

AN HOUR ON
HEALTH

Morris Fishbein, M.D.



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AN HOUR ON HEALTH

by

MORRIS FISHBEIN, M.D.

Editor of

The Journal of the American Medical Association

LONDON

J. B. LIPPINCOTT COMPANY,
16 JOHN STREET, ADELPHI.

1929

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**PRINTED IN THE
UNITED STATES
OF AMERICA**

FIRST EDITION

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AN HOUR ON HEALTH

CHAPTER I

HOW LONG WILL YOU LIVE?

SINCE the earliest times men have searched for the fountain of youth, some magical elixir by which their years of life might be prolonged far beyond the three score and ten assigned by Biblical legend as the due of all. Modern authorities are inclined to view askance the numerous years assigned to such patriarchs as Adam, Abraham and Methuselah, believing that the Biblical accounts refer either to lunar months or represent merely the desire of the descendants to brag about their forefathers. The Middle Ages also gave rise to numerous stories of remarkable longevity, but few critically minded investigators give much credence to the tales of these centenarians.

Of all of those to whom reference is made, the most romantic was Old Parr, an Englishman of Shropshire, who was first married at the age of 88, asserted his fatherhood of an illegitimate child and had to sit in the stocks in a white sheet at

the age of 105, married a widow when he was 122, and overdrank himself when being presented to the King of England in 1635, dying at the age of 152 years. Rumor credits him with five children born after he was 100 years old, but his career seems to have been more a legend than a reality.

Since the middle of the last century reforms in hygiene and sanitation coupled with the advances in general medical knowledge, have increased the expectancy of life of a child born in the United States from 40 years to 55 years. Most of this increase is due to the prevention of death in the first few years of life. In contrast with these figures there has been little if any advance after a person has passed the first forty years of his life. The expectation at the age of fifty is to-day only 21.5 years as compared with 21.2 years in 1825.

It is interesting to know that women are more likely to reach one hundred years of age than are men. Out of 691 reputed deaths of centenarians, 504, or 73 per cent, were women and only 187,

or 27 per cent, were men. In 1923 of the centenarians who died in England 74 were women and 22 were men.

Professor Raymond Pearl of the Johns Hopkins University studied carefully the records of fifty persons living beyond ninety years of age. He reports that less than five women out of every 10,000 born alive ever get to be 100 years old. His figures indicate that persons who live long come of long-lived families. The brothers of the people who lived long lived on an average $17 \frac{1}{3}$ years longer than the general male population and the sisters of the long-lived persons lived at least 9.28 years on an average longer than the average woman in the population.

The common assumption is that the person who lives long is one of exemplary habits particularly so far as relates to the use of tobacco, alcohol and similar substances. Professor Pearl found that fifty-four per cent of the men had used alcohol as a beverage during their lives and forty-six per cent had been total abstainers. Of the twenty-six men over the age of ninety who were studied, six smoked, five

chewed and two both smoked and chewed tobacco. The remaining thirteen or fifty per cent had never used tobacco in any form.

Sir Humphrey Rolleston is convinced, as are also practically all who have made a scientific study of the subject, that heredity is the most important factor in determining the span of life. Among 184 persons whose parents both lived more than 80 years the average age at death was 52.7 years whereas among 128 persons whose parents died before sixty years of age the average life was 32.8 years.

Only recently have scientific biologists begun to apply the experimental method in an endeavor to learn the factors that actually control the duration of life. Many of the most important studies have been made in the department of biometry and vital statistics of the School of Hygiene and Public Health of Johns Hopkins University. The life cycle of the ordinary fruit fly is a short one. The average age of a generation is 9 to 11 days. After years of study on the life of

this fly the investigators were able to develop experiments which showed the factors governing the duration of life.

It was found for instance that the rate of mortality was profoundly influenced by the density of the population. When a certain number of the flies together occupied a limited space such as was represented by the bottle in which they were grown, the volume of air, the volume of food and the area of food surface being constant, the crowding definitely influenced the rate at which the flies died. Whenever the optimal density was exceeded the death rate increased.

In an endeavor to determine what it is that is inherited that makes one family live longer than another, Professor Pearl concluded that the thing might be characterized as "inherent vitality." The human being is conceived as an aggregation of matter that has the property of automatically changing food or energy into heat, work, component matter of itself, or waste. Obviously human beings are differently organized and vary in the manner in which they utilize the prod-

ucts of the earth in sustaining life. The inherent vitality is the total potential capacity of the organism to perform actions necessary to life. Of course, the more rapidly the person uses up his inherent vitality the more likely he is to die soon. This conclusion is of the utmost importance in considering a plan of life because it points definitely to the fact that the length of life depends inversely on the rate of living.

With this fundamental premise in mind it is possible to formulate certain factors that influence longevity. Sir William Osler said that much depends "on the quality of arterial tissue (vital rubber) which the individual has inherited." Another way of saying the same thing was the famous proverb "Man is as old as his arteries." To-day the main causes of death are related to the blood and its circulation. Heart trouble causes one out of every seven deaths. Diseases of the kidney are responsible for 148 deaths of each 100,000 persons between the ages of 45 and 64 years, and high blood pressure is given credit for 140

deaths in this group. The conditions mentioned are detectable and controllable to some extent in their early stages. Their onset is insidious. They cannot be detected except by the scientific tests that are known to any well-trained physician.

Before giving advice to the aged as to the conduct of their lives it may be well to recognize somewhat their economic conditions. It is estimated by Dublin, statistician of a famous life insurance company, that one and one-quarter million persons in the United States who have reached the age of sixty-five are in want and are supported by charity, public and private. This means that twenty-eight per cent or more than one out of every four are dependent.

It has long been known that retirement not infrequently has hastened the death of the aged. A successful business man, when relieved of the usual life and caused to resort to idle luxury, tends to degenerate rapidly. Every trifling ailment begins to receive his undivided attention. The mental attitude is important. Sir Humphrey Rolleston says

that "a well-occupied mind, a happy disposition that thinketh no evil, naturally smiles instead of frowning on a stranger or a new idea, free from anger, hatred, and jealousy, the vice that gives no pleasure to any one, and an attitude of charity in its original and best sense to all, tend to prolong life and make it a happy, healthy prelude to crossing the bar." Thus one may point out that dignitaries of the church, chief justices on supreme court benches, prime ministers, and those of similar professions whose activities are prolonged tend to live longer than others.

Apparently the most important advice for attaining and prolonging old age has to do with the diet. A half-dozen proverbs attest the manner in which men have accepted this fact. "You dig your grave with your teeth;" "Man does not die, he kills himself;" and best of all the double-edged statement of the Hoosier farmer: "Pigs would live a lot longer if they didn't 'make hogs of themselves.'" An investigation made by one life insurance company revealed that thirteen per cent of some thousands of policyholders

beyond the age of forty were more than twenty per cent overweight. Persons at this age have usually stopped taking even the physical exercise of walking.

Since it is impossible for us to choose our parents, all that we can do toward the prolongation of life is to avoid preventable disease by the usual sanitary and hygienic precautions and by having physical examinations at least once each year to detect the presence of the diseases of middle life that come on insidiously. Avoid worry since it is of the greatest importance in using up the inherent vitality. Moderation in all things, a certain amount of mental and physical exercise, some time in the open air, and a reasonable amount of happiness—these constitute the prescription for a long life and a useful one.

CHAPTER II

PHYSICALLY FIT

WHETHER you are a bricklayer or "the big boss" you find that it is economical to be healthy. For loss of time on account of disease or loss of efficiency due to fatigue can be measured in terms of dollars and cents. Therefore men should have an actual knowledge of their state of health, and this can be had by a proper physical examination. Granted that such an examination reveals no serious conditions demanding immediate correction, every one ought to know enough about personal hygiene to conduct his life to the best advantage.

The human body is a combination of cells bound together in various systems, including for example the muscles, the bones, the circulation of the blood, the nervous system and the digestive tract. These interlocking cogs of the human machine will usually get along satisfactorily if left largely alone, particularly since there is within the cells the power of

repair—an ability that does not exist, for instance, in such machinery as can be found in an automobile or an oil-heating furnace. Then, too, man has the intelligence which makes it possible for him to realize when things go wrong and to take steps toward correction.

Regular physical examinations are important primarily for the detection of remediable defects or of diseases in their early stages, but secondarily such examinations may afford a feeling of confidence in one's state of health which means freedom from worry.

Without being able scientifically to measure the amount of damage that can be done to the human body by worry, high tension or irritation, the experience of ages has shown that these factors play a definite part in the onset of disease.

There was a time when worry was listed as a contributing cause to high blood pressure, hardening of the arteries, diabetes and even many infectious diseases. Unquestionably worry does play a part in the causation of disease because

of the secondary effects exerted on the functioning of the body.

When a man is tired he ought to rest. During the resting process the body cells recover from fatigue. Scientific investigations have shown that definite chemical changes take place during fatigue and others during rest. The amount of sleep necessary at different periods in life changes. It varies also for different persons. The average man ought to sleep eight hours every night.

Sometimes insomnia is due to physical conditions, but it may also be due to the establishment of bad habits. Falling asleep is a habit. If one establishes the routine of going to sleep easily at a regular hour and of relaxing the body at the time of going to sleep, he will probably have much less trouble than if he indulges in constant variations of the sleeping performance.

The man who begins to worry as soon as he goes to bed ought to have competent advice, since the tendency is toward a vicious circle. Almost every one knows that a walk or drive in the fresh air, a

warm bath or a warm drink tends to induce sleepiness. People who are sensitive to caffeine should avoid the use of tea or coffee before going to sleep.

The esthetics of eating have not yet been developed in our rushing civilization. A quiet, clean dining room, free from orchestral din and dancing is more conducive to good digestion than can easily be estimated.

Enough food should be eaten to provide energy for the daily work, but it is safe to say that all of us eat too much. A continuous and steady gain in weight is not advisable after middle age. For evidence indicates that obesity is associated with conditions which shorten life. Every man ought to find out what his optimum weight is for health, and control his diet to the point at which such may be maintained.

A proper diet contains suitable quantities of proteins, carbohydrates, fats, mineral salts and the essential vitamins. If the diet contains sufficient milk, meat, eggs and fish to amount to 75 grams or two ounces per day of actual protein,

the proportion will be suitable. For palatability, meat protein is superior to vegetable protein. Two ounces of meat provide 10 grams of protein, or one-seventh of the average daily intake. Butter provides no protein, but is almost wholly fat.

The human body needs a lot of water to keep itself in suitable condition as sixty-five per cent of the human body is composed of this fluid. Most experts suggest somewhere between six to ten glasses of water a day—modifications of ordinary water may be more pleasant to take.

The best scientific evidence indicates that, taken in moderation, tea and coffee are not harmful. It is inadvisable when greatly fatigued to attempt to relieve this feeling by drinking tea or coffee. This is like whipping a tired horse. The caffeine does not relieve the fatigue, but merely gives stimulus sufficient to overcome it temporarily, placing, however, an added burden on the tissues.

Among the peculiar follies of the physical culture movement none is so

preposterous as the notion that breathing of one type or another is important in the causing of disease or the cure of various complaints. Breathing is not automatically regulated by the human body to the same extent as the beating of the heart may be. The latter is almost wholly an automatic function.

Breathing may, to a large extent, be controlled. You can breathe as deeply or as fast as you wish, but if you overestimate yourself in exercising, the lungs will take in as much air as they can to equal the increased demand. When a person inhales air through the nose, dust and dirt are removed high up in the breathing tract and the air is warmed. Breathing through the mouth does not supply these safeguards.

All systems of breathing such as the "vitalic" breathing, abdominal breathing, rhythmical deep breathing, and other schemes are irrational. Nobody ought to live for his lungs alone. It is possible through breathing too rapidly to stop the respiration and it is possible by breathing in too shallow a manner to produce

changes in the blood that are not altogether healthful.

Enough exercise should be taken and ordinary breathing ought to be done sufficiently to provide for the lungs a regular amount of ventilation and development.

There are all sorts of baths for all sorts of purposes. A warm bath cleanses the body, draws the blood to the surface, increases perspiration and has a soothing effect. Bathing in very hot water is dangerous, particularly to a weakened person.

Cold baths taken in the morning stimulate the nerve endings in the skin and drive the blood from the surface, to which it returns with a rush when the person comes out of the bath and rubs himself briskly with a towel. The worst fanatic for his friends is the cold water bath fanatic.

There was a time when the skin was considered merely a covering for the human body. Nowadays the skin is recognized as a mirror of the human body. A good skin, which indicates a generally healthful condition, is one that is fairly

firm, does not sag, that is free from pimples, and that does not scale away. In the care of the skin, ordinary bathing with soap and water sufficiently frequent will keep it clean and healthful.

Like other domesticated creatures man did not always live indoors. A certain amount of time out-of-doors every day is necessary for health. During this period one may inhale fresh air, secure sunlight and indulge in moderate exercise. This does not mean that every one ought to be an out-of-door fanatic, a marathon runner or a hundred mile walker. The road to health does not lie in the exceptional performance, but in a simple routine of average performance. Out-door exercise should be indulged in regularly, but not to the point of fatigue, or irritating sunburn, or of undue exposure. The indoor man succumbs easier to exposure than the one who is used to spending considerable time in the open.

The pleasures of life may be divided into in-door and out-door sports, the in-door life for mental relaxation, the out-door life for exercise and physical health.

