

MALNUTRITION THE MEDICAL OCTOPUS

JOHN PRESTON SUTHERLAND, M.D., Sc.D.
(hon.)

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By

JOHN PRESTON SUTHERLAND, M. D.
Sc.D. (hon.)

Dean Emeritus of—21 years Professor of Anatomy, and 20 years
Professor of Theory and Practice, in Boston University School
of Medicine—14 years Editor of the New England
Medical Gazette—Past President of the Inter-
national Homoeopathic Congress—since 1923
member of the Editorial Board of the
New England Journal of Medicine
—Member of the Massachu-
setts Medical Society, etc.



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Dedicated

*to my WIFE whose sympathetic coöperation
has made the writing of this book possible.*

“This book has been written . . . for those who are bold enough to understand the necessity, not only of mental, political and social changes, but of the overthrow of industrial civilization and of the advent of another conception of human progress.”

ALEXIS CARREL in the Preface to
“Man, the Unknown.”
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P R E F A C E

In the following pages are set forth views which differ considerably from the commonly accepted ideas and practices concerning diet: views which slowly during a period of more than thirty years, have impressed themselves upon the writer's mind, and which seem to him plausible, rational, logical and in accord also with the revelations of Nature. Chemistry, physiology, medical experience and every day life have all contributed to the formation of these views.

* * *

This book is purposely condensed and suggestive, as the field it covers is so broad as to prohibit detailed treatment of the subjects included.

The writer has endeavored not to introduce matter or ideas or suggestions that might or would lead to useless controversy.

Well intentioned discussion of the ideas advanced may be very helpful in clearing up doubtful points, in establishing the truth, and in deepening impressions made by reading.

All constructive criticism will be gratefully received, and any pointing out of error in argument or statement will be heartily welcomed.

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FOREWORD

Nutrition is the most important function of all living organisms. All living organisms are composed of Protoplasm and its products. Nutrition manifests its results in body-heat, energy, cell-repair and cell-reproduction. Cell reproduction results in growth with its physiological limitations. Reproduction of the individual organism according to Herbert Spencer is "discontinuous growth." Irritability, contractility, locomotion and other properties of protoplasm are of great importance, but the vital property, the *sine qua non* is Nutrition; which means the taking into the organism substances from the organic or inorganic kingdom or both, and after a decomposing or splitting up process recombining the elements into the cells and tissues of the organism itself, or utilizing these elements in producing and liberating heat and energy, thereby sustaining its various functions.

Man, so far as is now known, is characterized by being subject to a greater variety and number of diseases than any other form of life. Being the highest form of life created on this planet; being capable of intelligent observation and of reasoning therefrom, and of storing up and utilizing his accumulated knowledge, it certainly is not to his credit that he should be such a sickly creature and find it necessary from the earliest moment to the end of life to seek and employ means to combat disease.

It is legitimate to ask, why should this marked difference exist between Man and the other forms of life? What is there in Man's life that produces so much sickness?

Disease is an end result, a something that happens after some disquieting influence has affected the body. None know better than members of the medical profession that they are bending practically all their intelligence and faculties to the treatment of end results. Here and there is an individual who is studying *causes*, but humanity as a whole is not yet deeply interested in causes. The cause has little attraction to the average person if only the results can be escaped—All of which is concisely put in the aphorism, “Thousands are hacking at the branches to one who is striking at the roots.”

Man is without question a Something more than a mere body of flesh and blood, a mass of protoplasm governed by reflexes and instincts. Even the untutored are convinced that Man is a Something very different from the rest of the animal kingdom; that he differs essentially from other mammals and even primates in his mental capacities, in his ability to form concepts and of applying them to his life, his every day activities. The greater pity and disgrace is it, therefore, for Man to be subjected to such an almost unlimited number of diseases.

THE VIEW POINT

Illustrations and arguments are not needed to show that one's point of view is of vast importance in determining what is actually seen. This applies to watching a parade or a ball game, seeing a street accident or considering an intellectual, physical, moral, social, philosophical, or scientific problem.

The view point of the writer, in-so-far as diet is concerned, may be summarized as follows:

- I. Protoplasm is the physical basis of life.
- II. Nutrition is an indispensable function of protoplasm if not the chief and most important.
- III. Nutrition is a delicately balanced biologic-chemical process definitely established by Nature, ages before Man knew anything about chemistry or biology.
- IV. Man, therefore, would show wisdom by studying and interpreting Nature's processes and applying the knowledge thus obtained to the Nutrition of his race.
- V. It is now known that unbalanced diets are capable of producing many disorders or illnesses,—Beri-beri, Pellagra, Rickets, Scurvy and Diabetes, for instance. Research workers are demonstrating this truth daily.
- VI. It is a disgrace that Man, the only potentially rational creature on the face of the earth, should be the sickliest.
- VII. The more civilized mankind has become, the greater the prevalence and variety of disease; that is, the more diseased mankind has become.

- VIII. It is rational to assume that the first men were innocent, simple, happy, healthy creatures and like other animals lived natural lives in accord with Nature's planning.
- IX. Coincidentally with the acquisition of knowledge and the development of "civilization," perversions of appetite led to a departure from the natural diet.
- X. As a viewpoint, therefore, it is here assumed that the majority of diseases are due to errors in life, among which dietetic errors are of supreme importance.

CHAPTER I

PRENATAL LIFE

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MALNUTRITION THE MEDICAL OCTOPUS

CHAPTER I

PRENATAL LIFE

"Poorly nourished cows often give birth to weak, puny calves which are hard to raise. The feeding of the calf, therefore, begins before it is born. The food elements necessary for the development of the calf are taken into the stomach of the cow, digested, assimilated, and transmitted to the calf through the umbilical cord, the connection between the mother and the calf. It is evident that if the cow does not receive food enough to keep herself in thrifty condition and at the same time develop her calf, the calf may suffer. In endeavoring to raise good, thrifty calves, many dairy-men handicap themselves at the start by not properly feeding the pregnant cow."

Such is the opening paragraph of the U. S. Department of Agriculture's Farmer's Bulletin No. 1336, which gives instruction in the "Feeding and Management of Dairy Calves and Young Dairy Stock." Special comment is unnecessary for "he who runs" may see at a glance the vitally important lesson to humanity to be found in the short, very practical and common-sensed paragraph quoted. The quotation is a truism that is as applicable to the human as to the bovine family, and

thrice blessed and fortunate are they who will take that lesson home to their hearts and apply it to their lives.

In the Journal of the American Institute of Homœopathy for September, 1923, on p. 266 may be found the following significant statistics:

"The annual number of uterogestations in the United States approximates 2,650,000: from this number 15,000 maternal lives are lost, and additional thousands left with impaired health. 150,000 mothers give birth to full term dead babies and during the first four weeks of infant life another 115,000 die. How are we going to lessen this unnecessarily high mortality rate? First, by stimulating the enthusiasm of physicians for increased prenatal work."

Within recent years the vital importance of prenatal life has been appreciated by a portion of the medical profession and an encouraging proportion of the laity, and prenatal clinics for the examination and instruction of expectant mothers have been instituted in all up-to-date hospitals, dispensaries and maternities, with results which quite justify their existence.

It is being realized in these days of eugenics that a woman is not necessarily fit, physically and otherwise, to be a mother, to bring healthy, happy children into the world, simply because she is a woman. Something very much more is needed.

Physically the most important period of the individual life is that which is spent *in utero*, for during that period all the foundations are laid, the tissues and organs are formed and cellular activity is at its highest. Not only the skeleton with its connective tissues, muscles and the enveloping skin, the heart, lungs, liver, spleen, kidneys, and the wonderful organs of sense; the eyes with the marvelous retina, the ear with its astonishing series of tympanic membrane, ossicles, and cochlea; the little known but most interesting endocrine glands;

the blood; the brain and the nervous system; all these wonders and more, are perfectly outlined and fashioned during the nine months prior to birth. A veritable miracle and beyond comprehension!

Let it be remembered that the beginning of the individual's physical organism is just a minute mass of protoplasm approximately .2 millimetre or $1/125$ of an inch in diameter. This potentially is the individual. Everything that comes later is simply the result of the changes which take place in that single cell; viz. cell multiplication, cell specializations and combinations, with their secretions and excretions; all contributing step by step in orderly sequence, till the perfectly formed creature is made. And all these different steps are absolutely dependent upon nutrition *and the nutrition is wholly dependent upon the mother*. The original cell, and all succeeding ones, must be supplied with the suitable variety and quantity of nourishment (food) in order to do its work satisfactorily. The cells are tissue and organ-builders and must be supplied with good and proper material in order to do good work. An architect cannot build a house if he has only men to work with; each man must have just exactly the right material from which to make the chimney, the walls, floors, windows, doors, etc. which are essential to a well constructed useful house. Naturally it is so with the tissue and organ-builders of the body. They individually must have just exactly the right kind of material (food) from which to construct the body as a whole.

Nature has made wonderful provision for all of this. In the human family it is intended that the maternal structures shall directly, without the intervention of any special apparatus, furnish nourishment to the primitive single-celled organism which is the potential child, as the child is the potential man; but very early in uterine life a peculiar mechanism is formed through which

there passes from the maternal blood-stream to the embryonic or fœtal blood-stream those nutrient materials which form the food of the developing child. This mechanism is called the placenta and is developed partly by the mater and partly by her offspring. This placenta acts to the child in the double capacity of pulmonary and intestinal mucous membranes, being chiefly absorptive though partly eliminative in function. That is, food is taken into the mother's stomach, is digested and absorbed into her own bloodstream, which carries oxygen and the food material modified by her own digestion to the placenta, from which the fœtus absorbs the materials to be used in building its own tissues and organs, or body, and which carries away to the maternal organs of elimination certain waste materials which result from the chemico-physiological activities of the rapidly growing fœtus. It should be distinctly understood that the mother does not give even a drop of her own blood to the child. The latter forms all its own blood (leucocytes, discs and all) from the food material supplied through the placenta.

But the mother can give only what she possesses. She must have in order to give, and she must acquire in order to have or possess. Therefore in her bloodstream must be found not only the suitable amount and proportion of lime, iron, potassium, sodium, phosphorus, nitrogen, and the other elements needed to keep her own bodily tissues and functions in good condition, but an additional supply of all these materials, properly balanced, from which the fœtus may draw its needed nutriment. If there be too much nitrogen or carbon or other chemical element in her own blood there is trouble as a result in her own and in the fœtal organism. Or if there be an insufficient amount of iron or lime or other needed material, there is a proportionate deficiency of these materials in both mater and child. It should be intelligently realized that the health and well-

being of both mother and child absolutely depend upon the rational and balanced diet of the mother; and it should never be forgotten that neither the mother nor the child can make iron from lime, or nitrogen from oxygen or other chemical element; that these materials and their combinations must be included in the food, otherwise there is a mischievous deficiency.

Unfortunately just what a rational and well balanced ration is can be discussed indefinitely, there are so many opinions on the subject. A helpful lesson, however, may be drawn from nature.

In the vegetable kingdom the seed has a "germ" or germinal area plus enough food material to keep the germ active and growing until structures have developed which enable the plant to draw its sustenance from mother earth.

Among birds (take the chick for example) the egg contains in addition to the small germinal area a relatively large amount of food, well balanced, in the yolk and white, and enough oxygen in the air chamber, so that by the time all the food is consumed the chick is formed and active and ready for its début.

Among mammalia, however, the offspring is dependent wholly upon the mater for food and protection during the entire intra-uterine period of existence, "pregnancy" being universal among the mammalia only.

The non-human mammalia live, governed by instinct, a simple life on a diet of limited variety furnished by nature. The human species as a rule lives on a mixed and artificial diet, being guided by whims, fancies, traditions, customs, fads and theories, with sometimes a little intelligent experience which stands for knowledge.

The sub-human mammalia go through their pregnancies with apparent indifference, ease and freedom from the long list of sufferings and dangers so common in the human family.

The diet of the animal is as nature furnishes it, whereas the diet of the human family during pregnancy and at other times, is as unnatural as man's ingenuity and unintelligent art can make it. Scarcely an article of man's food is as nature produces it. Practically everything is modified by milling, preparation, cooking, preservation, etc.; by the abstraction or addition of something, all of which manipulations have undoubtedly assisted in producing results as follows:

- I. Pregnancy, a perfectly natural physiological condition, has become among civilized people a period of suffering and danger.
- II. The birth of a child is often a difficult task accompanied by much suffering and real danger to the life of both mother and child.
- III. Too many babies are born puny and feeble, and lack the vigor and sturdiness that should mark the beginning of life.

The fact should be emphasized, and everybody should understand, that the mother's chief task during pregnancy is to furnish a suitable quantity and variety of food to the developing child within her; that the mother simply has to feed the fœtus and therefore must pay particular attention to her own diet; that no organic connection exists between mater and child except through the placenta; that the physiological connection is, in a word, dietetic. The psychology of pregnancy is not under consideration.

One would not expect a fine woolen mill equipped with the best machinery and amply supplied with workers to produce first class woolen goods if only shoddy or cotton yarn were supplied to the workers. "Impossible," every one would say. But women expect to bear first class healthy children when the tissue-builders of these children, that is, the nucleated protoplasmic cells of

the body, are given shoddy material (imperfectly balanced foods) with which to work. Sentiment and psychology aside, the building of healthy bodies during prenatal life is simply a question of feeding—*correct feeding for mothers*; and nature has furnished an ample variety of well balanced foods for the purpose.

Undoubtedly the natural forces, which since the beginning of Time have been bringing countless generations of human beings, mammalia and other forms of life into existence, can be consulted on this all important matter of food during prenatal life with greater confidence than can any of our bio-chemists, physiologists, or obstetricians whose dietetic knowledge is the result of tradition and "generalization" rather than the result of extensive and wise research investigations.

Undoubtedly again, Nature, the force which prepared the earth for Man's habitation before Mankind came into existence, if honestly and humbly interrogated, will furnish innumerable suggestions as to what maternal diet is suitable during this period of prenatal life.

And further, all forms of living things have been amply provided for, and the highest of the animals, man only excepted, take intuitively the foods nature has prepared for them without modifications; and, if not "domesticated" *i.e.* made to live artificial, man-ordered lives, they go through pregnancy and life without the dangers, diseases and sufferings so characteristic of man's experiences.

A diet, then, that will furnish all the carbohydrates, proteins, mineral salts, vitamins and fats needed by the mother for her own nourishment and for the nourishment of her unborn babe may be obtained from seed wheat, seed rye, honest "cracked" and ground wheat, rye, corn, oats, barley and buckwheat; from brown or natural rice; from unbolted corn meal and rye meal and those breakfast cereals made without demineraliz-

ing the grains; from real whole wheat macaroni and spaghetti, and from breads made from whole grain, un-screened meals and flours such as shredded wheat and muffets, "ry-krisp" and Swedish health breads, Scotch oat cake, brown-bread and corncake;—from the wide variety of vegetables Nature has so lavishly provided for Man's use according to the season of the year, such as white potatoes (baked and eaten with skins), sweet potatoes, carrots, parsnips, beets, turnips, squashes, corn, peas, beans of all sorts; the "greens" such as lettuce, water cress, endive, spinach, broccoli, sprouts, cabbage (raw or cooked), beet-tops, dandelions, asparagus, cauliflower, chard, marrow, egg plant, artichokes, mushrooms, etc.—and the wonderful variety of berries and melons and fruits available practically throughout the year; and from peanuts, domestic and Italian chestnuts, pecans, almonds, cashew nuts, Brazil nuts, walnuts, etc.; all of which offer much wholesome and strength giving food in concentrated form.

These foods may be taken singly or in mixtures to suit individual tastes and desires:—in the form of porridge, or gruels, or "breakfast cereals," or breads, or soups, purees, stews, chowders, sautees, salads, compotes, and simple desserts, etc. in great variety. A little intelligent thought and initiative will enable one to prepare attractive, palatable and nourishing meals without thought of calories, or proteins or acid or alkaline forming foods, sweets, acids, starches and the many fads and ideas that are so common at the present time. Many of these foods may and possibly would better be taken in the raw, dried, or dehydrated state as is the case with all of the fruits and berries (which are injured by cooking), and many of the vegetables which convention now permits to be taken raw. At all events care should be taken that none of the foods are demineralized or devitaminized by over cooking.

Fireless cookers, waterless cookers, steam-pressure

cookers and other modern methods carefully used, prevent this injurious demineralization to a marked degree, if not wholly.

From these natural foods endless combinations and palatable variations may be made, and eating thus rationally, the result will be a strong maternal body able successfully to carry the extra burden of pregnancy and parturition and the subsequent lactation. Moreover the altogether too common and frequent obstinate tribulation known as "morning sickness" would be a thing of tradition only, for under natural conditions pregnancy is a physiological state, and pathological intrusions would be repelled by a normal, healthy and vital body.

Certain dietetic prohibitions are all important if a balanced ration is to be obtained, perhaps the chief prohibitions being the absolute avoidance of white flour in any form or combination and also the avoidance of commercial or artificially treated sugar in anything or upon anything. Starch is needed in human food; and so is sugar; but Nature has supplied all the starch that is needed in whole wheat, in corn, rice, oatmeal, potatoes, beans, peas, squash; even in bananas, and in very many other forms of grains, vegetables, nuts, etc. And sugar is found almost universally in fruits and vegetables. Onions, rhubarb, lemons and cranberries for instance, contain sugar, while raisins, prunes, figs, dates, squash, parsnips and beets, contain it in large quantities. Nature knows what she is about, and wise is that human who heeds her advice. These two prohibitions which include many forms of breads, cookies, doughnuts, cakes, pastries, pies, puddings (most desserts in fact) jellies, jams, preserves, marmalades, ice cream, confectioneries and candies, present a list which is partial only and incomplete. It seems formidable, however, but it deals with artificial products, irrationally made by man; all

of them demineralized or devitaminized or in one way or another unbalanced by manipulation.

In 1885 a book was written with the intention of its serving as a guide to the rational and intelligent care of women during pregnancy. The book carried the unique title of "Tokology." Among many excellent ideas advanced by its author (Dr. Alice B. Stockham) was the suggestion that pregnant women got on much more comfortably during their pregnancies and had far easier deliveries on a vegetarian than on the ordinary mixed diet. Moreover the babies seemed to thrive most satisfactorily during prenatal and postnatal life. There is considerable confirmatory testimony to this idea but statistics on any large scale are not available and the subject must be left *sub judice*.

Dr. Percy R. Howe in 1922, in a paper "Decalcification of Teeth and Bones, and Regeneration of Bone through Diet," p. 9 of reprint, refers to some of his experiments on pregnant guinea pigs, stating that the use of a scorbutic diet, *i. e.* one containing an excess of carbohydrates, "resulted, in a number of cases, in the absence of eyes in the young. I have had several animals born with only one eye, or one good eye, and the other sightless or imperfectly formed. Many are born with spots on the outer coating of the eye, which clear up under proper feeding."

"In animals on the scorbutic diet, eye trouble follows even to the point of pus welling out over the eye during eating. Feeding orange juice is followed by complete clearing up of the trouble."

This quotation is presented simply because it is illustrative and suggestive of the troubles that may be produced in the offspring by a wrong diet on the part of the pregnant woman. All the possibilities are by no means included in the brief quotation from Dr. Howe. It surely would seem to be well worth while for the

medical profession and the laity intelligently to consider and adequately to study the all important subject of *prenatal feeding*.

CHAPTER II

MILK—ITS COMPOSITION AND PURPOSES

- I. There is no authority except *facts*.
- II. *Facts* are obtained by accurate observation.
- III. Deductions are to be made only from *facts*.

HOWARD W. HAGGARD,
Associate Professor of Applied Physiology, Yale.

CHAPTER II

MILK—ITS COMPOSITION AND PURPOSES

Milk is a secretion formed in the mammary glands of females of all mammalia. It has a definite chemical composition according to the species of mammal secreting it. From the chemical standpoint it is composed of water, fat, sugar, proteins, and unknown ash and vitamins. It is evidently intended to be the only food for the young of all mammalia for a more or less definite period of time, the length of time varying with the species. When this period is reaching or has reached its appointed limit, the secretion gradually ceases and the offspring finally gets no more milk. By this time the young mammal, without much oversight or assistance, is able to obtain for itself that particular food Nature has provided for it. This is true of all mammals except the young human being. Under normal conditions the human infant is wholly helpless when the period of weaning has arrived, and is absolutely dependent upon older humans for the selection, preparation and administration of its food. The vast importance of this difference between the other mammals and man is not deeply or widely recognized. When it is, and when parents and those into whose care and upbringing the human infant is placed appreciate the incalculable responsibility which rests upon their shoulders in the selection of the proper food for the helpless child, it will be a blessed and most fortunate thing for the human race.

Animals, not mammals only, are guided in all their acts by what is called Instinct. That is, animals auto-

matically select their food from their environment, without instruction or experience, without reason or deliberation or hesitation. A natural impulse, for which they are in no way responsible, impels or guides them to eat those things by means of which the functions of living things . . . nutrition, growth and reproduction . . . can be successfully carried on.

The human body, as a mechanism, is simply an animal body. In its chemical composition, in its anatomical structure, bones, connective tissues, muscles, blood, the nervous system and organs generally; and in its physiological activities . . . nutrition, growth, reproduction . . . it is governed by the natural laws, impulses and influences which govern other forms of life; and the majority of its activities are automatic, reflex or instinctive; that is, these activities during its very early life, are not dependent upon the will, or education, or intelligence or reason, or any act of the mind.

Man, however, has been granted rationality, and potentially man is a rational being. He has the freedom to choose to do things. And happy is he and fortunate, if his choice is the result of wisdom and knowledge, and desire to know and to do the right thing. The further development of the human race depends upon the absolute subordination of instinct to rationality, but mankind as a whole has a long road to travel yet, before the race becomes truly and wholly rational.

It is man's privilege and ability to acquire knowledge, and by a long and complicated process man has learned much about his earthly environment. He has learned to apply his knowledge of chemistry, among other things for instance, to the study of milk, and he has found that the milk of no two species wholly agrees in its composition.

It is claimed mammals first appeared on the earth in the tertiary period, geologically speaking. According to the classification now almost universally current

there are about 150 families, nearly 1000 genera; and living species reach about 3250 in number, and each species has its own particular kind of milk. Naturally milk made its first appearance with the evolution of mammals during the tertiary period, and as no two species are just alike physically, and as the differences between the extremes are startlingly great, as for instance the hippopotamus, the elephant and the whale at one end, and the white mouse, the guinea pig, the chipmunk at the other, so the differences in the milk of the various species are significantly striking. The milk from all species has not yet been analyzed, but such milks as have been examined show remarkable dissimilarities.

It is reasonable to assume that because milk is the only food for mammals, each species after its kind, during the period of earliest post-natal development, it must be composed of all the chemical elements necessary to be transformed into the bones, blood, muscles, glands, organs and all the tissues generally of the species, and also in just the right proportions for the particular species.

It is also reasonable to assume that all the necessary chemical elements in just the needed proportions must be in *normal* maternal milk, because it is the only food the offspring gets during the earliest months of its life; and the animal body, in fact even the plant, *cannot create* any chemical element, any mineral or mineral salt. It should be fully recognized that even the highest form of mammalian life cannot *create* lime or potassium, or iron, or hydrogen, or oxygen etc. All it can do . . . and this is one of the great marvels of life . . . is to split up the chemical combinations which are found in its food and recombine these elements into the tissues of its own organism.

These same general facts may be observed in the reproduction of the ovipara, . . . birds, which instead of feeding their young upon milk during what corre-

sponds to the prenatal or post-natal periods of life, furnish in the egg all the food the germ needs for its complete organic development. That is, the egg contains with the possible exception of oxygen, all the chemical elements, or in other words, all the food the bird needs to grow into a robin, a swallow, a titmouse, a crane, or eagle, hawk or chicken, etc. as the case may be. In some cases, the gallinaceæ for instance, the newly hatched bird needs but little training to learn to scratch, search for and obtain its own food, and to seek shelter from its enemies. It easily can be observed and proven by incubating eggs, that chickens, ducks, pheasants, partridges etc. immediately after hatching are prepared organically and by instinctive forces to seek and obtain their needed food and protection. On the other hand song birds and birds of flight are not quite independent on being hatched (or born). They need parental care, oversight and protection, and must be provided with their food, for a length of time corresponding physiologically to the nursing period of mammals.

With the fish (excepting the mammalian whale, seal, walrus, etc.) the general rule of development is from the egg which is laid in large numbers (spawn) fertilized and left to the tender mercies of tides and other watery environment. With the laying and fertilizing of the eggs the care of the parents generally ends. With rare exceptions no parental care, oversight, instruction, provisioning or protection is bestowed upon the individual young. The food for its early development is found in the spawn.

A lesson in regard to milk may be drawn even from a study of the growth of plants. One point and illustration only need be used. Corn for instance grows from the germinal end of the grain or kernel. There is enough food, and just the right kind and quantity, furnished the germ in the contents of the kernel to give it a start in life, after which it is dependent upon the

soil in which it is living, for its necessary food. It is common knowledge that the soil in which the corn is planted must contain the elements needed by the plant to develop ultimately the rich and attractive corn cob with its full and edible and nourishing grain. Much depends upon the soil itself. The plant cannot *create* oxygen, or nitrogen, or carbon, or hydrogen, or sodium or anything else. It can and does utilize the elements given to it by soil, by water, surrounding atmosphere and solar radiation; and by combining these elements form starch, sugar and fat, and the proteins and mineral salts etc. found in the matured grain. Minus these things in the soil and atmosphere, and the corn crop makes a poor showing.

Milk therefore, must be looked upon as a highly specialized food made for a very specific purpose. This idea is amply substantiated by the analyses that are presented in the accompanying tables. These analyses, made by competent and recognized authorities, are here offered for study: sub-human first, followed by analyses of human milk, contrasted at times with cow's milk which is so universally used in America.

The questions involved are numerous and important, vital and comprehensive, and are not to be settled definitely by percentages and analyses. Nevertheless these tables furnish a basis of facts for helping to settle the "questions involved" and as such deserve the most careful scrutiny and study.

TABLE I

1000 parts of milk by weight contain:
 (Percentages may be obtained by moving decimal point one
 figure to left)

Animal species	Casein	Albumin	Total protein	Fat	Sugar
Dog I	48.0	26.4	74.4	116.2	32.4
Dog II	48.4	24.3	72.7	121.9	32.3
Cat I	37.9	33.0	70.9	44.9	47.9
Cat II	37.9	31.1	69.0	48.0	48.0
Cat III	36.9	32.9	69.8	49.8	47.1
Cat IV	35.9	34.9	70.8	47.6	48.2
Pig I	37.6	14.5	52.1	95.4	33.0
Pig II	32.6	15.5	48.1	70.9	34.4
Pig III	37.1	16.5	53.6	63.2	31.9
Pig IV	—	—	74.5	129.6	35.3
Sheep	40.8	08.0	48.8	92.9	50.4
Goat	29.1	07.6	36.7	43.3	36.1
Calf	29.0	05.0	34.0	37.0	49.5
Buffalo	42.6	04.6	47.2	72.1	47.7
Llama	30.0	09.0	39.0	31.5	56.0
Camel	34.9	03.8	38.7	28.7	53.9
Reindeer	83.8	15.1	98.9	170.9	28.2
Horse	13.0	07.5	20.5	11.4	58.7
Zebra	—	—	30.3	48.0	53.4
Esel	07.9	10.6	18.5	13.7	61.9
Mule	—	—	26.3	19.2	56.9
Elephant	—	—	34.5	205.8	71.8
Rabbit	81.7	22.1	103.8	167.1	19.8
Guinea Pig	46.0	04.9	50.9	73.1	23.1
Guinea Pig II	47.9	06.1	54.0	69.6	20.2
Whale	—	—	94.3	194.0	—

TABLE II

The following table taken from König shows marked differences from Table I in the analysis of dog's milk, especially in the protein and fat content, whereas they are very close in their estimate of the sugar content. They differ also as to the protein and fat content of cat's milk, and practically agree as to the sugar content. They are in rather close agreement as to the protein and fat content of goat's milk but do not agree by quite a good deal as to the sugar content. There is considerable disagreement as to proteins, fats and sugar contained in sheep's milk; and there is quite close agreement as to all these compounds as found in cow's milk. There is close agreement also in the analysis of horse's and ass's milk, but there are wide differences in their estimates of the contents of pig's milk, although it is to be noted that in Table I four analyses of pig's milk vary astonishingly. Again there is a fairly close agreement as to the protein and fat content of elephant's milk. The uninitiated may marvel at these disagreements among scientists and feel inclined to put aside as valueless the reports of their analyses. Others will explain the differences as due to "personal equation" or technique. The seeker for real facts will tentatively accept the points on which there is agreement and hold the others for further investigation.

PARTS PER 1000

Milk of	Water	Solids	Proteins	Fat	Sugar	Salts
Dog	754.4	245.6	99.1	95.7	31.9	7.3
Cat	816.3	183.7	90.8	33.3	49.1	5.8
Goat	869.1	130.9	36.9	40.9	44.5	8.6
Sheep	835.0	165.0	57.4	61.4	39.6	6.6
Cow	871.7	128.3	35.5	36.9	48.8	7.1
Horse	900.0	99.4	18.9	10.9	66.5	3.1
Ass	900.0	100.0	21.0	13.0	63.0	3.0
Pig	823.7	176.3	60.9	64.4	40.4	10.6
Elephant	678.5	321.5	30.9	195.7	88.5	6.5
Dolphin	486.7	513.3	—	437.6	—	4.6
Whale	698.0	302.0	94.3	194.0	—	9.9

TABLE III

100 parts of Milk by weight contain in grams

Species	K ₂ O	Na ₂ O	Cl	Fe ₂ O ₃	CaO	MgO	P ₂ O ₅
Man	0.0795	0.0253	0.0468	0.0008	0.0489	0.0065	0.0585
Dog	0.1382	0.0779	0.1656	0.0020	0.4545	0.0195	0.5078
Pig	0.0945	0.0776	0.0756	0.0040	0.2489	0.0157	0.3078
Sheep	0.0967	0.0864	0.1297	0.0041	0.2453	0.0148	0.2928
Goat	0.1302	0.0617	0.1019	0.0036	0.1974	0.0154	0.2840
Calf	0.1176	0.0972	0.1368	0.0021	0.1671	0.0231	0.1011
Horse	0.1050	0.0140	0.0310	0.0020	0.1240	0.1030	0.1310
Guinea Pig	0.0754	0.0700	0.1999	0.0013	0.2417	0.0241	0.2880
Rabbit	0.2516	0.1980	0.1355	0.0020	0.8914	0.0552	0.9966

(Those who are not familiar with the chemical symbols used in table III, may like to know that K₂O, Na₂O, Cl, etc., stand in general for potassium, sodium, chlorine, iron, lime, magnesium and phosphorus; all of which are absolutely necessary to support normal mammalian life.)

TABLE IV

Analyses of the ash of human milk

	A	B	C
K ₂ O	0.780	0.703	0.884
Na ₂ O	0.232	0.257	0.357
CaO	0.328	0.343	0.378
MgO	0.064	0.065	0.053
Fe ₂ O ₃	0.004	0.006	0.002
P ₂ O ₅	0.473	0.469	0.310
Cl	0.438	0.445	0.591

Analyses A and B by Bunge

Analysis C by Soldner & Camerer

Analysis A, 14 days after delivery (very little NaCl in diet for 4 days previous to analysis).

Analysis B, 3 days after daily addition of 30 gms. NaCl to food. Comments on tables three and four, as to the mineral salts found in the ash of human milk, might be made, similar in character to those found in connection with tables one and two concerning the mineral content of whole milk.

TABLE V

Percentage Composition of the Ash of Milk

	CaO	MgO	P ₂ O ₅	Na ₂ O	K ₂ O	Cl
Human	23.3	3.7	16.6	7.2	28.3	16.5
Cow	23.5	2.8	26.5	7.2	24.9	13.6

Holt, Courtney & Fales
Am. Journ. Dis. Children 10, 229, 1915

According to table V there is decidedly more magnesium, phosphorus, potassium and chlorine in human than in cow's milk, and as the figures represent work done by the same investigators it is fair to accept them as accurate since the personal equation and technique were identical.

TABLE VI

Composition of Milk (% of whole milk). Normal variations from beginning of 2nd month of lactation.

Meigs and Marsh

	Cow	Human
Water	87.0	87.5
Solids	13.0	12.5
Protein	4 to 2.5 (1)	1.5 to 0.7
Fat	2 to 4	2 to 4
Sugar	3.3 to 5 (1)	6 to 7.5
Ash	0.6 to 0.7	0.2 to 0.3

(1) Protein starts high and decreases.
Sugar starts low and increases.

TABLE VII

Percentage Composition of Human Milk by Periods

Period	Fat	Sugar	Pro- tein	Casein	Albu- min	Ash	Total Solids
Colostrum (1-12 days)	2.83	7.59	2.25	—	—	0.31	13.4
Transition (12-30 days)	4.37	7.74	1.56	—	—	0.24	13.4
Mature (1-9 months)	3.26	7.50	1.15	0.43	0.72	0.21	12.2
Late (10-20 months)	3.16	7.47	1.07	0.32	0.75	0.20	12.2

Holt, Courtney & Fales
Am. Jour. Dis. Children 10, 229, 1915

It must be borne in mind that all of these analyses have been made of milk from the ordinary run of domestic animals and unselected human beings and not from ideal or specially selected cases.

TABLE VIII

Time required from the day of birth to produce 100% increase in weight.

Species	Days
Man	180
Horse	60
Calf	47
Goat	22
Sheep	15
Pig	14
Cat	9½
Dog	9
Rabbit	6
Rat	6 to 8
Mouse	4 to 6

Attention here must be called to the rapid doubling of the weight of the calf in contrast with that of (man) the human infant, even presumably when the latter has been fed on cow's milk, as is the calf.

This rapidity of growth differentiates all the animals included in the table from man.

It is common knowledge, however, that the natural length of life of these animals, in no instance equals the length of the human life. Here again is a fact worthy of thought.

It should be borne in mind that the chemist can go in analytical work only as far as present day knowledge can carry him. It was only a few years ago when the number of chemical elements reached only approximately 30, whereas today chemists recognize the existence of 98 and the probability is that other elements will be added to the list as man's knowledge of nature increases. Vitamins, for instance, concerning which people speak with a fluency and certainty suggesting the possession of intimate and positive knowledge, are unknown and as yet unidentified things, although they were discovered and named by Prof. Funk in 1912 and have been subjects of intensive investigation ever since. Unquestionably they are chemical elements or combinations of elements, but more delicate methods of analysis than the chemist yet possesses will be needed to reveal their true nature; and it is not at all impossible that other things, at present undreamed of, will be revealed in milk and other foods by methods of analysis to be developed.

In the meantime it is unnecessary to know to the ultimate detail the exact composition of milk. Enough is now known beyond any reasonable doubt to show,

- I. That each species of mammal has its own very definite and very exact kind of milk differing more or less from the milk of all other species.
- II. That the secretion of milk under natural or normal conditions continues for a fixed period.

- III. That during this period it should be the only as it is the *perfect food* for the particular mammal.
- IV. That when this period of natural lactation terminates, Nature provides no more milk for the species, and
- V. Therefore when this physiological and wholly natural weaning period has passed it is unnatural to make use of milk as a food;
- VI. That is, when the weaning period has arrived the individual of the species has reached a point of development wherein no more milk is needed, and the time also has arrived for the individual to use the ordinary food provided for the adult of the species.

All this applies to the human family quite as explicitly as to other forms of mammals, for man, once more, is anatomically and physiologically simply a mammal, subject to the laws which govern the development of other mammalian bodies.

It may perhaps profitably be noted in passing that Man is the only mammal to make use of milk voluntarily and intentionally after the natural period of weaning has passed: that the generous use of sub-human milk during childhood and youth is characteristic of Man; and that the adult, in civilized countries at least, drinks milk and uses milk in custards, cakes, pastries, puddings, soups, chowders, ice cream etc. with unrestricted freedom.

It may be pointed out as a fact that Man is the only mammal that habitually drinks and uses as food the milk of a decidedly inferior animal (cow, camel, goat, ass etc.) and certainly no one, not even the milk consumer, producer or dealer, will claim that these animals are on an equality with themselves, that is with Man, the crown of creation!

It is also worthy of note that according to census re-

ports (1928) 27% of the money spent for food in the United States is spent for milk and milk products; and Man, civilized and uncivilized, with all his æons of experience, with all his centuries of accumulated knowledge and his possibilities of rationality, is the sickliest of all mammals or even of all forms of life.

It may not be rational to draw definite conclusions from the facts just presented, but it is reasonable to imagine that there may be some direct connection between the milk-drinking and dietetic habits of mankind just referred to, and the pathetic prevalence of the diseases of early life, and the varied physical and mental ailments and deficiencies of later life. Detailed consideration of these possibilities would be out of place in this connection.

A calm and unprejudiced observation of Nature's provisions and methods of procedure in the rearing of offspring, and a logical interpretation of Nature's purposes based on such observations, once more, would seem to lead to the conclusion that Nature did not intend any animal to use milk as food after the period of weaning;—that the use of milk by human beings after this period is in defiance of one of Nature's decrees, for Nature does things in strict accordance with law and order, and there is a purpose in all her methods and acts.

A brief survey of the customs of humanity shows that different races and nationalities obtain their supply of milk from different animals. Some of these milks have been analyzed and the analyses of all but one are included in the preceding tables. According to Prof. Langworthy of the United States Department of Agriculture as shown on a poster exhibited at the Massachusetts Institute of Technology in one of the laboratories,

In Thibet	the milk	in general	use is	obtained	from the	Yak
" Arabia	" " "	" " "	" " "	" " "	" " "	Camel
" India	" " "	" " "	" " "	" " "	" " "	Water Buffalo
" Peru	" " "	" " "	" " "	" " "	" " "	Llama
" Lapland	" " "	" " "	" " "	" " "	" " "	Reindeer
" Persia	" " "	" " "	" " "	" " "	" " "	Sheep
" the U. S.	" " "	" " "	" " "	" " "	" " "	Cow
" Italy	" " "	" " "	" " "	" " "	" " "	Goat

Reference to the analyses presented are convincing as to the recognized differences in the quantity of sugar, of fat and of protein found in these milks; notice in table I for instance, the very marked variations in the protein, fat and sugar content of the milk of the llama and the reindeer. These and other differences may be explained, satisfactorily perhaps, when one thinks of the climatic and general environmental influences these animals are subjected to, but in what ways are human being affected by these influences? And what are the physical, mental and spiritual effects on human beings of using these milks as food, especially during the early developmental period of life? No one will claim that the physical, intellectual and psychic possibilities of man are on the low plane of the llama or the reindeer; and it would seem rational to assume that the human being (infants especially) needed a very different and much more highly specialized food for the development of their physical and psychic possibilities; and this idea is supported by the universally recognized fact that the milk of the average healthy, normal human mother is very different from the milk of these and also other animals.

These various facts furnish food for very serious thought.

Possibly minor considerations are suggested by a study of these variations in the milk produced by different animals, among which are the following:

- I. Man's body being made of food is therefore no better balanced than the food he eats.
- II. Man cannot make a silk dress from a piece of flannel: neither can he build a fire-proof house by using inflammable and explosive material in its construction. Therefore he must have suitably sound, properly balanced, rational food wherewith to make a sound and useful body.
- III. The marked difference between Man and the other mammals is more on the psychic than the physical plane.
- IV. Possibly or probably the chief organic peculiarity of Man is his possession of a definitely developed fore-brain, the unquestioned seat of the mind, the intellectual faculties, the portal through which the soul enters and rules the body.
- V. In all probability the specialized nerve cells of the forebrain are the most highly constructed cells, or the most intricate and complicated in their composition, to be found in the universe.
- VI. Copper and zinc among other minerals are invariably to be found, we are told, in these important brain cells: and the question naturally arises what is the source of these minerals but the food used, especially during the developmental period?
- VII. Once again, Man in common with the other animals, cannot create any of these metals, mineral or chemical elements or combinations: he can only utilize them as they are found in mother's milk and other natural foods after weaning.

The milk supplied to the residents of large cities is a subject of perennial interest and discussion. Many laws have been enacted concerning the production, bottling, pasteurization and distribution of milk with the purpose of eradicating milk-borne diseases and epidemics.

The public knows full well that epidemics of typhoid fever, scarlet fever, diphtheria, septic sore throat, to mention some of the dangerous diseases spread by means of milk, are preventable and how to prevent them; but people do not appreciate the recognizable decree of Nature that milk shall pass from the maternal organism to the offspring by the act of sucking, without being exposed to air, that is, without contamination. Milking cows or goats or asses or other animals definitely breaks this law of Nature for such milk is always contaminated by the presence of germs or micro-organisms introduced by the act of milking. This is not the fault of the milk but of humanity. Germs multiply very rapidly in milk which is an excellent culture medium, and within an incredibly short period have reached in number high in the thousands, where originally there were none.

Boards of Health are increasing their vigilance in regard to the milk supply of all large cities. This milk is tested frequently and monthly reports are made as to the findings. Within a few years as a result of these investigations many "milkmen" have gone out of business. At all events the number of independent distributors has decreased. Decreased also have the numbers of germs found in the milk. During the year 1926 the number of micro-organisms found in a cubic centimetre of milk (a cube approximately one-half inch in its dimensions) averaged 49,000. During the year 1928 the number averaged 37,000. In May, 1929, the number was only 21,000 per cubic centimetre.

A fact in this connection is that these germs have been nourished by, and have grown at the expense of the milk itself, the quality of which is by so much the poorer for having raised such a large brood of living organisms. Again, and this is even a less agreeable fact, the excreta of this army of germs have been thrown into the milk, naturally not in the least adding

to the nutritious properties of the milk and probably, on the contrary, introducing an element of danger.

In addition to all this, urban milk according to law must be pasteurized and distributed in original, individual, sealed bottles. As far as milk-borne diseases are concerned this is without doubt a rational precautionary measure, for dangerous germs * are thereby destroyed and the milk made in this respect safe to use. Pasteurization, however, is another artificial procedure, unnecessary under Nature's decrees, and artificial to a high and possibly injurious degree. The application of heat, forty degrees F. higher than the normal temperature of the body for a period of twenty minutes or more, is enough to engender chemical and physical changes which cannot increase the digestibility or usefulness of the milk, and is much more likely to injure the milk, some claim even to the point of destroying vitamins.

Propos of Pasteurization it is claimed by Allen K. Krause (vide "Cecil's Text-book of Medicine" p. 167 and p. 168) and others that bovine tuberculosis is spread through butter and cheese. Until recently the cream from which butter is made has not been pasteurized and the same is true of the casein in milk which forms so large a proportion of cheese.

It would seem as if Man had done all his ingenuity could devise, in regard to milk, to baffle Nature in her effort to maintain Man in a state of useful, happy, healthful activity.

*Much is said about "germs" and it is without question a fact that certain germs are dangerous to animal and vegetable life and are the means through which many diseases are transmitted and spread over the face of the earth, but this other important point should be impressed upon the public mind, viz: that only a small percentage of the germs known to science are mischievous or dangerous. There are some germs, colon bacillus for instance, to mention only one variety, that are positively useful to humanity, and there are probably 20 or 30 other varieties whose products are used medicinally and are also invaluable in producing immunity to as many diseases.

First of all, from one or another cause (discussed elsewhere) a large proportion of women, civilized and "primitive" are unable adequately to nurse their children, necessitating therefore the use of an artificially modified, inadequate, infra-human substitute for human milk.

Second, the infant and young child are obliged by their ignorant seniors to take relatively large quantities daily of the substitute.

Third, the growing child long after the natural period of weaning has passed is still forced to take liberally of this substitute, instead of following Nature's dictates and using suitably prepared adult food.

Fourth, later and generally all through life Man continues unthinkingly to use this highly specialized calf's food, or this wonderful secretion Nature prepares for the nutrition and growth of the bovine calf, under the traditional idea that it is a "perfect food" for mankind! It seems almost beyond belief that the human being of the twentieth century (A. D. 1936) could be such a slave to a custom prehistoric in its origin, but not on that account a wise or rational procedure.

The milk man insists upon using, is an unnatural thing in that its secretion is apt to be prolonged beyond the normal time limit: its quantity is increased by forced feeding, restriction of ranging, and by general "domestication," so that the modern cow yields three, four or five times as much as she would if leading an unrestricted natural life. Is the milk produced a better article as a result? Also the milk so produced becomes a germ-laden, toxin impregnated, chemically modified food instead of remaining an uncontaminated pure nutriment, one of Nature's magnificent achievements.

No one will deny that cow's milk, a very specific secretion, was intended for the one specific purpose of

nourishing a calf, and only the light-minded will maintain that Man is a calf.

It might profitably be borne in mind that cow's milk is secreted by mammary glands which are supplied with blood made by the transformation of grasses and grains, not from drinking a large supply of milk. Mothers whose milk supply is insufficient or inadequate might draw a lesson from this fact and not force themselves to drink a lot of milk under the delusion that it will remedy their deficiency and increase their own supply.

Cow's milk makes for bulk of body, for bones and muscles but not for intellectuality or rationality. If there is a rational creature on earth it certainly is not the cow or the calf. And if there is anything man needs to fulfill his destiny it is brain power and rationality.

Milk very evidently is intended for something more than mere increase in the size or bulk of the offspring: for more than the building up of bones and blood and muscle, and furnishing heat to the body. If mere growth, if size of body were the main thing to provide for, there would be no need of such marked differences in the composition of milk. *Differences in quantity alone* would be ample, and the cow's milk and human milk would be similar in composition and differ only in the quantity secreted. But the fact is the two milks differ much in composition as well as in quantity, being one quart to three pints a day in the human family to six or eight quarts daily in the cow. Other differences are shown in tables III, V, and VI.

That there are other differences than mere bulk between animals is intuitively recognized. No one would consider the milk of a hippopotamus or elephant, food for a lamb! And yet if the differences in size and weight were the only differences between these animals, it might be assumed that the milk they secrete would be approximately the same and the lamb would need to take for nourishment only enough of the elephant's

milk to satisfy its appetite. Reference to tables I and II shows the fallacy of this as an argument. But, and here is an analogous condition, how about the big and ponderous cow and calf on one hand and the human infant on the other? Is it not as unreasonable in the latter, as in the elephant and the lamb case, to imagine that the milk of the cow, or camel, or buffalo, or ass, is suitable, adequate nourishment for the human child? Even when artificially modified, cow's milk only approximates the fat, sugar and protein content of human milk. The salts, vitamins and the "unknown" naturally cannot be discussed. However, humanity has much to be grateful for in the fact that cow's milk can be so modified by art that thousands of infants are now given a chance to live, though handicapped, that formerly would have been doomed to an early death. (This general subject, infant feeding and weaning, will be discussed in later chapters).

The animals which furnish the human family with so large a share of its lacteal nourishment are all vegetarians. The carnivora while able to furnish their young with their needed milk supply never are moved by the generosity of the herbivora. Whether psychologists ever will be able to make anything out of these facts and ideas remains to be seen.

In concluding this brief and incomplete survey of a vitally important question "What is Milk?", attention may be called once more to the facts that

- I. Milk is a very highly specialized secretion:
- II. That it is not made by any man-made formula.
- III. That its composition is not yet wholly known:
- IV. That it is a product of that unknown but definitely recognized thing called *life*:
- V. That no dead thing can produce milk:

- VI. That sub-human milk is used by man irrationally, wholly without thought, as a mere conventionality, an age-old tradition and custom:
- VII. That modern man does not know what race or peoples first instituted the habit of using sub-human milk: and
- VIII. That the use of milk after the period of weaning may be fraught with more danger and even harm than benefit to the human race.

At all events it would seem as if the time had come for Man to use his God-given power of rationality: to do things from wisdom derived from knowledge and not be a mere automaton.

CHAPTER III
Is MILK A PERFECT FOOD?

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IS MILK A PERFECT FOOD?

No single substance, if we except water, is used so universally for food as is milk. Milk, including its products (cheese, butter, cream) is looked upon by civilized man as an absolutely essential article of diet, not only during infancy, but during later periods of life as well. Physicians, physiologists, chemists, and many laboratory authorities of world-wide and enviable reputation claim that milk is an ideal and perfect food, and should be freely used by young and old.

