed, leukocytosis was unavoidable. In this case, not only did the white corpuscles increase in number, but the correlation of numbers between the different kinds of white corpuscles was altered.

In medicine, an increase in the number of white corpuscles in the blood, together with disturbances in the percentages of different kinds of white corpuscles, is known to indicate that some kind of disease process is going on in our body. In time of infectious illness, or when harmful extraneous substances are introduced into our system, these changes in white corpuscle development always take place. We have reason to believe that the "digestive leukocytosis" following the consumption of cooked food is indicative that chemicals or chemical combinations in food may become toxic and harmful under the influence of heat, with the degree of toxicity dependent upon the temperature at which the food is cooked.

The European nutritionist, Prof. Ziegelmayer, well illustrates the total biochemical changes that heat produces in food in these words: "It is certain that cooking alters the colloidal state of food: it decomposes highly molecular

compounds, it alters the structure and surface tension of molecules, the degree of dispersity, the osmotic tension, the degree of dilution, the course colloid molecular and dispersed statuses, the water binding capacity and the hydrophobe qualities of the colloids, it alters the viscosity and reduces the falling gradient of energy.... The uncooked state secures the maintenance of some food substances, prevents alterations of the proteins, preserves the original mineral salts in their optimum concentration.... The more the food energies are maintained in their intimate compound and correlation, the greater the total effect and the higher the efficiency. "

It is clear that all heat-processed foods undergo important changes in chemical composition. They lose a part of their mineral and vitamin content; their proteins are partly destroyed and rendered less digestible and nutritious; their fats become less digestible and assimilable and sometimes become toxic. The starches and sugars are altered to some degree. The foods lose all of their enzymes, their "filtrate factors" and "anti-lameness" chemicals; their organic combinations of minerals and catalytic agents are broken down and altered, and some may become toxic. The complete chemical reaction to the cooking process covers considerable scope, as may be seen, and it is of definite importance in the science of nutrition, determining to some extent the value of practically all known foodstuffs.

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RAW FOOD IN PHYSICAL STRUCTURE

COOKING INDUCES a rapid change in the physical state of all foods. The degree of change is dependent upon the amount of heat that is applied and its duration of process. The heat tends to soften the food and break down the rough cellulose material into a soft bulk. In so doing it renders certain foods edible and more palatable, though not necessarily more appropriate as nourishment. The change in physical structure of foods resulting from heat has an important effect upon the teeth and gums, as well as upon digestion, assimilation, and the rate of food movement through the intestinal tract. As such it may have a definite effect upon the condition of human health.

FOOD, TEETH, AND GUMS

It is believed that the buffer action of the cellulose of raw plant foods tends to prevent erosion of dental enamel. In experiments conducted by Carey Miller at the Agricultural Experiment Station at the University of Hawaii, it was shown that sweetened whole fruits, including grapefruit, guavas, plums, mangos, and pineapples, had only slight erosive effects upon the dental enamel of rats which consumed the fruits. When the cellulose was removed from the fruits through the process of juicing, with the juices then given to the animals, the erosive effect was increased three to seventeen fold. Experiments at other experiment stations also reveal the erosive effects of sweetened fruit juices upon dental enamel, especially when the juices are canned or otherwise heat-processed. The fact that this is almost entirely prevented when the whole fruits are consumed in their raw state is considered evidence that the physical contact between the teeth and the raw cellulose acts as a buffer and prevents dental erosion.

The decay of teeth, as distinct from erosion, is affected by the physical state of food. Hoppert, Webber, and Canniff have noted that white rats may be kept on a diet fully adequate in minerals and vitamins and yet suffer from dental caries if the foods eaten are sufficiently soft to be impacted around the teeth. Wallace has noted that soft sugars, sweets, and other carbohydrate foods tend to increase susceptibility to tooth decay in humans, whereas crisp "fibrillar" foods such as

raw fruits and vegetable salads tend to prevent decay by removing harmful bacteria, preventing tartar formation, inducing mastication, and also promoting the flow of saliva and oral mucus which is important in oral health. Whereas foods may be softened in various ways, and cellulose may be removed through different procedures, the most common contemporary method of promoting such food changes is through the process of cooking.

Not only the teeth but also the gums are affected by changes in the physical properties of foods. The presence of sufficient raw cellulose or other food materials in the diet which afford the gums exercise is helpful to the development of healthy gums. In experiments with more than 200 ferrets, King and Glover found that animals given rib bone, with the attached muscle, tendon, and periosteum, which required much gnawing and chewing with consequent prophylactic action on the gums, were free from gum disease and tartar deposits at all times. Ferrets given the same foods separately suffered from gum lesions and tartar deposits, for the animals no longer had to gnaw the bone to obtain the tendon and periosteum. Those ferrets which were fed entirely upon soft foods, including powdered bone-meal, all suffered from severe gingival disease and gum lesions, with heavy incrustations of tartar.

Burwasser and Hill conducted similar experiments, using dogs for their work. Two groups of the animals were fed diets identical chemically but different physically. The control animals, given hard foods, maintained normal gingivae during the fourteen months the experiment lasted. Those given soft foods in the form of a mash all developed marked pathological changes in the gingivae, similar to those observed in ferrets.

As a result of these experiments with animals, an attempt was made by J. P King to test the effects of hard foodstuffs on the parodontal tissues of humans. A number of institutional and other subjects suffering from severely diseased gingivae were given raw sugar cane to gnaw upon each day, thus exposing the gums to the friction of the hard food. In all cases where calculus deposits were relatively slight, there was rapid cessation of bleeding and marked improvement in the color, texture, and contour of the gum surface. When heavy accretions of tartar were present, improvement was noticeable, though limited. In all cases the gum area that was improved was limited entirely to that part which came in contact with the friction of the sugar cane, the

inaccessible gum tissue remaining unaffected throughout the duration of the experiment.

At a later period a group of subjects with gum disease were given the same quantity of sugar cane each day, but this was softened through a canning process. The results in this case were almost entirely negative and little or no improvement was noticeable in any case. One group of the subjects was treated by scaling to remove the tartar deposits, but this showed no favorable response and only accelerated the rate of calculus deposition. With or without such dental aid, the subjects receiving the soft, heated sugar cane failed to respond to treatment.

DIGESTIBILITY OF RAW FOOD

The change in physical structure brought about by heat may be partly responsible for changes in digestibility between raw and cooked foods. Cooking may impair or improve digestibility. For milk, most vegetables, and many other foods there is usually impairment. At the New York State Agricultural Station, tests were conducted with cooked and uncooked clover, hay, and corn meal, indicating that the relative digestibility of the albuminoids was more or less diminished by cooking. Thirteen separate series of experiments have been conducted at agricultural stations in this country on the supposed value of cooking or steaming foods for pigs. In ten of these trials, there was not only no gain in digestibility; there was a definite loss, and in some cases the loss was very considerable. The tests showed that a pig may require up to fifty per cent more food to produce a pound of gain in weight when food is cooked than when it is raw. Ragner Berg has reported similar results in experiments, and he points out that a mixture of soy bean, wheat, wheaten bran, sunflower seeds, hemp seeds, and rye meal, which is quite adequate for animals in its crude state, becomes conspicuously inadequate when it is mixed with water, formed into cakes, and baked.

IMPORTANCE OF CELLULOSE

While digestibility is important, it should not be assumed that all foods should be one hundred per cent digestible. Many plant foods contain much cellulose, which is not readily digested. Yet, the presence of this cellulose in the diet is very important. Well-cooked foods, which lack raw cellulose, fail to stimulate peristaltic action to the degree necessary to promote rapid and effective bowel action. They

remain in the intestinal tract much longer than raw foods, and putrefaction and fermentation are often well advanced before elimination is made. Usually the feces have a rich bacterial flora and an offensive odor as evidence of the putrefaction that has taken place.

The effects of the excessive fermentation and putrefaction of foods within the body are believed to be an important cause of disease. A number of distinguished scientists have held that prolonged putrefaction produces toxins which are absorbed by the bloodstream. Elie Metchnikoff, of the Pasteur Institute in Paris, made what is perhaps the most thorough study of longevity and senility ever undertaken, and he maintained that such putrefaction is a definite source of poisoning to the body and is the primary cause of the severe symptoms of senility. He associated the richness of the bacterial flora in the feces with the length of life and claimed that with both animals and humans the average longevity was greatest when the bacterial flora was very slight or entirely absent.

In this connection it may be pointed out that intestinal putrefaction is rapidly diminished in the presence of uncooked foods. The cellulose of raw plants is of vital importance in maintaining normal peristaltic action in the intestinal tract and thus preventing stagnation in the movement of foods. On an exclusive raw diet, the movement of foods is so rapid that putrefaction is very slight; the resulting feces in such cases are almost free from offensive odor and contain only a fraction as many bacteria as would otherwise be present. If the viewpoint of Metchnikoff and others is correct, this would have a very important effect upon human life and be conducive both to a higher immunity to disease and a greater duration of life.

The physical changes which cooking produces in foods are clearly marked. They involve primarily the destruction of cellulose material of plants. Such destruction may result from different methods of food-processing, of which cooking is only one. The effects of this change in the physical state of foods appear to have a definite reaction upon the health of the animal organism, and are particularly detrimental to the parodontal structures. They have a pronounced effect upon digestion, assimilation, and the movement of foods through the intestinal tract. As a cause of disease they rank of possible importance, and existing evidence would indicate they may be associated to some degree with senility and longevity.

4
RAW FOOD IN EXPERIMENTAL STUDY

THE THEORETICAL BASIS for the results of using raw and cooked foods has been considered from the standpoint of biochemistry and physiology. It has indicated the manner in which cooking alters food. It would appear at first glance that these alterations would lower the value of the food and render it much less nutritious and valuable to animal life. For confirmation or refutation of this logical assumption, we must turn to applied science in the fields of nutrition and biology. Here many studies of animals which have used both cooked and uncooked diets under controlled experimental conditions have been made, and they provide rather conclusive evidence on the entire subject.

GENERAL EXPERIMENTAL DATA

Among the first scientists to study cooking in its application to animal nutrition were Weill and Mouriquant of France. In 1912, as they were conducting their celebrated experiments with pigeons to determine the effects of refined flour, they added a less known series of experiments, also with pigeons, to determine the effects of cooking. A number of pigeons were fed whole raw grains; the others were given the same kind of grain, entirely whole, without any kind of refining, only this grain was thoroughly cooked. The pigeons given the raw grain showed great activity and vigor. They gave every indication of being perfectly nourished. Those given the cooked grains developed beriberi and all died paralyzed within ninety days. Other pigeons were then given two-thirds cooked grain and one-third raw grain, which was sufficient to give complete freedom from beriberi symptoms.

While Director of Nutrition Research under the Research Fund Association in India, the celebrated British scientist, Sir Robert McCarrison, followed with the first large scale experiments with white rats which revealed the effects of cooking. One thousand pedigreed albino rats were placed on a diet of raw cabbage, raw carrots, raw milk, raw meat, unleavened bread, and sprouted legumes. Two thousand rats were then placed on a diet of white bread, margarine, tinned meat, tinned jam, boiled tea, boiled potatoes, boiled cabbage, and a small amount of milk. All animals were given the same general care. The laboratory was kept perfectly clean; the

tiled floor and walls were frequently washed. The cages were large and spacious, so each rat could run about and exercise as it pleased.

The rats given primarily uncooked foods were remarkably healthy in all respects. From all appearances they suffered from no diseases whatsoever, and all mothers reared their young. At the end of two and a quarter years, corresponding to 55 years in man, all rats were autopsied. The only trace of disease found was an occasional cyst in the liver, which was assumed due to the straw bedding which the rats often nibbled.

The 2, 000 rats eating mostly cooked foods soon began developing a wide assortment of diseases—practically every ailment that one might find listed in any medical textbook. Foremost among these, as revealed in the post-mortem examinations, were: tuberculosis, arthritis, Bright's disease, gastric ulcers, duodenal ulcers, glandular enlargements, inflammation of the eyes, anemia, loss of hair, infected teeth, infected tonsils, middle-ear disease, corneal ulceration, and skin diseases of various types. In addition the rats seemed to be affected mentally. In contrast to the raw food rats, which were gentle and affectionate, these animals became ill-tempered and vicious. They would bite the attendant, kill each other, and generally display a state of continuous nervous irritability.

Following the rat experiments, McCarrison used twenty monkeys in a new series of tests. All animals except one were in perfect condition when the experiment began—the exception being the result of a slight injury sustained by one monkey during capture. Nine of the monkeys were placed on a diet consisting chiefly of raw foods, including wheaten bread, milk, ground nuts, fresh onions, fresh butter, plantains, and water. Six were given wheaten bread, cooked rice, cooked ground nuts, boiled milk, fresh butter, and water. The other five were given a similar assortment of cooked foods, fresh onions and water, plus a little fresh butter. All animals were provided with the same amount of exercise, sunshine, fresh air, etc. The only difference in their mode of life was their diet, involving the condition (cooked or uncooked) in which the food was given.

Regarding the monkeys fed primarily uncooked foods, McCarrison stated: "They remained in good health, with the exception of an attack of jaundice in some of them; this was thought to be due to the sudden lack of exercise, as well as to the too generous provision of monkey-nuts which in the earlier stages of the experiment were not limited to 10 grams.

The jaundice was corrected by reducing the diet to milk and bananas for a few days, and adding magnesium sulphate to the drinking water. After recovery, which occurred in all cases, the diet, as above detailed, was used without recurrence of jaundice or any untoward symptoms whatsoever. "

The monkeys given cooked foods developed troubles from the very start. Diseases were common and every animal died within 43 to 100 days. Average length of life of those given the cooked foods plus onions was 60 days. Those allowed a little butter each day lived an average of 69 days. The postmortems of these monkeys indicated the presence of dozens of physical abnormalities and ailments. These included: dilation of the stomach, gastric catarrh, stomach ulcers, duodenal catarrh, degeneration of the mucous membrane, congestive changes in the jejunum and ileum, ballooning of the small bowel, atrophy and thinning of the walls of the small intestine, colitis, ballooning of the colon, atrophy of the omentus, and cancer of the pylorus.

Experiments with guinea pigs, to determine the effects of cooked foods, were conducted by Dr. O. Stiner, an investigator for the Swiss Board of Health in Berne, Switzerland. Dr. Stiner placed a large group of these animals on a diet of their normal foods (hay, oats, carrots, and water) which would normally be taken raw, but in this case were cooked in a high pressure steamer. A large number of diseases appeared shortly thereafter. The teeth became softened to such an extent that they could be cut away with scissors. Gangrenous gingivitis developed, and the jaws softened and warped until the rows of teeth overlapped and would not close in the normal manner. The salivary glands became diseased and the animals developed both goiter and anemia. In certain cases two teaspoons of pasteurized milk each day were added to the diet, and this was followed by the development of another disease, arthritis. Most of the guinea pigs died of scurvy, with a smaller number succumbing to cancer of the lung.

In America, Dr. Rosalind Wulzen and Alice Bahrs, of the Department of Zoology in Oregon State College, also used guinea pigs in their experimental work. Efforts were made to determine the effects of pastuerized milk. The animals were divided into four groups which were given whole raw milk, whole pasteurized milk, raw skim milk, and pasteurized skim milk respectively.

"Animals fed raw whole milk grew excellently and an autopsy showed no abnormality of any kind" Dr. Wulzen

reported. Animals fed pasteurized milk did not grow as well, and developed stiffness of the muscles. Within a period of a month to a year they died after showing signs of "great emaciation and weakness. " The autopsy revealed that the muscles were extremely atrophied and streaked with white lines of calcification. Lumps of tricalcium phosphate were found deposited under the skin, in the joints, the heart, and other organs.

In addition to guinea pigs, white rats were used in the tests at Oregon State College, these being reported by Bahrs and Hughes. The animals given pasteurized milk gained weight less rapidly than those given raw milk, and on autopsy the hearts were found to have a flabby appearance. The adrenal glands were of a pale color and there were small areas of apparent atrophy. The livers and skeletal muscles also exhibited a very pale color, as compared to those of the animals given raw milk.

At Ohio State University, Dr. Ernest Scott and Prof. Lowell Erf also fed different groups of rats on raw and pasteurized milk. The animals on raw milk showed a good, sleek coat; they were adequate in growth and weight; their eyes were clear; their dispositions were excellent, and they enjoyed being petted. Those on pasteurized milk had a roughened coat; their growth was slow; their eyes lacked luster, and they were very irritable, often showing a tendency to bite when being handled. The rats on pasteurized milk also showed a loss of vitality and weight, and many developed anemia.

Using cats in a similar set of experiments, Prof. Erf noted the following results when pasteurized milk was used as a partial ration for the animals: "(a) Incomplete mineralization of the offspring, (b) The inability of the animal to remineralize its own skeleton adequately after pregnancy and likely to produce a rachitic condition in the offspring. (c) Failure in the development of the teeth. (d) Muscular and ligamentous atony as well as changes in the histological factor of the various organs. (e) Tendency toward development in allergies. (f) Tendency toward sterility in subsequent generations. "

Two English scientists, Mattick and Golding, employed white rats in a series of experiments, also with milk. They fed different groups of the animals fresh raw milk, pasteurized milk, and sterilized milk. Those receiving raw milk attained normal weight and growth in each of the four generations the experiments were conducted. Rats receiving pasteurized milk grew less rapidly, and reproduction was impaired. The animals given sterilized milk grew less rapidly than either of

the other groups; reproduction was also less efficient, and none of the animals in the third generation lived longer than a day.

Another investigator, S. Schmidt-Nielson, fed white rats pasteurized milk and reported that the food produced diminished vitality and early death in the offspring of mature animals. Daniels and Loughlin reported the failure of normal growth in all rats given heated milk, whether evaporated, condensed, or pasteurized. They also observed that this milk increased the tendency of the animals to develop polyneuritis. Given adequate amounts of raw milk, none of the animals developed this disease, whereas three on pasteurized milk were severely afflicted. Kitchin and McFarland noted that raw milk provided good growth curves in rats, whereas growth among animals given pasteurized milk was poor. Russell observed that the addition of raw beef to a wheat-milk diet in rats improved reproduction and increased the general vigor of the young. Abeline reported that rats fed whole wheat bread baked at high temperatures were stunted in growth and not so resistant to disease as were rats given bread baked at low temperatures. In Finland, Dr. Reinius reported feeding rats a diet composed exclusively of food heated in an oven at 140 degrees C. for 30 to 40 minutes. This caused total cessation of growth of the animals, which was attributed to the destruction of certain amino acids by heat.

McCandlish and Black, of the West of Scotland College of Agriculture, tested raw and pasteurized milk on the growth and health of calves. Fourteen calves of different breeds and sexes were divided into two groups of six and eight respectively, one receiving raw milk from the age of five days and the other receiving pasteurized milk from the same age. At the end of go days all calves on raw milk were alive and in good health. Of those on pasteurized milk, two had died and one had to be removed on account of unthriftiness. For the first 60 days there was no significant difference in the rate of growth, but after that period the calves on raw milk grew more rapidly. The calves on pasteurized milk consumed more food per pound of weight gained, using 6 per cent more milk, 16 per cent more grain, and 43 per cent more hay.

W. Catel, using goats, also found better results from the use of raw milk. Animals so fed attained much better growth than those using pasteurized milk, though some fared badly when given milk from the bottle but thrived well on the mother's milk obtained naturally. Catel found that "The utilization of fat, carbohydrate, protein, calcium, and phosphorus was less

complete in the animals fed on heated milk; these animals retained a very high proportion of choline in their food."

Dried skim milk has been heralded as a "super food" in some quarters, but experimental animals live very poorly on this food after it has been heat-processed during manufacture or at any other time. Dr. Joseph E. Muller, of Indiana University, found that white rats given unheated dried milk had only 5.4 per cent dental defects, while the caries incidence rose to 9.3 per cent when heated dried milk was given. McClure and Folk likewise found that dried milk produced dental caries in rats, with the amount of damage being parallel with the degree of heating the milk had undergone. Kraft and Morgan, of the University of California, reported that the dried milk lost half of its growth efficiency for rats if it had been cooked for 15 minutes, and all of its growth value if cooked for 25 minutes. From Germany comes a report from Fink and Schlie, who tested 21 samples of dried skim milk as contrasted to fresh skim milk. Of 200 rats given the dried milk, 95 per cent died within 40 to 100 days, and 85 per cent of these had liver necrosis. All rats given the same diet, but with fresh skim milk instead of dried milk, survived the experiment with complete freedom from liver necrosis.

Both mice and rabbits have been tested with raw and heat-processed foods. Wilson and Cowel noted that young mice thrive better upon raw milk than upon pasteurized milk, possessing a higher weight average and much greater vitality. Marine and his associates fed a group of rabbits upon raw cabbage and a group upon cooked cabbage. The former were healthy and displayed complete immunity to goiter, whereas cooked cabbage was found to be goitrogenic and produced a high incidence of the disease among the animals.

Cats and dogs fed commercial pet foods, which have all been heat-processed, show various symptoms of disease in experimental tests. M. L. Morris fed a group of cats upon fresh meat and all thrived well, but those animals given samples of many different commercial cat foods did poorly in comparison, and a number of the cats showed emaciation, skin lesions, and neurological signs. Dr. Clive McCay has pointed out that "The meat meals commonly used in dog feeds are often so over-heated in processing that they are entirely devoid of vitamin B_1. Recently in a digestion trial of meat meals made by students, the dog refused to eat and became badly constipated." Koehn observed that dogs may appear healthy and thrive for long periods on cooked rations containing cottonseed meal, "but eventually they will die very suddenly." Dogs fed upon raw foods are resistant to experimental amoebic infection, but those animals given a

diet of canned meat have very low resistance. E. C. Foust found that he could produce amoebic infection at will in poorly nourished animals and then establish a cure by feeding raw liver. This food arrested the amoebic lesion and at the same time lessened the danger of secondary bacterial infection.

Magendie made extensive feeding trials with dogs to determine the effects of raw bones. Animals given boiled bones died within a couple of months, and those fed the heat-processed bone extract, gelatin, for a few days, preferred to die rather than eat more. Fresh raw bones, on the other hand, kept the dogs alive for long periods and appeared to afford adequate nourishment.

The canine experience with milk has been much the same. An English physician reported feeding puppies on pasteurized milk, and the animals died. Other puppies were given raw milk and thrived well. The American physician, Dr. Charles Sanford, reported that "Dogs fed on pasteurized milk only are liable to have the mange and other disorders, while others of the same litter thrive on raw, sweet and sour milk."

EXPERIMENTS WITH HEAT-PROCESSED FATS

In England Dr. May Mellanby tested raw and heat-processed fats in their relation to the dental condition of the dog. Dr. Mellanby found that the inclusion of raw butter, raw butterfat, or raw cod liver oil in the dog's diet would, almost without exception, insure good calcification of the teeth. When these foods were heated at 120 degrees C., however, their calcifying potency was seriously reduced. This was especially noticeable when the foods were exposed to oxygen during the period of heating. The loss of calcifying properties was thought due to either impairment of the fat soluble vitamins by heat or to the production during treatment of harmful substances which in themselves interfere with teeth calcification.