A change of occupation or of scene is of value in promoting longevity, but dissipation is not recreation.

The trend of modern life seems to be toward speeding up to greater mental strain and almost ceaseless activity. To-day the business man's panacea is golf, but golf may be merely a mental relaxation. Too much attention to the nineteenth hole, and six hours of dissipation after a heavy dinner may undo all of the good effects of the eighteen holes of actual play in the afternoon. The oldest aphorism in personal hygiene is a plea for moderation in all things. A healthful life requires, of course, play, rest, and sleep, but even these must be in moderation.

CHAPTER III

EXERCISE

ITS BENEFITS AND HAZARDS

ONE of the most amusing performances ever witnessed by the people of these United States, directly or in the movies, was the cross-country marathon promoted by C. C. Pyle. Just what that was planned to prove, or just what relationship it might have to the general subject of health has not yet become apparent. One of the difficulties with the whole physical culture and athletic movement has been the creation of out-door fanatics, marathon runners, hundred-mile pedestrians and similar enthusiasts who believe that the road to health lies in the exceptional performance rather than in well-conducted and suitably regulated physical activities.

No doubt, the one-hundred-mile walker is a healthful person or he could not walk a hundred miles, but the average man has little occasion to walk one

hundred miles and does not need the hundred mile equipment.

Man, like other domesticated animals, did not always live in-doors. Modern investigations indicate that a certain amount of time out-doors is beneficial to health. But out-door exercise to the point of overfatigue, of irritating sun-burn, or of undue exposure to the elements is likely to do as much harm as good.

Various authorities have suggested the amounts of muscular activity desirable for persons of various ages. Hetherington of the University of California suggested four hours of muscular activity at the age of five years, five hours from seven to nine, six hours from nine to eleven, five hours from eleven to thirteen, four hours from thirteen to sixteen, three hours from sixteen to eighteen, and two hours daily from eighteen to twenty as the proper amounts. Williams states that one hour should be given daily to activities involving the use of the large muscles of the body after twenty years of age, and that anything less than that will re-

sult in physical deterioration. Man should not live for the muscles alone. Think of Sandow! Think even of Bernarr Macfadden! But maybe some people want to be Sandows or Macfaddens.

Exercise has the value for the young of stimulating body growth. Swimming, walking, golf, horseback riding, fishing, and gardening are forms of exercise suitable to all ages. Competitive sports are available and useful up to the age of thirty years, but serious overactivity after thirty years of age may do more damage than good. Calisthenics, daily dozens, and similar exercises are valuable within limitations, but our tendency is to become exercise fanatics if we do not become fanatics about something else. There is no royal road to health by means of any daily dozen, or any other exercise formula promoted by some former trainer of prize-fighters with the aid of good advertising agencies. The chief advantages of exercise are that the body's general chemistry and physiology are stimulated, the circulation is aided and

the elimination encouraged. There are no magical formulas in exercise that will guarantee freedom from disease or the presence of what is commonly called "pep," vim, vigor, and vitality. The latter characteristics seem to be just as much a part of the mental disposition as of the physical state.

The big attraction in the field of exercise for every one over college age at this time is golf. Courses appear as if by magic on the outskirts of even the smallest towns. Every Saturday afternoon and Sunday father puts on his short pants and hies himself to the pastures where the gutta percha pellet is pursued hither and thither and mostly thither. Every year fifty or sixty veterans drop dead of heart disease through overstrain in this mild form of exercise, but the casualty list is slight compared with that of motor cars upon the roads. Millions of tempers are lost in bunkers and sand-traps but the first good drive or putt brings that smile of contentment that even the worst of golfers may enjoy occasionally. Doctors take their golf seri-

ously. Many a physician nowadays prescribes golf for his patients. There is much to be said of the game as to its health-giving qualities. It provides muscular activity, sunlight, out-door air, co-ordination of muscle action and of the special senses, healthful perspiration and many other important factors. As with every other sport, it cannot be played successfully when the player is fatigued either in mind or body. When we are very tired we become irritable and slightly unbalanced. When the golf player gets too tired he "blows up."

As mankind turns more and more to out-door sports, physiologists and physicians give increasing attention to the action of the heart. The heart is but one of the organs of the human body, however, and any change that affects the rest of the body is likely to affect the heart at the same time. When unusual demands are placed upon the heart, it will, like other organs, enlarge to accommodate those demands. A severe sudden effort thrown suddenly upon the heart unused to work may result in sudden

acute enlargement. The hearts of persons of ordinary body build, indulging in ordinary amounts of exercise have not been found by investigators to be enlarged over those of persons who do not exercise but rather to have somewhat better functional capacity. In other words, exercise for pleasure does not cause enlargement of the heart, but on the contrary produces a strengthening of the whole organism. Competitive athletics, however, provide a different observation. Oarsmen, swimmers, and marathon runners are found to have hearts enlarged beyond the normal. Skiers and bicycle racers have hearts that are even larger. Football players and boxers show relatively little change in the heart and fencers apparently none.

After all what does the average person accomplish by his exercise? The physiologists have found that a healthful man, with well-developed muscles, who is working very hard, can sustain an average output of about one-tenth horse power for eight or ten hours. If he works himself up to an output of two-

tenths horse power, he is exhausted in two or three hours. Expert rowers in racing shells can work up to five-tenths or six-tenths horse power, but they are all through after twenty minutes. A Ford car or any kind of motor gets far more done with less wear and tear on the machine than occurs with the human machine. For ten to fifteen seconds, the amount of time required for a hundred yard dash, a human being can develop, according to Haggard, as much as three to three and a half horse power. But what of it? Any kind of an automobile engine does better than twenty horse power.

One of the chief uses of exercise to-day is to aid reduction. Correct diet and exercise, adapted to individual needs, will aid health and life, but too strenuous exercise, particularly when accompanied by wrong diet, will destroy health and wreck mental efficiency. The worst thing about exercising to reduce is that exercise stimulates the appetite tremendously and following this a restriction of the diet becomes torture. Sooner or later the exer-

cising becomes monotonous or difficult, but the habit of hearty eating is ingrained and continues long after the exercising is given up. That is what physicians call a vicious circle.

Perhaps the most interesting information available in connection with the whole subject has been evolved by the eminent British physiologist A. V. Hill. In many track events and other athletic performances the ability to win is not a matter of muscle strength but rather of muscle sense. This means correct timing, skilled performance and vital capacity. The practiced pitcher can throw almost as well with his eyes shut. A practiced rifle or revolver shot can aim without sighting. A good mile runner can tell you the time it takes him to run his first lap without looking at his watch. Skill is thus an essential part of accomplishment, and when associated with endurance means success. Hill points out that one cannot be a good runner unless he can expend energy rapidly, and the reason that women cannot run as fast as men

is simply that they cannot exert the same amount of force and energy.

The chief value of exercise is general stimulation of all body activities. Carried to excess exercise results in dangerous overstimulation. Muscle activity produces fatigue poisons. The average man thinks he has exercised well when he is terribly fatigued, stiff and sore after his efforts. Williams points out that "that exercise is most scientific which produces increasing amounts of fatigue substances, causing increased resistance to fatigue, but at no time resulting in soreness or stiffness."

If a muscle is taken from the body and stimulated once every second its contractions will become slower and slower, and weaker and weaker. In a few minutes it will be unable to contract at all.

If these contractions are traced and recorded one above the other the curve of contractions at first is tall and narrow. As the muscle becomes tired the contractions get weaker and slower, until finally the muscle simply will not move at all.

The first effect of the fatigue is a slowing of the contraction rather than a weakening. Those who have run long races know that near the end of the race the legs do not seem to be weak but they simply will not move as fast as we want them to move.

If the blood supply is cut off from the one set of leg muscles and permitted to go on in the other set, and if the muscles are then stimulated, the muscles without blood become fatigued much more quickly than those that are receiving blood. In fact, the muscles without blood seem to become paralyzed in a few minutes.

The experiment can be tried in a simple way by comparing two kinds of exercise. If you chin yourself on a bar your muscles become unable to respond in a few minutes in the chinning exercise because the bending and swelling presses on the blood vessels and interferes with the blood supply.

However, if the limbs are moving freely and the blood circulates easily through them, violent exercise such as

swinging Indian clubs, using the weights, or gymnastics may be indulged in for a long time.

The important factor in this connection is oxygen. The muscles have in themselves enough food material to take care of that used up by work. It has been suggested that the flow of blood carries away poisons that are developed by the muscles in their work. No doubt, poisons are carried away. But the crucial experiment may be made of letting two muscles work, one with oxygen and one without. The one without oxygen wears out in a few minutes. The one with oxygen goes on working for a long time. When both are completely fatigued they are allowed to rest. After the rest the one that had oxygen recovers and works again. The muscle that had no oxygen fails to recover; it does not contract again.

As explained by Dr. A. V. Hill, Nobel prize winner in medicine, and Foulerton, professor of the Royal Society, a good runner of the sprint distances, going at full speed, would need more than 30

quarts of oxygen per minute if he were required to continue the speed of the 100-yard dash for a long time.

It has been found by measurement that a man's heart and lungs can supply him with about one-seventh of that amount, so that he cannot go on at such a high speed for more than a fraction of a minute. He gets tired and acquires what the physiologists call an "oxygen debt." The tiredness is due to the appearance of a substance called lactic acid in the muscle fibers.

A muscle is a mixture of chemical substances. When we eat muscle we take into our bodies protein which is made up of carbon, hydrogen, nitrogen, oxygen, and traces of other elements. The muscles also store up glycogen, the fuel that they use for activity and one which breaks down into sugars in the process of usage.

The glycogen is broken up into sugars by the action of the muscle and it is restored to the muscle through sugars brought by the blood from the liver, or

from the intestines. Lactic acid appears in the muscle during work.

As much as one ounce of lactic acid appears when a man runs a hundred yards as fast as he can. Fatigue of a muscle occurs mainly due to the formation of the lactic acid. The purpose of the oxygen is to remove the lactic acid.

Now there are some of the scientific factors associated with getting tired physically. The fatigue that occurs in industry and in the world generally may also involve the matter of getting tired mentally. The two things are intimately related.

Emotional factors play a considerable part in fatigue. Under certain emotions the glands secrete unusual amounts of substances that have the power of stimulation. Some of these substances have the ability to modify the chemistry associated with the use of sugar by the body. The sensation of fatigue is partly a feeling of heaviness in the limbs and chest due to a slower flow of blood and dilation of the blood vessels. The accumulation of the

lactic acid that has been mentioned gives this sensation, but it is not to be regarded as a fatigue poison, as some romantic writers on medicine have called it.

When a person becomes fatigued his body reacts in various ways. His mental and physical efficiency are interfered with. He is more likely to suffer injury or accident because of lessened watchfulness. Some investigations have shown that he is more susceptible to becoming infected at such time, whereas other experiments on animals indicated increased resistance in certain species. Clerical workers are more likely to make errors late in the day when they become fatigued.

Studies reported to the British Medical Association last year indicated that fatigue affects individual output, efficiency, and sickness. The influence of atmospheric conditions is striking. Output in factories without ventilation systems fell off as much as 13 per cent during the hot summer months, whereas in the best ventilated factories production decreased only 3 per cent in the same period.

In the iron and steel industry, those who did the hottest and heaviest work lost by sickness 23 per cent more time than the average, whereas those who worked at ordinary temperatures suffered a time loss 9 per cent less than the average. Accident frequency apparently obeyed the same law, for, in a coal mine the accident rate among those working at a temperature of 74 F. was 52 per cent greater than that among other miners who worked in an atmosphere at 62 F.

Machine work, distribution and specialization of jobs, and increased speed tend to bring about a second type of fatigue, due to the monotony. Because the modern worker deals only with one process, the range of difficulty is limited; in a short time there are no surprises, and his own contribution to a piece of work is overlaid at a later stage by the labors of other people. When monotony becomes more intense, the person may develop exhaustion of his nervous system and become exhausted sooner.

The physiologists who have studied the problem of fatigue have made a signifi-

cant contribution to the means for overcoming it. What the worker wants to do is to get as much done in a given time as possible, and at the same time to get it done with the least expenditure of energy. The using up of energy leads to fatigue, and continued fatigue, as has been pointed out, means ill health, inefficiency, and discontent.

All sorts of panaceas for pep, punch and vitality have been offered with the claim that they overcome fatigue or prevent its development. Actually there is little or nothing that can be taken out of a bottle that will prevent fatigue.

Alcohol gives an impression of well-being that may cause the worker to put on more effort, but that is merely whipping up a tired horse. The same is true of coffee, which contains the drug caffein that has the power to speed up the brain.

During the World War, reports were circulated regarding the promotion of muscular activity and the prevention of fatigue in both man and animals through the giving of sodium phosphate. Patent medicines based on this substance have

appeared both in Germany and in this country. The investigations made by the United States Public Health Service showed that the only beneficial effect was the feeling of well-being that resulted from stimulation of the intestinal tract and the elimination of body wastes.

The endurance of a man is governed by two things: the greater the income of oxygen during exercise, the longer a man can go on, and the more severe exercise he can undertake. The greater the oxygen debt he can carry, the longer will he be able to keep up a certain effort.

The amount of oxygen that a man can take in depends naturally on the size of the man, on the capacity of his lungs, and on the rate at which his heart can force the blood around. Apparently the limit of intake that the heart can handle is about four quarts of oxygen per minute. A man who can take in four quarts of oxygen a minute when breathing air can take in six quarts of oxygen when he breathes a mixture that is one-half oxygen. Hill asserts that a man who could run a mile in 4 minutes and 15 seconds

breathing air could do it under 4 minutes breathing oxygen.