For instance: "Milk is an essential foodstuff not only for infants but for older children and adults. Every child needs one quart of a milk a day, and every adult a pint and a half of milk to insure an adequate supply of all food essentials and the efficient utilization of other foodstuffs" . . . "One of the greatest needs of this nation, and in fact of every civilized country at the present moment, is more milk and clean milk." (Thus said Dr. John H. Kellogg of the Battle Creek Sanitarium, Michigan, in an address delivered in Boston, June 7, 1921.)

Dr. Joseph Garland in an article on Milk-Borne Diseases published in the Boston Medical and Surgical Journal for December 13, 1923, quoting from a Bulletin of the United States Department of Agriculture says, "No greater field of usefulness exists than the production of milk for human consumption."

In the Old Farmer's Almanac for 1924 we are told "The per capita consumption of milk and its products in the United States during the year 1922, has been

estimated as fifty gallons. Twenty per cent of the total food supply of the average family is furnished by milk."

"The milk from the goat, mare, buffalo, camel, reindeer, sheep, and cow is used for human consumption in different parts of the world. Man has taken advantage of this milk-producing function, and by particular methods has increased the amount of milk secreted by an animal and has prolonged the period of secretion."

The preceding estimate quoted from the Almanac is much too low according to Dr. C. W. Larson, Chief of the Bureau of Dairying, United States Department of Agriculture. In the daily press (Boston Traveler for Jan. 27, 1926) Dr. Larson is quoted as saying before the House Appropriations Committee, that the annual consumption of milk in the United States during the year 1918 was 834 pounds per capita, and during the year 1924 was 1020 pounds per capita; and that in 1918 the country was exporting 2,250,000 pounds whereas in 1924, 250,000,000 pounds were imported!

Of every dollar spent by Americans for food, 24.8 cents goes for milk and milk products. This is by far the largest single item in our food bill. It explains why doctors, inventors, business men and public commissions are constantly trying to devise ways to safe-guard the quality and purity of milk.

And speaking of waste as opposed to efficiency, dairy men say our annual bill for breakage of milk bottles varies between \$12,000,000 and \$15,000,000. (Boston Transcript, May 22, 1929).

A more recent estimate, drawn from census returns, claims that 27% of the money spent in the United States for food is spent for milk and milk products.

This will give an idea of the present consumption of milk and its products as food in the United States.

A custom that has such world-wide support naturally is looked upon as normal and proper; but is this cor-

rect? Is milk the "perfect food" it is so generally supposed to be? The question certainly is a debatable one.

For instance, thousands of analyses of milk have been made by chemists and investigators in various parts of the world with fairly close agreement as to the general results, and humanity, physicians perhaps especially, feel convinced they know the composition of different kinds of milk. Yet curiously enough in these days of synthetic chemistry, no enterprising manufacturing concern has put artificial milk on the market. Sub-human milk may be modified to approximate human milk but no physician can write a prescription that can be filled from the shelves of any chemist's laboratory. In a very practical way it is acknowledged that there are certain valuable and important, necessary and elusive somethings in milk that make it impossible for man to manufacture a substitute.

To discuss the subject with any prospect of arriving at a conclusion that is convincing to all minds is, of course, hopeless. There are, however, a few rather essential viewpoints which usually are not taken into consideration when the subject is discussed, and these viewpoints are the ones which are here emphasized because of their importance in helping towards a solution of the question.

- I. When was milk, other than human milk, first used by mankind?
- II. When were animals first domesticated and used for milk production?
- III. What is Nature's teaching in regard to the use of milk?
- IV. What has the most advanced biological chemistry to say in regard to the composition of milk?
- V. What does Reason have to offer in answer to the question?

It is not known when other than human milk was first used for food by mankind. The earliest historical records available are to be found in the *Scriptures*. For instance, we read in *Genesis* xviii:8 that Abraham "... took butter, and milk, and the calf which he" (the young man referred to in the preceding paragraph) "had dressed, and set it before them," (the three angels who had called on him "in the heat of the day" as he "sat in the tent door.") The date of this occurrence was approximately 1897 B. C.

In *Judges* iv:19 we read apropos of Jael and Sisera, "... he said unto her, 'Give me I pray thee, a little water to drink; for I am thirsty', And she opened a bottle of milk, and gave him drink..." The incident referred to occurred about the year 1280 B. C.

In *Proverbs* xxvii:27, "... And thou shalt have goat's milk enough for thy food, for the food of thy household, and for the maintenance for thy maidens." This was written prior to Hezekiah's reign 727-699 B. C.

In the *Song of Solomon* v:1 is found "... I have drunk my wine with my milk..." The *Song* was written probably about 975 B. C.

That milk must have been held in high esteem by the peoples of early historic days is evidenced by the phrase "a land flowing with milk and honey" which was so frequently used in descriptions of a rich and prosperous country.

According to E. Wallis Budge in his *History of the Egyptian People*, page 14, the man of the Pre-Dynastic (Neolithic) Period "lived in villages, circular in shape, and surrounded by a wall: ... Domestic animals lived in the clearing round the village." And on page 212, "... the well-to-do classes ate animal food ... milk was drunk in large quantities, and cheese was a common article of food." No references are given, and these statements may be merely assumptions, or

traditions. There is no good reason, however, why these statements should not be accepted as true.

The earliest historians do not offer any assistance in answering the question, but anthropologists present some data that help to carry our ideas somewhat into prehistoric times. For instance, Madison Grant in his most entertaining and instructive *The Passing of the Great Race* (page 138) says, "They (The Neolithic Alpines) brought with them from Asia the art of domesticating animals and the first knowledge of the cereals . . ." This is in contrast with the "flesh eating hunters," therefore nomadic people, the Manyons, who as inhabitants of Europe were supplanted by them the Alpines. This period was about 5000 B. C. or somewhat later, and points unmistakably to the use of animal milk as an article of human food. Such use of milk unquestionably antedated Abraham's day. Five thousand or seven thousand years are as nothing however in the life of Man who has been a habitant of the earth for many thousands of years, and knowledge of his dietetic and other habits during the many prehistoric years is exceedingly vague. In all probability though, the use of animal milk came more or less into vogue soon after animals were first domesticated.

The domestication of animals is as much shrouded in mystery as is the first use of sub-human milk as human food. Two explanations are possible. One is, that certain animals of gentle disposition remained as companions of mankind from the earliest "primeval days" when the entire animal kingdom lived together in harmony.

As Walter C. Rodman charmingly puts it in an exquisite bit of verse entitled "What Time is It?" (privately printed)

from sickness of some sort, and ill health is certainly an abnormal condition even if universally prevalent. Universal prevalence, therefore, does not make either sickness or a custom "normal and right."

Whatever views one may have inherited or acquired concerning the use of milk; whatever one's training may have been, it simply must be conceded that milk is the one and only food Nature intended that the young of all Mammalia should have; and *each species its own particular variety for a definitely fixed period of time.*

Milk from the chemico-physiological standpoint contains all the elements needed to carry on the work begun *in utero*; that is, to continue the growth of mammalia for a certain period. But it is also very evident from even a cursory view of the subject, that within a short time after birth, short in comparison with the lifetime of the individual, the supply of milk is cut off and after that absolutely no more milk is to be had from the mater. Such is Nature's very evident plan.

Such at all events is her custom, and even in the human family Nature makes no exception to her rule. Occasionally, under mistaken ideas, a human mother may continue to nurse her child for a prolonged period (longer than normal) but with no benefit to either the child or herself.

What does Nature mean by this custom? Only one interpretation would seem to be possible; viz., that Nature did not intend to have the youth or adult of any mammalian species use milk as food. The fact is, however, Man thinks he knows better than Nature how to feed himself, and according to this conviction it is his practice to continue the use of milk, rather generously throughout life, or the greater part of it:—true not the milk product of his own species but of a *distinctly inferior one.* This point is worthy of more consideration than can here be given it.

If Nature adapts means to ends, and this seems to be her way of doing things, nothing exists without a purpose, and that purpose is definite if circumscribed. It may be assumed, therefore, that the milk of a mouse provides for a distinct purpose, and the milk of a hippopotamus for another, and as these two extremes are widely separated, so the two milks are widely different in quality no less than quantity. Chemists have analyzed milks and certain differences have been recognized.

To quote from Hammersten and Hedin's "Text-Book of Physiological Chemistry," 1000 parts of milk contain:

Milk of the	Water	Solids	Proteins	Fat	Sugar	Salts
Dog	754.4	245.6	99.1	95.7	31.9	7.3
Cat	816.3	183.7	90.8	33.3	49.1	5.8
Goat	869.1	130.9	36.9	40.9	44.5	8.6
Sheep	835.0	165.0	57.4	61.4	39.6	6.6
Cow	871.7	128.3	35.5	36.9	48.8	7.1
Horse	900.6	99.4	18.9	10.9	66.5	3.1
Ass	900.0	100.0	21.0	13.0	63.0	3.0
Pig	823.7	176.3	60.9	64.4	40.4	10.6
Elephant	678.5	321.5	30.9	195.7	88.5	6.5

According to Holt in "The Diseases of Infancy and Childhood," p. 137, human milk has in 1000 parts:

Water	Proteins	Fat	Sugar	Ash
875.5	12.5	35.	75.	2.

These analyses, it must be remembered, refer only to those contents which are detectable by the methods now in use by the chemist. It is but a few years ago that chemists, physiologists, pediatricists, physicians, and laymen generally thought they knew all there was to be known about milk because certain percentages of fat, sugar, protein, ash and water were recognized as being present, and it was thought that by changing these

percentages the milk of one species might easily be transformed into milk suitable for another. It is beginning to dawn on the scientific mind, however, that there may be elements and combinations in milk that have heretofore escaped recognition. Everyone today knows that milk contains what are called "vitamins" that man only within a very few years has had any conception of, and even now man does not definitely know what these vague "vitamins" are. Yet Nature has known all about them for many thousands of years for she put "vitamins" into milk and other foods—for a purpose. And the probability is that there are other things in human and sub-human milk besides fat, sugar, protein, ash, vitamins, and water—put there for a purpose—that man may learn something about in the more or less distant future, after he has developed sufficiently to recognize them.

As concisely and suggestively claimed by Prof. Funk, the discoverer of vitamins and the coiner of the term itself, ". . . From what has been said in this chapter, it is evident that we are not yet fully informed as to the nutritive value of milk, and that this foodstuff *still presents some riddles for us to solve.*" ("The Vitamines" by Casimir Funk, p. 262.)

Mankind has made and still makes use of goat's milk, ass's milk, and cow's milk as food in addition to, or as a substitute for, mother's milk. These are the chief varieties used. Why? is a question appropriate to the occasion. Not because Man as a biological chemist knew anything whatever about the composition of milk when other than human milk was first used as food. He knew nothing about it then and possibly knows only a few outstanding facts about it now. The milk of these animals was used because the animals were:

- I. More easily domesticated than others, being perhaps more stupid and more lacking in initiative than others:
- II. Because they could be made to yield a relatively large quantity of milk, and
- III. Were relatively easy dietetically and financially to take care of.

It is well known that the modern cow, under forced feeding, can be made to yield a larger quantity of milk and to yield milk for a longer period than she would under natural conditions. And dairymen boast of the number of pounds of butter fat their high grade cattle yield daily in contrast to medium and low grade cattle. But at the best the cow is a very stupid, lazy creature, lacking in intelligence, of absolutely no mental ability, good-natured because too indolent to be otherwise, possessing no initiative, dirty unless she is kept clean, as shown by willingness to lie on anything, clean or dirty; . . . a mere animal factory for converting food into meat and milk. Her milk evidently was intended by Nature to nourish temporarily a calf. The calf's organs and tissues had all been formed prenatally, from the digested grasses which in a state of nature formed the pregnant cow's food, or in the case of the domesticated animal, from grasses, hay and grains which formed the maternal food. *No new organs or tissues are added while the calf is being fed on milk*, but those that have been formed are helped to grow more rapidly than they would on any other diet. Presently the milk has done its work and the supply is gradually withdrawn, or cut off, and the calf has to shift for itself and take up an independent life.

The same story is true of all Mammalia; but the idea to be especially emphasized is that the milk of each species is evidently intended for that species only; that is, it is adapted to a certain and positive end. The calf

develops a lot of meat, a large skeleton with necessary organs, but a relatively small brain and no mental power. But the modern cow does yield a large quantity of milk and may be made to yield a revenue to her owner—and this is the chief reason why the modern man keeps cows.

Man needs a smaller skeleton, a smaller body, less muscle tissue (meat) and certainly very much more brain tissue and power than any calf or cow that ever lived. He may not have either the needed gray matter or mental power, but that he needs them both, none will deny. Possibly if during the all important early and formative period of life (prenatal and subsequent nine months) Man were given food absolutely adapted to the needed end, the result would be a stronger, more useful, more highly specialized race. And the fully adequate food has been abundantly furnished by Nature in cereals, vegetables, berries, melons, fruits and nuts, which can be prepared easily and without interfering with their natural composition or nutritious properties. Man's most important duty in this connection is accurately to observe Nature's methods and interpret these as logically and certainly as he possibly can, and do his intelligent best to adopt as his guide in the matter of nutrition Nature's revelations and decrees, and not allow himself to be guided by conventionalities, traditions, fads, or irrational customs.

It is not generally known yet what varieties or quantities of mineral salts are to be found in well developed human brain cells, but certain very definite elements must be there, and the elements must be supplied in the food given to infants and children and the growing body, otherwise there is a deficiency, for the body cannot create these elements.

The opinion is here ventured that given a more appropriate food the mental power of the race could be materially improved. Brain cells are formed early in the

growth of the embryo, being recognizable as specialized cells as early as the second month. From this time until birth they are doubtless being made more and more perfect. During this entire period of intra-uterine life the developing child is absolutely dependent upon its mater for nourishment and the mater can give only *what she possesses*, viz., the elements which she has obtained from her own food. *Neither the mother nor the child can create chemical elements or compounds such as are needed to form brains cells. These things must come from the mother's food.*

Provided brain cells are well started during prenatal life, the suitable proportion, quantity, and variety of chemical elements must be supplied to keep up subsequent growth and activity. Nature unquestionably planned to have the human mother supply her offspring with a perfect milk during the approximately nine months following birth; i.e., a milk capable of offering the baby all the varied substances needed to develop bones, muscles, viscera, blood, *brain* and other organs and tissues which together form the ideal human child. Are these things supplied by cow's milk or by the average mixed and artificial diet upon which young humanity is fed, including as it does a mixture and excess of carbohydrates, fats, proteins, and condiments?

It is appropriate in this connection to refer to an article on "The Salvage of the Backward Child" by the well known Dr. Walter E. Fernald, of Waverley, Massachusetts, to be found in the "Boston Medical and Surgical Journal" for August 2, 1923, in which he states there are no fewer than 50,000 mentally defective children and adults in the state of Massachusetts. The names and addresses of 18,000 are known and the "School Clinics" are revealing at the rate of 4000 per annum.

As recently as January, 1935, personal inquiry at the Waverley Hospital for Backward Children brought

later information to the effect that the number of backward children in the State was nearer 100,000 than 50,000. Appropriate also is reference to the report of the Massachusetts Psychopathic Board of its analysis during the winter of 1923 of over 3,300 high school children, and its conclusion that 40 per cent of them were unfit mentally for further educational training. Is it not rational to assume that the so-called "food" upon which children are brought up, bears a definite relationship to this pathetic and appalling mental deficiency?

Not to digress too far, everybody knows that cow's milk cannot be given to the average human baby with safety until the milk has been very much modified as to its sugar, fat, and protein content. That is, humans, during infancy at least, will not and cannot thrive on unmodified cow's milk, convincingly demonstrating its unsuitability to the purposed end—a human rational being. Adult humans when ill have been known to subsist for quite long periods on cow's milk and when extra cream is added, and a few eggs, they have been known to increase much in weight and girth. But how long human life can be kept up to a relatively normal standard on a milk diet is not known.

Once again let it be noted that an attempt to read Nature's intentions by observing and analyzing her methods must convince the ordinary mind.

- I. That milk was intended to serve as a food for its own species only during the infancy (or early life) of the individual of the species.
- II. That the milk of one species was not intended to be used by other species, and
- III. That milk was not intended to serve as food for the adult of any species.

Nature unmistakably has decreed that the milk of all mammals shall pass directly from mother to offspring without being exposed to the air, that is, without becoming infected by germs.

Everyone knows the ease, rapidity and certainty with which cow's milk becomes infected during and subsequent to the process of "milking." Every one also knows that these germs rapidly multiply at the expense of the milk upon which they feed and into which they pour their own excreta. Certainly this addition of germs and their excreta to the milk and the pasteurizing to which such milk is subsequently subjected, cannot make of the milk an ideal or perfect food. As a matter of fact, analysis of milk distributed to the inhabitants of Boston and vicinity reported by the Health Department in its "Monthly Bulletin" for February 1926, shows that such milk, distributed by 89 dealers, contained on an average 49,200 bacteria per cubic centimeter, or approximately 23,222,400 bacteria per pint, which as far as figures are concerned would seem to make a sizeable meal.

The lowest showing was 7,000 bacteria per cubic centimeter (approximately one third of an inch) or 3,304,000 per pint, while the highest showing was 570,000 per cubic centimeter, or 269,040,000 per pint, which is a small quantity for the average milk drinker to take during the day.

Milk-borne germs and diseases are not specifically considered in this connection though it may be apropos to call attention to the fact that milk is one of the very best culture media for germs and that it may act as a vehicle for the transportation of scarlet fever, typhoid fever, diphtheria, influenza, septic sore throat and tuberculosis germs as well as innocuous micro-organisms, from one place to another.

Perhaps no comment is needed, for the analysis and figures speak convincingly for themselves.

The fact that human youth and adults do drink milk enough to form from 5 per cent to 20 per cent of their diet only demonstrates that the human body temporarily can do a certain thing without evident ill results, but the *end* is not yet in sight; the human family has advanced so pathetically little beyond the status of other animals.

Perhaps we should rejoice that biological chemistry has enabled man accurately to modify cow's milk so as to adapt it to the use of human babies and give them at least a start in life, even if it is not the best; otherwise thousands of lives would perish annually in their infancy as only a few years ago was the sad case. It is a fact that in civilized communities babies do seem, on superficial glance, to thrive on the substitute, * but how explain the adenoid and tonsillar troubles, the imperfect dentition, the appalling increase in the number of weak-minded children, the increase in the number of cases of dementia præcox, the wide prevalence of deficiencies in the nervous system, etc., among the very civilized communities where this use of a so-called "perfect substitute" for mother's milk is used, and cow's milk later in life is so confidently given the growing child?

One may ask what substitute for cow's milk can be suggested? An answer would be why seek a "substitute" for a bad or an injurious thing? As far as human babies are concerned the only "substitute" is mother's milk. The modern substitution of cow's milk for

*Sir George Newman, M.D., F.R.C.P., Chief Medical Officer, Board of Education and Ministry of Health, Great Britain, in an article on "Permeation of the Medical Curriculum by Preventive Teaching," in the *British Medical Journal*, September, 1923, reprinted by the Rockefeller Foundation, says: "At the end of the nineteenth century there died every year in England and Wales 150 infants per 1000 born (a mortality of 15 per cent). In many industrial districts the figure was 300 (or 30 per cent). In 1922 it had fallen for the whole country to 77 (or 7 per cent). What brought about the change? More enlightened motherhood and infant nurture." That is, an improvement in feeding is responsible for the change.

the mother's milk is at the best only a temporary makeshift and should be done away with as soon as possible. In the meantime, until mothers can learn how to feed themselves during pregnancy and the period of lactation and at all other times, the "makeshift" will have to be used.

According to Nature's evident plans the youth and the adult of all mammalia, including Man, have other and more adequate food, so no milk or milk substitute is needed. The cook and others may still cry for a substitute, which easily can be found in the juices of vegetables and especially of fruits. As to things that cannot be made without milk, mankind would be far better off if he did not have them.

A few conclusions concerning the use of milk as a food may be drawn from even a brief survey of the subject:

- I. Animal milk has been used by mankind probably since the very early "primeval days." It has been called the "lazy-man's food". †
- II. The use of sub-human milk as human food was introduced by men whose knowledge of the natural sciences was *nil*.
- III. The milk of a given species is the natural and perfect food for the young of that species only.
- IV. Nature evidently did not plan to have milk used as food after the period of infancy.
- V. The free use of cow's milk as human food may be simply one of the instances which show how the human body seemingly stands up under an abuse.

†(A. W. Rowe, Professor of Chemistry at Boston University School of Medicine.)

- VI. The use of sub-human milk as food by Mankind may be one of the factors which produce some of the deficiencies and diseases of Mankind.
- VII. Habits and customs are not necessarily reliable guides or good things simply because they are old and long established.
- VIII. The introduction of a dietetic custom by a race of men ignorant of physiology, chemistry, biology, and embryology is no reason whatever why modern man, whose knowledge and rational powers are considerably in advance of his early progenitors, should adhere tenaciously to that custom, and look upon it as a fixed and definite dictate of Nature.
- IX. Mankind has been exceedingly slow in developing rationality and in acquiring knowledge.
- X. Human knowledge is not yet very comprehensive and doubtless there are many facts yet to be learned about milk, as well as about other things.
- XI. Nature should be more thoroughly investigated and interpreted to the lasting profit of the present and future man.
- XII. Animal or sub-human milk, after all is not the ideal or "perfect food" for humanity that it is generally and thoughtlessly considered to be, and its free use probably is more injurious than beneficial to mankind.

CHAPTER IV
CONCERNING "MILK CURES"

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The few who have offered arguments against any of the conclusions presented in the preceding chapters have confined themselves to three points: viz.,

I. The feeding of the unfortunate babies who, for one reason or another, have been deprived of human breast milk, the natural and, if normal, the "perfect food" for human babes.

II. The claimed marked improvement in health of the Danish people who, during the Great War, 1914-1918, being cut off from the rest of the world and thereby being deprived of white flour, white sugar, abundant meat supply, and many "delicacies," were obliged to subsist on the dairy products for which they are famous. An abundant milk diet therefore during the latter years of the war, became their chief source of nourishment, and

III. The success which, in the majority of cases, attends a four to six weeks' residence at a well conducted "Milk Cure," or a sanitarium where the "milk cure" is administered.

The first point may be disposed of by referring the reader to other chapters where the subject of feeding babies is discussed with sufficient detail. Everyone must acknowledge that in the unhappy dilemma of a deficient natural or maternal milk supply, some substitute, as near human milk in composition as possible, has to be used; but it is almost universally acknowledged that the substitute *is a substitute*, and is simply *as near the*

natural maternal supply as mankind can make it. The imperfection, or the deficiency of the substitute is, by just so much, a handicap, the serious nature of which cannot yet be measured.

The second and third points offer practically the same argument and are covered by the same explanation; although it may be well to treat of them separately.

In regard to Denmark: in the absence of definite vital statistics it must be assumed for the sake of argument that the claim concerning the improved health of the Danish people who lived, during the latter part of the war, largely on a milk diet, is true and well substantiated. Can this fact be reasonably explained? The answer to the question may be divided into four parts:

I. The blockade to which the Danes were subjected by the exigencies of the war stopped the free importation of white flour, sugar, meats and delicacies of various sorts, and the supply of these things *all of which are to a greater or lesser extent insufficient and injurious* as food, became diminished greatly, if not exhausted, as the four years passed. The nation, as a whole therefore, became limited in, or deprived of the intake of a harmful and unbalanced diet and *no longer* suffered from the injurious consequences of eating such food. Individual metabolism would necessarily be improved and certain very common toxæmias, deficiencies and degenerations would be less in evidence and less numerous.

II. The ingestion of a large quantity of milk means the ingestion of a large quantity of water, for milk consists of approximately 87% of water. Not being permitted to export milk and its products, and not having an abundance of other foods to eat, meant that milk formed a generous percentage of the food of the people, and the freer the consumption of milk the freer the consumption of water, and the better the elimination

of body wastes through the kidneys. The synchronous detoxication naturally resulted in improved health.

III. The quantity of milk, sugar, butter fats, proteins and vitamins taken as food in the milk kept up the body temperature and maintained the energy, vitality, and fatty complement of the body and also the body's resistance to minor infections. General body metabolism was kept at a low or normal level and detoxication was continued by the free amount of water consumed in the milk. All these things *made, temporarily at least, for an improvement in the general health of the nation.*

IV. Non-participation as combatants in the war itself and the consequent absence of and relief from the loss of life and physical privations, sufferings, and anxieties, and the many inescapable responsibilities endured and carried by nations participating in the conflict was undoubtedly a psychological influence that led to a relative peace of mind, undisturbed by the emotions which are strong factors in producing illness. Privations unquestionably there were, but they were chiefly of the sort which led to simplicity of life and abstemiousness in diet which were distinctly beneficial.

Considering all the factors involved in producing individual or national good health, one is forced to conclude, and is justified in asserting, that it was not milk *per se* to which the claimed improvement in health of the Danish people at the termination of the war was due.

As to the sanitarium "milk cure" that has been adduced in favor of the free use of milk, it may be shown, that to claim the good results obtained are due to the unusual and excessive use of milk by those undergoing the treatment, is neither logical nor in accord with all the facts involved. It is not milk *per se* that accomplishes beneficial results, but milk as a vehicle plus other very important factors. Analysis of the treatment

shows that the so-called "milk-cure" consists of the following items:

- I. *Rest* in bed for a longer or shorter period, averaging a month.

This means

- a. the bringing of metabolism down to the base line.
- b. giving the heart and muscles the lightest burden possible.
- c. repose of the body and of mind if the patient coöperates.
- d. the repair of worn out, over-fatigued toxin-infiltrated tissues.

- II. *Sleep*. The majority of patients resorting to a "milk cure" are often "social wrecks" who from late hours, over excitement, social dissipation, pleasure seeking lives, have used up nerve force and are to a greater or lesser extent nerve bankrupts. Having forsaken temporarily the pleasures, or extreme anxieties and responsibilities of life and put themselves into a position of relaxation, they can make up their deficiencies of sleep. It is not as widely appreciated as it should be that during our sleeping hours we are repairing the wastes of daily physical and mental vocations and avocations. When awake and active we are drawing upon our supply of nerve force. When asleep only is the body able to store up fresh energy and repair waste.

- III. *Fasting*, one of the first and most important of the influences which form the treatment, really means going without food for one, two, three, four or more days, as needed, and as long as the patient's coöperation will endure. During this fast only water and oranges are allowed;

the juice of three to six or eight oranges, and water up to four or six quarts a day. This forms the all important period of detoxication, during which soluble toxic material and débris are washed out of the body, cleansing brain, nervous system, blood, muscles and tissues of the body generally. People are frequently overzealous about "washing" the outside of the body little realizing how absolutely necessary it is to "wash" the blood, tissues and organs of the interior.

IV. *Detoxication* has just been referred to and this is, perhaps, the first essential. It is in reality fundamental and consists of the "*acute period*," which includes the fasting and the very free drinking of water, and of a "*continuous period*" which lasts throughout the "cure." During this continuous period, while orange juice may be freely given, the water is administered as the largest part of the so-called "milk." Let it be remembered that milk contains 87% of water; the solid elements of the milk, consisting of sugar, fat, proteins, mineral salts and vitamins forming the remaining 13%. Milk is given up to six to eight quarts in twenty-four hours. A six quart quantity of milk equals about 5700 cubic centimeters and 87% of that is about 5000 cubic centimeters or practically five quarts of water. This is enough to aid very materially in detoxicating the body, and this is a point generally overlooked. *The elimination of waste matter is just as important to health as is the intake of food*, and this point is beginning to be appreciated.

V. *The feeding* part of the treatment consists, as has been said, of milk and orange juice; the juice of a few oranges a day furnishes not only

its particular vitamins and pleasing flavors, but an appreciable quantity of fruit sugar and other ingredients, one effect of the total being to ward off acidosis. The milk solids, that is, the milk sugar, butter fat, proteins, salts and vitamins held by the 87% of water in solution, suspension or emulsion, furnish an abundance of food, in fact an excess of some things; one result being, that when the daily quantity of milk reaches four or five quarts the patient begins to transform the excess into adipose tissue. The increase in weight, in some cases, may be a desirable thing, but if pushed very far reaches the undesirable condition of obesity with its physical burden, overtaxation of heart and muscles, the encouragement of indolence, etc. No fixed rules concerning the forced feeding can be made, but sooner or later a return to a normal varied diet must be brought about.

Just how long a patient can gain on a forced milk diet has not been accurately determined, but there is unquestionably a limit beyond which it is unwise to go. The monotony of such a diet makes its continuation well nigh impossible.

In the early stages of the sanitarium treatment of tuberculosis, patients were stuffed with milk and eggs with the idea of making them increase in weight. Irrespective of body-weight, temperature, cough, expectoration, etc., milk was administered freely and a large proportion of the patients gained very materially in weight, but the gain in weight had no effect upon the course of the disease, which went relentlessly on to its fatal termination. As a result the milk and egg treatment of tuberculosis, from which so much was expected, lost favor and is no longer made use of to any great ex-

tent. This experience may not prove anything definitely but it is suggestive of the insufficiency of a "milk diet" for adults.

VI. *Abstinence* from eating highly refined, artificial, overflavored, devitaminized, demineralized food is a factor not to be overlooked in estimating the effects of a "milk cure." The average conventional diet is not only irrational but is sure eventually to produce a more or less severe toxæmia, and more than likely abstaining from eating the "delicacies of the table" is as influential for good as any other part of the "cure."

VII. *Expectancy* is one of the most potent factors in the "milk-cure," as it is in most of the treatment resorted to in the efforts to cure disease. The psychology of disease and medical treatment is too profound a subject for more than mention at this time, but the breaking up of one's ordinary routine and going to a sanitarium to undergo a popular "cure," and putting oneself into a cooperative frame of mind in a cheerful and hopeful environment, in addition to the incalculable personal influence of the attending physician and nurses, all combine to form a psychic condition of inestimable worth.

Neglecting as of minor importance the effects of massage, passive exercises, music, (radio etc.) reading and other items connected with the treatment outlined in the preceding paragraphs, one is tempted to ask "Why call it a 'milk cure'?" "Why attribute so much value to the milk?" "Why not call it a water cure?" or a "rest cure" or a "detoxicating and rest cure"? As a matter of fact the treatment is only a modification of the Weir Mitchell "Rest Cure" so deservedly popular and successful in America during the eighties, nineties,

and early part of the present century, and in England under the famous Lawson Tait.

As to permanent restoration of health from this or any other treatment, it is not to be expected, unless a rational life is adopted and faithfully followed after the cure has been started, by the resting, fasting, detoxicating, feeding and psychic agencies referred to.

Relapses are common enough because the patient, who has rested and been started on the road to health, frequently on his return home, returns also to his former diet and routine of hard work, pleasure-seeking excitements, dissipations of one sort or another which sent him to the sanitarium originally.

As to the milk itself, if one wishes to delude himself and others concerning its efficacy he may of course do so, but is it wise?

Close adherence to facts, a careful analysis of the treatment, and a desire to use an accurate terminology, will help one to refrain from emphasizing the milk factor as the prime and most important element of the treatment, or attributing too much to its use.

CHAPTER V

WEANING AND ITS PERILS

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The average individual when thinking of weaning is apt to think in limited terms, and to have in mind only the transition period in a human baby's life when its natural food, breast milk, is being gradually and naturally withdrawn, and a varied diet, introductory to that of the adult, substituted in an orderly way.

According to our dictionaries we shall find considerable latitude in the meaning of this word "weaning," just as we do among individuals, from the restricted human physiological view to the broadest, non-material, psychological aspect: For instance, we find in Appleton's "Medical Dictionary" the following definition: "The discontinuance of the nursing of a child." A very limited field. In Stedman's "Medical Dictionary" we find: "To take from the breast, to deprive permanently of breast milk and nourish with other food." Still a restricted view, because the non-human side of the question is omitted. Again we read in Bolles Phonographic Pronouncing Dictionary (1845): "To put from the breast; to ablactate. To withdraw from any habit or desire." Here we get the same indefiniteness or rather insufficient breadth of view, but we also get a definite glimmering of the idea that weaning is a word applicable to a wider field than the human dietetic, and reaches even into psychological fields. In Webster's International Dictionary, however, we come into the scholastic atmosphere and a broader field of thought. For instance here we find:—1. "To accustom (a

child or other young animal) to loss of mother's milk; to cause to cease to depend on mother for nourishment." 2. "Hence, to detach or alienate the affections of, as from some object or desire; to reconcile to the deprivation or loss (of anything)." And here we have specifically stated that weaning is applicable to a transition period, to a changing from one habit or custom to another of body or of mind.

For present purposes then it is justifiable to apply the term weaning to a definite change of habit, to a transition from one method of doing a certain thing to another method. And we shall find also that the process of weaning is an experience that comes into the lives of all mammals whether human or sub-human: and the accompanying phenomena are practically the same in all species. There has been for example a period, varying in duration according to the species, during which the offspring has been wholly dependent upon its mater for food, milk. During this period of lactation the life which was begun *in utero* has been carried on. Organs which already have been formed are gradually developed and made more efficient, and the general process of growth has been going on with great activity in all the tissues and organs of the body.

During the early part of lactation, growth is at its height, cell multiplication and activity being at a higher level in proportion to the size and weight of the individual organism than at any other period of post-natal life. This means that nutrition is at its best, and that means that the supply of food materials is the best the maternal organism affords. Where natural laws are obeyed the mater furnishes adequate nutriment, and growth proceeds in orderly fashion.

Fortunately substitutes for mother's milk are not sought or needed by the very great majority of mammalia. As a matter of fact bottle feeding, substi-

tute or artificial feeding is a method made use of practically in only two instances, the rearing of the bovine calf and the human baby, although occasionally cow's milk is given to puppies, kittens, pigs, hens and chickens, and more rarely to other animals: but whether natural or artificial feeding has been followed, the time surely comes when a change from milk, or its substitute, to the adult form of food is simply *inevitable*. The process naturally is a simple, physiological one, devoid of special dangers and accomplished within a period of a few days to a few weeks. True, as with other transition periods of life, (dentition, adolescence, menopause) changes which should go along smoothly, without complications or hindrances, are in the human family very apt to be seasons of storm and stress and to become pathological instead of physiological. This is due not to the general plan devised by Nature but to extraneous circumstances.

The fundamental principle of the process is a gradual transition from infantile to adult diet, avoiding *en route* things artificial.

One other fundamental which should sink deeply into the hearts and convictions of all humans, is that *Nature knows*. Man should make himself more familiar with nature's plans, laws and methods, because all things in the universe are in accordance with law and order and definite plans. The forces that have made man and all other forms of life have prepared beforehand for the sustenance of these varied forms of life. It seems so impossible for mankind to have been overlooked and left to wander about in a maze of ignorance. No! Nature's path is clear and definitely blazed, if one has but the eyes that can see.

It may help to broaden one's views and convictions to take a side glance at the feeding habits of other forms of life than mammalia and note some of the transitions

that may be found in their habits. Nothing strictly analogous can be found outside the big family of mammals because no other type of animal changes so completely from a milk to a mixed diet: but among birds (omitting the gallinaceæ) a faint analogy is found. During its period of hatching the bird finds just enough variety and quantity of chemical elements in the egg to develop its own small body into a unit. But at the time of hatching, the bird is too ungarbed, too weak, too inexperienced to be thrown onto the tender mercies of the world. So for a period the parents hover with tenderest solicitude over their brood feeding their young as generously as possible with the *kind of food which is to form the habitual diet of the grown bird*. No gradual transition here, no slow education to a new type of food but an abrupt transition to the adult diet. As soon as growth has supplied the needed feathers and muscular strength, the brood takes to wing and as full-fledged individuals lead independent lives.

The problem before us, however, is the weaning of the human babe and the method is and should be practically the same whether the child has been breast fed or artificially fed. In the case of breast feeding nature definitely says the time for a change has come as indicated by a slowing down or cessation of increase in weight on the part of the infant; the eruption of incisor teeth; an increased activity of the salivary glands; some uneasiness and fretfulness suggestive of insufficient nourishment; and on the maternal part a diminishing secretion of milk and deterioration of its quality.

Let it be borne in mind that the object in view in weaning is to get the child onto a varied and mixed adult diet in due season. Nature's larder from which supplies are to be drawn is richly laden with a big variety of food materials, the variety being infinite if one

considers the possibilities of mixing foods. With the variety of cereals (grains) as a *sine quâ non*, and the much bigger variety of so-called "vegetables" and the equally large variety of berries and melons and fruits, with nuts in unappreciated values and varieties in addition, the human family certainly almost suffers from an *embarras des riches*.

To go somewhat into detail in an effort to make things understandable, it must be realized that the young mammal has a wonderful food furnished by its mater. This wonderful food is Milk, each species having its own special kind. This milk is very composite. Its composition is not yet wholly known. It contains, however, (if normal) all the peculiar elements and combinations of chemical elements (excepting possibly oxygen and water) needed to continue the growth of the individual body which was well started *in utero*. *No other kind of food is needed, no orange juice or cod liver oil, during the period of lactation* if the mother's milk is what Nature planned it should be. No need to worry about scurvy, or rickets, or delayed dentition, walking or talking or mental deficiency or any other abnormal condition. If the mater's milk is not sufficient to continue the development of the offspring it is not the fault of Nature. It is the fault, or possibly the misfortune of the maternal organism.

If the bovine calf or the human infant has been handicapped by being deprived of its normal milk, and has had to accept and make the most of man's concocted substitute, the period of transition or weaning comes all the same, and the young creature has to be introduced to the adult food of its species. In the case of the calf the introduction and the completed change is easy and simple, its needs being much less than those of man. In the case of the human infant the change from one type of food to the other may be made as easily and simply as it is in the cases of the calf, or any

other animal. The secret of the transition is its accomplishment by easy stages: gradually modifying the quantity, variety and combinations of food offered.

Once more, the human baby's natural food is its mother's milk, and the secretion of this milk, after certain changes in its composition, which have been referred to in the chapter on Milk, gradually ceases and lactation comes to an end. A stage of life's experiences has terminated for that baby. Nature does not furnish it any more milk, and there is no warrant to be found in any of Nature's manifestations for the use, by that baby, of the milk of any other animal, especially for the use of the milk of such an inferior creature as the cow, or goat, or ass. The milk era for that individual has gone by.

Nature has been preparing the child for the "transition." During the fourth or fifth month of life, under normal conditions, teeth have developed and the eruption of several teeth will have been accomplished by the time lactation has come to its end.

Also, the salivary glands will have taken on activity and the pancreas and other portions of the gastro-intestinal tract will have undergone their structural changes and been prepared for their adult functions. All these anatomical modifications and physiological changes have been progressing without flare of trumpets or attracting attention.—What next?

Following Nature's law concerning food, the child, by slow degrees perhaps, has been given gruels and porridges, mashed potato or ground vegetables of some sort, soups or stews, fruit of several varieties, dipped toast and so on, and in most instances eggs and milk. If the advice of dairy-men, milk dealers' associations, most boards of health, school boards, school physicians and nurses, and the majority of physicians is followed, the child will get a quart to three pints of germ infiltrated, pasteurized cow's milk daily for the remainder

of its life; and will be brought up to look upon milk as a really necessary and perfect food.

Let this vital three-fold fact be appreciated. There are three phases, so to speak, in the food history of the mammal, and the human being is a mammal.

The *first phase* is the pre-natal or intra-uterine. All organs and tissues are formed during this phase. No new organs are formed afterward. The prenatal food, for instance, has been pre-digested by the mother and by way of the placenta has been taken into the fetal blood-stream to be further elaborated by the fetus' own liver before being utilized as food.

The *second phase* is the normal period of lactation, when the young animal is dependent on its maternal supply of milk. If through misfortune or intention the bovine calf and the human babe are deprived of the food Nature in her wisdom intended them to have, one of man's concoctions must be resorted to. It is important never to forget that during this period the individual, whether calf or human babe, does not form any new organs, but the organs and tissues already formed grow more rapidly than at any later period of life, and the chemical activity, or the metabolism of the body, is at its highest in proportion to the size and weight of the individual. The time has come now when the food, which is as yet chiefly milk, is digested in the young creature's stomach and intestines as will be the case throughout the rest of its life.

The *third phase* is the more or less varied and mixed adult diet, simple in the ordinary mammal or other animal, but very much mixed and varied in the human family.

The vital question is, How shall the transition stage be successfully accomplished? or the physiological *second phase of nutrition* be safely and felicitously transformed into the third and permanent phase?

Given a healthy mother and a healthy babe there is

no necessity for change of any sort until at least the four central incisor teeth have fully erupted. These are soon followed by the lateral incisors, and the parotid and other salivary glands and pancreas have become active. Nature signals that starchy foods may be used. They are best used, at first as gruels or thinned-down porridge. Whatever porridge the family is having for the day, may be thinned with a little water or much better the water in which vegetables have been boiled, if they have been boiled or steamed in very little water. It is assumed the cereal used for the morning family porridge is an honest whole meal: for instance, a good Irish or Scottish oatmeal (preferable in many ways to the starchier American oatmeal); a ground wheat, unbolted; a rye meal; an unbolted corn meal; brown or natural rice. The porridges need not be boiled more than a few minutes, five or ten at the most. Prolonged boiling destroys flavors, probably vitamins, induces chemical changes and produces a pappy, tasteless travesty of a porridge. At first these porridges will need to be strained through a moderately coarse sieve, but before the end of the first year no straining will be needed.

These grains, by the way, may be used either alone or mixed in various combinations for the sake of variety in taste and value. The majority of so-called "Breakfast Cereals" to be found in the shops have been manipulated by man to the detriment of the cereal, which has been demineralized, devitaminized or injured in some way. Palatability and commercialism, or financial profit, is the main-spring leading to the malting and flaking and puffing etc. of these cereals. Nature and what it signifies, and not Man with his tendency to perverseness, should be our reliance in this matter of food.

Porridges versus breads might be thought of and discussed, but enough here to say the former are simp-

ler, much more natural and therefore more wholesome foods and they have undergone much less manipulation and less cooking. Most breads are made from bolted, demineralized, white flour and are therefore unbalanced and insufficient diets. No breads are made (for sale at least) without the use of more or less white flour, and if under the term bread are included "crackers", cookies, doughnuts, cakes and delicacies no condemnation of their use can be too severe. The most wholesome "breads" are the well known shredded wheat, muffets, and ry-krisp, all unleavened breads, in the making of which nothing has been added to Nature's own product but water and possibly salt, and nothing has been taken away. When softened with hot water they can be reduced to the softness and smoothness of a "pap" and when served with fruit of some kind are palatable and nutritious.

Small quantities only of these gruels and porridges are to be given to begin with; a mere taste at first; then a half teaspoonful and so on until within ten days to two weeks the infant is taking all he wants.

It is folly to think of serving a cereal food for breakfast only. It may be used twice a day or oftener if desired. It is useful at any time. Fruit juices and strained or chopped fruits, seeded raisins, prunes, dates, bananas, peaches, etc., or unsweetened applesauce with or without stewed or soaked peaches, apricots, or strained crushed pineapple, alone or in combinations, may take the place of milk or cream. There is more flavor in such combinations and more variety, and safer nourishment, than milk can furnish.

Before the porridge period has been reached the infant should have been introduced to fruit juices: orange, grapefruit, apple, pineapple, tomato, and the water in which prunes, raisins and dates have been soaked. These juices all contain a most easily and quickly absorbed sugar, and in addition flavorings, pro-

teins, vitamins, etc. And for the sake of giving other elements, extractives, starches, proteins and vitamins in addition to chlorophyll, the vegetable juices in small and then in increasing quantities should have been administered.

Soups also can be used with profit during the early part of this transition period. Thin soups at first, gradually thickened to a bisque. Pea soup made from canned or fresh or dried green peas, not from the dried and split pea. Lentil soup, corn soup, bean soup using any kind and all kinds of beans, squash soup, and the vegetable soups made from one or two or several kinds of vegetables in any variety or combination. *Vegetable stock* must be used in making these soups. Milk soups are not needed and meat stocks should never be used. The soups may be thickened to suit any individual taste, and even a six or seven months old baby has preferences and usually is not backward in making its preferences known.

Easily by the eighth month the infant can safely and with profit be given mashed, and more or less strained, vegetables. Mashed, boiled potato or baked potato without butter, but moistened with vegetable juice; strained tomato, asparagus tips etc. may be used. Potato must not be "pared"; it can and should be skinned. One must be careful not to remove the thin layer just beneath the skin, a layer that contains potassium and other salts and vitamins. It is perilous indeed to remove this layer. With care the thin, brownish, tissue-paper-like skin can be removed leaving this important layer intact. It is a clay colored, or dusty sort of layer, smooth and moist as if polished. And once again, it must be remembered that this layer contains mineral salts and so-called vitamins without which the potato is a one-sided, unbalanced, and very insufficient food.

The same thing may be said of the thin brownish coating of the natural rice, the removal of which by

the polishing or washing process makes of the rice an unbalanced ration the use of which produces many thousands of deaths yearly from the disease beri-beri.

It is a curious fact that Nature has selected the outermost layers of cereals, vegetables and fruits as the storehouse of these useful and absolutely necessary proteins, mineral salts and vitamins—the “accessory food factors” as many like to call them. And it is equally curious that man disapproves of this plan of Nature, and with great ingenuity and cleverness, upheld by appealing sophistry, has succeeded in removing this layer from most of his foods, and then persuading himself to rely upon them as wholesome foods.

The popular and sincerely worshiped fetich, milk, can be laid aside as a curio to be classed with the superstitions and idols of preceding civilizations, — Chaldean, Egyptian etc. The highly bred milch cattle (the cow, the water buffalo, reindeer, camel, llama, goat, ass) are not fed on milk after their weaning, and their food consists of herbs, grasses, and grains. Man has a much greater variety of wholesome, well-balanced food than any of the animals have, with which to build his body and maintain his strength. There is no necessity for milk in his diet any more than in the case of the other mammals.

Another peril lies in the use of meat broths, stews, soups, and of blood itself (meat juice or various meat extracts), by the helpless little piece of humanity whose life and health and happiness are dependent on the judgment, intelligence or ignorance of its parents. Many physicians prescribe meat juice (blood) and meat extracts (blood again) for their little patients, apparently, so the parents are led to believe, under the conviction that blood will make good red blood for the baby. Such prescribers do not realize that the animals who furnish this juice, extract or blood (the cow and the sheep chiefly) are animals that make their

own red blood out of the green grasses they eat! Why cannot mankind make as good blood from the vegetable and fruit and grain Nature has provided for the purpose?

By the ninth month of post-natal life the baby is ready for more rapid changes in its diet. The more liquid and softer types of food may become supplanted by the more solid. A variety wide enough to include all grains and fruits and vegetable foods may be utilized. The maternal milk has not yet been withdrawn but it does not and should not form the chief part of the baby's food. The normal period of weaning is at hand, and within a month or two the process will have been accomplished and the child's habits will have been gradually modified so that the full and varied, rational and well-balanced physiological diet will be wholly adopted by the child. Fortunate will that little child be whose family will have become as reconciled to the diet as he himself has become.

As a resumé of this *second phase of nutrition* in the case of a healthy mother and a healthy child:

- I. Mother's milk should be used exclusively till teething is on the horizon.
- II. Fruit and vegetable juices as drinks from this time on:
- III. The introduction of gruels into the baby's diet after the eruption of four incisors. Small quantities to begin with.
- IV. By the sixth month strained uncooked *ripe* fruits without the addition of sugar. Mashed vegetables also are to be used.
- V. By the eighth or ninth month soups in variety are to be added and chopped or ground vegetables, such as asparagus, dandelions, beet-tops, spinach, sprouts, cauliflower, cabbage, white and sweet potato, carrots, new beets, parsnips, tur-

nips, squash, etc. Corn, (maize) wonderful food as it is, had better be taken in the form of a mush, bread, gruel etc. until molar teeth have erupted.

- VI. By the ninth month the menu includes with possibly two nursings a day, the fruit and vegetable juices; raw, scraped, mashed, ripe fruits (all without additional sugar); apples, pears, peaches, raisins, prunes, dates, melons, bananas very ripe; green vegetables finely chopped and the solid vegetables steamed or boiled or baked, (sweet potatoes and winter squash being particularly useful). The solid vegetables may be mashed.
- VII. By the end of the first year beans parboiled or baked, or in soups; lentils and peas, with corn if the child has learned to masticate, may be added to the list and the child is safely launched into the *third phase* of nutrition, the mixed and varied and permanent adult diet.