Heat-processed vegetable oils are staples of the dietary throughout most of India. Accordingly, Indian scientists have made tests to determine their value. Ragu and Rajagopalan heated groundnut, sesame, and coconut oils in an open iron pan to a temperature of 270 degrees, C., as is the usual practice in India, and these were fed to white rats. Those animals receiving 315 per cent ration of heated oils developed jaundice; at a 30 per cent level of oil feeding, all animals died within a week. Conversion of feed was very poor in all animals, and upon autopsy the livers were found to be badly

damaged, congested, and discolored. Control animals, receiving uncooked oils, utilized their food well and survived the experiment in good health. Sir S. S. Sokhey, of the Haffkine Institute, tested hydrogenated oils and noted that they produced inferior growth in animals and interfered with the absorption of calcium in the body. The popular Indian butter substitute, *vanaspati*—made from the heat-processed oils of fruits, flowers, and vegetables—was fed to rats at the Research Institute at Izzatnager, and animals of the third generation became blind.

Scientists of the Western world have also tested heat-processed vegetable fats, as well as heat-processed animal fats, and found these to be instrumental in producing cancer and other diseases. British scientists injected 12 mice with cottonseed oil pre-heated at temperatures of 340-360 degrees C. Two of the mice developed cancerous lesions at the site of the injection, whereas no animals of a control group injected in the same manner with oil heated at much lower temperatures developed cancer. Yet cottonseed oil has been found to produce cancer even when heated at comparatively low temperatures, providing the cooking temperature is maintained for sufficient time. When white rats were fed a 15 to 21 per cent ration of cottonseed oil heated at only 95 degrees C. over a long period, the animals rapidly lost weight, developed diarrhea, and were affected with enlarged liver, kidneys, and adrenals. All animals died within three weeks. In another set of experiments, a group of white rats was fed liberally upon heated, hydrogenated fats, and the control group was given a similar amount of unprocessed fats. All rats were then given butter-yellow, a known cancer-producing substance. Every rat on the hydrogenated fat diet developed tumors or cancer, whereas not one receiving the uncooked fats was so affected. Dr. Lane has reported experiments in which 54 rats were given rations of brown lard heated to 350 degrees C. for thirty minutes. Thirty-seven per cent of these animals developed papillomas tumors of the forestomach and malignant tumors of the glandular stomach. Of rats given a similar ration of unheated lard, only 5.7 per cent of the animals developed tumors. Even this small percentage might be attributed to the fact that the so-called unheated lard had been heat-processed to some degree during manufacture. And last but not least are the celebrated experiments of the late Dr. Angel Roffo of Argentina. Dr. Roffo found that all fats heated to "browning" temperatures increased the tendency of experimental animals to develop cancer. The most damaging of fats were found to be those fried at high temperatures.

THE POTTENGER EXPERIMENTS

Perhaps the most important of all the animal experiments with raw and cooked foods are those of Dr. Francis Pottenger, Jr., one of the world's great physicians and food scientists. These were conducted at the long established Pottenger Sanitarium in Monrovia, California, and covered a ten-year period. Both white rats and cats were employed. Rats given heated milk suffered from many kinds of deterioration, and the change in trabeculation of the bones was particularly noticeable. With the cats the experiments were reported in great detail and covered a large number of animals. A total of 900 cats were studied, and complete records were kept of nearly 600 of them. Through generation after generation the animals were studied, and Dr. Pottenger has issued the detailed results of the experiments as they apply to growth, reproduction, and all phases of the animals' health.

In these tests the animals were fed upon meat-scraps (including the muscle, bone, and viscera), milk, and cod liver oil. The animals were divided into various groups, depending upon the condition, whether heated or unheated, in which their foods were given. Some of the cats were fed entirely upon raw meat and raw milk; others were given two-thirds cooked meat and one-third raw milk. In some cases raw meat and pasteurized milk were used. A number of cats were also fed sweetened condensed milk, evaporated milk, or raw metabolized vitamin D milk with raw meat. Cod liver oil was used by all animal groups.

The cats fed entirely upon raw meat and raw milk remained in excellent health in all cases. Physical development was virtually perfect and the cats reproduced in homogeneity from one generation to the next, maintaining large skulls and thoraxes, broad faces with prominent malar and orbital arches, broad and well-formed dental arches, adequate nasal cavities, and large and long bodies. The cats were quite free from vermin, infections, and parasites. The membranes were firm and of good pink color. All evidence of degeneration was absent. Abortion occurred very seldom; the size of the average litter was five, and all of the mother cats nursed their young in a normal manner. The cats possessed excellent equilibrium. Organic development was complete and normal physical and mental function was the general rule. Death resulted only from old age or injuries sustained in fighting. None of the cats died from disease.

Cats which were fed the cooked-meat scraps were defective in many respects. They were smaller in build and the bones were smaller in diameter. In some cases the bones would

grow out of proportion, with the hind legs being much longer than the forelegs. The animals did not reproduce in homogeneity, each kitten being of a different skeletal pattern. There were variations of facial structure similar to those of human beings. Configuration of the skulls was different in each individual cat. Often there would be marked failure in the development of the upper lip and in some cases a mandibular protrusion.

Dental conditions would usually remain fairly good in the first generation, though gingivitis occasionally developed. Second generation animals usually had much smaller primary teeth than normal and there was irregular spacing of teeth. Bleeding of gums would increase considerably. Some teeth would be lost. In the third generation loss of most of the teeth through decalcification and pyorrhea would be common. Dental development was generally so irregular that the development of the whole face was interfered with.

There was severe impairment of bone composition in all cases. The calcium content would fall from the normal 12 to 18 per cent of bone weight in healthy animals to 8 to 12 per cent in the first generation, 3½ to 7 per cent in the second generation, and finally 1½ to 3 per cent in the third generation. The phosphorus content also became progressively less, and by the third generation the bones would be very porous and similar to rubber. This resulted in bowlegs, distorted spines, and other deformities.

Reproductive efficiency was greatly lowered. Abortion ran from 25 per cent in the first generation to as high as 70 per cent in the second generation. Deliveries were very difficult and many cats died in labor. Often the mother was unable to lactate. The mortality rate of the kittens was very high, many of them being even too frail to nurse. In a number of cases the mother would steadily decline in health following birth of the kittens and die about three months later. Others had increasing difficulty with subsequent pregnancies and some failed to become pregnant. In the males there was disturbance of genital development and descent of the testes. Sterility was so common that raw-food males had to be used for all breeding purposes.

Development of the secondary sexual characteristics was incomplete. The degree of masculinity and femininity was lessened and cats of both sexes tended to become more neutral in appearance. For instance, X-ray pictures showed that skulls of third generation cooked-fed animals had neutral profiles for both sexes, as contrasted to the difference in raw-fed animals. At the same time sex interest was very slack; in

many cases it was perverted, with some cats developing into true homosexuals.

Most of the cats fed cooked meat were very irritable and would occasionally viciously bite the keeper. Intestinal parasites and vermin were very common. Skin lesions and allergies became worse from one generation to the next. Pneumonia and empyema were the most common causes of death in the adult stock; a great number died from diarrhea followed by pneumonia. No cats survived the sixth month of life in the third generation. Among the diseased conditions that were found upon autopsy were: osteomyelitis, cardiac lesions, hyperopia, thyroid disease, hepatitis, nephritis, paralysis, meningitis, cystitis, arthritis, rickets, enlarged colon, bronchitis, fatty infiltration of the muscles, rachitic rosary of the ribs, and enlarged bladder.

Cats fed upon a combination of two-thirds pasteurized milk and one-third raw meat presented much of the same deterioration as the other animals. Reproductive efficiency was lowered; skeletal structures were severely impaired; dental irregularity and gingivitis were common, and all kittens showed some form of deficiency in development. Cats fed evaporated milk were damaged even more, and sweetened condensed milk produced the most marked deficiencies of all. Even the raw metabolized vitamin D milk (from cattle fed irradiated yeast) proved harmful. The males showed osseous disturbances following its use, and the adult males died within 10 months, with the young males failing to live beyond even the second month.

In some instances cats which had been fed either cooked meat or one of the forms of heated or vitamin D milk would be placed upon a completely raw diet, which would be continued in subsequent generations. Improvement in resistance to disease was noticed in the first and second generations in the "regenerating" animals, though there were still allergic manifestations, and reproduction was erratic. In the third generation there was considerable further improvement, and by the fourth generation some of the animals returned to completely normal skeletal and tissue form.

From these experiments, as well as all others which have been reported, results of feeding raw and cooked foods under laboratory conditions become readily apparent. It follows that, almost without exception, experimental animals thrive well upon an exclusive diet of raw foods. With general uniformity they immediately suffer from various forms of deterioration—physical, sexual, and mental—when given

various forms of cooked foods. It has indeed been shown that members of certain animal species fail to reach maturity and reproduce if sufficient cooked foods are included in their diet. The degree of damage may vary to some degree with different animals, *but* in no instance have large quantities of heat-processed foods been consumed over a long period of time without some harm being observed. The contrast is clearly observed in all cases, and the many different animals used in the experiments show that the results do not apply to only certain kinds of experimental animals, but may be accepted as a general principle in all such nutritional work.

5
RAW FOOD IN NATURE

MODERN NUTRITION has given the experimental aspect of the use of raw foods, as applied to various animals. Other biological sciences give another, and equally important, aspect to the same subject. They show, through careful and detailed observation of animals beyond the confines of controlled experimentation, exactly how animals thrive in states of captivity, complete domestication, less-restrictive domestication, and wild nature. In the former state the diet may be primarily cooked or primarily raw, depending upon animal species; in the next it is primarily cooked; in the third it is mainly or entirely raw, and in the latter it is exclusively raw. These provide the contrasts that may be studied.

CAPTIVE ANIMALS

In the modern zoological garden, we find evidence of disease, though this is markedly less than formerly. The captive animals, particularly the carnivora, were once fed mainly upon cooked foods. The death rate was then very high and the animals were valued accordingly. With the introduction of raw meat for the carnivora, the death rate sharply dropped; the animals lived longer and reproduced more successfully, with a proportionate drop in animal cost. Yet some of the animals are still fed largely upon cooked foods, and they suffer from much disease. Included among these are the primates. Forbes has pointed out that "the gorilla is very delicate and rarely lives long in captivity, even in his own land." A life span of 19 or 20 years is considered very long for a typical zoological gorilla fed some cooked foodstuffs. The orangutan is given canned fruit, bread, and even tea and coffee in captivity, and its life span is then very short and it is subject to all of the diseases common in civilization. The captive baboon, given cooked foods, is subject to many respiratory diseases and often dies before maturity is reached. The chimpanzee in captivity is probably better accustomed to a cooked diet than is any other primate. Typical diseases under these conditions are listed as follows: bronchial pneumonia, typhoid fever, scarlet fever, measles, cholera, grippe, colds, ulcers, colitis, tuberculosis, peritonitis, hypertrophied liver, debility, and loss of hair.

DOMESTIC PETS

The ordinary house pets—dogs, cats, etc.—represent domestic animals which are fed chiefly upon cooked foods, and they display a long series of physical defects. The degeneration of the modern dog is so severe that it is receiving national attention from dog breeders and dog lovers. Pure-bred dogs are developing poor eyesight, impaired hearing, and such dullness of the sense of smell that they are no longer useful for hunting purposes. One of the most frequent symptoms of degeneration in dogs is weakness of the hindquarters. This is well marked in the German shepherds, great Danes, and Boston terriers. Some great Danes have such weak hindquarters they can hardly stand up, while the Boston terrier has such narrow hips that normal birth is often impossible. The dogs are also developing human-like neuroses and cease to be dependable. Shepherds are easily upset and often become fear biters. The great Dane was bred to hunt wild boars, but modern specimens frequently quiver at the approach of a poodle. The cocker spaniel is losing its reputation for being alert, friendly, and dependable, and is now described as a shy neurotic. Poor behavior is associated with low resistance to physical diseases, and indeed the modern dog is in need of the care of the veterinarian as frequently as man needs the care of his physician. Many dogs die young, and those that do reach an advanced state of life are affected by senility in its most advanced forms.

The sad degeneration of our dogs is usually ascribed to selective breeding practices, which build up undesirable strains, or to careless breeding practices, which are not selective enough. While selective breeding can bring out gradual physical deformation in dogs, as well as other animals, it is extremely doubtful that this is responsible for most signs of degeneration seen in the canine world. The fact is that all types of experimental animals in laboratory work suffer from basically the same physical and neurological defects as do dogs when they are placed upon a diet of heat-processed foods. The modern dog is usually fed upon cooked table-scraps or specialized canned pet foods and dog biscuits, all of which have been thoroughly heat-processed. The stray mongrel, living upon hand-cuts and garbage, actually has a better chance to secure adequate nourishment than does the finest and most expensive show-dog. All evidence points to the fact that the degeneration seen in the modern canine world is due, in great measure, to the almost exclusive use of heat-processed foods in feeding practices.

Physical deterioration in domestic cats usually manifests itself in the form of abnormal bone development, impaired reproductive efficiency, together with bronchitis, distemper, and other diseases. The cats are so under-developed in the area of the head and neck that few people even know what a perfectly healthy raw meat-fed cat looks like. The British lay-scientist, Anthony Ludovici, in making observations of ordinary house cats, quite accidentally discovered that raw foods were essential in providing rapid and painless parturition. When he fed the animals exclusively raw meat, the mother cats actually seemed to enjoy the process of birth and would purr as the kittens were being born. The cats which consumed cooked meat and other heat-processed foods had painful parturition in all cases. They groaned and appeared to undergo great pain throughout the entire period of labor. Such observations remind us of controlled laboratory experiments with cats. Certainly this animal is no more able to attain good health on a heat-processed diet in the home than it is in the laboratory.

FARM ANIMALS

Domestic farm animals, including cattle, horses, swine, and poultry, have at various times been fed cooked foodstuffs, with a noticeable deterioration in physical condition. Reproductive efficiency is severely impaired in these cases. After his observations of cats, Ludovici made a study of the feeding habits of sheep, cows, and horses. He found that these animals reproduced without apparent pain or difficulty when they lived upon fresh green feeds during gestation. But when cows and mares were given heat-processed cottonseed cake and other artificial winter foods during gestation, labor was often difficult and attended by death of the young.

Present farm practices involve feeding animals mainly or entirely upon raw foods. The dietary balance is established on the basis of flesh, milk, and egg production rather than health, and an excess of grains is often given to the exclusion of other important dietary essentials. The inclusion of purified nutrients with commercial feeds, the lack of fresh, green foods for some animals, together with extensive vaccination and other medical procedures, tend to produce adverse reactions in animal health in many instances. As a rule, however, the liberal use of raw foods tends to offset, to some degree, these factors, and farm animals as a whole are less affected by disease than are humans. According to Furnas, in reference to domestic breeds, "it takes at least a dozen average animals to have as much ill-health as a single human." The animals usually live several times as long as the

period of growth. If they were as ill as man, we would need more than 150,000 veterinarians in the United States to take care of them.

HEALTH IN WILD NATURE

Within all branches of the wild animal kingdom, the exclusive use of raw foods is the norm of existence. Accordingly, a study of wild animal life might be expected to reveal the effects of a raw food diet. While many of the features of wild animal health are doubtless directly attributable to nutritive habits, this is not true in all cases. There are often adverse factors in nature which are largely or entirely absent in civilization. Thus, while the wild animal is receiving excellent nutrition when food is available, it is starving when food is not available. When the animal is thirsty, it must drink from sewage-polluted water if no other source of water exists. If the animal lives in an area which has been subjected to treatment with insecticide sprays, much of its food supply may be poisoned. If ticks carrying tulmaria and other transmissible diseases are active, no means of defense are available. When injury from predators or accidents occurs, no special care of the animal is possible. When heavy snow and severe cold strike, there is no protection against excessive exposure.

In consideration of all of these facts, it would be far too much to expect to find a condition of perfect health existing throughout wild nature. The wonder is not that wild animals are subject to some disease; the wonder is that they are able to survive at all. The fact that they do survive and also maintain a high level of physical excellence in many respects is important to us. Certainly much of the good health that does exist in wild nature may be attributed to the use of raw foods, and if good nutrition during times of food availability did not exist, it is doubtful that the animal could be carried through many periods of intense stress, exposure, and food scarcity. The use of raw food in nature gives health and vigor to all biological life. If only cooked foods were available, it is certain that life could not exist on its present scale, and the extinction of many species would be probable.

INFECTIONS

Biologists have often reported the existence of infectious diseases in wild animals. It cannot be said that such diseases are especially common, but they do occur. The reasons behind the epizootics which occasionally spread through

animals of a particular area are not as yet fully understood. It is known that most wild animals carry ticks which can produce disease. When a particular species has multiplied beyond the normal carrying capacity of the land, and sufficient food is no longer available, the ticks multiply in number and their hosts may succumb to disease. Careful studies of wild animal life have shown that cyclic reductions in the numbers of certain species occur after a peak in numbers has been reached, which exceeds the toleration point of range capacity. The causes of disease under such conditions are not ascribed to malnutrition, although they can be due in part to undernutrition, due to insufficient quantity of food.

Parasites are abundant in wild nature, but they seldom seriously affect their host and their presence is of little importance. In nature a live-and-let-live compromise—a mutual *modus vivendi*—has been established between parasites and animals, and the presence of thousands of parasites does not necessarily produce disease or cause death. Most wild grouse, for instance, harbor thousands of minute threadworms, but this has no noticeable ill-effects upon the health and vigor of the bird. It is only when the normal conditions of animal life are altered, usually by human interference, that parasites will gain the upper hand and enfeeble their hosts. Continuous bad weather, a lack of food, or close inbreeding within a stock may also tend to lower animal vigor and allow parasites to multiply enormously and bring about fatal results. Fortunately, such conditions are not sufficiently frequent or severe to produce a significant amount of disease in wild animal life.

WILD ANIMAL DENTITION

The real superiority of wild animal health—and this may be attributed very largely to the use of uncooked food—is shown by the almost complete absence of dental decay, and the very low rate of parodontal disease, in all animals living under natural conditions. The most complete study of wild animal dentition ever undertaken was that of the British scientist, Sir Frank Colyer. A total of 18,365 wild animal skulls were examined, covering all major groups of mammals. The percentage of skulls showing traces of decay was less than one-fifth of one per cent in all groups except the primates, and in the latter the percentage was only 1.4 per cent. There was also remarkable freedom from infection in teeth which had been injured in battle or accident. Even in the case of severe injury, when teeth had been split through the pulp, healing usually took place without suppuration. Parodontal

disease, involving localized bone destruction in the tissues surrounding the teeth, was entirely absent in some animal groups and extremely rare in others. Hypoplasia, a condition involving pitting of the teeth, was seldom noted in wild animal skulls, and was of a mild type in the few discovered cases. Likewise, abnormal positions of teeth were noted in wild animals, but only in a small percentage of cases and involving slight irregularities of the dental arch.

Colyer also studied the skulls of large numbers of captive animals, and he found the presence of much dental decay, parodontal disease, hypoplasia, and variation in tooth position in many of the specimens. The great contrast between the near-perfect condition of wild animal dentition and the many defects of captive animal dentition was always apparent. Parodontal disease was the most severe affection of the captive animals. Colyer stated that "The disease is caused by an alteration in the character of the diet of the animal, either of a physical or chemical nature—in other words, by a departure from natural diet and conditions." Other dental defects in captive animals were also attributed to the feeding of artificial foodstuffs which would not be consumed in wild nature. Colyer's important research is strong evidence for the value of raw foods in maintaining excellent dentition with high immunity to all forms of oral pathology.

Superior wild animal health is also manifested in other ways. Sexual pathology is considered extremely rare in nature. Degenerative diseases doubtless exist, but they are not common. Dr. Herbert Fox, the famous veterinarian of the Philadelphia Zoological Garden, has made the most extensive of all studies on the health of wild animals. He reports finding less disease in recently captured wild animals than in those which are reared under zoological conditions. Concerning neoplasms, Dr. Fox states that "there is an impression of their extreme scarcity among wild animals." Dr. Fox found arthritis in wild specimens but only in an extremely small percentage of cases. Parasites were common, but they did not appear to lower animal vigor or act as an important cause of disease.

SENILITY

As many wild animals are victims of predation, accidents, deep snows, sub-zero cold, etc., it cannot be said that their average duration of life is especially long. Yet some wild creatures doubtless do reach the natural termination of their existence, and this is accomplished with fewer signs of aging than are seen in civilized man. The biologist, Sir J. Arthur

Thompson, has often referred to the healthfulness of nature as being manifested by the absence of senility and the rarity of more than mild senescence. He states that man has "a monopoly of senility" and in wild nature "there may be indications of senescence or normal aging, but there is no senility." It is difficult to tell the age of some mature animals without examining the teeth for wear. After maturity is reached, the aging process is very slow, and all animals look very much alike. A decrepit animal is so rare that few naturalists, hunters, or trappers ever see one. As Thompson so well points out: "Nature has much more to teach man than he has yet learned, and it would be well, indeed, if man could come closer to wild nature's standard of positive health and prolonged youthful-ness."

HEALTH OF THE PRIMATES

In the animal world, the primates are man's closest relative from the standpoint of comparative anatomy and physiology. Their excellent example of health and longevity while living on raw foods in their natural habitat is of special importance to us. According to the naturalist, Barnes, the gorillas live in nature a "life free from molestation, famine, or disease, also judging by the worn teeth of one animal I secured, live in my opinion, to much greater age than man." On the authority of the primitive Dyaks of Borneo, who are in the best position to know, the orangutan lives in nature fully 40 to 50 years longer than man, and it is not seen to suffer from disease during this period. Chimpanzees, gibbons, and baboons have a shorter life span, though they live far longer in the wild state than they do in captivity, and they are quite free from the symptoms of senility. Indeed, explorers and hunters in Africa almost never report seeing a senile primate. The gorilla has been seen to lose a part of pigmentation of hair in advanced years—the hair on the back and shoulders assumes a silver shade—though this is indication of normal senescence rather than the pathology of senility.

WHY ANIMALS ARE HEALTHY

Philosophers of the past have referred to the health and vigor of the wild and savage life, but, like Rousseau, they mistakingly drew the assumption that all factors of nature are responsible for the superb animal health. It has been thought that, to duplicate the health of the wild animal, we must duplicate in every respect its living habits. This necessarily

leads to a "back to nature" philosophy, opposing civilization as such, which modern man does not accept.

Animal health in nature is due to a number of different factors. Pure air, adequate exercise, and rest, sufficient exposure to sunlight, consumption of unsprayed foods from fertile soils—all these are compatible with a high level of vigor and strength in animal life. They are insufficient in themselves, however, to sustain animal health. Only when combined with fully adequate nutrition, including the consumption of raw foods, are they associated with freedom from pathology.

Some have attributed the deterioration of modern man to the fear and nervous tension in civilization. In wild nature these are thought to be absent, allowing the animals to live thereby in good health. Actually, there is more reason for fear and nervous tension on the part of the wild animal than there is with either domestic animals or civilized man. Carnivora, accidents, and food scarcity represent enemies to which the captive or domestic animal need give little thought. Wild nature is a constant battle for survival, a fact apparent to every biologist, and this precludes any possible psychological advantage which wild animal life would have over civilized man. It compensates at least in part for the restraints placed upon animal life in captivity and under domestication.

The health and vigor in wild nature is, judging from the evidence at hand, due in the main to the consumption of completely natural foods. The exclusive raw food diet is the norm of all wildlife. When man's interference does not place into existence compensatory factors, it is associated with a relatively high level of physical excellence. When an animal is placed in captivity or domestication, with the continued use of raw foods, it continues to maintain this physical excellence in spite of limited compensatory factors as may be present. If the animal is given heat-processed foods, it fails to maintain its normal forms of immunity, and often fails to survive, even though all other factors—exercise, rest, sunshine, pure air, freedom, etc.—are most favorable.