This assertion is figured mathematically from a knowledge of the average capacity of human lungs and from the ability of a normal heart to circulate blood purified with oxygen. The figures have never been verified by actual experiment because the necessary oxygen would cost \$500 and a special tunnel to contain it would have to be built for the runner.

CHAPTER IV

DIGESTION AND INDIGESTION

MODERN medicine gives more attention to diet than to almost any other single factor in the control of the human body. The appetite is a fairly good guide to the time when eating should be indulged in and the quantity to be taken. It is a good rule to stop just short of satisfaction. An epicure or gourmand is hardly likely to stop at this point.

A good set of teeth permits complete chewing without "fletcherized" concentration on the number of bites or movements of the jaw, which is likely to interfere with digestion. Lumps of food should not be swallowed, and that means that food should not be taken in haste. The saliva should be thoroughly mixed with the food, since it contains valuable digestive ferments.

Overeating means that more food will be taken than can easily be digested, that extra weight will be carried, and that the organs will be given more work to do

than they can reasonably handle. Their response is to develop disorders.

Eating may be developed into a habit so that one becomes hungry at definite hours and so that sufficient time will elapse between meals to permit complete digestion of the food that is taken. Some foods require four or five hours for digestion. It is obviously undesirable to pour in new materials while the old are in process of absorption.

Americans have developed the habit of eating or drinking to relieve fatigue. When a person is tired his body needs a chance to recuperate, and it is not advisable to throw in quantities of food at such a time, neither is it desirable to overstimulate the body with stimulating drinks or drugs in order to overcome fatigue. At such times the body requires rest more than anything else.

Enough food should be eaten to provide energy for the daily work. The desire to eat is fundamental. The antidote to the desire to eat is the development of a feeling of fullness or satisfaction.

Hunger manifests itself by contrac-

tions of the stomach with hunger pains. The sense of fullness, which is the opposite of the sense of hunger, is secured when food is in the stomach.

Some foods make greater demands than others on the digestive organs. Some remain for long periods and others only for a short time within the stomach. Some foods cause the stomach to secrete large amounts of digestive juices, whereas others require but little. A full stomach empties rather slowly, whereas emptiness of the stomach brings about stronger and more regular contractions.

It has been found that protein foods require more digestive juice than do those that are chiefly composed of carbohydrate or sugar. Bread will pass from the stomach within an hour and a half, whereas a combination of bread and meat will require two or three times as long before it passes from the stomach.

The degree to which food brings about a feeling of fullness or satisfaction depends on the rate at which it leaves the stomach. Therefore, meat keeps the sensation of appetite satisfied longer; after

meat, fat and such mixtures of fat and proteins as is represented by cheese brings about a feeling of satisfaction. The substances that stay in the stomach for the shortest intervals are cereals and starchy foods.

In picking a diet one is not, however, chiefly concerned with the amount of time that the food will stay in the stomach. A satisfactory diet contains certain amounts of proteins, carbohydrates, fats, mineral salts, or the vitamins that are essential for proper body growth and body repair.

The sophistication of food substances seems to be pointing toward that time so much exploited by the wagsmiths, when a whole meal will be taken in a tablet. More and more we are inclining toward meat, eggs, sugars and fats, and less and less toward vegetables, fruits and bulkier foods.

The ordinary time required for food to be digested and pass through the body is from two and one-half to four days. If the food passes through too rapidly the

body does not absorb properly the qualities that it should get from the food.

Physicians analyze various food substances in relation to the amount of indigestible residue that they contain. The grains or cereals and the fine, white flours have had most of the indigestible residues removed. They are almost completely digested and absorbed.

Meats, including fowl, fish and shell fish are almost completely digested. It is found that dogs fed almost wholly on meat may have only one excretion in five days. The animals chew bones with their meat and thus obtain indigestible residue. Eggs, milk sugars and fats are also almost completely digested and absorbed.

The lack of sufficient bulk in the diet and the abuse of the use of cathartics are believed to be responsible for many of our difficulties of digestion. A normal amount of bulk will help the process and will not give rise to the irritative disorders that result from the abuse of cathartics.

A person who eats the proper food in proper amounts and who has regulated

his intestinal action will have one normal bowel action daily without any artificial assistance.

Persons who complain of a sour taste in the mouth and of the eructation of sour material are likely to think that they have what is called acid stomach.

The scientific name is hyperacidity, which merely means too much acid. The diagnosis usually refers to symptoms that include a burning feeling in the region of the stomach that comes on after eating.

Associated with this there may be nausea with perhaps the belching of gas and of acid fluid. In most instances, physicians find there is seldom a real excess of acid in the stomach.

Sometimes the difficulty lies in the manner in which the stomach attempts to dispose of the material that it contains, so that the juices of the stomach, which are normally acid, are carried back to a part of the stomach in which they should not be. In other words, the disturbance is one of the motion of the stomach rather than of the nature of its secretions.

Associated with this disturbance, there

may be a constriction or cramping of the passage from the stomach to the intestines. This constriction may be the result of an infection, such as an ulcer or of some other serious condition which can, of course, be determined only by a careful examination.

This examination sometimes includes the taking of a mixture of milk and other substances which make the stomach opaque to the X-ray and permit the physician to watch its activities while in motion.

Fortunately only two out of about every twenty persons given a careful examination for symptoms of this type are found to have a serious condition of the stomach. In most instances the treatment is dietetic and results in early relief.

The symptoms of hyperacidity are signals of trouble which should be investigated carefully. Sometimes the trouble is constipation; sometimes the difficulty is in the gall bladder; sometimes the symptoms occur from appendicitis or inflammation of the intestines elsewhere.

When a fire bell rings, the fireman does

not pour water on the fire bell; he recognizes the signal and goes where there is fire. When acid eructations occur, the difficulty is not always with the acid.

Business men say that they suffer with "nervous stomach." Physicians who specialize in diseases of the stomach and intestines are constantly the recipients of the sad stories of patients who claim that they are unable to retain any food, that they have lost their appetites, that the whole idea of eating makes them tired, and that the world is no good, anyway.

Dr. Walter C. Alvarez says that these patients have usually been overworking and losing a great deal of sleep, that they have been eating sophisticated foods and mistreating their entire bodies generally.

The first important step in such cases is to find out the details of the patient's life—his possible worries, domestic conflicts or other troubles that are disturbing his mind.

It does no good to tell such a person that he should stop worrying. Until the cause of his worry is removed, he is likely to keep right at it.

As Dr. Alvarez says: "Particularly difficult to deal with are the women who cannot make up their mind about getting a divorce, and those who lead a cat-and-dog existence with their husbands, but who are chained to them by love for their children."

Wrangling at meal time is specially detrimental to the digestion, and Alvarez cites the Biblical test: "Better is a dry morsel and quietness therewith than a house full of feasting with strife."

Frequently the patient is relieved merely by telling his troubles to another person.

If the person will take his gastro-intestinal trouble for what it is and decide to get all the happiness he can out of life, regardless of his digestion, he will make a remarkable improvement.

Of greatest importance also is the establishment of a routine of life that will save energy and use up a minimum amount of nervous strength.

As Dr. Alvarez says: "Women in particular must be exhorted to break themselves of the habit of getting all stirred up

over little things and of reviewing at great length painful or annoying experiences which a more sensible person would promptly forget."

Some years ago the word "dyspepsia" was one to conjure with. It was the great American disease, now transferred into the possibly more scientific term "nervous indigestion."

In several considerations of this condition, it has been pointed out there is a tendency to overdo the use of bran and that nowadays one of the simplest ways of helping dyspeptic patients is to take away their bran mush and muffins. Bran is used because of its indigestibility, and is prescribed for persons who need roughage in the diet. People with irritable digestive organs, however, are likely to be upset by the use of bran, and to suffer with gas distention and other symptoms.

Some people require smooth, soft diets and cannot tolerate roughage. Persons with irritable bowels should eat no coarse foods containing fiber, skins, seeds or gristle. They must avoid salads with celery, tomatoes, cucumbers and pine-

apple; they must avoid green vegetables, raisins, berries and jams containing many seeds. If they suffer unduly with gas, they must eliminate from their diets beans, cabbage, onions, green or red peppers, melons, cucumbers and peanuts. Chewing gum is useful for cleansing the mouth and exercising the jaws, but some people swallow air with the saliva and suffer later with gas distention.

Among the items suggested for soft diet are a breakfast including orange juice or grapefruit; coffee, if desired, in moderation, or else chocolate, cocoa or tea; eggs with ham or bacon, avoiding the tough parts of the bacon, bread or toast with butter, and any smooth mush. Graham bread is permitted, but not coarse, whole-wheat bread.

For lunch or dinner, Alvarez suggests fruit, avoiding the fiber of the fruit, broths, cream soups and chowder, and meat, fish or chicken, avoiding the fibrous parts and the gristle. Smoked fish, pork, crab and lobster are delicate experiments, and had better be let alone. Oysters may be tried occasionally.

Such vegetables as rice, potatoes, sweet potatoes, stewed tomatoes, well-cooked cauliflower tips, asparagus tips and others, freed from fiber, may be tried. Salads may contain tender lettuce with apples or bananas, tomato jelly or boiled eggs. Desserts may consist of simple puddings, custard, ice cream, gelatin, plain cake and canned or stewed fruits, particularly pears and peaches.

In cases of constipation, stewed fruit is to be taken once or twice a day. Prunes are the most laxative of fruits and may be eaten every morning. They should be cooked slowly until they become quite soft and the skin, if tough, should be discarded.

Of all of the terms most misused by the public in relation to medicine, "indigestion" may take the lead, unless "bilious" supersedes it. The term "dyspepsia" is well up in the same list.

The term "indigestion" is used when the condition concerned may be an ulcer of the stomach, and inflammation of the gall bladder, chronic constipation, psychoasthenia, hysteria or any one of a

number of other complaints. Newspapers also frequently carry a statement that some individual has died of acute indigestion. No patient dies of acute indigestion.

The appearance of sudden cramp in the stomach, or of vomitings, or of high fever should be the reason for a careful investigation. An analysis of newspaper accounts of fatal cases of acute indigestion indicates usually that the person has had a sudden and severe pain over the stomach, has turned pale and sometimes fainted. Usually it is a man over 40 years of age, somewhat fat, who has had difficulties with his heart at one time or another. The attack concerned is sometimes an attack of heart disease and the investigation must be made in this direction.

The conditions described as chronic indigestion are more often inflammations of the gall bladder, but occasionally ulcer of the stomach or chronic appendicitis. After a careful study is made with modern scientific methods it is found that 90 per cent of these cases may be ascribed

to one or the other of the conditions mentioned.

Unfortunately, the person with these symptoms usually attempts to treat himself with laxatives or by eating of health foods or peculiar diets of one kind or another, and the condition tends to become more and more chronic. It is a wise rule to find out as nearly as possible exactly what is the matter before undertaking any kind of medical treatment.

When the tired business man leaves the quick lunch counter on a busy day and returns to his office he sometimes begins to complain of stomach ache an hour or so later. He may belch either air or the gastric juice from the stomach; he may feel distended, and sometimes he complains of pain in the region of the stomach and of dizziness.

Usually a friend in the office recommends to him that he get some soda at the nearest drug counter and that this will give him relief. Sometimes it does and thereupon soda becomes to him a panacea for all disorders of the stomach regardless of their cause.

Not infrequently the symptoms complained of are simply the result of eating too rapidly and swallowing a great deal of air in the process.

Digestion of food in the stomach does not proceed without the presence of a certain amount of acid. If sodium bicarbonate is used in large amounts it either stops digestion entirely or forces the membranes of the stomach to give off even more acid in an attempt to neutralize the alkaline soda. Besides much of the soda may be taken up by the blood and given off through the kidneys, placing an unusual burden on these organs.

In the case of any disability associated with the digestion of food and accompanied by severe symptoms the patient will do better to find out whether the disability is actual or only the result of bad eating habits.

A physician who investigates such a case will examine the secretions of the stomach as to the amount of acid they contain and will determine whether or not the acids need neutralization. He will also study the movement of the

stomach to determine if it is passing the food along properly.

Since the symptoms referred to are not infrequently the first signs of an erosion of the stomach wall, leading perhaps to gastric ulcer or to more serious conditions, the patient will do better to place his reliance on diagnosis than on too frequent doses of baking soda.

Eat just enough food to satisfy the body's needs. Investigators have estimated that a man at hard muscular work requires 4,150 calories; a moderate worker, 3,400; a desk worker, 2,700; the person of leisure, 2,450 calories a day. A child under 1 year requires about 45 calories per pound of body weight, or about 900 calories per day.

The number is reduced from the age of 6 to 13 to about 35 calories per pound, or 2,700 per day. From 18 to 25 years, it is still further reduced to about 25 calories per pound, or 3,800 per day.

At 30 years one may have 2,750 calories per day if he weighs about 152 pounds; at 40 years, 2,500 for a weight of 154 pounds; at 60 years, 2,300 calories for a

weight of 150 pounds; at 70 years, 2,000 calories for 134 pounds, and at 80 years, 1,750 calories for a weight of 139 pounds.