The question of the artificially-fed infant is somewhat more complex and difficult, because the feeding of each child is a special problem, and rules must not be too rigid. In a general way the suitable menu has already been outlined in the treating of the weaning period of the breast-fed baby. Here, however, on account of the unnatural substitute for mother's milk it is wise to begin early to accustom the baby to the use of *fruit* and *vegetable* juices. Orange and grapefruit juice, tomato juice and the strained juice extracted from grapes, apples, pears, and the "crushed" pineapple may be given. Also the waters in which greens and other vegetables have been steamed or boiled may be used in the third month; and by the fourth month the water which is used to modify the milk or any "milk modifier" or infant's food, *should be replaced by these vegetable*

juices; gradually reducing the water by an ounce every few days and substituting an ounce of the vegetable juice.

By the fifth and sixth months gruels and soups as already described may be used; and mashed vegetables and fruits may be given. Very ripe bananas and raw prunes soaked in cold water, strained, alone or together, through a moderate sieve make a palatable and appealing addition at this time and help to keep the bowels active. Small quantities of other fruits and vegetables similarly strained can be given with confidence in their usefulness. The modified milk four times a day and the fruits and vegetables and gruels twice a day.

By the seventh month thicker gruels may be used with a wider variety of fruits and vegetables; and during the eighth and ninth months the diet may be extended to include the staple and useful porridges twice a day, with fruits in place of milk or cream; bananas when very ripe; melons, oranges, peaches, apricots (fresh or dried) prunes raw and soaked, not stewed; *crushed* pineapple, in short any ripe and mellow berry or fruit in season, without the addition of sugar; greens in their season; other vegetables steamed or lightly boiled and mashed; peas, beans and lentils. The substitute food is to be reduced one feeding at a time, every week, until by the end of the first year it may be omitted; for the child is prepared to graduate into the adult human family, of which it is essentially a member, though it has been deprived of some very valuable rights.

The transition from the artificial diet to the varied and mixed, life diet of the human being must be gradual in character and as intelligent as present human knowledge permits. It is assumed that this program is to be followed only in cases where dentition and growth have been as nearly normal as possible. Each child, once more, is a problem to be specially studied, but all human beings are subject, with slight variations,

to the same natural laws, and the laws of nutrition are applicable, with slight modification, to all.

Dentition and growth have been referred to as more important guides than body-weight. A fat child is not by any means always a well child. Mere weight is not as indicative of good health as the eruption of teeth, growth of head and skeleton, quickness and keenness of the senses, powers of observation and mental development generally. A well baby is good-natured, cries and fusses but little, has more smiles than tears, and sleeps well and much. With these points as criteria the perils of weaning may be avoided by approaching as quickly and completely as possible the diet a wise Nature evidently planned for the human being.

It is not here claimed that the use of sub-human milk during the second phase of nutrition is responsible for all the subsequent ills of humanity, singly or *en masse*, but the claim is made that the child so fed is handicapped at the start of life, and a foundation is laid for trouble later in life. It is distinctly with the idea of overcoming this handicap and improving as much as possible, the child's start in the great race of life, that these dietetic suggestions are urged so seriously upon the consideration of parents, and all who are concerned about the question of food for the babe, infant and child. If the adolescent and adult thoughtlessly or from mistaken conviction habitually use milk as a part of their diet, and by so doing infringe one of Nature's laws, the evil results may not be easily traced because life becomes more and more intricate as the years pass; but how explain the presence of tuberculosis, cancer, pernicious anemia and the frightfully long list of incurable diseases which cut short by many decades the useful length of human life? A lesson to be drawn from "Tuberculosis in Cattle" (vide Chap. IX.) may

here be pointed out; viz., the handicap of one generation may be slight, or severe, but it is a handicap which under the same dietetic habits in succeeding generations becomes, by natural laws, progressively more and more severe until it has undermined resistance and the body becomes a prey to incurable disease.

No one acquainted with all the facts, however prejudiced for or against milk, or however convinced that it is or is not a suitable food for children after the weaning period, can fail to admit:

- I. That the use of modified and pasteurized cow's milk has saved the lives of thousands of babies during the past 25 years, and this in spite of widespread milk-borne epidemics, and in face of the fact that isolated cases of bovine tuberculosis have been caused by the free drinking of milk;
- II. That thousands of babies have had a start in life that otherwise could not have lived; but do these facts help to explain or prevent the increasing tendency to illness generally and to the greater prevalence of infectious diseases among the artificially fed; to the increasing prevalence of deficient and difficult dentition; to tonsillar inflammations and adenoid troubles; to ocular defects and mental deficiencies so common and increasingly common in modern times?

The one and perfect remedy for all these and connected disorders and abnormalities, the permanent and satisfactory remedy is to secure a womanhood that can nurse adequately its offspring. It is this phase of the question of milk, infant feeding and weaning, and *not* "birth control" that should be talked about, thoughtfully studied and taught rising generations of young women.

It must be kept in mind

- I. That not every woman, simply because she is a woman, can secrete ideal milk and successfully nourish a child;
- II. That a free quantity of milk is not necessarily indicative of good *quality*;
- III. That milk-borne diseases also are not uncommon in the human family;
- IV. That commendable efforts have been made, particularly by the Staff of the Floating Hospital, Boston, in recent years to obtain and conserve a supply of human milk for serious and especially needy cases among children, an effort which testifies to the superior qualities of human milk.
- V. That there are some Baby Foods, Baby Soups and Strained Vegetables and Strained Fruits, many of them of tested value, to be found in the shops. These may be appreciated by those in need.

The old aphorism "As the twig is bent so the tree inclines" is very applicable to the subject of weaning.

To do justice to the helpless child those responsible for its feeding must *overcome prejudices* no matter how hoary with age these prejudices may be. One should substitute knowledge and reason for prejudices.

One prejudice to be overcome has to do with the traditional faith in the necessity of cow's milk to the child during weaning and at later periods of life.

Another has to do with the use of "*coarse*" foods which theoretically irritate the stomach and bowels, but are essential to good health.

Another is in favor of the use of refined foods which have been deprived of many essential properties and are made thereby positively injurious. Refined or polished rice and beri-beri is a case in point.

Among the perils of the weaning period may be men-

tioned the formation and firm establishment of injurious dietetic habits: such as a dislike of vegetable food and an over-fondness for sweets. Beware of the delicacies of the table.

The average dietitian, cook-book and chef are sources of danger to a confiding public.

Cow's milk is not a necessity to the growing child or adult.

White flour is peculiarly dangerous at all ages as a food: especially so during the early developing stages of life. It is a man-made imposition upon himself. It is a one-sided unbalanced food incapable of supporting life and its use makes for ill health.

The refined white sugar of commerce is as artificial and insidiously harmful as anything in the line of food. It is demineralized, devitaminized, proteinless, and wholly inadequate as a nourishment. Humanity cannot live without sugar, and that is why an easily digestible nourishing sugar *is found in* most foods. That even lemons and rhubarb contain a demonstrable quantity of sugar can be proven by the merest tyro in chemistry.

Belief in the necessity of meat and meat foods for the young is wholly without foundation and is based probably on a prehistoric, barbaric, carnivorous period of human development. Meats contain the substances which when combined and thrown from the body as an excretion is called "urine." Comment would seem needless.

A reliance on Nature and as intelligent an interpretation of her methods and plans as can be made, will enable one to forget calories and proteins and even the highly venerated vitamins; for Nature has combined all these things in the foods she has prepared for all the forms of life, man included; and, by the way, prepared them before Man appeared on this planet.

In consideration of Nature's wonderful adaptation of means to ends and of the limited confidence Man has placed in her *provisions*, it would be well to preserve the "*open-mind*" and not cling too tenaciously to old human habits and customs but to analyze them and seek the reasons for them.

CHAPTER VI.

WHY THE "MODERN MOTHER" CANNOT NURSE HER CHILDREN

"Right and wrong are in the nature of things. They are not words and phrases. They are in the nature of things and if you transgress the laws laid down, imposed by the nature of things, depend upon it you will pay the penalty."

JOHN MORELY quoted by LOTHROP STODDARD
in "*The Rising Tide of Color.*"

CHAPTER VI.

WHY THE "MODERN MOTHER" CANNOT NURSE HER CHILDREN

By the "Modern Mother" is meant the present-century mother who represents the product of the prevailing civilizations. Among the less advanced and the unprogressive multitudes who people the earth the nursing bottle has not yet supplanted "mother's milk," although among these very people, as in India, Africa, Central and South America, according to reports of medical missionaries and others, infant mortality is pathetically high, or as Dr. Lois Cutter says, "terrific." (vide quotation to follow) The presentation of statistics would not affect the validity of the argument here offered, for it is a well known fact, whether widely heralded or not, that a large percentage of the young mothers of the present day, (early 20th century) are unable to nurse their offspring throughout the normal period of lactation. To the credit of modern motherhood be it said the mother of today heroically attempts the duty of nursing; makes a happy beginning, but finds, all too soon, that her supply of milk reduces in quantity or becomes impoverished, and her offspring loses in weight and strength, and finally a "substitute" has to be resorted to.

In the absence of reliable statistics connected with this subject, the following questions may be suggestive of the wide use of "substitutes":

Why are there so many varieties of "Foods" for "Infants" manufactured and put on the market?

Why are such large quantities of these foods sold?

Among what people and classes of people are they sold?

Why are there so many laboratories scattered over the country for the purpose of modifying cow's milk so as to adapt it to the uses of the human infant?

Why are so many books written on the subject and so many methods of modifying sub-human milk recommended?

In answer to questions concerning the artificial feeding of infants Dr. Lois Cutter of the medical department of the United Fruit Company writes:—

“In the regions or districts within the scope of the Company's hospitals many of the native mothers come at least to the dispensaries for help in caring for their children. In these cases, of course, the babies are fed by the the usual methods of the States . . .

In the regions bevond the scope of the hospitals, as well as in a good many cases where the people are too ignorant or superstitious, goat's milk or cow's milk is used to a large extent. There is an idea prevalent that it is best to secure one cow for feeding purposes and not to use any milk except from that one cow.

It is practically impossible to persuade mothers to boil water for dilutions, and every effort is made by us to have the child remain in the hospital for supervision of feeding. In some cases the mother comes for a daily supply of prepared food.

I should not say that the bottle is much in evidence.

Infant mortality is terrific in all these countries

due to living conditions; i.e., houses absolutely air tight at night, lack of sanitation and so on."

All of which testifies to the fact that inability to nurse offspring is not confined to the more civilized or cultured portions of the human family.

A brief but most valuable and instructive bulletin on "Breast Feeding" was issued in 1921 by the Children's Bureau of the U. S. Department of Labor.*

Apropos of human milk it is stated on page 5 of the bulletin:

"The experience of centuries, as well as scientific laboratory studies, has demonstrated that in nutritional properties, in purity and cleanliness, in warmth, in protective powers against infection, and in the assurance it gives a child of mother's care, *human milk can never be replaced adequately by artificial food*. The nourishment of an infant with anything other than the secretion of the human breast is properly termed 'artificial feeding,' or 'substitute feeding'. . . . The fact that the diet is other than the natural one renders an absolute solution of the problem impossible, since science has as yet been *unable to construct a food which is exactly like human milk*, and each child is an individual to whom general rules can apply only in a general way."

References are given on page 6 in regard to mortality:

"Studies made in many different countries have demonstrated that the death rate among the artificially fed is at all times higher than among the breast fed; that where for any reason breast feeding is the custom, the mortality rate is low in spite of other unfavorable factors; and that when for any cause breast

*Italics in the following quotations are the author's.

feeding is increased in a community the infant mortality rate is lowered. The studies of the Children's Bureau in New Bedford, Mass., Akron, Ohio, Manchester, N. H., and Brockton, Mass., have demonstrated that in these cities the mortality rate for the artificially fed is *about three or four times as great as for the breast fed.*

In studies made in overcrowded and poverty-stricken districts of London, New York, Chicago, and other large cities, the fact is very clearly brought out that where by race, or custom, it is the practice to feed infants at the breast the infant mortality rate is lower, even though the environment be highly unsanitary."

Especially significant is the statement found on p. 7 that during childhood and even later in life, the protective influences of breast feeding are manifested.

"Mortality figures alone, impressive though they are, do not tell the whole story. An extensive study of school children and military recruits in Germany pointed out that the good effect of breast feeding was manifested in later childhood and even in adult life. Nutritional disorders, not necessarily fatal but which permanently handicap the individual, occur much more frequently among the artificially than among the breast fed. These disorders render the infant much more susceptible to infection, and may produce deformities of a permanent nature (rickets)."

As to the vitamin content of breast milk, the following is very suggestive:

"In recent years variations in the nutritional properties of human milk have been shown to be due also to its vitamin content. The vitamins of human milk

are concentrated from the food taken by the mother; *if they are not present in sufficient quantities in her food, the milk suffers.* The effect of an insufficient amount or absence of these substances is exhibited in the child. Scurvy, for example, in the breast fed has been shown to develop because of the deficiency of the anti-scorbutic factor in the mother's food. The development of rickets in the breast fed has also been shown to be due to a deficiency in the mother's diet, reflected in the quality of her milk."

It may be emphasized that these quotations are from a Government document, and that the Bulletin quoted from is the result of careful study and investigation by an experienced, impartial and unprejudiced research worker; and carries an authority which ordinary writings do not possess.

But first of all what are Nature's provisions for the nourishment and sustenance of recently born mammalia? What is Nature's adaptation of means to ends in this connection? As usual we shall find them so marvelous as to call for reverence in considering them.

This entire subject can be approached entirely from the unsentimental, laboratory and biological viewpoints, and the following facts and suggestions are presented for consideration.

All mammalia are characterized by the possession of what has given name to the great family itself: viz. mammary glands, which function in the female for certain very definite purposes and at certain periods of life only. These glands are classified as "secretory" in opposition to "excretory," on account of compounding or supplying a necessary product, not in this case to the maternal structure itself, but to the maternal offspring. The process is simple, and briefly described consists of the following: the "epithelial cells" which line the tubules and acini of the gland possess the power of select-

ing certain substances which are distributed to them by the abundant blood supply of the gland, and combining these substances into what is known as milk, which consists of so much fat, so much sugar, so much protein, and so much water and so much of everything else known and unknown which may be needed to continue the growth of the offspring, which already has been carried to a definite point *in utero*.

Much has been heard during the recent few years (or since 1912) of vitamins and the vitamin content of milk, which simply means that Man, after Nature has for some hundreds of thousands of years been feeding infant mammalia and nourishing them by means of the maternal organism up to the point of their caring for themselves, has at last discovered that milk contains something in addition to fat, sugar, proteins, ash and water, a something which he is not yet sufficiently acquainted with to classify, describe, and correctly name: so the temporary name "vitamin" has cleverly been given it.

It should be emphasized that this milk is a "secretion": that is, it is formed by specialized cells which by "instinct" or under the influences of ages of heredity do a certain thing in a certain way. They have no brain to help them do their work intelligently. In their work there is no knowledge, will or reasoning. It is reflex or automatic. *They do not create anything.* They take or select substances (elements) which pre-exist in the maternal blood-stream and combine them into "milk." The maternal will, knowledge, devotion, love, may all help to control this process, though no effort of will, or amount of love on the part of the mother will force her glands to secrete good nourishing milk.

The process is analogous to the secretion of saliva, sebum (from sebaceous glands), gastric juice, mucus, sweat, pancreatic juice, etc.: that is, certain definite things are selected by epithelial cells having the power

to do so, from the blood which is distributed to them, and combined to form certain definite products. The great point to bear in mind is this: if the glands, thyroid, gastric, pancreatic, mucous, mammary, etc. cannot get what they need from the supplied blood stream *they cannot furnish the normal product*. It is all here as "in a nutshell." As to milk, the mother must have the ingredients, first of all, to form within herself normal, healthy, useful mammary glands; and secondly, she must have enough ingredients to supply the glands with what they need, when, under the natural stimulation, milk is needed. Consideration of the nerve mechanism which is involved is omitted as it is not important to the argument. The integrity of the mammary epithelial cells is of prime importance:—the supply of proper material with which to work is next in importance.

According to our chemists milk consists of fat, sugar, proteins, salts, and water: and the milk of different mammalian species differs considerably in these known respects, and probably even more in the unknown particulars of vitamins and other things that may yet be discovered; because it is not likely that even the "vitamin" idea is the last word on the subject.

The deficiency, so common in the modern mother, may have to do with any one or two of these ingredients, rarely with all. Sometimes there is an abundant flow of milk for a few days or weeks after childbirth, and then a gradual or rapid cessation of secretion. Unfortunately the deficiency cannot be surely ascribed to any one factor, but since the secretion is the result of an involuntary function and the involuntary functions are connected so intimately with nutrition: and since nutrition is the one big and distinguishing function of living organisms, it is within the bounds of the probable that the deficiency is a manifestation of unbalanced or disturbed nutrition on the part of the maternal or-

ganism itself. That is, simply put, the mammary glands cannot get from the maternal blood stream the elements needed to combine into milk, *because these elements are not in the blood stream.*

Again, it is the least essential functions that are most easily disturbed, and the secretion of milk is not an essential to the welfare of the mother. So, while the secretion of milk is the result of hereditary influences passing through thousands of generations of the human family, a modification, in the line of a deficiency, possibly may be more easily introduced by the indiscretions of one or two generations than is the case with the deeper and more fundamental inheritances. An heredity passing through 300,000 or 500,000 or more years is not easily set aside, so milk of some sort is secreted, but in the case of the modern mother a deficient milk, deficient in fats or sugars, or more seriously in the mineral salts, proteins and vitamins.

At all events a physiologically healthy mother will be able not only to truly nourish her offspring *in utero* but during the subsequent allotted time of lactation. She may seem buxom and even "husky"; be overweight, athletic or indolent, but she *is not physiologically healthy if milk secretion is deficient.* This common deficiency cannot by any known means, always be overcome in any one individual, but one or two generations of intelligent, rational feeding will overcome the deficiency and restore an imperfect motherhood to a normal status.

The carnivorous as well as the herbivorous mammal living a natural life seems to be able to carry on this function of milk secretion, so vegetarianism versus a mixed or meat diet cannot profitably be discussed in seeking a solution to the question.

Here, as in the case of all other glands, the mammæ are like factories. They may be adequate in shape, size, general structure, vascular and cellular equipment, but like the Israelites in Egypt they "cannot make bricks

without straw"; they cannot manufacture nourishing milk unless they have the material to work with. Those things the mother *can* and *must furnish through her diet and through her diet only*. Her food must contain starch and sugar and fats and proteins, mineral salts and vitamins enough for the healthy performance of all her own ordinary functions, and enough over to supply her mammary epithelial cells with the substances which they can convert into milk:—no single article of diet will suffice.

The ordinary diets of

White flour products,—

Demineralized cereals,—

Artificially and highly sweetened desserts and delicacies,—

Meats and meat dishes,—

Fish,—

Eggs,—

Milk,—

Demineralized vegetables,—

Confections, jellies, jams and preserves,—

In short the ordinary four course breakfast and lunch, and six or seven course dinner, is so artificial, unnatural, unbalanced and deficient that milk secretion is a matter of luck and chance, and is usually deficient or absent.

When a young mother is first made aware of this deficiency, it is too late, in the very great majority of instances, to remedy it at once. A fairly long period is needed in which to overcome the physiological inefficiency resulting from years, and probably from one or two generations, of wrong living. In all cases, white flour and white sugar should be absolutely excluded from the human diet, as unnecessary and even harmful; and the natural, unmodified grains and the fruit and vegetable sugars used instead: vegetables in wide variety also should be freely used, but cooked (if

cooked) so as to preserve all their minerals and flavorings; and fruits, berries and melons, should be liberally included, but eaten only when thoroughly ripened and matured, and without artificial sweetening.

It is especially incumbent upon the mother, who, in this case is responsible for another life than her own, to *eat for nourishment only*, and not simply to please a palate trained to the use of condiments and artificially modified, highly sweetened and seasoned foods. Nature is lavish with her rewards, and one soon finds more delight in natural unspoiled flavors than in the compounds and recipes of the trained and most mischievous chef: to say nothing of increased health and efficiency.

This inefficiency on the part of so many mothers should be looked upon not only as a direful misfortune, for the infant starts life with a serious handicap, one he may not be able to overcome, but as a disgraceful deficiency on the part of humanity; for the cause of the deficiency is either the result of ignorance concerning food values, or self indulgence, or the two combined.

One other viewpoint of the subject is not very frequently referred to, or considered. We hear much even in these modern days of "self expression," "self determination," "behaviorism," "liberality," etc., in the rearing of children, and of "What children owe their parents." The converse of this, however, "What parents owe their children" is not often discussed. The moral obligations of parents to children are heavy, and their indebtedness great. Very few children are conceived intentionally, in accordance with a mutual desire on the part of the parents. The inception is, as far as parents are concerned, usually accidental and simply a sequel to the gratification of sex impulse or urging. Thought, reason, volition, desire for offspring are not often involved, and the union of germ cells is purely fortuitous. Without consultation with or consent of

the children they are brought into the world,—*for what purpose?* None for which they are responsible. Certainly parents are under very grave "moral obligations" to the children upon whom they have imposed the tremendous possibilities of life. According to verse 5 of the 51st Psalm ". . . in sin did my mother conceive me." Probably this should be interpreted "into sin did my mother conceive me," for in the words of the liturgies and by practically common consent "we are all miserable sinners." Under any and all considerations, however, children are unwittingly forced to face *life*, with its cares and responsibilities, its anxieties, and incessant toil, its hopes and disappointments, its pains and its pleasures, its worries and uncertainties, its hardships and sorrows, its failures and successes, its sadness and its gladness, its ignorance and its knowledge, its possibilities of immortal life and truth and knowledge and freedom and blissful devotion to the Great Creator, the real and enduring and truly loving Father of the universe. By what right do parents impose such possibilities upon another immortal soul? In simple justice children have a right to demand of their parents a fair and trained start on the perilous journey of life. Certainly they have a right to demand, at the very least, a *healthy, sound and useful body, clean and balanced through and through*, with which to begin their own physical, mental, and spiritual growth and development. In these days of eugenics there is something for parents to think of besides "birth control" as the phrase is ordinarily interpreted.

Briefly then the child has a right to demand of its parents *health and intelligence and conscience* enough to furnish the food Nature clearly intended it to have. It is the mother particularly upon whom this burden rests, for the entire physical structure of the child is wonderfully put together during its prenatal life, and during an equal length of time, the normal period of

lactation, the child is normally dependent upon its mother for food.

The child has the right to demand that *all girls shall be educated to develop a strong, natural, vigorous body*, capable, should the demand be made upon it, of giving fully adequate nourishment to its progeny.

If Man is, as it is claimed, a rational being, i.e., if he possesses the power of reasoning which differentiates him from the brute creation, then the brain must be looked upon as the chief necessity in life.

The babe is absolutely ignorant and helpless at the time of birth. It must be taught everything, even control of the so-called instinctive and automatic functions which belong to it as a mere animal, insofar as these functions are controllable. The brain as the storehouse of knowledge and the seat of the will, intelligence and judgment, must be specially nourished, and since Man knows practically nothing about this, it is incumbent upon parents, mothers especially, to possess a normal and healthy body, obtained by scrupulously following the teachings of Nature and avoiding the artificial, using as food the things so generously furnished by Nature. Undoubtedly Nature provides Man with such a phenomenal variety of food in order to suitably develop the brain and nervous system.

The infant and growing child being wholly ignorant, knowing neither right nor wrong, devoid of morals, ethics, and religion, must be protected, cared for and educated by its parents, duties which should be shared by the father with the mother.

The spiritual, which is the most important thing in education, is a matter not immediately connected with deficient lactation, the subject under consideration. A sound, healthy, normal body and brain, nevertheless, forms a promising foundation for the development of moral and spiritual powers.

It may be concluded then from the biological and

humanitarian standpoint that parents do owe much, very much, to their children.

In conclusion then it may not be irrational to claim that the "modern mother" is deficient in the power to nurse her offspring because

She has inherited some deficiency;

She has not been fed wisely as a child;

She has not been educated to the idea of maternity and its responsibilities;

She has not been trained physically to the necessity of developing a strong efficient body;

She in her ignorance of physiology as an adult has not acquired a competent knowledge of food values;

Her condition of deficiency in milk secretion is due partly to heredity, partly to her upbringing and partly to her own dietetic deficiencies.

No man of intelligence would expect to manufacture corn or wheat or potatoes, or squash, or apples or any kind of fruit, berry, melon or nuts, or any of the natural foods. He can prepare the ground, plant the seed, cultivate and harvest the crop but he knows he can't make it:—that "God alone giveth the increase." It seems equally presumptuous for man to attempt to make a substitute for the marvelous thing, human milk. Would it not be wise to give up the effort and follow Nature's lead humbly and thankfully?

CHAPTER VII
DENTITION, NORMAL AND DEFECTIVE

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Dentition is a process that begins long before birth and continues until the eruption of the third molars or "wisdom teeth" at the twenty-second to twenty-fifth year of age. That is, the formation of the teeth in the human family covers the entire period of growth. The process is not carried on with the same intensity during this length of time. For instance "teething," as it is called in infancy and childhood, and to which so many and varied disturbances have been unjustly attributed, is only a period of intense activity in the eruptive process of the growing teeth: a physiological spurt during which the bodies and roots of the teeth are rather rapidly developed, the hard enamel organ or "crown" of the teeth having been previously and more gradually constructed.

It is unnecessary here to describe in detail the development of the teeth. Enough to say they are produced, like everything else in the body, through the agency of "cells" (minute nucleated masses of protoplasm). These cells come from two different embryonic layers, but no matter how simple, or how complicated, or how fascinating the process is, the result is the deposit of lime salts according to certain very definite patterns. The soft cellular elements, blood-vessels, lymphatics and nerves are the builders of the teeth, but the materials they use, and upon which the form, hardness, durability and usefulness of the perfected teeth wholly depend, is a combination chiefly of lime salts. Chemical analysis shows the teeth to be composed almost

wholly of lime salts:—carbonate, phosphate and fluoride of lime. Blood-vessels, lymphatics, nerves and some connective tissue are present in small proportions. According to Berzelius and Bibra the dentine which forms the roots and the body of the teeth is composed of seventy-two parts of earthy matter (lime salts) to twenty-eight parts of animal matter; the enamel or crowns of the teeth being made up of 96.5 per cent of earthy to 3.5 per cent of animal matter.

The durability and hardness of teeth are due to the fluoride of lime in the enamel. To secure desirable and lasting teeth it is absolutely necessary therefore, to have in suitable variety and exact proportion these lime salts. The conclusion is inescapable that an individual minus assimilable lime salts is minus teeth to just the extent of the deficiency. Put otherwise and one reads "a deficiency of assimilable lime salts leads inevitably to a deficiency in the teeth."

A very important related point is that the animal body, wonderful as it is in structure and function, cannot, never did and never will be able to *create* or manufacture lime. This fact evidently is not widely appreciated. The body cannot transmute one mineral into another, or one chemical element into another. The body then cannot create, but it can utilize, the minerals, the chemical elements that are, as food, brought within reach of its component cells. And it is the tooth-forming cells, the odontoblasts, or builders of the teeth that are endowed with the special faculty of selecting lime salts from the food offered them and depositing these salts and arranging them in the form of teeth.

Lime salts, in suitable variety and quantity, must be constantly available during uterine or prenatal as well as during early post-natal life, in order to first form and later to keep teeth in good condition, free from disease and decay. Even during adult life teeth may be

softened or hardened by the absence or presence in the body of available lime salts.

It is not too much to assume that with an abundance of needed ingredients the teeth would pass without incident through their various stages of primary development and eruption:—the first set would be, in due season, without disturbance, supplanted by the “permanent” set which would be as durable as the body itself:—and that disease and decay of the teeth would be unknown. The very reverse of this, unfortunately, is the case. Teeth are slow, often retarded and delayed in developing. More or less decay of the first set is the rule. Irregularity is common. And the second or so-called “permanent” set is oftentimes anything but what its name implies, for, pathetically enough, this second set is often extremely short lived. It is not at all infrequent to find the entire “permanent” set wholly removed by disease and necessary extraction during the twenties, and it is an exceedingly rare thing to have many of this set retained in a healthy and normal condition as late as the seventies. *The “permanent” teeth should last, without disease or decay, as long as a person lives.*

“Thousands of bodies exhumed in Nubia, in the vicinity of the Assuan Dam, show on examination that the Egyptians suffered but little from pyogenic infections; that the death rate of children was much lower in ancient than in modern Egypt, and that in the earlier and less luxurious epochs few of the inhabitants of the region suffered from premature decay of the teeth. At no period is there any sign of filled or of artificial teeth, and even as late as the sixteenth century B. C. a large proportion of adults in some districts were able to show perfect sets of teeth.”

(excerpt from Walter Libby's book, “The History of Medicine” p. 11)

Everyone knows, however, that the primary set in almost every child needs the care of the dental surgeon before the natural termination of its usefulness, and the "six year molar," the first of the permanent set to make its appearance, is frequently soft and carious within a short time of its eruption.

It is equally well known that the period of the eruption of the primary set of teeth, the "teething process" of the nursery, is in a large percentage of children a hazardous time. Attacks of fever, loss of appetite, poor digestion, constipation or the reverse, nausea or vomiting, loss of weight or cessation of gaining, irritability, crying and fretful spells, indifferent and broken sleep, convulsive seizures and other difficulties are, in domestic and even professional circles, attributed to "teething." That such states do occur during this period of life is a universal experience. That many of the illnesses may be reflex in character is also true; but one should not be content with these standard explanations. Children who exhibit any of these and similar symptoms are not up to par; they are not in good physiological condition. Thorough examination of the mother, her milk and the child, will very frequently reveal the fact that the infant is trying to live on a deficient or unbalanced food and the abnormalities it is suffering from are due to faulty nutrition. In such cases perchance, it is the nursing bottle that originates the trouble, and here the most careful inspection is needed. People too calmly accept the traditional idea that suffering of some sort during dentition is natural and must be accepted as a foregone conclusion. This mental attitude is wholly wrong. *A normal process should not be distressing or painful or dangerous.* The development of the teeth is absolutely a normal process and covers more than two decades of life. Not continuously but intermittently its symptoms are evident. The process itself is, once more, a normal process and should not produce

any deviations from the healthful normal condition. In medical circles it is being recognized that the teething process is one of the best indices of the general state of nutrition. Its manifestations are simple, easily accessible, plainly manifest, and unmistakable. The cure of its distressing symptoms is to be sought not in "soothing syrups" or palliative medication but in getting at the root of the trouble, recognizing and modifying the malnutrition. This is not the lazy man's method, or taking the line of least resistance, but it is the most scientific, the most rational and by all odds the most ideal and worthy and truly humanitarian way of treating these abnormal states.

An enormous number of Public School children, averaging approximately twenty-eight thousand (28,000) are treated annually at the Forsyth Dental Infirmary for children in Boston. And this number, large as it is, does not include by any means the probably larger number treated at other institutions and by their own family dentists. Why should this be the case? The question is answered very practically by a forceful and timely editorial in the Boston Medical and Surgical Journal for June 21, 1923, entitled "Is Dental Caries Avoidable under Present Dietary Conditions?" Very evidently it is not, for with ensuing generations the teeth decay at earlier and earlier ages.

An admirable paper discussing the question of "Dental Health: A Problem in Nutrition" by Dr. Jos. Garland also is to be found in the N. E. Journal of Medicine for March 15, 1934, p. 565. In this article the causes of caries and more especially the relationship of diet to caries are definitely and clearly, rationally and positively emphasized. For details which are scientific and sensible the reader is referred to the article itself, since disconnected quotations would be inadequate and might easily do injustice to a praiseworthy teaching.

Examination of the lunch boxes carried by school children, indicative as they inevitably are of the food they get at home, and the lunches they frequently get at school itself, shows at a glance the prevalent deficiency in mineral ingredients without which it is absolutely impossible to form sound teeth.

Children are instructed by parents and nurses, at home and at school, in the care of the teeth, and the modern urban child of even the lowest social stratum has opportunity to learn the usefulness of the tooth-brush; and yet according to Dr. Howe of the Forsyth Dental Infirmary some of the finest and most perfect sets of teeth he has come across have been found in the mouths of children who have never made the acquaintance of a tooth-brush. In short, it is not sanitation that makes the teeth, or seriously controls their destiny, any more than keeping the dust and dirt off a plant will make it grow. The plant must have suitable soil, moisture and heat, or in other words suitable food, otherwise it simply cannot grow sturdily and bear fruit abundantly. This is as true of the human body as it is of the plant.

Much is heard about uric acid and the acidity of the oral secretions softening and producing decay of the teeth. The absurdity of the claim may be proven by exposing bone or teeth to the action of uric or lactic acid solutions, or saliva. Fairly strong solutions of hydrochloric, nitric, picric and other acids will dissolve lime salts, but uric acid will not; and the weak reaction (often neutral or weakly alkaline) of the oral secretions is demonstrated by the use of litmus paper.

Much is heard about the action of germs in causing dental caries and there is much that legitimately can be said on this subject, but are the germs that may be found in connection with carious teeth the cause of the caries or the result?

If germs from decomposing food, or from other ori-

gin, are causative agents of caries in spite of the most approved dental hygiene, how is it the children referred to by Dr. Howe, who have never known the use of tooth-brush, dentifrice, antacids, disinfectants etc. have such splendid, hard, well formed and durable teeth? And how about animals living a free and natural life whose teeth last the life-time of the animal? No artificial dental hygiene there!

The following argument seems incontrovertible. Children brought up on bread and dozens of other things made of, or from white flour which is largely demineralized, such as the ordinary white bread, rolls, biscuits, muffins, toast, cookies, doughnuts, cakes, pies, tarts, sandwiches, etc.:—who for “cereal” or breakfast food eat hominy, cream of this, that, and the other grain; flaked this and flaked or puffed or malted something else; who eat much American made white macaroni and spaghetti, or polished rice, farina, sago, tapioca and similar things; who eat, as practically all children do, very freely of sugar, (the commercial white sugar) on foods generally, and especially in jellies, jams, preserves, marmalades, ice cream, ice cream sodas, *confectionery* of hundreds of varieties; and whose diet consists chiefly, as here suggested of carbohydrates and *demineralized* foods, of foods minus the absolutely essential lime and other salts, *simply cannot develop durable, hard teeth*, because their tooth-forming cells have insufficient lime, magnesium, etc., with which to work. Apparently the ordinary bone-forming cells (osteoblasts) appropriate, in order to build the skeleton, what lime happens to get into the children's food. The teeth are starved and therefore deficient. It is to be remembered that it is during the intra-uterine and earliest period of life that the enamel organs which form the hard crowns of the teeth are laid down, and that the enamel organ of the wisdom teeth is being formed as early as the third year of life, although its full growth

and eruption may not be completed until the twenty-fifth year of life. The great importance therefore of keeping up an adequate supply of assimilable lime salts in the food given children and young adults would seem to be very evident.

Soluble lime salts needed by the body's various activities may be found in the milk of healthy, properly fed mothers and this vital point cannot be over-emphasized. Prospective mothers, not only during pregnancy but for years before that event, should be taught the absolute necessity of eating those articles of food which will make their own bodies an enviable possession, and which will furnish their offspring during the vitally important period of prenatal existence those chemical elements in natural form and combination from which a strong, sturdy, well balanced, healthy, enduring and useful body can, and surely will be formed. Pregnancy and parturition will lose their dread and suffering, and lactation will prove to be a successful and happy period if the prospective mother will simply eat intelligently and rationally. And she can be helped to do this by realizing how helplessly, pathetically and absolutely dependent upon her is her child, not only for its teeth but for every organ in its body; in short for its complete physical and mental equipment.

Assimilable lime and other mineral salts are to be found in the cereal or grain foods (whole wheat, rye, oats, rice, barley, fresh corn and unbolted corn meal); and abundantly found in the almost unlimited variety of vegetables, berries, melons and fruits so lavishly furnished by Nature's own laboratory ready for digestion, absorption and utilization. The bones of the skeleton, the brain and entire nervous system, and the blood all need lime salts, and enough must be furnished the mother for use during the prenatal and nursing period, and also for the needs of the growing child thereafter. Therefore demineralization of food must not be per-

mitted if good teeth are to be had. It must not be forgotten, in spite of advertisements, that no one single food furnishes all that is required by the human organism (except good human milk during infancy). Orange juice and spinach juice may contain necessary vitamins and possess many virtues, but a variety of natural foods is needed to furnish the organism all the elements it requires for healthy development.

Above all things the *growing organism must not be given demineralized foods* for (once more) carbohydrates which form the great bulk of children's food cannot, by any known process within the body or without, be converted into lime salts, and without assimilable lime salts the tooth-builders (odontoblasts) are most seriously handicapped.

CHAPTER VIII

THE INJURIOUS POSSIBILITIES OF PURE FOOD

"In short, it may be said that according as the quality of the diet diminishes with respect to proteins, fats, minerals and vitamins, so do physical efficiency and health; a rule which applies with equal force to the European as to the Indian."

SIR ROBERT McCARRISON.

CHAPTER VIII

THE INJURIOUS POSSIBILITIES OF PURE FOOD

It so happens that the physician in his efforts to cure some of the chronic conditions that come under his care, finds it necessary from the diagnostic and therapeutic standpoints to seriously consider the possibly pathogenic influences of diet. The writer's attention was primarily directed into these channels many years ago by reading an interesting and illuminating book on "Diet" by J. Milner Fothergill, one of the most popular, able and influential English physicians of his day. During this interval of more than half a century the uric acid idea became exceedingly prominent as an etiological factor in the production of chronic disorders and Professor Haig's dietetic treatment was initiated and attained practically a world-wide reputation. "Vegetarianism" also, has been much to the front and has been advocated ardently and enthusiastically, by some who have argued from the firm foundation of physiological chemistry, but chiefly by those whose arguments have been founded on sentimental or humanitarian grounds, or ethical or religious convictions or who have been mere faddists. Salisbury's "Beef Plans," a method of treating many chronic and obstinate conditions by the use of an exclusive and even raw meat diet, also held sway temporarily and made many converts, as well as victims.

Unfortunately for the medical profession, and more unfortunately for suffering humanity, there has been no universal acquisition and diffusion of knowledge concerning what constitutes a rational and truly physiolog-

ical diet. From time immemorial, people have eaten for food such things as have come their way, or such things as have been dictated by convenience, by fashion, or by economy. It seems an anomalous state of affairs that humanity has not yet learned, even in this intensely scientific age, what we should eat, and in only a vague way has learned why we should eat. Some medical writers who aim to instruct the public by popular lectures and articles in magazines and newspapers, claim that in the subject of diet man should follow his inclinations; should eat whatever he wants to, that he can get, in any variety and quantity; in short that he should be guided by his appetite, desires, cravings, palate, or as they say, by his "Instinct."

Certainly it is not as widely known as it might be and as it *ought* to be that Man during his prenatal life practically passes through all the different phases which are characteristic of the various forms of life below him; from the structurally simple unicellular organism, the oöspERM, through the multicellular, the differentiated trilaminar and the tubular phases and so on, stage by stage, until he is finally a vertebrate, and step by step through the vertebrate series up to its climax, man himself. He possesses, therefore, the characteristic, functional possibilities of all the forms of life below him in the scale of living beings and therefore he possesses instinct, but instinct modified by his being made a potentially rational being. Instinct may be his only guide as to diet but as he progresses in his evolution *Reason* will take its place and he will become kinetically "*Rational*."

What utter confusion, unhappiness and desolation would be brought about in individual and community life, in the development of character and morals if man were to be guided in all the affairs of life by his appetites and desires, his "instinct" or which is much the same thing, his "moral depravity!" If instinct and ap-

petite are trustworthy guides in eating and drinking they are equally trustworthy in these other affairs and relations of life.

Man, however, is a potentially rational being—although the evidence does not always point convincingly to that fact. Man is so equipped that all his actions may be and should be guided by knowledge. He is not a mere animal to be guided by instinct; he should be led by reason, because in addition to potential rationality he is endowed with "free will;" he has the power to elect what he shall do under certain circumstances. Of all animals, man alone has the power of acquiring and applying knowledge, in a broad sense, to daily life. In this all-important matter of food for the natural body one cannot help feeling that needed knowledge may be acquired by a suitable study of physiology and chemistry, and by following the hints so generously given by Nature herself.

In these days of wide-spread interest in collegiate and national athletics, in Marathon races and Olympic games, everyone is familiar with the term "training table." It is probably true that tradition rather than exact physiologico-chemical knowledge prescribes the menu for such a table, but it is practically universally recognized that a certain and regulated diet is necessary to bring one up to his physical best and enable him successfully to endure the strain of training and competitive contest. If an athlete "breaks training" in diet or otherwise, disastrous results and failure are looked upon as certain. Humanity's attitude toward this question emphasizes the fact that the *diet ordinarily made use of is not the sort calculated to set one into, and keep him up to, his best form.* Logically then it may be assumed that "the diet ordinarily made use of" may be or is positively injurious, and the following pertinent question becomes permissible since life is full of tests requiring strength and endurance of body and of

mind, *Why not keep in continuous "training" dietetically and otherwise?*

In these days, also, when science is being turned to economic uses, people generally are more or less familiar with the investigations carried on and the educational work attempted by our national "Department of Agriculture," by our various state Agricultural Colleges and Experiment Stations. The rural population hears much about and appreciates the value of potash, ammonia, nitrogen, lime, phosphates, etc. in agriculture. It knows something about the feeding of plants and realizes the necessity of a well-balanced ration if a good crop is to be secured. It is becoming known that too much of one thing in the soil will make all stalk, blades and leaves but produce no fruit; that an excess of something will burn the roots and perhaps kill the plants; that one kind of soil (nutriment) is needed for potatoes, another for asparagus, another for fruits, etc. That is, the health, vitality and productiveness of plants have been and are being scientifically studied and the acquired knowledge put to practical use. The farmer knows how to fatten hogs, chickens or geese economically, and how to feed horses and "stock" so as profitably to utilize their various possibilities—but poor neglected humanity! Efficiency, avoidance of disease, and nutrition (diet) have not yet been usefully consociated.

In this brief presentation of views it will be impossible, of course, to go into details with any sort of thoroughness, but a few ideas may be offered with the hope of exciting an interest which will result in the acquisition of knowledge.

First let us prepare for a discussion of the subject by formulating our conceptions of food. What are we to understand by the word itself? Duglison, who is still an authority in the medical world, under the word "Food" simply refers us to "Aliment."

His definition of "Aliment" is "Food: any substance which, if introduced into the system, is capable of nourishing it and repairing its losses." The Century Dictionary tells us that Food is "What is eaten for nourishment; whatever supplies nourishment to organic bodies; nutriment; aliment; victuals;" etc. also "Anything that sustains, nourishes and augments." These definitions while in the main satisfactory lack the definiteness and precision needed for our present purposes.

If we turn to biological studies we shall find that the physical basis of life is the chemical compound called protoplasm, and that life manifests itself through certain functions or properties of protoplasm which are called irritability, nutrition, growth, reproduction, conduction and locomotion. "Nutrition," that marvelous property of life, consists of taking into an organism substances from without, organic and inorganic, disintegrating them and recombining them so as to form the organism's own protoplasm. The entire chain of disintegrative and constructive processes plus the production of energy and the elimination of waste matter constitute metabolism; and metabolism consists of simple and complex physico-chemical processes which are under the direction and control of vital force. Nutrition, as far as thought or language is concerned, may be expressed in chemical terms and it is to chemistry, physiological chemistry especially, that we must look for knowledge concerning our subject. For our purposes we may conclude that food is the material, elementary or compound, organic or inorganic, from which vital force may construct protoplasm and maintain its efficiency.

Nature has given us, if we can read her language, that is, interpret the handwriting on the wall, only one perfect food for mammalia during the early part of extra-uterine life, and that is milk "*each after its kind.*" After birth, during infancy, the most active and impor-

tant period of development, perfect milk furnishes all the ingredients for the construction of protoplasm and milk may be looked upon as the type of food necessary for the later growth and activity of the mammalian body. Food, therefore, must consist of water, carbohydrates, fats, proteins, and mineral salts in due proportion and quantities besides vitamins and other things yet to be discovered.

If we turn for a moment to the pathogenic aspects of food we shall find that medical literature is remarkably silent on the subject. Among the laity, however, certain aphorisms exist which show that this phase of the food problem has attracted attention. For instance, an old saying has it that "Men do not die; they kill themselves." Also, "Many men dig their graves with their teeth;" "Diseases increase in proportion to the number of chefs;" "What is one man's meat is another man's poison;" "More people die from overeating than from starvation;" "Much meat, many maladies;" "Quick to the feast, quick to the grave;" "Feastings are physicians' harvests;" "As a man eateth, so is he;" and so on. Apropos of the last, a small boy who was being taught that he made himself by his food, asked, "If a cannibal eats a missionary, will he become a Christian?"

As has been said, the pathogenic aspect of food has been curiously, and even unwarrantably neglected by medical writers, and unnecessary confusion exists in medical circles concerning the injurious possibilities of food on the one hand, and the effects of a disturbed or vicious metabolism on the other. The difference between the two is, however, easily and clearly definable. In the 1912 edition of Osler's "Principles and Practice of Medicine" we find a short section devoted to "Food Poisoning" and we naturally turn to it with the expectation of finding something instructive on the subject, but the examples cited refer to infected food

in which the food forms simply the vehicle for poisonous parasites, germs, fungi, and the products of putrefaction, or to poisonous things like poisonous mushrooms which are eaten by mistake for the edible varieties. In the case cited it is the parasite, germ or putrefactive product that poisons and *not the food itself*. On the other hand, in a notable book by Winfield S. Hall entitled "Nutrition and Dietetics" (1911) we find a section on "Nutritional Disturbances Due to Food" which presents the pathogenic possibilities of food in a clear and logical manner. And here notice particularly the fact that it is *pure*, that is *unadulterated*, food to which Dr. Hall refers. For instance, to quote a paragraph from Dr. Hall's book to illustrate this point: "Overfeeding:—This occurs especially in the first few months before the baby and the breast have become adapted to one another. The baby gets either too much milk at proper intervals or more commonly too much at too frequent intervals, or else its tolerance for fat is lower than normal. Regurgitation and vomiting are commonly the first symptoms. Occurring immediately after feeding, it may be considered a physiological process of getting rid of an excess of food. Sooner or later it comes on some time after nursing, and is then part of a dyspeptic condition that manifests itself further, if unchecked, in undigested, curdy, greenish, slimy, sour and irritating bowel movements that are greatly increased in frequency. With this there are discomfort and restlessness, shown even in the short intervals of sleep by the drawn, anxious and twitching face. The child seems hungry, sucks its fingers, and eagerly looks for the breast, that is only too often given still more frequently. Periods of colic that are exceedingly painful and cause the child to draw up its legs and scream pitifully, occur as a result of the increased gas production and distension of the intestines, making it difficult and painful for the gas to pass on. The but-

tocks are excoriated, often ulcerated. Thrush is apt to appear in the mouth. Eczema of the cheeks, scalp, and body is common. The child becomes pale and flabby and loses in weight. Fever and intoxication naturally follow in severe cases, unless the condition is relieved. The fat is, doubtless, the chief disturbing element." And again: "Under feeding:—This occurs if the mother has an inadequate supply of milk, or more rarely, if it is of poor quality. There is, naturally, no evidence of indigestion, and yet a failure to gain normally in weight, or what is more serious, an actual loss. A very suggestive symptom is constipation, that is rarely ever due to any other cause in breast feeding. The baby is commonly quiet and 'good,' often 'too good,' and may become listless and apathetic. If the lack of food is marked, it finally becomes pale, inactive, weak, cool to the touch, emaciated, with soft and sunken abdomen, and depressed fontanelle, and may not nurse or even swallow when food is introduced into the mouth. The bowel movements may become greenish or greenish-brown and slimy looking, as in infants on a simple water diet. . . . The baby often nurses quite indifferently, and then cries because it is not satisfied. Excessive crying and apparent hunger are more characteristic of overfeeding than underfeeding."

Dr. Hall then directs attention to the disturbances caused by fat when given in too large quantity; by starch as used in certain "baby foods," or when used too early in life before preparations for its digestion have been completed; by the excessive use of sugar in artificial feeding; and by the too free use of protein. He also discusses the subjects of "Food Intoxications" (differentiating these from bacterial infections), of "metabolic bankruptcy;" of lack of toleration of breast milk or artificial foods, and the dietetic regime by means of which these conditions may be best overcome. This book by Dr. Hall brings out more clearly than any other

book with which the writer is acquainted, the pathogenic potency of an unbalanced diet or of a diet unsuited to a given child, and the therapeutic value of a diet adapted to the peculiarities of the individual infant.