It is apparent that food exerts an important biological influence upon animal life in general. Captive animals, domestic animals, and farm animals fail to maintain a high immunity to disease, and their life span is materially shortened, when cooked foods are consumed in large amounts. Given raw foods, the respective animals live in good health, retain strength and vitality throughout life, and attain a normal life span. Wild animals, living exclusively upon raw foods, thus exemplify the optimum physical

condition of the animal world. Their comparative freedom from dental decay, parodontal disease, and sexual pathology, as well as other degenerative processes, and even senility, is the biological norm of all life in a state of nature. The existence of this fact is perhaps the most important reality which nutrition and medicine have come to face.

6

RAW FOOD IN HUMAN EXPERIENCE

RECOGNIZING the important chemical and physical changes which heat produces in foods, as well as the close relationship existing between animal health and nutrition, the question arises: Can the results of animal experience be successfully applied to humans? Upon this question hinges the basic importance of the entire matter of food cookery. If the application is not possible, all of the experiments and observations that have been made on this entire subject will seem of little importance to us. If it is possible, food will be seen to be the most important single factor in determining the state of human health. It will offer hope to the human race and optimism to a philosophy of medicine which up to now has been groping in the dark in a desperate effort to control human disease and physical degeneration.

Nutritionists and biologists believe that the greater part of animal experience in the use of foods can be applied to humans. They point out that man is governed by the same basic biological and physiological laws that exist throughout the animal kingdom. Man is listed as the animal species, Homo sapiens, and as such he is a part of the animal kingdom. Whether or not he is placed on a different mental or spiritual level than other forms of animal life, no scientist would attempt to place him on a different physical level.

When experimental animals are given a diet similar to that of various human racial groups, their physical condition and rate of disease often corresponds almost exactly with that of humans using the same foods. This was best demonstrated by Sir Robert McCarrison in India. This scientist placed groups of white rats on diets which corresponded to those of racial groups in India and other parts of the world. He found that rats given the diets of the relatively healthy people of India—Hunzas, Sikhs, and Pathans—attained the same good health the people attained. Those fed the diets of the less healthy races failed to maintain their physical vigor and suffered from disease at the same rate the respective people did. For instance the rats fed a cooked and refined diet similar to that used in the Indian province of Madrasi developed ulcers in 10 per cent of all cases, which corresponds exactly with the percentage of ulcers among the inhabitants of the province.

For those given the cooked foods of the Travancorian area the percentage of ulcers was 25 per cent, just as it is among the Travancorian people. Fifty per cent of the rats on the Sind diet developed stones in the bladder, and half of the people in the Sind province suffer from the same ailment.

Such striking similarity in the reaction of man and other animals to various foods applies in the main to the forms of processing the food undergoes, not to the specific kind of food itself. All animals, including man, do not react exactly the same way to a strictly carnivorous, insectivorous, omnivorous, herbivorous, or frugivorous diet. Each animal has certain dietary limitations, determined by physiology and anatomical structure, which must be met. Members of the cat family, for instance, would not get along on a diet of grass with the same efficiency as the hoofed mammals; nor could the latter animals secure adequate nutrition by using animal flesh exclusively. However, with each animal group, including the higher primates, adhering to its normal dietary customs, but having the same percentage of foods cooked and refined, there is remarkable resemblance in the kind of disease developed, its intensity, and the general physical development as a whole.

This does not mean that every animal experiment can be applied, in all particulars, to man. A general application is almost always possible, but not a complete application of each specific point. As an animal lives in part upon cooked foods for many generations, it develops an increased tolerance for their deficiencies and may eventually achieve a higher survival rate than did the first generation. Man, living largely upon cooked foods for hundreds of generations, does not always experience the violent reactions common to the wild animal or experimental animal that is given cooked foods for the first time. He finds that reproduction and survival are rendered more difficult, though not impossible. He finds the bone and dental development to be impaired, though not to the extreme degree that is observed in the cat. If only the less destructive methods of cooking are employed, and much of the diet remains raw, he even finds that a relatively high immunity to some diseases is obtained, as may be seen by the experience of various primitive racial groups. Yet optimum health is not reached, and the difference is only one of degree; the ill-effects require more time to develop in man and their total intensity is lessened in some cases.

Applying the general animal experience with raw food to man, we may expect, therefore, to observe a great increase in the average duration of life and a notable improvement in the state of health. On the former point we must speculate,

though with good biological foundation, as a completely raw diet has not yet been used throughout life, under scientific observation, by any member of the human species. In nature an uncooked diet affords a normal life span of five to eight times the growth period for most forms of mammalian life. The same may be possible for man, though more than one generation might be required and other hygienic factors also enter the picture. What, one may ask, would the optimum length of human life be under such conditions, as nutrition became adequate and all biological requirements were successfully met?

Using the coefficient given the length of animal life, it might approximate 100 to 150 years. Haller, the great physiologist of the eighteenth century, gave an even higher estimate and considered man's normal span of life to be no less than 200 years. Hufeland agreed and claimed that man's organism "is capable of living and functioning to the age of 200 years." The scientist, Elie Metchnikoff, was more conservative, though his estimate of more than a century as the normal limit of human life indicated a great increase over the present-day life expectancy. After 15 years of research on the subject, the late Alexander A. Bogomolets, founder and director of the Kief Institute of Experimental Biology in the Soviet Ukraine, issued this viewpoint: "It may sound paradoxical but a man of 60 or 70 is still young. He has lived only half his natural life. . . . Normal longevity at the present level of human development may be scientifically determined as being 125 to 150 years. There is no reason, however, to consider these figures as limits."

On the relationship of raw food to the length of human life we may thus arrive at an optimistic biological probability. On the relationship of raw food to the development of specific diseases, and the treatment of specific diseases, we also can be optimistic, though in this case we need not speculate at all, but can cite many human experiences which afford corroboration. Fortunately there has been very extensive human use of certain raw foods in certain areas, and there has been much clinical work already done with exclusive raw food diets. These show, in actual practice, exactly to what extent the animal experiences with raw food can be applied to humans, as pertains to physical development and the prevalence of many common diseases.

RAW MILK VERSUS PASTEURIZED MILK

As in the case of experimental animals, much of the information concerning raw food consumption by humans

involves a study of raw versus pasteurized milk. As soon as pasteurization came into use in various cities, striking changes were observed in public health statistics, particularly as applied to infants. In the three largest hospitals in Toronto, Canada, there was a sharp increase in the death rate after pasteurized milk came into use. In Berlin, Germany, pasteurization was adopted in 1901, and followed by a virtual epidemic of scurvy throughout the city, though previously this disease was uncommon. An investigation was made as to the cause of the disease; pasteurization was judged responsible, and as the process was later discontinued the scurvy disappeared just as rapidly as it had earlier appeared.

In 1917 the American scientist, Dr. F. A. Hess of Columbia University, published the results of his extensive research on the cause and remedy of scurvy. He indicated that scurvy could be produced or cured at will in infants simply by altering their diet as regards the use of raw and pasteurized milk. Infants given only pasteurized milk tended to display evidence of scurvy within six months. Those on raw milk were free from the disease, and when the food was added to the diet of those already afflicted, recovery was the general rule. Subsequent investigations by Ragner Berg and other scientists have confirmed the experience of Hess. Scurvy is now universally recognized to be a deficiency disease which can be prevented by the use of raw milk or other food of adequate potency in vitamin C content. In modern nutrition fruit juices or artificial food supplements are often found necessary to prevent scurvy when no raw milk is used in the diet.

Dr. Evalyn Sprawson, of the London Hospital, studied the rate of dental decay among children in orphan institutions and found that the percentage of decay varied in direct proportion to the amounts of raw or pasteurized milk in the diet. Children in institutions that used only raw milk had excellent teeth as contrasted to others. Among 750 boys in one institution the addition of a daily ration of raw milk to the diet caused a marked reduction in the number of caries, the effects being noticeable within two to three years after the beginning of milk feeding. Data were collected regarding 40 children (ages 2 to 7) who received raw milk regularly from the age of 4½ months and exhibited complete absence of caries. Another group of 58 were examined who received raw milk regularly from the age of six years, and they showed no caries in any tooth erupted after this period. A third group which started taking raw milk at the age of ten years showed good results. It was noted that all teeth that had erupted, but were not yet fully formed, came under the beneficial influence of raw milk. Of further interest is the fact that the children given

raw milk attained improved general health over the others. Fewer of them required tonsil and adenoid operations, as compared with other children, which suggests an improvement in the quality of lymphoid tissue throughout the body.

Bone development among infants and children has long been known to be dependent upon the use of raw or pasteurized milk. The incidence of rickets rose 100 per cent in the city of Baltimore, Maryland when pasteurized milk was introduced as standard food for infants in the city. Raw milk in itself affords freedom from rickets, though pasteurized milk must be balanced with certain other foods or fish liver oil supplements if protection is to be provided. Special pasteurized milk, to which a certain amount of vitamin D has been added through the process of irradiation, may prevent rickets, but it has been proven to be very detrimental to animals in other ways, and Dr. Stiner has reported that it may also prove harmful to non-rachitic children.

The prevalence of certain infectious diseases also appears to depend to some extent upon the type of milk used in the diet. Investigators have pointed out that grippe and diphtheria occur more frequently among infants given pasteurized milk, especially when it forms the predominant part of the diet. Digestion, too, is more difficult when pasteurized milk is used. Cohen and Ruelle, of the Department of Pediatrics in the University of Brussels, have employed raw milk with good results in the treatment of specific digestive disturbances. In the case of diarrhea and vomiting they gave small amounts of raw milk every 1-2 hours to promote recovery. They believe that certain ferments in milk which aid digestion are destroyed by heating.

Milk tests among children in schools in Scotland have been made which indicated that both weight and height increases among children were dependent upon the form of milk that was used. Fisher and Bartlett have analyzed the figures resulting from these tests. They have expressed the relative value of pasteurized milk as a percentage of that of raw milk as demonstrated by increases in weight and height when the latter is used. Listing the increase on raw milk as 100 per cent, they show that on pasteurized milk the weight increase for boys was only 66 per cent, in girls 91 per cent. For height the increase in boys was 50 per cent and 70 per cent in girls, the increase thus being significantly greater for both sexes, in terms of weight and height, when raw milk was used.

In New York, studies of the relative weight gains made by infants fed pasteurized and raw milk was made by M. Ludd,

H. W. Ewarts, and L. W. Franks. The infants were divided into four groups. The first was given only pasteurized milk; the second was given pasteurized milk plus orange juice; the third was given pasteurized milk plus orange juice and cod liver oil, and the fourth was given only raw milk. An analysis of the percentage in weight gains made by the four groups showed that the first gained 1.7 per cent in weight; the second group gained 1.7 per cent; the third gained 9.5 per cent, while the fourth group, fed entirely upon raw milk, gained 14 per cent in weight.

Dr. Francis Pottenger, Jr., while best known for his animal experiments with raw and pasteurized milk, has also tested these foods on a clinical basis. He reports that infants fed upon raw certified milk tend to be healthy, whereas those given standard formulae consisting of powdered milk, pasteurized milk, boiled milk, canned milk, etc., frequently suffer from gastric distress, asthma, respiratory infections, bronchitis, and colds. X-rays of raw milk-fed infants revealed densely mineralized bones of adequate thickness, together with wide chests and broad dental arches. X-rays of the infants given heat-processed milk showed thin and fragile bones, abnormal mineral deposits, narrow chests, and underdeveloped dental arches.

Dr. Kirkpatrick ascribes the development of enlarged hearts, with valvular involvement, in many cases to the use of pasteurized milk. Some of the children are said to rapidly recover if raw milk is substituted for the pasteurized milk. "Without raw milk, recovery does not occur" declares Dr. Kirkpatrick "and those who reach the age of 10 or 15 will, upon examination, show chronic heart diseases which are usually diagnosed as rheumatic fever; so the patient usually goes through life a semi-invalid. I personally know of many children, who were suffering from heart complications, who have made complete recovery in a few months by drinking raw milk along with other wholesome food, and with no direct treatment to the heart."

Contrary to popular belief, raw milk affords greater resistance to both undulant fever and typhoid fever than does pasteurized milk. Undulant fever is today more common in large cities where pasteurization is a requirement than in rural areas where some raw milk is used. Madsen of Denmark has indeed stated that "no case (undulant fever) has ever been observed in the hospitals and asylums for children in Copenhagen or elsewhere where raw milk is used in large quantities." The famous epidemic of typhoid fever in Montreal during 1927, in which there were 5,353 cases and 400 deaths, was restricted entirely to families who purchased

milk from the Montreal Dairy and its associated National Dairy Company, both of which distributed only pasteurized milk.

Tuberculosis is also more prevalent in areas requiring the pasteurization of milk products. An interesting example of this is afforded by a letter printed and signed by eight members of parliament in England, in which important statistics on this question are referred to. The letter states: "May we here adduce certain facts relating to a single county as recorded in the last report of the Medical Officer of Health for Hertfordshire: This county has a population of 420,000 souls, and all the milk drunk by them is produced in the county. During 1932 there were 45 deaths in all from surgical tuberculosis, of which 33 were children under 15. In 13 rural districts, where the whole supply is in the hands of small retailers of raw milk, there were no deaths at all during the year from surgical tuberculosis. The highest death rate was in an urban area where the population lives under model conditions and practically all the milk supply is pasteurized." A further study of the relationship between milk and tuberculosis was made by Dr. MacDonald, Medical Officer to Dr. Barnardo's Homes in England. Dr. MacDonald reported that, among 750 children who were given pasteurized milk along with other food for a period of five years, 14 cases of tuberculosis developed. Another 750 boys were given raw milk for an equal period of time, with the other conditions, including the rest of the diet, the same as with the other group. During this time, only one case of tuberculosis developed, which represents a 1,400 per cent advantage for the unpasteurized group. It was also reported that chilblains were absent among the boys of this group, whereas they were quite common among those receiving pasteurized milk.

GENERAL RAW FOOD EXPERIENCES

The effects of consuming heat-processed fruits, vegetables, nuts, honey, eggs, meat, and other foods are probably as pronounced, if not more so, as those of consuming pasteurized milk. The heat used in the pasteurization process ranges from 145 to 160 degrees F. for regular milk, and up to 186 degrees F. for homogenized milk, which is a lower degree of heat than is used in treating many other foods. Nor does the application of heat extend for a longer period of time than is so applied in different cooking methods. Thirty minutes is the period of time in pasteurizing milk at 145 degrees F., and homogenized milk is pasteurized by the flash method. The frequent losses of minerals into cooking water (then discarded) in vegetable cookery are perhaps even more

damaging to the respective foods than pasteurization is to milk.

So we may expect to find that the use of cooked foods of all kinds induce physical impairment, corresponding in accordance with quantity of intake, to those of pasteurized milk. Likewise, we may expect the use of raw foods of all kinds to give physical benefits, corresponding in accordance with quantity of intake, to those of raw milk. Examples of this in actual practice are found in non-institutional medical cases and in various human experiences not associated with direct medical supervision. They are also found in a number of scientific institutions and medical clinics and sanitariums where raw foods are used in the treatment of specific diseases.

The non-institutional cases involving the exclusive use of raw foods are relatively few in number but important. Over a hundred years ago Sylvester Graham of America called attention to the advantages of raw foods, and he stressed the fact that, "the artificial process of cooking is decidedly and often exceedingly inimical, not only to the physiological interests of the alimentary organs, but also to the whole human system." The many thousands of followers of Graham in the eighteen-thirties and forties did subsist largely upon raw foods, and their complete freedom from cholera during the widespread cholera epidemics of that time is of peculiar historical interest. Since the days of Graham, the raw food diet from time to time has found enthusiastic advocates in the persons of Thomas, Drews, Christian, Estes, Richter, Gibbon, and others, who arrived at the same conclusions through empirical observation that we now do through scientific analysis. At one time (1900) there were estimated to be three thousand people in Chicago living upon the raw food regime, and during a later period a special cafeteria operated in Los Angeles which served only foods in the uncooked state.

Many years ago Prof. Jaffra, of the University of Southern California, made *a* study of a number of families, who, for religious, ethical, and scientific reasons, subsisted almost entirely upon raw fruits and raw nuts. Prof. Jaffra found these people to be in excellent health, with unusual freedom from colds and other ailments. Both children and adults were below average in weight, and in addition the children were below average in height. This was attributed by Prof. Jaffra to the limitation of food types consumed, in particular to the complete lack of all animal food products. Subsequent observations of families living upon raw foods have indicated much the same. Many have reported a rapid improvement in health after adopting the raw diet, with the remedy of severe

and long-standing diseases. Height and weight of children, as well as the dental condition, have appeared to depend upon the number of food types being consumed; when these have been adequate, favorable results in every particular have been the common rule.

A raw food experience of worthy note is that of the scientist, Dr. Ferd L. Stone, who conducted research into the mysteries of anabolism in his strange laboratory near the Scottish village of Wick on the North Sea. Dr. Stone stated that "biological constructive metabolism changes by which staple food becomes complex living material in a cell" are ended, with rapid nutritive losses, when the flesh of animals is exposed to oxygen through cooking and storage. He believed that man's health would improve if he consumed only flesh from animals instantly after their slaughter. Using his own body for experimental purposes, Dr. Stone lived exclusively upon the raw flesh of animals for over 25 years to determine its effects upon his own constitution. In his laboratory he obtained his flesh from live goats, sheep, dogs, lion cubs, and other animals which were clamped to cutting blocks. Moving later to a jungle area of Kenya province in Africa, he subsisted upon the raw flesh of lions, giant hogs, and other wild animals which abounded in this region. At one time he visited Nairobi for a medical examination, and some ten years later he appeared in Voi to check up on his weight and general physical condition, where he was found to be a "fine physical specimen in spite of his advanced years." Dr. Robert Gunther, the examining physician, declared: "The remarkable thing about Dr. Stone is that, although he is now approaching 70, he has the youthful and robust health of a chap of 25 or 30." Dr. Stone's unique experiment came to an end in 1943, when he was fatally wounded by wild animals during a hunting expedition. Another instance involving the exclusive use of raw foods over a long period of time is seen in that of an African boy who subsisted for 13 years in wild nature upon raw foods, and then lived 6 years in civilization "on raw vegetables and fruits, raw fish and eggs, and such flies and bugs as he catches and eats alive." The press report of December 7, 1930, described the individual, then a young man, as "tremendously powerful" being capable of undergoing great physical exertion over long periods of time "without showing the slightest signs of fatigue." Another such case reported March 3, 1935, involved a girl found in a remote region of the Carpathian mountains of Europe, where she had subsisted for several years upon flowers, plants, grass, and other raw foods which were available. Upon capture, she was said to exhibit "superhuman strength" as may well have been required to sustain her difficult existence. Similar cases have been reported in past years, one as

recently as 1950, in which children were forced to subsist upon raw foods in wild nature, and such observations as have been made in these instances revealed superior physical condition of the children involved, with the strength and endurance above average.

THERAPEUTIC PROPERTIES OF RAW FOOD

Individual raw food histories are important, but even more so is the applied clinical work in the field of science. Here also we find strong evidence of the value of raw foods. In America this was noted as early as August of 1907, when an announcement was made by the New York Post Graduate Hospital that a cure for long-standing and obstinate cases of consumption was found in certain raw foods. Under the supervision of Dr. John F. Russell, eleven patients were given four ounces of raw vegetable juices each day in addition to their regular meals. The juices were extracted from such vegetables as potato, rhubarb, summer squash, beet, turnip, cabbage, celery, carrot, parsnip, radishes, string beans, and peas. Later fifty additional patients were placed on the same dietary regime. Within seven months the eleven patients were discharged as fit subjects for a life insurance risk, and the fifty patients who started later were described as well on the road to recovery.

At a later period, in California, raw vegetable juices were again used in the treatment of tuberculosis. In this instance, Dr. H. E. Kirshner was placed in charge of 200 tuberculosis patients for the county of Los Angeles at the Olive View Sanatorium. Some of the patients had spent as long as nine years on their backs with very little progress towards recovery. The diet was composed largely of spaghetti, macaroni, and other cooked foods. Dr. Kirshner added a glass of "green drink" consisting of the raw juices of alfalfa, spinach, and parsley, to the diet of each of these patients every day. Results were highly favorable, and the course of the patients was changed to recovery. Some of the patients who had been considered hopeless were able to get out of bed within six to eight months. In Dr. Kirshner's private practice, raw carrot juice, in addition to the green juice mixture, was included in the diet of tubercular patients, which brought about more rapid recovery than did the green juice alone.

Dr. Kirshner has also reported that other chronic ailments can be treated very successfully with raw vegetable juices, taken in some cases in amounts exceeding two quarts per day. He has cited recoveries from heart disease, prostrate gland disease, cancer, neuritis, arthritis, and hemorrhoids through

the use of raw juices. In one diabetic case, remarkable improvement was noted within the first 21 days of treatment, and the insulin dosage was reduced from 15 to 5 units per day. The most remarkable case history cited by Dr. Kirshner, however, was that of a severe case of splenic leukemia. The patient in this instance was given raw carrot juice—small quantities at first, with gradual increases to very large quantities—and her weight increased from 65 to 135 lbs. Recovery was complete within 18 months, and at no later time was there any recurrence of the disease.

The famous cancer specialist, Dr. Max Gerson, has employed a diet containing large amounts of raw vegetable juices as part of his treatment for cancer. Some of Dr. Gerson's patients are given as much as 16 glasses of raw juice each day, but most of them are given somewhat smaller amounts, including daily doses of 4 glasses of carrot and apple juice, 4 glasses of green leaf juice, 2 to 3 glasses of calf's liver juice, and 1 glass of orange juice. About 75 per cent of Dr. Gerson's cancer diet, including all juices, is uncooked; the balance consists of vegetable broths and other foods which are cooked by the least destructive methods. Dr. Gerson has reported gratifying results in about 50 per cent of his cancer cases, with many complete recoveries. Indeed, Dr. Gerson's experience in treating cancer at the Gotham Hospital in New York was so successful that he was called upon to testify before a subcommittee in the U. S. Senate in 1946. In Canada, Dr. Gerson's counterpart may be found in the person of Dr. J. R. Davidson, formerly of the University of Toronto, who has also reported curing a number of cancer patients on diets which consisted of raw foods and foods subjected to a minimum of cooking. Among other foods, Dr. Davidson prescribes rare meats, raw milk, raw vegetables, and raw vegetable juices made from carrots, celery, and lettuce.

In Great Britain, physicians have been equally successful in utilizing freshly-extracted raw juices for therapeutic purposes. The Ministry of Health and Public Health Service Laboratory has issued a report pointing out the value of using the juices of cabbage, kale, parsley, and other uncooked vegetables in the treatment of a wide variety of diseased conditions. The report states: "Juices are valuable in relief of hypertension, cardiovascular and kidney diseases and obesity. Good results have also been obtained in rheumatic, degenerative and toxic states. Juices have an all-around protective action. Good results can be obtained in treatment of peptic ulceration, also in treatment of chronic diarrhea, colitis and toxemia of gastro and intestinal origin."