These figures indicate the importance of calories to sustain body loss during the time of greatest energy, the gradual reduction of food intake with increasing age, and the importance of the reducing of weight after 40 years of age in relation to longevity. Of this more will be said later.

Nevertheless, at every age the human being requires a certain amount of food to sustain his physical mechanism. An occasional starvation may be worth while in relation to disease, but long continued fasts or starvation as a routine is merely a fad and should be severely discountenanced.

Among the many terms invariably misused by the public and not infrequently by the physician is "auto-intoxication."

The significance of the term lies in the belief that it is possible for a human being to suffer serious symptoms as a result of absorbing poisons developed in his own

body. These poisons develop presumably in the intestines as the result of the putrefaction of food, due to the fact that the intestinal tract is full of the wrong kind of bacteria.

According to Metchnikoff, the celebrated Russian-French investigator, the human being comes into the world with his intestines free from germs, and harmful microbes enter promptly into his system.

It was Metchnikoff's belief that these microbes might be overcome or combated by favorable microbes that could be implanted in their place. The favorable microbes originally proposed were known as Bulgarian bacilli.

More recently it is the acidophilus organism that is urged for the purpose and preparations of milk containing this organism are to be had on prescription by physicians, at soda fountains, or directly from milk concerns.

Much of the condition known as auto-intoxication is due to the American habits of living. The patient who gets up in the morning feeling tired complains of his

work as irksome, apparently ages rapidly and disregards all general hygiene, is likely to feel that he is suffering from auto-intoxication.

He begins his day with a breakfast of sausage and hot wheat cakes, sometimes supplemented by steak and fried potatoes, and washes this down with several cups of strong coffee.

He sits all of the forenoon in a chair smoking anywhere from 20 to 50 cigarettes or three cigars. His elimination is poor and it is not surprising that he has a dull, listless or irritable temperament during the attempts of his overloaded intestinal tract to get rid of the accumulation.

Much of the treatment of so-called auto-intoxication involves, therefore, a proper regulation of the diet, which results chiefly in cutting down the quantity of food taken and in the addition of fresh fruits, fresh vegetables and other substances with a markedly laxative action.

The modern physician is rather intolerant of attempts to control disturbances of

the stomach and intestines by the regular use of patented laxatives and cathartics.

Many a person has developed a cathartic habit by attempting to control temporary attacks of slow action of the bowels by the ready-made preparations that may be had through the drug stores.

A person who suffers with irregularity should add to his diet a larger quantity than normal of fluids in the form of water or of buttermilk. Tea should be avoided because it contains tannic acid, which may by its astringent action counteract the good effect of the large quantity of liquids. The fluids should be taken not only at meals but in the intervals.

The diet in such cases should contain as large an amount of fat as the patient can take without much disturbance. The amount of vegetables that contain quantities of fibrous tissue should be increased. Such vegetables include spinach, peas, cauliflower, cabbage, asparagus, onions, celery and tomatoes.

It is possible, however, easily to carry to extremes the eating of indigestible sub-

stitutes that add bulk to the diet. If such masses accumulate in the bowels the effect is not favorable.

It has been estimated that the average American consumption of cathartics represents a total purchase of over \$50,000,000 a year. These include not only the irritant pills but also the salts of various types and the synthetic preparations.

Among the relatively harmless substances now taken by the public because they may be kept in the family medicine chest without much danger are mineral oil, which is apparently not damaging to the stomach and intestinal walls and which aids the easy passage of material, and the substance known as agar-agar, a Japanese seaweed. This substance has power of absorbing water, forming a bulky mass in the intestines, distending them and stimulating their movement.

CHAPTER V

FOOD FADS AND FALLACIES

NEVER was there a proverb less proverbial than the old saw, "Tell me what you eat and I will tell you what you are." The fanatics who subsist largely on hay, grain and oats are not all either thoroughbreds or jackasses. With national consolidation of concerns dealing in food products and with nation-wide campaigns for food specialties, the public is admonished at every turn to eat more meat, more raisins, or more yeast to combat acidosis, halitosis, bromidrosis and several other "osises." The vegetarians who attach undue harm to the eating of meat base their conclusions on the fact that the apes live on nuts, fruits and cereals. The monkeys have, however, other habits not quite appealing to homo sapiens, or even as Mr. Mencken would say, to pithecanthropus erectus. The vegetarians say that animals living on a vegetable diet are strong and tractable, while the meat-eating animals are ferocious. The most ferocious man I

ever saw was a vegetarian who discovered that he had eaten a caterpillar with his lettuce. Maybe it's true.

The sufferer from indigestion or the person disturbed by chronic attacks of inflammation of the gall bladder or of the appendix is likely to be irritable. Nevertheless, Mark Twain and some of our greatest humorists abused tobacco; Irvin Cobb has the appearance of an epicurean and some of our most efficient leaders in politics and in business are known to resort not unusually to the flowing bowl. Good case histories can be found to support various contentions. There is something more to temperament and to mentality than the eating of steaks, bran, or fish. There is not the slightest scientific evidence to support the view that the eating of wholesome quantities of any single article of diet, such as meat, bread, or any other of the fundamental foods is dangerous.

A little more than twenty-five years ago Horace Fletcher supported vigorously the view that thorough chewing of food was the fundamental factor for digestion

and good human nutrition. Like all fad-dists, however, Mr. Fletcher was not satisfied with reestablishing the simple fact that thorough chewing of food is desirable. He finally came to believe that chewing was the greatest discovery of all times and would revolutionize the world. Perhaps Mr. Wrigley and the "Spearmint Twins" have done much to prove that Horace was right. However, Mr. Fletcher found eventually that when he chewed thoroughly he ate less than previously. This fact was of the greatest importance because it established scientifically the fact that the appetite requirements of the body may be satisfied with much less food than is usually taken. The logical conclusion was not, however, the one that appealed primarily to Mr. Fletcher. He came to the view that but little food was necessary and that every food which could not be liquefied in the mouth should be avoided. The result of the application of this pronouncement was a thorough disturbance of the entire system of assimilation and digestion, the development of intoxication and general

disability. Prof. William James the great psychologist said after he tried Fletcherism for three months, "I had to give it up, it nearly killed me."

It is one of the peculiarities of genius that its possessors attempt to choose for themselves in fields of knowledge not at all related to the things they know; having chosen such peculiarities they adhere to them religiously. A second peculiarity is the desire of every faddist to convince every person with whom he comes in contact that his special notion will do wonders for them. It is not reported that Nebuchadnezzar ordered all of his subjects to consume grass, but the Emperor Augustus, devoted in his old age to crusts of dry bread, and Seneca, also an apostle of the dry bread diet, took the pains to record for posterity their addictions to this unappetizing food.

No doubt, the ethnologists could trace for us to the fullest satisfaction a definite relationship between the avoidance of meat and religious worship. It has been suggested that the Jews avoid pork because of original reverence of the animal

that makes the bacon. Possibly the Christian reaction against the fatted calf was the result of the extreme popularity of meat among the heathen Romans. Certainly, the early Christians avoided any meat that had been dedicated to heathen gods. The Seventh-day Adventists, the Trappist order of the Roman Catholic Church and the Dadupanthi Sagus of the Hindu group practice strict abstinence from meat. Indeed, it is difficult to find a single peculiar religious sect without certain dietary attributes, a condition easy to understand philosophically because the practice of such abstentions keeps the religious cult constantly in the mind and in the emotions of the observer. It is a question whether any religious cult could achieve complete success without emphasis on either food or sex. Bronson Alcott, founder of New Thought, also promoted a diet without flesh. Thus Alcott wrote:

“Our diet is therefore strictly the pure and bloodless kind. No animal substances, neither flesh, butter, cheese, eggs, nor milk, pollute our table or

corrupt our bodies, neither tea, coffee, molasses, nor rice, tempts us beyond the bounds of indigenous productions. Our sole beverage is pure fountain water. The native grains, fruits, herbs, and roots, dressed with the utmost cleanliness and regard to their purpose of edifying a healthful body, furnish the pleasantest reflections and in the greatest variety requisite to the supply of the various organs. The field, the orchard, the garden, in their bounteous products of wheat, rye, barley, maize, oats, buckwheat, apples, pears, peaches, plums, cherries, currants, berries, potatoes, peas, beans, beets, carrots, melons, and other vines, yield an ample store for human nutrition, without dependence on foreign climes, or the degeneration of shipping and trade. The almost inexhaustible variety of the several stages and sorts of vegetable growth, and the several modes of preparation, are a full answer to the question which is often put by those who have never ventured into the region of a pure and chaste diet: 'If you give up flesh meat, upon what then can you live?'"

No doubt, the practice of vegetarianism as a part of religious belief leads to greater humility of spirit, self-denial, and perhaps increased will power. It is supported, however, in modern times, by pseudo-scientific argument which lends strength to its practitioners. Thus symbolism is called on to compare the eating of steak to the drinking of blood. The monkeys do not really live on a meatless diet, since they have been observed searching assiduously for insects which they chew with signs of extreme enjoyment. Meat is attacked for its content of germs and parasites, although every one knows that suitable meat inspection and complete cooking make meat as safe as any food that man can take.

Some years ago medicine was addicted to a theory known as uric acid hypothesis, which held that certain food substances gave the body an oversupply of uric acid and that good health could not be had in the presence of this substance. To-day it is known that uric acid is a by-product of the body's metabolism and that the normal person is not likely to be inconven-

ienced by its development as a result of the eating of foods rich in purines, the products that lead to the formation of uric acid. The comical factor is the realization that many of the vegetables eaten ad libitum by vegetarians are also rich in purines.

The unfortunate lack of accurate statistics as to the amount of sickness and the length of life of non-meat eaters as compared with meat eaters prevents any final statement on the subject. However, a general survey by those who are constantly in contact with persons of both types inclines to the opinion that meat eaters in general live just about as long as those who refrain from roast beef, veal chops, baked ham and crisp bacon. Furthermore, the meat eaters make better company and have something resembling a sense of humor. The absence of the latter from faddists of all types is their greatest weakness.

Recently scientific medicine has offered to the world several remarkable discoveries, an extract of liver which cures pernicious anemia and an extract of the

pancreas—insulin—which makes it possible for the diabetic to lead a healthful and useful existence. The vegetarian who suffers with either of the complaints mentioned does not hesitate to avail himself of these two extracts of meat which offer him the choice between life and death.

The second group of faddists visible in largest numbers on the American scene are the white bread fanatics, possibly exceeded by those who believe that a cold bath every morning keeps them healthful. I doubt whether they are as obnoxious. A cold bath enthusiast in any office is a menace to the sanity of his associates. But let us keep in mind the food faddists—there are so many peculiar people. Linked with the campaign for and against white bread are tremendous commercial interests. Whenever a food faddist casts about in these modern times for something on which to base his campaign, he is likely to seize on cancer, the most terrible of all diseases of unknown origin. The vegetarians argue that cancer is more prevalent among civilized

people than savages, that civilized people eat more meat, hence meat must be the cause of cancer. Opponents of white bread likewise argue that white bread is a civilized food, and hence, must be the cause of cancer. In the first place, the evidence is not at all satisfactory that savages suffer less with cancer than do the civilized population. It must be remembered that cancer is essentially a disease of advanced age and that savages seldom live to advanced ages. Physicians who have studied the conditions report the presence of cancer in many atavistic populations. Good evidence is available of some relationship between heredity and cancer and it is reasonable to believe that the application of the modern science of public health to the savages will insure to them longer life, more cancer, and continually increasing cancer as they live longer and propagate more freely. The argument that meat eating is the cause of cancer has also been applied to white bread in the post hoc propter hoc form of debate. One might equally point out that automobiles are the cause of cancer,

since their increase has taken place coincidentally with the apparent increase of cancer among civilized people. Some years ago the view was promoted that most of the ills of mankind are caused by stagnation in the intestinal tract and constipation. Associated with this conception was the terrible word "auto-intoxication," still the keyword of dozens of American exploiters of food notions. Whole wheat was urged to relieve constipation.

Among the chief exponents of this view was a foreign publicist who asserted that the eating of white bread and of our modern diet is the cause of cancer. As has been pointed out, the majority of scientific evidence indicates that those who live on a less sophisticated diet suffer just as frequently. There is not an iota of proof that the eating of white bread or of any other kind of bread will cause cancer, and not the slightest reason to believe that the use of whole wheat will in any way prevent it.

The "eat more" fads have to do with specialization on raisins and on similar

products for iron, with yeast which is presumably a laxative food, with oranges to counteract acidosis, and with potatoes, celery, pineapple, lettuce, or anything else that some coöperative food growers' association may happen to wish to exploit. A certain amount of iron is necessary to the human system, but iron is found in many foods which are regular constituents of the average diet. There is no need for any one to put a vast amount of the indigestible residue associated with raisins into his system in order to get a sufficient amount of iron for the body needs. Calcium is found in lettuce and in milk and also in many of the leafy vegetables. There is no need to eat vast quantities of anything in order to get sufficient calcium. Yeast contains vitamin B as its primary constituent. It is also slightly laxative. However, vitamin B is also found in lettuce and in the leafy vegetables, including cabbage, as well as in wheat germ, hence the vitamin B needs of the body may be satisfied without recourse to and without the laxative effects of yeast. Yeast will not grow hair on

bald heads, grow new teeth, remove pimples, blackheads, and similar embellishments from a dirty face, or permit octogenarians to put their young ideas into practical effect.