It has long been recognized that rickets and scorbatus are typical instances of nutritional disturbances brought about in infants by an unbalanced diet. The food administered in such cases may be *pure*—too pure and sterile perhaps—but is lacking in some important ingredient and the results are disastrous. Probably in no branch of medicine has physiological chemistry done so much to decrease suffering and prolong life as in the department of infant feeding, and it is a firm conviction and contention that a rational application of chemical knowledge to the feeding of adults will prove as life saving as has been the case in the feeding of infants. Incalculable misery and unhappiness may be prevented and human life still further prolonged, its usefulness and comfort vastly augmented, by the suitable adaptation of what is called food to the needs of the individual body. The quality and quantity of food should be intelligently scrutinized and rationally estimated if the human body is to accomplish the greatest amount of work with the minimum of wear and tear to the organism. From the standpoint of dietetics the human body should be regarded as a machine or engine and fed with as much care as a man, for instance, will feed his automobile engine.

An enumeration of the abnormal conditions directly traceable to an unbalanced ration or an improper supply of food will include many forms of indigestion or dyspepsia, flatulence, diarrhœa, constipation, obesity; certain varieties of what is called rheumatism, gout, gall stones, renal and vesical calculi as well as endogenous and exogenous forms of auto-intoxication, acidosis, varieties of arterio-sclerosis, anemia, chlorosis, and

even apoplexy, as well as many forms of that protean disorder called neurasthenia. And it is the consensus of opinion at the present time that a widespread and fatal disease occurring in Asia and Japan called beri-beri is due to the removal of mineral salts in whole or in part from rice during its preparation as a food. Also the enfeebled resistance that permits the body to fall a prey to many diseases, tuberculosis, and cancer, for example, is probably due in great part to an improper feeding of the body. The list is far from complete but these conditions are cited simply as examples of the disorders that may owe their existence chiefly if not wholly to errors in diet.

One would hardly be so rash as to claim that insanity and cancer, both of which conditions are increasing with deplorable rapidity as may be shown by reference to health statistics, mortality records, hospital reports and medical literature and experience generally, are directly due to improper food, but how about the *pre-disposition* or the lack of vital resistance which permits the development of these forms of suffering and disease? It is a matter of common knowledge that the most successful treatment of the lamentably frequent disease, tuberculosis, is based upon upbuilding of the body's resistance and recuperative energy by improving its nutrition. Suitable food, and fresh air by means of which the body is oxygenated and therefore all its functions stimulated, bring about this improved nutrition and the increased resistance based thereon. Considering what can be adduced as proof of pathogenic and therapeutic influences of diet in beri-beri and tuberculosis, rickets, diabetes, scorbutus and other diseases, it is certainly not far fetched to claim that there is an etiological relationship between an unbalanced or unsuitable diet and insanity and cancer, in so far at least as the *development of susceptibility is concerned*, and

that this subject should be more seriously and assiduously considered than has been the case.

It is not inappropriate to direct attention at this time to certain distinctly pathogenic agents among the most widely used pure foods. There are three of these agents to the too free use of which may be attributed many ills, and to the excessive use of which there may be well founded opposition. These three things are granulated sugar, white flour and meat or the flesh of animals.

To this trio of injurious pure foods, although there are serious objections to calling meat pure food, should be added a fourth, viz., the milk of subhuman animals. This subject which is a large and most serious one has been discussed in the earlier chapters of this book, and need not be more than mentioned here.

Granulated sugar represents the crystallizable element of the juice of the sugar-cane and the sugar-beet obtained by the evaporation of the watery constituents of the juices, the product being "crystallized," refined," and "bleached." No one can deny that it is an unnatural food for nature does not give it to us in its artificial form. It is a highly concentrated sweet, and capable when used with the ordinary freedom among the well-to-do of "spoiling the appetite," of producing fermentative disorders in the gastro-intestinal tract, and of upsetting hepatic functions with an acknowledged ease and certainty. Its ultimate effects upon metabolism are not sufficiently recognized or as yet known. Obesity and diabetes among other conditions are attributed to the too free use of "sugar" by no less an authority than Dr. Joslin.

No one would consider taking a quart or so of the thin and limpid sugar-cane juice at a meal. To do so would be considered excessive, and yet many teaspoonfuls of the concentrated juice in the form of sugar are taken at every meal by the average individual. No

wonder sugar is hygroscopic, for the water which forms its natural solvent has been artificially driven off by evaporation, and it is not unlikely that its hygroscopic property plays a part in its etiological possibilities. Sugar, as we know, enters largely into the preparation of the so-called foods, or more precisely, the culinary products of confectionery which find their way to the tables and stomachs of civilized people, and it is among civilized people that we find the greatest number and variety of diseases. It is a recognized fact that human breast milk, the highest type of food for the rapidly growing human organism, contains a relatively large amount (6 or 7 per cent) of sugar, but it is lactose, not cane-sugar, and it is the only carbohydrate in milk, starch being absent. It is recognized that a form of sugar is found in liberal quantities in other foods, such as corn, beets, carrots, turnips, sweet potatoes, parsnips, squash and other vegetable foods, and practically in all fruits and berries, but in these foods the sugar is in a natural combination and proportion. It has been put there by a nature wise beyond our comprehension, and if we take it as nature has provided it we are not likely to use it to excess. It is well known that all the starches we eat are converted into a form of sugar in the process of digestion; that a sort of sugar is stored up in the liver and in the muscles; that sugar is a fuel food of high value; in short that sugar is a *necessity* to the well-being of our bodies; but once more we should use in reasonable quantity the *natural* and not the *artificial* product if we wish to avoid discomfort and disease. The fact that the artificial, granulated sugar does not react to the ordinary chemical tests for sugar shows that some change has been made in it by the processing it has passed through. Other matters connected with sugar have been referred to in the chapter "The Sugar Problem."

White sugar has been manufactured in large quan-

tities since about the time of the American Civil War, and during the intervening period there has been, if statistical and other information be trustworthy, a notable increase in the prevalence of mental, nervous, intestinal, nutritional and other disorders, not necessary to enumerate.

The principles which underlie the criticism of the prevalent uses of cane sugar here advanced apply with equal force to criticism of the use of white flour. White flour decidedly is an artificial product and in its preparation much of the mineral matter associated with it in its natural state is removed. It is exactly on a par with the polished rice that is the acknowledged cause of beriberi. In the milling process something essential is taken away, for the mineral salts have been reduced fifty per cent, and the proteins have been reduced seventeen per cent. When we realize what a difference a fraction of one per cent of fat or sugar makes in infant feeding, we can readily believe that the large reduction in salts and proteins brought about in the milling of white flour must be capable of seriously affecting the health of those who habitually use, in large quantities, white flour as a food.

The following quotation from the "Encyclopedia Britannica" is here introduced because it contains some statements of facts which are undoubtedly truths, and because it reflects certain popular opinions which are not sound.

"Qualities of Flour: There seems to be at present some conflict between public demand, as indicated by the increasing attention paid to the production of a fine, strong, white flour, and the current or scientific opinion expressed, though with some hesitation and doubt, in favor of whole meal or flour in which the richly nitrogenous outer portions of the wheat are retained. The fact that the outer portions of the wheat are richest in nitrogenous principle, and that also in

a peculiarly active form, is indisputable; but it has not been satisfactorily determined whether the nutritive value of that portion of the grain is exactly measured by its chemical composition. The condition of the nitrogenous substance, the amount and irritating nature of the ligneous tissue which accompanies it, and its peculiar influence on the other constituents of the wheat grain may and probably do affect its value. It is certain also that white flour is deliberately preferred by the laboring population, whose instinct is probably right, and it is also preferred by and for many purposes indispensable to the baker and cook."

The points to be objected to in the preceding quotation refer, first, to the "irritating nature of the ligneous tissue which accompanies" the nitrogenous substance of the wheat grain. It is a frequently expressed opinion that the hulls of grain (the ligneous tissue) and the cellulose of vegetables are "irritating" and injurious and should therefore be removed from these otherwise valuable foods. If the word "irritating" were used in its physiological sense of "stimulating" it need not be objected to, for the cellulose of vegetables and the ligneous tissue of grains are both very useful as a natural mechanical stimulant of the peristaltic action of the intestinal tract, and if these substances were allowed to form a regular proportion of our diet, such as is suggested by nature, there would be no need for the enormous expenditure of millions of dollars per annum for, and the almost universal use of, laxatives and cathartics. This would mean not only an immense saving of the hard-earned wages of the "laborer" and others, but it would also mean a freedom from the injurious effects which attend the habitual abuse of cathartics.

It is not necessary to comment on the fact that one of the largest milling concerns in the United States carefully saves the embryonic area of the wheat kernel in addition to the external layers removed by the mill-

ing process, and under an appropriate name it is successfully and widely sold and used to combat and cure the weaknesses, deficiencies, and diseases produced by the too free use of white flour as a food: an exact analogue of taking rice screenings from the polishing process to cure, palliate, and inhibit the condition beriberi.

Secondly, one is justified in objecting to the idea that the "instinct" of the laboring population is "probably right." As has been suggested, the physical salvation of the human race is to be made sure by the acquisition and practical application of a rational judgment founded on knowledge of good and evil and not upon any blind following of that uncertain thing called "instinct."

One may quite unreservedly approve of many of the statements attributed to Mr. Alfred McCann in a lecture reported in the Boston daily press as follows: "Mr. McCann gave the mineral constituents of true grain food as twelve—iron, phosphorus, potassium, magnesium, manganese, sodium, sulphur, silica, fluorine, chlorine, iodine, and lime. Each of them, he asserted, has its own essential food function, and it is the filching away of 75 per cent, by the screening of wheat to remove the bran and tailings, the polishing of rice and the pearling of barley, that prevents more than a small portion of these life-giving elements from reaching the population."

The lecturer quoted figures to show that in 1910 there were in America 15,000,000 children of the school age physically defective in one way or another; 1,000,000 tuberculous, 6,000,000 with enlarged glands and 10,000,000 with poor teeth. He insisted that many of these conditions could be traced to defective bread.

"Of the 600,000,000 bushels of wheat produced in the United States yearly," said Mr. McCann, "not 1,000,000 reaches the human family as nature intended it should."

White flour enters, to an unreasonably large extent, into the diet of the average person. It is found in the ordinary white bread, biscuits, rolls, muffins, crackers, cake, pastry, pies, and as a thickening in gravies and soups. One may acknowledge that these things are whiter and flakier and possibly more attractive therefore to the eye, and unfortunately are considered more palatable by the "instinct" of the laboring population than the same articles made with or from the whole or natural wheat flour; but these are no reasons, by any means, why white and bleached flour should be so universally used by people who should be intelligent and rational.

Once more it is sensible and logical to claim that a wise and beneficent nature dictates that we should use as food the grains, vegetables, and fruits she has so wondrously and laboriously combined for our sustenance and physical development.

If our present purposes permitted, it might be profitable to consider at this point the variety, composition and food value of the cereals so bountifully supplied by nature; the tenacity with which they hold on to the vital principle as manifested under congenial circumstances by the growth and productiveness of grains which have lain buried with mummies for thousands of years; and the constructive metabolism of plant life as opposed to the destructive metabolism of animal life; but the merest reference to these subjects will have to suffice.

The third point, the pathogenic properties of meat or animal flesh, there is not time at present to elaborate. Briefly, the chief objection to the average meat diet is based on the fact that animal tissues, possessing as they do a destructive metabolism, are more or less charged with waste and excrementitious matter and chemical compounds, some of which are distinctly toxic,

and which may prove fatally toxic to the animal producing them, *if they are not eliminated*, as well as more or less injurious to those who freely partake of them as food. One may recognize the fact that meat contains certain useful nitrogenous elements and compounds, as well as soluble mineral salts in an assimilable form that are valuable as foods. These things, of course, are not objectionable. It is the toxic elements and possibilities of meat that are to be objected to. And since proteins and easily assimilable and necessary mineral salts are accessible in other foods which do not contain the waste products of animal life, it seems, from the physician's standpoint, they should be substituted for the customary meat diet.

To be a little more explicit, it is to be taken for granted that physicians as a rule are conversant with the exceptionally brilliant and original investigations into animal metabolism and the toxicity of urine conducted by Bouchard. Certainly every member of the profession is familiar with the more recent work of Von Noorden, whose name has become almost a "household word" among the intelligent laity, and whose demonstrations in connection with the toxic influences of a vicious metabolism has practically given rise to the aphorism, "Man is the generator of his own poisons." Profession and laity are thoroughly acquainted with the terms "uraemia," "uraemic convulsions," "uraemic coma," "uraemic headaches," "uraemic vertigo," "auto-intoxication," etc., and it is well known that deficient elimination as a part of a disturbed metabolism is chiefly responsible for these and allied conditions. It is known that the chief organs for the elimination of tissue wastes are the kidneys. It is known that the elements of the urine, which is an excretion not a secretion, *pre-exist in the blood and are not formed in and by the kidneys*, although the kidney epithelium may help to combine certain elements. And

it is known (vide Bouchard and others) that the urine even of healthy animals is distinctly and fatally poisonous to other animals as well as themselves, as has been experimentally demonstrated. The exact nature of these poisonous agents—for there are doubtless many—has not yet been ascertained, but skilled chemists and physiologists are at work on these problems. Analyses which will confirm the idea that the urine pre-exists in the blood stream and may be found abundantly in meat may be made by even the tyro in the technique of medical chemistry. It need not be emphasized that by universal consent urine is not looked upon as a food. So much, all too briefly, on the meat question. This subject is more fully discussed in the chapter on “A 38 Years’ Experiment with a Meatless Diet.”

CHAPTER IX
TUBERCULOSIS IN CATTLE
A LESSON FOR MANKIND

"The whole history of life, both human and sub-human, teaches us that Nature will not condone disobedience: . . . no living being stands above her law, and protozoon or demigod, if they transgress, alike must die."

DR. LOTHROP STODDARD, in
"The Rising Tide of Color"
Page 304.

CHAPTER IX

TUBERCULOSIS IN CATTLE

A LESSON FOR MANKIND*

According to Dr. E. A. Crossman, inspector for the National Department of Agriculture in Massachusetts, New Hampshire and Rhode Island, more than 300,000 cows have been slaughtered in the United States during the past six years on account of having tuberculosis. (Boston American, November 23rd, 1923.)

It is also claimed that \$40,000,000.00 worth of cattle in the United States are tuberculous, and the percentage infected in the different States varies from 1 to 30 per cent of the entire number of cattle

Through the courtesy of Dr. Lester H. Howard, formerly Director of Animal Industry of Massachusetts we learn that out of 168,870 dairy cattle in the state, 1552 were condemned in 1922, on exhibiting physical symptoms of tuberculosis: and out of 17,196 head subjected to the tuberculin test 2,572 reacted. As all reactors were slaughtered there was a total of 4,124 tuberculous cattle killed in the state during that year, or one in 41.

It is generally accepted as a fact that animals living the unrestricted, natural life are not afflicted with tuberculosis. Reliable statistics covering this point are not easily obtainable; but in the latest contribution to the study of the general etiology and morbid anatomy of tuberculosis in Cecil's "Text-book of Medicine"

*Reprinted by permission from the Veterinary Journal, London, Vol. 84, No.5, Pages 224-231, 1929.

(1927), representing the most modern views in the field of medicine, p. 167, we read: "Tuberculosis occurs so rarely among wild animals as to be of no significance."

Everyone knows that the Great White Plague still flourishes and exacts its high toll of human life. More than 100,000 persons die from it annually in the United States, or to be exact as possible, 90,452 deaths occurred in the registration portion of the United States during the year 1922, according to compilations made by the Bureau of the Census of the Department of Commerce (Boston Medical and Surgical Journal, Dec, 23, 1923, p. 1052); and practically the same number, or 89,724 during the year 1924. The registration area contains 85.3 per cent of the entire population of the country so the total mortality from tuberculosis would reach well over 100,000, and this heavy mortality is in spite of state Sanitaria, energetic campaigns against tuberculosis, wide educational propaganda, governmental restrictions, fresh-air schools and other preventive measures. Moreover it is stated by Allen K. Krause (vide Cecil's "Text-book of Medicine", p. 169) that the number of persons ill with the disease is at any time probably tenfold the number of deaths. Generally accepted estimates, therefore, put the incidence in the United States at about 1,000,000 per year. To still further quote Dr. Krause we read (*ibid.* p. 170) "a careful analysis of statistics from the State of New York which shows that during the year 1922 there were 10,695 deaths from tuberculosis, or about one per 1,000 of the population, and the total number of cases of illness from tuberculosis as shown by infection tests, 10 times the number of deaths, or 100,000. We may, therefore, believe that at least half the people of New York State (taking into account all ages) or 5,000,000 are infected with tuberculosis."

In recent years nothing has been added to our knowl-

edge concerning the cause of tuberculosis. The discovery of the *bacillus tuberculosis* by Koch in 1882 remains the unrivalled contribution to our knowledge of the etiology of this dread disease. Yet it is acknowledged that something more than the germ is needed to produce the disease. The germ is unquestionably the exciting cause, but the question of susceptibility looms up as of vital importance. All people, all animals are not at all times equally susceptible. To quote Dr. Krause once more (*ibid* p. 171): "We can detect no races or individuals that are presumably exempt from it, or more or less resistant or immune to primary infection as such. All that we can discover suggests that slight and transient exposure to tubercle bacilli will bring about infection in everyone." The great majority, however, possess sufficient resistance to keep the germ influence at "arm's length." *Upon what does this immunity depend?* The full and correct answer to this question will be of greater value to mankind than the discovery of the germ . . . a greater contribution to our knowledge, and to our means of prevention. The following facts and ideas are offered as of some possible value in the final solution of the great problem.

It is a widely accepted opinion that "Raw cow's milk is . . . a primary source of bovine-bacillus infection in human beings. Indeed, cow's milk and its uncooked products, butter, cheese, etc., are the only noteworthy animal sources of human infection" (Krause, *ibid*, p. 167) and (p. 168) "*Bovine bacillus* infection occurs through the ingestion of tuberculous cow's milk."

Since there are so many cases of tuberculosis among the people of the United States with all the possibilities of spreading infection; since there are so many tuberculous cows in the country as a whole, with the possibilities of spreading the disease through infected milk; and since the *per capita* annual consumption had risen

in 1923-4 to 1020 pounds of milk and its products, the subject of the rearing of calves and the feeding and care of cattle is one of vital importance. Therefore a brief consideration of the subject is appropriate.

Even city-bred people have occasional opportunity to observe the feeding of calves and to question the why and wherefore of the proceeding. It is well known that during the first few days of life calves may be permitted to nurse freely, but very soon the calf gets no more unmodified mother's milk. It is given a mixture of whole milk, skimmed milk, and meal of some sort, or some artificial preparation advertised to be a good substitute for the one food nature planned the calf should have.

The following quotations from "Farmers' Bulletin No. 1336 of the U. S. Department of Agriculture" must be looked upon as illuminative and authoritative, and as representing the most advanced and successful practice in the rearing of calves.

"Poorly nourished cows often give birth to weak, puny calves which are hard to raise. The feeding of the calf, therefore, begins before it is born. (p. 1)

"Under natural conditions the young calf receives nourishment every two or three hours. In hand feeding it is best to follow these conditions as closely as possible, but because of the trouble and expense (*sic*) involved it has been found impracticable to feed calves more frequently than three times a day. They usually are fed only twice a day.

"It is the practice of many dairymen to feed young calves three times rather than twice a day, because the better results obtained more than pay for the additional work. (p. 4)

"At least four-fifths of all dairy calves are raised on separated milk, grain being used to supply the

fat removed. Usually it pays well to feed whole milk for about two weeks, at the end of which time separated milk may be used in part. The proportion of the latter may be gradually increased until at the end of the fourth week it is used altogether (p. 5).

"In most cases, at the end of the third week the ration should be approximately one-half whole and one-half separated milk (p. 5).

"At the beginning of the fourth week, from one-half to three-quarters of the milk ration should be separated milk. During the week the change should be continued until by the end of the week only separated milk is fed. With especially vigorous calves the change to separated milk may be made about a week earlier. After the fifth week separated milk may be fed altogether, unless the calf is very delicate (pp. 5-6).

"The time milk should be discontinued depends upon its *cost* in relation to the value of the calf, its breed, size, vigor, etc. . . . six months is probably a good average age at which to wean calves from milk. When the best of hay, silage, and a good variety of grains are available the calf may be weaned earlier than when such feeds are lacking. (p. 6).

"The stronger and more vigorous the calf the earlier it may be weaned with safety. On the other hand, the more valuable the calf, the more expense the owner is warranted in incurring to develop it, and the later it will probably be weaned. If skim or separated milk is plentiful calves may be fed *profitably* until they are eight or ten months old (p. 6).

"Whole milk is 'Nature's balanced ration' for the calf. When skim or separated milk is fed, other feeds are used to supply the fat which has been removed. Proprietary calf-feeds or meals, for feed-

ing with separated milk, have been put on the market. Many of these have merit, but by using the feeds usually found on the farm or in markets near by, the farmer can generally mix a grain ration which is as good and *costs* less (pp. 7-8).

"In dairy herds in which the entire output is sold as whole milk at high prices, there is a strong demand for feeds to take the place of the milk fed to the calves. While it is probably not practicable to take calves two days old from the cows and raise them entirely without milk, some skillful feeders have been able to approximate these conditions. The time at which calves can be put on milk substitutes depends upon the same factors as in the use of separated milk, namely, the breed, the development, and vigor of the calves etc. It is hardly safe, as a rule even with the most vigorous ones, to attempt to put them on milk substitutes alone within three weeks after birth; and with calves below the normal in vigor, some milk for six weeks or more may be necessary to raise them. In supplying a substitute for milk an attempt is usually made to use a liquid which in composition resembles milk as much as possible (pp. 8-9)."

The virtues of certain "milk substitutes" are then considered in the "Bulletin" such as "bean soup," various "calf-meals," "skim milk powder," and adjuvants such as bran, corn, oats, and roughage in the form of hay, alfalfa, green pasturage, etc.

The preceding quotations, backed as they are by the highest national authority, should be most carefully read and even re-read, as they are vital to a rational consideration of the subject under discussion.

Some dairymen claim that calves thus artificially reared grow as rapidly, seem as strong, and get as heavy and big as those fed naturally. And so it may seem

on superficial examination, but observations covering a single generation are not sufficient to settle a question of such great importance.

Probably very few calves born in Massachusetts annually are brought up as nature evidently intended they should be. On big stock farms in the Canadian Northwest, in the grazing parts of the United States, and in other parts of the world (Central and South America, Africa, Australia) where stock raising is an industry, the calf is allowed to "run with the mother." Occasionally only this is so in more settled communities. A comment worthy of consideration comes from "S. M. C." of the Massachusetts Department of Public Health that colts "run with the mother" and tuberculosis is rare among horses.

The result of the artificial feeding is inevitable. *The laws of nature are fixed and inexorable, and cannot be tampered with*, without a penalty being exacted of those who defy her or attempt to improve her methods.

As to the bovine calf, it must be claimed and acknowledged that on its artificial feeding, which cannot equal in value the natural food, it starts life with a handicap, for it does not get, during the early formative period of its life, the nourishment planned so wisely for it by nature. This handicap may be and undoubtedly is slight, or perhaps comparatively insignificant for the individual calf; but with succeeding generations, all brought up during the early part of their lives, in the same vicious way, and during adult years living in every way an artificial life, the handicap increases and steadily augments until finally a delicate, high-bred, sensitive, weakened strain has been produced, natural immunity and resistance have been reduced, and even under the greatest care as to light, warmth, ventilation and cleanliness of stables and barns, tuberculosis makes its appearance in the herd; and as not infrequently happens, the entire herd is condemned and the dairyman possibly

commences anew to go through the same routine with another breed or strain of cattle.

In the light of this view it is not unreasonable to assume that the unbalanced food, or the artificial diet upon which the domesticated calf is reared, in reality a defying of Nature, is the real cause which leads up to a loss of the immunity which is possessed by cattle leading a natural life, and induces in the domesticated cow a susceptibility to invasion by the tubercle bacillus, with the fatal results so well known.

No detailed argument need be presented to fortify a proposition that seems to carry its own convincing power. The evidence presented seems clear enough to warrant the conclusion that:

- I. Domesticated bovine calves are not fed as Nature evidently intended they should be.
- II. The result is a handicap at the start of life.
- III. The forced feeding of cows to increase the quantity of milk and prolong the period of its secretion puts a physiological strain on the animal that increases its handicap.
- IV. During the course of several generations, all having been subjected to the same treatment, the handicap has increased from generation to generation so much that the animal loses its natural immunity to tuberculosis and, due to its loss of resistance, an invasion of tubercular bacilli occurs with the usual results.

Herein certainly lies a lesson which Mankind may well ponder most seriously, and intelligently apply to his own tuberculosis problem. If an artificial, and therefore unnatural food, for the calf, and a forced feeding, also artificial and unnatural for the adult cow, eventually bring about a loss of immunity and permit the development of tuberculosis in the cow, *why may not an im-*

perfect and artificial feeding of children and human adults eventually produce not only a susceptibility to tuberculosis, but a condition that will permit the disease to develop and relentlessly run its course? That children and adults *are* imperfectly and artificially fed is a statement amply supported by the average human diet.

The popular method of rearing calves is very evidently a successful method of cultivating a susceptibility to tuberculosis, a method of lowering the natural immunity, or in other words, a method of decreasing the resistance to infection. This resistance doubtless is due to the defensive mechanism developed by the free, unrestrained, natural life.

It is impossible to read such an authoritative bulletin of instruction to dairymen as the one quoted from, without feeling that here we have a convincing explanation of the existence of tuberculosis among cattle; and the same explanation slightly varied as to details is applicable to mankind.

In the case of cattle the economic or commercial factor looms large upon the horizon, and the question becomes one of finance and not of science. Naturally, there is no charity or altruism in cattle raising or dairying, but there ought to be some rationality, some knowledge of nature.

It is now definitely recognized that there is in milk and other natural foods certain infinitely small amounts of something, called for convenience a "vitamin," that has only within a few years (since 1912), been known to scientific investigators: a something which has existed since the dawn of creation for certain fixed purposes; a something for which there is NO substitute, and under the present state of our knowledge a something for which there can be no substitute; a something originated by nature years ago, before man appeared on the earth, and only recently discovered by man. There-

fore, is it not reasonable to assume that there are, or at least may be, other things in milk and other foods necessary to life which have not yet been recognized or discovered? And is it not reasonable to assume that it is the absence of these vitamins and other things from "foods" given to young calves and humans that undermines their immunity, reduces their powers of resistance and opens the way to invasion by germs: micro-organisms of one sort or another?

Just what is a "natural" and what an "artificial" food is a question that with our lack of knowledge can be endlessly discussed, but the thoughtful and observant mind need not be harrowed by details when general principles are so obvious.

In the words of the Bulletin, "Poorly nourished cows often give birth to weak, puny calves which are hard to raise," etc. *The feeding of all mammals begins during pre-natal life, and the human babe is no exception to the rule.* The human foetus is absolutely dependent during this most important pre-natal period upon its mother for nourishment, and very few mothers can intelligently feed themselves during pregnancy. Therefore the foetus is not suitably nourished. This is handicap number *one* for the child.

Subsequently, or after birth the human child is still absolutely dependent upon its mother for natural and adequate nourishment. The fact that so many mothers are unable to breast-feed their offspring as nature evidently intended they should, is convincing testimony to the fact *that they have not properly fed themselves*, and from the physical standpoint are not equipped for motherhood. Their lack of physical fitness results not only in pre-natal handicap for the foetus, but in handicap number *two*, because babies "raised" on sub-human milk, modified *secundum artem*, are not fed in accord with nature's plan. Such feeding of a so-called "substitute" for mother's milk is therefore unnatural

feeding, and is attended by the penalties of a broken natural law.

Handicap number *three* comes after the period of weaning, when food that is exceedingly artificial is given the still helpless child, and habits dictated by an unreasoning tradition are formed which usually last through life. The life itself is frequently, deplorably and unnecessarily cut short by lack of ability to resist the attacks of germs of one sort or another. Immunity and power to resist and overcome malign influences cannot easily be built on a foundation furnished by an irrationally fed and therefore unfit mother. Pre-natal feeding, therefore, becomes a matter of supreme importance to both mother and child, for, rationally conducted, it ensures a good start for the offspring and fits the mother for the all-important period of nursing. With a good and thoroughly natural start, the subsequent period of life will naturally show a reasonable resistance to disease influences. *It would seem to be food and chiefly, if not wholly, food upon which resistance to the activities of the bacillus tuberculosis (and other) germs depends.* It is time to discard tradition and conventionality and the so-called "instinct" which should have no influence in the matter of feeding the human body, and follow the teachings of biological chemistry and the plain dictates of the natural laws of life. The gifts of Nature in the wide, wholesome and palatable varieties of cereal foods, rye, oats, wheat, barley, corn, rice; the almost endless variety of vegetable foods; and the abundant, attractive and nutritious fruits and berries and melons according to their season, as well as the less used but no less valuable assortment of nuts, will surely furnish clean, nutritious food which by clever combinations and mixtures may be made attractive even to the gourmet.

Sunshine, fresh air, bathing, healthful exercises, sanitary schools, factories, offices and barns are all of un-

doubted service in securing and maintaining health and vigor, but it is after all food, *and food alone*, from which the body and its vitality are developed. And in-so-far as food is concerned, it is the *natural* and not the *artificial* or the assumed "substitute" that is to be relied upon as an unfailing guide.

CHAPTER X

THE UNLEARNED LESSON OF BERI-BERI

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During the many centuries that have passed, Mankind has made many discoveries and inventions that have mitigated suffering, prolonged life and added much to human comfort, happiness and well being. But among all such discoveries that have been made none has been more potent for good or richer in promise than the discovery of the *cause* of the chronic, and so frequently distressing and fatal disease known as Beri-beri.

This disease was recognized and described as early approximately as the eleventh or twelfth century. It has existed continuously since then at all events, and it probably was in existence ages before its recognition as a distinct pathological entity. Its toll of human life has been, in the meantime, tremendously heavy, though in countries where it has been mainly prevalent, and where vital statistics are practically unknown and unkept, its total number of fatalities is a matter of conjecture or mere estimate. Its habitat has been almost wholly in rice-eating countries, or chiefly in China, Japan, India and the Islands of the Pacific, though it occasionally has occurred in Institutions in the United States and among fishermen at the Grand Banks, Newfoundland, and here and there at times in other portions of the Western Hemisphere. The amount of suffering, invalidism and incapacity it has given rise to is quite inestimable and there are no known means of measuring it.

During the Russo-Japanese War, however, or very

early in the present century, announcement of the discovery of the cause of beri-beri was definitely made. And if humanity can and will learn the vital lesson which that discovery plainly teaches, then it may be confidently claimed that that war was not fought in vain; in fact what that war cost in suffering, death and financial outlay was a cheap price to pay for the knowledge of the cause of beri-beri and its lesson to humanity.

Three or four types of the disease are met with, differing mainly in severity, but the most marked and striking symptoms are progressive weakness, pain and tenderness of the extremities, with more or less shrinkage or wasting of muscles, leading up to paralysis; more or less dropsy which may be confined to the extremities or become general; shortness of breath with difficult breathing; rapid heart beat and irregularity of heart action, and eventually heart failure. The disease may take on a very acute form of short duration, or, as is perhaps more commonly the case, it may stretch out and become quite chronic. For present purposes it is not necessary to give in detail the symptoms of the different forms the disease may take. It is the *cause* of the trouble that forms the main consideration here.

The mortality varies quite a good deal according to the form the disease takes; it being stated that it may be from three or four to fifty per cent.

The disease is practically unknown in America, except through literature, for it is not indigenous here and it is only the stray case or unusual epidemic (so called) that makes its appearance in our midst. As a case in point reference may be made to the well known fact that a famous German Cruiser during the latter part of the World War voluntarily ceased its destructive work and put into port at Norfolk, Virginia, on account of inefficiency due to the prevalence of beri-beri among its crew.

Although the disease beri-beri is not common in America it may be that diseases equally chronic, equally simple in symptomatology and equally, or even more fatal do exist here. At all events special and serious attention may be called to the cause of beri-beri for an absolutely similar cause may be found for some of the distressing and fatal diseases which are as common in this country or even more so, than beri-beri is in the Orient. The following quotations from some of the best known American authorities in medicine are worthy of deep confidence and they show very clearly how slowly the most accurate and modern knowledge concerning the cause of beri-beri has developed.

James Tyson in the fifth edition (1909) of his excellent book "The Practice of Medicine" says apropos of the cause of beri-beri (p. 970) "Sheube and Baelz first determined its true nature, but our knowledge has been greatly increased by the studies of Pekelharing and Winkler. It is believed to be due to a special organism" . . . As a matter of fact neither Tyson nor the authorities he quotes really knew much about the cause. He simply mentions a rice diet as something to which the disease has been attributed.

Anders in the eighth edition (1907) of his "Text-Book of the Practice of Medicine" (p. 316) says "Beriberi, first recognized by Strabo among the soldiers in the Roman armies while occupying Arabia (24 B. C.) strangely enough was not grouped with the infections until the beginning of the nineteenth century . . . As stated by Osler, however, we may date the modern study of the disease from Malcolmson's monograph published in Madras, in 1835 . . ." Also, "Although beri-beri is most probably an infectious disease the specific cause still remains a doubt . . . A second leading theory as to the nature of beri-beri ascribes the disease to certain articles of diet, more especially rice, and fresh fish. The striking diminution in the number of cases in Ja-

pan, following the introduction of an improved dietary has been adduced in support of the food theory, but it may here be stated that the total number of cases of beri-beri that developed during the Russo-Japanese War (in the Japanese Army) is to be placed at a minimum of from 75,000 to 80,000."

Osler says in the second edition of his "Principles and Practice of Medicine" (1895) that "Great difference of opinion still prevails concerning the cause of the disease. It is probably due to a micro-organism. Food appears also to have a large share in its causation, and it has been attributed to a fish diet." However, in the ninth edition of this deservedly popular work, as revised by McCrae and published in 1920 we read (page 406) that beri-beri is "A deficiency disease due to the absence of certain elements of the food, the so called vitamins, . . . The form which is particularly common in China and Japan is due to a diet deficient in the special vitamine which occurs in the outer layer of rice . . . The disease is believed to be of great antiquity in China, and is possibly mentioned in the oldest known medical treatise . . . and we may date the modern scientific study of the disease from Malcolmson's monograph, published at Madras in 1835 . . . Two main views have prevailed: That it is an acute infection and that it is a disorder of metabolism. Numerous bacteriological studies have not determined the presence of any definite organism . . . Studies in the Far East leave no doubt that the disease is there due to a diet of rice from which the pericarp has been removed. in what is called 'polishing' or 'milling.' This is an old story, as the Dutch knew of the association of the disease with rice, and it was by modifying the rice diet of the sailors that Takagi eradicated beri-beri from the Japanese Navy. Braddon showed the importance of the retention of the pericarp for the prevention of the disease. Schaumann's experiments, amply

confirmed by Fraser and Stanton, leave no question that beri-beri is associated with a diet freed from the materials existing in the peri-carp . . . That beri-beri occurs in ships and in institutions may be explained by the fact that in the dietary, though it may not be of rice, similar compounds are lacking." On page 408 we read the convincing, amply confirmed statements that "There has been no more remarkable triumph of modern hygiene than Takagi's dietetic reforms in the Japanese Navy. Everywhere in the East a change in the diet has been followed by the disappearance of the disease. In the Straits Settlements a group of men took No. 1, polished, white, Siam rice, and developed beri-beri within sixty days. A group that took unpolished rice remained free from the disease. By exchange of clothing, contact, living together, the disease was not conveyed from one group to the other. Then the group that had partaken of the unpolished rice was fed with polished rice, and within two months developed beri-beri."

"The change of diet in the Philippine Scouts instituted on September 30th, 1909, has been followed by remarkable results. Instead of 20 ounces of highly milled rice, the amount was limited to 16 ounces of unpolished rice," (this quantity, after experiment, having been shown to furnish as much nourishment as the 20 ounces of ordinary rice). "The number of admissions for the disease in 1908 and 1909 in a strength of men of 5,000 was 619 and 558. In 1910 there were 50 cases, and in the first five months of 1911 only one case. Chamberlain states that the Philippine experiments bear out at every point the polished rice theory of the etiology. After having been continuously present for five years at Culion Leper Colony in the Philippines, beri-beri disappeared entirely in the nine months after the use of unpolished rice was enforced. (Heiser)"

Douglas Vanderhoof in Cecil's "Text-Book of Medicine" Second Edition, (1930, p. 576 et seq.) says Beri-beri "is a disease of great antiquity and has been endemic for centuries in the Orient and certain tropical countries. Like scurvy, beri-beri breaks out especially on ships and in jails, barracks and asylums. During the Russian-Japanese war over 80,000 cases of beri-beri developed in the Japanese Army in a period of two years. It is recognized that beri-beri is constantly present in all countries where rice is the staple article of diet . . . The essential etiological factor in most cases of beri-beri is too exclusive restriction of the diet to polished rice, i.e., rice from which the external layers have been completely removed by a process of over-milling. The disease may develop also when a monotonous diet is limited to other grains that have been decorticated, such as wheat and corn, as well as when it consists chiefly of *bread made from fine flour*, and sugars, molasses, honey, and fats, all of which are deficient in the antineuritic vitamin . . . It continues to take very heavy toll among the poorer and more ignorant natives."

In "An Index of Differential Diagnosis of Main Symptoms"—edited by Herbert French, London, it is claimed that "Beri-beri, often with œdema of the legs, is a familiar result of long-continued eating of decorticated rice as the main staple of diet." (p. 73). Also on p. 82 "Beri-beri is sometimes seen in this country, generally in patients who have come into port in a ship from the East; . . . the peripheral neuritis and muscular wasting will often be associated with œdema, and there is often a history that the dietary has consisted of decorticated rice."

Reference should be made to a fine article by Riesman and Davidson on "Beri-beri following Drastic Voluntary Dietetic Restriction" in the "Journal of

the American Medical Association" for June 16, 1934 (p. 2000).

A short but convincing article on "Early Beri-beri" by Lt. W. S. Sargent of the U. S. Naval Hospital, Agaña, Guam, not only well worth reading but very convincing, may be found in "Annals of Internal Medicine" for 1930-31 p. 1340, Vol. 4.

In short the testimony of the past twenty to thirty years goes definitely to show that the free use of *white* or *demineralized*, or *polished* or *milled* or *decorticated* rice is the cause of the form of neuritis called *beri-beri*.

Further literary testimony might easily be furnished, but enough has been offered to demonstrate very positively that modern opinion concerning the *cause* of beri-beri, viz., that it is due to the *eating* of decorticated and demineralized rice, is amply supported by clinical and laboratory experience.

Let those before whom these pages may come never forget that the disease, beri-beri, which is capable of producing such havoc is *caused* by the simple presumption of mankind in "polishing" rice in order to make it more attractively white, and in eating the demineralized and devitaminized product as the main article of diet. White rice is "pure"; it is unadulterated, but it is insufficient, made deficient by finite man's putting asunder something that the Infinite Creator joined together. To emphasize the point once more, man cannot make a kernel of rice, but he can spoil it after Nature has miraculously made it, and to his own great injury. In other words, pathological, organic changes are brought about in the human body by continued use of the deficient white rice as food. It is not a quickly acting poison like Arsenic or Opium, etc. but simply an *insufficient nutriment*.

Animal experimentation amply proves the assertion that the eating of white or polished rice for a length of time is the *cause* of beri-beri.

Now then, what is the lesson to be learned from these facts? It would seem as if the untutored mind could grasp the significance of the facts. Rice is the most universally used single food in the world, although wheat is now pressing it as a close second. That is, a larger number of the earth's inhabitants subsist on rice than on any other single article of food: *but not on white or polished rice.* An exceedingly large percentage of Orientals live on the natural brownish or slightly yellowish product, probably because the polished rice costs a little more and they cannot afford to use it. Possibly some as a matter of taste prefer the natural rice. At all events it is a quite well established fact that those who eat the slightly colored, unpolished rice habitually *do not develop beri-beri*, and the use of unpolished rice will arrest and even cure the cases of beri-beri, that have not been serious enough to have developed severe organic changes in the body. Animal experimentation and human experience have definitely established this vitally important point.

The simple lesson, therefore, is that man should not manipulate his food so as to destroy the chemical combinations nature constructs so wonderfully for his growth and for his nourishment. Man should not presume that he, in his ignorance, can improve upon the Creator's plans for the building up of a strong, enduring, healthy, happy and useful human race. Man should not by any device or process such as milling, polishing, washing, screening, grinding, boiling, stewing, baking, frying, grilling or in any way "cooking" his food, interfere with Nature's plans for his nutrition. For instance to thoroughly boil green vegetables and cereals, corn, oatmeal, as examples, until most or all of the useful and palatable sugar, flavorings, chlorophyll, mineral salts, vitamins and proteins are extracted (and usually thrown away), is, as the old phrase, goes, to "fly in the

face of Providence." The ultimate results are too varied and numerous to be pointed out.

This is not arguing for a wholly raw or uncooked diet. At the present time it would seem as if a slight cooking, such as mild boiling or baking, might be considered necessary to liberate or make accessible some of the elements of the food, but the most scrupulous care should be exercised not to *overcook* and so injure any of our foods. Demineralization and devitaminization are not tolerated by the Forces which for æons antedated man, and it would be a wise thing for man to curb his inventive faculty and in a humble, receptive spirit accept the suggestions made by these Unknown Forces. A heedless generation has permitted the warning of beri-beri to fall on deaf ears. That does not mean, however, that the warning is valueless. It still holds good, and reinforced by the lesson of rickets and scurvy and diabetes and pellagra, it may yet impress the professional and lay mind sufficiently to yield a fruitful harvest in the *prevention* of much and needless suffering, disease and death.

Once again, briefly put, human beings should not so manipulate their foods that necessary portions are removed as in the case of milling rice. A most evident parallel is found in the milling of wheat and converting it into a white flour; in the grinding of corn and removing in the process the potent and useful germinal area, thus interfering with Nature's plans; and in many other ways modifying natural products to suit some whim or fancy of mankind. Beri-beri is not a disease prevalent in America, but tuberculosis with its approximately 90,000 deaths annually in the United States, and cancer with its 120,000 deaths annually, are conditions to be most earnestly and seriously thought of in this connection. Nature will not long tolerate any interference with her plans. The average diet in wide use is made intolerably deficient in the chemical factors

planned by Nature, and unquestionably leads to calamitous results. Tuberculosis is claimed to be caused by the bacillus tuberculosis, but that micro-organism seems powerless to flourish in a healthy body. The body must lose its resistance to the germ before tuberculosis can make headway.

Cancer micro-organisms have not yet been discovered in spite of years of patient and intelligent and expensive research. Why not think of an insufficient or an unbalanced diet and therefore of Malnutrition as a possible cause of this dreaded scourge, or a predisposition thereto, which entails a mortality of approximately 120,000 every year?

Other applications of beri-beri's lesson might be made, but a word to the wise, is, or should be, sufficient.

CHAPTER XI

A FEW THOUGHTS ON VITAMINS

"It may, therefore, be taken as a law of life, infringement of which will surely bring its own penalties, that the greatest single factor in the acquisition and maintenance of good health, is perfectly constituted food."

SIR ROBERT McCARRISON.

CHAPTER XI

A FEW THOUGHTS ON VITAMINS

Probably no single medical subject has received so much attention and been written about so voluminously during the last few years as vitamins, and there are probably but few medical subjects about which so little is really known. It has been a surprise on looking up the matter in medical libraries to find such a stupendous bibliography devoted to this modern discovery. Irrespective of articles on Food, Dietetics, Nutrition, Reproduction, etc., in which vitamins are definitely mentioned, many articles dealing not incidentally but specifically with vitamins have been listed in the "Quarterly Index."

For instance:

	7	articles	are	indexed	in	1916
10	"	"	"	"	"	1917
14	"	"	"	"	"	1918
16	"	"	"	"	"	1919
45	"	"	"	"	"	1920
56	"	"	"	"	"	1921
64	"	"	"	"	"	1922
106	"	"	"	"	"	1923
80	"	"	"	"	"	1924
108	"	"	"	"	"	1925

A total of 506 articles in 10 years. The list shows the interest taken in vitamins and also how that interest developed during a single decade.

It is curious and interesting to note that in spite of the very great and absorbing interest shown in the

subject, the word vitamin cannot be found in any of the well-known medical or general lexicons prior to 1919. A careful investigation fails to reveal its presence in Funk and Wagnall's New Standard Dictionary of the English Language (1919), Webster's New International Dictionary (1917), The Century Dictionary, Encyclopaedia Britannica, Dorland's Medical Dictionary, or Billing's National Medical Dictionary. In the Winston Simplified Dictionary (1919) is found: "Vitamines: a newly discovered group of substances, the nature of which is not yet fully determined, that are found in carbon foods, as in rice, butter, vegetables, oranges, etc., and that, while not directly food, are essential to the welfare of the body."

Why is it that a word, which is, as the phrase goes, "on everyone's tongue," should be thus neglected by the lexicographer? The answer is:

1. Because it is too recent an addition to our language to have gotten into our dictionaries, and
2. Because our knowledge of these interesting and necessary substances is too imperfect to permit of an authoritative definition.

Future editions of our dictionaries and encyclopedias, however, will unquestionably contain much information on the subject, for very intensive study is being devoted to it by research investigators and experimenters. Just at present, then, knowledge of vitamins is somewhat nebulous although crystallization is well under way.

Radio announcements, popular lectures, health talks, and especially advertising literature have done much to spread widely over the face of the earth some ideas concerning the wonderful efficacy of vitamins. Reports of new discoveries made by "research workers," lay and professional, have helped greatly to inflame the popular mind concerning the astonishing remedial and preventive powers of these "accessory food factors."

Probably the most potent influence in informing the public concerning the miraculous potency of these newly recognized but unknown substances has been the commercial mind, which, always awake and keenly sensitive to the financial possibilities of any new ideas, promptly and eagerly grasped the vitamin idea, and skilfully utilized these possibilities to its own advantage. Words of warning against the too free use of these new seekers for popularity, the vitamins, have occasionally been sounded, but probably with slight effect in stemming the tide of confidence in vitamins, a tide which will in due time ebb as all tides do. In the meantime scientific and earnest investigators will continue their work in this new addition to the medical field, and sooner or later, when the truth concerning vitamins is more fully known and established, these physiological entities will be removed from the field of commercialism and charlatantry and will settle into their recognized places among worthy and reliable medicinal agents, and do whatever work they are capable of in the way of curing and preventing diseases.

Until that happy day arrives a word of caution may be useful. A lesson may be drawn from certain diseases due to under- or over-activity of the thyroid gland. For instance, under-activity of the thyroid brings about a condition known as myxœdema; that is, a combination of symptoms marked by mental sluggishness to stupidity; a slowing down of all the body functions; slowness of heart beat and circulation; a more or less hoarse and croaking voice; slowness of speech as well as of thought; coarsening of facial physiognomy; swelling of hands and fingers; torpidity of bowels; indigestion, etc. When marked the condition is a very characteristic one. It is due to insufficient quantity of the thyroid secretion in the body, and other things being equal, it is almost if not quite cured by taking tablets made from the thyroid gland itself, or its extract, in

reasonable quantity, (this, by the way, must be a more or less continuous performance). A condition quite the reverse of this is produced by an over-activity of the thyroid gland and a plus quantity of thyroid secretion in the tissues of the body, a condition of *hyper*-thyroidism instead of the *hypo*-thyroidism of myxœdema. It is recognized by its prominent, wide-open, bulging eyes; its intense nervousness, restlessness, apprehension and increased mental activity; its invariably rapid heart action with quickened pulse beat (in simple cases uncomplicated tachycardia) not infrequently up to double its normal frequency. Arrhythmia is uncommon in the average case though at times marked irregularity as well as rapidity may occur. The respiration is also always increased in rapidity and shallowness; the thyroid gland is more or less prominent, sometimes very noticeably so, and loss of weight and appetite, with gastro-intestinal indigestion and progressive weakness is apt to end the trouble. Those inclined to pulmonary tuberculosis are apt to develop the condition. The treatment of such cases, usually called "exophthalmic goitre," is less encouraging and less certain (in the writer's experience, at least) than in the opposite condition of myxœdema.