The dental scientist, Dr. Harold F. Hawkins, has reported

that correct dietary control, with at least half of all foods used in their raw state, is of much value in treating the symptoms of pyorrhea, including infection of the alveolar bone which supports the teeth and gums. According to Dr. Hawkins, in caring for the pyorrhea patient, it is "essential to work out a plan of eating that will include food that can be eaten raw such as raw milk, raw eggs, oysters on the half shell, raw vegetable salads and raw fruit." Dr. Hawkins states that when an adequate dietary is followed, "the gum tone usually shows a definite improvement in 60 or 90 days, and the X-rays show an improvement in bone density in about a year."

During the years 1929, 1930, and 1931, Dr. Milton T. Hanke, working through the facilities provided by the University of Chicago and the Chicago Dental Research Club, studied hundreds of school children in the city of Mooseheart, Illinois, to determine the effects of adding the uncooked juices of citrus fruits to a conventional diet. During the first year the children were studied as controls; the second year was the test period, and the third the recheck period. Approximately 16 ounces of freshly extracted raw orange juice, plus the raw juice of one lemon, was added to the diet of each of 341 children on each day of the test period. This brought about a sharp increase in growth rate over the control period, as well as a 50 per cent reduction in the incidence of dental caries and the almost complete disappearance of gingivitis. During the recheck period, when the quantity of juice was reduced to three ounces a day, the accelerated growth was maintained, though dental decay again increased and most of the gingivitis reappeared.

Other fruits and juices also have therapeutic qualities. The "grape cure" is well known in parts of Europe and has found extensive employment in the sanitariums and resorts of Merano, Italy, parts of France, and southern Germany. The patients of these institutions are fed almost exclusively upon raw grapes for four to six weeks at a time, starting with about a pound a day and gradually increasing the amount to five to eight pounds a day. Johanna Brandt reported a number of cures from cancer through the employment of the raw grape diet, and others have used it successfully in the treatment of constipation, rheumatism, catarrh, gallstones, exzema, jaundice, malaria, hemorrhages, and other ailments. Grape cures are even recommended in certain mental disturbances and in weakened conditions of the entire muscular system, including the heart.

Raw cabbage juice has been used with remarkable success in treating ulcers. Dr. Garnett Chaney at Stanford University treated 63 ulcer patients with one quart of raw cabbage juice

per day, and 60 of these showed pronounced healing. In most cases, the pain disappeared within a few days and recovery was complete within three weeks or less. Six patients with "huge" ulcers required 56 days of treatment. The three patients who failed to respond had dense scar tissue in the stomach and liver damage before treatment started. Dr. Chaney's experience was almost duplicated by Dr. William Shive and his colleagues at the University of Texas. Dr. Shive found that raw cabbage juice—as well as the juices of some other vegetables—tends to prevent ulcers and to cure them. He studied 100 cases in which the ulcerous condition was so severe that the use of the bland diet and anti-ulcer drugs had failed. But the drinking of one quart of fresh, raw cabbage juice per day by these patients brought about marked beneficial results. The use of raw cabbage juice in amounts less than one quart per day promotes less rapid recovery than does the full quota but it is of definite value, and even a glass of juice per day tends to reduce or eliminate the pain in some cases. The raw cabbage juice is also an important aid to normal elimination and it improves the general health of the ulcer patient as well as promoting recovery of his primary affliction.

The "scraped apple" diet is an old German folk remedy for both diarrhea and constipation. Modern scientists have employed raw apple in the treatment of these same conditions with very good effects. T. L. Birnberg treated diarrhea in children with raw, grated apple and obtained completely successful results in 88 per cent of all cases. He noted relief from abdominal pain achieved almost immediately, normal stools achieved in 24 hours, reduction of fever within 48 hours, and disappearance of mucus in 60 hours. The beneficial effects of raw apple in these cases are attributed to the presence of "hydrophilic colloids" in the food which absorb excessive water and furnish bulk to control peristalsis.

Of particular interest is the therapeutic value of raw honey. This food has long been known as a "folk medicine" for hay fever and asthma, and recent experimental studies conducted at the William Beaumond General Hospital in El Paso, Texas have shown that raw honey containing the pollen of the offending grasses or weeds builds up a natural resistance to these agents in the body, thereby offering relief to the hay fever victims. Studies made by P. E. Weesen of the Frauenfelder Sanitarium of Europe showed that patients given raw honey exceeded all others both in strength and healthy appearance. Dr. Paula Emrich tested 100 children, and found that those given raw honey achieved a 12 per cent increase in hemoglobin content of their blood over the others. Dr. Rolleder gave a smaller quantity of raw honey to 58 children

of an Austrian orphanage and noted a hemoglobin increase of 8½ per cent. Dr. Schacht of Wiesbaden claimed to have cured many supposedly hopeless cases of gastric and intestinal ulcers with raw honey, and the celebrated Father Sebastian Kneipp remarked that "smaller ulcers in the stomach are quickly contracted, broken and healed by it." Surprisingly, raw honey has even been given to treat diabetes. Dr. A. Y. Davidov of Russia noted that it tended to prevent acetonemia, and in spite of its high sugar content, its use was associated with the actual reduction of sugar in the urine. The American physicians, Dr. L. R. Emerick of Eaton, Ohio, and the late Dr. R. J. Goss of Middlebury, Vermont, have treated hundreds of diabetic patients with raw honey, achieving remarkable success and vast improvement in the weight, strength, and appearance of many patients.

The value of raw liver in treating pernicious anemia is now well known. As early as 1926 Drs. Murphy and Minot were curing severe cases of this disease with raw liver, and they claimed there was some unidentified factor in the food which stimulated the growth of red corpuscles. At first this was called the "red blood vitamin." It is now known that there are two such factors, folic acid and vitamin B_{12}, both of which are destroyed by heat. Thus, whereas well-cooked liver is practically useless in these cases, raw liver brings about consistent and rapid recovery. For perhaps the same reason raw liver, given to weak and undersized children, has been reported to increase vigor and strength and improve the rate of growth.

Other raw meat products are also of unquestioned therapeutic importance. When tuberculosis was still a common disease in this country, frail and consumptive people would be seen going to slaughterhouses to obtain draughts of fresh blood, which were believed to be of great value in such cases. In countries where tuberculosis remains prevalent, this practice is still followed, with reportedly good results. On a clinical basis the celebrated French physiologist, Prof. Charles Richet, was among the first to use raw beef juice in the treatment of tuberculosis, and he reported excellent results in this practice. More recently other European physicians are following this same method, and they apply the term, "zomotherapy" to designate treatment of disease with raw meat or raw meat-juice. They claim success with zomotherapy in treating many conditions, including anemia, neurasthenia, debility, convalescence, and latent, incipient, or active tuberculosis.

Few raw foods have been as highly recommended as sunflower seeds, squash seeds, pumpkin seeds, and

watermelon seeds in the treatment of disease. Several years ago, J. I. Rodale noticed that sunflower seeds, when used in their raw state, effected a remarkable cure for some cases of bleeding gums. After his report on this subject was published, new evidence accumulated which indicated that raw sunflower seeds were also useful in treating gum sores, dermatitis, rheumatism, rheumatic fever, arthritis, and kidney disease. The teeth were said to improve under the sunflower seed treatment, as was the condition of the eyes. Raw squash and pumpkin seeds have been recommended as worm expellents. An infusion made by soaking dried watermelon seeds in water was an old Indian folk treatment for kidney and bladder infections, and many in modern life have also testified as to the efficiency of this treatment. The watermelon seeds may also be eaten in their fresh state with good results. While much of the evidence in favor of these uncooked seed foods is in the form of testimonials rather than clinical data, it is too extensive to be ignored. Whether we consider the seeds as effective "folk medicine" or just good food, they are doubtless of much value in modern nutrition.

Raw foods have even been used to improve the intelligence quotients and mental attitudes of backward children. In Germany, Dr. Lottner reported an experiment in which 33 children, having low intelligent quotients and attending a school for backward children, were given a raw breakfast each morning. This was in the form of "muesli" an uncooked porridge made from oat flakes, milk, fruits, nuts, and honey. The children given the raw breakfasts rapidly improved over all the others. They did better work in dictation, arithmetic, letter-cancelling, and drawing completion tests. They were also less restless, did not become tired as rapidly as before, and showed better concentration in accomplishing their daily work.

CLINICAL APPLICATION OF THE RAW FOOD DIET

If the simple addition of certain raw foods to a normal diet produces such startling changes in human health, it may be expected that a diet composed entirely, or nearly so, of raw foods would be much more beneficial and achieve more rapid and far-reaching results. This has been shown to be true at the Pottenger Sanitarium in California, where a large variety of raw foods has been employed for therapuetic purposes.

Dr. Pottenger writes that "the highest grade of raw milk, raw meat, raw vegetables, and fruit products obtainable" are used in the clinical work. He points out that "we have been able to improve the physiologic response of children who

have previously been developing in a deficient manner" similar to the experimental animals which were fed upon heat-processed foods. Even defective facial growth has been improved, and Pottenger states that "when additional growth stimulation is applied to certain deficient children at the right time, before they have attained facial growth, material changes in the contour of the face can be brought about without the application of surgical appliances."

In Europe a diet composed primarily of raw foods was employed in the treatment of disease as early as the latter part of the nineteenth century. At that time the "Jungborn" a health resort located in the Hartz mountain region between Isenburg and Hartzburg of Germany, was opened. The director of this institution was Adolph Just, a philosopher and naturalist, who concluded from his observations of wild and domestic animal life that only raw foods were capable of building the health, strength, and vigor that are normal in nature. At his resort, Mr. Just provided sun and air baths, special water baths, and earth compresses as treatment in addition to raw foods. The diet consisted in the main of fruits, berries, nuts, and milk in the uncooked state.

In 1896, Mr. Just issued a number of case history records illustrating the results of his raw food and natural treatment therapy. Among the diseases reported cured or benefited were inflammatory rheumatism, consumption of the spinal cord, tuberculosis of the bones, dropsy, incipient dropsy, fistula of the rectum, cancer, nervous spasms, deafness, and various digestive ailments and sexual disorders. Recoveries were often rapid as well as complete. Recovery from severe nervous disorders was achieved in ten weeks, from deafness in eight weeks, from inflammatory rheumatism in nine days, and from incipient dropsy in less than a week. Great improvement in cases of different forms of consumption was noted during the first two weeks of treatment. In almost all cases treated at the "Jungborn" some benefit was reported, and the general success was attributed largely to the use of raw foods.

During the year, 1897, another great raw food institution was opened in Europe, this being the famous Bircher-Benner clinic and sanitarium in Zurich, Switzerland, which continues operation in the present day. Here extensive use has been made of raw foods, and some patients have been placed on an exclusive raw diet for a limited period of time when this was deemed necessary. The late founder of the institution, Dr. Bircher-Benner, stated that "raw vegetable food is the most potent healing factor that exists" which is able "to bring healing to very many widely spread disorders of health and

serious diseases, in quite astonishing fashion, where all other curative measures have failed." He called raw food "sunlight food" and referred to his delicious preparations of fruits, vegetables, nuts, honey, milk, and other foods, all in their raw state, as "sunlight dishes." The success of this sanitarium has been so phenomenal that it has attracted patients from all over the world. It is best known for its treatment of digestive diseases. So astonishing was the recovery, on a strictly raw diet, of one supposedly incurable patient suffering from the Herter-Heubner disease that it attracted the attention of the children's hospital in Zurich, which in turn introduced a raw diet for its coeliac patients. The medical director of the hospital at the time published a monograph giving an account of the "staggering success" thus achieved.

Today Dr. Ralph E. Bircher carries on the important work of his father at the clinic and sanitarium, with equally satisfactory results. He describes raw food in relation to "the five zones of its influence." In the first zone the effects are noticeable within a few days, with the "return of appetite, rapid fading of unnatural thirst" and "much better digestion." In the second zone, embracing weeks of time, the circulatory system responds to the curative effects of raw food. The third zone "needs months to become effective" though some improvement may be noticed almost immediately. It covers the endocrine glands and metabolism. The fourth zone, embracing the capillary system and secondary effects on all parts of the organism, is reported by Dr. Bircher to require one to three years, sometimes less, "to show the effects of its domain." The entire four-fold action, according to Dr. Bircher, "generally brings about a complete change in obstinate cases of many chronic conditions such as stomatitis and ulcers, sprue, amoebic dysentery, lambliosis and malaria, kidney troubles, jaundice, eczemas and urticaria, headaches, and schizophrenias, also in cases of varicose, thrombophlebitis and many other conditions." The fifth zone applies to the constitution itself, from which our diseases and infections originate. It means a fundamental change in the physiological efficiency of the entire body, with new vitality and vigorous health.

At the First Medical Clinic of the University of Vienna, two scientists, Eppinger and Kaunitz, tested the Bircher-Benner raw food diet as a means of improving the interchange of energies and substances between the ends of the blood vessels (capillaries) and the tissue cells of the body. Under normal conditions of life, the blood gives up its nutritive substances, and the cells give up their waste substances in this interchange through two fine membranes and a narrow dividing interstice. Often, however, the cells lose a part of

their "selective capacity" because of salt penetrating the cell wall, distortion and spasms of the capillaries, a sticky coating of blood globules, waste products being scattered around the cells, and reduction of the chemical, physical, and electrical tensions which promote the nutritive interchange. When this happens, cells cannot rejuvenate fast enough; bacteria tend to multiply too rapidly, and the general cause of many clinical symptoms of disease is in existence. Eppinger and Kaunitz studied this condition and tried every possible means of restoring normal selective power in the cells once this had been lost. Only one measure was found to be successful. This was the application of an exclusive raw food diet "exactly according to the prescriptions of Dr. Bircher-Benner." Under the influence of this diet, the life-giving tensions between capillaries and cells grew and the capillaries were slowly restored to a normal, vigorous condition.

In Denmark an exclusive raw diet consisting of fruits, vegetables, nuts, cornmeal, sprouted grains and legumes, honey, and milk is given for all patients who visit the "Humlegaarden" a sanitarium located near Humlebek. Dr. Kristine Nolfi, medical director of this sanitarium, was formerly associated in medicine and surgery with the Communal Hospital in Copenhagen and also with the State Hospital in Pediatrics. During her years of hospital training she suffered from weak digestion and catarrh of the stomach, and in the winter of 1940 and 1941 she observed the symptoms of cancer. A trial microscopy taken at the Radium Centre in Copenhagen was positive, indicating there were cancer cells. Dr. Nolfi treated herself with an exclusive raw diet and recovered excellent health. This success prompted her to open the "Humlegaarden" where not only all patients, but even members of the hospital staff, live entirely upon foods which have not been treated by heating. About one thousand patients annually visit this sanitarium, and doctors from Denmark and foreign countries also visit the place and make observations which are later utilized in their practice.

The therapeutic successes attained at the "Humlegaarden" are said to be phenomenal. Dr. Nolfi attributes this to the consumption of raw foods, and in particular to the use of raw garlic and raw potatoes. Patients at this sanitarium recover from all manner of diseases, including cancer, sterility, obesity, diabetes, heart debilitation, high blood pressure, rheumatism, epilepsy, asthma, and many others. In some cases even grey hair darkens in color. According to Dr. Nolfi, the raw diet "has a curative effect not only for a particular disease and on an individual organ, but on the organism as a whole. It cures not only the diseases contracted during our

short span of life, but also those determined by hereditary predispositions."

Dr. K. Eimer, of the University Medical Clinic at Marburg-Lahn, has employed the raw diet in the treatment of many different diseases. He reports that no gastric disturbances occur on the diet and that the relatively large amounts of cellulose in the raw vegetable foods appear to aid peristalsis. He found the raw diet to be especially suitable in cases of renal or cardiac oedema or the oedema of obesity, with the elimination of superfluous water and salt being rapidly achieved. In diseases of the circulatory system, the diet was found to usefully supplement other treatment, and high blood pressure and diabetes were found to be benefited through the use of raw food. The blood was improved on the raw diet, and the alkali reserve was raised an average of 20 per cent among the patients. Dr. Eimer also reported that the refractive index of the serum increased through the use of raw foods.

Of equal importance is the experience of Dr. Joseph Evers in Germany, who has treated 600 cases of multiple sclerosis with diets containing no refined foods, and consisting chiefly of raw fruits, raw nuts, raw vegetable roots, raw honey, raw grain sprouts, uncooked coarse rolled oats, wholemeal bread, raw ham, raw bacon, and raw chopped beef. Dr. Ever's dietary treatment was set up under the controls of recognized scientists and tested in different universities, clinics, hospitals, and sanatoriums. Results were surprisingly good, and 42 per cent of all patients showed improvement or complete recovery. This percentage might appear to be low, but for multiple sclerosis, which consistently fails to yield to orthodox medical treatment, a single recovery is worthy of mention.

In the city of Munich, the German physicians, Friedrich and Peters, employed a raw diet consisting chiefly of fruits and vegetables, and small amounts of meat. Many very severe cases of liver cirrhosis, with ascites were treated. Results, surprisingly, were quite successful, and a number of most striking cases have been cited by the physicians to show the value of raw foods in the treatment of this disease.

Other physicians and scientists who have studied the raw diet in relation to therapeutic uses are D. C. Hare, J. F. Kinderheilk, W. Heupe, I. Kanai, and M. Kuratsune. Dr. Hare, of the Royal Free Hospital in England, placed arthritic patients on an exclusive raw diet for two weeks followed by a predominantly raw diet for several weeks. Most of the patients began to feel better within one to four weeks, with marked improvement continuing thereafter. Kinderheilk

found the raw diet to be of value in avitaminosis, nephritis, diabetes, and chronic constipation. In cases of cardiac disease he noted that it promoted the excretion of superfluous water and was thus helpful to the patients. Dr. Heupe, working at the University Medical Polyclinic in Frankfurt, reported the diet to aid in the treatment of diarrhea of children, in heart and kidney diseases, and in obesity and diabetes. Kanai, of the University of Berlin, studied the effect of raw and cooked vegetarian diets on the oxidation of the body. He noted that oxidation was impaired by cooked vegetarian foods. On the raw diet the urinary output of nitrogen was greater, indicating better absorption, and the weight increase was better. Dr. Kuratsune, of Kyushu University, Japan, also tested raw and cooked vegetarian diets, and reported results were decidedly better on the raw regime. Heated vegetables tended to produce anemia, which was cured when raw vegetables were eaten. Other diseases, which had failed to yield to conventional medical care, responded favorably to the raw diet.

The sum total of all human experience with raw foods has thus been remarkably successful. As in the case with animals, the efficiency of physiological function within the body, as well as the proportion of both infectious and degenerative diseases, appears to correspond to a large degree with the relative quantity of raw and cooked foods in the diet. In the case of raw and heated milk the evidence is especially conclusive, particularly with reference to the growth and bone and dental development of children. In the clinics and sanitariums of the world, where a raw food diet has been employed, evidence of the value of all types of raw foods has been obtained, and the raw diet is found to be of definite therapeutic value in the treatment of many common diseases. Its value in this capacity is most pronounced, as it is associated with no adverse side-effects, which so frequently follow the use of conventional medical treatments.

7

RAW FOOD IN LIMITATING CIRCUMSTANCES

AFTER ALL that has been said, it may seem that raw food constitutes the perfect nutriment of man. But in spite of the very great advantages of raw food, there is the question of possible disadvantages. Seldom in science is there a principle or practice which is never contra-indicated under any circumstances. The use of raw food, valuable as it is, does have its limiting qualifications. It is important that these be recognized if we are to view this subject on a strictly scientific basis.

FOOD PRESERVATION

Among other things, cooking is a method of preserving foods. As such it has played an important and necessary role in human history. Until recently, the public food supply was often seasonal and uncertain. When food was available, it could not all be consumed at once in its raw state. Much of the food had to be preserved for a later day. Drying and salting were two methods of accomplishing this. Cooking was another. Often all three methods were combined, particularly as applied to the preservation of meat. Canning, which was associated with a long cooking process, developed later and permitted people to keep fruits, vegetables, and meats indefinitely. Cooking was important in helping to preserve certain foods because it destroyed the enzymes which otherwise would bring about rapid biological change. Cooking has thus played an essential role in human history by stabilizing the food supply, though in the modern world, where more practical methods of food preservation are available, it ceases to be of importance for this purpose.

HEAT-LABILE POISONS

Nature is a storehouse of plant poisons. Through thousands of years of trial and error, man has identified and avoided these, selecting the non-poisonous products of nature for use as human food. Wild animals, in their own way, have done the same. However, in rare cases the poisons of plant or animal tissue are heat-labile, and the process of cooking can

render the food available for human nourishment by destroying such poisons as may be present.

A number of foods of this type may be given mention. First is the acorn. This food is found in both sweet and bitter varieties. The former are satisfactory in their raw state, but the bitter acorns contain tannin, which is removed by washing acorn meal in hot water or boiling water. Likewise with the cassava root, the sweet varieties are perfectly innocuous and may be eaten raw as a table vegetable, but the bitter cassava root contains poisonous hydrocyanic acid, which must be dissipated by heat before the root can be used as food. Cottonseed meal contains a toxic pigment, gossypol, which is destroyed by heat treatment. The little known cynad nuts of Australia are toxic in their raw state, but through prolonged soaking and cooking, the poison is removed from the flour of the nut. Young brakefern shoots are poisonous when raw, but safe for human consumption when cooked. The raw cashew nut is surrounded by two shells, between which is found a strong and blistering brown oil which must be dissipated by heat before the nut can be safely extracted. Untreated raw soy beans contain a toxic anti-enzyme which tends to block protein digestion and cause some impairment in the growth of experimental animals. This substance is destroyed by heat or it can be removed by soaking raw soybeans 24 to 48 hours in an ice box or refrigerator with three or four changes of water. The anti-enzyme is washed out into the water, which is then discarded.

Animal food can also contain heat-labile poisons. Certain uncooked fish, including clams, mussels, cockles, shrimp, lobster, suckers, catfish, bullhead, carp, herring, and whitefish, contain the enzyme, thiaminase, which destroys part of the B complex vitamin, thiamine, in the gastro-intestinal tract. For this reason foxes in captivity which are fed large amount of such fish in the raw state eventually develop symptoms of thiamine deficiency, and trout have been observed to suffer when feeding primarily upon carp, which are particularly rich in this enzyme. People in different parts of the world have consumed clams, mussels, shrimp, and herring in the raw state, but no obvious signs of deficiency disease have appeared. Apparently humans can tolerate some thiaminase in the diet, though as with foxes and trout, excesses are doubtless possible. The troublesome thiaminase is destroyed by heat, and thus in conditions where very large quantities of fish containing thiaminase are consumed, there is some reason for cooking.

Raw egg white contains the heat-labile substance, avidin, which tends to destroy the B complex vitamin, biotin, in the

body. The consumption of very large quantities of pure raw egg white can lead to symptoms of biotin deficiency, whereas cooked egg white may be taken without difficulty. The yolk of the raw egg is rich in biotin, which may counterbalance the effects of avidin and account for the fact that many people have used whole raw eggs in the diet without experiencing difficulty. In fact, there have been reports of definite physical benefit from using whole raw eggs, and the food has been used successfully in the treatment of tuberculosis, rheumatism, and other diseases. H. T. Parsons found that egg white injury in rats could be prevented by including brewers yeast or liver (which are rich in biotin) in the diet, and other investigators have reported its prevention when the vitamin C intake was adequate. The presence of avidin in raw egg white does not then indicate that raw eggs can never be used, but it does indicate that the raw white should not be used alone, particularly in diets which are rather low in biotin and vitamin C intake.