The Americans are a constipated people. When it was discovered that the great majority of our citizens suffered with this complaint, bran became a panacea for all intestinal disturbances. Bran is used because some roughage is necessary to permit the intestines to exercise and function satisfactorily. Any food with indigestible fiber or cellulose will provide roughage. Celery, lettuce, cabbage, and similar products will meet the need. Some men and women are helped by roughage and their intestines are not injured, if they happen to have the digestion of an ostrich. If, however, their intestines are defective in structure, if they have ulcers of the stomach or duodenum, or narrow places due to the healing of previous ulcers, they will promptly get into trouble by eating food that is too indigestible or too difficult to eliminate.

The most recently exploited idea has to do with the dangerous food combination theory. To this most of the commercial exploiters of dietary advice adhere with the fanaticism that is commonly bestowed on religious cults. These food fads claim that some food combinations are deficient because they leave out important substances. More frequently they urge that combinations of acid foods, such as fruits, along with starches, such as occur in bread and potatoes, are unwise because the acid will prevent the digestion of the starch. There are digestive ferments for starches released far down in the intestines. It is ridiculous to urge on any person with ordinary common sense that it would be desirable for him to eat his proteins in the form of meat about six o'clock and to wait an hour or so for this to leave the stomach before following with the starches and sugars. At least five generations of Americans have grown up on a diet consisting mainly of meat and potatoes, with sufficient stamina as an end result to con-

tribute largely to the winning of the World War.

Other faddists claim that milk and fruit acids must not be eaten together because the acids curdle the milk. I propose to fight to the last ditch for my enjoyment of strawberries and cream. Indeed, another faddist argues that orange juice must not be added to the milk of infants, whereas the specialists in diseases of children have been urging for the past ten years the vital importance of orange juice in order to add to milk sufficient vitamin C to protect the infant from scurvy.

Among the most recent contributors to the faddist field are those in the group who urge that aluminum is the cause of cancer and of dangerous disorders in the human body. Hence they attack cooking in aluminum vessels as the first step in their campaign, regardless of the fact that extensive research has revealed the utter harmlessness of this substance when taken in the quantities which might develop in food from such cooking or even from baking powders containing alum.

Another thinks colds are due to wrong eating and classes germs with magic and evil spirits. His publications are opposed to all established scientific conceptions of diet.

Extremely funny are the views of a lecturer who promotes comical notions regarding food. "People do not know," he says, "that the combining of stewed tomatoes and creamed or mashed potatoes has a strong tendency to tear up the mucous lining of the stomach and intestines, cause constipation, and a general acid or sour condition of the body, make asthma, rheumatism and other maladies possible." Neither does he know that, because it is not so. He argues that rheumatism sufferers should not eat grapefruit and that nervous people should not eat honey. As a "should-notter" he leads the field. Indeed, he does not limit himself to foods; he has devices for cleaning the intestines and he promotes a system of rhythmical breathing to insure success in love and business. It takes more than breathing for success in either.

It is impossible to leave this field of

medical folly without casting a few small pearls at the feet of the starvation fanatics. The perfect system for building up a fortune promptly is to open a sanatorium for the starvation treatment of disease in which the patients are assessed \$10 a day for board. Principally through the physical culture school of health, starvation has been advanced as a panacea for all sorts of human ailments. An occasional resting period may be helpful to the human digestive tract, but long abstinences from food place burdens upon the metabolism which are not its due. The fasting road is the way to digestive ruin. Prolonged fasting is never necessary. As a result, the intestinal tissues lose their motility, and there is a tendency to stagnation all along the intestinal tract with re-absorption of waste products. Moreover, the person who is fasting fails to have his regular intake of the necessary vitamins.

So important is food to the human economy that any prophet crying in the wilderness can assemble some followers. So irregular and fallacious are American

habits of diet that any Babbitt is willing to listen to any neighbor's suggestion as to what he should eat. So desirous of magical formula is the average citizen that he is willing to believe for a brief period that each new cure is giving him increased years and new vitality. What fools these mortals be!

CHAPTER VI

SLEEP

WHEN a person is fatigued he rests, and by the material processes of the body cells tend to recover from fatigue during the resting period. The earliest books of hygiene known to mankind recognized this factor and took it into account.

The amount of sleep necessary at various periods in life varies. Whereas the child of from 4 to 6 years of age should sleep from 7 P.M. to 7 A.M. and take a one-hour nap in the afternoon, the child from 12 to 14 may sleep from 8:30 P.M. until 7 A.M. without taking a nap.

The growing boy or girl between the ages of 14 to 18 should sleep nine or ten hours, preferably between 10 P.M. and 7 A.M., rather than between 1 A.M. and 11 A.M. The person of 18 years of age should try to sleep eight hours each night, although it is recognized that some persons are able to do with less.

Inability to sleep, or insomnia, is some-

times due to physical conditions, but is also due largely to the establishment of habits. If one has established the habit of going to sleep easily and at a regular hour and of relaxing the body systematically at the time of going to sleep, he will probably have much less trouble with insomnia than if he attempts to sleep at varying periods and indulges in constant variations of the sleeping performance.

A mind that is disturbed is not easily lulled to rest. Certain drugs, such as caffeine, have the power of lowering the threshold for stimulation of the thinking portion of the brain, and persons who are sensitive to caffeine should avoid the use of tea and coffee, particularly before going to sleep.

The scientific researches of modern years have served to confirm the opinion held by physicians for centuries that rest is a great healer of disease. During sleep the tissues of the body recuperate from the chemical changes that have been going on during work or activity.

The person who has lost sleep appears

haggard and worn and actually suffers a loss of weight, representing the actual wear and tear upon the body.

An old proverb said, concerning sleep, "Six hours for a man, seven for a woman, and eight for a fool."

The need for sleep in various people varies, and is modified in the same person by his age, temperament and the climate. Girls, especially during growth, require more sleep than boys.

A successful man is not one who spends his time in sleep, but it is a dangerous doctrine to apply this attitude to the growing child, since research has shown that insufficient sleep and sleep of inadequate quality are responsible for more absences from and failures in school than are other factors.

The quality of sleep varies greatly. Some persons have the ability to fall asleep immediately and to sleep intensely; others are restless during sleep, toss about, and are almost as tired on awakening as when they first sought the bed.

The common causes of disturbed sleep are too great activity before retiring, or

the carrying of fatigue to a point impossible to sustain. When a person is over-fatigued, he is extremely irritable and sensitive to the slightest impressions. He thus finds it difficult to fall asleep.

It therefore would seem to be desirable to have the sleeping habits of the child regular, so that he will go to bed at the same hour each day and that he will have a quiet period before his bed time. Investigations have shown also that the room in which the child sleeps should be well ventilated, the bed comfortable and far removed from noises or other external excitants.

The term insomnia implies not only inadequate sleep but also failure to obtain sound and restful sleep. Three types of insomnia are concerned: 1—Cases in which sleep is delayed in the beginning. 2—Sleep in which there are disturbing dreams. 3—Sleep which begins normally but does not continue because the sleeper awakens in the early hours of the morning and is unable to sleep again.

Disturbed sleep is not to be regarded as a disease in itself, but as a symptom of

disorder somewhere in the body. In some cases definite physical causes are found and bodily discomforts will invariably prevent satisfactory sleep. In other cases definite physical causes cannot be found and it is necessary to determine the psychological cause or the emotional state, whether anxiety, fear, or depression, which acts as a mental irritant and interrupts sleep.

Among the physical causes of disturbed sleep are pain, shortness of breath, frequent coughing, itching, high fever, disturbances of digestion, disturbance of the blood circulation and irritating poisons.

The mental cause may include an emotional disturbance such as has been mentioned, severe fatigue, obsessions, or various forms of insanity.

Overwork is seldom a cause of insomnia, but overwork is frequently associated with anxiety, irritability, or other mental reactions that may result in insomnia. In certain hysterical cases the sleeplessness does not actually occur to anywhere near the extent that the pa-

tient may claim. Such people talk constantly about how little they have slept, but a careful observation will show that actually they sleep a great deal.

When fatigue or exhaustion develops in any human being, if the fatigue is not overcome by suitable rest, the result is likely to be what is sometimes called a "nervous breakdown." In an attempt to find out what changes occur through lack of sleep, investigations recently have been made in the departments of anatomy and of pharmacology in the University of Wisconsin Medical School. Animals which went for considerable periods of time without sleep were studied as to the ultimate effects.

It was found that a lack of sleep may result in collapse and even in death, and that various animals differ greatly as to the amount of endurance without sleep. The shortest period in which any animal collapsed was seven days and the longest thirty-one days.

Previous to the breakdown there usually is a sudden fall in the tempera-

ture, a sudden rise and then a fall in the pulse rate associated also with gradual reduction in the breathing rate.

Significant changes were found to take place in the nerve cells of the spinal cord, as the result of exhaustion. The cells lose some of the material which is necessary to their life and undergo actual degenerations.

The entire nervous system is so definitely affected that the nerve cells undergo anatomical changes from which it may be difficult for them to recover.

Thus scientific evidence developed in the laboratory proves what many men have found by observation on themselves or on others. Conditions actually associated with lack of sleep result in terrific disturbance of the human system that may lead to collapse and death.

CHAPTER VII

THE HEART AND THE BLOOD VESSELS

THE heart has aroused the curiosity and interest of man to an extent equaled by hardly any other organ in the human body, unless it is the brain. The human being who is ill mentally is inclined to refer many unusual symptoms promptly to his heart. The heart has often been associated with the idea of courage, as in the phrase "faint heart never won fair lady." We are likely to speak of others as weak-hearted or stronghearted. The mass of muscle, weighing usually just under a pound, lying toward the left side of the chest cavity, has the prime duty of keeping the blood moving about the body. When the circulation stops life stops with it.

Before the time of William Harvey it was believed that the heart was the seat of the soul. Scientists thought it sent blue blood outward along the veins and red blood outward along the arteries. Later came the knowledge that the heart

sends the arterial blood outward and that it returns through the veins.

A person who suddenly has a pain in the heart or in the region of the heart is likely to become excessively frightened. Neurotic pains and pains of slight degree occurring elsewhere in the body are referred to the heart with resultant worry over the possibility of sudden death. Physicians know that all pains in the region of the heart are not necessarily due to heart disease. In cases in which the heart itself is affected, there are likely to be physical symptoms related to the accomplishment of work, to breathing and to body nutrition. A physician who makes a careful examination of the heart, listening to the sounds made by the various valves in action, making an investigation of the blood pressure, and measuring the size of the heart, both by tapping on the chest for areas of dullness, and by the use of the X-ray, learns facts of importance. He is able then to determine whether the pain associated with the disease of the heart is due to an actual physi-

cal change in its tissues or the result wholly of nerve action.

Any factor that causes unusual wear and tear on the human tissues may have a secondary effect on the tissues of the heart. These tissues are then unable to withstand the strains of ordinary life. The heart may be incapacitated from birth due to some deficiency in its development before the child is born. The most common cause of heart disease in children and in young adults is infection, particularly with the germs that attack the tonsils and adenoids. Other secondary results of such infections are rheumatism and St. Vitus' dance. While such infectious diseases as diphtheria, influenza, scarlet fever and measles may lead to unusual circulation of bacteria or poisons, and possible secondary inflammation of the heart, an attack of acute rheumatism or St. Vitus' dance or chronic attack of tonsillitis, are far more likely to be followed by or associated with heart disease. Another common cause of diseases of the heart is syphilis. This is a potent source

of disease of the whole system of blood vessels. Its presence has been associated with hardening of the arteries, inflammation of the linings of the blood vessels, the appearance of clots in the blood stream, and particularly the presence of weak spots in the blood vessel walls. These weak spots cannot stand the pressure of the blood stream and gradually give way. The resulting dilated spot in the blood vessel wall is called an aneurysm.

Old age is not infrequently associated with weakness and failure of the heart. The human body begins to wear out slowly after passing the middle milestone; changes develop in the walls of the arteries and in the pressure of the circulating blood, with resultant inequalities of nutrition and stress. These soon manifest themselves in disordered action of the heart.

It used to be thought that it was a comparatively simple matter to strain the heart and much was made of the fact that an athlete or physical laborer had overworked himself and thus brought on

heart disease. Then too it was asserted that unusual mental strain might permanently damage the organ. However, the heart has scarcely ever been proved to have been injured in such cases unless the muscle was previously weakened by infection or the results of long disease. Unless it has been weakened in this way the heart muscle is not likely to break down with any exertion that can ordinarily—or even extraordinarily—be placed upon it. In fact, the unusual exertion serves a valuable purpose in calling attention to previously unsuspected disease of the heart tissue. This indicates the importance above all things of knowing definitely that the heart is normal and able to respond to unusual burdens before attempting excessive activities. The failure to have such knowledge is responsible for the type of collapse that occurs when a heavy middle-aged man runs too hard after a street car, when a young man collapses on the fifteenth green during the third day of a golf tournament, when a débutante faints during the twentieth dance at three in the morning.

The first symptoms of a failing heart are usually either shortness of breath on slight exertion or pain in the region of the heart. However, it should be emphasized again that not all pains are heart-pains. It is a common saying in medical circles that when a patient complains of his heart the wise physician will think of his stomach. Conversely, if he complains greatly of his stomach it may be well to examine his heart.

Pains in the heart sometimes come on when the person has been subject to unusual cold. Emotional excitement alone or combined with extra physical exertion may bring on an attack of heart pain. Leaving a warm room and going out into the cold may start the pain. Worry seems to intensify heart pains.