If perchance any analogy can be found between the unknown vitamins and the better known endocrine secretions, if structurally or functionally they may be considered like one another, then a lesson may be learned from the *hypo*- and *hyper*-thyroidism just referred to; that is, too little or too much of a vitamin in the body may be productive of opposite sets of symptoms and cause even serious trouble. This possibility certainly is not appreciated by those who urge people to take artificially vitaminized foods of any sort, confectioneries, etc., in unlimited quantities. Too much (that is any excess of the physiological quantity) may be as injurious in its effects as is the case with too little (the

more commonly and quickly recognized condition). The normal activities of vitamins must be better known and the abnormal conditions produced by the hypo- and hyper-states must be more familiar before they can be used intelligently and effectively in the treatment of abnormal states, or in their prevention.

People as a rule, and probably the profession also, do not appreciate the fact that the word "vitamin" was simply coined by Casimir Funk in 1912 for temporary use to cover the *Something* he had found in his analyses of rice screenings; which "something" he thought might belong to the chemical group "amines," and which he knew (as did others) were necessary to maintain life; so he united the "vita" and the "amine," crossed out an "a" and called the indefinite something a "vitamine." The final "e" was soon dropped and "vitamin" resulted. Since Prof. Funk's work, or within the last 10 or 12 years, not one, but seven vitamins have been discovered, and many able investigators have been devoting their studies to the elucidation of this special chapter of biological chemistry. It is here that the physiologist and the chemist certainly have occupied common ground and have worked in harmonious and useful co-operation.

It has been suggested that these newly discovered food principles be called "accessory food substances," because, as Stiles says,* "an amine is a nitrogenous compound of a certain type, while the prefix suggests that a vitamine is such a compound as is necessary to life. The objection has been raised that the term is too specific; we do not know that all such bodies are amines, nor even that they are nitrogenous; it is probable that some of them are neither. Hence it seems better to call them accessory substances, and not to insist on a chemical classification."

*Percy G. Stiles, Ph.D., in "An Adequate Diet," p. 30.

The term "accessory food factors," on account of its freedom from any chemical theory, has been suggested (Hopkins and others) as preferable to the word vitamin, but the latter with its novelty, brevity and suggestiveness has already made a strong appeal to the professional and lay mind and seems to be firmly entrenched in thought and language.

A superficial glance at the literature on the subject is quite enough to convince one that there is something in what we call "foods" besides carbohydrates, fats, proteins, inorganic salts and water. Within recent years the caloric value of foods was considered the all-in-all, and dietetic tables were based on the number of calories per pound in each article. It was as recent as 1916 or 1917, when in the effort to conserve food and at the same time sufficiently nourish humanity, that several articles appeared in the daily press (Sunday editions) on "How to Feed Your Families." In very large type the assertion was made that 3,200 calories per diem were needed by the laboring man, and 2,700 calories per diem were needed by the active housewife. Then followed tables of caloric values of foods per pound prepared by Prof. Langworthy of Washington. The tables showed that "oyster crackers," "doughnuts," and "chocolate cake," of the foods analyzed, yielded per pound the largest number of calories. The one natural conclusion was that families should be fed oyster crackers, doughnuts and chocolate cake. Yet even the unlearned know that in spite of the large type used and the impressive tables exhibited such a diet is absolutely insufficient and may be very injurious. There are hospitals and institutional dietitians today who prescribe and prepare diets on caloric formulæ, and menu cards at some popular sanitariums and restaurants have printed in the margins the calories per serving of each article included.

Remonstrants against this one-sided view of foods

have arisen, and there are those who claim that the *proteins* have not been duly considered and their values have not been suitably set forth; but even the caloric value and the protein combined have not been enough to satisfy the few who feel that the *inorganic salts* (or the mineral content of food) are just as necessary a factor in growth and nutrition as the calories and the protein elements. And now in this year 1937 with articles in the daily press, in magazines and current literature generally, plus popular lectures and books on food and nutrition, the vitamin idea has spread, and is spreading, with the rapidity of a very contagious epidemic, or the action of yeast itself in a congenial dough; and there is danger of ignoring the favorites of yesterday, or technically the carbohydrates, the proteins and the inorganic salts.

We are told that these heretofore overlooked and unrecognized "accessory food factors," these *sine qua non* vitamins have been found in vegetables, fruits and fats, or more specifically in onions, leaves of green plants, potato skins, beans, lettuce, cabbage, spinach, tomatoes, carrots, peas, turnips, in oranges, lemon juice, bananas, apples, in yolks of eggs, in butter, cream, cod liver oil, and especially in milk, rice polishings and yeast. Experimental evidence also shows conclusively that there are at least seven of these vitamins, and it is not going too far to suggest that others may be discovered before long; that is, we have no good reason to conclude that the vitamin story has been told in its entirety. As a matter of fact the medical profession and the laity are becoming convinced there is something to think of in connection with health and disease besides germs and sera and vaccines; that the building up of the body's resistance to germ invasion is of greater value to humanity than the study of the germs themselves, and that the study of food proteins, inorganic

salts and vitamins is likely on the whole to be productive of incalculable benefits to the human race.

The term "deficiency diseases" is naturally being rather closely linked up with the vitamin idea, and it is a matter of the profoundest significance that such serious and even fatal diseases as scurvy, rickets, pellagra, and beri-beri have been proven quite unquestionably to be the result of the removal from the ordinary diet of some infinitely small quantities of something Nature put into the food with the intention of its being utilized as food. The significant thing is that the removal is wholly the work of Man; that Man, in his ignorance, his stupidity and his wilfulness, breaks up combinations that Nature has put together for the express purpose of giving him a useful, strong and healthy body. No better illustration of this can be found than the "polishing" of rice by the removal of its pericarp, whereby mineral matter and vitamins are taken away and scarcely anything but the starchy mass left; with the result that when this improved or refined white rice is fed to animals such as pigeons or hens, or when it is used very largely as food by human beings, a fatal polyneuritis, or "beri-beri," as it is called in humans, is or may be developed.

It may be useful briefly to describe this disease, beri-beri, for though it is confined chiefly to the orient, the discovery of its cause is likely to prove one of the most important discoveries ever made in medicine. According to Osler and McCrae, pp. 406-408 of the 1920, or ninth, edition of this famous work on the "Principles and Practice of Medicine," "the most constant and striking features are changes in the peripheral nerves and degenerative inflammation involving the axis cylinder and medullary sheaths—not only in the peripheral nerves, but also in the vagus and phrenic. The fibres of the voluntary muscles as well as of the myocardium are much degenerated." "Paræsthesia, pains

and weakness in the limbs and a lowering of sensibility in the legs, appear, and sometimes œdema." "In the atrophic form, muscular atrophy and paralysis occur. Widespread paralysis with anæsthesia may be present. The mortality may reach 40 to 50%." "It is interesting to note that during the Russo-Japanese war, more than 50,000 cases occurred in the Japanese army." It was the study of beri-beri instigated by this experience that led to the discovery of vitamins by Funk; and if by this discovery humanity can be taught, first, the possible value of small quantities, so small in fact as to evade searching microscopical and chemical tests and analyses; second, to have confidence that the Nature which brought Man's body into existence has amply and intelligently provided for the nourishment of that body; and, third, that it is unwise to interfere with Nature's plans by attempting to improve or "refine" the food products she so generously bestows upon us—then that war will not have been fought in vain.

Special attention may usefully be called to the symptoms of the nervous system which occur in the disease pellagra. (Osler & McCrae pp. 404-405.) "Headache and vertigo are common. Mental features are often marked, among which are confusion, dullness, lassitude, irritability, feelings of anxiety and depression, change in the disposition, and hallucinations of sight and hearing. These may progress to profound depression and ultimately dementia. Mania occurs sometimes and suicidal tendencies are not uncommon. A spastic condition, disturbances of sensation, paralysis of the sphincters, or loss of the reflexes of the legs may be found." "There is always the tendency to mental deterioration which occurs in fully 10% of the cases." "The physical features might suggest general paresis . . ."

It is the consensus of opinion that pellagra is analogous to beri-beri and that it is due to the absence of a

something (a vitamin or some inorganic salt) from the diet of those attacked.

Officers of our own U. S. Public Health Service in 1915 performed experiments which showed conclusively that pellagra was at least a deficiency disease if not due to absence of a "vitamin." The Government generously distributed pamphlets giving reports of these experiments.

It is almost inconceivable that the discovery of the causes of these diseases, beri-beri and pellagra, should have made so insignificant an impression on the minds of an intelligent public alive to the importance of preventive medicine; and especially that the medical profession has been so little concerned about the enormous significance of the widely applicable principle revealed with the clarity of sunlight, in the discovery.

If the removal of a "vitamin" from rice, or if demineralizing or otherwise tampering with Nature's food products can work such havoc as beri-beri has done during the past six hundred years, why may not the removal of vitamins from other foods or the demineralization of these foods be a definite causative factor in the production of many diseases such as tuberculosis, cancer, pernicious anaemia, etc.? The question is certainly deserving of the most earnest study.

At the present time many conditions are considered as essentially "deficiency diseases" and are associated in one's thought with the classical beri-beri, pellagra, rickets and scurvy. Such conditions are infantile scorbutus, marasmus, dentition difficulties and imperfect teeth in children and adults, dyspepsias, indigestions, diarrhoeas and constipation, obesity, inability to nurse children, diabetes, neuroses, infantile paralysis, certain myalgias or "rheumatism," dementia præcox, and even tuberculosis and cancer. The list can be extended but it is already a formidable one. The subject under consideration, "A Few Thoughts on Vitamins," pre-

cludes discussion of the entire question of diet, but it is readily acknowledged by the unversed in the intricacies of medicine, whether or not the profession appreciates it, that the animal body of flesh and bones and blood is made from the food ingested and *if this food is imperfect the body itself must likewise be imperfect.*

Deprive the food Nature has given to Man of any of its ingredients and disaster is surely invited and courted. Man's great presumption is that he, the finite, the created, can improve upon the work of the Infinite, the Creator, and so man ingeniously and deliberately demineralizes his food—and then wonders why there should be so much disease and suffering and premature death. Even a partial study of the vitamin question, which is certainly a dietetic question, must convince one that the presence of so many and such varied diseases is a disgrace to civilization and that it is the duty of the medical profession to take up the neglected study of diet from an adequate, a comprehensive and a thorough standpoint.

Man cannot make, never has made and never will be able to make a grain of corn or wheat or rice, but with his ability and cleverness he can spoil these and other foods Nature has so generously given him. Vitamins may be carbo-hydrate or protein or mineral in their composition, organic or inorganic, it matters not. They are *something Nature has put into our food*, and all animals, man included, suffer when these things are removed from the diet. It has been shown by experiments carefully conducted by Dr. Percy G. Howe of the Forsyth Dental Infirmary for Children, Boston, that food lacking a certain vitamin tends to produce xerosis (xerophthalmia), showing a selective affinity for the eye, or it may produce a neurosis or disease of the nervous system. A paper by Edward Reynolds and Donald Macomber, also of Boston, entitled "Defective Diet as a Cause of Sterility," was read at the

meeting of the American Medical Association recently held in Boston.

Why is it that physicians in general, that neurologists and psychiatrists have failed to grasp the significance of the studies in vitamins and unbalanced rations which have been made during the last ten to twenty years? Is it not time for the profession, to see the simple but all-important principle herein involved and utilize that principle for the benefit of humanity?

There are just a few thoughts that are possibly appropriate in this connection:

- I. Man did not make or create "vitamins"; he only discovered them ages after Nature had made them, for they existed on this earth long before Man came into existence.
- II. Vitamins are essential elements of food. Seven varieties have been recognized. Doubtless there are others and possibly each kind of food has its own vitamin.
- III. Man does not yet know the composition of vitamins.
- IV. Man does not know the quantity or composition of vitamins in any food, but he does know that no microscopical or chemical or similar test has yet revealed their nature or quantity. Animal experimentation alone has demonstrated their existence.
- V. Absence of vitamins from a diet leads to diseased conditions of the body so deprived. A demineralized diet also produces disease, and this disease may be fatal.
- VI. A diet should be thoroughly balanced. Man evidently does not yet know enough to balance his ration; hence many diseases.
- VII. Being still ignorant of many things connected with the question of food, Man should not demineralize or devitaminize his diet.

VIII. In the garb of humility Man should modestly study Nature and learn to rely confidently upon her. Some day he may, and doubtless will, become better acquainted with her.

Before leaving this vitally important subject of vitamins special attention should be asked to the substantial addition of knowledge of the subject contributed by Major-General Sir Robert McCarrison, C.I.E., M.D., D.Sc., LL.D., F.R.C.P., as a result of 34 years of continuous work in India as a research worker in the vast field of Nutrition and Health. His research included years of laboratory experimental work; clinical experiences among and study of the different races in India; physiological, pathological and post-mortem investigations of thousands of animals experimented upon with different forms of food; and noting minutely the economical, social, climatic and other influences which modify, more or less, the life of mankind. A summary of his convictions and knowledge concerning vitamins and allied food values is to be found in a short series of three lectures on "*Nutrition and National Health*" delivered before the "Royal Society of Arts" in London during February 1936, and published by the Society, John Street, Adelphi, London W.C. Quotations from these lectures are considered appropriate in connection with the subject under discussion.

In the introductory paragraphs of the first lecture, when speaking of the cellular structure of plant and animal forms of life, McCarrison says on page 2: "The root of the whole matter of food and nutrition is the nourishment of the cell, whether it be of bone, epithelium, muscle, gland, nerve or special sense. The inevitable consequence of its faulty nourishment is depreciation of its structure and functions—the foundation upon which a vast edifice of disease is built."

"He (MAN) is, indeed, created out of the earth; and according as the earth provides . . . the materials needed by his body, so is that body well, ill or indifferently made and sustained."

On page 3: he, with scientific humility says: "Certain it is that no synthetic diet that I have been able to devise has equalled in health-sustaining qualities, one composed of the fresh food-stuffs as nature provides them."

And on page 6: "The alimentary tract is very prone to suffer both structurally and functionally in consequence of faulty food and to become the prey of pathogenic agents of disease or the harbourer of parasites" . . . "Indeed, there is, perhaps, no more significant fact in regard to the function of nutrition than that this highly specialized alimentary mechanism on which the nourishment of the body depends is itself amongst the most susceptible of the structures of the body to faulty nutrition."

On page 8: "Specific diseases of many kinds can be produced by feeding them (animals) on diets having specific food-faults, or prevented by the correction of these faults" . . . "I know of nothing so potent in maintaining good health in laboratory animals as perfectly constituted food; I know of nothing so potent in producing ill-health as improperly constituted food. This, too, is the experience of stock-breeders. Is man an exception to a rule so universally applicable to the higher animals?" . . . and, after referring to recognized differences between man and animals in their reactions to foods, good and bad, he says: "Nevertheless, the principles of nutrition are fundamentally the same in man and animals—It may, therefore, be taken, as a law of life, infringement of which will surely

bring its own penalties, that the greatest single factor in the acquisition and maintenance of good health is perfectly constituted food."

On page 10: . . . "I have little patience with those who would have us believe that 'white flour' is as good an article of diet as 'whole wheat flour.' White flour, when used as the staple article of diet, places its users on the same level as the rice-eaters of the South and East of India . . . Rice—a relatively poor cereal at best—is subjected to a number of processes before use by the consumer; all of which reduce—some to a dangerous degree—its already sparse supply of certain essential nutrients" . . . "In short, it may be said that according as the quality of the diet diminishes with respect to proteins, minerals, fats and vitamins, so do physical efficiency and health; a rule which applies with equal force to the European as to the Indian."

Page 14: "It is not, therefore, unreasonable to conclude that if by minute attention to three things—cleanliness, comfort and food—it is possible to exclude disease from a colony of cloistered rats, it is possible greatly to reduce its incidence by the same means in human beings and to produce a race whose physique is as nearly perfect as nature intended it to be."

Page 17: Apropos of peptic ulcer, in a series of experiments which were continued approximately 700 days, McCarrison found on post-mortem examination of all the animals that had died during the experimentation no evidences of peptic ulcer in those animals that had been fed on the Sikh diet: while in those that had been fed on the diet common to the Madrassi, 11 per cent had had peptic ulcer, and the third group that had been fed on the Travencore diet there had been

an incidence of 29 per cent. This experimentation would seem to prove, beyond any reasonable doubt, the definite relationship which exists between a balanced and an unbalanced diet and peptic ulcer. He who runs may easily read the lesson herein given. It may be pointed out that the diets made use of by the different races of India differ much in nutritious values. Hence the differences in the incidences of diseases.

McCarrison's great purpose in India was to ascertain, if possible, what relation the "foodstuffs" in common use by the people of India had to the diseases from which they suffered. Therefore during a period of eighteen years he experimented on "many thousands of animals . . . feeding them on diets . . . in common use by the people of India." The experimental and post-mortem evidence quite definitely showed that all and each of the organs and tissues of the body are affected for good or ill, sooner or later, by the diet utilized. A long and startling list of recognizable diseases is given on page 19 in proof of this statement.

At the end of an unusually useful, concise and differentiating study of the vitamins from page 27 to and including page 36, he says:

Page 37: "To one whose work has lain in India, and who for more than twenty years has been engaged in a study of the relation of faulty food to disease, the belief that such food is of paramount importance in the causation of disease amounts to *certainty*."

Page 40: McCarrison also makes the astounding claim, founded on official statistics, that tuberculosis is nearly twice as common, leprosy much more common, peptic ulcer 58 times more common, rheumatism nearly five times, cancer 3.5, anæmia and malnutritional diseases generally more than twice, rickets four times,

diabetes and mental diseases three times, disorders of the heart four times, nephritis ten times and infestation by round worms twenty times as common in the South as in the North of India. These differences he attributes in large part to the known, recognized and acknowledged differences in nutritive quality of the diets in use by the inhabitants of Madras and the Punjab respectively. He also emphasizes the great importance of recognizing in their earliest incipency the oncoming of these and their related diseased conditions and suitably modifying the dietetic habits of those who are so threatened.

On page 42, he vigorously condemns the use of the customary diet "excessively rich in vitamin-poor, mineral-poor, starchy foods and in protein-less, vitamin-less, minerally deficient sugar", and claims in this connection that "the inordinate use of refined sugar is one of the most serious addictions of the day." He also frequently refers to the absolute necessity of including a sufficiency of vitamin B-1 in one's food and gives a list of foods containing a goodly quantity of this all-important vitamin.

On page 46 after reference to malnutrition in children and some of its consequences, McCarrison says: "If the diet does not contain in adequate amounts all elements and complexes needed for normal nutrition, then the user of it is suffering from, or will suffer from malnutrition."

On pages 49 and 50 while discussing the prevention of disease by diet, McCarrison refers to the Papworth Village Settlement for Subjects of Tuberculosis and says that in this village of 400 persons "no child born there during the twenty years of its existence has, while a member of the community, contracted tuberculosis of the lungs, bones, joints, cerebral membranes,

nor indeed any clinical form of the disease. Yet these children are the offspring of parents who suffer from tuberculosis and are in constant contact with them." The reasons offered for these remarkable results are:

- I. "Adequate food supply" with education as to dietetic values:
- II. Freedom from anxiety as to loss of employment, i.e. adequate support:
- III. Proper housing, including aseptic precautions:
- IV. Free and habitual use of "sputum pots" and "pocket flasks" for sputum collection.
- V. Medical supervision, nursing and education.

The child's resistance is maintained by adequate nutrition and "absence of mass dose of infection."

On page 52: we read "Fifteen years ago . . . I wrote as follows:—With increasing knowledge of nutritional problems, it has become apparent that our dietetic habits need remodelling, and that education of the people as to *what to eat and why they eat it*, is *urgently necessary*" (our italics.)

Finally on page 54, the following apt quotation is to be found:—"It is for us [the medical profession] so to instruct ourselves that we may . . . use our newer knowledge to the end that customs and prejudices may be broken and a more adequate dietary secured for those under our care." "There can be no doubt" said the *British Medical Journal*, in a leading article last year (1935) "but that this newer knowledge of nutrition has placed in the hands of our profession a potent weapon against disease; a potent instrument in the promotion of physical efficiency and well-being. It behooves us, therefore, to become proficient in this knowledge, to apply it in the daily course of our work, and to spread it by every means in our power."

CHAPTER XII

HOW MUCH FAT SHALL I EAT?

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"In recent years no subject has received more assiduous attention from scientific men, and none has been made the object of more constant or more profound research, than the question of food and food supply. The feeding of animals and men is without question the most pressing and vital of all economic problems . . ."

"In fact it has been clearly shown that the quality and quantity of the food intake is just as directly and as clearly related to the question of human efficiency as is the quality and quantity of gasoline to the efficiency of an automobile."

The preceding lines, quoted from an article by Dr. John Harvey Kellogg of Battle Creek fame, in "Good Health" for February 1926, p. 5, are very concise, simple and direct statements of fact. They are more. They are inspirational if not truly prophetic, for with the "profound research" and intelligent scientific investigations in the great field of nutrition, at the present time being conducted in so many thoroughly equipped laboratories by such an army of well trained minds, it is safe to predict that the quarter century upon which we have entered will witness greater advances in the prevention of suffering and disease and untimely deaths than the history of man has yet recorded, and all through a real knowledge of food composition and food values. Medicine has many laurels yet to win and the freshest of them will be won in the realm of dietetics.

Everybody today (1937) is acquainted with the term "calories" and with its significance when applied to diet. Many persons build their daily menus around the caloric content of their food. Although the term is used in many quarters much less than it was a few years ago, it is very far indeed from being obsolete or archaic. As when speaking a foreign language one is apt first to think in his native tongue and then translate, so one is apt to think of food, first in terms of calories, and then apply his conclusions to the meal or food problem in hand.

Closely associated in one's mind with the term calory are the terms carbohydrates and fats, or starch, sugar and fats, and it is to the last of these familiar terms that attention is here particularly asked.

There must be some significance to the very evident facts:

- I. That food having distinct caloric value is absolutely necessary to all forms of animal life, though at this time we are concerned with man only.
- II. That calories are easily obtained from starches, sugars and fats. (Proteins are not here to be considered).
- III. That the caloric value of the starches, the sugars and the fats differ from each other.

Just what the significance is, i.e., just why the differences referred to should exist, is a matter to be definitely decided by a wiser generation than ours. The facts however we must accept and try to make rational use of them.

One who is anxious to know "How much fat one's diet should contain," and "Where this fat can be obtained" and "What differences there are between the food value and digestibility of vegetable fats and the animal fats," is likely to turn to the physiologist for

the information. Here one may find real help or may have to be content with indefiniteness. For instance, one may ask a physiologist the question "How much fat should the ordinary diet contain?" and receive the following reply:

".....
 "The question is probably a difficult one. I am leaving a few references which may help. But I fancy the ideal proportions are yet to be determined.

I will be on the lookout for further light.

Yours truly,

....."

Turning to text-books one finds that Howell in his deservedly popular "Text-Book" pp. 959-961 quotes Atwater's figures for an average diet as follows:

"Protein	125 grams
Fat	125 grams
Carbohydrate	400 grams"

The proportions are said to "vary with the activity demand on the body."

According to Friedenwald, "Diet in Health and Disease" p. 68,

"As carbohydrates can replace each other it is of course hard to set an ideal figure for each."

"There is some little difference of opinion on this subject. While it would not be well under ordinary conditions to omit from the diet either all the carbohydrates or all the fat, as a matter of practical experience on a mixed diet, the exact amount of fat and carbohydrate does not make so very much difference as long as the total number of calories needed to be supplied in addition to that supplied by the protein is covered. Volt's standard was 56 grams of fat and 500

of carbohydrate. Playfair, in England, reduced the fat to 51, and increased the carbohydrate to 531. Gautier, in France, suggests 65 grams fat and 437 carbohydrate. Fat is expensive as a food, and from an economic standpoint, diets containing over 60 grams are not apt to be employed. In cold weather the amount ingested may be increased if desired, and persons doing very hard physical labor can take more. If fat does not agree, an amount of carbohydrate having an equal caloric value may be substituted for whatever fat is omitted. Fat-free diets are not advisable either in infants or young children."

"The amount of carbohydrate used will depend on the total number of calories needed, and can be determined by deducting the proteins and fats. A diet consisting largely of carbohydrates is objectionable chiefly on account of the bulk and the strain made in the digestive organs." And one may add on account of the possibility of developing a diabetic condition by making use of such a diet.

If, as would seem to be the case, our physiologists hesitate to fix a standard for the ingestion of fat, or if human knowledge is not yet sufficiently far advanced to permit fixing a standard quantity for fat consumption, what are the rest of us poor unguided mortals likely to do in the matter? Naturally we shall follow the traditions and customs we have inherited from our predecessors and do so without trying to reason the matter out or look elsewhere for guidance. Some, however, will be dissatisfied with such a proceeding and with grim determination will insist on getting whatever truth may be accessible in connection with the subject, no matter where the search may lead them.

In order to get some side lights on the subject it may be of service to ask:

1. What fats are made use of today in the diet of the ordinary individual?
2. Are the fats all alike as to food value?
3. Is "caloric value" the only difference between starch, sugar and fat?
4. Is the digestive process the same for sugars, starches and fats?
5. Does Nature give us any hints that will help illuminate the subject?
6. How much fat shall we eat?

I. The answer to our first question will include such familiar substances as milk, cream, butter, cheese, bacon, olive oil, the fats of pork, mutton and beef, fowl, game and fish, cod liver oil, blubber, cotton-seed oil, lard, peanut oil, peanut butter and other nut butters and oils, glycerine, oleomargarine, etc.

The dining table that does not contain one or more of these fats at every meal is looked upon as being most inadequate and excites the commiseration of the average beholder. Those who are acquainted with the kitchen and its recesses will be able to extend this list, but it is long and comprehensive enough for our purposes.

The quantity of fats ingested daily by the average person may be partially estimated by the fact that during 1918 in the United States, the per capita consumption of milk (and its products) was 834 lbs. or 834 pints for each individual. In 1924 the consumption had risen to 1020 lbs. (or pints) of milk per capita; that is 2.8 or nearly 3 pints of milk a day for each man, woman and child in the United States; and the country, in the meantime, had become a large importer of milk and milk products, instead of being an exporter as it long had been. The quantity here mentioned includes cream, butter and cheese, so it is not quite as

formidable from the plain milk standpoint as it at first sight seems to be.

The amount of bacon and ham and pork, and the fats of meats will reach a considerable figure per capita, but reliable statistics are not available.

Cod liver oil and its substitutes with glycerine preparations are very popular, and have been increasingly so since 1841 when John Hughes Bennett of London published his famous "Treatise on Cod-liver Oil as a Therapeutic Agent." We will not discuss the processes made use of in obtaining this highly prized oil. Fortunately perhaps the ordinary individual is not familiar with the process and therefore is the more easily able to overcome his natural repugnance at the thought and odor of the product.

II. According to physiologists and bio-chemists there is practically no difference in the food value of the fats, for glycerine is the basis of all and the different flavorings influence the palatability chiefly. Further knowledge may modify present-day views on this subject.

III. "Caloric Value" is not the only difference between starch, sugar and fat, and it seems somewhat strange that an authority as highly esteemed as Friedenwald should say "the exact amount of fat and carbohydrate does not make so very much difference as long as the total number of calories needed to be supplied in addition to that supplied by the protein is covered." Also, "If fat does not agree, an amount of carbohydrate having an equal caloric value may be substituted for whatever fat is omitted." If these three things are so much alike that it really makes no difference whether one uses starches, sugars or fats so long as one gets a certain "caloric value," why does Nature go to the trouble of bringing these somewhat similar but essentially different substances into existence? Why are the digestive processes each goes through before giving

up its "caloric value" so very unlike? The real significance of these dissimilarities seems to be ignored by our scientists. And in all probability the human mind does not yet know all that is to be known concerning the composition, chemistry and physiology of carbohydrates and fat. If the chemistry of today cannot point to essential differences, the chemistry of the future doubtless will be able to do so.

IV. A brief glance at the digestive processes of sugars, starches and fats may impress one's mind with the idea that they are not just alike in composition, reactions, or destinations,—that they are only "somewhat similar." For instance, the natural sugars such as are found mainly in berries, fruits and vegetables pass into the circulation from the digestive tract without loss of time or calling for elaboration or modification. In the circulation they are rather rapidly "burned up" liberating their heat and developing energy.

The starches, as is well known, require time and an elaborate chemical process to transform them into glucose and prepare them for utilization in the liver and body tissues. There is no need for detailing this complicated process here; enough to say it is elaborate and very precise.

The fats after saponification and emulsification are finally absorbed through the agency of leucocytes and other factors into and through the villi of the intestines and so through "lacteals" into the lymphatic structures and stream and on through the thoracic duct into the circulation where further and final changes occur.

It is here claimed that these three distinct processes, in one of which the liver is involved, in another the pancreas, in another the lymphatic system, are significant beyond our comprehension, and since these processes have existed from the dawn of creation and man is as yet only beginning to be slightly acquainted with them, it would be wise for us in our uncertainty to interrogate

Nature and try to interpret her in seeking a guide as to the kind and the amount of fat and carbohydrates we should eat.

V. That we are not questioning a myth, a figure of speech, or mere figment of the imagination when such a practical and even vital matter is referred to Nature, may be made evident by a little consideration as follows:

1. Man is a created being: he did not create himself.

2. Physical man is a mammal.

3. All mammals have a diet furnished by Nature and adapted to their several needs.

4. This is true also of all reptiles, birds, fishes, and all forms of life.

5. It is unlikely that Man, the acme of created things, has been unprovided for by the influences that have brought him into existence.

6. Man has been in existence many thousands of years and has developed mentally only to the point of superficial acquaintance with the world he is living in. He does not yet know the all of chemistry or physiology.

The Forces that made Man have been operative from the earliest times and all things in the universe, great and small, animate and inanimate, are found to be acting under law and order, and therefore all processes whether called mechanical, chemical, dynamic or physiological are unquestionably orderly and significant. These Forces are by many called Nature. They are at all events manifestations of a Power.

As has been stated, (vide ante) Nature has provided for man's use three substances having high caloric value to meet certain absolute needs. These are called starches, sugars and fats. These three substances at

first glance seem to be alike, and they certainly do chemically greatly resemble one another. Physiologically, however, they are digested, absorbed, assimilated in different ways suggestive of being dissimilar substances. Moreover, there is this significant fact connected with the final uses of carbohydrates. The sugars furnished in natural foods, as has just been stated, are quickly absorbed and liberate their energy or develop calories which are needed and utilized by the tissues of the body. While these sugars are being utilized the starches are undergoing their more elaborate digestive process and by the time the natural sugars, as furnished by Nature in suitable quantities and combinations, are beginning to be used up, the digested and converted starches are being poured into the circulation from the liver to supply the place made vacant by the burned up and utilized sugars. Thus a continual supply of calories is maintained and Nature's cleverness, one might say wisdom, is illustrated.

The fats, as has been pointed out, in their digestion become linked up with the lymphatic system and it is assumed that they are directly concerned in the formation of leucocytes, or white blood corpuscles. At all events, an increase in the number of these corpuscles may be found in a blood count made a few hours, say three, after having eaten freely of fat food. Just what the relationship is between the formation of white blood corpuscles and the development of fatty tissue or the liberation of heat units cannot be stated with any certainty at the present time.

Nature not only gives illuminating hints but stands ready to make full revelation of all her processes just as soon as Man is capable of receiving the knowledge.

VI. If then, physiologists cannot help us to an answer to our question as to the quantity of fat which should enter into the average diet, is it necessary to give up searching for an answer? By no means. The

very Nature which existed æons before physiologists were dreamed of, and which has been throughout the years furnishing fats and carbohydrates and all needed "calories" to all living things, tells very plainly how much fat one should eat. Herbivorous animals get their fats from grasses and leaves and fruits: carnivora from the flesh of their prey: birds from seeds (grains), insects and fish, each after its kind. One has but to study the foods which Nature evidently intended for Man's use to get some very clear ideas on the subject and a definite answer to the question.

Analyses by noted independent experts and by the United States Department of Agriculture, and other authorities are available and may be found in any good library.

The following tables show the amount of fat and of carbohydrate found in the more common natural foods.

BERRIES

	Fats	Total Carbohydrate
Blackberries	1.0	10.9
Cranberries	.6	9.9
Currants	0.0	12.8
Huckleberries	.6	16.6
Raspberries	0.0	12.6
Strawberries	.6	7.4

(Atwater & Bryant)

FRUITS

Edible portion of	Fats	Total Carbohydrate
Apples	.5	14.2
Apricots	0.0	13.4
Bananas	.6	22.0
Cherries	.8	16.7
Figs, fresh	0.0	18.8
Grapes	1.6	19.2
Lemons	.7	8.5
Muskmelons	0.0	9.3
Oranges	.2	11.6
Pears	.5	14.1
Pineapples	.3	9.7
Plums	0.0	20.1
Prunes	0.0	18.9
Watermelon	.2	6.7

(Atwater & Bryant)

VEGETABLES

	Fat	Total Carbohydrate
Artichokes	.2	16.7
Asparagus	.2	3.3
Beans, dried	1.8	59.6
Beans, fresh lima	.7	22.0
Beans, green string	.4	9.4
Beets	.1	9.7
Brussels sprouts	1.1	4.3
Cabbage	.3	5.6
Carrots	.4	9.3
Cauliflower	.5	4.7
Celery	.1	3.3
Corn, green sweet	1.1	14.1
Cucumber	.2	3.1
Egg plant	.3	5.1
Lettuce	.3	2.9
Mushrooms	.4	6.8
Onions, fresh	.3	9.9
Parsnips	.5	13.5
Peas, green	.5	16.1
Potatoes, sweet	.7	27.1
Potatoes, white	.1	18.0
Pumpkin	.1	5.2
Rhubarb	.7	3.6
Spinach	.5	3.1
Squash	.5	9.0
Tomato, fresh	.4	3.9
Turnip	.2	8.1

(Atwater & Bryant)*

*Bulletin No. 28, Experimental Station, U. S. Dept. of Agriculture.

PRINCIPAL CEREAL GRAINS

	Fat	Sugar	Starch
Wheat	1.75	1.45	64.08
Barley	2.16	1.56	61.67
Rye	1.79	0.95	62.0
Oats	5.32	1.91	54.08
Corn	4.62	2.46	62.57
Rice	.88	Carbohydrates other than crude fibre 76.05	
Buckwheat	2.81	Carbohydrates other than crude fibre 63.34	

(Atwater & Bryant)

The Edible Portion of

NUTS

	Fat	Total Carbohydrate
Almonds	54.9	17.3
Beechnuts	57.4	13.2
Brazil Nuts	66.8	7.0
Butternuts	61.2	3.5
Chestnuts	5.4	42.1
Cocoanuts	50.6	27.9
Filberts	65.3	13.0
Hickory Nuts	67.4	11.4
Peanuts	38.6	24.4
Pecans	71.2	13.3
Pistachios	50.0	16.3
Walnuts, Calif.	64.4	13.0

(Atwater & Bryant)

Villier and Collin state that with the exception of the chestnut and peanut, starch is absent in nuts.

Even on superficial reading of the foregoing analyses it would seem to be very evident that the use of fat in food should be restricted to a small percentage; that Nature or the Source of Life and Matter did not intend man to express or remove the fat from some foods and eat it by itself or add it to other foods to make them more attractive to a perverse palate, and to unbalance the chemical composition of these foods. In other words, the Force that made fat and starch and sugar and proteins and vitamins combined them skilfully so Man and the other animals could have the nourishment that would give them all healthy, useful, beautiful bodies, free from deficiencies, suffering and disease. Man should remember he did not originate fats, sugars, starches, proteins, vitamins etc.; he has simply discovered these things and has named them but they have existed through the ages.

The conclusion would seem to be logical and inevitable that Man should follow the suggestions of Nature in regard to eating fats, and not eat pork and bacon and lard, the fats of meats, or cod liver oil or sweet oil, almond or other nut oil, or even butter or cream or other fats isolated from their natural combinations. For Nature KNOWS and Man does not yet know!

If, or when, extra fats are needed as foods, they can be obtained in sufficient quantity and in natural combination in ripe olives and especially in nuts. In winter, then, or at other times when necessary, nuts should form a definite part of the daily ration. And they may be eaten freely if carefully masticated and unsalted, without fear of increasing the weight of the body or "overheating" the body, or interfering with any of its functions. Other foods, as shown in the tables, contain fat and presumably enough for all the ordinary needs of life, but the extra or emergency supply is to be found in nuts.

The cook may feel it necessary to use fat for some

culinary purpose and if she could be persuaded to use mineral oil in place of the fats she is accustomed to, it would be to the great advantage of mankind, but food should be so simple and sufficient without the things that "must have a little fat" that even this concession need not be made.

Man has invented too many combinations by courtesy called food, and that is probably the chief reason why he has developed so many diseases in the course of the centuries. *The first step towards permanent good health is to eat rationally, or in other words to follow a rational interpretation of Nature and use those foods which she has so generously provided; things that are clean, well balanced, palatable and truly nutritious.*

CHAPTER XIII

HOW MUCH SHOULD I WEIGH

"They [men] have not understood that their body and consciousness are subjected to natural laws, more obscure than, but as inexorable as, the laws of the siderial world. Neither have they understood that they cannot transgress these laws without being punished."

ALEXIS CARREL

page xiv of "*Man the Unknown*"

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CHAPTER XIII

HOW MUCH SHOULD I WEIGH.

One of the popular twentieth century questions is the one which forms the above title. Young people, the middle aged, and the elderly of both sexes show a genuine interest in the subject. Various motives give rise to this interest. Some people are conscious of being much over-weight and of the physical clumsiness and awkwardness associated therewith, and therefore desire to "reduce." Others, much fewer in number, are disturbed by being "underweight," but the distress is mental rather than physical and is caused chiefly by being urged by friends and relatives to "get fat." Not infrequently an applicant for life insurance is rejected on account of not being up or down to an accepted standard of weight. Many mothers are distressed by their children coming home from school with a note or card suggesting that the child is undernourished and underweight.

Physicians are frequently asked by their patients how much they should weigh; and many people, whether ill or not, daily consult their bath-room scales eager to know whether they have gained or lost weight. The wide interest in the subject is testified to by the conspicuously placed weighing machines in railroad stations and public places. Whether this weight is a matter of vital importance or not, the keen interest taken in the matter warrants a brief consideration of the standards which are looked upon as furnishing authoritative answers to our question.

Many people are quite satisfied with the figures

found in the printed tables of weighing machines; others with the tables published by Insurance Companies: others with the assurance of friends that they are "just right": others refer with confidence to the school physician or school nurse: others to the standards adopted by the Surgeon-General's office during the drafting period of the recent world war: while still others rely upon figures furnished by biologic or anthropologic investigators.

The standards adopted by these different agencies represent larger or smaller groups of individuals and are based upon the general law of averages. For most purposes these standards may be considered satisfactory and in the main the differences are not very significant. But the question is suggested, Is the average person normal and suitable as a standard for comparison or only approximately so? Here the questions of age, of sex, of nationality come up for consideration; for it is a well recognized fact that weight with ordinary individuals varies during the periods of early maturity, mid-life, and old age, and that after the earliest periods of life (infancy and childhood) a marked difference exists between the sexes at the same age: also that nationality is a matter that must be taken into consideration since some races average taller, larger, and heavier than others. There evidently can be no standard of weight that is applicable to all nationalities, so that in a nation of mixed races such as is found in the United States, the standards adopted must be flexible enough to admit of considerable variation.

In seeking an answer to our question various considerations present themselves. Shall we adopt an aesthetic, an anatomic, or a physiologic standard? Evidently these standards will vary considerably from that of the average person.

Standards of physical beauty, which include weight, have varied much from the days of the Greeks in

their prime through the "dark Ages" to the Renaissance and Moderns; from the ideals of the barbaric and uncivilized to the civilized and cultured races and peoples. From the artistic standpoint certainly nothing has been produced by any people, ancient or modern, that excels in attractiveness of outline, in symmetry, graceful form and strength, the bas reliefs and statues produced by the classical Greek sculptors. Even today these may be held up as ideals to be striven for in art and in life.

The so-called practical age in which we are living has but scant room for Greek idealism. It would seem as if the American standard of beauty was one of mere bulk, weight, or corpulency, for the "aldermanic" figure is almost a predominating one. To be "fat" is looked upon as a sign of prosperity and is considered by many indicative of good health. Increase in flesh, and therefore of weight, is almost universally somewhat progressive through the years, but one is justified in asking why a person of forty should weigh any more than he did at maturity, i. e. twenty or twenty-five? . . . Why anyone at sixty should weigh any more than he did at twenty-five or thirty?

It is a well known fact that the weight of the brain, lungs, liver and organs of the body generally is no greater at forty or sixty than it is at twenty-five. The muscles are usually considerably smaller, the bones certainly are not bigger although they sometimes are heavier from the deposition of lime salts.

The increased weight of the body which is an accompaniment of the passing years is due simply and wholly to the accumulation of fat in the sub-cutaneous tissues chiefly, but somewhat in muscle tissue and in the supporting tissues of many of the glands. It may be deposited almost anywhere in the body, although adipose tissue is rare in the brain and spinal cord.

This increase in the deposit of fat is due only partially

to the decrease of physical exercise that may come with the years. The real cause is to be found in diet, for without an over supply of fats and carbohydrates it is next to impossible to make fatty tissue.

It is not as widely recognized as it should be that fatty tissue has, under ordinary circumstances, no function to perform. Looked at from the physiological standpoint it is certainly as nearly useless as anything can be. All the other tissues of the body have certain and very definite work to do. The bones are useful in forming the framework of the body, supporting and protecting the delicate organs and making locomotion possible.

The connective tissues are useful in holding bones together, in connecting muscles to bones, and in general in supporting the various organs of the body. The brain and spinal cord have very highly specialized functions to perform. The special sense organs (eyes, ears, nose, tongue and skin) have their own very particular work to do, each being differentiated to perform just its allotted work. The lungs are recognized as necessary to respiration, that is, the oxidation and purification of the blood. The heart as the fountain head of the circulation, and the blood vessels, all do their very wondrous duty. The mucous membranes and glandular organs of the body have their highly specialized functions to perform, each one doing something that *cannot be done by the others*.

Adipose tissue from the anatomical standpoint is simply a padding of which but little is needed, and from the physiological standpoint is next to useless. It is looked upon by physiologists as a reserve fuel food but in the life of a healthy and normal individual this extra fuel food will rarely if ever be needed. Even with a very small amount of fatty tissue one can weather the storms of most fevers, and it is fevers that may be said to be fed by fat.

When one realizes the uselessness of this tissue one cannot help wondering why so many people consider the possession of a surplus quantity a desirable thing.

It is unnecessary to make lengthy quotations in support of these comments in regard to the use or uselessness of fatty tissue, but the following letter from Dr. F. H. Pratt, Professor of Physiology in Boston University School of Medicine, may be quoted:

"In response to your request for a brief statement of the function of body fat, I would suggest the use of the following quotations from E. H. Starling's Principles of Human Physiology, third edition, page 827:

"Functions of Fat:

First and foremost must be mentioned the significance of fat as a reserve food store. The power of the organism to store up reserve carbohydrate is strictly limited.—On the other hand, in most animals there is practically no limit to the amount of fat which can be laid down, and *over-feeding*, whether with carbohydrates or fats, leads to the deposition of fat. *This fat does not enter into the normal metabolism of the body*, but is available for use whenever the needs of the body are increased above its income.—Fats enter into the constitution of the complex bodies, lecithin and myelin, which form important constituents of the limiting membrane of every living cell. As constituents of the membrane itself, fatty substances therefore have a protective action, and also regulate the passage of substances into the cell across the membranes.' "

From the anatomico-physiological standpoint, therefore, it seems very evident that the body should consist of the skeleton, the connective tissues, the muscles, the integument, mucous membranes, viscera, special sense

organs and glandular structures which are necessary to enable it to perform its highly complex duties. It is equally evident from physiological studies that overweight of the body, or the fleshy, portly, stout figures so commonly reached by mid-life, is due, as our physiologists and common sense tell us, to over-indulgence in those foods which are easily transformed into fatty tissue. Physiological consideration also tells us that to weigh more than the combined weight of the functionally active organs and tissues of the body, is to impose a very definite burden upon those organs, but more particularly upon the heart and circulation.

The person who will voluntarily carry about with him, in each hand continuously, forty, fifty, or sixty pounds of useless material will be looked upon as at least lacking in judgment. The burden will soon be appreciated and dropped as soon as opportunity offers. The burden on the muscles, heart, and circulatory apparatus of carrying about a similar weight of fat distributed over the body is just as great, although perhaps not quite so quickly appreciated; and if it is senseless in the one case, it is equally irrational in the other.

Statisticians are calling special attention to the deplorable fact that within recent years there has been a startling increase in the incidence and mortality of diseases of the cardio-vascular system. Everything therefore that throws extra burdens upon the heart and muscles, such as being over-weight, is to be studiously and assiduously avoided.

We have seen that the thing that makes for overweight is the eating of more food than is necessary to carry on the functions of the body, and especially over-indulgence in fats, sugars and starches. To be more specific, it is the eating of cream and milk and butter, of meat fats, of oil and oil dressings, of refined cane and beet sugar (demineralized sugar), of jellies, jams, preserves, ice cream and confectionery, into all of

which the sugar of commerce so largely enters; of the excessively starchy foods such as white flour and the things made from it; of polished rice, peeled potatoes, American (or white) macaroni etc.: in a word, the eating of the highly "refined" and demineralized food eaten by the average person that makes for overweight. If these imperfect foods are capable, as they certainly are, of raising the weight of the body above the anatomico-physiological normal, it is only rational to exclude them from one's diet altogether, and as reasonable substitutes to make use of the natural and unspoiled grains and vegetables, and fruits and nuts of which Nature has furnished Mankind a wonderful and useful variety. In such foods the starches and sugars and fats and proteins and minerals and vitamins are all present in balanced proportions, in forms easily digested and assimilated and so combined with "roughage" that one's appetite can easily be satisfied, all the needs of the body fully supplied, the functions of the body kept harmoniously in action, and the weight of the body be maintained at the point which is evidently a part of Nature's plan.

Concerning fixed and inflexible standards, whether of the weight of the body or anything else, one might apply the common sense and acumen of Lincoln in answering the question put by an artist apropos of the symmetry and artistic proportions of the human body.

"Mr. Lincoln, how long do you think a man's legs ought to be?" to which Lincoln rather promptly replied: "Long enough to reach to the ground."

So instead of adopting a set scale for weight, according to age and height, or even the aesthetic standard of graceful outlines, symmetry and attractiveness, one would better adopt the anatomico-physiological standard of efficiency, strength, endurance, and freedom from inharmonious functioning of the body: of the ease with which one does his work; of ability to walk

and run, to climb a hill or go up two or three flights of stairs with pleasure and comfort; of sound and restful sleep, normal appetite, enjoyment of simple food, good digestion and assimilation; of having a steady and reliable heart, and full and free respiration; in short, of being unconscious of the body and having all its functions performed in accordance with Nature's reasonable plan.

"Good health" should be the standard aimed at and not an arbitrarily fixed number of pounds. When humanity by the use of its great gift of rationality has succeeded in freeing itself of its unnecessary and disgraceful burden of disease, there will be no need of asking the question "How much should I weigh?" for the weight will then be normal according to a physiological standard. In the meantime the majority of Mankind will probably prefer the agile, flexible, lithe, unencumbered, clean-cut figure of the athlete, Greek or modern, to the "aldermanic," cumbersome, overgrown body of the unwisely fed or the overfed; and will also prefer the sylph-like, slender, graceful figure of the maiden to the heavy, unwieldy, unattractive and ungraceful figure of the portly matron.

CHAPTER XIV
THE SUGAR PROBLEM

“In learning the secret of the constitution and of the properties of matter, we have gained the mastery of almost everything which exists on the surface of the earth, excepting ourselves.”

ALEXIS CARREL
page 2, “*Man the Unknown*”
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CHAPTER XIV

THE SUGAR PROBLEM

Why do we eat sugar? Ask the ordinary individual, and he will probably answer, because we like it or because it is sweet. Certainly, the average individual does not know why he eats sugar, except that it is sweet, and he likes it.

With the exception of white flour and flour products, there is probably no article of food that is eaten so universally and in such large quantities, as sugar; in fact, starch and sugar form the bulk of the average diet. It is right and proper that they should form the major part of one's diet, because the body is composed, to a very large extent, of carbohydrates and their products.