The removal of heat-labile poisons from food through the application of heat is attended by removal or destruction of essential nutritive factors. Though cooking may dissipate the poisonous principle, it does not render the foods completely suitable for human nourishment. The foods become non-poisonous, it is true, but they are as defective as other cooked products. If we must use large quantities of foods containing strong heat-labile poisons which cannot be removed by the water-soaking process, let us apply cooking by all means. But as long as we already have an adequate supply of healthful non-poisonous foods, there is no necessity for using those containing the more powerful heat-labile poisons. And the mild anti-vitamin factors, such as thiaminase and avidin, need not worry us providing we use the foods containing them in moderation and in proper combination with other foods.

PARASITIC INFECTIONS

In sections of China, Japan, Formosa, and other areas of the Far East, human parasitic infections have been quite common and have seriously reduced the efficiency of many of those affected. Unsanitary disposal of human nightsoil pollutes the water and soil in these areas, which in turn infects crabs, crayfish, snails, water plants, and vegetables with parasites. In many cases the nightsoil is even used as fertilizer for the water vegetables and water nuts. Lakes are so polluted that wading or bathing in them brings about human fluke infections. When the natives consume the raw fish, snails and red ling water nuts of the lakes, together with the raw vegetables of the soil, they are re-infected again and again

with liver flukes, lung flukes, and other parasites. In certain other parts of the world some parasitic infection has also been reported, usually as a result of eating infected fresh-water fish and infected pork.

No one need doubt that parasitic infections can result from the consumption of raw foods which are contaminated with parasitic organisms. However, these are problems which are restricted primarily to parts of the earth where human night-soil is used as fertilizer and facilities for the disposal of sewage are inadequate. When modern sanitation is absent, even the drinking water may be so polluted that boiling is essential. In this country, as well as many others, such problems do not usually confront us. Our watercress and vegetables are generally produced under sanitary conditions without the aid of human nightsoil. Unfortunately many towns and cities do dispose of their sewage into rivers, and since this is true, fresh-water fish are often infested with tapeworms and other parasites. The production of swine under unsanitary, poor nutritional conditions has also left us with the problem of trichina infection.

It is important to recognize that even when foods are contaminated with parasites, cooking does not always render the foods safe for human consumption. The development of parasites within the body probably depends far more upon the physiological conditions which are provided for the parasites than it does upon the frequency of infection. Scientists have repeatedly noted that poorly nourished animals are infected by parasites far more frequently than are well nourished animals. Furthermore, once infection does take place, the damage inflicted upon the host appears to depend upon the state of nutrition, with malnourished animals or people always suffering the most. Pottenger noted that when cats were fed raw meat they were relatively free from intestinal parasites, whereas those given cooked meat, in which all parasites were supposedly killed, were severely affected. Experts on the subject of canine nutrition point out that tapeworm infection is not generally associated with the use of raw meat by dogs. Yet, dogs living almost exclusively upon heat-processed commercial pet foods are often heavily infested with tapeworms and other parasites of every conceivable description. It is estimated that 18 to 25 per cent of all Americans are infected with sub-clinical trichinosis, and practically every one of these people consumed cooked pork rather than raw pork. Indeed, hogs in this country are affected with trichina in only 1.5 per cent of all cases, or less than one-tenth as often as humans. It is the human population, consuming cooked foods, which is the primary reservoir of parasite infection for many domestic animals. The basic

human problem is one of reinfection. It is clear, then, that the cooking of food does not get at the primary source of the parasite problem, although it may be recommended in the case of known contaminated foods.

PALATABILITY OF RAW FOOD

In a limited number of cases—probably not over ten per cent—cooking may be considered useful to improve the palatability of foods. Almost all raw vegetables are suitable for consumption, although the cooked products are often considered more acceptable. Raw carob pods are edible, but they must be ground into a meal and lightly toasted in order to bring out a chocolate-like flavor. Pure maple sap is a very palatable food, but the very rich maple flavor is brought out only through prolonged boiling. Popcorn is rendered edible through the application of heat. Certain grains, as well as meats, have not been widely used in their raw state, and it is possible that cooking is essential for their full palatability.

One must not deduce from these facts that raw foods as a whole are less palatable than cooked foods or that an exclusive raw diet is less palatable than a cooked diet. Actually our food habits are determined primarily by our dietary during infancy and childhood. As adults, we may prefer cooked foods because we were trained to like them. We may actually dread to taste a particular raw food simply because we never received it as a child. But during the early part of life we can be trained to appreciate the flavor of practically any food, cooked or raw, and if given the opportunity to consume raw foods, there is seldom hesitancy in doing so. For instance, Dr. Clara M. Davis conducted an experiment on the self-choice of foods by infants and young children, and found that the favorite of all foods was raw calves' brains. These were eaten in amazing quantities, often as much as a pound a meal. Children given raw meat, raw grain products, raw yams, raw potatoes, etc., learn to appreciate them just as well as they do raw fruits and nuts. Our customary practice of dividing foods into types which can be eaten raw and types which must be cooked is based primarily upon childhood habits. Aside from the exceptional cases which have been mentioned, those foods which are considered best raw are those we have always eaten raw; those which are considered best cooked are those we have always eaten cooked. Actually, at least 90 per cent of all the foods which have ever been eaten by man are fully edible in their raw state. We have probably not utilized half of these.

Once our dietary pattern has been established and carried into adulthood, there is still every opportunity for change. People who have been trained to appreciate the flavor of cooked foods to raw foods must undergo a re-education of the sense of taste. This is not a difficult procedure, and surprising as it may seem, it can be accomplished quite rapidly. Within just a few weeks, one may learn to appreciate the flavors of many raw foods which formerly were consistently avoided. To accomplish this, you need only adopt a "nibbling" habit in which small but increasing quantities of the respective foods are consumed every day. At first you may find certain foods bitter or flat tasting, but gradually you will find them to be more flavorful and pleasing. Eventually the satisfaction in consuming raw foods of nearly all kinds may exceed that formerly derived only from cooked foods. This does not mean that every food will be equally palatable after re-educating the sense of taste—there will always be certain preferences of one food to another—but it does mean that raw foods as a whole may be consumed with an optimum degree of gustatory pleasure.

It is clear that there are limitations in the application of raw food therapy. It is enough to recognize the value of raw foods without assuming that no reason for cookery can ever exist. Reasons for cookery have existed, but they are less common today than they were in the past. We now have excellent facilities for the preservation and transportation of raw foods. We do not have to depend upon bitter acorns, bitter cassava roots, and other foods containing heat-labile poisons as staples of our dietary. We do not have to avoid raw vegetables in fear of contamination with harmful bacteria. We do have an abundant supply of fruits, nuts, and other highly palatable raw foods, available for all classes of people. In short, those factors preventing the full utilization of raw foods are no longer present. Modern civilization has made the extensive application of raw food therapy possible. It has presented us with an exciting "elixir of life" which can transform the whole state of our existence.

8
RAW FOOD IN SELECTION

THE USE OF FOOD in its uncooked state is the key principle in establishing a healthful dietary. This, however, does not represent the final answer to all nutritional problems. We can live exclusively upon raw food and yet suffer from nutritional deficiencies and imbalances if no consideration is given to the proper selection of such foods. An unbalanced diet of uncooked foods may be less damaging than an unbalanced diet of conventional foods, but it is still not to be desired. It is well known that different selections of natural foods in primitive life produced different reactions in health and disease. For our own purposes it is necessary to analyze each of the basic food types, and many specific foods within these types, in order to determine the most effective way of selecting food and balancing the components of our dietary intake.

In the usual textbook analysis of food selection, it is customary to rate the value of various foodstuffs in relation to their economic cost and their ease of being included in the dietaries of all income groups. In the usual vegetarian analysis of food selection, it is customary to rate the value of foods in part upon their moral cost of production, determined by the death or survival of animals. Neither of these patterns will be followed here. It is important to approach the subject of food selection on a strictly biological basis, determining thereby the value of uncooked foodstuffs entirely in relation to their effect upon human health. This does not mean that the suggestions given will not be adaptable to the dietaries of all income groups. It does mean that some adjustments will have to be made in certain cases. Many raw foods are no more expensive than their heat-processed counterparts, and anyone who can afford to purchase foods at all can afford to use them. On the other hand, achieving a completely ideal balance in the diet may involve the use of certain accessory foods which would not normally be found in the most inexpensive diet. The very best nutrition may be restricted to nations, states, families, and individuals who can afford to use a wide selection of the very best of foods. Greatly improved nutrition, however, can be achieved by every human group which is willing to make certain inexpensive,

though important, changes in the dietary. As to the moral issue of vegetarianism, this too can find compatability with good nutrition under certain conditions, but it cannot be the determining factor in deciding what constitutes good nutrition. It is important that we approach this subject on a scientific plane first, and then let the economic, moral, and other issues fit into the total picture as best they can. With these thoughts in mind, the following analysis covering the selection of uncooked foodstuffs is being presented.

FRUITS

In terms of historical dietary experience, man is an omnivorous animal. In terms of comparative anatomy and physiology he is a frugivorous animal. We can ignore neither of these facts. Man's long experience with both plant and animal foods indicates that the omnivorous principle cannot satisfactorily be broken all at once. His anatomical structure and physiological function are adapted ideally to the digestion of fruits. This means that man's best diet may be omnivorous, with a decided inclination to the frugivorous with respect to the selection of staple foods.

Most fruits are rich in the vitamins which are usually seriously deficient in the modern diet. They are our very best source of vitamin C, which is probably more important than any other single dietary factor for maintaining high resistance to infectious disease. In the conventional diet, the use of fruit is restricted to an insignificant fraction of the total food intake, and such fruits as are used are usually canned or otherwise heat-processed. In some of the better primitive diets, fruit was a basic food staple; in a balanced diet composed of uncooked foods, it may be regarded as the most important single food type used.

The variety of fruits suitable for human nutrition is very large. Scores of basic fruit types, and hundreds of fruit varieties, are developed in nature and have been developed by man. These permit the preparation of meals which have no equal for flavor and palatability. The fruits of the temperate zone are useful, and most kinds are readily available, although the wild varieties are not commonly marketed. Such tropical and subtropical fruits as bananas, oranges, grapefruit, lemons, limes, dates, figs, and avocados are imported or grown for public consumption. Guavas, mangos, papayas, cherimoyas, and cactus fruits have been available in limited quantities in restricted areas. Other tropical fruits have not commonly been imported to the temperate regions, but they are of great value for those who live in regions where they

can be obtained. These include: breadfruit, cashew-apples, imbus, ambarellas, red mombins, yellow mombins, soursops, ilamas, soncoyas, sweet granadillas, purple granadillas, giant granadillas, capulins, loquats, manzanillas, icacos, pitangas, feijoas, jaboticabas, grumichamas, litchies, longans, rambutans, sapodillas, sapotes, canistels, kakis, mangosteens, jackfruits, durians, tunas, carissas, and carambolas.

NUTS

Next to fruits, nuts are the most neglected of food types in the conventional diet. Butternuts, pecans, filberts, Brazil nuts, English walnuts, black walnuts, chestnuts, almonds, and other kinds are often available and should be used at every opportunity. The researches of Cajori, Van Slyke, and Osborn have shown that most nuts contain all of the essential amino acids and thus may be used effectively as a basic source of protein in the diet. Nuts are also good sources of fat, minerals, and other nutrients, and they represent a more valuable supplementary food than hitherto suspected. Other seeds, such as sunflower seeds, pumpkin seeds, squash seeds, and watermelon seeds, are also valuable for nutritive purposes.

Most nuts undergo a decided loss of flavor after they are shelled, and some are fumigated to prevent infestation with vermin. For this reason it is usually best to purchase your nuts in the shell, which gives you a fresh and flavorful food from a sanitary container that requires no fumigation. Sunflower seeds and related seed products may be shelled by hand methods, but they keep fairly well outside the shell and can also be purchased that way. When desired, nuts and other seeds may be transformed into delicious butter by running them through a special kitchen appliance designed for this purpose. To save time you can also purchase ready-made nut butters. All of these nuts and other seeds, as well as the butters made therefrom, are fully palatable in their raw state, and they should not be salted, roasted, fried in oil, or prepared in any other unwholesome way.

Of special importance among the nut and seed foods is coconut. This remarkable food is composed of one of the most adequate nutritional balances of all plant foods. It is rich in first-class proteins, carbohydrates, and fat, and is an excellent source of minerals, especially phosphorus, potassium, and chlorine. Nearly everyone is familiar with the sugared shreds and colored coconut oil which civilized man has manufactured from the coconut seed. But this food may be found at its finest, both for palatability and nutritional

value, in its fresh, unprocessed state. The immature jelly coconut contains the delightful, smooth, snow-white coconut of custard-like or jelly-like texture, together with much coconut water. The mature coconut, which is shipped to many regions of the temperate zone, is juicy and sweet and contains a smaller amount of delicious water. Both the immature and mature coconuts are extremely valuable in human nutrition and can be used in a multitude of ways. Hard coconut may be eaten exactly as it comes from the shell; it may be ground up with other ingredients into raw cakes and confections, and it may be run through an electric juicer and converted into a rich coconut cream, which is unsurpassed in making fine dressings, sauces, and beverages. Like other nuts and seeds, coconut may also be converted into a fine butter, used for the same purposes as ordinary dairy butter, and also applied in the preparation of confections and beverages.

VEGETABLES

The green leaf is the storehouse of minerals in the plant. Animal experiments indicate that the addition of the green leaf to a deficient diet has maximum supplementary value in correcting deficiencies. Green leafy vegetables should therefore be used in the diet, while the tubers and roots of vegetables are also important, though perhaps less so.

It has been a common practice to divide vegetables into types which can be eaten raw and types which must be cooked. In reality, almost all types can be eaten raw, and this particularly applies to the root vegetables which are always cooked in conventional methods of food preparation. Among the vegetables which are appropriate in their raw state are: white potatoes, sweet potatoes, yams, turnips, parsnips, summer squash, zucchini squash, crookneck squash, string beans, lima beans, peas, kale, spinach, rhubarb, celery root, cucumbers, bell peppers, kohlrabi, beets, asparagus, Jerusalem artichokes, sweet corn, Brussels sprouts, broccoli, rutabaga, and cauliflower. These can all be "salad" vegetables, and when combined with those vegetables such as have already found acceptance in their raw state, they will do much to improve nutritional balance and pleasure of any diet.

FLOWERS

While the number of raw vegetables may be thus increased, it should not be thought that this is as far as man can go in the utilization of salad plants. Another step is the utilization of salad flowers, which thus far have been almost totally

neglected in conventional meal preparation. Actually, many common flowers found in most flower gardens are sweet, succulent, and pleasing to the sense of taste in their raw state. They have been tested in human dietary experience and have been found to be nutritious and wholesome. Among the many flowers which may be used for human consumption are: marigolds, lavetera flowers, hollyhock flowers, pansies, nasturtium flowers, oxalis flower panicles, dandelion flowers, chrysanthemums, gillyflowers, altheas, rose of China flowers, forget-me-nots, water lilies, double zinnias, sweet pea flowers, alfalfa flowers, verbenas, sweet alyssum, and the flowers of certain bean plants such as the scarlet runner, hyacinth bean, and Chinese wistaria. These flowers may be chopped up or used whole in salads, or they may be eaten alone just as you would eat any ordinary vegetable.

HERBAL TEAS

In addition to the use of cold beverages, such as milk and fruit and vegetable juices, there are many beverages which are used in their warm state, and these may also contribute to healthful nutrition. Of the one hundred and more beverages of this type which are available for human use, civilized man selected only a few, and each of these contain caffeine, tannic acid, or other poisons. The great number of herbal teas and other healthful beverages have been almost completely ignored. Some of these beverages supply valuable nutrients, and a number are considered more delicious than the conventional tea and coffee used in civilization. Rose hips, for instance, contain upwards of thirty times as much vitamin C as do oranges, and rose hip tea is a valuable source of this vitamin. Peppermint tea is perhaps the most popular, in terms of flavor, of all herb teas, with strawberry leaf, papaya leaf, alfalfa, fenugreek, sassafras, nettle, shave grass, squaw tea, juniper berry, and many other kinds also offering pleasing flavors.

SEASONINGS

The fact that salt and most of our common spices have been proven to be quite irritating to the human body does not mean that all forms of seasoning are objectionable in this respect. Here, as with so many other foods, we note that civilized man has confined his use of seasonings chiefly to those which are known for their irritating qualities. There has been a peculiar avoidance of a large number of herb seasonings which are not only healthful when used in moderate amounts, but also

possess delightful flavors even surpassing those of the harmful group of condiments.

The dried herbs which are suitable in good nutrition include bay leaf, garlic, dill, onion, chives, parsley, sage, mint, sorrel, sassafras, thyme, caraway, fennel, basil, and chervil. Some of these may be home-grown in any window flower pot, and then dried in the sun. They may also be purchased from commercial sources. The herbs can be used to add flavor to uncooked soups, meats, salads, and other foods. Dehydrated vegetable flakes, made from a single vegetable species, or from a variety of vegetables, may be employed for the same purpose.

As a substitute for salt, dehydrated vegetable broth powder is best used. This food is actually rich in mineral nutrients, and it has no irritating qualities whatsoever. The pure vegetable broth powder is simply a combination of dehydrated vegetables, ground into powder form. It may serve much the same purpose as dried herbs and dehydrated vegetable flakes, being used in raw meats, soups, etc. It may also be sprinkled on other foods, in much the same manner that ordinary salt would be used, and added to salad dressing ingredients to impart extra flavor.

The use of even the best seasonings can be overdone. With the use of devitalized foods, as have lost most of their flavor in refining, processing, and cooking, an extensive use of seasonings is to be expected in order to replace the lost flavor. However, raw foods possess distinctive flavors of their own, and nothing is to be gained if these are to be completely disguised by seasonings. Let us then use natural seasonings in moderation, to add a little extra tang to certain foods, but not to completely replace the original flavor of foods.

VEGETABLE OILS

The use of various kinds of oil extracted from plant substances is important in improving the human dietary. A number of laboratory and clinical experiments conducted over a period of many years have shown that most unrefined vegetable oils contain substances which help to reduce the cholesterol content of the blood. When these substances are not present, the excess of plasma cholesterol is unstable and not properly emulsified. The cholesterol thus tends to collect along the walls of the arteries, producing hardening of the arteries and coronary heart disease. Lecithin and certain unsaturated fatty acids, found in unrefined vegetable oils,

tend to act as an emulsifying agent for cholesterol and prevent it from caking along the walls of the arteries. Keston and Silbowitz, in experiments with rabbits, showed that the lecithin of soy bean oil kept cholesterol from collecting in the blood and prevented hardening of the arteries. Drs. Pottenger and Krohn found that the administration of soy bean lecithin to patients on high-cholesterol diets produced a 79 per cent reduction in blood cholesterol. Other experiments have shown that the unsaturated fatty acids in sunflower seed oil, safflower seed oil, and certain other vegetable oils also tended to cause a dramatic reduction of the blood cholesterol level.

Six years of experiments with 300 men, women, and children have shown that unrefined wheat germ oil is of exceptional value in increasing physical endurance and improving heart response. Drs. Cureton and Pohndorf, studying middle-aged men of a university faculty, observed improved endurance, better response in electrocardiograph, blood pressure, and pulse 'wave tests, together with quicker speed reactions to light and sound, when a supplement of unrefined wheat germ oil was administered each day. Dr. Counsilman, of Cortland State Teachers College in New York, reported experiments in which track athletes were given a teaspoon of wheat germ oil each day, achieving thereby marked improvements in endurance and the capacity of the heart to do work. Among boys seven to fourteen years old, marked improvements in the endurance have been registered when wheat germ oil was administered. Evidence has also been recorded showing that wheat germ oil is valuable in treating certain types of muscular dystrophy and in improving the efficiency of reproduction. Similar advantages have been reported upon the administration of wheat germ oil to laboratory animals. In the face of all such evidence, there need be no doubt but what wheat germ oil, as well as other forms of unrefined vegetable oil, deserve an important place in the uncooked diet.

The ordinary salad oils and cooking oils which are used in conventional cookery are of little or no value in supplying the vitamin E and other vital nutrients which we expect to receive from the best natural vegetable oils. It is important to buy vegetable oils in their crude non-filtered state in order to achieve the fullest benefit. Such oils are darker in color than refined oils, and they still possess some odor and flavor. Most good vegetable oils are cold-pressed, although solvent-extracted oils are also acceptable if they are prepared at low temperatures. Among the vegetable oils which may be used in good nutrition are: olive oil, soy bean oil, corn oil, sunflower seed oil, wheat germ oil, rice bran oil, sesame seed

oil, peanut oil, and safflower seed oil. These oils may be used in salad dressing recipes, and for all other culinary purposes in which oils are necessary. They may also be taken alone for medicinal purposes whenever a specific need for extra vitamin E, lecithin, unsaturated fatty acids, etc., exists.

GRAIN PRODUCTS

All raw grains are usually considered non-edible, but this belief is not warranted by facts. Fresh wheat is soft and succulent prior to ripening and may be eaten in its natural state. After ripening, the softer varieties may still be used in the diet. When chewed and mixed with saliva, the grains gradually soften into a succulent mass. Certain types of raw grains may be soaked overnight in water or milk and served in the same liquid with honey or fruits as a cereal the next morning. One can also use raw whole grain flour wheat germ, and rice bran in the diet. These may be sprinkled on salads and mixed with milk and other ingredients and made into unleavened bread dough, which may be pressed into flat pieces and kept under refrigeration. No baking is required for grain products of this type, and uncooked bread may form an important part of the diet.

Another excellent way of utilizing raw grains is to permit them to sprout. When grains sprout, many chemical changes take place, enhancing the original value of the seed. The starch is converted into sugar, thereby rendering the food more easily digestible. More amino acids are developed, and there is a marked increase in values for niacin, biotin, pantothenic acid, inositol, folic acid, and pyridoxine. Vitamin A is also manufactured during the sprouting process, as is vitamin C, the latter often tripling and more in quantity within two to three days.

It should not seem surprising, therefore, that raw sprouted grains are of extraordinary value in animal nutrition. Dr. Francis Pottenger, Jr., has reported that sprouted grain sets up great activity in the cells, increases adrenalin formation and metabolism, and brings about more calcification throughout the body. Dr. Oscar Erf tested sprouted grain at Ohio State University, and he found that it tended to make animals less susceptible to tuberculosis, mastitis, and undulant fever. In experiments with cows, Dr. Erf found that a diet of sprouted grain would increase the productive life span by almost one-fourth of the total life. Tests conducted by the Dept. of Husbandry of the U. S. Dept. of Agriculture in Beltville, Maryland showed that cows which had apparently lost or outgrown their ability to reproduce became fertile again and

gave birth to fine healthy calves after they had been fed on a diet of sprouted oats. Likewise, younger cows, apparently sterile, which had failed to reproduce even though they had been sired several times, quickly became fertile when given sprouted grain. With bulls that had become sterile, the use of sprouted grain restored fertility in all cases tested. The independent scientist, Dr. Eherenfried Pfeiffer, also has reported that without exception he has been able to restore the fertility of bulls through the use of sprouted oats plus green alfalfa. If sprouted grains are this important in animal health, we have good reason to believe they are also important for human health. Sprouted wheat, sprouted rye, and other sprouted grains thus have their place in good nutrition, and they may be used as liberally as desired for both their good flavor and high nutritive values.