The person who complains of palpitation of the heart is usually a woman under 50 years of age with a certain amount of disordered digestion. When the palpitations come on the patient usually exhibits great distress and may even faint away.

The physician will endeavor first to de-

termine if the tissues of the heart are normal. This he does by finding out if the heart is enlarged beyond its usual borders and if it lies in the usual position. He will listen to the sounds of the heart to see if murmurs are present, indicating that the valves of the heart do not operate efficiently. He will look for swellings of the extremities which may be taken as a sign that the heart is unable to pump the blood all the way around the circulatory system. It will also be necessary to find out how much work the heart can do without distress.

Among the methods of testing the capacity of the heart are such simple tests as hopping on one foot, running up and down stairs, lifting weights a certain number of times, or other rapid and regular movements. Examination of the heart while the patient lies absolutely still does not give an opportunity to determine how much the heart can do when its reserves are called upon, as may frequently be the case when a person runs for a street car.

Sir James Mackenzie said that the heart

would never fail if its muscle were never given more work than it could do without exhaustion.

Besides the tests mentioned, the physician is now able to study the movements of the heart by the use of a number of electrical devices of great sensitivity. These show the propulsion of the heart beat through the various parts of the organ, and are indeed so sensitive as almost to be able to record every twitch of a fiber.

When the heart tissues are found to be normal by every possible test, and the heart is able to react in a normal manner to unusual strains, the physician must determine if the usual symptoms are due to some nervous reaction. This may involve a study of all the circumstances of the patient's life to reveal whether the symptoms tend to come on in association with any particular event of the daily routine. Sometimes the cardiac neurosis is merely a part of a general neurosis.

Sir Clifford Allbutt, one of the greatest of the British authorities on heart disease, said to his pupils: "Tell a patient

with heart disease to find out what he can do and do it; tell him to find out what he cannot do and never do it."

The one hope of prolonging life in heart disease is to keep the activities within the functional capacity of the damaged organ. Persons with heart disease should avoid occupations that involve sudden effort, such as lifting heavy weights or the constant use of the arms as in swimming, in sweeping, or in hammering. In general, any exercise that the person can take without becoming short of breath or feeling pain will be good for him. The chief prescription, however, is rest, which is the first advice whenever any symptoms appear.

In order to provide rest for a weakened heart the physician will usually prescribe a diet that is low in protein material, low in sugars, limited as to fluids which make a greater quantity for the heart to push through the blood vessels, and capable of easy digestion. The person with heart disease should not overeat, because the products of digestion are an added burden in the circulation and because a full stom-

ach may, in some positions, press upward on the diaphragm and seriously affect the movements of the heart.

The physician may prescribe drugs which are sedative and serve not only to help the patient sleep but also lower the threshold of stimulation of his nervous system and thus permit the patient to respond less readily to minor irritations. A drug such as digitalis has the power to slow the heart and to regulate and strengthen its beat. All of the drugs that are used in the control of heart disease are powerful for harm as well as for good if they are not prescribed in proper doses given at the proper time. Certainly they should never be used in attempts at self-treatment.

The number of deaths from heart disease for each 100,000 persons rose steadily from 161.2 in 1901 to 202.4 in 1917 and has remained rather steadily above 175 ever since. The increase in the death rates from heart disease has given great concern to both physicians and public officials. The prevention rests in proper attention to focal infections in early life

and in proper attention to infections and to a suitable personal hygiene in middle and later life.

It is an old saying that a man is as old as his arteries. If the patient's general health is good and if he keeps regular habits, if a heart defect is compensated and has not progressed for several years, the physician is likely to promise him many additional years of life.

When the heart is affected so greatly that the person cannot keep up his usual activities, the entire body will be found to be in an exhausted condition. The proper procedure under such circumstances is to provide a diet that will not impose an excessive load on the circulation of blood, but will at the same time give sufficient nourishment for the ordinary activities.

In an attempt to determine the best possible diet for persons with heart failure, it was found that milk and carbohydrates or sugar substances should form the major portion of such a diet. A simple diet that was developed included 44 grams of protein, 110 grams of fat and

232 grams of carbohydrates, and heat energy value of 2,100 calories. Most of the diet consisted of milk, cream, butter, eggs, vegetable purees, cooked cereals and fruit juices. These things were given in small amounts.

Frequently when the heart fails there is a tendency for water from the blood to accumulate in the tissues. Under such circumstances the amount of liquid taken in is limited to about three pints a day, and the amount of salt is reduced to minimum. If it is found that the person gets along well on this beginning diet, jelly, salt-free crackers, toast and stick candy may be added to the diet on the third or fourth day. On the eighth day, if the patient still continues satisfactorily, pureed vegetables are added to the diet. The diet is kept soft in order to aid digestion, since practically all of the patients are constantly in bed, and it is only as they are improved that the energy value and the nature of the food are changed.

Patients who have failing hearts are put to bed at absolute rest. If necessary,

drugs are used to strengthen the heart beat, to aid the action of the bowels and to promote sleep. The proper use of remedies in such conditions is an indication of the manner in which medical science uses every possible advantage provided by chemistry, physics and pharmacology to give the patient a chance to recover from his disease.

Under proper treatment by diet, the excess of fluid is controlled so that water does not accumulate in the tissues and the person is provided with sufficient energy to give his own assistance toward his recovery.

CHAPTER VIII

HIGH BLOOD PRESSURE, BRIGHT'S DISEASE AND DIABETES

SINCE the development of the technical device that measures accurately the blood pressure of man, physicians have given increasing attention to departures from the normal of these measurements.

It must be understood that high blood pressure and low blood pressure are not in themselves diseases; they may, however, be manifestations of disturbances of the body tissues.

Blood pressure is usually lower in children than in adults: at the age of 3 to 10 it will average 90 to 100; between the ages of 7 to 14, approximately 98. British investigators find that the blood pressure rises gradually with age, being 85 at 5 years of age, and approximately 115 at 14 years of age.

The blood pressure of young men is approximately 120. Forty-five per cent of men examined in the University of California had pressures of 130; 22 per

cent, 140 mm. Eighty per cent of 1,000 Danish soldiers from the ages of 20 to 25 were found to have blood pressures varying from 110 to 130.

Most of the insurance experts in the United States were inclined to believe that low blood pressure, particularly in persons after 50 years of age, tended to longevity. About 3 per cent of men have blood pressure under what is supposed to be normal.

The evidence altogether indicates that there is a slow but steady rise of blood pressure from childhood onward, with a slight lowering of pressure in the early years of adult life. The blood pressure remains stationary until after the age of 40 in most instances, at which time there may be a gradual rise.

Great variations of pressure are found in various large groups of persons, and most physicians believe that heredity, which produces fixed types of blood vessel systems, is largely responsible for this factor. About 3 per cent of normal, healthy white persons have a blood pressure of 110 or less. Chinese and Filipinos

in even larger numbers have low blood pressure.

A study of the incidence of low blood pressure in relation to the presence of various diseases and various body types indicates that there are many factors that may be involved in the presence of this condition.

Blood pressure falls during sleep, paralleling the depth of the sleep. When the sleep is disturbed, there may be a sharp rise in blood pressure; when the person dreams of some active effort, the blood pressure rises. There seems to be a definite relationship between the blood pressure and the body weight. Thus persons who are obese tend to have a higher blood pressure than persons of normal weight.

The factors controlling the blood pressure are the force of the heart beat, the condition of the walls of the blood vessels, the volume and physical state of the blood, and the amount of the resistance that the blood meets while circulating through the body.

When a person takes an anesthetic his

blood pressure tends to fall. In most of the acute infectious diseases there is a fall in the blood pressure, more serious in some conditions than in others. During the height of fever the flow of the blood, particularly in the smaller blood vessels, is slower than in health. This slowing of the circulation naturally tends to diminish the blood pressure. The same is true of many of the more chronic infectious diseases in which fever is a prominent sign. In the advanced stages of tuberculosis there tends to be a lowering of the blood pressure, apparently associated with the general poisoning of the body by the production of the bacterium that causes this disease. On the other hand, diabetes appears to affect the blood pressure but little.

Many drugs are known which will lower the blood pressure, but these drugs do not have the value of keeping the pressure lowered or overcoming the fundamental physical conditions of the body which are responsible for either high or low blood pressure.

Apparently, all of the various glands

in the body that have secretions may be concerned with the maintenance of the blood pressure at a certain point, hence a disorder of any of these glands modifies the circumstances and may raise or lower the blood pressure. At present, research all over the world is endeavoring to define accurately the effects of these glands and of their secretions on the state of the body in health and disease.

Almost every one is now familiar with the method used by the physician in finding out the blood pressure of the patient. Usually he wraps a rubber cuff about the patient's arm, then he inflates this with air so that it will constrict the arm. The cuff is connected through a tube either with a column of mercury or with a spring device that has a dial, on which a needle records figures equivalent to the height of the mercury column. Then by feeling the disappearance and reappearance of the pulse beat, and by listening to certain sounds made by the blood in the vessels in the arm, the physician records the blood pressure at various phases of the heart's activity.

Dr. Virgil C. Kinney reported a case of a man suffering with heart and kidney disease whose blood pressure reached 306 millimeters of mercury. As has been mentioned, it is possible to lower the blood pressure greatly by the use of various drugs which act on the blood vessels, but such effects are temporary, and it is more common to treat the condition by proper diet, graduated exercise, baths and massage.

It is important, however, not to lower the blood pressure too rapidly or too greatly. The extent to which lowering is to be brought about will depend on the general condition of the patient. The dilated blood vessels must be given opportunity to contract as much as the condition of the tissues composing them will permit. The heart that has been overworked under normal conditions must be given opportunity to adjust itself to a new state of affairs within the body.

An unusual observation made by Dr. Kinney is the effect of changes of the weather on blood pressure. He suggests that the majority of apoplectic strokes

coincide with some great atmospheric disturbance. Thus he has noted that the blood pressure changes during the winter months after a warm spell with much humidity when the wind suddenly swings to the north and the temperature drops to zero, the air becoming very dry. At such times many patients with disturbed blood pressure have shown a sudden rise or fall of from ten to thirty points. When the reverse condition occurs during the summer, sudden changes in blood pressure may occur again.

There seems to be no doubt that high blood pressure is frequently a prominent sign in members of the same family. In families in which there is a strong element of this kind, Dr. James P. O'Hare says, parents should guide their children toward the less strenuous walks of life and advise them against excessive mental and physical exercise, excessive ambition and obesity. This disease, like others that seem to have an hereditary basis, might be eliminated if marriages were arranged according to physical conditions and not for emotional reasons.

Dr. O'Hare suggests that in mind cases it is frequently just as well not to inform the patient of his high blood pressure, since this may disturb him, but merely to suggest that he slow down the pace of his existence. It is well recognized that all of us to-day are living at a much faster rate than formerly. The level of the blood pressure at any time is the result of the condition of the heart, the thickness of the blood, the degree of hardening of the arteries and the degree to which the veins may be dilated or constricted. The modification of any one of these factors will, of course, influence the blood pressure. Physicians arrange to modify them by modifying the routine of the patient's life so as to bring about a general change in the systematic conditions.

The person with high blood pressure should be instructed to cut down on the amount of his work and to reduce his responsibility and his cause for worry as much as possible. Dr. O'Hare suggests that such people adopt an easier attitude toward life. Such people should take frequent vacations, daily periods of re-

laxation, with rest after each meal, and preferably a nap of one-half to one hour after lunch. Moderate exercise may be tried, the best form being short walks, but never taken to the point of fatigue. The intestines should be regulated so as to keep the system free of all poisonous substances and also avoid any undue strain associated with elimination.

High blood pressure must be considered as a symptom involving practically all of the human body. Its care will necessitate a study of the whole body and a general readjustment toward a form of life that will place the least possible burden on the weakened portions.

In 1827 a London physician, Richard Bright, described a disease of the kidneys that is now known as Bright's disease, also as chronic interstitial nephritis, which means a long continued inflammation of the tissues of the kidneys.

These organs are charged primarily with separating waste substances from the blood. When they become diseased they permit some of the material from the blood to leak through and a physician, by

simple laboratory tests, is able to detect the presence of such leakage.

It has been found that in many instances these inflammations come from infections of the blood in other parts of the body, particularly from the tonsils or teeth.

In some diseases, particularly scarlet fever, there seems to be a special tendency toward involvement of the kidneys so that it is customary in scarlet fever to give a simple diet and to place as little burden upon the kidneys as possible.

The approach of this disease is insidious. There are such symptoms as paleness, swelling, nausea, headache, or more serious manifestations.

A regular physical examination should be made of every person once each year after the age of 40, at which time his blood pressure and other laboratory tests should be taken.

If the symptoms are seen early, prompt attention to the diet and habits of life will arrest the disease. At the same time a search is made for any spots of infection in the body which may be sending

germs through the blood to the kidneys, and as these are found they should be removed or controlled.

Particularly to be avoided are too much salt and condiments, such as highly spiced relishes. It is not known definitely just how much they share in causing Bright's disease, but it is known that in some forms of Bright's disease the use of too much salt forces the development of collections of fluid within the body.

Diabetes was described by a Greek physician, Aretaeus, who lived in the reign of the Emperor Hadrian about 300 A.D. His description of it can be improved according to our knowledge today only in some terms of chemistry and physiology.