It is a curious fact that only a few short years ago, during the World war, the population of this great country of ours was thrown into a feverish panic over the official announcement made through the press concerning the "shortage of sugar." The coal situation had affected the people profoundly; but the fact of being restricted in the supply of sugar, and the possibility of being obliged to go without it, produced an alarm, an unhappiness and a dread, that made the coal shortage sink into insignificance. The excitement was hysterical in its manifestations, and anticipation of acute and dire suffering swayed the popular mind. The people considered themselves deprived, or on the verge of being deprived, of not only a staple article of food, but of one of the essentials of life. The idea of getting along comfortably without sugar did not seem to enter

people's minds, and the suggestion that instead of being a calamity, the "shortage of sugar" was in reality a blessing, was looked upon as unworthy of a moment's consideration.

It is not intended here to attack the sugar problem with the thoroughness of the research investigator. It will be necessary to omit lengthy discussion of the commercial, the agricultural, the chemical, the physiological, and other aspects of the subject, and instead, to devote ourselves to only a few practical points.

Is sugar really a necessity? If so, what kind, and how much of it should one eat? Is there any standard that may be used as a guide? What becomes of it in the body? Can sugar hurt anyone?

In answer to the first question, we are justified in saying "Yes." Sugar is an absolute necessity to the mammalian body, but this does not necessarily mean refined, granulated, or commercial sugar. In this matter of sugar, mankind has been guided, as in other dietetic matters, by his palate, or by racial or national habits, etc. Sweet things are said to taste good, and therefore everything is sweetened, especially among our modern peoples. There are very few articles put upon our table which do not contain sugar. Baked beans, lettuce and bread are not eaten without their share of sugar or sweetening. Porridges frequently are so covered with sugar that the cereal itself cannot be seen and the natural taste is obscured. Tea and coffee are taken in a super-saturated solution of sugar. Cookies, cakes, pastries, puddings, jellies, jams, preserves, confectionery, and ice cream enter into the average daily menu, and berries, melons and fruits which naturally are very sweet have a liberal amount of sugar added to them, by perhaps the majority of people. If this were done in an intelligent response to a definite requirement of the body, it would be all right; but into

this, as into so many of our habits, intelligence does not enter.

We have enumerated only the more common uses of sugar; many others will occur to the reader of these pages.

Attention should be called to the fact that the sugar in such common use is the refined sugar of commerce. The refining process need not be described; it is enough to say that the process which has been universally employed, and even now is in vogue in most places, is a complicated physico-chemical one, which results, among other things, in a rather thorough demineralization of the sugar. This is the great fault of the diet of civilized peoples. Most of our food in the preparation or cooking becomes more or less demineralized, and this is the cause of many of the diseases to which humanity is subject.

In addition to the demineralization, the sugar represents a tremendously concentrated product. The sugarcane contains from 14 per cent. to 18 per cent. of sugar. The expressed juice contains from 15 per cent. to 20 per cent. The sugar-beet contains from 12 per cent. to 16 per cent., and the juice from 13 per cent. to 17 per cent. By the simple process of evaporation, these percentages are raised to practically 100 per cent. This tremendous concentration, plus the demineralization, renders the sugar a very different thing from Nature's simple product, and it is to this point that the most serious attention should be directed.

In the days of the Civil War and for some time thereafter, there were found at our ordinary grocers two or three or four kinds of sugar, ranging from the dark brown, slightly refined product, to the "coffee crushed." It is only about 50 to 75 years ago that the refined granulated product became popular and the brown varieties disappeared from the market, so that they are

difficult to obtain, though they recently have made their appearance as "live sugar."

Co-incident with this change, there has been a marked increase in the number of cases of certain diseases. One only need be mentioned at this time; viz., cancer.

So recently as during the latter part of the last century, cancer was supposed to be a disease of senility, not to occur until its victim was 65 or 70 years of age. Later it was found to occur in the 50's: still later in the 40's, and it is not uncommon today to come across cases of cancer in the 30's, or even during the second decade of life. Vital statistics show that in the registration portion only of the United States there are upwards of 90,000 *deaths* from cancer annually, and the number has been steadily increasing of late. It is not here claimed that the over-free use of granulated sugar is the cause of cancer or the direct cause of other serious diseases, but there is a suggestive co-incidence found in the facts referred to.

In this connection one may ask, Why should there be so much tuberculosis? Why so much insanity? Why such a woeful prevalence of nervous prostration in its myriad forms? Why should the most intelligent and most highly civilized creatures upon the earth be subject to so many diseases? Why is the modern mother in such a large percentage of cases unable to nurse her offspring? Why should there be such an appalling number of children with defective teeth and the ill results of this condition? Why so many "backward" and defective children?

Many diseases are said to be caused by germs, but the fact of immunity is well recognized, and why should not the human family be immune, as it doubtless was intended to be, to germ activities? It is well known everywhere today, that beri-beri, a very fatal disease, affecting chiefly the nervous system, is a result of eating an excess of demineralized rice, the popular food in

countries where beri-beri prevails so alarmingly. It is well recognized today, as so beautifully proved by our National Public Health Service, that pellagra is produced by a one-sided carbohydrate (demineralized) diet. For many years scurvy among mariners has been duly recognized as a dietetic disorder. It can easily be proven that infantile scorbutus is due to an unbalanced ration. Now then:—If these and many other conditions are known to be due to improper food, why is it not reasonable to assume that many or most other diseased conditions may be due directly or indirectly to improper food?

If granulated, commercial sugar can be shown to be an unbalanced and unnatural food, why is it not proper under the circumstances to eliminate it from our diet? To suggest, if not to prove, that granulated sugar is unnatural, it is simply necessary to refer to its production. Nature certainly does not give it to us in its commercial form. It comes in a weak, or moderately weak solution, and is obtained by evaporation, crystallization, and refining. Nature gives us sugar in a wonderful variety of substances. Our fruits and berries, many of our vegetables and milk contain sugar in varying proportions. For instance, lemons, rhubarb and apricots contain from less than 1 per cent. to 2 per cent. of sugar. Blackberries, huckleberries, and blueberries contain 4 per cent. to 5 per cent., currants between 6 per cent. and 7 per cent. Strawberries, gooseberries, raspberries and apples average $7\frac{1}{2}$ per cent. Sweet potatoes contain 4 per cent. to 6 per cent., corn and carrots 6 per cent., beets 8 per cent., oranges 5 per cent. to 10 per cent., bananas and peaches about 11 per cent., pineapples 12 per cent., plums 14 per cent., grapes and sweet cherries 15 per cent., fresh figs $15\frac{1}{2}$ per cent., and dried figs $51\frac{1}{2}$ per cent. Figs, dates and raisins go as high as 50 per cent. in the dried form.

Peas, parsnips, turnips, and other vegetables contain easily demonstrable amounts of sugar. *

The sugar content of milk is an important as well as an interesting and suggestive matter.

Comparison of Breast and Cow's Milk with Relation to Lactose Content:

Authority	Breast Milk	Cow's Milk
Meigs	7.4	4.9
Munk	5.0	—
Koenig	6.2	4.9
Heubner	7.0	—
Kamerer	6.5	—

The variation in the above figures depends in part upon the accuracy of the methods used and in part unquestionably upon the period of lactation which predominated in compiling the averages. Meigs' figures are most recent and probably the most reliable.

In milk from the pig, goat, buffalo, cat and ewe, is to be found 4 per cent. or 4 per cent. plus of lactose; in the rabbit only 2 per cent.; in the dog 3 per cent. plus; in the llama, camel, and mare, over 5½ per cent.; in the ass 6 per cent.; and in the elephant 8.8 per cent.

The main point in citing these various statistics is to draw attention to the fact that Nature has a serious plan in view in the food she furnished her creatures. If we do not comprehend the full importance of that wise plan, would it not be well for us to use it as our guide and standard, and not try to modify or improve a plan of which we do not at present grasp the significance? Certainly Nature intended us to eat sugar. No one with intelligence will deny this statement, and it is only respectful to assert that Nature, which means the Creative Intelligence, knows what it is about and it

*(These percentages are from "Farmers' Bulletin 535," year 1913.)

will be wise for us to follow as closely as possible the hints that Nature gives us.

Mankind, for instance, evidently does not approve of Nature's plan in the making of fruits and fruit juices, and so, very liberally, adds sugar to fruits and berries when eating them; and for the so-called purposes of "preservation," will add to the fruit juices in the making of jams, preserves, jellies, marmalades, etc., up to pound for pound, thus interfering most seriously with Nature's intentions. Is this a wise and rational thing for intelligent people to do? Is it not right to expect that Nature will resent such interference and, so to speak, punish the offender? This, at all events, seems a rational view to take of the matter.

It is easy to prove that the too free ingestion of sugar is injurious, both to the growing and the developed organism. Even the laity knows that it is a bad thing to eat too much confectionery; that sweet deserts, pies, puddings, etc., are upsetting to the digestion; that headache, bad taste in the mouth, coated tongue, "biliousness" of various forms, indigestion, loss of appetite, flatulency, etc., are sure to come, singly and in combinations, from a free indulgence in sugar compounds.

It is well known that the well-rounded outlines or the "aldermanic figure" of the middle-aged individual, and the obesity that occurs at any period of life, are due to over-eating of sugar and its so closely related starch products. It is easily shown that the obesity which so many look upon as a sign of prosperity and good health is sure sooner or later to overtax the circulatory apparatus, and lead to serious organic conditions.

In order to show, however, that this condemnation of white or granulated sugar, the work of man's ingenuity, is not a thoughtless prejudice, special consid-

eration of the following impressive facts is earnestly desired.

According to Nature's laws there are chemical actions and reactions which occur and recur with unflinching regularity and precision whenever two substances are brought into contact with each other; and chemical tests have been devised which reveal the presence of sugar in a solution. One of the simplest of the sugar tests, called Benedict's after its inventor, which when added in a definite quantity to a solution containing sugar and the whole subjected to boiling in a test tube, will convert the very definite blue color of the solution into a more or less reddish color the depth of the color depending on the amount of sugar present. This is infallible, and one can easily be taught or trained to make the test. Other tests are available but the one referred to is very popular. A point of fact never to be forgotten and a most suggestive one is that solutions of all the varieties of berries, melons and fruits, and of many forms of vegetable foods invariably respond to the test, and after the boiling show up the transition from the blue color to a more or less reddish color and precipitate. The result of the test is inevitable.

Now the startling and mystifying fact is that the solutions of white, granular, commercial, man-manipulated and *refined* sugar *does not react as the other sugars do*. Why? Because some change in its composition has been brought about by man's interference with the natural substance and man has so modified it that it no longer reacts to the test. Is the change beneficial or does it suggest something deleterious in character? It cannot be an improvement, for the sugar-cane and the sugar-beet have been made by Nature for a specific purpose, and here as elsewhere Nature is wiser than Nature's product, Man. The juice of the sugar-cane and sugar-beet in proper solution responds satisfactorily to the test and the "refined" sugar *does*

not. The full significance of this fact may not be wholly known, but the artificial and modified product, granulated sugar, naturally cannot do the work Nature intended the unmodified and simple juices to do. In addition to physico-chemical changes man converts the simple cane and beet juice into super-concentrated substances and uses these end products as a so-called food at the rate of 70 or more pounds per capita annually in the United States.

Of course, we all know that people prefer to eat things they like, even if they do get obese, and then try to "reduce" their flesh by massage or mechanical means. This is simply one illustration of the aphorism "there are thousands hacking at the branches to one who is striking at the roots."

The evil results so commonly attributed to the citrus fruits, to tomatoes, strawberries, etc., are due in all probability to the additional sugar which is so generously eaten with them rather than to the fruits and berries themselves. There would seem to be no reason why thoroughly ripe fruits, berries, etc., should not be eaten by rheumatics, neurasthenics, and other invalids, or why we should not advocate their free use, *always prohibiting*, however, the addition of cane sugar. One may reasonably ask why fruits, vegetables, etc., such as rhubarb and cranberries, that are considered by many too sour to be eaten without the addition of sugar, should be eaten at all.

It may be interesting to note that the *per capita* consumption of sugar in the year 1904, as found in the Senate Document Vol. VII (1914) was as follows in the following countries: Servia, Bulgaria, Roumania, Italy, Greece, and Turkey, from 6½ to 8½ lbs., which may be looked upon as a low annual consumption. (Reference is here made to commercial sugar, and not to the sugar found in honey, raisins, figs, etc., which in these countries are liberally consumed.)

In Spain the *per capita* annual consumption was a little over 12 lbs., in Portugal and Madeira 14.7 lbs., in Russia 19½ lbs., in Austria-Hungary 20½ lbs., in Belgium 25.6 lbs., in Germany 32.9 lbs., in France 34.4 lbs., in the Netherlands 35.6 lbs., in Sweden and Norway 42.7 lbs., in Switzerland 44.1 lbs., in Denmark 60.6 lbs., in the United States 70½ lbs., in the United Kingdom 81 1/3 lbs.

No comment need be made at this time on the dietetic habits referred to, but some interesting conclusions might be drawn from them.

In order to satisfy the craving of the child and the adult for sweet things, one can heartily recommend the free use of dried currants and raisins; of prunes, figs, dates, pineapples, bananas, peaches, etc. Not only can the craving be satisfied in this way, but the caloric needs of the body can be fully met and the over-igestion of sugar will be unlikely to occur. The dehydrated, evaporated or dried fruits may be used if and when the fresh ones are not obtainable.

CHAPTER XV
A THIRTY-EIGHT YEARS' EXPERIMENT WITH
A MEATLESS DIET

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The age in which we live, that is, this remarkable 20th century, will probably be distinguished in history as the Scientific Age, in contrast with the Stone Age, the Iron Age, the Bronze Age etc. Mankind is becoming more and more familiar with Nature and Nature's methods. Her laws are being more and more thoroughly revealed, and her forces are being more and more brought under subjection to and utilization by Man. The scientifically trained mind has learned the value of investigation, analysis, and experimentation, and repeated experiments are considered necessary to the establishment of any fact. In things medical Pasteur never could have made the wonderful bacteriological discoveries which have made his name immortal without experimenting and repeating his experiments hundreds of times.

The cause and prevention of smallpox, typhoid, typhus, cholera, yellow fever, bubonic plague, diphtheria, rickets, and hook-worm disease, to mention but a few of the triumphs of medical science, could never have been discovered but for patient and repeated experimentation. Bacteriological fields having been quite thoroughly and usefully explored, the attention of medical scientists is being directed towards the all important field of dietetics, nutrition, and biological chemistry. During the first quarter of the present century, food problems have been more fruitfully investigated

than ever before in the history of the race; and the discovery and recognition of vitamins has greatly stimulated the spirit of investigation. Beri-beri, pellagra, rickets, scorbutus, and diabetes are now recognized as preventable diseases because of the discovery of the cause, which in each instance is dietetic.

The reasons which led the writer to investigate and experiment with a meatless diet were:

1. The occurrence in his practice of an unusual number of uræmic crises such as headache, convulsions, and coma;
2. The reading of Bouchard, Von Noorden and others on the general subject known as "auto-intoxication."*
3. An effort to apply the teachings of physiology to the practical side of medical life.

Much has been written about uræmia and uric acid. Much illness has been attributed vaguely to the presence of an excess of uric acid in the blood. Diets have been modified to harmonize with theory. But twenty-five or thirty years ago much less was known about the subject than is known today. Adherents of certain fads or cults, or philosophico-religious bodies, had abstained from the use of meat on theoretical, sentimental, or humanitarian grounds and many others abstained because the eating of flesh was abhorrent to them. In the effort to get beyond theory, the writer conceived the idea of making chemical analyses of meats and meat extracts to find particularly if any waste or injurious matter was to be found therein. He made use of ordinary red meat or fresh butcher's meat, the cold storage method not being used at that time. Fresh liver and kidney were also used and the

*Ch. Bouchard's "Lectures on Auto-Intoxication in Disease, or Self-Poisoning of the Individual."

Von Noorden's "Man, the Generator of His Own Poisons."

three most popular beef extracts which were then on the market. Small pieces of the meat, liver and kidney were soaked for a short time in cold distilled water so as to make a weak cold decoction of each, and small quantities of the extracts were dissolved in distilled water.

These decoctions and solutions were then tested for tissue wastes, especially urea which then and even today is looked upon as the chief waste of the body tissues. It is the substance called urea and its ally uric acid that are considered the active agents in uræmic headaches, convulsions and coma, and chronic "rheumatic" conditions, generally. Although it is recognized that pure urea by itself is not a poison, some of the factors which finally make it are toxic and the term urea is used generally as indicative of the cause of many disorders of the body. At all events the tests resulted in discovering a considerable quantity of these and other wastes such as are found in urine. The tests are easily made and the results are inevitable. Waste matters are to be found in all forms of meats. Under normal physiological conditions these chemical wastes of life are picked up by the circulation and, floating in the blood stream, they are carried to the kidneys where by specialized epithelial cells they are selected from the blood stream or are allowed to filter through into the excretory tubes of the kidneys and thrown out of the body as urine. The urine is not a substance formed in and by the kidneys but a something that pre-exists in the blood stream, the kidneys acting simply as eliminators.

It should be widely known that all meats contain what is practically urine, and the juicier the meat the more urine it contains. Everyone knows now that urine is not good food, and it is known to many that urine retained in the body is very poisonous even to the point of producing the death of the body which formed it. As pointed out years ago by Bouchard, the average

duration of life in a person whose kidneys for any reason have ceased to function is fifty-two hours. The important lesson is that some of the tissue wastes, which when collected and thrown from the kidneys are called urine, are distinctly poisonous, and it is the retention of these wastes (or some of them) that brings about the condition called auto-intoxication with its many evils and varied manifestations.

These discoveries were not pleasant to think of, and the writer (the experimenter) was convinced that Bouchard's and Von Noorden's theories and ideas and announcements were correct.

It is surprising that these simple facts were not taught in the medical schools of a quarter of a century ago and are not today. Many complicated and difficult analyses are made by medical students in their beautifully appointed laboratories but the simple and useful analyses referred to are not made or taught. No physicians of the writer's acquaintance, or to his knowledge, have made these investigations for themselves, and the term "auto-intoxication" is very loosely used by perhaps the majority of them.

Physiological teaching shows that the wastes of the brain and nervous system, the muscles, bones, and organs and tissues of the body are collected into the blood and lymphatic system and carried to the organs of elimination, the kidneys. The liver gets rid of certain wastes: the skin of small quantities: gaseous wastes pass off through the lungs: but the bulk of the most important and poisonous materials are disposed of by the kidneys. These teachings are not practically applied in the practice of the average physician who unfortunately is too apt to leave his physiological knowledge behind him when he graduates from his medical school.

These simple tests and their revelations naturally

convinced the writer that there was some reason behind the injunctions found in

Genesis ix-4: "But flesh with the life thereof, which is the blood thereof, shall ye not eat."

Leviticus xvii-11: "For the life of the flesh is in the blood—."

" " 12: "Therefore I said unto the children of Israel, No soul of you shall eat blood—."

" " 14: "For it is the life of all flesh; the blood of it is for the life thereof; therefore I said unto the children of Israel, Ye shall eat the blood of no manner of flesh: for the life of all flesh is the blood thereof: whosoever eateth it shall be cut off."

Leviticus xix-26: "Ye shall not eat anything with the blood—."

Deuteronomy xii-16: "Only ye shall not eat the blood—."

He was also convinced that every time one ate any kind of meat or game or fish, or any soup, bouillon, consomme, broth, or stew, made from a meat stock: and every time one ate roasts, steaks, cutlets, sausages or other meat preparation, one took more or less urine of some animal into his own system. Why add to the burden of the body the task of eliminating these extra wastes? Why run the risks of injuring the body or poisoning it by absorbing and retaining some of these

waste products? Why, in the words of *Leviticus* xvii-14, should one run the risk of being "cut off"? (Kosher meats if carefully prepared have had the bulk of the blood removed and therefore contain less poisonous matter than ordinary meats.)

The experiments thus briefly recited, and the conviction which they produced, have been a forceful deterrent in the writer's life in so far as eating meat is concerned; and the experiment of going wholly without meat has been faithfully adhered to for a period of thirty-eight years. During this time he has been able to work and work with joy with less rest and recreation than many have. Long days of mental and physical effort possess no horror for him. Sundays and holidays, as is the case with the general practitioner of medicine, have not been free from professional responsibilities and effort, and he hopes his mind has been made, during the interval of thirty-eight years, more receptive of other truths, medical, dietetic, and otherwise, than it was previous to the experiment.

It should be noted that the convincing demonstration of the truth concerning meat was purely chemical and physiological. It was not due to any form of religion or ethics or sentiment. These things had their influence later in deepening the conviction.

CHAPTER XVI

CONSTIPATION AND ITS CURATIVE TREATMENT

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Diet unquestionably may be the cause as well as the cure of constipation. That is, an irrational diet may cause what a rational diet may be able to cure.

There probably is no minor difficulty that is so prevalent and that causes so much apprehension and distress of mind and body as this common and unnecessary inactivity of the bowels. Much has been written on the subject and many warnings have been uttered concerning the necessity of securing regular and daily evacuations of the bowels, until the idea has become well nigh universal that one of the chief functions of the body is daily defecation. So deep-rooted is this impression that millions of dollars are spent annually by the laity in the purchase of laxatives and cathartics; and even in the opinion of the medical profession in all acute diseases, the first thing to do is to "clear out the bowels." This may be irrational as a routine procedure, nevertheless it is the common practice.

The term "constipation" is rather loosely applied to all conditions of delayed or difficult action of the bowels whether functional or organic. The bowels may be lazy, indolent or sluggish from weakened peristalsis, or there may be atony from weak innervation of muscle tissue, or the mucous membrane may be dry from lack of mucus, or the feces may be hard and dry or more or less impacted, or the evacuation in quantity may be insufficient temporarily for the amount of food ingested. The one term constipation is generally applied indiscriminately to all these conditions and for our

present purpose it is unnecessary to make fine distinctions in phraseology. The condition to be considered is characterized by a person's going two, three, five, seven or more days without an evacuation of the bowels; or having no evacuation at all except after taking "some kind of physic"; or securing a small, insufficient evacuation with much straining effort; or having no "action" without use of suppository or enema. The discussion does not include paralysis of the intestinal tract due to organic disease of the spinal cord; cases of mechanical obstruction due to pressure as from a tumor within or without the intestinal tube, to organic stricture of the intestine, although even in such conditions the treatment to be recommended is more rational, efficient and safe than is the use of "cathartics." There are conditions, emergency cases wherein the use of a cathartic is rational and necessary, such as the treatment of intestinal parasites, after the ingestion of some poison or injurious substance, or on other rare occasions. It is the indiscriminate and habitual use of aperients, laxatives and cathartics using one until even in increasing doses it ceases to produce desired results, and then changing to some other and so "running the gamut" until nothing has any effect; it is this sort of thing that is condemned as wholly irrational, injurious and unnecessary.

It is a mistaken notion that the bowels should be moved once each day. Why not twice or three times, as is so frequently and "normally" the case? There is nothing in the anatomy or physiology of the intestinal tract that decrees there shall be but one! Again, why not once in two days instead of daily as not infrequently is the case in apparently normal people? The "law of the Medes and Persians" is not operative here. The function is simply to eliminate useless material from the body, material which in itself should not normally be harmful.

There is much false teaching and misconception concerning "constipation" and "auto-intoxication", a widely prevalent misconception being that any inactivity on the part of the intestinal tract, any sluggishness or "constipation" permits the absorption of "poisonous" matter with more or less serious results according to circumstances. The medical profession itself in this respect is somewhat at fault for laxity in the use of terms. "*Auto-intoxication*" refers to the absorption of chemical or other toxic material from the tissues or organs of one's own body, as for instance, from the tonsils, teeth, muscles, bones, glandular organs: and may include the dissemination throughout the body of the toxic matter formed during the course of enteric (typhoid) fever, diphtheria, pneumonia, the suppurative stages of tuberculosis or the degenerative stages of carcinoma for examples. Anatomically the intestinal tract is a tube which passes through the body, a tube open at each end, and at each end communicating with the surface; the lining of the tube representing what was in early embryonic life a free surface, the innermost of the three layers of which the embryo consists, and converted into a tube by an incurving and uniting of its edges. Therefore, absorption from the surface of the gastro-intestinal tube is only absorbing from a surface which essentially is only the inner lining of the body wall and is no more "auto" (or from the somatic tissues) than absorption through the skin would be.

Another misconception concerns the contents of the tube, for the generality of people think of the contents as something very poisonous. People do not realize that *there is nothing in the intestinal tube that they do not put there* directly as "food," or indirectly as secretions such as saliva, gastric juice, pancreatic secretions, bile (which in itself and in its proper place is absolutely harmless) and the enzymes, hormones, and secretions generally from the glandular structures and mucous

membrane of the tract, with epithelial debris, *all* of it, with the exception of the so-called "food," wholesome and harmless. At birth the contents of the intestine represent chiefly bile from the liver, mucus and cellular debris from the rapidly forming gastro-intestinal tract, being practically odorless and sterile. Very early in life germs are introduced with food, and otherwise by the mouth, and presently the colonies of fauna and flora are quite extensive. One variety, especially, establishes itself in the large intestine, which becomes its normal habitat, and is known as the "colon bacillus." Under ordinary and normal conditions the microorganisms which inhabit the intestinal tract are not in the least injurious to their host. Quite the reverse: some of them seem to be of service.

Neither is it generally known of what the evacuations of the bowels consist, technically called "feces." Feces consist of the unused secretions including the bile, the cellular debris, the mucus and the germs already referred to, plus the indigestible and undigested remains of the food eaten. There is much fibrous tissue in meats, and cellulose in vegetables, fruits and grains that is not digested and is thrown out of the body in the alvine dejecta. The very offensive odor dejections sometimes have is due chiefly to the character of the food taken: the flesh of dead animals, more or less decomposed, for instance; eggs with their sulphuretted hydrogen; butter more or less rancid before or after being eaten, and other things. Normal grains, most vegetables (omitting onions) and fruits which in fermentative processes form carbonic acid gas impart no odor to either flatus or feces.

Briefly the diet that causes constipation is a diet which has been refined by milling or modified by cooking so as to eliminate the cellulose and fibrous and other material which forms the connective and protective tissues of grains, vegetables and fruits; (in a single

word "roughage") or a diet that is very concentrated naturally and has no "roughage" such as milk, eggs, cream, cheese and butter. These things containing nothing that has structure (except possibly the protein envelope of the fat globules of cream) have nothing that cannot be (and usually is) wholly digested and absorbed: so there being no waste material in such things there is nothing to be voided from the bowels but the accumulated bile (approximately 500 c.c. or one pint daily) the mucus, cellular débris and unused secretions already referred to. Most thin soups and things made from white flour and sugar might be mentioned next as substances containing a minimum of roughage; then possibly the fruits, melons, and berries and finally the meats and vegetables, the latter having the maximum amount of indigestible substance—"roughage."

The insufficient drinking of water (which is needed as a diluent and lubricator throughout the whole body) has an undoubted influence in producing constipation. An indolent life, "invalidism," an inactive life, the lack of exercise active or passive, may also be classified among the factors which induce "constipation"—but the main factor is the diet referred to.

It may be seen at a glance then *what sort of a diet will cure constipation* and cure it inevitably in all cases except the few in which some diseased condition (such as have been mentioned) is the cause, and in comparison with the vast multitudes of those who suffer more or less from constipation these latter conditions are negligible.

In well established, longlasting, "chronic" cases, wherein there has been an abuse of cathartics or an excessive use of enemas or suppositories, (and almost invariably there has been exactly this abuse,) the first thing to do is to stop taking drugs, and stop the use of enemas, because the continuance of these injurious habits surely prevents a real cure. This point cannot

be urged too emphatically. Then, or coincidentally the following regime may be made use of, and even most obstinate cases may anticipate a cure in two weeks time, when some relaxation in the strictness of the regime may be permissible. Naturally returning to the old irrational habits will be accompanied by a recurrence of the old trouble.

A breakfast consisting of

1. Ripe fruit without milk or sugar, preferably raw figs, uncooked soaked prunes, or fresh pears, raisins, bananas, apples, oranges, though any fruit and an abundance of it is desirable.

2. A dish of porridge made of rye meal, Enright's "All O' the Wheat" or some honest all wheat meal; a good oat meal; or what is ideal, a dish of boiled seed wheat, seed rye, alone or mixed, or a real cracked wheat. No milk or cream is necessary with these things but unsweetened apple sauce, seeded or seedless raisins, cut up dates, prunes, figs or bananas may be mixed with the cereal to increase its palatability and effectiveness. Shredded wheat and "ry-krisp" mixed, or oat meal and shredded wheat mixed, or in fact any mixture of these natural cereals, with raisins added will furnish a variety which will permit the indefinite use of a wholesome cereal breakfast. As a word of caution, the *shorter* the boiling process the *less* is the mischief done by the cooking. The proteins, mineral salts, vitamins, etc. should be kept in as unspoiled a condition as possible.

3. Shredded wheat, "ry-krisp," Scotch oat cake or bannock will furnish a bread course, to which may be added as desired "Boston brown bread," brown bread brewis, toasted whole wheat bread, bran muffins or corn bread made without sweetening or white flour.

4. Other things will not be needed for breakfast except possibly in cold weather or by those doing exceptionally hard physical work, when a baked white

potato, skin and all, a baked sweet potato or some warmed up vegetables from the previous dinner may be added. Eggs, fish and meat are unnecessary even for hard workers and their use may do more harm than good. For reasons to be found in other chapters their use is not here recommended.

5. A glass or more of water at the end of the meal is more efficacious than tea, coffee, cocoa or chocolate.

For dinner at noon or night:

1. A thick soup, preferably some variety of bean or pea (black bean, baked bean, lima bean etc. and dried pea, canned or fresh pea, *not* the split pea with its flavoring of ham, bacon, or pork soups) tomato bisque using honest whole wheat for thickening, or tomato as a flavoring for bean soups, and cream of celery, corn, spinach or other cream soup using whole wheat flour for thickening. Mushroom, onion, squash, asparagus or other vegetable soup may be used for variety's sake, no meat stocks being used for any of them.

2. For those unable or unwilling to give up fish and meat, white fish of some variety may be used, such as cod, halibut, sword fish, flounder, hake, sole etc.: some preparation of potato, being sure to preserve the layer of mineral salts directly under the thin outer skin, and always spinach, sprouts, dandelions, beet tops, asparagus, lettuce, cabbage, cauliflower or chard; string beans, peas, and carrots, turnips, parsnips, squash: but always the greens.

It might be emphasized that whole wheat macaroni and spaghetti with or without mushrooms flavored with tomato or onion is an excellent substitute for meats: and as is well known a plate of baked beans, or beans of any sort, or baked or boiled peas will furnish energy enough for the most strenuous labor. For a hard day's work a plate of beans is worth more than any beef dish that can be had, and it will not add any waste

and more or less poisonous matter for the body to eliminate as is the case with meat foods. Fish being a cold blooded animal does not have as high and destructive a metabolism as is the case with meat-foods generally and, therefore, has less injurious waste matter in any of its tissues to be eliminated; and, therefore, it may be taken with greater freedom from harm than is the case with the mammalian, bird and game meats.

3. Lettuce with vegetables as a salad; and coleslaw particularly useful.

4. A dessert of fruit salad, raw or cooked fruit, or prune souffle; dates, figs, and bananas are especially desirable.

If luncheon is a noon-time function soups as above, whole wheat bread, "ry-krisp," oat cake, triscuit plain or toasted, salads and fruits will furnish the needed variety.

Supper:

Coarse bread, plain or toasted, a dish of boiled seed wheat or seed rye alone or mixed, a plate of vegetable hash; lettuce or salad, and fruits such as figs, dates and prunes, pears, apples, oranges, bananas, persimmons, etc.

In addition to the preceding, all bad cases at first may need, at all events, will be helped by taking a tablespoonful of a good mineral oil (the so-called Russian oil) very shortly after each meal. This without other modifications of diet is often sufficiently effective, but the dietetic modifications here recommended will be of service in very many ways other than in the curing of the constipation.

Coffee often helps to induce constipation and discontinuance of its use can do no harm and often seems to aid in restoring normalcy.

Finally enough water must be taken to dilute certain digestive juices and furnish sufficient fluid to eliminate through the kidneys all the tissue wastes of the body. In regard to water the vital question should be not how much water shall I drink but how much urine shall I pass? Water serves many functions in the body but among its chief ones is the removal, in solution, of waste and toxic material from the blood via the kidneys. One should therefore pay attention to the quantity and quality of urine daily passed remembering that it requires approximately 3 pints daily of normal urine to keep the body tissues free from injurious and other wastes.

Constipation in infancy has not been spoken of. It is, however, amenable to dietetic treatment of the mother, who if truly healthy and normal will not be troubled by constipation herself or have a child constipated. Babies on the bottle can have their diet modified so as to overcome the torpidity of the bowels. It is all and always a matter of diet. *Medication is unnecessary and disturbing if not positively injurious.*

Dietetic Suggestions to Overcome CONSTIPATION

No Medicines Needed

Exclude *all white flour products from the diet*:—
restrict the use of milk, and *stop the use of cathartics.*

EAT FREELY OF

Rye meal mush with raisins at breakfast.

Enright's "All O' the Wheat" porridge with raisins, dates, or prunes at luncheon or supper.

"Ry-krisp," shredded wheat, triscuit, Boston brown bread, honest whole wheat bread (made only of Enright's "All O' the Wheat"), Scotch oat cake.

Breads may be toasted.

Raw or stewed figs (particularly useful).

Raw or stewed *prunes*; dates, raisins, Hawaiian canned pineapple, bananas, raw or baked, and only when very ripe; apples, pears, peaches, plums, berries of all sorts (except blackberries); melons in season, oranges, grape fruit, etc.

Vegetables of all sorts should be eaten freely (cooked in casserole, waterless, or steam-pressure cooker), but especially the GREENS, such as spinach, sprouts, cabbage (raw or cooked), cauliflower, lettuce, celery, endive, water cress, asparagus, dandelions, chard and string beans.

A *vegetable*, fruit, or plain SALAD every day.

A compote of brown rice and figs (or other fruit) makes a wholesome and palatable dessert, but for torpid bowels the best desserts are salads, fruits and nuts, with "ry-krisp," oat cake or triscuits, (cheese should be excluded).

MINERAL OIL: A tablespoonful of NUJOL or any good mineral oil, immediately after eating, three times a day will be found useful; the dose to be reduced gradually to the vanishing point, after ten days or two weeks, or when the bowels begin (as they surely will) to act spontaneously.

Always drink enough of water, hot or cold, to keep the urine up to about three pints a day.

Do not worry about the bowels acting, but "worry" or what is better, be very particular about what kind of food is eaten.

CHAPTER XVII

MAN'S CHIEF DIETETIC TRANSGRESSIONS

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DOES HUMANITY KNOW WHAT TO EAT?

Medical Science is just waking up to the fact that the human body—the most wonderful thing in the world—cannot create the chemical elements of which it is composed. These elements man knows comparatively little about, but Nature with her marvelous power and foresight, has been making them since the dawn of creation, and combining them and preparing them for man's use.

Man has but recently (1912) discovered vitamins in food, but Nature put them into food many thousands of years ago. Man does not yet know all that is to be known about them.

Interesting is the fact that since the discovery of vitamins, or more correctly perhaps, since the discovery of the cause of the disease beri-beri, so common in the Orient, the attention of chemists and medical scientists has been more and more usefully directed to the vitally important subject of food, until now, 1937, the knowledge obtained, and the promise of the greater knowledge to be obtained, is the most hopeful thing on the medical horizon.

One is justified in looking upon the half century just passed as one of the most eventful in all human history.

Ignoring the marvelous evolution of physics and chemistry, in medicine the art of surgery has developed with astonishing rapidity and reached an astounding efficacy during these fifty years.

So great has been this development, one's assertion that surgery saves more lives and prevents more suffering during a single year, than all other branches of medicine have been able to do in any century preceding the present surgical era, is amply confirmed by experience and statistics. Surgery, however, has no more anatomical worlds to conquer. It has successfully entered all the cavities of the body and attacked every organ including brain and heart. Henceforth it can simply perfect its technique; and is it not likely that its zenith has been reached?

During this half century preventive medicine has been developing with awe-inspiring leaps and bounds. Knowledge of the causes of disease, and studies in immunity have enabled the medical profession practically to control epidemics and wholly prevent the spread of such devastating scourges as smallpox, typhoid and typhus, bubonic plague, yellow fever, malaria, trench fever, hookworm disease, diphtheria, beri-beri and diabetes.

Control of these diseases enables the medicine of today to save more lives and suffering in a year than the entire medical profession has been able to save in any preceding century of its existence. And now comes into the medical field the subject of dietetics, which never yet in man's history has been scientifically studied; and an understanding of the history and causes of beri-beri, of pellagra, of scurvy and infantile scorbutus, of rickets and of diabetes, makes it possible to extend this list of preventable diseases and most encouragingly to swell the grand total of lives saved annually.

All that is needed still further to increase these victories over disease is an intelligent cooperation of the laity with the profession.

During the last two decades infant mortality has been almost unbelievably reduced by a scientific study

of dietetics and this mortality can be still further reduced when the subject of *prenatal life* and *feeding* has become a more familiar topic of study and research.

The well known Professor McCollum of Johns Hopkins, famous as an original research worker and experimenter, is reputed to have said in substance at a convention held in St. Louis in 1924, that "the diet of modern civilization is a failure."

A *bon mot* attributed to Senator Copeland is to the effect that "People live on one-third of what they eat;—the doctor lives on the other two-thirds."

A prophetic aphorism attributed to Alexis Carrel is to the effect that "if the doctor of today does not become the dietitian of tomorrow, then the dietitian of today will become the doctor of tomorrow."

The writer has made the claim that the use of such incomplete and demineralized foods as white flour and granulated or refined sugar causes more diseases and kills more people annually than the use of alcoholics ever did.

To substantiate this claim, reference is made to the average medical practitioner, who in a long period of practice has seen very few fatal cases (cirrhosis of the liver, for instance) caused directly by the use of alcohol; whereas, during the same experience he has seen many deaths from the single disease, diabetes.

It is stated by no less an authority than Dr. Joslin of Boston that there are annually a million cases of diabetes in the United States. Everyone knows that the mortality of this disease is heavy, to say nothing of the suffering and economic loss produced by it—in spite of insulin. And the same authority, Dr. Joslin, claimed in the Bulletin of the Boston Board of Health for April, 1924, that diabetes was caused by a faulty diet: i. e., a diet containing too heavy a proportion of carbohydrates as starch and sugar.

A brief list of the abnormal conditions induced by

eating improper food will include many cases of nausea, vomiting, headache, flatulence, indigestion, cholera morbus, diarrhœa, constipation (ninety-five per cent of which are easily cured by a rational diet without medicine), gout and so-called rheumatic troubles, "milk crust" of infancy, and many eczemas, varieties of acne, obesity, malnutritions, imperfect dentition and early decay of teeth, high blood pressure with its many evils, and apoplexy. Xerophthalmos, suppuration of eyes, and animals born sightless are reported as a result of Dr. Percy Howe's experiments at the Forsyth Dental Infirmary, Boston. Sterility is also reported by Drs. Reynolds and Macomber of Boston. All these are in addition to the beri-beri, pellagra, scurvy, infantile scorbutus, rickets and diabetes, reference to which has already been made.

If beri-beri, a disease which leads up to mental deviations and organic changes in the cerebro-spinal axis resulting in paralysis and death, can be brought about by eating food from which some natural, valuable and important ingredient has been removed by man's ignorant, willful or irrational manipulation why may not other diseases such as cancer, tuberculosis and mental deficiencies be the result of eating an unnatural, unbalanced ration throughout a series of years?

Man's chief dietetic transgressions include:

1. *The use of meat.* Anyone by simple tests can prove that meats of all sorts, roasts, steaks, liver, kidneys, sweetbreads, contain urine, (i. e., the elements which when collected by the kidneys from the blood stream is called urine) and everybody knows that urine is not good food. Physicians do not realize this because they do not apply their knowledge of physiology, do not question tradition, and do not think along these lines.

2. *The use of white flour.* Here again, even the untrained can prove by simple biological tests such as

the feeding of some animals on white flour products, and other control animals on whole natural wheat, or the one on polished rice and the other on brown rice, that in the one case disease and death result; in the other health and growth and activity continue. Much experimental evidence is accumulating to demonstrate the fact that the diet of modern civilization is worse than "a failure."

3. *The use of granulated sugar.* The over-concentration of sugar-cane and sugar-beet juices and the refining process the products are subjected to, result in an injurious demineralization which makes of the sugar an unbalanced food, incapable of supporting life but able to bring about many abnormal conditions of the body. Nature has most bountifully supplied her children (human and sub-human) with sugar in berries, fruits, melons, and vegetables, and in sufficient quantity and combination to maintain a normal degree of health and usefulness and happiness. Here again even the untrained in chemical analysis can make a solution of white sugar in distilled water and demonstrate to himself that it will NOT react to the ordinary chemical tests. Why not? Because the processing has produced some undesirable change in it.

4. *The use of sub-human milk.* This subject has already been adequately treated, but fortunately for mankind, there is a stirring up of the spirit of inquiry, and extensive experimentation plus theoretical considerations are convincing many minds that human dependence upon the use of sub-human milk is fraught with grave dangers.

Serious thought for a moment should be enough to convince one that Nature's Law concerning milk is that all mammals, each after its kind, shall have mother's milk as its one and only perfect food during the first few weeks or months of life, after which period the

supply is gradually shut off and no more milk is furnished the offspring.

An experience that has occurred millions of times and can be amply confirmed by repeated observation and experience is sufficient ground for claiming that Nature intended milk to be used as food for a brief and definite period, and *only during that period*; and that each species is to have and use its own particular milk. Furthermore, it is plainly evident that Nature intended milk to pass from the mater to her offspring without being exposed to air. Milk as obtained by man from cows is certainly exposed to air and becomes infected by germs even under the most sanitary conditions. Here is another of Nature's Laws broken by Man in the ordinary process of "milking."

Organized commercialism is adroitly opposing itself to many dietetic reforms which by some are considered essential to the life and happiness of the race,—but the prediction is not without basis that the next quarter of a century will see enormous additions made to the life-preserving preventive measures now possessed by the medical profession.

Once more—*Nature Knows*. Nature has provided amply for man's physical needs as she has for the needs of the beasts of the field and the fowls of the air.

Nature's Laws are written large in her handiwork, and transgression of her dietetic laws will as surely be followed by disaster as transgression of her other laws surely is. Natural, unspoiled grains, of which there are so many—properly cooked; natural vegetables, of which there is such a big variety; natural fruits and berries, which are able to furnish so many of the essentials of life; and the very great variety of nuts, which can provide fats; all of which provide starches, sugars, fats and proteins to the human family. All these things are made for the express purpose of constructing

animal bodies and maintaining vigorous life and will give humanity the food which will make for health, happiness and freedom from disease.

CHAPTER XVIII
HOW TO SECURE AND RETAIN HEALTH AND
HAPPINESS

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What is Health? What is Happiness?

The answers given by different people to these questions will depend largely upon their life experiences and their ideals. If one consults the dictionaries, he will find that Health means essentially "wholeness"; "soundness of body"; "that state (of any living organism) in which all the natural functions are performed freely without pain or disease"; "freedom from sickness or decay." And Happiness by the same authorities signifies in its full extent "the utmost pleasure we are capable of;" "that state of being . . . in which pleasure decidedly predominates over pain;" "the pleasurable experience that springs from . . . the gratification of the desires, or relief from pain and evil;" "a continued experience of pleasures and joy;" "enjoyment;" "a state of felicity and satisfaction;" etc.

Concerning Health, we find opinions are practically unanimous including, as they do, the possession of vitality and energy and the ability to do in an unhampered way whatever inclination or necessity demands. Concerning Happiness, however, if we turn to other sources than those quoted, we find Longfellow saying "To be strong is to be happy." Locke says, "A sound mind in a sound body is a short but full description of a happy state in this world." Carlyle said, "The only happiness a brave man ever troubled himself with asking much about was happiness enough to get his work done."

Ruskin claimed that "to read, to think, to love, to pray, . . . are the things that make men happy." To Marcus Aurelius is attributed the saying "The happiness of your life depends upon the quality of your thoughts; therefore guard accordingly." Robert Louis Stevenson, who set "happiness" as a task for himself, wrote "To be truly happy is a question of how we begin and not how we end; of what we want and not what we have." Elbert Hubbard has said "If you have health you probably will be happy; and if you have health and happiness, you will have all the wealth you need, even if not all you want." An author of many centuries ago, Epictetus, taught "If a man is unhappy, this must be his own fault, for God made all men to be happy." "Health and cheerfulness mutually beget each other" was Addison's opinion, but while health and cheerfulness and happiness usually co-exist it must not be assumed that health is always essential to true happiness, for there are numberless instances wherein happiness is present in spite of deformity, of ill-health, of pain and suffering, of privation and poverty.

As a matter of fact there are at least two types of happiness presented to our minds, one consisting of selfish pleasures, the delights of the senses, indulgences of appetites and gratification of desires, all of which tend to cripple one's usefulness to humanity at large;—and the other a condition in which one attempts to serve his neighbors, to comfort, encourage, and strengthen the faint-hearted, to make the rough places smooth and the crooked paths straight for those whose places and paths are difficult;—in short that condition possible only to those whose ideals embrace an unselfish devotion to the comfort and well-being and happiness of others. But not to attempt too closely to define Health and Happiness let us concede for present purposes that Health consists essentially of a sound mind in a sound body, and that Happiness is a state of mind

which permits one to rise above cares and anxieties and troubles and enjoy the good things that are within the reach of all, rich or poor; and which leads to peace of mind and a cheerful, hopeful and contented spirit.

Are these conditions of health and happiness universal? Should they be universal? Was it a part of the first great plan that man, the crowning achievement of creative force, should possess health and happiness? If we are permitted a literal interpretation of the thirty-first verse of the first chapter of Genesis we are to understand that at the end of creation, when "the heavens and the earth were finished, and all the host of them" that "God saw everything that he had made, and, behold, it was very good." It could not have been otherwise according to our conception of Infinite Love. Only an unblemished article could have issued as the product of creative skill. If it were then part of the Creator's plan that man should be blessed with the possession of a high type of health and happiness, and this is a fundamental conception, why is it we are literally surrounded by and living in the midst of so much illness, so much suffering, so much pain, such heart-rending sorrow and degradation, such incalculable and indescribable unhappiness? Surely there must be somewhere something wrong;—somehow some mistake has been made;—something has interfered with the carrying out of the original plan which when instituted was pronounced "very good." What is this wrong? Wherein lies the mistake? What has interfered with the execution and full carrying out of the plans laid by the All-Wise Creator? Possibly from a medico-religious standpoint answers more or less conclusive and convincing and helpful may be found to these questions.

To consider the first part of our subject, "How to Secure and Retain Health," let us briefly review the nature and causes of ill health or disease and the surest, sanest method of avoiding it. It is unnecessary to

present a list of the various diseases to which humanity is subject. The list would be a long and a depressing one, for these diseases or deviations from health are numbered by the score, and even by the hundreds. Disease itself is simply a departure from health, a friction or difficulty in the running of the machinery of life. The deviation may be slight, short-lasting and scarcely more than a passing discomfort, or it may be so severe as to lay the strongest low, to stretch one on a bed of agony and suffering, and to terminate in exhaustion and death. All imaginable grades of severity and duration are possible, but for them all, causes are necessary and causes are recognized. These causes are not in the sunshine, the source and preserver of physical life on this planet; not in fresh air, a recognized necessity to maintenance of life; not in climate, not in pure water, not in well-lighted and well-ventilated dwellings, not in the majority of our occupations, although there are some disorders properly classed as "occupational." These sanitary and hygienic influences cannot produce disease. The real causes of disease may be classified into two groups:—primarily and fundamentally must be placed a lowered resistance of the body, or to be technical, a loss of natural immunity; and secondarily the introduction into the body of some germ, parasite or noxious influence having its origin outside the body, or the generation within the body itself of some irritating, poisonous or noxious material capable of interfering with the normal performance of body functions.