EDIBLE WILD PLANTS

Modern man has tapped only a small part of the vast reservoir of nature for his food supply. Prior to the sixteenth century, meat and bread were the staple foods of most Europeans, and very few vegetable foods were considered satisfactory for nourishment. When the Europeans invaded lands of the Western Hemisphere, they found the Indians growing many seed plants and vegetables they had never seen before. Many of these were sent back to Europe and were widely cultivated. It is estimated that at least half of the garden vegetables in use today originated with the American Indian. Yet these vegetables comprise only a very small fraction of the total variety of plants used at one time or another by various Indian groups. The white man took only the Indians' cultivated plants. He ignored the vast number of wild fruits, wild herbs, wild seeds, and wild roots which formed a part of the Indian dietary fare. The U. S. Department of Agriculture has listed 444 genera and 1,112 different species of plant life as having been eaten by the Indian, and the greater number of thesewere edible in their wild state. Yet, even the Indian may not have utilized all the wild plants which were available. The truth is that nature is abounding in an extremely wide variety of fruits, seeds, seed pods, tubers, stems, buds, flowers, leaves, barks, roots, tree saps, gums, mushrooms, flavoring herbs, and lichens, which are edible and healthful for human use. These only await gathering by man, and their re-seeding and cultivation under scientific care, to be put to valuable use.

The flavors of wild plant foods often differ markedly from those of their domestic relatives. This may be objected to by those who are accustomed to the more flat-tasting domestic

foods, but after nibbling at wild foods for a while, the powerful flavors are usually appreciated. Many, in fact, enjoy them at their first trial. This particularly applies to the use of wild fruits, which usually have delightful flavors far surpassing those of domestic varieties.

It should not be supposed that all edible wild plants can be used in their raw state, but it is true that we may best restrict our use to those plants which can be eaten raw. Some plants are bitter and poisonous when raw, but the poisonous principle is dissipated by heat, and the food thus becomes edible when cooked or washed in several applications of boiling water. Fortunately, most wild plant foods do not fall within this class, and the majority may be taken with complete safety and enjoyment in their raw state.

The kinds of edible wild plants found in nature are of such infinite variety that no attempt will be made to list all of them here. However, a limited number of some of the best known varieties will be given, and this will be confined to those which are considered edible in their raw state.

For wild fruits, the following species have been highly recommended: Juneberries, barberries, hackberries, snowberries, strawberries, nannyberries, black huckleberries, dangleberries, partridgeberries, red mulberries, black mulberries, white mulberries, prickly pears, choke pears, tomatillos, ground cherries, May apples, crab apples, goose plums, beach plums, Canada plums, pin cherries, choke cherries, black cherries, sand cherries, gooseberries, fetid currants, red currants, garden currants, mountain blackberries, tall blackberries, purple raspberries, black raspberries, red raspberries, dwarf raspberries, elderberries, blueberries, cranberries, deerberries, huckleberries, cowberries, bunchberries, pimbinas, grapes, red haws, sugar pears, and pawpaws.

Edible salad-plants growing in their wild state include: canary-grass, sweet flag, spiderwort, corn-lily, mountain-sorrel, purslane, water-shield, penny-cress, peppergrass, shepherd's purse, scurvy grass, sea-rocket, yellow-cress, watercress, winter-cress, spring-cress, alpine-cress, wild mignonette, live-forever, roseroot, lettuce-saxifrage, swamp saxifrage, golden saxifrage, burnet, clover, wood-sorrel, storksbill, false mermaid, deergrass, caraway, pimpernel, brooklime, seaside plantain, corn-salad, ox-eye daisy, costmary, nipplewort, and cat-brier.

In addition to the afore-mentioned plants, which are useful for their leaves, there are others, such as Indian cucumber,

crinkle-root, wild licorice, eel-grass, alpine bistort, water-parsnip, and woundwort, which are useful for their roots. Other plants, including cat-tail, cat-brier, and bamboo-vine, have delicious sprouts. Bubleweed, deergrass, chufa, Jerusalem artichoke, purple-bellflower, brooklime, and woundwort have edible tubers. Some plants, including a number already listed, are also valuable for their stems, petals, or leaf-stalks. Delicious beverages may be made from spicebush, blackbirch, yellowbirch, paper birch, New Jersey tea, American wild mint, peppermint, spearmint, ground ivy, black spruce, fragrant sumac, squaw bush, and horse gentian. A delicious gum, suitable for chewing, is obtained from spruce, sweet gum, bird-cherry, milkweed, sugar pine, fir tree, skeleton weed, and pilotweed. Edible tree saps are available from the sugar maple, black sugar maple, red maple, silver maple, and box elder. There are hundreds of species of edible fungi in nature, and even some of the wild lichens may be used as food.

No one should use wild plants without care in selection and gathering. We know that some wild plants come in both poisonous and non-poisonous varieties. Others may contain both poisonous and non-poisonous parts. For instance, there are three species of the sumac plant which yield delicious and healthful fruit, but there is another species which is poisonous, even to touch. The only non-poisonous part of the May-apple plant is the fruit, which is eaten. These are not criticisms of wild plants, as such, for domestic species can have some of these same characteristics. Certain domestic plants may come in both poisonous and non-poisonous varieties; a number, such as apples and peaches, possess seeds containing poisonous prussic acid, and the rhubarb plant has poison leaves, but edible leafstalks. Whether dealing with wild or domestic plants we must use discretion and care in our full utilization of the food. If the primitive Indians were able to accomplish this without difficulty, certainly civilized man can do so.

For those undertaking the use of wild plant life in its edible forms, an adequate knowledge of the location, growth, and characteristics of such life is of course essential. This subject has been described as a lost chapter in the history of botany. During the past twenty years, however, this vacuum has been partly filled. Probably the best all-around publications on this subject in the English language are *Edible Wild Plants,* by Prof. Medsger, and *Edible Wild Plants of Eastern North America,* by Fernald and Kinsey. These works, along with others, may effectively guide those in carrying out future investigations.

The time may come when nature-lovers, botanists, nutritionists, and physicians will unite to become "hunters" in nature—not hunters for animals, but hunters for many hundreds of wild plants which may hold a potential key to man's physical destiny. We know that a high level of physical development is possible with a varied selection of domestic foods, but it is quite possible that this can still be improved by utilizing many of the wild foods which are now going to waste and becoming ever more confined in their habitats. On a national basis, it is clear that large-scale investigations and work in this field are called for. On an individual basis, you can learn more of nature's abundant produce, and with fortunate circumstances, you may be able to include at least a few wild fruits or plants in your dietary program.

HONEY

Honey is one of the finest foods in the uncooked diet. It is unique as a sweetening agent in the sense that it can be used in quantity without harming the teeth. C. W. Eddy has reported an experiment in which a dessert spoon of raw honey was taken each evening after cleaning the teeth. The honey was chewed well, coated over the teeth, and worked in between the teeth, with the object of testing the food for its effect upon dental decay. "During these years" declares Eddy, "no new cavities have appeared. In fact, two cavities in quite painful teeth, which one of us had, have completely disappeared. The other one of us, who previously suffered with several sensitive teeth, has had no more trouble with them." Other experiences with honey have also been associated with high immunity to dental caries. Whether this is due to the fact that bacteria cannot live in honey, or to the peculiar chemical combination found in honey, or to the fact that honey needs neither chemical treatment nor extensive heat-processing, remains to be seen. Perhaps all three reasons are important.

Some commercial honey is derived from bees fed large amounts of refined sugar and is removed before the cells are completely sealed. Carbolic acid fumes are used to drive the bees from the hives before removing the honey, and the honey is then heated to 150 degrees E and higher. Such honey lacks the purity, flavor, and nutritional qualities of raw honey produced by natural methods. As a rule, good honey may be obtained from natural food outlets and private beekeepers. In its raw state you can appreciate the food at its best. Honey may be obtained in many types, each of which has a flavor and aroma distinctive of it alone, so it is well to include, not one, but many kinds of honey in your diet. The honey may be

taken in its liquid or crystallized state. When crystallized honey is ground in a fine mill, it becomes creamed honey, which is also a satisfactory food.

Surprising as it may seem, U. S. "Grade A" honey is inferior honey which should be avoided on all purchases. U.S.D.A. Regulations state that honey may be labeled "Grade A" only if it will pass through an 80 mesh strainer. As raw honey possesses too much viscosity to pass through such a fine strainer, it cannot pass under the top classification. On the other hand, "Grade B" honey need only pass through 48 mesh strainers, which can be accomplished without the use of heat. A further point to remember is that "uncooked" honey, as it is commonly labeled in the honey trade, is simply honey which has not been heated over a specified high temperature. Such honey can be raw, but it can also be heated to such an extent that it will not crystallize. In purchasing honey, it is important to obtain *raw* honey, and if the honey has crystallized you may be sure it is raw. The crystallized honey returns to liquid consistency when the honey container is placed in a pan of mildly heated water.

DAIRY PRODUCTS

Raw dairy products are among our finest sources of unheated protein and fat-soluble vitamins. Whether used to supplement the conventional diet, or as a basic portion of the raw diet, they are of exceptional value. The milk is best obtained from a "certified" source of supply. Cottage cheese can easily be made in the home, and it is an excellent product for general use. Raw cream can be utilized in many ways for ice cream and other desserts, and it may be soured for salad dressing recipes. Due to the unavailability of raw butter on the general market, it is best to churn your own butter from raw cream. Such butter is unexcelled, either for flavor or nutritional qualities.

Most commercial sour milk products are distinctly inferior to the simple sour milk which can be made right in your own home. The well known yogurt, long advertised for its supposed healthful qualities, must be made from pasteurized, scalded, or boiled milk in order to enable the special bacterial cultures to work satisfactorily. It is distinctly inferior to ordinary sour milk and has lost many nutritional qualities. Commercial buttermilk is usually made from pasteurized skim milk. It is to be distinguished from real buttermilk, which is the liquid left when butter is churned from cream. Sour milk may be prepared simply by placing fresh milk in an open container in a warm place. It will transform into clabber

and whey, which may be taken as is or beaten into a smooth consistency through the use of an egg beater or liquefier.

It may be pointed out that, for some people, these sour milk products represent a superior source of food to sweet milk products. Sweet cow's milk forms a much harder curd in the stomach than does human milk, and a number of people find that this is difficult to digest. Others may digest the milk with ease, but later complain of sensitive reactions in different parts of the body. For a large percentage of these people, sour milk and sour milk products offer a solution to their difficulties. In sour milk the casein is furnished in a precipitated and finely divided condition, which does not tend to the formation of such hard curds as are formed by sweet milk. For this reason, it can be of greater value. It may be significant that sour milk products, rather than sweet milk, have been utilized as staple foods by certain racial groups who were known for their good health and great longevity.

While cow's milk and its products represent an important source of food in human nutrition, it should not be thought that they need represent the only source of dairy food. Actually, goat milk is superior, in certain respects, to cow's milk, and it certainly deserves more widespread use. Goat milk does not have to be soured to improve digestibility, for the fresh, sweet goat milk is already found in easily digestible form. The fat globules of goat milk are only about one-fourth the size of those found in Jersey cow milk, and they are more readily broken down and dissolved in the human stomach. In addition, the curds of goat milk are formed into very light flakes, which are soft and friable, and easily digested like the curds of human milk. Many people who tend to be sensitive to cow's milk thus handle goat milk with ease. Goat milk may be used to replace cow's milk in some diets, and to supplement cow's milk in others.

There are eighteen distinct types of cheese, and 400 minor variations of these cheese types, in world use. Most of these cheeses can be made without cooking the ingredients, and if the cheeses are found in their unprocessed state, they are suitable for good human nutrition. It is still possible to buy imported cheeses made from unpasteurized goat, cow's, or sheep milk, and it is also possible to buy certain local cheeses made from unpasteurized cow's milk. Such delicious cheeses, made by natural aging processes, have a more highly prized flavor than do pasteurized cheeses, and they are nutritionally superior in every respect.

EGGS

Raw eggs are a satisfactory animal food when properly used. Avoid the use of raw egg whites in their pure state, as the presence of biotin in the egg yolk is necessary to compensate for the avadin in the egg white. If any allergy to egg white is noticed, the white may be discontinued and the yolks used alone. Fertile eggs are considered nutritionally superior to infertile eggs, and they should be selected whenever possible. The eggs may be eaten right from the shell—a practice enjoyed by many—or they may be beaten with a liquefier or egg beater. Whole eggs or egg yolks may also be used in egg nogs, fruit juices, and liquefied drinks of all types, as well as being included in ice cream and many other food products.

MEAT

There is a strong precedent for using raw meats in human nutrition. The people in parts of northern Europe have long been known to serve raw ground steak in various ways. Some of the European sausages have also contained raw meat, and the old Bulgarians, known throughout the world for their superior health, were proud of eating their bacon raw. The Marquesas Islanders, most perfectly developed of all racial groups in their primitive state, consumed large amounts of raw fish. Indeed the whole Polynesian race in the South Seas was known for its consumption of raw fish. Visitors to the South Pacific have often stated that there was no native food they learned to enjoy so quickly as raw fish, and no food they remembered so long after departing. The Japanese still enjoy their raw cuttlefish and raw sea bass, while the native Hawaiians are especially fond of raw tuna.

Beef and lamb are considered the most appropriate of the red meats in their raw state; pork and pork products are best avoided under existing methods of pork production and inspection. Beef steaks and lamb chops may be eaten without further preparation or they may be prepared by chopping and grinding. Probably the most popular raw meat dish is "Steak Tartar" made by running raw lean beef through a meat grinder and mixing this with egg yolks and chopped onions or garlic.

The raw organ meats may also be included in the diet, as these are much richer in vitamins than are the muscle cuts. The glandular organs are especially rich in vitamin D, which tends to be deficient in plant foods. A well balanced uncooked diet may include liver, brain, kidney, sweetbreads,

and heart, as well as muscle meat. These can be sliced and used without further preparation, or they may be chopped or ground. For those who have not learned to appreciate the flavor of raw organ meats, these foods may be blended with raw vegetable juices, which disguises their original flavor.

Halibut, mackerel, sea bass, barracuda, tuna, clams, octopus, conch, mussels, cuttlefish, and oysters are considered the best tasting of the raw sea foods. Clams, mussels, and herring contain a little of the enzyme, thiaminase, so they should not be used as freely as the other sea foods. Raw fish may be served alone or with a sprig of parsley, a little lemon, or some uncooked mayonnaise. They can also be chopped up into small pieces, mixed with sea greens, onions, radishes, bell peppers, or other vegetables, and then marinated with lime juice. The fish are best chilled in the refrigerator before serving.

VEGETARIANISM

In arriving at the general dietary balance, it is necessary to consume both plant and animal foods. An uncooked diet composed exclusively of foods from the plant kingdom, as advocated by some sincere vegetarians, is not adequate for optimum health. After many years, of observation and study of primitive racial groups in all parts of the world, Dr. Weston A. Price declared: "As yet I have not found a single group of primitive racial stock which was building and maintaining excellent bodies by living entirely on plant foods. I have found in many parts of the world most devout representatives of modern ethical systems advocating the restriction of foods to vegetable products. In every instance where the groups had long been under this teaching, I found evidence of degeneration in the form of dental caries, and in the new generation in the form of abnormal dental arches to an extent very much higher than in the primitive groups who were not under this influence."

The late Mahatma Gandhi devoted much of his life to the advocacy of strict vegetarian diet, and for years he experimented on his own body to find a suitable selection of plant foods on which to sustain health. But all attempts were failures. In 1929, Gandhi and 22 companions went on a diet consisting of a limited selection of uncooked plant foods. Whereas the diet worked out well for a time and led to marked improvement in consumptive cases, it failed to prove adequate on a long-range sustenance basis. One by one Gandhi's companions were forced to depart from the diet, and Gandhi himself had to add goat milk to his fare in order to

regain health. "For my companions I have been a blind guide leading the blind" declared Gandhi after the experiment was over. Gandhi still felt, however, that "the hidden possibilities of the innumerable seeds, leaves and fruits" of the earth could be explored and found to provide mankind with adequate nourishment. He never stopped trying to experiment along these lines, but he always had to turn back to goat milk to regain his strength. In the end he had to acknowledge the necessity for animal food. In 1946 he declared: "The crores of India today get neither milk nor ghee nor butter, nor even buttermilk. No wonder that mortality figures are on the increase and there is a lack of energy in the people. It would appear as if man is really unable to sustain life without either meat or milk and milk products. Anyone who deceives people in this regard or countenances the fraud is an enemy of India."

These are strong words from a man who devoted most of his life to the search for a satisfactory vegetarian diet. But Gandhi's experience is not unique in the field of nutrition. Many others have also gone through the experience of believing that man could thrive exclusively upon a limited selection of uncooked plant foods, only to find in the end that animal products were necessary for sustenance. In England the word, "vegan" is used to designate one who abstains from all animal food products, and a so-called vegan movement has attained marked prominence among English vegetarians. Several years ago, a large group of vegans in England were studied in the Laboratory of Human Nutrition at Oxford University. It was found that these people tended to receive adequate amounts of the recognized nutrients, except for vitamin D, calcium, and vitamin B_{12}, which were somewhat deficient. Whereas some of the subjects had lived as long as ten years on the vegan diet without suffering from serious illness, a number developed deficiencies which caused serious ailments. This difference in reaction was considered due in part to the varying ability of the subjects to synthesize vitamin B_{12}, in the body. When serious deficiencies of this vitamin existed, the addition of milk to the diet brought about rapid improvement in health. Other observations of vegans in England have also indicated the presence of considerable impaired health, including a number of sudden and unexpected deaths in the vegan ranks.

Dr. Price believed that the lack of vitamin D in plant foods was responsible for the failure of an exclusive diet of plant foods to maintain health. Whereas the Oxford studies confirmed this viewpoint in part, they indicated that the deficiency of vitamin B12 in plant foods was perhaps even more important. It is true, as Gandhi stated, that there are

many hidden possibilities yet to be explored in all of the plant products of the earth, and there is a chance that some plants not presently in use could improve the nutritional quality of a strict vegetarian diet. Possibly there is a combination of plant foods that will prove adequate. For the present it is sufficient to say that no one has succeeded in developing such a combination. We must rely upon a combination of plant foods and animal foods for optimum nutrition. The plant foods doubtless should predominate in quantity, as they have with the most successful dietary regimes, but they cannot be used to the exclusion of all else.

What has been said with reference to a strict vegetarian diet, from which all animal foods are excluded, does not apply to a lacto-vegetarian diet, which includes dairy products, or a lacto-ova vegetarian diet, which includes both dairy products and eggs. Vegetarianism can be successful if adequate animal-food substitutes for meat are included in the dietary. Some racial groups have sustained high levels of health by utilizing liberal amounts of dairy products and very little meat. Others have succeeded in building superb bodies with meat but no dairy products. In the therapeutic use of raw diets, remarkable successes have been achieved on both lacto-vegetarian and non-vegetarian diets. The obvious deduction is that meat is compatible with good health but not essential to good health. There is room for both lacto-vegetarians and non-vegetarians in the modern world, and both may secure adequate nutrition from the wide variety of foods which are at man's disposal.

The proper selection of foods in an uncooked dietary is quite simple and can easily be established on a practical basis. Instinct alone tends to lead to sufficient variety in selection providing no food classes are omitted from the diet for ethical, religious, or economic reasons. A satisfactory uncooked diet may include fruits, nuts, vegetables, legumes, grains, seeds, tree saps, flowers, herbs, fungi, honey, milk, cheese, eggs, and meat. The diet must be omnivorous or lacto-vegetarian, and it may be derived from both the land and sea. Domestic foods will form the basis for the diet under present conditions. Edible wild plants are not essential, but they do represent accessory foods which can add significantly to the pleasure and nutritive value of the diet. In terms of total composition, the uncooked diet is thus easy to select, simple to balance, and available to everyone living under modern conditions of food production and distribution.

9

RAW FOOD IN PREPARATION AND USE

THE PREPARATION of raw food is the most important part of the culinary art. In the usual cookbook, information on this subject is restricted almost entirely to the preparation of salads, and even here many cooked ingredients and irritating condiments often enter the recipes. For those undertaking the maximum possible use of raw foods, much more knowledge is required. Salads comprise only a limited part of the total intake of food in the uncooked dietary. If we are to achieve maximum benefit from our meals, all other methods of raw food preparation must also be considered. With adequate knowledge covering every phase of this subject, uncooked foods may be prepared easily and quickly. The meals will be tasty, appetizing, and completely satisfying to the most sensitive palate.

BASIC METHODS

The first step in the preparation of raw plant foods is thorough washing. This does not mean that vegetables should be soaked in water, for soaking causes some nutrients to pass into the water, which is then discarded. Green leaves should be washed quickly but thoroughly. Fruits and leaves which have been sprayed with insecticides require special attention, and should be given a more prolonged cleaning, even though this will not remove all spray residue. Root vegetables should be well scrubbed, but the peelings should not be removed unless they are tough or bitter or too rough to permit satisfactory cleaning.

After cleansing, the methods of raw food preparation may involve chopping, grating, grinding, pulverizing, mixing, liquefying, blending, churning, juicing, and freezing. These may be accomplished by hand or by machine methods. This means that in the kitchen the cookstove will be supplemented or replaced by appliances designed specifically for the preparation of raw foods. The chopping board, salad bowl, ice cream freezer, fruit juicer, food grinder, food grater, food shredder, and chopping knife will be employed as needed. These can be supplemented or largely replaced by the electric juicer, electric blender, electric shredder, electric mixer, and

electric freezer for those who prefer the time-saving and work-saving efficiency of modern technical appliances.

The electric vegetable juicer is one of the most useful appliances for the kitchen. A number of different types of such juicers have been manufactured and are readily available in kitchen-appliance shops. The electric juicer enables you to make many delicious juices, not only from vegetables, but also from such fruits as melons, peaches, pears, apples, and berries. The juices can be made in just a few minutes and taken in their pure form or mixed in various combinations as may be considered more palatable. The pulp resulting from the juicing process may be discarded or it may be used in making additions to salads.

Juices are also available on a commercial scale, and some firms maintain a special delivery service to bring the juices right to the housekeeper's doorstep. While this represents a definite convenience to some, and is indeed *an* absolute necessity for a few, it does not represent the ideal method of obtaining juices. Much of the flavor and most of the enzymes in juices are lost within 30 minutes after they are made, and the very peak of palatability and nutritive value is obtained if the juices are consumed immediately after being extracted. There is no method of delaying this flavor-destroying oxidation, so we must be prepared to accept some loss in palatability in all commercial fruit and vegetable juices which have been prepared long before consumption. Whenever possible, juices should be extracted immediately to individual order, whether in the sanitarium, the restaurant, or the home.

Of all implements for use in preparing raw foods, none is of more all-around value than the electric blender, or liquefier-blender, as it is also called. This machine consists of a small electric motor in an enclosed base and a covered quart container on the base. Four or more blades in the container make thousands of revolutions per minute and instantly cut all food into fine pieces, mix it with a liquid base, and blend all ingredients together into a smooth, delicious preparation. Actually the machine may replace many other common kitchen implements. It will chop, grate, and grind as well as mix, liquefy, blend, and churn.