"The nature of the disease," he said, "is chronic and it takes a long period to form; but the patient is short lived if the constitution of the disease becomes completely established. Moreover, life is disgusting and painful; thirst unquenchable, excessive drinking, which, however, is disproportionate to the larger quantity of

fluid excreted; for more fluid is excreted; and one cannot stop them either from drinking or excreting fluid. Or, if for a time they abstain from drinking, their mouth becomes parched and their body dry; the organs seem as if scorched up; they are affected with nausea, restlessness and a burning thirst; and at no distant term they expire."

The term "diabetes" came either from the Greek word meaning fountain or from another term meaning to "pass through" because the essential feature of the disease is the rapid passing of sugar and fluid through the body.

In 1674 an English physician named Willis found that the fluid excreted in diabetes is sweeter in character than normally, and a hundred years later another physician showed that the sweetness was due to sugar. Afterward it was found by German investigators that removal or inactivity of a gland called the pancreas is followed by the development of this disturbance of the body, and later that it was the cells in the pancreas

known as the islands of Langerhans that are associated with the way in which sugar is handled by the body.

The Canadian investigators, Banting and MacLeod, received the Nobel prize for their investigations of this disease and for their discovery of insulin. They prepared an extract of the pancreas which is apparently largely composed of the tissues of the islands of Langerhans. The use of this extract has greatly modified the method of control of diabetes to-day. By its use the patient may eat the food necessary to keep him in normal weight and strength without further injury to his pancreas. It is not a cure for the disease, but a method of control.

The chief symptom by which a physician determines the presence of diabetes is the appearance of sugar in measurable amounts in the fluids excreted from the body.

The exact cause of diabetes, other than the disturbance of the pancreas resulting in degeneration of the islands of Langerhans, is not known. It has been found, however, that overeating and lack of ex-

ercise may be prominent points in the history of the individual concerned. The sugars come largely from starch and other foods. The person does not manufacture more sugar than usual, but cannot use properly that which he manufactures. The excess of sugar that accumulates is then poured out of the body through the fluids.

Sometimes a severe infection may be the insult to the body that results in degeneration of the pancreas and diabetes. Sometimes tumor of the pancreas or a stone in the tube which carries the external secretion of that gland into the intestines will cause a degeneration of the gland that results in diabetes. The disease apparently runs in families because of some peculiarity of body structure that is inherited.

Before the discovery of insulin it was customary to treat diabetes largely by lowering the amount of food, and particularly the amount of sugar taken in. It is still customary to rest the diseased organ in this manner, so that dietary changes are made even when insulin is

used. Insulin makes it possible to take part of the burden off the pancreas and to permit the patient a somewhat more varied diet.

Most of the quacks who sell patent remedies of one kind or another for the treatment of diabetes get their testimonials from persons with mild cases who are apparently helped by any medicine, provided they also modify their diet. The directions accompanying the remedy usually list a simple diet, and the person will invariably feel better if he follows the diet, whether he takes the medicine or not.

The competent physician changes the amount of food that the person may take according to the amount of sugar that he excretes. Thus it is necessary to make repeated examinations of both the blood and the excreted fluid to determine to what extent the sugar is being utilized properly by the body.

Patients who have been sick for many years with diabetes sometimes learn to perform the simpler tests for themselves. The simplest test includes merely the add-

ing of a few drops of a solution containing copper. If there is sugar present the grayish-blue color of the solution changes to red. Any physician will be glad to show this test to the patient who suffers with diabetes.

A person with diabetes should have a scale for weighing food. In order to determine his tolerance for sugar, he begins with a diet composed almost exclusively of green vegetables containing 5 per cent of carbohydrates.

Among these vegetables are lettuce, spinach, cauliflower, sauerkraut, canned string beans, celery, asparagus, brussels sprouts, tomatoes, rhubarb, eggplant, cabbage, radishes and artichokes.

Although these vegetables contain but little nutriment, they have a large bulk and will fill the stomach and thus allay the pangs of hunger. The person is given from 150 to 200 grams of these vegetables, about five grams of which will be available carbohydrate or sugar.

If there is no sugar in the excreted fluids on this diet, he is given a diet on the second day which contains five more

grams of carbohydrates, and this is increased until twenty grams of carbohydrates are being taken.

Then the diet is increased by five grams of carbohydrates every other day until the sugar appears, or until the patient is receiving an amount of sugar equivalent to three grams of his body weight in twenty-four hours.

After the first two or three days vegetables containing 10 per cent of carbohydrates, such as onions, squash, turnips, carrots, beets or canned peas, may be added to the diet in order to make up the increased amount of sugar.

Subsequent to that, foods containing 15 per cent, such as canned lima beans or parsnips or 20 per cent of carbohydrates, such as potatoes, baked beans, green corn, boiled rice or macaroni, may be added to make up the amount of sugar.

Fruits have also been classified according to the amount of sugar they contain, and many other foods have been listed for this purpose. It is possible for a physician who is familiar with the amount of protein, fat and carbohydrates

that different foods contain to develop a varied diet for a diabetic patient and to control accurately the amount of sugar that is taken in.

The vegetables should be cooked preferably by steaming in a double boiler, as in this way all the juices are retained.

Bread is seldom included in the diet of a diabetic, because it contains large amounts of starch. Special breads are on the market made of gluten or diabetic flours, with the amount of carbohydrates and proteins usually mentioned on the label.

When sugar appears in the excreted fluid, the physician realizes that the patient's ability to assimilate has been exceeded. It then becomes necessary to cause him to fast briefly until the sugar disappears, or he may be given insulin, which aids in causing it to disappear.

In the past, many patients did not do well on the diabetic diets because the amount of food taken was not sufficient to provide proper nutrition. As a result, there was a marked loss of weight and strength and the patient could not

resist disease. The discovery of insulin has made it possible to feed the patient a more varied diet, to avoid fasting, to combat complications and thereby to prolong life.

Dr. J. J. Conybeare of Guy's Hospital, London, has formulated briefly some simple rules to be followed by every diabetic in order to resist the complications which may be the final factors in bringing about death. These are:

1. It is important to avoid undue exertion, either physical or mental. The latter is probably even more important than the former. A moderate amount of regular physical exercise is beneficial, but to what extent it may be indulged should be left to the decision of the medical attendant.
2. Special attention must be paid to the teeth, and regular visits should be made to the dental surgeon. Should any abscesses be discovered, the teeth affected must be extracted. The reason for this somewhat drastic action is that poisons

are absorbed into the blood if an abscess is present, and these affect the pancreas.

3. The diabetic should pay particular attention to the feet; they should be washed daily, carefully dried, and sprinkled with boracic powder. Infections are far more serious in diabetics than in other persons. Shoes must be large and not constrict the toes. Neglect of these precautions may lead to gangrene of the toes, a condition which often ends fatally.
4. Be careful to avoid constipation. The diabetic diet, with its high proportion of 5 per cent vegetables, is in itself usually one which will tend to lead to regular action of the bowels.
5. Diabetics are more liable to infections such as influenza than normal people, and the results of such infections are far more serious in diabetics. In consequence it is wise in the presence of an epidemic to avoid places such as theaters, churches, etc., where the disease is likely to be contracted.

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When a diabetic feels ill from any cause he should at once get in touch with his doctor. It is prudent to avoid patent medicines.

CHAPTER IX

A SENSIBLE VACATION PROGRAM

THE general impression is that persons who take an annual vacation are likely to live longer than those who work constantly without any break in continuity of their daily routine. A long and healthy life depends largely on the type of body that one has inherited from his parents and on one's freedom from numerous infections that may undermine the body in youth. Young, rapidly growing persons need more rest than do adults. On the other hand, there are numerous instances of persons who have lived for many years who have never taken a vacation. Among them is the famous surgeon, Sir James Paget, who lived to the age of 85, although during the beginning of his career he did not take a vacation for a period of fifteen years.

Obviously the exact relationship of the taking of holidays to health is difficult to determine. Supposing that a business man has been working constantly at his

desk for a long period of time and has reached approximately the point when he feels that he must have a rest or that he is likely to have a "nervous breakdown"—if he is a sensible business man, he takes the rest and his life proceeds its even tenor. On the other hand, he may not take the rest and may as a result have the nervous breakdown or develop coincidentally some infection from which he dies. The natural tendency will be to say that he "worked himself to death," although the elements of coincidence cannot be avoided. Physicians speak vaguely of a condition known as "lowered resistance," which means an increased likelihood that a person will succumb to the onslaught of bacteria should he be exposed. However, the element of chance of exposure enters in as well as the dosage and virulence of the bacteria with which he may come in contact.

Sir Humphrey Rolleston has said that the best test as to the suitability of a holiday is to try one. As long as a person really enjoys a vacation, he or she is of the right age for that form of vacation.

The type of vacation chosen, at least from the mental hygiene point of view, should be such as to cause the executive to forget his usual occupation and habits. Thus the desk worker and clerk should spend their vacation preferably in some muscular exercise that will distract their minds from their ordinary routine. By the very nature of things, the manual laborer might find a vacation spent in a hammock with a good book the ideal form of recuperation. Usually, however, he spends most of his time sitting on the bleachers at the ball park and in the evening at the movies, and rarely fishing off the end of a dock. The intelligent desk worker who spends two weeks' holiday playing bridge in a hotel room, or attending the theater in a crowded city is merely diverting his mind without in any way giving opportunity for a change in his tissues physically. From the point of mental hygiene, also, it is probably desirable for the head of a considerable household to spend his vacation away from his family and his usual associates. The broker who attempts to recuperate in a

hotel in which he keeps in constant touch with his ticker and his customers in the city will probably return from the vacation more tired than when he went away. The departing from the usual mental groove is probably the most important factor to be considered in planning a healthful vacation.

Men and women are more fit physically in the years from 18 to 40. This is the period when the human body is strongest and when the athletic records are made. Presumably because of this sense of fitness, the majority of men and women forego active recreation and take part only in quiet amusements during this period. The result is likely to be lessened health and physical efficiency. The person who takes a little regular physical exercise once each day is likely to have returns in the way of pleasure, speed, endurance, mental relaxation and physical grace.

One of the most difficult choices to make in the matter of vacations and holidays is the decision between two weeks, a month, or three months continuously or

regular periods for rest and recreation taken throughout the year. It was a wise provision of the old Mosaic law that ordained a day of rest in every seven. The conscientious observer obtains in this manner fifty-two days out of three hundred sixty-five. If he decides to take the week-end instead of an annual vacation, he will secure one hundred four days of freedom out of three hundred sixty-five, not counting religious holidays. If he lives in a community like New York City he will probably secure the multiple advantages of Jewish, Catholic and Protestant special holidays, and may rest at least half his time. Certainly for such a person a month or two continuously is not required every year. Unfortunately the week-end holiday is seldom used for purpose of rest. It is more frequently employed in severe physical activity or at least golf. For this reason some physicians have suggested that the desk worker who is at a high strain constantly should spend at least one day of each week in bed, particularly if he is of the neurasthenic type.

The point of view of the well-to-do has changed greatly in the past twenty-five years. People have come to realize the importance of a change of scene and a change of routine. A man who works hard in town is likely to live in the country for the holiday months of July, August and September, sometimes coming to town only once or twice a week to observe that the office continues its usual routine. The difficulty with such methods of recreation is that physical health benefits, but the mental groove continues in the same line. Thus the business man who is constantly driven by attention to detail will do well to take an occasional vacation abroad or at some spot where he is not accessible to the telephone, telegraph, radio, or even a newspaper.

The most serious failure known to man is the vacation that goes wrong. This is the type of vacation indulged in by the executive who loads his family into a big touring car and drives away to the seaside or the country. There he is likely to deposit the group in a cottage or hotel

where their demands on him make the strain far worse than any in the office. If it rains every day and he is forced to amuse as well as to supply them with physical comforts, his vacation is ruined. Even under the best of circumstances a parent accompanied by children will suffer from the strain of entertainment, from a disturbance of restful routine habits and from all of the other things that are so obviously likely to happen.

Nowadays water supplies are in general protected against contamination with typhoid fever or with the germs of dysentery. In the selection of a vacation resort, proper water supply, milk and food supplies must be given attention. Mosquitoes are a nuisance, flies are worse.

A middle-aged man who launches suddenly into active exercise after ten months of quiet life should have available a place for recuperation, including a hot bath, possibly some massage, certainly a rest and quiet. The demands of sea bathing and swimming or of mountain climbing are likely to prove too much for the

man with high blood pressure, hardened blood vessels, or angina pectoris.

Certain communities become subject to epidemics of coughs, colds, or influenza. Some areas are too dry for persons with some diseases, others too moist for the patient with tuberculosis or bronchial asthma. The many with hay-fever should avoid a district in which the weeds grow and in which there are pollens that produce his attacks. In other words, a vacation must be as carefully anticipated and planned for as any emergency in business life. In making plans the individual will take into account his physical condition and power, his temperament, inclinations, and hobbies.

Rules for a Successful Vacation

1. Choose a type of holiday that will be a by-path from the mental groove of daily life.
2. Indulge in physical exercise, but not beyond the limitations of tissue repair.
3. Select a place that is healthful, including pure water, milk, and a good food supply.

4. If some people irritate you unduly, keep away from them on your vacation.
5. Rest at least eight hours of each vacation day.
6. Avoid undue exposure to the sun, the rain, the cold, or other inclemency, particularly if you are subject to respiratory infections.
7. If you are a persistent family man, give the family a chance to be without you on your vacation.
8. Have a physical examination before you leave so that you will know your physical possibilities.
9. If you worry unduly about your business when you are away you are having a bad vacation.
10. A good vacation is one during which you enjoy yourself thoroughly, in which you are rested when you are through, in which your mind selects a new groove and has no urge to the old one.