To take these causes seriatim it may be claimed that the most important factor in disease production is lowered resistance. Life is a constant and continuous battle with the forces of dissolution, but under favorable conditions of nutrition the resistance to malign influences is sufficient to preserve a balance and maintain health. More especially in crowded communities man is daily subjected to the influence of what are pop-

ularly known as "germs." It not infrequently happens that man, for a longer or shorter time, carries about in his body the germs of pneumonia, diphtheria or other diseases, but his resistance is naturally and usually sufficiently high to prevent the germs from exerting their injurious influences. This is as it should be, for Man in the beginning was given "dominion over the fish of the sea, and over the fowl of the air, and over the cattle, and over all the earth, and over every creeping thing that creepeth upon the earth" (*Gen. i:26*), and . . . "over every living thing that moveth upon the earth" (*Gen. i:28*). This "dominion," however, is not always alert and efficient, but is sometimes lost, with the result that man falls a victim to tuberculosis, scarlet fever, malaria, yellow fever or any one of the host of so-called germ diseases. It may be assumed that if all men always retained their normal powers of resistance, or their "dominion over every living thing that moveth upon the earth," germs might come and germs might go, but man's life would flow on forever.

Apropos of germs, it is correct to claim that only a minority of diseased states are attributable to their activities. These are mainly the acute febrile disorders, self-limited in character, which run more or less typical courses and in the main tend to recovery. There are diseases, however, caused by germs, parasites and their products, which once implanted in the body do not tend to spontaneous recovery, but linger on indefinitely, to terminate, unless arrested by medical art, in the death of the sufferer.

It is more particularly that cause of disease which is generated within the individual's own body, or that has to do with its nutrition, toward which attention should be directed. The possibility of man's generating his own poisons is fairly well recognized by members of the medical profession but is not appreciated to any practical extent by the laity. And yet everyone knows

that all life, the life of plants, the life of animals, the life of man, depends upon what is called nutrition; that if from any cause nutrition is interfered with, the life itself suffers accordingly. By nutrition is understood that process by means of which substances introduced into a body are by chemico-vital action transformed into the tissues or structures of that body, or are utilized by it in the production of heat and energy; in either case certain waste materials are formed which have to be disposed of. The process is a complicated one of up-building and disintegrating and is in physiological parlance spoken of as metabolism. Nutritious substances introduced into the body, from whatever source derived, are known as foods, and the medium by which the food is distributed throughout an organism is called the "sap" in plants, the "blood" in animals. It is a self-evident truth that the sap or the blood must contain all the ingredients necessary truly to nourish the plant or the body; otherwise the plant or the body cannot grow and flourish and perform its various functions. "For a good tree bringeth not forth corrupt fruit; neither doth a corrupt tree bring forth good fruit. For every tree is known by his own fruit." Neither is it possible to form a healthy, strong, efficient body from food materials that do not contain the exact quantity and variety of substances demanded by that body. Illustrations in confirmation of this statement are easily obtained. To select but one let us refer to the parable of the sower who went out to sow his seed.

It seems strange considering the acknowledged value of health, the great necessity of possessing a "sound mind in a sound body" in order to live a life of usefulness and happiness, that some revelation has not been made, some definite directions given to guide us in the proper nourishment of the body, to help us decide what we should eat. Some claim that we are to be guided

by instinct, but man does not possess instinct as do the lower animals. Man is a rational being and is to be guided in his actions by knowledge and judgment, not by irrational instinct. Some claim we should be guided in the matter of food for the physical body by our palate, by our likes and dislikes. The fallacy of this claim is seen at once when it is broadly applied as a rule of conduct. Society would soon be utterly demoralized if people followed as a guide their likes and dislikes, their emotions, their passions, their desires. These things are always to be controlled and governed by knowledge, by reason, by judgment, by obedience to the higher laws of life. But possibly a revelation has been made; and suggestions as to what is useful and necessary for the nourishment of the body, for the full and vigorous development of a "sound mind in a sound body," have been written in exceedingly legible language, if one will look and see.

Possibly we may find the revelation we seek if we consult the book of Nature and make use of the knowledge or sciences of biology and physiology and chemistry, which have been vouchsafed us. Such a search reveals the minutest composition of the physical body and all its component parts, as well as the chemical composition of all the materials used by man as food. Bone and cartilage and tendon and muscle and blood and brain and glandular organs, and even the minute cells which compose these tissues and organs, have been painstakingly analyzed, and the physiologist can tell us all about these material structures. The chemist can tell us the varieties and percentages of mineral matter, the amount of that wonderful thing called protein, the exact proportion of fat and sugar and starch and extractives found by analysis in grains and nuts and vegetables, in fruits and berries, in milk and eggs, in meats and other things used as food for man and beasts. Analysis has been carried so far that the heat-produc-

ing power, or the "caloric value" of foods has been tabulated, and physiological experiments have determined how many calories or heat units are needed by the average man for the average day's work. Man's patient examination and analysis of Nature's products has determined all these things with commendable and satisfactory accuracy and he has learned to utilize much of this knowledge to the saving of innumerable lives and the prevention of much suffering. Man's knowledge of physiology and chemistry and anatomy and the causes and manifestations of disease; and his knowledge of drugs and surgery and other healing measures have made, we are told, wonderful progress during the centuries, but more especially during the last half century. And yet man's knowledge has not progressed far enough to enable him to prevent the development and continued existence of the host of diseases which afflict humanity. A few of these diseases he happily is able to prevent, but he seems helpless before most of them. What is wrong, for there must be something wrong somewhere? Why is it that disease is most rampant among civilized people, who possess all this knowledge? Why is it that today fewer men fifty years of age will live to reach seventy than was the case a generation or less ago? This is what vital statistics according to life insurance authorities tell us is the fact. Why is it that the dreaded white plague, Tuberculosis, is so devastatingly prevalent? Why is it that in recent years there has been such an alarming increase in the number of cases of insanity and nervous disorders? Why is it that the terrible scourge, cancer, which only a generation ago was supposed to be a disease of old age, is found not only in the sixties and fifties, but has become very frequent in the forties and even in the thirties? Why is it that pneumonia, the germs of which are with us always, is so alarmingly prevalent and fatal? Why is it there are such an un-

countable and unclassified variety and number of wrecked physiques and incompetents, and sufferers from chronic disorders of heart and lungs and intestines? Again there must be something wrong somewhere. These things are all evil, and these wrongs and these evils were not present on that day when "God saw everything that he had made, and, behold, it was very good." There was, therefore, nothing wrong and nothing evil as a part of the original creation. It must be that man himself, by perverting the good that was his original heritage, has brought all this disorder upon himself; for he was created into an absolute freedom to choose for himself what he should do in the essentials of physical and spiritual life. This statement is supported by the knowledge derived from biological studies. As man has progressed from the simple, uncomplicated life of primitive peoples to higher and higher forms of, what is called civilization, diseases have multiplied in variety and number. That is, as man has increased in his knowledge of material things, as his mental powers have expanded and his ability and ingenuity have developed he has more and more set up his own judgment in opposition to the Almighty's and has suffered and is suffering the consequence in physical disabilities.

To recapitulate:—from the physiological viewpoint, one of the vital properties of protoplasm, which is the physical basis of life, is nutrition. Naturally the quality of protoplasm or the quality of the living organism depends upon the quality of the food ingested. It is only rational to assume that an unsuitable food, an imperfect or unbalanced ration, a diet deprived of ingredients which Nature evidently intended it to contain, never did and never will produce, and cannot be transformed into, a healthy body, a "sound mind in a sound body." It, therefore, behooves us to determine what Nature intended us to utilize as food. The

question naturally arises—has Nature made any revelations to guide us? Are there any indications pointing to what is good and valuable, and to what is injurious? Possibly such revelation is nearer at hand than many think—one has but to look and see! Much depends upon our conception of Nature. It is to be hoped that none of us agree altogether with the well-known naturalist, John Burroughs, who in one of his shorter essays wrote as follows:—"Man plans and builds and plants by method, order, system; he has eyes to see and hands to guide, and wit to devise: Nature builds and plants blindly, haphazardly, all around the circle; her handmaidens are industrious but undirected." "Nature is pervaded with an intelligence that differs in kind from that of a man—a blind, groping intelligence. Instead of taking short cuts, as man does, and saving time and waste, she beats all around the field like a blind man looking for a gate." "If the Creator was aiming at man all these long geologic ages, groping his way through these low, and then through these gigantic repellent forms, how blindly and indifferently He seems to have worked!" "Yet through this hit-and-miss method of Nature, things have come to what they are; life has come to what we behold it; the trees and plants are in their places; the animals are adjusted to their environments; the seeds are sown, fruits ripen, the rains come, the weather system is established, and the vast and complex machinery of the life of the globe runs more or less smoothly, undirected, in the human sense. Blind groping, experimenting, regardless of waste, regardless of pain, regardless of failure, circuitous, fortuitous, ambiguous, traversing the desert and the wilderness without chart or compass, beset by geologic, biologic, and cosmic catastrophes and delays, yet the great procession of the life of the globe, with man at its head, has arrived and entered into full possession of the inheritance prepared for it." The essay ends with,

"Who and where is the general who is conducting the campaign?"

Rather let us agree that behind Nature is the Great and Only Intelligence;—that what is called Nature is simply a physical or material manifestation of the love and wisdom and power of God. It is not too much to claim that Nature has a wonderful faculty of adapting means to ends; a farseeing vision that can plan and provide. We have, for instance, on the one hand a wonderful mechanism called man whose body, an ephemeral structure, is in constant need of rejuvenation and sustenance;—and on the other hand an abundant supply of wholesome food materials adapted to the nourishment of that body.

One thinks in this connection of the exceedingly appropriate and clever answer an interviewer got in reply to a question asked Sir Oliver Lodge concerning the somewhat prevalent teaching that the earth is cooling off and the solar system is gradually running down. Sir Oliver said in substance, "Yes, we are told the earth is getting cooler and the solar system is running down, but I think—I think" (he said) "there is Something that keeps winding it up."

It is not possible within the present limits to enumerate in detail the foods which Nature unquestionably has provided for man's use, but the endless variety of grains and nuts and vegetables and fruits and berries certainly provide all the mineral salts and vitamins, all the protein, all the starch and sugar and fat needed to produce a thoroughly healthy and clean and strong and useful body;—a body that, hygienically and suitably cared for in other respects, will give its possessor but little annoyance and will have resistance enough to repel malign influences, which seek to injure, cripple or destroy it. Be assured, however, that Nature has provided wisely and intelligently and *imperatively insists* that man shall take the combinations she has thus

provided, and that man *shall not* presume to separate and divorce the things she has so marvelously compounded. If we are told anything, we are told to eat the *whole* of the wheat grain, of the rye, the barley, the rice and oat and corn, and told *not* to deprive our bodies of any of the ingredients of these grains.

By way of additional illustration, rice is known to be the chief food of millions of people; and it is now known that milled or polished rice, that is, rice deprived of much of the mineral matter Nature put into the grain is the one and certain cause of beri-beri, a disease common among the Chinese, Japanese, and oriental peoples generally, and fatal in 40 to 60 per cent of those attacked. By eating the whole rice, Nature's own product, the disease may be prevented, and also cured, if it has not been allowed to develop too far.

Now how much of the ill-health, the nervousness, the insanity, the cancer, etc., so common in America may be due to the too free use of the staple white flour which enters so largely into the popular diet? Upon what authority is the noble wheat deprived of a large percentage of its mineral salts and protein and in its demineralized form converted into an unbalanced, incomplete ration?

"A word to the wise is sufficient." Nature *has* revealed her wisdom in providing food that is all-sufficient for the needs of the human body; and mankind, in going contrary to the directions plainly given, brings upon itself misery and suffering, disease and death.

Concerning the second part of our subject:—by *happiness*, we ought to understand not only the joy of living, the comfort which co-exists with the ability to endure and accomplish, the satisfaction of laboring with useful results and striving to do our various duties, and the pleasures which are consistent with the high ideals of life; but, in addition, that state of mind which brings about peace, tranquility, confidence.

faith and hope in the eternal right and justice of things in this life. What soundness and strength and freedom from disease and suffering are to the body, happiness is to the mind or soul. Much unhappiness and inefficiency are due to the mistake made by many in considering man as simply a material, a physical organism, a thing composed of flesh and blood. The most elementary studies in anatomy, physiology and embryology, and the ordinary experiences of life should be sufficient to convince us that Man is *not* simply flesh and blood; that he is something more, in fact nothing less than an immortal soul or spirit temporarily and for a short time encased in the material and ever-changing body, handicapped by its limitations. It is commonly recognized in these days of psycho-analysis, psychotherapeutics, mental healing, sub-conscious cerebration and researches into the psychological, that the real man is an indestructible Personality, an imponderable, intangible force and entity, a reality separable from the purely physical. The idea of man being a spirit is not as offensive to scientific thought as it formerly was. Recent investigations into the nature of electricity, of x-rays, of radium, of wireless telegraphy, of psychic phenomena, of the all-penetrating ether, and the new conceptions of matter, the atom, the ion, the electron, etc., have prepared the scientific mind to accept the idea of immortality, and to look upon man as a spiritual substance destined to immortal life. The progress in this direction is reflected in modern scientific thought, but nowhere do we find it more definitely stated than in the famous address on "Continuity" (the Continuity of life) made by Sir Oliver Lodge as President of the British Association for the Advancement of Science. He says, . . . "already the facts . . . examined have convinced me that memory and affection are not limited to that association with matter by which alone they can manifest themselves here and now, and that person-

ality persists beyond bodily death." It is recognized not only by the medical profession, but by the laity that man himself is *not* the bones and muscles and tissues of which his body is composed, for this body may be crippled by the loss of eyes or tongue or stomach or appendix or limbs, or various other organs and structures, without in any way crippling the ego, the personality, the essential characteristics of the individual. And it can be easily demonstrated that the cellular and more active tissues of the body are doing their work and being eliminated daily; that the *body* of today is different in many ways from the *body* of yesterday or tomorrow; that it is ephemeral in structure and evidently a thing of the present; "here today and gone tomorrow." It is unquestionably then a belief in the existence and persistence, in the indestructibility of the soul that makes for the highest type of happiness and that affects most profoundly the whole physical and spiritual life of man.

In conclusion, it may be claimed that an unshakable belief in the essential, spiritual nature of man; a definite conviction that Life is not an ephemeral earthly existence, but stretches far beyond the confines of time and space;

I. helps us to differentiate means from ends, the important from the insignificant;

II. helps in the selection of modes of life and formation of habits;

III. helps one to say No, to many of the sensuous, natural temptations of life;

IV. gives peace and courage to the perplexed and fainthearted;

V. gives one some ideals worth living for;

VI. makes it easy to try to obey the decalogue and the two great commandments;

VII. illuminates one's judgment in the difficulties of life;

VIII. brings comfort in illness, courage in adversity and strength at all times;

IX. brings a degree of Health and Happiness not obtainable elsewhere or elshew.

CHAPTER XIX

DIET FROM THE STANDPOINT OF RELIGION

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DIET FROM THE STANDPOINT OF RELIGION*

Certainly no apology should be necessary for referring to the most important physical function of the body, nutrition, from the standpoint of religion, the highest viewpoint within one's reach; for nutrition far outreaches and overtops all other physical functions being, as it is, the foundation upon which all others depend; and religion being, upon deep analysis, the controlling influence in life. Of course there are minds very much averse to any consideration of religion. To such naturally the following presentation of the subject is not likely to appeal. On the other hand, there are many who may find in these few pages some ideas and arguments that will strengthen their desires to adhere to the highest interpretation of Nature, in the matter of nutrition, they are capable of making, and who may be receptive of what, to many minds, is the truth.

Neither is it necessary to offer even the slightest suggestion of an apology for making use of the following exquisitely appropriate quotation found on the title page of Volume No. 1 of William Harvey Cushing's "Life of Sir William Osler."

"Thus there are two books from whence I collect my divinity; besides that written one of God, another of his servant, Nature, that universal and public manuscript, that lies expanded unto the eyes of all; those that never saw him in the one, have discovered him in the other . . ."

"Religio Medici"

*Reprinted by permission from "The New Church Review" of January, 1926.

To some it may seem irreligious to try to connect, or see any relationship between diet and religion, but perhaps the distance between may not be insurmountable.

The most potent thing on this earth is Man; and the one thing about Man that raises him incalculably above all other forms of life is his brain, or more correctly the power that uses the brain.

It is the mental power that makes the difference, although the organic brain of Man differs in certain respects from the brains of other animals in its complexities of architecture which adapt it to higher uses. Other animals have cerebrum and cerebellum, each having the properties characteristic of these structures wherever found. All animals possessing specialized sense organs also have in the brain localized centres for the perception of the special sensations: touch, taste, smell, hearing, vision. All animals have special motor centres also, wherein stimuli productive of definite muscular contractions originate. All normal brains have connecting and coördinating departments, and all these things are similarly placed and inter-related in the brains of all animals. The one organic distinguishing feature of Man's brain is the presence of a developed, relatively large fore-brain, the frontal lobes being decidedly and absolutely larger than those found in other animals.

However, it is not so much in the realm of the organic as in that of the functional that the real difference lies, although theoretically the more intricate the function, the greater is the differentiation in organic structure and form. The functions of all brains, human or other animal, include sense perceptions (vision, hearing, smell, taste, touch), memory, the origination of motor impulses, imagination, reasoning, voli-

tion, emotions, coördination, reflexes, secretion, excretion, and nutrition (i. e., control of all the vegetative functions).

Even the untutored human brain, however, is capable of higher and more intricate functions than the highest of animal brains. Along many lines the difference is of degree rather than of kind, e.g., animals can observe, can appreciate physical environment to a marked degree, and, by a valuation of conditions, apparently drawing conclusions, can adapt their actions to these conclusions or conditions. This is a sort of reasoning possessed by lower animals but restricted very decidedly in scope. The limitations of reasoning, imagination, volition and emotions, among the animals are easily and quickly reached. While this is true among many members of the *genus homo*, it is also true of the human brain that it is capable of reaching heights and depths of reasoning, imagination, volition and emotions absolutely out of reach of the highest and most developed of the animal brains.

Another point of difference is that throughout æons of time, so far as can be appreciated, the functions of the sub-human brain have not been increased in any way. Very likely all brains, animal and human, are structurally just what they were 25,000 or 50,000 or more years ago, but functionally while it is claimed that the most capable human brain of today is not more capable of original work than were the noted and best brains of 2000 years ago, the mass brain of today, through education, is greatly advanced beyond the average individual or mass brain of 2000 or 3000 years ago, or even of much less time. In a word, development cannot be predicated of the sub-human brain, whereas it is the one hopeful possibility of the human brain.

Again, the untutored brain of certain races seems to be capable of as high idealism in regard to fidelity, chastity, tribal duties, honesty, and devotion to

conceptions of deity as that of so-called "cultured" races.

Probably the distinguishing feature of the human brain, or preferably, perhaps the mind that utilizes the structural brain, is its power of forming high conceptions concerning a Creator; concerning life present and future; concerning duty in every and all relations of life; concerning beauty, harmony in all things, fidelity, chastity, morality, honesty, good-will, charity, love, service, right and wrong, etc., one might say concerning religion; because whereas no known animal possesses anything that can by any stretch of imagination or fact be called religion, no known race of peoples is without some (or a) religion, and it is this religion which is the great controlling factor of their lives.

There are many to whom any reference to religion is obnoxious, who dislike to talk about it, possibly because their views are so vague, yet who may acknowledge in a half-hearted way that there must be a Creator, a Deity, a God, Who reigns over the universe, but they don't know much about it, and "It's all right anyhow!"

There are others who think they have no religion; who hold the idea there is no Supreme Intelligence to Whom is due the creation and maintenance of the universe; who prefer to ascribe all things to some so-called Nature, some Force, Power, or Energy that slowly during the lapse of time has been developed and augmented into the controlling influence throughout the universe.

There are still others, and very many of them, who are convinced as definitely as it is possible for a mind to be convinced, that it is impossible for nothing to produce something; that something cannot come from nothing, for "from nothing, nothing can come;" that the presence or existence of any force or substance must be only a result, and since all results are due to

causes, there must be some Cause that produces force and substance. A self existent force doing things blindly, without guidance or directing, is unthinkable to many who are convinced that there is a One and One Only Supreme Source of all force and all substance, the one and only Creator of the entire universe, who brought nature into existence with all the powers and orderliness and stability ascribed to her.

It must be accepted as a truism that Man did not make himself; that he is a product, a created thing. And as a piece of machinery, a cleverly made mechanism, does not know its maker, so Man the created will never really know his Creator. He does know something, and may know much more about his Source; but Man the finite will never be able to comprehend the all of the Infinite. Man yet has developed only to the point of learning a few things about the energies and the methods which have produced the so-called "material substance" of this earth and the universe of which it is a part. He has still much more to learn than he has learned, and the more humbly and receptively he goes about his lessons the sooner will he attain unto a knowledge that will clear up some of the present mysteries.

Is there any other revelation that will bring Man into closer relationship with the great Directing Power of the universe? There are many of us who claim there is great help to be had and to be found in the revelation called Nature. We prefer to agree with the physicist, the modern scientist who claims that everything in Nature is under the direction of definite Law: who is earnestly and courageously seeking to discover Nature's laws; who has already profitably discovered many such laws in all fields of research; in chemistry; physics, biology, heredity, etc.

It is for Man, therefore, to make use of this gift, this manifestation of Divine Power, and continue to investigate, observe, analyze, and study the "earth," or Nature and its laws, as therein is to be found the revelations and guidance needed to solve many of the problems of physical life.

Let it be emphasized that all things in the universe, all natural phenomena, are brought about in an orderly way through action in accordance with law; that Nature has decreed many things, and that her laws are God's laws and are inexorable.

"The whole history of life, both human and sub-human, teaches us that nature will not condone disobedience; . . . no living being stands above her law, and protozoon or demigod, if they transgress, alike must die." (Dr. Lothrop Stoddard's *The Rising Tide of Color*, p. 304.)

A broad interpretation of religion then will, or may, include as guides to life, acquaintance with and obedience to the testimonies, and precepts, laws and decrees of Nature as they are revealed by industrious observation, research, and experience. The astronomer acknowledges the existence of law in the development, activities, and structure of the stars. Laws are recognized in physics, in chemistry, in biology, in embryology; and in physiology there are recognized laws of nutrition, growth, and reproduction. Natural laws are found connected with all the natural sciences. The operation of these laws is shown in results; and it is to be realized that these laws existed and were in operation long before Man came upon the face of the earth, and was given "dominion over all the earth."

Therefore there are laws governing the subjects of diet and nutrition. All living things, that is, all forms

of life, vegetable as well as animal, must have as food those substances of which their own structures are composed. No plant or animal, including Man, can create the elements which constitute their bodies. These elements must be supplied by mother earth, including air, water, and sunshine, in the case of plant life; and by the vegetable and animal kingdoms, in the case of animals. Instinctively, all forms of animal life (except Man) take as food those substances, few in number, which will supply the chemical elements needed to develop their bodies and maintain them in a healthy condition. Man's body is a body of flesh and blood so like the bodies of other mammalia that the specially trained eye is needed to detect any of the microscopical differences; that is, the minute structure of all mammalian bodies is practically the same, and the same laws govern the nutrition of all mammalia.

On account of Man's freedom of will he must choose; he must select from the great variety offered by Nature those foods which will furnish the needed chemical elements to construct and maintain a healthy body. Man having no instinct to rely on must possess knowledge obtained by observation, experience, and reasoning. He must be rational as it was intended he should be. By experience, Man has learned that some things furnished by Nature are not nourishing, in short that they are injurious; while other things are nourishing and furnish strength and energy to the body. The fact that he cannot make any one of these things, even the least of them, has not yet sunken into his consciousness. He knows he cannot make a grain of wheat or corn, or any vegetable or fruit, but he does not yet know enough to realize that the food for his body has been made for him, just as surely as the food for his soul has been prepared for and offered to him.

And because in this matter of diet Man is thoughtless, indifferent, or ignorant, one is justified in say-

ing, with all reverence, "If the Lord does not know how to feed me, certainly man does not."

With a clearer understanding and comprehension of Nature's plans, and a loyal coöperation therewith, Man unquestionably could greatly widen the distance which now separates him from the rest of the mammalian kingdom called the "beasts of the field." By freeing himself from the bonds of enslaving appetites; by restraining wrong impulses and acquiring fuller self-control; by realizing the vastness of his ignorance and appreciating his own incompetency, Man may find himself in a condition to humbly, gratefully, and confidently accept the bountiful provisions for his physical well-being supplied by a truly wise and beneficent Nature. To do this is to truly acknowledge the omnipotence and omniscience of God the Creator of all things; and this is the fundamental essence of Religion.

CHAPTER XX

THE UNWRITTEN COMMANDMENTS AND DIET

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It is not man alone, that is under the domain of law and commandments. The material universe, in its mighty whole and in its smallest part is governed by definite and very specific commandments. Law and order are to be found everywhere; otherwise chaos.

There is a law, a decree, a command shown through one of the mightiest forces in the universe, the all-pervasive, ever-active gravitational force, a universal force that holds the planets in their courses, drawing all things unto itself, and even coördinating the seemingly chaotic activity of electrons and protons; everywhere present and ever alert, knowing no cessation of activity. Such is gravitation with its definite laws.

And so throughout the physical universe, everything is under the domain of law and order—of decrees, statutes, and commands. Refraction, reflection, radiation, elasticity, combustion, absorption, diffusion, heat, light, and electricity, all under the control of law.

In the wide-reaching and useful field of chemistry, actions and reactions are definite, reliable and always the same. A drop of a solution of silver nitrate added to a solution of salt, or a solution of iodine in a starch solution, produces a well known, easily recognized, unmistakable reaction, always to be depended upon. Why? Because of the existence of law. Not an occasional reaction, nor a thousand, nor a million, but times without number will these chemical reactions occur. These actions and reactions are among the reliable and stable things of the physical world. The same dependableness is found in the entire realm of physics.

Not only in the inorganic kingdom do we find evidences of law and order. Such evidences abound in the vegetable kingdom, and are increasingly numerous as we get into the animal kingdom.

It is unnecessary to attempt to enumerate the laws . . . unwritten commandments . . . of physics, chemistry, mechanics, electricity, etc. Enough to assume that all the laws of the inanimate world, the inorganic kingdom, are included in the animate, organic kingdom—the higher and more advanced including the lower. Therefore, chemical, physical and electro-magnetic actions and reactions in the organic world behave in the same way—being governed by the same laws—that they do in the inanimate or inorganic world. This idea may be applied, possibly with benefit, to the human body itself, the acme of creation. The application of the idea may perhaps be more easily grasped when we realize that man, *as to his body*, is absolutely of the earth, earthy, having been made of the “dust of the ground,” and therefore subject to the specific laws of the inanimate, material world. These laws are more manifest in the nutrition, growth, and repair of the body, than in its higher functions.

As Professor Mather said in his address before the General Convention of the New Jerusalem in June, 1929: “We scientists assume that this is a world of law and order; that every event is the result of law-abiding processes; that each effect is produced by an adequate cause.” Apropos of animate nature, he said:

Here, too, is law and order, but here is something perhaps more important than mere consistency of operation. The scientists of today are becoming more increasingly aware of the presence of realities in the universe that are not susceptible of measurement . . . They are spiritual, that is, non-material, non-measurable realities in the life of human beings.

He also called attention to the fact that "the same laws and the same forces which are now utilized in a radio-broadcasting or receiving apparatus were available back in the time of Joshua, but only lately did man discover them."

Unfortunately there has been, even in quite recent days, acrimonious antagonism between those who accepted the teachings of Nature and those whose beliefs and practices were founded on Revelation; an antagonism between Science and Religion. It is interesting to note that most of the "martyrs" in this antagonism have been furnished, not by the Church, but by Science. There must in the nature of things be differences of opinion among men; and interpretations of facts cannot always coincide; but tolerance should displace, and more and more is displacing, bitterness in controversy. Much help in securing amicable and cooperative toleration might be permanently and happily secured by appreciating that the scientist is seeking the truth on the physical plane of life, while the churchman is seeking the truth on the higher, the spiritual plane. This is in keeping with the *fact* that man is a duality; essentially an imponderable personality inhabiting a body of flesh and blood; the latter simply an everchanging material substance, subject to the inexorable, unwritten laws of inanimate Nature; and the former, a spiritual reality, persistent with the stability of immortality, subject to the written Law of Love and the Beatitudes. The difference between the two is greater than that between night and day; and yet temporarily they form a unit.

Modern science, in its expanding acquaintance with Nature, and its understanding of unwritten commandments, has given mankind very many things that have added enormously to man's comfort, convenience and pleasure; have reduced the hours of labor, mitigated drudgery, and increased his possibilities of industrial

production, and in many ways his usefulness to his neighbor. Modern life with its luxuries is greatly indebted to the scientist. But can these things—autos, radios, aeroplanes and other wonderful mechanical things, which are chiefly useful to the flesh and capable of giving fleeting pleasure—satisfy the aspirations and yearnings of the soul? These are not the things that give and secure lasting happiness, tranquility of mind, contentment, development of character and personality. Nevertheless the development of the scientific spirit, the desire to know more about Nature and to understand her more thoroughly, has been and is a necessity to the continuous evolution of man.

Throughout the ages intellectual progress has been due to three attributes of Mankind: a deeply implanted, insatiable curiosity; a far-reaching, unrestrainable, unfetterable imagination; and an undaunted faith that there is *order* in the universe, an underlying harmony in Nature. *

For ages upon ages, man's knowledge of Nature and his interpretation of natural phenomena was exceedingly limited; his knowledge of the unwritten commandments or laws of Nature was practically nil. Even today, in the words of Sir Oliver Lodge, man has only scratched the surface of things. But the eyes of some men have been opened that they might see, and so show Nature to others. The list of the more prominent is not a very long one; neither is the list of the prophets. But science may be said to have had a beginning with Archimedes, who, in Michael Pupin's estimate (himself a worthy disciple) was the "father of the scientific method of inquiry." This was something over two centuries B. C. For a period of approximately seventeen

*A. Vibert Douglas in his article "From Atoms to Stars" in the *Atlantic Monthly* for August, 1929, page 158.

centuries science was dormant; then Galileo, towards the end of the sixteenth century, revived and utilized the Archimedean principles of inquiry, and "laid the foundation of the science of motion."

References in preceding pages have been made to Nature and Nature's laws and commandments. It has been very clearly and beautifully expressed by the late Rev. Thomas A. King, in his "Story of the Bible" (pp. 49-52):

"God has placed before men two grand revelations. They are the volume of His works and the volume of His Word; and upon both He has impressed certain characteristics which are derived from His infinite mind. Both revelations unfold themselves progressively to the human mind, according to definite methods of action, which we term laws. The constant action of these laws in Nature, according to a fixed and universal system constitutes the order of the universe and forms the basis of an intelligent knowledge and the construction of science. Not only is this true, but it is true that man's knowledge of the laws and facts of Nature has been attained very gradually . . . Modern science has drawn aside the veil that ignorance of the constitution of the universe hung over men's eyes, and with the infallible key of knowledge has unlocked the doors and opened to the understanding the *inside* of the volume of Nature, and thus admitted the human mind to an intelligent grasp of the facts, laws, and eternal principles that lie back of Nature's phenomena . . . When the scientific age came, the *inside* of *Nature* was opened. When the rational age of religion came, the *inside* of the *Bible* was opened." As a matter of fact the earth with all its physical and chemical properties, all the laws and commandments under which it

functions, has been given to man as a problem to be solved.

This may be looked upon as Man's grand commission, as his authority to investigate and learn all within his comprehension of Nature's phenomena and laws,—the unwritten commandments.

With these thoughts in mind, it may be useful to glance at a very few, two or three only, of the problems of the earth with which every one is more or less intimately concerned; such as health, disease, nutrition, growth, old age, reproduction, sex, marriage, the home. These topics are much before humanity at the present time.

As to health and disease, it may be assumed that the one is normal, the other, abnormal. Health should be the possession of every living soul. The truly primitive man must have been well and strong, healthy and unacquainted with illness and suffering.

With such a wonderful start in life, why has Man-kind so degenerated that he is the sickliest form of life on the earth? Why is it that Man is subject to a list of diseases requiring hundreds of pages to even briefly describe, and several volumes to describe in detail? Single volume modern textbooks on medicine, such as Osler's and Cecil's each describe about five hundred diseases; and the entire medical field is very far from covered by these authoritative works.

With such a magnificent start as Man unquestionably had, we must today look upon disease as indicative of broken law, of disobedience to commandments, written and unwritten.

Harrowing and appalling statistics might be quoted to show the number of deaths in the United States and elsewhere annually from cancer, tuberculosis, diabetes, acute and chronic alcoholism, pernicious anemia, and other diseases; the number of hospital beds, not in-

cluding nursing homes and private sanitarium, all of which are occupied continuously; the large number of mentally deficient children in the country, and the number of resident patients in hospitals for the insane and epileptic; and so on; but it is enough to call attention in this brief fashion to the fact that the majority of human beings die from disease many years before reaching the normal limit of life. Under the most favorable conditions, human longevity has reached only fifty-nine years instead of being extended to the three score years and ten or four score years, claimed by the Psalmist to be the normal.

There is evidently something wrong with humanity even in this boasted and boastful practical and scientific age. Man has not yet acquired the understanding that will enable him to learn the unwritten commandments. He steadfastly overlooks the fact that the laws of chemistry act as unswervingly in the human body as they do in the chemical laboratory; chemical actions and reactions go on in the living body as they do outside the body. Mankind apparently does not appreciate the fact that the stomach and digestive organs have no special set of brains that will enable them to select the good and wholesome and discard the injurious. The digestive organs perform their functions in obedience to the definite biochemical laws that control chemical actions and reactions everywhere.

Nature tells us, if we have receptive ears, that all things are related as cause and effect; that everything in the universe is made for a use; that things are created in accordance with law and order for a specific purpose; that man should cooperate with and not disobey natural laws.

As the noted scientist, Robert A. Millikan, so aptly says:

We can still look with a sense of wonder and mystery and *reverence* upon the fundamental elements of the physical world as they have been partially revealed to us in this century . . . It is true that we are slowly learning more of *the rules in nature's game*, so that our progress is not made by hit or miss experimenting, nor by random theorizing, but by following a more or less systematic, if not always a strictly logical, procedure . . . The discoveries of our generation have taught us a wholesome lesson of *humility, wonder and joy* in the face of an as yet incomprehensible physical universe . . . We have learned to work with *new satisfaction, new hope and new enthusiasm*, because there is still *so much* that we do not understand, and because . . . we have found in our lifetimes more new relations in physics than had come to light in all preceding ages put together, and because the stream of discovery as yet shows no signs of abatement.

And a poet (Dr. Gordon's Presidential Address before the American Institute of Homœopathy) has beautifully echoed the sentiments of the scientists in saying,

And Nature, the old nurse, took
The child upon her knee
Saying "Here is a story book
Thy Father has written for thee."

"Come, wander with me," she cried
"Into the regions yet untrod
And read what is still unread
In the manuscripts of God."

CHAPTER XXI
THE PREVENTION OF CANCER
A DEFICIENCY DISEASE

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THE PREVENTION OF CANCER.

A DEFICIENCY DISEASE

Probably no medical topic has given rise to more serious thought, called for as universal investigation, been the subject of such careful and exhaustive research work, or entailed the expenditure of as large sums of money within a score or more years, as cancer. Volumes have been written on it as a subject and numberless discussions have been instigated by it. Theories as to its cause have been propounded, and experiments to prove whether or not it is due to germ activities have been patiently repeated and repeated. Governments, "foundations," Boards of Health, individual and group researchers, clinicians and surgeons, have all enthusiastically and assiduously battled with the problem without finding the cause. The Massachusetts State Department of Health has issued monthly bulletins for over a year, containing reports of studies made of various phases of the cancer problem and contributions on the subject by noted authorities, besides general information concerning cancer, that has been a veritable post-graduate course of instruction.

To summarize the present status of the problem:—

- I. One may say without fear of contradiction that the world knows no more about the cause of cancer than it did a quarter or a half century ago. And it is accepted as a well established fact that cancer does not belong in the category of germ diseases;

- that is, no germ has been discovered that seems to have an etiologic relationship to cancer.
- II. There is no form of cancer that has been definitely shown to be contagious. In ulcerative forms ordinary infection may occur, but no transmission of cancer results. Surgical antiseptic technique, however, should be observed by all attendants and nurses in such cases.
 - III. There is evidence that suggests the hereditary transmission of cancer, but the evidence is not sufficiently strong or convincing enough to more than suggest the possibility. On the other hand, it is widely accepted as a fairly well established fact, that a *predisposition* to the development of cancer is transmissible from parent to children. It is not an unusual experience today to meet a case of cancer occurring in a person, one of whose parents is suffering or has died from cancer.
 - IV. The *curability* of cancer is no longer a matter of doubt. This may be as positively stated as anything in medicine can be. A period of at least three to five years after the complete disappearance of a cancer is required before one is justified in saying the cancer has been cured. And many such cases are exhibited in the occasional special cancer clinics held in Boston. It is not infrequent for patients to go twenty to twenty-five years after an operation or some other treatment such as x-ray or radium without recurrence. The writer has had two cases cured; one by an attack of erysipelas, the other after or by an operation, who had apparently good health for seventeen and nineteen years after the "cure," before cancer in another portion of the body occurred with fatal results. It is very suggestive that neither case, in the interval of health, had made any change in her mode of life, dietetically or otherwise.

- V. Early diagnosis or recognition of cancer is almost the *sine qua non* as far as cure is concerned. It is the neglected, unrecognized case that goes downhill with lamentable certainty. In doubtful cases it is far better to have a benign growth removed by surgical interference than it is to allow a malignant difficulty to slip past the favorable period of treatment.
- VI. Radical surgery and radiation (x-ray and radium) stand out as the most hopeful and successful methods of treatment for recognized or possible cases of cancer. No curative pharmaco-therapy has yet been positively developed; and considering the fact that there are so many widely different manifestations of cancer, it seems doubtful if any universally curative pharmaco-therapy will be developed. Infrequent, sporadic cures may and do occur and pharmaco-therapeutic studies must be earnestly continued, because it is the recurrent and intractable cases that need all the help that can be given.

One thing is absolutely imperative in connection with cancer, and that is to continue unabated and undiscouraged search for the cause. Cancer is caused by something. If this is so and it unquestionably is so, then that cause can be discovered.

A line of inquiry that promises more than any other at the present time is the dietetic. Other popular and scientific kinds of investigation into the etiology of this dreaded disease, have been faithfully followed without fruitful results. Why then not try some other line of attack, especially since there is so much that is reasonable in the idea. For instance, everyone knows that cancer produces organic, structural changes in the body. So do beri-beri, rickets, scorbutus, diabetes, eczema,

acne and many other diseases to a greater or lesser extent; and it is as well known that an unbalanced diet is the chief agent in bringing about these and other organic, as well as functional disorders, in those unfortunates who are so predisposed, as that tomorrow will follow today. There is no need here of comparing or contrasting beri-beri and cancer. Enough to say that they both cause eventually organic changes, progressive weakness and death; that they are very prevalent, the one in the Orient, the other in the United States; that the cause of the one (beri-beri) is acknowledged to be dietetic and the evidence is pointing to the possibility if not the probability that the other is also due to infringement of the dietetic laws of health. At all events an unsearched lane is here open for the investigator. The suggestion that the undue eating of meat caused cancer was energetically championed by Dr. Bulkley of New York, who wrote voluminously on the subject. Another suggestion that the active, embryonic area of eggs when freely eaten was the cause, has also been advocated. Many other theories have been advanced.

The influence played by heredity and the influence due to diet in producing cancer can be found out only by concerted cooperation of trained social workers, nurses and physicians on a sufficiently large scale, and for a series of several years, in any one or better several, of our large cities. Minutely detailed clinical histories of cancer patients from infancy up to the development of the disease, and including pre-natal influences if accessible, should be obtained, and also as much knowledge of the mother's habits and history as possible. Analyses of these points must be looked upon as absolutely essential. Laboratory and physical studies may be made as required. And at the end of three, four or five years, twenty-five to fifty thousand cases could have been studied and enough valuable, physiological and

clinical data collected to permit the formation of a definite conclusion concerning the possible, pathogenic influence of nutrition or malnutrition, in the etiology of cancer. State institutions for the treatment of cancer such as the special hospital at Pondville, Massachusetts, might undertake, lead, or participate in this desirable investigation. Animal experimentation may throw light on many of the points involved.

Once more, there is a *cause*, a something that produces cancer; and since cancer is an ungoverned "riot of cells," a degenerative disease, a retrograde metamorphosis, an organic thing, and since nutrition is the fundamental function of protoplasm, the cause must be discoverable.

So many degenerative diseases are already quite positively known to be due to malnutrition as a fundamental cause that one is justified in assuming, for purposes of investigation at least, that cancer may legitimately be added to the list. And since so many years of expert research and scholarly investigation have already been fruitlessly spent: and since cancer has been practically excluded from the list of germ and infectious diseases; and since the vitally valuable field of malnutrition has not yet been explored with the purpose of discovering the cause of cancer; and since the mortality from cancer has increased until the disease ranks among the highest in the mortality records; may it not be claimed as a reasonable thing that a scientifically planned campaign of inquiry in the field of malnutrition is one of the crying demands of the day?

Until that happy day arrives when the cause of cancer shall be known, and the disease thereby rendered preventable, the following suggestions might be put into actual practice to the lasting benefit of all who participate. The suggestions cannot do any harm; they can do only good. Summarized they advise humanity

to follow as obediently and humbly and faithfully as possible the hints, the laws and the commandments of Nature connected with nutrition. Nature with wisdom incomparable, has furnished for man's nourishment, in palatable and varied form and combination, all the fats and sugars and starches, all the "calories," all the proteins and vitamins, all the mineral salts and chemical elements, needed to maintain the heat and energy and functions of the body; to keep up to the maximum the resistance to disease influences and the reaction necessary to get well if abnormal physically or mentally. Nature's laws are inexorable but not unreasonable. If transgressed the results are inevitable. Coöperation with nature, obedience to her laws will lead to health, happiness and usefulness.

Nature has given mankind a marked variety of well balanced grains, staple articles of food to be taken singly or better in combination and without much processing and with no "refining;" invaluable articles that can be kept indefinitely without the use of preservatives. Also a much larger variety of vegetable foods no two of which are alike, which suggests that a variety should be liberally eaten; each in its season, perhaps, more liberally. Why should such a big variety be given mankind if not to serve some useful purpose? The same may be said of the berries, melons, and fruits almost in endless variety so bountifully provided by Nature. It is here that the temptation to manipulate, preserve and improve on Nature's products is too strong for mankind as a rule; with disastrous results when the temptation is not overcome. And as to nuts; of all the foods just mentioned only corn (maize) contains a relatively large percentage of fats or oil. Nuts, however, seem to be Nature's great storehouse for fats. Starch and sugars are not present in any quantity. This is significant. Easy preservation without artificial means or processing is another of the characteristics

of nuts. These nut oils would seem to be Nature's chosen way of administering fat as food because the oil is in combination with other materials. Coconut oil, cottonseed and olive oil are the popular ones and are used freely by humanity as food; but they are extracted and taken away from their natural habitat, and it may be questioned whether or not they should be considered desirable foods. Their natural combinations have been broken up anyway. Apropos of oils, it may be a pardonable digression to recommend the use of mineral oil in the making of salads and other dressings for food. This so called "mineral oil" is not digestible therefore is not a food and does not increase corpulency but it may lubricate the intestinal tract besides satisfying the palate's desire for oil. Neither does it ferment and germs do not thrive in it. It seems, therefore, on account of its inertness, to be a very desirable substitute for oils, which to give the least criticism, have been taken away from their normal environment, are digestible, increase obesity, may undergo fermentation, furnish a breeding place for germs and have no special lubricating value.

No detailed menus need be given, for from the large varieties of food just mentioned, one may select a different menu for every day in the month. The list, short as it seems to be, is varied enough and nourishing enough to maintain the best of health, to furnish strength and vigor enough for any duty, to fortify one's resistance to disease, to prevent the development of disease predispositions and the degenerative processes so characteristic of cancer.

To those who have a prejudice against a meatless diet and think that meat is necessary to develop strength, it may be stated what everyone knows, that the strongest, most enduring and useful animals on earth such as the elephant, the camel, the ox and the horse for instance, are purely vegetarian in their diet, besides be-

ing more easily domesticated, more reliable, more useful and companionable to man than any carnivorous animal known.

It may, then, in the absence of a recognizable cause for cancer and with the knowledge that nutrition is the essential foundation of good health and that cancer and all disease processes are abnormal, be assumed that the active and possibly the basic cause of cancer is malnutrition, and that the prevention of cancer and its predisposition is best secured by maintaining a high degree of health through a rational, natural, physiological diet.

CHAPTER XXII

MALNUTRITION: THE MEDICAL OCTOPUS

"Mental deterioration is more dangerous for civilization than the infectious diseases to which hygienists and physicians have so far exclusively devoted their attention."

ALEXIS CARREL

(Page 20 "*Man the Unknown*")

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CHAPTER XXII

MALNUTRITION: THE MEDICAL OCTOPUS

What are we to understand by the term "Nutrition?" According to physiologists, nutrition is that biological property characteristic of living structures, of taking extraneous substances into themselves, disrupting these substances and recombining the elements into cells and tissues to form their own organisms and carry on the functions characteristic of the organism itself.

However defined, Nutrition is the most essential and fundamental function of all living things, whether belonging to the vegetable or animal kingdom, and food is absolutely essential to nutrition and the maintenance of life, i.e., of body temperature, energy, growth and all psychic and physical activities; and it goes without saying that a correct and balanced ration is necessary to an ideal and normal state of any organism.

By way of emphasis certain aphorisms common among laymen may be quoted. For instance, "a girl cannot make a silk dress out of a piece of flannel;" "a man cannot build a fireproof house out of inflammable material;" or less elegantly "a person cannot make a silk purse out of a sow's ear."

These aphorisms by common consent are recognized as universally true and indisputable. It equally will be admitted that a man cannot make (or create) a fish, a bird, or even a microbe; he cannot make a tree or shrub or flower; he cannot make a metal or chemical element; he cannot make a potato, a kernel of corn or rice or wheat; a berry or any kind of fruit or nut. In a word

he cannot create his food. He can, if he is wise, accept and make use of the food created for him by a beneficent nature.

All these and countless other things have been and are constantly being made by an invisible energy for man's appropriation and utilization; in a word, his use. And there are certain immutable laws governing the growth, action and reaction of them, and all of their characteristics. Man may and does utilize these products of creation but his use of them is inevitably and positively controlled by the accompanying laws.

Life and nutrition are most intimately connected, being interdependent. Biologically, life is defined as a process or a condition manifesting itself by irritability, nutrition, growth and reproduction. Normal nutrition signifies a condition of health. The more normal the nutrition the more perfect the health. Health is then evidently dependent on nutrition; and an unbalanced or imperfect nutrition unquestionably leads to or produces imperfect health. It should not be forgotten that nutrition ends where katabolism begins; that is, nutrition is anabolic or constructive, whereas katabolism is destructive.

Does the average person know from the biologic and chemical standpoint what is needed in the way of food for the upbuilding of a normal, enduring, disease-free human body? The inspection of family menus, of the menus of restaurants, hotels, cafeterias, delicatessen and other food shops, and the so-called food offered for sale at bakeries, grocers, confectioners, etc., will furnish an answer to this question.

Even the medical profession is not so well prepared to speak "ex cathedra" on the subject as it should be. For in the medical schools the important subject of food and nutrition never has been and is not today studied with the scientific ardor and thoroughness characteristic of pathology, anatomy, embryology, physiology,

and other medical sciences;—possibly because nutrition is not yet a science.

Malnutrition shows itself according to its degree; first in discomfort and mild symptoms, functional in character. Gradually only do these disturbances assume an organic change and become fixed physical entities. The abnormal may, of course, manifest itself to any degree, from the almost insignificant and trivial to the most devastating and even fatal results.

Briefly a few clinical cases may be referred to by way of illustrating common and not very serious conditions of malnutrition and yet baffling and obstinate to the medical practitioner; interfering with the health and efficiency of the patient and being quite outside the influence of pharmaco-therapy.

1. A young man, aged twenty-two, height 5 ft. 8½ inches, weight 155 pounds, a college student now in his junior year. The chief complaint at present is alopecia totalis, which for a year and one-half has been present and gradually increasing in spite of much and varied treatment from its incipiency to its existing total baldness, not a hair on any part of the body. He is stockily built and of light to fair complexion; is affable and genial and not very seriously distressed over his condition as he has no pains or actual suffering. He sleeps well and eats freely without any sign of indigestion. His bowels are fairly active. His urine he quotes as "normal." His physical strength is fair though he is not inclined to athletics.