With the electric blender you can make the most delicious salad dressings, sauces, puddings, nut milks, and beverages of all kinds entirely from raw ingredients. All that is needed in most cases is a liquid base with such solid ingredients as may be chosen. Such foods as bananas, avocados, and other soft fruits will semi-liquefy into a smooth consistency with no other base than the fruit itself. Salad dressings are perfectly

emulsified in the blender, and sauces and puddings may be made with the same ingredients as the beverages except that the proportion of liquid in relation to solids is reduced in quantity. Apples, cranberries, and some other fruits are converted instantly into the most delicious sauces. A combination of fruit juice and nuts or nut butter is quickly converted into a rich, smooth cream or milk-like drink. A mixture of fruit juice and crushed ice is turned into the finest sherbet or frappe. Vegetables are ground up with a liquid base into a semi-liquid salad. Any food may be converted into a puree suitable for infant feeding or for anyone who cannot easily chew solid food due to dental defects. All of these things, and indeed more, may be accomplished with the electric blender. For the person preparing raw foods in a varied manner, this machine is truly indispensable in saving time and work.

It may be accepted that practically all methods of food preparation which involve a significant change in the physical state of foods may permit oxidation and thus induce loss of nutritive factors. Such losses, however, are relatively small and do not render the food unsuitable for moderate use. Fruit juices and vegetable juices, as well as various foods prepared in the electric blender, appear in practice to retain their basic vital effects upon the human system, and some have been used with very remarkable success on a therapeutic basis. Consequently they are all quite valuable in any diet and may form an integral part of the uncooked regime. It may be pointed out, however, that they should not be used to the exclusion of unchanged foods except under special conditions for a limited period of time. The teeth and gums need exercise from chewing hard, crisp foods, and these should be included liberally in the normal dietary regime. The preparation of raw foods, as with the grinder, juicer, blender, or other appliances, may be considered useful and practical as a means of improving the variety, palatability, and enjoyment of the diet, but it should be used within normal limitations such as common sense will dictate.

HOW TO SPROUT GRAINS AND LEGUMES

As sprouted grains and legumes are useful additions to the uncooked diet, methods for their preparation and use become important. Mung bean, soy bean, and alfalfa sprouts are occasionally developed and marketed, but others must at present usually be made in the home. To sprout any seed, it need only be kept moist and warm. Within a few days the sprouting process is well developed. A common commercial method is to soak the seeds in tepid water for 24 hours and

then place them in an incubator held at about 120 degrees F. for 48 hours or longer. In the home, seeds can be sprouted by soaking them overnight and placing them in a sterilized colander or any other sterilized container that has holes for drainage. They are then flooded with lukewarm water three to six times each day. An ordinary flowerpot may be converted into a sprouter simply by screening the hole at the bottom. The screen keeps the seeds in the pot and permits all water to run out, thus assuring good drainage. You can also put your seeds in an ordinary glass casserole. After they are flooded with water, simply place cover on casserole, and tip so as to permit water to run from the outlet. Another popular method for the home is the fruit jar method. The seeds are placed in the jar, and a piece of cheesecloth is fastened on the top and held in place with a rubber band. If an open screw top is available, this may simply be turned on the jar, over the cheesecloth, thus replacing the rubber band. Or for a still more practical sprouter, a permanent screen may be fastened over the open screw top. After the seeds are soaked overnight in the jar, simply invert the jar to remove the water. You can then pour additional water through the cheesecloth three or more times each day, and remove it by inverting the jar. Between watering the seeds, leave the jar partly inverted to permit continuous drainage of water and entry of air.

As a rule, wheat, rye, and barley seeds are preferred when they have just begun to sprout or when the sprouts are no longer than the seeds; mung bean sprouts are preferred about one and one-half to three inches long; alfalfa sprouts may be taken when one to two inches long, while soy bean and pea sprouts are good either long or short. The sprouts are eaten with the seeds, and they may be taken alone or mixed with salads and liquefied drinks. The sprouted cereal grains are usually preferred when served with honey and milk or cream as a breakfast cereal.

DRYING AND FREEZING FOODS

Raw foods are most appropriate for human nourishment when used in their fresh state. Yet, there is some reason for preparing certain foods by the process of drying. While refrigeration has been an enormous aid in preserving fresh foods longer, it has its limitations. Thus the extra supply of seasonal foods may be preserved by drying in the sun. There is unquestionably some loss of vitamin C and other nutrients in the drying process, but this is far less damaging than the chemical changes brought about by heat. Farm animals are forced to live during winter months on dry feed, and whereas they do not maintain the fine condition of green-fed animals,

they are far superior to those given cooked foodstuffs. It may be added that animal feeding experiments have shown that sun-dried alfalfa meals are far superior to dehydrated meals, and we may expect the same to be true of most dried foods. The excessive heat used in artificial dehydration makes the method less desirable.

We are all accustomed to the use of dried apricots, raisins, and prunes. Yet few people realize the large number of other foods which lend themselves well to the drying process. Apples, peaches, pears, bananas, raspberries and many other fruits may be dried in the sun. Sun-dried sweet corn is a delicious food. Meat may be cut into thin slices and dried in the sun. The early North American Indians were well known for their sun-drying of foods, and we might well take a few lessons from their experiences. The Indians cut much of their buffalo meat into slices one-half inch thick and sun-dried these without the addition of salt or smoke. They made cakes weighing from fifteen to twenty-five pounds from dried berries. In civilization we can utilize an even wider variety of sun-dried foods, and, as with the Indians, we can do so without the use of salt, smoke, sulphur, and other harmful preservatives.

Along with sun-drying, freezing is a method of giving variety to the diet and aiding in the storage of extra foods. Nutritive losses in frozen foods are very slight and confined to the thawing period. However, it cannot be said that frozen foods are equal in all respects to fresh foods. The commercial practices of bleaching vegetables, heat-processing fruit juices, and saturating fruits *with* refined sugar syrup prior to freezing eliminate these frozen foods from the raw diet. The home deep-freeze is adapted to storing some foods, but not all foods. All frozen vegetables are inferior in flavor and texture to fresh vegetables when consumed in their raw state. Fruits are much better adapted to the freezing process. Ordinarily, home-frozen fruits are treated with refined sugar syrup, just as commercial fruits are, in order to delay enzyme action and thus assure better preservation. But the practice is entirely unnecessary. All fruits may be frozen with complete satisfaction without added sugar, the only requirement being that honey be used as a substitute. Fruits frozen with honey preserve their original color and flavor every bit as well as those frozen with sugar, and they are far more healthful. Either the whole berries or sliced tree fruits may be frozen, or, if preferred, the juices may be extracted and frozen. All foods should be consumed as soon as possible after thawing. In addition to the regular deep-freeze, the refrigerator freezer

compartment and the ice cream freezer may be used in preparing certain frozen foods.

RECIPES

With a basic knowledge of the many foods that may be used in an uncooked diet, as well as some of the techniques of preparing such foods, you will be in a position to utilize recipes and menus for your own enjoyment and physical benefit. Here you will find recipes designed for the use of a wide variety of raw foods, as may be available under good conditions in regions favored with the widest production and marketing of food products. They represent an ideal to work for as far as the general circumstances permit, but that is all. Don't become disturbed if you cannot obtain all of the foods mentioned; substitutions can always be made and the dietary may be adjusted to fit in with the selection of foods you find available.

The fundamental need in utilizing raw foods is to make your meals as tasty and appetizing as possible. If you apply imagination and good judgment in the techniques of food preparation, you will find yourself enjoying your foods far more than you ever did in the past. The food combinations that may be developed in beverages, dressings, salads, confections, desserts, etc., are almost endless. Hundreds in each category may be devised at will. Here you will find a limited number to start with, and as you proceed to work and experiment with raw food preparations, you will doubtless find many new ones which may also suit your individual taste.

VEGETABLE JUICE COCKTAILS

POTASSIUM COCKTAIL

2 cups carrot juice ½ cup spinach juice
1 cup celery juice ¼cup parsley juice

RHUBARB COCKTAIL

1 cup pineapple juice 1 cup rhubarb juice

RADISH COCKTAIL

2 cups pineapple juice ½cup radish juice

BEET LEAF COCKTAIL

2 cups tomato juice ½ cup beet leaf juice
1 teaspoon lemon juice

VITALITY COCKTAIL

1 cup celery juice 1 cup orange juice

IRON COCKTAIL

1 cup beet juice 1 cup blackberry juice
1 cup spinach juice

APPETIZER COCKTAIL

1 cup pineapple juice 1 cup dandelion juice

BEAUTY COCKTAIL

½ cup celery juice ½ cup watercress juice
½ cup cucumber juice ¼ cup parsley juice
½ cup tomato juice

CARROT-COCONUT COCKTAIL

2 cups carrot juice ½cup coconut juice

PINEAPPLE-COCONUT COCKTAIL

2 cups pineapple juice ½ cup coconut juice

CARROT-CELERY COCKTAIL

1 cup carrot juice 1 cup celery juice

REFRESHER COCKTAIL

½ cup celery juice ½ cup pineapple juice
½ cup spinach juice

CUCUMBER COCKTAIL

1 cup cucumber juice 1 cup grapefruit juice

STRAWBERRY COCKTAIL

1 cup strawberry juice ½ cup rhubarb juice

APPLE COCKTAIL

1 cup apple juice 1 cup carrot juice

BEVERAGE COMBINATIONS PREPARED IN THE ELECTRIC BLENDER

The beverages that can be made in the electric blender number in the thousands. For all beverages you need at least two parts of liquid to one part of solid. Fruits, vegetables, and coconut should be cut into small pieces before blending. Raw nut butters can always be used in place of fresh nuts, and they will reduce the time required for mixing. If a rather thick beverage is to be made, it is best to pour in the liquid first and then add the solid ingredients slowly while the mixture is turning. Many of the beverages may be converted into soups simply by warming (but not cooking) them over a fire and serving in soup bowls. Usually the beverages are served cold, but if you want an extra cold drink, simply add a half cup of crushed ice to the mixture. The following beverage combinations are given as samples. They may be alternated with hundreds of others which may be devised at your leisure.

ALMOND MILK

1 cup orange juice ¼ cup almonds

PECAN MILK

1 cup pineapple juice ¼ cup pecans

WALNUT MILK

1 cup grapefruit juice ¼ cup walnuts

FILBERT MILK

1 cup pineapple juice ¼ cup filberts

CASHEW MILK

1 cup orange juice ¼ cup cashews

COCONUT MILK

1 cup pineapple juice ¼ cup fresh coconut pieces

DATE MILK

1 pint milk 8 pitted dates

EGGNOG

1 cup milk 1 egg
1 teaspoon honey

PEANUT MILK

1 pint milk 2 heaping tablespoons
6 dates peanut butter
½ banana 2 eggs

BANANA-NOG

1 pint milk 1 egg
1 banana 1 teaspoon lemon juice

SUNFLOWER MILK

1 cup orange juice 1 cup milk
6 pitted dates 1/3 cup sunflower seeds

ENERGY COCKTAIL

1 cup orange juice 1 egg
1 teaspoon honey

STRAWBERRY NECTAR

1 cup orange juice 1 cup strawberries
1 tablespoon honey

BAVARIAN CREAM

½ cup cream ¼ cup orange juice
¼ cup water 1 banana
2 tablespoons lemon juice

COCONUT CREAM

1 cup orange juice 1 banana
¼ cup fresh coconut pieces

STRAWBERRY CREAM

1 pint strawberries ½ cup milk
½ cup cream

APRICOT GLOW

½ cup fresh apricots
1 tablespoon lemon juice
1 cup milk
2 tablespoons honey

GOLDEN CREAM

½ cup sliced carrots
2 cups pineapple juice
½ cup raisins

PEACH MILK

1 cup milk
1 slice lemon
1 cup sliced peaches

SESAME MILK

1 cup water
1 tablespoon honey
1 tablespoon sesame butter

LIVER COCKTAIL

1 cup carrot juice
1 slice onion
1 tablespoon beef liver
1 tablespoon parsley
½ teaspoon vegetable broth powder

TOMATO COCKTAIL

1 pint tomato juice
½ small onion
1 stalk celery
sprig of parsley

CRANBERRY COCKTAIL

1 cup cranberries
1 cup orange juice
1 cup water
1 tablespoon honey

LIQUID SALAD

1 cup water
½ stalk celery
½ green pepper
1 tablespoon raisins
1 small carrot
½ cucumber
6 almonds

BEET COCKTAIL

1 cup beet juice
1 tablespoon lemon juice
1 slice onion
1 cup sour cream
1 teaspoon honey

SALAD DRESSINGS

The following recipes for uncooked salad dressings may be prepared in the electric blender. For recipes containing no oil, simply put all ingredients into the blender, switch on the motor, and let run until ingredients are perfectly emulsified. For mayonnaise and other oil dressings, mix all ingredients except oil first. Then pour oil into blender very slowly while mixture is turning. This assures a smooth, fluffy dressing in which the oil is completely emulsified with other ingredients. Uncooked dressings may be stored under refrigeration in labeled fruit jars or bottles. Due to the presence of enzymes, they will not keep as long as ordinary dressings.

MAYONNAISE

1 cup sunflower seed oil
juice of two lemons
1 teaspoon honey
1 egg

FRENCH DRESSING

½ cup rice bran oil
1 tomato
1 egg yolk
½ teaspoon honey
¼ cup chopped onion
1 tablespoon red bell pepper

PECAN FRUIT FRENCH DRESSING

½ cup peanut oil
1 tablespoon lemon juice
¼ cup pecans
½ cup orange juice
1 teaspoon honey

ROQUEFORT DRESSING

4 tablespoons crumbled Roquefort cheese
1 cup French dressing

COTTAGE CHEESE SALAD DRESSING

1 cup cottage cheese
2 tablespoons chopped chives
¼ clove garlic
½ cup cream
2 tablespoons chopped green bell pepper

LEMON CREAM DRESSING

1 cup cream
½ cup lemon juice

LEMON BANANA DRESSING

1 banana
½ cup lemon juice

SOUR CREAM DRESSING

1 cup sour cream
2 tablespoons chopped chives

TOMATO DRESSING

4 tomatoes
1 egg yolk
1 tablespoon finely chopped onion
1 avocado
1 tablespoon honey
½ clove garlic

MINT DRESSING

6 tablespoons finely chopped mint leaves
1 cup lemon juice
4 tablespoons honey

ORANGE CREAM DRESSING

1 cup orange juice
¼ cup pignolia nuts

SALADS

TOSSED SALAD

1 head lettuce, sliced
½ head cabbage, sliced
1 cup celery, diced
1 green bell pepper, chopped
1 onion, chopped
3 spinach leaves, sliced
3 watercress leaves, sliced
1 tomato, sliced

Rub large wooden salad bowl with ½ clove crushed garlic, and pour ¼ cup sunflower seed oil in bottom of bowl. Add all salad ingredients and toss over bowl, lifting them 3 to 6 inches above bowl and whirling them as they are dropped. Continue, with 15 to 30 tossings, or until all ingredients are glistening with oil. Add 3 tablespoons lemon juice and toss again until juice is well mixed with ingredients. Additional dressings are optional. Mayonnaise, French, and Roquefort dressings contribute to additional flavor. Grapefruit slices, diced cheese, diced avocado, or other garnishes may be dropped over finished salad. Chill salad in refrigerator and serve on chilled salad plates or salad bowls.

CELERY-NUT SALAD

4 stalks celery, sliced
1 green bell pepper, minced
2 large tomatoes
½ cup grated nuts

2 watercress leaves

Cut the tomatoes in small pieces and mix with the celery and green pepper. Add mayonnaise as dressing. Use lettuce leaves as a bed for this salad and sprinkle with grated nuts. Garnish with watercress.

APPLE SALAD

3½ cups diced apples
1 cup sliced celery
1 cup diced banana
½ cup raisins

Mix the ingredients and use lemon cream dressing. Serve in lettuce cups.

AVOCADO SURPRISE

1 large ripe avocado
3 slices fresh pineapple
½ cup sliced celery
¼ cup chopped almonds

Dice the avocado and pineapple and mix all the ingredients. Use lemon banana dressing. Serve on spinach leaves and garnish with a few chopped dates.

BANANA TREAT

4 bananas
chopped cranberries
chopped Brazil nuts
whipped cream

Cut each banana into slices and place on lettuce leaves. Sprinkle with the chopped nuts and cranberries. Top with whipped cream.

BANANA-CELERY SALAD

2 cups cubed bananas
2 cups sliced celery
½ cup chopped black walnuts
3 tablespoons pineapple juice

Mix the ingredients and serve on lettuce or spinach leaves. Top with mayonnaise dressing.

AVOCADO-ORANGE SALAD

2 cups diced avocado 1 cup sliced celery
4 oranges

Slice the oranges and mix with the avocado and celery. Serve on crisp greens with tomato dressing.

AVOCADO-PINEAPPLE SALAD

2 sliced avocados 1 sliced pineapple
1 sliced grapefruit 2 sliced apples

Arrange the fruit slices on lettuce leaves. Garnish with a few chopped dates or nuts if desired, and top with lemon banana dressing.

BRAZILIAN SALAD

1 cup chopped pineapple ½ cup Brazil nuts
½ cup sliced celery

Chop the Brazil nuts into small pieces and mix all the ingredients. Pile on endive and parsley leaves and top with mayonnaise.

DATE-ORANGE SALAD

2 cups quartered dates ½ cup sliced celery
4 oranges

Cut the oranges in small pieces and mix all ingredients. Add mayonnaise as dressing.

FIG SALAD

1 cup chopped fresh figs 4 cups oranges cut in
1 cup chopped pineapple small pieces

Mix all ingredients together and serve on shredded greens. Pour over a little lemon juice for added flavor.

BANANA-DATE SALAD

1 cup chopped dates
2 cups diced banana
½ cup whole black walnuts

Mix the ingredients with lemon banana dressing and serve on fresh green leaves, preferably spinach or lettuce. Cover with some chopped cranberries if desired.

FRUIT COLE SLAW

1 head cabbage, shredded
2 apples, diced
3 bananas, diced
½ cup sliced celery

Mix all the ingredients with mayonnaise and serve on crisp romaine leaves.

SPANISH-ORANGE SALAD

3 oranges
2 green bell peppers
3 tomatoes
4 young green onions

Cut the ingredients into small pieces and serve on watercress leaves. Sprinkle with chopped almonds and top with French dressing.

MANGO DELIGHT

2 mangos
2 bananas
2 oranges
1 cup dates

Cut the mangos, oranges, and bananas into small pieces; slit the dates into halves. Mix all ingredients and dress with lemon banana dressing. Top with mayonnaise.

SPINACH SALAD

1 pound spinach
2 onions
2 apples
1 cup sliced celery

Chop the onions and apples into small pieces. Chop the spinach quite coarsely and mix all ingredients. Add French dressing.

HONEYDEW SALAD

2 cups diced honeydew melon
½ cup diced avocados
1 cup diced bananas
1 cup chopped dates

Mix all ingredients and serve on endive leaves. Use coconut juice as dressing. Cover with chopped Brazil nuts.

VEGETABLE-NUT SALAD

1 bunch watercress
1 small head lettuce
¼ cup tomato juice
1 cup sliced Brazil nuts
1 teaspoon onion juice
½ cup chopped green pepper

Mix nuts, onion juice, tomato juice, and green pepper. Place on a mound of mixed watercress and lettuce leaves. Add French dressing.

VEGETABLE-RAISIN SALAD

1 head lettuce
3 tomatoes
3 young green onions
½ cup seedless raisins, soaked

Shred the lettuce and chop the onions into small pieces. Cut the tomatoes into eighths and mix all ingredients. Toss with cottage cheese dressing. Sprinkle with chopped nuts.

CUCUMBER SALAD

1 cup diced cucumbers
½ cup mashed banana
3 tomatoes
1 tablespoon lemon juice

Slice the tomatoes into eighths and mix with the diced cucumbers. Blend the lemon juice with the mashed banana and add to the first mixture. Place on a bed of endive or lettuce leaves. Sprinkle with grated almonds.

TOMATO-ONION SALAD

4 ripe tomatoes
1 green bell pepper
12 young onions

Cut the tomatoes and onions into small pieces and chop the green pepper. Serve on a bed of lettuce leaves. Top with pecan fruit French dressing and chopped Brazil nuts.

PEPPER SALAD

4 sweet green peppers, minced
1 small head cabbage
4 onions, chopped
2 tablespoons chopped parsley

Shred the cabbage and combine with the other ingredients. Mix with pecan fruit French dressing. Sprinkle with chopped dates or nuts.

RAINBOW SALAD

1 small head red cabbage
2 carrots
2 tablespoons parsley
2 turnips
1 large beet

Grate the turnips, carrots, and beets; shred the cabbage. Mix each of the four vegetables separately with French dressing. Place in rainbow fashion on shredded lettuce leaves. Sprinkle with minced parsley.

UNCOOKED BREAD

There are two basic methods for making uncooked bread. For the first method, mix all soft or liquid ingredients together, and add to flour. Mix together in large bowl, and knead the mixture with your hands until it becomes fine dough. Form into roll about 2 to 4 inches in diameter, and turn on dry whole wheat flour until outside of roll is dry and no longer sticky. Wrap roll in wax paper, and chill in refrigerator overnight or until roll is firm. Cut into thin slices as needed and serve.

In following second method, mix ingredients as before and knead into dough. Cover a bread board with dry whole wheat flour, and roll the dough into the flour in a layer about one-fourth inch thick (more or less, according to choice). Use the rim of a drinking glass to cut out round pieces from the flat dough. Place pieces on tray, and chill in refrigerator until dough becomes firm. Serve as ordinary bread.

Uncooked bread is flavorful exactly as made. Butter, cheese, and other spreads are optional and may be used according to taste.

Uncooked bread should be kept under refrigeration at all times. As no enzymes are destroyed, the bread tends to become rancid and spoil more rapidly than baked bread when

kept at ordinary room temperature. Keeping the bread cold also helps to maintain firmness of texture.

WHOLE WHEAT BREAD

3 cups whole wheat flour
1 cup milk
½ cup honey
2 egg yolks

WHEAT-DATE BREAD

2 cups whole wheat flour
1 cup milk
2 cups ground dates
1/3 cup soft butter

SESAME BREAD

2 cups whole wheat flour
1 cup milk
1 cup sesame flour
¼ cup honey

WHEAT GERM BREAD

2 cups whole wheat flour
1 cup cream
1 cup wheat germ
1/3 cup honey

RYE BREAD

2 cups rye flour
½ cup milk
½ cup soft butter
¼ cup honey

CORNMEAL BREAD

2 cups cornmeal
1 cup cream
½ cup lemon juice
2 cups whole wheat flour
¼ cup honey
2 egg yolks

ORANGE BREAD

3 cups whole wheat flour
1 cup orange juice
¼ cup soft butter
¼ cup honey

LIME BREAD

2 cups whole wheat flour
½ cup lime juice
¼ cup honey
¼ cup soft butter

BANANA BREAD

2 cups whole wheat flour
1 cup mashed banana
¼ cup honey
2 egg yolks

CARROT BREAD

2 cups whole wheat flour
2/3 cup carrot juice
¼ cup honey
1/3 cup soft butter

LEMON BREAD

3 cups whole wheat flour
1 cup lemon juice
½ cup honey
½ cup soft butter

STRAWBERRY BREAD

2 cups whole wheat flour
1 cup strawberry juice
1 cup rice flour
¼ cup honey

COCONUT BREAD

2 cups whole wheat flour
1 cup ground coconut
¼ cup ground dates
½ cup milk
½ cup orange juice
2 egg yolks

BLACK WALNUT BREAD

3 cups whole wheat flour
¾ cup honey
¾ cup soft butter
¼ cup black walnuts
¼ cup hot water
¼ cup lemon juice

MIXED RECIPES

MUESLI PORRIDGE

2 tablespoons coarse rolled oats
1 tablespoon lemon juice
1 cup chopped apple
1 tablespoon honey
½ cup milk
1 tablespoon nut meats

Soak rolled oats in milk for 30 minutes. Add other ingredients and mix well. Chill in refrigerator and serve cold.

For variations, use grated apple or mashed berries instead of chopped apple, or use cream instead of milk. Finely grated nut meats may be sprinkled on muesli if desired.

STEAK TARTAR

1 pound sirloin steak
2 egg yolks
1 chopped onion

Run sirloin steak twice through meat grinder. Add egg yolk and chopped onion and mix well. Divide into two or more even parts, form into oval shape, and serve immediately.

For variations, use round steak or any other tender cut of beef, or substitute a little garlic or vegetable broth powder for onion. Honey, butter, or lemon juice may then be included with mixture if desired. Steak Tartar may be served on lettuce leaves and garnished with a ring of sliced oranges or other fresh fruit.

UNCOOKED VEGETABLE SOUP

1 cup chopped carrots
1 cup chopped celery
1 cup fresh peas
1 quart water
½ cup asparagus pieces
2 tomatoes, cut in small pieces
1 chopped onion
2 sprigs parsley, chopped

Place water on fire to boil. Combine all vegetable and fruit ingredients in large bowl. Pour boiling water over mixture, but do not cook. Allow to set until soup arrives at desired temperature for consumption.

For variations, 2 cups tomato juice may be used to replace 2 cups water, adding the juice after it has been warmed but not boiled. A teaspoon of vegetable broth powder may be added for extra flavor. Turnips, potatoes, spinach, okra, string beans, or other vegetables, sliced or chopped, may be used to replace one-half of vegetables in basic recipe.

PEPPERMINT TEA

Peppermint tea is prepared according to the same method as ordinary tea. For each 1 to 1½ teaspoons of dried peppermint leaves, use 1 cup of boiling water. Pour boiling water over the leaves, but do not boil. Allow to steep for 3 minutes, drain, and serve as is, or flavor with honey, lemon juice slices or other natural ingredients.

Prepare other herb teas in the same manner. If tea bags are available, use one tea bag for each cup of water. While hot water or boiling water is applied in all cases, the heating process ends as soon as the water is poured over the herbs.

When herbs are actually boiled in water, they lose nutritional values and often become bitter and insipid.

DATE SYRUP

Pit five pounds of soft dates. Place in large bowl, and add water until water level is about three inches above dates. Soak for 24 hours or more. Put mixture into cloth sack, and squeeze with hands, allowing juice to drop into bowl below. Place juice in sun and cover with cheesecloth. Remove after two or three days, or when juice has thickened to form syrup. You can use date syrup as a natural sweetening and flavoring agent added to many foods. It is especially useful in the preparation of ice cream, puddings, and other uncooked desserts.

RAW BUTTER

For making unpasteurized, unsalted butter and real buttermilk, follow this procedure. Fill butter churn one-half full with sweet cream or mildly soured cream. Place churn jar in larger jar containing warm or cold water, and heat or cool cream to temperature of 55 degrees E to 60 degrees E Turn crank of churn at the rate of about 70 to 90 revolutions per minute until butter forms into granules about the size of rice. This usually requires about 30 to 40 minutes. Remove cap and pour off buttermilk. Pour water into churn until the granules float, and turn crank gently until all remaining buttermilk is washed from butter. Pour off buttermilk again, and remove butter from churn. Form butter into individual pieces of convenient shape and size, and wrap in wax paper. Store in refrigerator and use as needed.

If no butter churn is available, raw butter may also be made in smaller batches with the use of an egg beater and mixing bowl. Follow same procedure as with churn, except beat cream with egg beater. When butter is formed, pour off milk, wash butter with water, wrap product in wax paper, and store under refrigeration.

CLABBER MILK

Put 1 or 2 quarts of raw milk into a bowl and heat to 80 degrees E Cover with towel to assure cleanliness, and allow to set until converted to clabber and whey.

Clabber milk may be consumed without further preparation, or both the clabber and whey may be beaten in an electric

blender or with an egg beater until it is uniform in consistency and frothy.

Clabber milk may be made from whole milk or skim milk. If it is made from ordinary raw milk, it will set under natural conditions. If it is made from certified raw milk, which is too low in bacterial count to allow souring, about two tablespoons of commercial buttermilk must be added to each quart of sweet milk to induce souring. If this is not done, the milk will putrefy rather than sour.

COTTAGE CHEESE

Pour 2 quarts of raw skim milk into bowl and heat to temperature of 80 degrees F. Set aside at warm room temperature and cover with light towel. When milk has turned into sour clabber, pour into colander and allow to drain until all liquid is gone. The solid clabber remaining in the colander is cottage cheese. It should be stirred to improve consistency, and can be served immediately or kept under refrigeration for later use. For creamed cottage cheese, mix with a moderate quantity of sweet cream. Caraway seeds or chopped chives may be added for extra flavor.

As with clabber milk, if cottage cheese is made from raw certified milk of low bacterial count, a little commercial buttermilk will have to be added to the milk at the outset in order to promote souring.

HOME-MADE ICE CREAM

2 eggs, well beaten 1 pint milk

Add honey to the milk, stirring vigorously. Slowly add the eggs which have been beaten until thick, and stir constantly as the eggs are added. Cool the mixture and then stir in the cream.

A regular ice cream freezer, either hand operated or electrically operated, may be used. Fill the freezer can about two-thirds full with the mixture and place both can and turning crank into position in the freezer. Fill area around freezing can about one-third full of crushed ice; then fill remaining area with mixture of 4 parts crushed ice and 1 part coarse salt. Turn crank and freeze. When ice cream is frozen, drain off water, take out dasher and remove contents for serving. If mixture is to be kept frozen in freezer, remove

dasher, pack mixture down solidly with spoon. Repack, and cover freezer with newspapers or heavy cloth.

For making flavored ice cream follow the basic recipe except that substitutions and additions may be made as follows. For fruit flavorings, substitute two cups of finely mashed fruits (strawberries, raspberries, bananas, oranges, or any other fruit that is desired) for two cups of milk given in the basic recipe. The fruits may also be brought to the proper texture by being beaten in a liquefier for a few moments, or if preferred, the juices of the fruits may be used instead of the whole fruit. When black walnuts or other kinds of nuts are used, they may simply be added to the basic mixture, using one cup of chopped nuts for each batch of ice cream. For date flavored ice cream, pure date syrup may be added to the basic mixture in similar or smaller amounts, depending upon the strength of flavor desired.

REFRIGERATOR ICE CREAM

Perfect ice cream may be made in the refrigerator providing you have a special ice cream freezer which is designed for use in the freezer compartment of the refrigerator. This freezer has a one or two quart container in which the ice cream mixture is placed. An electric cord extends from the freezer through the refrigerator door, and is plugged in a wall socket. The freezer thus operates electrically, and turns the ice cream mixture by the use of paddles located in the container. Within about 45 minutes to one hour the ice cream is frozen into an ideal consistency, equal to the very best that can be obtained with any other method.

The recipe for refrigerator ice cream is exactly the same as used for the regular home-made ice cream. In making refrigerator ice cream, pour mixture into freezer container and place at least two tablespoons of water on the surface of the refrigerator freezer compartment. Place the electric freezer on this wet surface, and turn the refrigerator to its coldest setting. Connect the cord plug and let freezer operate as specified. When ice cream is done, paddles will stop turning, and contents may be removed and served immediately.

HONEY DESSERT

2 cups chopped English walnuts
1 cup whipped cream
¼ cup honey
1 teaspoon lime juice

Mix nut meats, honey, and lime juice together in mixing bowl. Place in dessert cups, and cover with whipped cream. Garnish each serving with a large nut meat.

DATE PUDDING

2 cups chopped pitted dates
2 cups whipped cream
1 tablespoon lemon juice
½ cup chopped pecans

Combine dates, cream, and nut meats, and pour lemon juice over top. Chill in refrigerator before serving.

FRESH PEACH PUDDING

6 peaches, mashed
1 cup whipped cream
1 cup peach ice cream
2 tablespoons honey
½ cup ground butternuts

Place mashed peaches in refrigerator to chill. Remove when cold and combine with whipped cream. Add nuts and honey, and place in dessert dishes. Cover each serving with a little ice cream.

PEACH-BERRY DESSERT

4 large ripe peaches
¼ cup blackberries
¼ cup cherries
¼ cup blueberries
¼ cup raspberries

Peel the peaches, cut in halves, and remove the stones. Place two halves on each dessert plate, and fill the halves with the mixture of berries. Top with whipped cream or ice cream, and sprinkle with grated nuts.

MELON DELIGHT

2 honeydew melons
2 cups fresh strawberries
2 large bananas
1 large avocado

Dice bananas and avocado. Cut melons in halves, and serve one half on each plate. Fill melon centers with the mixture of strawberries, bananas, and avocados.

FRUIT COCTAIL

1 cup diced peaches
1 cup diced pears
1 cup diced pineapple
1 cup pitted cherries
1 cup strawberry juice
2 tablespoons honey

Mix all ingredients together and serve in sherbet glasses.

UNCOOKED APPLE PIE

1 cup whole wheat flour
½ cup ground dates
¼ cup almond butter
4 cups grated apples
½ cup honey
1 cup whipped cream

Mix flour, dates, and almond butter together for pie crust. Roll out dough on wax paper. Invert paper over nine-inch pie plate, and line the plate with dough. Press down around edges and trim. Grate apples coarsely and mix with honey. Drain off liquid and fill pie shell with the grated apple mixture. Cover filling with layer of whipped cream, and then sprinkle with grated nut meats.

For other fruit pies, use same pie crust recipe, and fill in shell with banana slices, peach slices, berries, or other fruit of choice (sweetened with honey). If top pie crust is desired, this may be rolled out on wax paper, as for lower crust, and inverted over filling. Whipped cream covering is then optional.

CONFECTIONS

RAISIN COCONUT BALLS

2 cups seedless raisins
1 lb. fresh coconut

Cut coconut into small pieces which are adaptable to food grinder. Then run through grinder and set aside. Run raisins through food grinder, form into balls, and roll in the ground coconut.

RAISIN COCONUT CARAMEL

1 lb. seedless raisins
¼ lb. fresh coconut

Run both ingredients through food grinder. Mix together. Make into flat layer and cut into squares. If candy is allowed to stand several hours it will be easier to cut.

RAISIN BRAZIL NUT CONFECTIONS

2 cups seedless raisins 1 cup shelled Brazil nuts
¼ cup shelled almonds

Mix raisins and Brazil nuts together and run through food grinder. Chop the almonds. Then form the raisin-Brazil nut mixture into balls and roll in the chopped almonds.

FIG ALMOND CANDY

2 cups dried white figs ½ cup almonds

Run the figs and almonds through the food grinder. Mix one-half of the almonds with the figs, and run the remainder through the food grinder after installing the nut butter cutter. Then mix the almond butter with the almond-fig mixture. Roll into balls and press a blanched almond into side of each ball.

PEANUT DATE CANDY

2 cups pitted dates ½ cup peanut butter

Mix together and put through food grinder. Roll in finely chopped peanuts, or coconut, or make into flat layer and cut into squares.

DATE CARAMELS

2 cups pitted dates ½ cup walnut meats
¾ cup almonds

Put dates and nuts through food grinder. Roll into flat layer and cut into squares.

FIG AND DATE CARAMELS

2 cups pitted dates chopped walnut meats
2 cups dried white figs coconut

Put dates and figs through food grinder. Add chopped walnuts as you would to any kind of candy, the amount depending upon the taste. Roll in little balls in ground coconut or in finely chopped nuts.

FRUIT NUT PASTE

2 cups pitted dates
2 cups seedless raisins
1 cup seeded prunes
1 cup dried figs
2 cups shelled pecans

Put fruit and nuts through food grinder. Mix well together, form into balls and roll in ground coconut. This paste may be used as a foundation and made into various candies.

PEANUT BUTTER DREAMS

1 cup fruit nut paste
¾ cup peanut butter
pecan and walnut halves

Mix the fruit nut paste and peanut butter together, and put through food grinder. Roll in little balls and press half a pecan or walnut in the side of each ball. Or roll in finely chopped peanuts.

ALMOND SWEETS

1 cup fruit nut paste
1 cup almond butter

Mix together well and roll in ground almonds or coconut.

FRUIT ROLLS

1 cup dates
1 cup black figs
1 cup seedless raisins
ground coconut

Put dates, figs, and raisins through food grinder and roll out in a flat layer. Cover with a generous amount of ground coconut and roll like a jelly roll. Cut in slices.

PRUNE AND WALNUT CANDY

1 cup stoned dates
1 cup stoned prunes
½ lb. walnuts
4 tsps. lemon juice

Put dates, prunes, and walnuts through a food grinder. Add lemon juice and roll into small balls in ground coconut.

APRICOT MARBLES

1 cup sun dried apricots
½ cup nut meats
½ lb. coconut
4 tsps. lemon juice

Put apricots, coconut, and nut meats through a food grinder. Knead, while adding lemon juice. Form into balls measuring from one-half to *i* inch in diameter and roll in grated nuts.

FRUIT DELIGHT

¼ lb. sun dried peaches
¼ lb. sun dried apricots
¼ lb. pitted dates
¼ lb. coconut
¼ lb. pecans

Mix ingredients and run through food grinder. Press mixture into flat pan in a layer about an inch thick. Let stand overnight and cut into squares.

UNCOOKED MENUS FOR ONE MONTH

MONDAY

BREAKFAST: Apricots, almonds, goat milk.

LUNCH: Apple salad, whole wheat bread, gooseberries, green bell pepper, celery juice.

DINNER: Mango delight, ground round steak, alfalfa sprouts, strawberry ice cream, peppermint tea.

TUESDAY

BREAKFAST: Watermelon, sliced bananas with cream, pine nuts.

LUNCH: Salad bowl, cottage cheese, sunflower seeds, cherries, carrot juice.

DINNER: Banana-celery salad, sun-dried strips of beef, sliced yam, uncooked apple pie, clabber milk.

WEDNESDAY

BREAKFAST: Strawberries, sprouted wheat served with milk and honey, almond milk.

LUNCH: Brazilian salad, rye bread, cherimoya, fresh peas, beet cocktail.

DINNER: Fruit cole slaw, T-bone steak, asparagus, apricot marbles, strawberry leaf tea.

THURSDAY

BREAKFAST: Kumquats, pine nuts, date milk.

LUNCH: Rainbow salad, natural cheese, tangerines, pumpkin seeds, fresh maple sap.

DINNER: Honeydew salad, Steak Tartar, celery, uncooked apple pie, alfalfa tea.

FRIDAY

BREAKFAST: Plums, wheat-date bread, almond milk.

LUNCH: Tossed salad, squash seeds, raspberries, bananas, egg-nog.

DINNER: Cucumber salad, fresh halibut, sweet corn, date pudding, sage tea.

SATURDAY

BREAKFAST: Fresh figs, sliced peaches in cream, sunflower seeds.

LUNCH: Spinach salad, orange bread, alfalfa sprouts, sun-dried applies, goat milk.

DINNER: Vegetable-nut salad, beef kidney, summer squash, fruit mixture, buchu leaf tea.

SUNDAY

BREAKFAST: Cherries, sprouted wheat served with milk and honey, coconut milk.

LUNCH: Avocado-pineapple salad, cornmeal bread, celery, cherimoya, buttermilk.

DINNER: Celery-nut salad, Steak Tartar, sweet potato, prune and walnut candy, nettle tea.

MONDAY

BREAKFAST: Wild grapes, chestnuts, banana-nog.

LUNCH: Pepper salad, black walnut bread, avocado, sweet corn, clabber milk.

DINNER: Date-orange salad, beef liver, summer squash, peach ice cream, yarrow herb tea.

TUESDAY

BREAKFAST: Nectarines, wheat germ served with milk and honey, liver cocktail.

LUNCH: Honeydew salad, banana bread, string beans, watermelon seeds, date milk.

DINNER: Tossed salad, beef heart, white potato, peach-berry dessert, squaw tea.

WEDNESDAY

BREAKFAST: Huckleberries, hickory nuts, buttermilk.

LUNCH: Vegetable-raisin salad, coconut bread, strawberries, sun-dried peaches, sunflower seed milk.

DINNER: Apple salad, sea bass, sliced yam, peanut date candy, papaya-mint tea.

THURSDAY

BREAKFAST: Peaches, sunflower seeds, strawberry cream.

LUNCH: Berry salad, goat cheese, lima beans, spinach, energy cocktail.

DINNER: Rainbow salad, ground round steak, fresh peas, uncooked apple pie, peppermint tea.

FRIDAY

BREAKFAST: Cherries, sprouted wheat served with milk and honey, Brazil nut milk.

LUNCH: Avocado-pineapple salad, orange bread, Swiss cheese, broccoli, apple juice.

DINNER: Celery-nut salad, calves' brains, banana squash, fresh peach pudding, nettle tea.

SATURDAY

BREAKFAST: Fresh figs, cherries, sunflower seed milk.

LUNCH: Vegetable-raisin salad, lemon bread, string beans, black walnuts, date milk.

DINNER: Honeydew salad, Steak Tartar, sweet potato, maple ice cream, red clover tea.

SUNDAY

BREAKFAST: Papaya, pecans, Bavarian cream.

LUNCH: Cucumber salad, soaked garbanzo beans, asparagus, mulberries, peanut milk.

DINNER: Avocado surprise, sea bass, uncooked vegetable soup, sun-dried pears, papaya-mint tea.

MONDAY

BREAKFAST: Pineapple, cottage cheese, sesame milk.

LUNCH: Mango delight, wheat-date bread, rutabaga, pumpkin seeds, tomato cocktail.

DINNER: Honeydew salad, beef heart, sugar cane, strawberry ice cream, peppermint tea.

TUESDAY

BREAKFAST: Raspberries, sprouted wheat served with milk and honey, pine nuts.

LUNCH: Tomato-onion salad, soy bean sprouts, chestnuts, sun-dried pears, coconut cream.

DINNER: Tossed salad, lamp chops, white potato, date pudding, goat milk.

WEDNESDAY

BREAKFAST: Papaya, muesli porridge, liver cocktail.

LUNCH: Apple salad, natural cheese, Brussels sprouts, kumquats, carrot juice.

DINNER: Fruit cole slaw, T-bone steak, asparagus, date caramels, shave-grass tea.

THURSDAY

BREAKFAST: Cherries, sprouted rye served with milk and honey, goat cheese.

LUNCH: Fig salad, lime bread, fresh peas, persimmon, buttermilk.

DINNER: Celery-nut salad, tuna fish, sliced yam, sun-dried raspberries, peppermint tea.

FRIDAY

BREAKFAST: Blueberries, dates stuffed with peanut butter, clabber milk.

LUNCH: Tossed salad, lemon bread, cactus apple, pumpkin seeds, coconut cream.

DINNER: Banana-date salad, ground sirloin steak, sweet corn, fresh peach pudding, clabber milk.

SATURDAY

BREAKFAST: Fresh figs, kumquats, coconut cream.

LUNCH: Brazilian salad, whole wheat bread, cheddar cheese, crookneck squash, cranberry cocktail.

DINNER: Apple salad, baby beef liver, sliced beets, orange ice cream, fenugreek tea.

SUNDAY

BREAKFAST: Elderberries, black walnuts, date milk.

LUNCH: Fruit cole slaw, fresh lima beans, spinach, sun-dried apricots, energy cocktail.

DINNER: Avocado surprise, Steak Tartar, sweet potato, honey dessert, alfalfa seed tea.

MONDAY

BREAKFAST : Nectarines, sprouted wheat served with milk and honey, sesame milk.

LUNCH: Salad bowl, black walnut bread, avocado, sunflower seeds, liver cocktail.

DINNER: Banana treat, sea bass, cauliflower, uncooked cherry pie, red clover tea.

TUESDAY

BREAKFAST: Muskmelon, muesli porridge, peach milk.

LUNCH: Banana-celery salad, uncooked vegetable soup, loganberries, squash seeds, clabber milk.

DINNER: Tossed salad, Steak Tartar, kale, prune and walnut candy, buttermilk.

WEDNESDAY

BREAKFAST: Pears, sun-dried apricots, sunflower milk.

LUNCH: Apple salad, strawberry bread, goat cheese, mung bean sprouts, peanut milk.

DINNER: Rainbow salad, porterhouse steak, white potato, raspberry ice cream, strawberry leaf tea.

THURSDAY

BREAKFAST: Wild grapes, sprouted rye served with milk and honey, energy cocktail.

LUNCH: Pepper salad, cottage cheese, strawberries, banana, vitality cocktail.

DINNER: Banana-date salad, ground round steak, broccoli, uncooked apple pie, rose hip tea.

FRIDAY

BREAKFAST: Grapefruit, pumpkin seeds, eggnog.

LUNCH: Vegetable-nut salad, orange bread, cheddar cheese, asparagus, carrot juice.

DINNER: Honeydew salad, fresh halibut, rhubarb, uncooked apple pie, goat milk.

SATURDAY

BREAKFAST: Concord grapes, pecans, clabber milk.

LUNCH: Tossed salad, black walnut bread, fresh peas, canteloup, sesame milk.

DINNER: Avocado-orange salad, Steak Tartar, summer squash, peach ice cream, fenugreek tea.

THE CONCLUDING PICTURE

Modern nutritional science has clearly demonstrated the superiority of raw foods over those which have been heat-processed. Through biochemistry and physiology it has shown the theoretical advantages of consuming raw foods. Through animal experiments involving many thousands of animals, it has demonstrated under controlled observation that animals thrive better on the raw diet. In nature it has noted that freedom from disease is dependent in great measure upon the exclusive use of raw foods. With humans it has been equally successful and has shown how physical development is better, and immunity to disease is higher, in proportion to the quantity of raw food being consumed. In large clinics and sanitariums it has shown that raw foods have specific therapeutic values. And through the science of food selection, and the art of food preparation, it shows how raw food therapy can be applied on the most efficient basis in modern life.

What this all means in terms of human life and survival is easy to understand. Man created his first and primary cause of disease with the discovery of fire and its application in the art of cooking and refining of foodstuffs. In primitive life he employed the less destructive methods of cooking to a moderate degree and thus was able, in some cases, to retain a relatively high degree of physical excellence, though below probable optimum standards. In civilization he has applied the more severe forms of heat-processing to nearly all his foods, and the consequences have been tragic in many ways. Man today occupies the unique position of being the most degenerated mammal on the face of the earth. With a philosophy of medicine that has been developed through the centuries, and the existence of drug and medical facilities which involve directly or indirectly the expenditure of billions of dollars annually, he fails to even approach the

physical excellence which is the norm of the animal kingdom. For this the widespread consumption of heat-processed foods has been largely responsible, as the existing evidence so clearly shows.

But the final outlook is not a pessimistic one. It is indeed optimistic to the highest degree. A return to natural foods—uncooked and unrefined—offers man a future which otherwise would appear only in the realm of fantasy. A sharp reduction in the prevalence of human disease is now possible within the present generation. A definite prolongation in the span of life is also possible within a single generation. And to future generations the future is even brighter. Disease may be reduced to its normal insignificance; life may reach its normal biological limits, and the pathology of senility will be replaced by the normal changes of senescence. Such are the possibilities now before us. They may be reached through an improvement in all of the hygienic phases of our existence. Of these, it is clear that the consumption of raw food is the most important and will do more than any other single factor to improve the biological quality of human life.

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