Why this inefficiency, this deficiency of the function of the skin?

But this is far from all.—He has been free from venereal disease and from such exhausting diseases as typhoid, malaria, erysipelas, etc. But the greater part of his life he has been afflicted with eczema for which he has had a great deal of apparently non-curative medical treatment. The eczema receded as the alopecia

appeared. In addition he has, which is unusual for his age, over 100 fillings in his teeth. Why so much dental caries at his age? What does it indicate?

His hemoglobin is somewhat below the standard.

The whole picture is one of weakened, long-lasting insufficient or inefficient metabolism. One may reason that the three outstanding conditions of this case (the eczema, the alopecia, and the dental caries) had their origin during very early embryological life, for they all developed in the ecto-derm or ectoblast, the outermost of the three embryonic layers of which the embryo consisted for a short time only in earliest life. That is, the difficulty may have been decidedly prenatal in its origin and had to do possibly more with maternal influences than with the embryo itself. At all events, the skin, the seat of the eczema; the hair follicles with the vital hair papillæ; and the enamel caps of the teeth which were laid down as early as the third month of fetal life and developed to the period of eruption; all needed nourishment which could be furnished only by the maternal organism. At all events the ecto-derm and its derivatives never was in his case a healthy, well developed structure, for at the end of the second decade of life, after years of chronic eczema, it was in this patient in a state of what might be called senile impotence. The patient's affliction is not a germ disease and heredity alone cannot account for its etiology and pathology. Evidently it is a case of malnutrition which has existed for years.

2. This is a case of mother and daughter. The mother, aged fifty, 5 ft. 0 in. in height and 154 pounds in weight (approximately thirty pounds overweight) never has had good health. She has had general psoriasis with more or less severe pruritus since she was thirteen or fourteen years of age, and has spent "all her money on it." She has warts and keratoses all over the body; lost most of her teeth before she was forty,

and had the remainder extracted seven or eight months ago. She had complete oöphorectomy and hysterectomy four and one-half years ago (reason not known); and a bi-lobed thyroidectomy two years ago. She cannot blow her nose on account of "catarrh," probably has sinus and turbinate trouble, and has pain in the right mastoid region. She is "full of symptoms." She drinks an indefinite amount of coffee and "eats anything." Her bowels are moved by castor oil, salts, Ex-lax, etc., but they never move spontaneously. Her heart is 80 when she is standing, and is without disease. Her blood pressure is 170-110. Her tonsils are big, red, but smooth. She cannot drink water as swallowing is difficult. She knows nothing of her urine save for frequency. Her intellect is of inferior quality.

Very evidently the present condition of this woman is one which has slowly developed and, while nothing can be learned of her heredity, it is only reasonable to assume that much of her history and present state is the result of an unbalanced and insufficient nutrition. In a word a clear case of malnutrition. Certainly she never has been worthy physically or mentally for motherhood, but yet she has had two living children and one still-born.

One of her daughters is aged twenty-two, 5 ft. 7 in. tall and weighs 125 pounds. She is therefore not overweight, but she lacks initiative and energy. She did not graduate from the high school, making the second year only and then giving up. (Mental deficiency?) She is exceedingly "nervous;" cries easily and frequently, without reason; gets angry easily; does some reading but no studying; sleeps much; stays at home all the time; does not mix with girls of her own age; has no social life; does not go to dances or amusements of any kind; is not fond of sport except swimming. Menstruation came on at sixteen years of age;

has always been regular; but she is in bed the first day "with bad cramps." The periods last five days and seem normal but for the dysmenorrhœa which, according to many observers, is an evidence of malnutrition. This patient has no indigestion, though she has lost all her molars. Her bowels have always acted normally. She had tonsillectomy and adenoïdectomy when seven or eight years of age. Her throat seems capacious, roomy and normal.

Heredity, of course, laid a sufficient foundation for neurasthenia and neuroses generally; but how about her teeth, dysmenorrhœa and malaise? A more suitable nutrition would doubtless have lessened if not wholly prevented her deficiencies, and also much of her malnutrition.

3. A man, twenty-eight years of age, 5 ft. 6 in. tall, never has weighed over 119 and now weighs only 98½ pounds. He is married, but is without children; he is able to work steadily and has been free from ordinary diseases. His complaint might be diagnosed "gastralgia," for he has severe "tightness and heaviness" in the epigastrium often immediately after eating. This lasts a variable period, and gradually disappears. He says he "eats too much and too often." But his diet is monotonous, its variety being unusually limited. He is a very rapid eater and will often eat five bananas at luncheon, and nothing else. He has no clinical indications of gastroduodenal ulcer or organic disease. His bowels have been maltreated with cathartics. His blood and urine are reported normal. He sleeps well. In voice, speech and general demeanor he seems very effeminate, but his work calls for a considerable degree of strength. His blood pressure is 122-78. He is nearsighted and wears glasses. His hearing is all right and his teeth are in fair condition.

This patient is very far from being a specimen of well-nourished manhood and yet he has no developed

physical abnormality. His wife and mother worry very much more about his condition than he does; a psychic influence probably not good for him.

His condition may rationally be considered as belonging in the category of malnutrition and while no definite disease can now be recognized he is headed in the direction of a fall and unless suitable nutritional habits can be established his future suffering is sure. Pharmacotherapy in his case has been tried and found wanting.

4. The last clinical case to be referred to is that of a young man of about thirty years of age. His height is over 6 ft. 0 in. and his weight at its maximum was 236 pounds; but under reasonable diet he is now 220. He is married and has one child. Withal of a large bulk, the patient is kind-hearted, good natured, affable and genial. His opinions are apt to be positive. His scholastic attainments are rather meagre, for he did not graduate from high school and desultory study since high school age has resulted in mental expansion of mild degree only. His business experience has been disheartening on account of the world-wide industrial depression. He had, during adolescence, several of the diseases of early life, always making an excellent recovery. He maintains that he is well and "all right," but he is not. He cannot exercise without discomfort; a brief walk or dance exhausts him and, puffing more or less from dyspnoea, he is obliged to rest. On rising from a sitting position his pulse immediately climbs into the 90's and even over 100. The tachycardia lasts until he sits and rests. Cardiac hypertrophy, valvular disease, coronary troubles, etc., are not yet evident physically. His heredity may suggest the possibility of cardiac disease now or in the near future, for his father died very suddenly after only two or three weeks of preliminary suggestions of cardiac trouble. The pleasures of the table have appealed too strongly to

this patient and he has eaten unwisely and has taken beer and alcoholics too freely with a consequent malnutrition which has eventuated in corpulency and tachycardia which may prove his undoing. The outlook is not good for him unless something more than pharmacotherapy can be used in his treatment. The rational thing is a radical, sensible, physiological dietetic reform to overcome the malnutrition from which he is now suffering. His blood pressure is 140-90 and his hemoglobin 85 per cent.

In these recitals, diagnostic details and laboratory reports, some of which might have been included, have on account of limited space been omitted. Nothing of real value, however, has been overlooked.

Contact with cases similar to the preceding is a common thing with most general practitioners; though such patients as a rule are welcomed in only a few consulting rooms. They may not produce tangible "disease pictures;" their pathology may be nil; but they are abnormal, distinctly below the standard in some, possibly in many respects. They suffer or are incapacitated to a greater or lesser degree. To treat them as psychoneurotics and prescribe a placebo or some psychoanalytic, or hypnotic suggestion, stimulant, tonic, or climatic or environmental change is not enough. Any of these methods may find a niche in the treatment but here also, fundamentally, proper nutrition is a necessity if any improvement is to be accomplished.

To consider briefly the different stages in the span of human life our attention may be turned to that most vital period, the initial stage of infancy. The most important stage, the prenatal, is not even yet appreciated at its full significance by the majority of human beings, though within recent years prenatal clinics, instruction, and advice have been available and applied for in

all our medical centers, and must be looked upon as one of the prominent signs of a philanthropic, enlightened and advancing civilization. The prenatal life is unquestionably wholly one of nutrition and its great importance is incalculable. "As the twig is bent so the tree inclines;" and expectant mothers throughout the world should be taught the vital influence on their progeny and on the human race they hold, as it were, in the "hollow of their hands." At all events they are to an enormous extent the custodians of human health and welfare.

It is the duty of parents and of all who are connected with the education of the young, to teach the rising generation of young women something of the possibilities of pregnancy and the great and wonderful responsibilities of the prospective mother in the prenatal and also the postnatal nourishment of their progeny. A woman is not fit to be a mother simply because she is a woman. The prenatal life is more valuable to the individual child than is any other stage of its existence. The postnatal comes next in importance. During both of these periods the child's future welfare is to a large extent in the control of the mother. Everything, therefore, depends upon her own nutrition and intelligence. Suppose a breast-fed infant has some or many of the diseases common to this early period of life, is the fault due to mother or child? In the great majority of cases the difficulty is maternal, the mother being unable to supply her child with good, wholesome milk. She is below standard and therefore the child suffers. During this postnatal stage, the infant is or may be the subject of many diseases. Among the most prevalent are those of the gastro-intestinal tract, as these organs are so intimately connected with the nutrition of the infant. The various forms of indigestion; regurgitations, vomiting, gastric flatulence, constipation, cholera infantum, forms of colitis, inanition to mar-

asmus, colic and convulsions, disturbances from dentition, insomnia, fretfulness, crying, coryza, head colds, sore throats, etc. are frequent manifestations of gastrointestinal incompetency or more frequently of a mal-adjusted diet. Aside from the infectious diseases these are the most common at this stage and until within very recent years the most fatal. The mortality among infants all over the world: India, China, Africa, South America and among the so-called primitive races, has been exceedingly high and even among the civilized nations infant mortality has exceeded that of any other similar period of life. Attention might be directed to certain statistics kindly furnished by Dr. M. Luise Diez, Director of Child Hygiene of the Massachusetts Department of Public Health.

MASSACHUSETTS

Year	Number of Live Births in Mass.	Number of Deaths under 1 year	Rate per 1000 Live Births
1914	93399	9894	106
1915	93155	9490	102
1916	93487	9334	100
1917	95731	9325	97
1918	95607	10820	113
1919	87827	7769	88
1920	91859	8382	91
1921	92245	7005	76
1922	87636	7129	81
1923	89210	6968	78
1924	91463	6191	68
1925	86014	6294	73
1926	83502	6130	73
1927	82273	5320	65
1928	79054	5118	65
1929	74122	4592	62
1930	73690	4440	60
1931	69385	3803	55
1932	68518	3635	53
1933	63457	3294	52

The preceding table shows not only the decreasing number of births in Massachusetts during the period of twenty years but it also shows the marked decrease in the total number of deaths as well as the ratio of deaths under one year of age from 113 per thousand live births in 1918 to 52 in 1933, a decrease of more than fifty per cent. The required pasteurization of milk aided at times by immuno-therapy has practically done away with typhoid fever, septic and other sore throats, erysipelas, diphtheria and many other infectious disorders in addition to the more ordinary forms of infection leading to the common gastro-intestinal disorders, an unquestionable victory of science over ignorance and carelessness.

It is natural to ask, Why this decrease? The improvement is due chiefly to the modern control of the substitute feeding of infants. Most unfortunately a large percentage of mothers, civilized and uncivilized, are unable to nurse their children at all, or only in part. Often nursing may be continued for months, but the milk furnished the infant may be insufficient in quality to nourish the offspring. Milk is one of the big wonders of creation; only mammals secrete milk, and according to the classification of mammalia there are approximately two thousand species and practically as many varieties of milk; each species producing the quality and quantity of milk best fitted for the nutrition of its offspring. Man is the only mammal that habitually takes milk after the period of weaning, and he takes liberally the milk of distinctly sub-human and greatly inferior animals; a milk intended specifically for the nourishment of animals of a much lower order than man. Sometime man will know more than he now does about the chemical and biological composition and significance of milk, and will have greater regard for nature's provision and wisdom.

The commonly accepted views concerning milk are

reflected in one of the latest utterances on the subject by Brown and Tisdall of Toronto, Canada, in a paper on "The Effect of Vitamins and the Inorganic Elements on Growth and Resistance to Disease in Children." This paper was presented in part before the British Medical Association in London in 1932 and read at the Montreal meeting of the American College of Physicians in 1933. These authors say that "from the standpoint of the child's diet, it may be stated that it is absolutely impossible to furnish an adequate amount of calcium unless liberal amounts of milk are included in the diet." These are strong words and they should attract the attention particularly of mothers, because their milk must supply sufficient calcium and phosphorus as well as iron, iodine, copper and the other elements spoken of by these authors as essentials in the diet of children. In this connection it may be asked, Where and how do cows get the liberal amount of lime found in their milk? Evidently from grasses only, when living their natural lives, or from grasses and grain when domesticated. At all events the cow cannot make calcium any more successfully than the human mother can. The cow gets its calcium and various salts from its monotonous, simple, unvaried vegetable food and from no other source. *Why should not the human being, child or adult, be able to acquire its food essentials, calcium and other minerals from natural sources, especially since the human being has such an astonishing variety of natural foods to use?* Nature says the mother precedes the child. And no foster mother, even the most scientific nursing bottle, can substitute fully for a normal mother.

Another question in this connection calls emphatically for consideration; and that is "What is the significance and lesson of the weaning period?" This period was established by nature, not by man, and is universal among mammals. Without reasonable doubt it means

that no mammal needs milk after weaning. At all events it is not available except as a result of man's ingenuity and as a commercial venture on the part of the dairyman. (vide Chapter V on "Weaning and its Perils")

Closely connected with weaning is the process of dentition, which should be well under way when the weaning period arrives. Considering the undisputed importance of dentition, in the lives of the young, and the various troubles all through life arising from imperfections of the teeth, it is the wisest service that can be rendered at this time, earnestly to call for consideration of an admirable article by Dr. Joseph Garland entitled "Dental Health; a Problem in Nutrition," and published in the March 15, 1934, issue of the *New England Journal of Medicine*. One should not attempt to give any idea of the valuable, comprehensive, assuring, positive teachings of the paper by quoting even liberally from it. One may, however, be pardoned for quoting as follows:

"Our appetites and our genius for satisfying them have betrayed us;" . . . "the teeth are indices, sometimes the only obvious ones, of the general state of nutrition," and his concluding sentence "We are realizing at last that those foods which are nearest at hand, which are most edible in their natural state and which require the least preparation and processing are the best suited to our needs."

One should remember that having various dental cavities filled and cared for *does not cure the trouble*, though it may temporarily bridge over the condition for an uncertain interval. The constitutional malnutrition which usually is at the root of the decay persists and must be recognized and treated in order to bring about a cure.

It is impossible to consider in detail each and all of

the diseased processes encountered during the stage of infancy. Enough possibly has been said to show the vast importance of a rational and truly natural dietary during this period. The periods of childhood and youth merge together quite intimately; and the diseases common to the combined periods are much the same in character. The foundation has been laid during the prenatal life and the first postnatal year. Now the superstructure is to be raised. This is the period of the acute, eruptive and contagious diseases. Dental difficulties are always present; eczema, acne and skin diseases prevail; sundry blood abnormalities are apt to show themselves; but during this vital period nutrition is on a very high level, and growth in stature and mental characteristics is astonishingly prominent. Growth and general development, however, are under exceedingly inflexible laws and these laws must be observed if best results are desired. Hit or miss methods of feeding are not permissible. Resistance to the epidemic, infectious, eruptive diseases is notably greater, according to our best observers, among those whose nutrition is kept at the highest level by judicious feeding. The following authoritative utterance is appropriate in this connection:

"The physical well-being of the nation is dependent on two factors, heredity and environment, and the most important environmental influence to which we are subjected is food. Food enters more closely and intimately into the metabolic processes and affects them more profoundly than any other external influence. It is now generally recognized that a suitable food supply and its rational utilization are of cardinal importance in maintaining the health and efficiency of the community."

"The first official report issued on the physical examination of recruits during the late War, revealed the fact that a substantial proportion of the population

of this country, [Great Britain], suffers from physical defects which are largely traceable to abnormal or arrested development during the period of life when growth is most rapid. Every addition to knowledge indicates more and more clearly that physical defects of this kind have their origin largely in improper nutrition, resulting from deficient or unsuitable dietaries during early life. . . . Breast-fed infants of well-nourished mothers can withstand conditions of life that would be fatal to others not so well fed. The children of crofters though often living in overcrowded hovels are remarkably free from rickets, whereas children living in better surroundings but improperly fed, fall ready victims to this disorder of nutrition. The incidence of tuberculosis in a community appears to be closely correlated with the food supply; it diminishes when the food supply is ample and suitable and increases when, for one reason or other, food is difficult to obtain and the quantity and quality of the diet become inadequate." And much more to the same effect in the article "Qualitative and Quantitative Aspects of Nutrition in Relation to Public Health," by J. M. Hamil, O.B.E., M.D., D.Sc., from which this quotation is taken. (From "The Imperial Bureau of Animal Nutrition" printed in "Nutrition Abstracts and Reviews," Aberdeen.) Attention was called to this article by Dr. Percy R. Howe, Director of the Forsyth Dental Infirmary, whose original food investigations have attracted nation-wide notice and whose biological researches with unbalanced rations have revealed startling and convincing facts.

To emphasize the views expressed in the preceding quotation, some statistics obtained from Boston sources may appropriately be presented; especially as they are gathered chiefly from children of school age.

Forsyth Dental Infirmary is one of the well-conducted and useful charities of the city. Here, during

1933, 55,801 children of school age visited the dental clinics for extraction, filling of cavities and correction of deformities of the dental arch. That is, a number equal to nearly one-half the total number of public school children were treated at the Forsyth Dental Infirmary in 1933.

At the Harvard Dental School during 1933 over 9000 patients were treated for various dental troubles, extractions, fillings, etc. Twenty-two per cent or 1980 of this number were children.

At the Boston Dispensary in 1933 there were treated in the morning clinics, including all kinds of dental troubles mostly among children, 12,293 cases, and during the evening clinics 1939 patients, practically all adults, were treated.

These statistics do not by any means give the total number of dental deficiencies which annually occur in a large urban population. Thousands not here included are treated in other institutions or by their private dental surgeons or go without suitable treatment. Remember the quotation from Dr. Garland that "the teeth are indices, sometimes the only obvious ones, of the general state of nutrition." If they are unsound the disorder is not so superficial as the teeth themselves are, but much nearer the source of life and growth.

To view the subject at a somewhat different angle it may be noted that the school department reports a registration of approximately 138,000 children in the public schools of Greater Boston. Of this number there are 2169 in special classes on account of backwardness. Some deficiency is present that prevents their keeping up to the grades: in addition there are many who fail in promotion and others who fail to graduate. Also, from the Walter E. Fernald State School for Feeble-Minded at Waverley we learn that in that institution they have a resident population of

over 1800 mentally defective children, 1850 being an average population. In addition approximately 600 children annually are carefully examined for mental defects besides approximately 1500 in allotted public schools. A few months prior to his death, an article by Dr. Fernald was published in the *New England Journal of Medicine*, in which he claimed that there were 50,000 mentally deficient children in the State of Massachusetts. The opinion at the school at present is that 100,000 would be a conservative estimate of the number of deficient children in the State. The assertion also is made that the mental defect is not the only one apparent in these children. Physical deficiencies of one sort or another with teeth, mouths, noses, eyes; with muscular and general coordination, gait, etc., exist, and they are said always to be "big eaters;" to eat twice as much as normal children do. No special dietetic researches have yet been conducted and no opinion is offered as to the cause or causes of these defects; not even heredity is called to account, yet without knowledge of the cause preventive treatment is practically a hopeless task. No field of inquiry promises to yield a richer harvest of good and useful results than this one. Nutrition offers the most hopeful possibilities of solution of this and allied problems.

Convincing evidence of the influence of good or ample nutrition in minimizing the severity of hookworm infestation is given by Professor Wilson G. Smillie of the School of Public Health of Harvard University in his publications. His extensive experience with, and analytical investigations into, hookworm disease in its native habitat qualify him to speak with authority. He claims that "hookworm disease . . . is the most common parasitic infestation of humanity in the whole world." From the "Intensity Surveys of Hookworm Infestations" and in an article on Hookworm Infestations re-

printed from the *American Journal of Diseases of Children*, February 1926, in collaboration with D. L. Augustine, Sc.D., he states that "our Brazilian studies showed that good nutrition plays a great part in the bodily resistance to the effect of hookworm." (Pp. 2-3) Also on page 12 he says, "Individuals having ample food and excellent living conditions often have normal hemoglobin despite heavy hookworm infestation. Malnutrition and a poor dietary . . . were important factors which affected the hemoglobin of many of the patients infested with the hookworm." And in the same paragraph he concludes a chapter on "Influences of Nutrition on Hookworm Disease" with the statement . . . "that as ample food builds up resistance against the ravages of hookworm disease, starvation markedly increases the effect produced by the worms upon the body."

The period of adolescence calls for attention. Certain abnormal conditions are very common during this stage of life, and are characteristic of it. For instance the oncoming and institution of menstruation in a large percentage of girls are accompanied by physical and mental ills that cause anxiety to many mothers. Irregularities of menstruation are varied and numerous and much too prevalent. For the function of menstruation itself is an absolutely normal one, and should cause no more distress than respiration or sleeping. Delayed menstruation, dysmenorrhea, amenorrhea, menorrhagia and metrorrhagia, ovarian disorders, are sufficiently prevalent to merit analysis and study, especially from the standpoint of cause and prevention. Why should a normal function produce suffering? Evidently there is something wrong that brings about such misery. Fortunately competent practitioners, research workers and observers have entered this field with inquiring spirits and have done creditable work in ascer-

taining a probable cause, and in revealing a possibly preventive treatment for these difficulties. Mention might here be made of Dr. Edward Reynolds and Dr. Donald Macomber of Boston, who for years have been industriously studying malnutrition as a possible cause for many if not all of these common ills. It is pertinent in this place to refer to Dr. Macomber's work in the study of sterility, found in his articles:

"Defective Diet as a Cause of Sterility"

"A Study Based on Feeding Experiments with Rats, 1921" in which Dr. Reynolds participated.

"The Threshold of Fertility in Rats and its Relation to Diet Deficiency, 1923,"

"Effect of a Diet Low in Calcium on Fertility, Pregnancy and Lactation in the Rat, 1926"

and especially in,

"Diet in the Etiology and Treatment of Sterility, 1929."

This last article contains much that ought to prove more than suggestive to the general practitioner, who usually is called upon for help in these cases. For instance we read that "it is my purpose in this paper to review briefly the work on animals . . . and then to present what evidence there is that the same forces are operative in human beings as in animals." This might be considered a biological axiom. It is a perfectly true statement at all events of a biological fact. Man is subject to the same general laws that operate in the entire animal kingdom. Different species of animals may react differently to drugs, for instance, but the general laws of nutrition, growth and reproduction hold good wherever life exists. Macomber in this article presents an analysis of the diet of 206 sterile women. Reference is made to the experiments by Hart, Steenbock, Humphrey and MacCollum in investigating reproduction in cattle which showed "what an enormous effect changes in diet could have on reproduction in the

cow." Later in describing the work of Evans in studying the effect of change in diet on the regular occurrence of the estrous cycle, he says, "If the amount of food is still further reduced the effect is even more extreme and there comes a point at which activity of the reproductive tract ceases altogether or never develops though the animal may continue to function otherwise in a fairly normal manner . . ."

In a comment on the probable or possible causative relations of endocrine disturbances to sterility, Macomber suggests that the dietary cause, usually of long continuance, capable of producing the sterility may have actually preceded any disturbance of the endocrine glands. He states that so far as he is aware "no one . . . has ever explained what causes these glands to function in an abnormal manner."

Concluding his paper Macomber thinks that "there is a large body of evidence both experimental and clinical which shows that alterations in diet actually do produce sterility. An analysis of the diets eaten by 206 sterile women shows that they deviate in many important ways from normal. A large number of these women show evidences of nutritional disturbances. Of the 206, forty have become pregnant to date, even though practically all of them were seen for the first time within the last two years, and this result has occurred at least in part as the result of changes in diet and such other measures as the increasing of exercise, the taking of endocrine medication or the treatment of anemia. It seems to me, therefore, that we have in diet a means of treating sterility which we cannot afford to neglect." Macomber is not overpositive or over-enthusiastic in his statements, but reasonable and conservative in his claims and conclusions. The weight of his writings, however, leans to the idea that dietetic deficiencies are to be looked upon, at least as among the causes of sterility, and therefore when suitably

modified, food is possibly the chief of therapeutic agencies.

Not to spend too much time on any one period of life, let us turn for a moment to the major stage of adult and senile existence and consider only a few of the disease possibilities of this period.

If there is any chronic disease that stands preëminently as a typical instance of malnutrition it is beri-beri. This disease, though it had existed practically from time immemorial and had destroyed untold thousands of lives in the Orient, was not recognized as of dietetic origin until the Russo-Japanese War when the discovery of its cause was announced. Investigations, then and thereafter, seemed to confirm the accuracy of the announcement. It was not, however, until 1912, that Casimir Funk as a result of his analyses of rice screenings was able to proclaim to the world that he had succeeded in isolating certain chemical elements which he had found in rice for which he coined the term "Vitamines," and which he considered of vital value in maintaining the health of humanity. This discovery, though not fully explaining the cause of the disastrous disease, beri-beri, exerted a powerful influence over the thoughts and activities of mankind in both scientific and commercial circles. Without discussing the subject, it may be and is accepted as a definitely proved fact that the long-continued eating of polished rice is the cause of beri-beri which may therefore be considered "a deficiency disease;" that is, man removes from the rice something that nature put there: and the lack of it in the food he eats leads to malnutrition; and in an unknown number of instances to unnecessary suffering and death. (Vide Chap. X, "The Unlearned Lesson of Beri-beri.")

Constipation (sluggish and inactive bowels), with the hemorrhoids, the reflexes and other maladies it gives rise to, is curatively treated by a rationally adjusted diet. Probably over 90 per cent of these cases, no matter how chronic, can be easily and wholly cured by a rational and natural diet, and vast sums of money now spent for laxatives and cathartics, saved to be spent more usefully and less injuriously. This is not an idle or thoughtless boast but simply an unvarnished statement of experience covering a long series of years and rather wide contact with this form of malnutrition.

Probably most forms of indigestion or "dyspepsia" are the result of a preceding malnutrition or of faulty methods of living and are curable not so much by pharmaco-therapy as by a reasonably physiological diet. Such difficulties naturally produce malnutrition which leads often to more serious evils. Sick headaches, vertigo, cardiac "palpitation," forms of colitis, ordinary diarrhoea, and such conditions common throughout life are evidences of malnutrition and in the main are preventable by suitable, nutritive and well-balanced diets.

Corpulency is by very many people looked upon as a sign of prosperity and good health. If at all excessive, it is really a warning sign or danger signal that nutrition is *not well balanced*; in short it is exceedingly significant of abnormal nutrition; that is, certain foods are eaten which the body does not need for the work it does. And the excess or the unnecessary food is stored away as fat. This excess of adipose tissue, if not too excessive, may please the aesthetic sense; but every pound above a standard weight for skeleton and height of body is a burden on the heart and circulation, the carrying of which calls for the expenditure of much extra energy.

By no less an authority than Joslin, corpulency is looked upon as a precursor of diabetes. According to his latest utterances the chief causes of diabetes are heredity, corpulency and eating extravagantly. Apropos of obesity a few pregnant sentences of Joslin's may be quoted: "Since insulin, the death rate in Massachusetts from diabetes has steadily fallen for all diabetics under the age of 45 years; above 45 years it has risen, chiefly because of fat women. Therefore if anyone in your family has diabetes, don't get fat, and especially don't get fat if you are a woman with a diabetic heredity."

"If there is diabetes in your family, when you are fair and forty, keep thin.

". . . Diabetes in adults is a disease of the fat."
(Page 80, *Commonhealth*, Volume 21, No. 2.)

When speaking of a patient, an army officer, who when very ill, bore his burdens "like a soldier," Joslin claimed that there are now 400,000 diabetic soldiers in the country. In Massachusetts alone there were 3552 fatalities from diabetes in 1933; and it is estimated that there are 15,000 cases in the state. In the United States during 1931 there were 24,144 deaths from the disease, and in 1932, there were 25,458.

Very evidently diabetes is one of the more prevalent diseases. It causes much suffering and incapacity and many deaths. Its victims are found among young and old, no age being immune; it is most intimately connected etiologically and therapeutically with diet, ordinary medicinal treatment having but little or no effect upon it.

Small wonder then that the Massachusetts Department of Public Health devoted its quarterly bulletin for the month of April, May and June, 1934 to the consideration of diabetes in its various aspects. The bulletin contains over twenty contributions, five of

them from Dr. Joslin, and discusses all phases of the subject. It certainly is a most instructive symposium on a subject of great importance to individuals, to groups of sufferers and their dependents and to the state whose reputation is established by the intelligent care it gives the health of its citizens. Copies of the bulletin referred to may be obtained by applying to the Massachusetts Department of Public Health, Room 545, State House, Boston.

* * *

Conclusion

If beri-beri, diabetes, rickets, dental and other deficiencies, neuroses, sterility, menstrual disorders, obesity and other conditions which here have been mentioned and briefly discussed, have as a background or a foundation, a condition of malnutrition, why is it not possible for other diseases such as cancer, cardiovascular diseases, tuberculosis, poliomyelitis, and pernicious anemia to have the same foundation in malnutrition? What promises to be a most useful and fertile field of inquiry is here laid open for research investigation.

One might say the opportunity for rendering an inestimable benefit to humanity stands beckoning the investigator.

POSTLUDE

In the preceding chapters an effort has been made to point out certain errors in human diet and nutrition during and from prenatal days to advanced periods of mature life; to emphasize the assumed fact that a very large percentage of the ills from which humanity suffers and the occurrence of premature death itself, may be or are positively due to a faulty and unbalanced diet; to point out definitely some of these faults, and to suggest the rational and logical remedy. But above all to call attention to the preventive possibilities of the natural and rational and therefore balanced diet.

It is assumed that many readers will ask a question already many times asked—viz; , what shall I eat as a *substitute* for so and so? To which the answer might be made, why try to find a mere substitute for something that is essentially deleterious in its action, or positively injurious? It is our duty to find something that is distinctly *superior* to the discarded diet, something that is more nutritious and altogether more desirable than the thing which has been given up; like the illuminating and powerfully convincing experiment in *substituting* whole (brown) rice for white rice as a diet for the Philippine Scouts referred to in the chapter on "Beri-beri." It is something decidedly better that is here offered, a something which if faithfully followed will result in good health, a more vigorous and active and productive life, a life free from the burdens of illness, a life free from becoming a burden to others, a life of greater usefulness to others. It is no less significant a goal that is aimed at.

Instead, however, of presenting a "cook-book" or

a large and tiresome collection of recipes and menus, the reader is urged to use his own ingenuity in combining foods into palatable and appetizing forms not forgetting the all important question of nutrition.

One should recognize two very important matters; *first*, that the human body of flesh and blood, or the body itself, is simply an animal body, under the domination of the same laws that control the formation, development and nourishment of the animal creation as a whole: *second*, that whereas animals as a class are so constituted that they can fill to the full their life possibilities, grow and thrive on a simple, unvaried and monotonous diet, Man is so constituted and his possibilities are so infinitely greater that he unquestionably requires a much greater and wider variety of chemical elements in his food than do the other members of the animal creation. The wonderful variety of wholesome foods available to Mankind would seem to furnish support to the idea that he needed just that variety; that a monotonous unvaried menu was insufficient for his many possibilities. And clinical experience, and board of health statistics amply confirm this assumption. Therefore it would seem a very desirable thing for the human diet to be as broad and varied as possible, so as to furnish the needed supply of chemical elements, known and unknown.

A few suggestions of the variety of food material Nature plans for man's nourishment, are here offered. From these suggestions it is possible to make almost an endless list of menus; something different every day.

**A FEW
DIETETIC SUGGESTIONS**

A FEW
DIETETIC SUGGESTIONS
MAY EAT

CEREALS

rye meal	Enright's "All O' the Wheat"
oat meal	brown or natural rice
shredded wheat	Enright's "Cereal"
triscuit	pop-corn
cracked wheat	seed wheat, whole or ground
muffets	seed rye, whole or ground
unbolted corn meal	yellow seed corn or golden bantam, ground

To change flavor and variety ground roasted Spanish peanuts may be added to any of the porridges.

Porridges may be made from one kind of meal or a mixture.

Raisins, prunes, dates, figs, apricots, peaches, unsweetened apple sauce, crushed pineapple (alone or in a combination) may be used with porridges or "cereals" instead of milk or cream and sugar.

Red wheat, winter rye, golden bantam corn, separately or mixed, supply a nutritious and well balanced cereal food.

BREADS

The most wholesome breads are the unleavened, "ry-krisp," shredded wheat, triscuits and muffets.

Scotch or Irish oatmeal, raw or lightly boiled, eaten

cold or hot and *at any meal*, is more natural and more nutritious than any yeast-raised or baking-powder bread.

Bread made from Enright's "All O' the Wheat," using seeded raisins freely and a generous quantity of yeast, is far more nutritious than any of the white or other breads sold in the shops. (Adding a little peeled and mashed potato makes a spongier loaf of bread.)

VEGETABLES

ANY SORT OR VARIETY

baked white potatoes (eaten with skin)	radishes	egg plant
boiled white potatoes (peeled not pared)	tomatoes	cauliflower
sweet potatoes	string beans	cabbage (raw or cooked)
corn—fresh, baked or canned	pole beans	Brussels Sprouts
beets	lima beans	lettuce
carrots	baked beans of any kind	endive
parsnips	green peas (may be baked)	watercress
turnips	mushrooms	romaine
squash, pumpkin	spinach	celery
vegetable marrow	broccoli	asparagus
whole wheat macaroni and spaghetti	dandelions	artichokes
	beet tops	okra
		chard
		onions

All to be eaten freely in their season.

Baked beans and baked peas may be eaten freely on account of their mineral contents, especially if the use of meat is restricted.

Vegetables should be steamed, or cooked in casserole; or boiled in a small quantity of water which should be served with the vegetable. *Do not throw away the water in which the vegetables have been boiled, as it contains sugar, mineral matter and vitamins extracted from the vegetables.*

All vegetables should be cooked in a WATERLESS OR STEAM PRESSURE COOKER.

RIPE FRUITS AND BERRIES

Fruits and berries may be taken when RIPE in any variety. They may be eaten raw, dried or cooked, but *always without adding sugar.*

raisins	pears	grape fruit
prunes	plums	grapes
dates	apricots	pineapples
figs	melons	cherries
bananas	cantaloupes	and all kinds of
apples	persimmons	berries
peaches	oranges	

Be sure to eat fruits and berries only when RIPE *and without sugar.*

SOUPS

NO MEAT STOCK NECESSARY

Black bean, red kidney and yellow eyed bean, lima bean, baked bean, green pea, dried pea (not split), canned pea or lentil.

Tomato; tomato with mushrooms or with brown rice; squash puree; potato puree; cream of asparagus, celery, tomato, carrot, spinach or cauliflower.

Cream soups to be made with vegetable stock thickened with Scotch oatmeal, lima bean or brown rice flour and nut cream butter, instead of white flour and milk.

Whole wheat macaroni or spaghetti may be added to any of these soups. *Vegetable stews* made with any variety of vegetables using spinach as a basis, are *hearty, satisfying, nutritious and economical.* Spinach

water makes an excellent bouillon or consommé and can be thickened and flavored as desired. It also makes a good stock for other soups. This is true of all vegetable waters.

SALADS

A dressing of mineral oil, lemon juice, chopped onion, green pepper, mustard, salt, etc., may be used instead of mayonnaise.

VEGETABLE SALADS SUCH AS

beets with chopped green pepper and celery:
tomato with chopped Spanish onion:
plain tomato:
carrot, green peas and diced sweet potato:
cauliflower with white potato:
asparagus with green pepper:
ground raw cabbage with onion or carrot or crushed
pineapple:
lima beans, string beans or any combination of cold
vegetables:
potato with chopped parsley and onion:
apple and Spanish onion:
chopped carrot and raisins, etc.

FRUIT SALADS SUCH AS

Orange, apple and banana:
apple, celery and crushed pineapple:
grape fruit, apple and figs:
banana salad:
peach salad:
stuffed prunes or stuffed dates (using peanut butter)
*Any variety or combination of fresh fruits may be
used.*

Ground nuts add flavor and nourishment to the salads. (Cocoanut and other nuts)

DESSERTS

Fruit cup without artificial sweetening.

Unsweetened apple sauce with or without dried peaches or apricots or dates.

Prune and banana whip.

Apricot and banana whip.

Baked ripe bananas.

Figs and crushed pineapple with ground nuts.

Preserved peaches without artificial sweetening.

Prunes soaked in cold water.

Cold brown rice with dates and crushed pineapple or with raisins, prunes or figs.

Dates and prunes may be stuffed with peanut butter.

The fruit compote may be made with boiled seed wheat instead of rice.

Stewed figs, ripe fruits, berries and melons in season.

NUTS

May be taken freely and in any variety; thoroughly masticated;—*more wholesome if unsalted*—peanuts, pecans, English walnuts, Domestic and Italian chestnuts, Brazil and Cashew nuts, almonds, filberts.

Drink always water enough to flush the system.

Mineral Oil instead of butter, crisco, etc., may be used in cooking, in baking beans, in mushrooms on toast, in baked macaroni, etc.

Remember ground roasted Spanish peanuts added to Scotch oat meal or any natural cereal increases the

food value, gives an added flavor to the porridge, and is economical.

Molasses, honey, and maple sugar and syrup, if wholly natural products and not adulterated, may be used in small quantities infrequently and especially in cold weather and during the rapidly growing periods of life.

Molasses and maple syrup have been processed by Man. But indulgence in their use occasionally, possibly may be permissible and without harmful results; as is the case with honey their free and frequent use is certainly debatable. Nature does not make them in that form and honey is unquestionably made for the nutrition of bees. Whether man is fully qualified to attempt to improve upon Nature's plans for nourishing him and keeping him healthy and strong and useful, has not yet been demonstrated. The reverse would seem to be the experience of humanity.

SUGGESTIONS FOR BREAKFASTS:

Fruit Course selected from

Apples; raw, baked or in apple sauce:—
Pears: Peaches; Plums: Persimmons: Prunes:
Cantaloupe: Honey Dew Melon: Watermelon:
Seedless White Grapes: Concord or any Grape in
season: Soaked Prunes, Soaked Figs; Dates:
Cherries: Seeded or Seedless Raisins: Ripe
Bananas (whole or sliced): Fruit cups of any
mixture.

Cereals: A generous helping of any natural cereal.
Wheat, Oats, Rye, Corn, Rice, Barley, Buck-
wheat;— Boiled Seed Wheat, Boiled Seed Rye,
Ground or Cracked Wheat, Enright's Cereal,
Ground or Cracked Rye, Ground or Cut Oats,
Unbolted Corn Meal, Canned Corn and Shredded
Wheat, Boiled Brown Rice with Raisins or Prunes
or Dates or Cut Figs or other Fruit. Barley
mixed with other cereals to vary the flavor and in-
crease nourishment. Any of these grains alone
as porridges, or mixed with crumbled shredded
wheat or other grains, or ground, roasted Spanish
peanuts or any kind of ground nut may be used
with the porridge.

Substitutes for Milk or Cream.

Apple sauce, unsweetened or sweetened by the
addition of soaked dry peaches or other fruit, or
by addition of a small quantity of honey, or of
raisins, may be used economically the greater part
of the year in lieu of milk or cream;—a little plain
honey, or molasses not much refined, or baked
apple stuffed with dates or raisins,—or cut-up

dates, soaked figs, soaked (not stewed) prunes, sliced ripe bananas, soaked dried apricots may be used instead of milk and cream. Raisins, seeded or seedless, are often preferred with their porridges by children and adults alike. No trouble to find a *substitute* here.

Breads:

Boston brown bread fresh or toasted, with peanut butter—corn cake made of unbolted corn meal—rye muffins—whole wheat "Muffets"—"ry-krisp" biscuits or wafers with peanut butter—Scotch oatcake or bannock—griddle cakes or pancakes from whole wheat meal, unbolted corn meal, pure buckwheat, with a small quantity of honey or crushed pineapple, especially in cold weather; whole wheat bread or rye bread.

Beverages:

Cold water not iced: grape juice, pineapple juice, any fruit juice diluted or not with water: any good water, plain or carbonized: Ficgo or Postum.

SUGGESTIONS FOR LUNCHEONS.

Soups:

Puree of Pea, Tomato, Corn, Squash, Mixed Vegetable, Mushroom, Spinach or Asparagus, Baked Bean, Yellow-eye, Pea or Kidney Bean, or Potato Soup,—may be thickened with Enright's "All O' the Wheat", Lima Bean Flour, or Brown Rice Flour, and creamed with Nut Cream Butter. Shredded Wheat or Ry-krisp may be crumbled into the Soup to add flavor or thicken it. Do not make soups too thin and valueless as nourishment. Bannock or unsweetened oatmeal cracker is not used as much as formerly, but its value as nutriment is not surpassed. This may be taken with the soup.

A generous vegetable or fruit salad may be alternated with the soup or substituted for it.

Desserts:

A fruit cup or ripe fruit of any sort will complete a luncheon that is palatable, nutritious, economical and not too hearty.

Beverages:

Plain or carbonized water, grape juice or ginger ale as a beverage. Do not have beverages too heavily iced.

SUGGESTIONS FOR A MODERATE DINNER.

Fruit cup, tomato juice or pineapple juice cocktail, condensed vegetable juice from boiled vegetables, (too frequently thrown away).

Soup:

A thinner soup than advocated for luncheon, thickened as suggested to suit individual taste. Any simple or mixed vegetable soup, a vegetable stew or corn chowder. Vegex or Alfalfa bouillon.

Main Course:

A vegetable plate of four, five or six vegetables, selected from sweet potato (baked or boiled) or white potato, beets, carrots, spinach or chard or broccoli or Brussels sprouts or cauliflower, asparagus, onion, string beans, pole beans, lima beans, shell beans, cabbage, corn (from cob or can according to season), peas, parsnips, egg plant, whole wheat macaroni or spaghetti baked with or without tomato; turnip, white or yellow, brown rice, hot or cold, boiled or baked,—or especially a meatless loaf selected from the recipes to be given later. The main course should include starches, greens and proteins.

Radishes, celery.

Ry-Bread, plain or toasted with or without peanut butter.

Dessert:

Brown rice pudding with dates and crushed pineapple—Prune and banana whip, apricot and banana whip—unsweetened apple sauce with or without dried peaches, apricots or dates, stewed or soaked figs, baked apple, plain or stuffed with dates or raisins—baked ripe bananas,—figs and crushed pineapple with ground cocoanut or other ground nuts—cold soaked prunes, sliced banana and apple, any fresh fruit as pears and peaches and plums. Boiled seed wheat with any of the fruits added. Stuffed dates and prunes using peanut butter for stuffing. Any ripe fruits, berries and melons in season.

Nuts:

Nuts ground, cracked or whole of any variety—English walnuts, pecans, Italian chestnuts, Brazil, Cashew Nuts, Almonds, Filberts and Peanuts. Nuts contain according to analyses from 20% to 60% of fats (or oils) and form Nature's storehouse for necessary and nourishing oils.

FUNDAMENTAL PROHIBITIONS

**DO NOT EAT WHITE FLOUR IN ANY FORM
WHATEVER:** for reasons elsewhere given:

bread	muffins	cakes
rolls	cookies	pies
toast	doughnuts	puddings

**DO NOT EAT CANE OR BEET SUGAR ON OR IN
ANYTHING:—**including:

jams	preserves	ice cream
jellies	marmalades	confectionery

*(Raisins, prunes, dates or honey in moderation
instead of sugar may be used for sweetening.)*

DO NOT EAT:—

cream of wheat	sago	polished rice
hominy	tapioca	pared potato in
hulled corn	white macaroni	any form
farina	and spaghetti	(boiled, fried or mashed)

or the majority of cereal "Breakfast Foods" as they
have been processed:

and because these and similar things are **DE-
MINERALIZED** and therefore, are *unbalanced* foods,
incapable of maintaining health, and their free use leads
to disease. (Vide preceding chapters. See also Chapters
on Milk.)

SUGGESTIONS FOR MEATLESS LOAVES

MUSHROOM LOAF

- | | |
|---------------------------|--------------------------------|
| 1 cup mushrooms | 4 cups water |
| 2 cups steamed brown rice | 1 chopped onion |
| $\frac{1}{2}$ tsp. salt | 6 stuffed olives (sliced) |
| 1 green pepper | 1 cup whole wheat bread crumbs |
| 1 cup grated cheese | |

In mineral oil (1 tbsp.) cook onion, green pepper (chopped) and mushrooms broken into pieces. Cook 5 minutes, but do not brown. Combine with remaining ingredients and bake in casserole dish in a moderate oven. 350 degrees F.

SAVORY ROAST OR MOCK TURKEY

(Contributed by Mrs. A. L. Miller)

- | | |
|-----------------------------------|--|
| 2 cups bean puree | 2 tbsps. grated onion |
| $\frac{1}{2}$ cup of muffets | 1 tsp. salt |
| $\frac{1}{2}$ cup Enright's flour | 2 tsp. celery
(dried celery leaves) |
| 1 cup strained tomato | |
| 2 cups finely chopped nuts | $\frac{1}{2}$ tsp. of sage |

Mix together and bake in a loaf in a hot oven twenty to thirty minutes.

Serve with a sauce made of strained tomato juice and thickened with Enright's flour.

(Some people prefer chopped onion and green pepper added to the strained tomato juice of the sauce, similar to chili sauce, unstrained).

The above recipe may be served in the form of a roast chicken (baked in a mold) and garnished with parsley and radishes.

CARROT LOAF

1½ cups ground raw carrots	3	tbps. mineral oil
1 cup steamed brown rice	1	tbps. onion juice
1 cup ground peanuts	½	tsp. ground mustard
2 tbps. chopped green peppers	½	cup Enright's flour

Mix ingredients in order given, bake in moderate oven thirty to forty minutes. Serve with tomato sauce.

VEGETABLE PEANUT BUTTER LOAF

2 cups cooked lima beans	2	tbps. mineral oil
2 cups chopped cooked carrots	1	tsp. grated onion
1 cup dry whole wheat bread crumbs	1	tbps. chopped parsley
	½	tsp. salt
6 tbps. peanut butter	½	cup water (if necessary)

Mash lima beans and carrots and add flour. Mix peanut butter and fat together and add, with seasoning, to the foregoing. Mix thoroughly. Pour into greased loaf pan and bake in moderate oven until firm and brown. Serve with tomato sauce. Time in cooking about one hour. Recipe makes 8 servings.

REMEMBER

that Man was not created to be what he is,—the sickliest of all created things :

therefore that sickness, ill-health and invalidism are a disgrace to humanity :

the teaching of the Decalogue to the effect that "I am a jealous God, visiting the iniquities of the fathers unto the third and fourth generation of them that hate me, but showing mercy unto the thousandth generation of them that love me and *keep my commandments.*"

that Man was given in the days of his creation, "dominion over the beasts of the field and over every creeping thing that creepeth upon the earth;" i. e. over the things also represented by "beasts of the field," etc.

the phrase found on one of the walls of the Surgeon General's Library in Washington that "Nature is the Art of God": a very clever, satisfying and subtle definition.

that Nature should be our highest authority on diet, not a "noted Parisian Chef" or a graduate of a "dietetic school."

that heredity and self are the two main causes of disease and suffering.

the recognized causes of Beri-beri and Pellagra, of Scorbutus, Scurvy, Rickets and Diabetes, which produce invalidism, economic burdens and many thousands of unnecessary deaths annually.

the experimental evidences furnished by brilliant, talented, reliable, thoroughly trained research workers in the field of balanced and unbalanced foods and use only natural and balanced rations.

that meats, cooked or raw, contain waste and more or less poisonous matter such as urine and urea factors.

that properly made *soups* and *salads* are particularly valuable and economical as foods, are easily prepared in almost unending variety and should be used daily.

that the Nut Kingdom is Nature's Storehouse for oils (or fats). Sugars and starches especially are to be found elsewhere.

that if we wisely follow Nature's teachings we shall continuously be well and strong, happy, healthy and useful.

that if we eat the things Nature evidently intended we should, we shall be free from disease and much stronger than we are physically, mentally and spiritually.

that if we "live right" we need not worry about calories or proteins or vitamins for Nature knows better than we do what we need and has given the right things to us.

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