CHAPTER X

MEDICINE IN OUR CHANGING WORLD

THE conception which some people still continue to call the germ "theory"—namely, the established fact that bacteria bring about definite changes in the human body—is responsible for the great rise of preventive medicine. But already the bacteriologists have gone far beyond that conception. To-day they are concerned with the important problem of cycles in the development of bacteria and of bacterial mutation. As the human being changes with time and with circumstance, so also the bacteria may change in their habits of living and in their relationships to their environments. The human body, resistant to the invasion of the bacteria it has learned to know by trial, develops new specific antibodies to these changed bacteria. Such scientific facts, derived by hours of toil and experimentation in the laboratories, have an immediate influence on the prevention of disease. Their application has changed the great

aim of modern medicine from the cure of diseases to the prevention of diseases, and has given the medical man a new relationship to the social order. In that position scientific medicine goes far.

It learns the means by which the bacteria are passed from one person to another, and how to interfere with the passage. Investigations which showed that the mosquito transmitted yellow fever and malaria enabled control of those diseases even before the causative organisms had been determined. Then science discovered the manner in which resistance to disease is built in the human body. Now it increases not only specific resistance, as it has done with vaccination against smallpox, typhoid, diphtheria, scarlet fever and whooping cough, but general resistance. The mechanisms by which the body resists disease are intricate and the descriptions technical. The problem involves all of the sciences subsidiary to medicine, including heredity, eugenics, chemistry, physics, physiology, biology, bacteriology, and immunology. Undoubtedly mother and father transfer

to the child some of their specific and general immunity. Undoubtedly the physics and chemistry of the organism have to do with these mechanisms. Certainly the habits of life—diet, baths, exercise, rest, fatigue, hygiene—bear an intimate relationship. The environment, whether hot, dry, damp or cold, has something to do with it. More and more, men are controlling the controllable factors having to do with the resistance to disease and thereby increasing more and more the life expectancy. But already the physiologists and the statisticians are beginning to set limits to both—and with reason.

To-day the child born in the United States may expect to survive for fifty-eight years. This is near to the three score and ten promised in Biblical legend. If the man reaches fifty years he may reasonably expect some 20 years more. That figure is approximately what it was in 1825. The gain has been primarily in the control of infectious diseases and in the early years of life.

The difficult problems of infection that

hold medical attention to-day have to do with the securing of some specific method of attacking tuberculosis—something similar perhaps to the use of salvarsan in syphilis. For the prevention of tuberculosis we are dependent on isolation of the patient and control of his excretions. Calmette working on the use of a vaccine made of living tubercle bacilli from bovine sources hopes to build resistance by inoculation of children so that they may have a mild form of the disease. But not yet is sufficient known concerning the nature of these germs to insure the absolute safety of such inoculations. And here medicine calls on the famous aphorism as old as the Corpus of Hippocrates, *Primum non nocere*—"In the first place, do no harm." In some diseases, notably pneumonia, immunity is feeble and of short duration. Hence patients may develop the disease repeatedly, a single attack does not protect as it does, for example, in scarlet fever. Here is a new problem—the necessity for changing the nature of the immunity so that it may be specific against all the various forms

of the pneumonia germ and have some permanent qualities. How soon such discoveries may come is known to no one and is almost impossible to predict with a semblance of accuracy. Given a genius of bacteriologic investigation with adequate laboratory and clinical facilities, one must yet depend on the accumulation of a vast amount of detail concerning the gradual changes of virulence in organisms attacking the respiratory tract and a better knowledge of natural immunity in the human body. The latter might afford some explanation for the fact that epidemics of respiratory disease occur in cycles at intervals of some thirty years.

But little has been accomplished for the degenerative diseases and for cancer. The degenerative diseases include high blood pressure, kidney diseases, heart disease, hardening of the arteries. In addition to these the leading causes of death include cancer and pneumonia. The causes of the degenerative diseases are not definitely known, and so far as known not accurately controlled. They include, for example, infections sustained early in

life, particularly of the nose, throat, tonsils and sinuses, infections of the teeth, and spots of infection elsewhere in the body from which germs are carried to the heart, kidneys and blood vessel walls. Apparently, moreover, early infections are themselves associated with poor personal hygiene, with overcrowded living conditions, with residence in damp places and with undue exposure to the elements. So tonsils are removed, teeth are pulled, infections removed surgically. In our small way we attack the problems of overcrowded and bad living conditions, and we have made a start on the matter of personal hygiene. All of us can remember when schools taught only reading, writing and arithmetic, and the fact that the exports of Sardinia are not sardines. Now through coöperation of the National Educational Association with various health agencies, health has become a part of the school curriculum.

As might be expected the efficiency of such education varies greatly in various places in our fair land. In Pennsylvania an orderly program has been developed

correlating health teaching with other work in each of the primary grades. Some universities content themselves with an annual lecture by the professor of hygiene to the incoming freshmen. Other institutions make physiology at least a compulsory course in almost every curriculum. Where faddism predominates science suffers. Eventually, no doubt, there will be nation-wide acceptance of the fact that some knowledge of the human body and of the functions of its various parts is necessary to complete happiness and properly graded lessons in these and related fields will permeate the entire educational program.

To the adult from a hundred sources the message goes that the degenerative diseases are insidious in their onset and that they can be controlled only if they are caught early. A few take advantage of the preachment. Then the physician outlines a course of living which they may obey and perhaps prolong their existences a few months—even a few years. However, the problem becomes still more complicated! Raymond Pearl, in such

studies as "The Biology of Death" and "The Rate of Living" and others have shown that most often longevity is a matter of heredity and that barring accident and severe infection, which is itself an accident, our years are pretty well determined by our birth. Then Dublin calculates that even if we do determine the presence of degenerative disease and do all we can to stop its progress the most we can hope for is five to seven and one-half years of increase in life expectancy. That's not a great deal. What about pneumonia and cancer? Pneumonia will be conquered because the germ cause is known and the ways of science are marvelous. The establishment of types of pneumococci, and the development of serums and vaccines through the work of Cole, Dochez, Avery, Chickering, Amoss, Olitsky, Felton, Huntoon and Rosenow indicate the nature of the attack and the possibilities of success. Already some of the types seem to yield to specific treatment. Coupled with this come the special studies that have been made of chemical substances such as quinin derivatives

which have some virtue. And Oxygen administration is now being widely used to prolong life in the multiple attack on this deadly disease.

But cancer may be another story. Already some are insisting that cancer is the natural end of man, that senility is itself a sort of cancer of the whole body. Of course, cancer deaths are on the increase, because the disease is essentially one of older people and more people are living longer than used to reach an advanced age. Hence more cancer. The cancer can be removed surgically and its progress halted, the growth of the cell may be checked by X-ray or by radium. Then the body continues to wear out and the cells lose gradually the power of repair. So senile decay comes upon the human being. One begins now to see these specimens of living death everywhere about, tottering shakily and gazing with lack-luster eyes on the—to them—incomprehensible scene. They force the action of laggard intestines with lubricating oils, and concoctions of drugs. They stimulate the action of the shaky heart, steady-

ing it with digitalis. They gasp for air while sleeping upright, coughing the phlegm that accumulates as epithelial cells are cast off from the air passages. Occasionally they are dragged forth as specimens of what man can accomplish in years to give advice to the young on how to reach advanced age. The advice is seldom good because the result is not of their accomplishment. I am not one of those who believe that increasing years of human life are under all conditions an unmixed blessing. It is not so much the years as what one can do with them. Our glorious state makes no provisions for the aged. What pitiable objects are the octo- and nonogenarians when they have not the means of subsistence and of proper nursing care. What price these extra years when they are years of dependence! Already philosophers and statesmen begin to prate alarmingly of scientific euthanasia for the aged.

What then of rejuvenation, of Steinach and of Voronoff? Their experiments are unsubstantiated, their theories unsupported by evidence. Almost ten years

have passed since the announcement of these technics and where are the living cases to substantiate the claims? Just as the "cures" for cancer fall naturally without scientific attack through the progress of the years, so too is time the great exposé of false claims of rejuvenation. Such cases as have come to public knowledge, one in England, one in Germany, and several in this country, reveal the utter failure. And at the great International Congress of Physiology in Stockholm last year the publicist Voronoff sat in moody silence, unable to withstand the searching questions of his colleagues, notably Carlson of the University of Chicago. So far as we know, the human cell is not to be brought to life when the process of decay sets in. But Carrel takes the cells of a chicken's heart and keeps them alive artificially for years beyond the period when they should have died, indeed not only alive but reproducing and active. Perhaps when we learn all we ought to know about vitamins and the chemistry of the cells and mineral salts, and the physical basis of life, and the

way in which light, heat and electricity influence the human organism, we may be able to do more for the human cell. But that day is far, far away, and many things may happen before that time. Let us then content ourselves with a fine existence up to sixty or seventy and a gradual decline from sixty to seventy on, as the most we can really hope for and achieve. It will, of course, be the tendency for the longer lived and physically best stocks to populate the earth. Indeed, it has already been shown that it is the tendency of the best educated and most successful to have more children than the average. But to-day the educated and the successful seem to be in such a hopeless minority. How many years must pass until their number increases to a controlling percentage? And if it does, what will the world do for its robots?

The body of man is not what it used to be. The big-boned, muscular, prognathic, hairy, stupid ape man has given way to the smooth-skinned, bald, slightly corpulent, spindly-legged and thin-armed mental dynamo. For the sharp-

nosed, keen-eared savage with quick vision, sensitive touch and rapid response substitute the alert-brained, heavily bespectacled, false-toothed director behind a desk. From his sanctum lead the tentacles of electric transmission and intensification of voice bidding to action. For weakened vision modern man prescribes telescopes, periscopes and microscopes as well as optical lenses. For the ears there are radio tubes, microphones and audition devices. For the sense of touch are provided calipers and instruments of measurement more fine than the fingers of Jimmy Valentine. And though the sense of smell is not aided mechanically the smells themselves are stepped up to the point where they are obnoxious and overpowering. One wonders, indeed, how men tolerate now the oily, irritating, suffocating vapors resulting from the combinations of thousands of automobile exhausts and evaporation of the covering of oiled roads. Muscles are a well-nigh unnecessary attribute for modern man; the power of the machine

makes brute strength merely a matter for exhibition and dramatic show.

But with all this the population begins to divide itself with special types of men selected for special purposes. The experts already classify the aviator type by temperament, sense of balance and other Lindberghian qualities. It seems reasonable to believe that selection will develop more and more bird men as the customs of the world require them. But these bird men do not develop the multivisioned eye of the bird or the fly. They are aided by the mechanical devices that make the human eye suffice for flying. Indeed, even the sense of equilibrium is less important with every type of compass and similar instrument to assure the bird man of his exact position in space. Only the brain must change. And it is the brain of man which has changed most and oftenest to equip man for changing conditions. In several recently published volumes, particularly Herrick's "The Brains of Rats and Men," and Tilney's monumental discussion "The Brain from

Ape to Man," the gradual development of this highly sensitized human organ has been well portrayed. Brain power, as Tilney emphasizes, admittedly is the secret of human success. Is the human brain to develop sufficiently to permit man to avoid disaster, war, revolution and civic incompatibilities? Are we perhaps to develop a reasoning type of mind which will avoid stupidity in the management of social organization, a brain which will be free from superstition, delusion and mental disturbance? A study of the evolution of the human brain through thousands, indeed through hundreds of thousands, of years, indicates that without a doubt such a brain will be developed. The attitude is perhaps as optimistic and rose-colored a conception as one might well desire. With such a brain, man's conflict with his environment will be much less of a struggle. With such a central directing power, the inexactitudes of biology, physiology, pathology and eugenics will become mechanically accurate. A clear knowledge of man will permit greater ability in the control of

man, just as a knowledge of the causes of disease brings them under man's supervision. Least understood of all processes in life are the intelligence, thought, hopes and emotions of the human being.

Conceive of a human being in the future then as a man of much the same type as the one we know to-day, but with a mental power that will make far different his human relationships. Conceive of him as attacking epidemics wisely and without the necessity of overcoming the rabid and fanatical actions of the superstitious and the commercially minded propaganda of the cultist. Conceive of him as taking proper care to avoid poverty and ignorance. Think of human beings with enough knowledge of scientific breeding to begin a gradual lowering of the tremendous number of the insane, the mentally defective, even the stupid that now make any social or hygienic problem full of well-nigh insurmountable difficulties. For available knowledge seems to indicate that only scientific breeding will overcome the problems of mental defect and inca-

capacity. True general paralysis is now controlled through our knowledge of its syphilitic origin, but dementia præcox, mongolian idiocy and various forms of schizophrenia are practically as hidden in mystery as they were one hundred years ago. This we do know—the minds of men are being beset by the speed of a civilization that seems to strive more and more for greater rapidity. So tumultuous is the noise of our city streets that organizations are already being formed to attack this menace to rest. Constant stimulation wears to a point of fatigue from which there is no recovery the delicate nerve cells of the human body. In the control of such functional psychologic disorders as hysteria, psychasthenia and neurasthenia medicine will have to take account of the extent to which modern civilization shares in the causation. Certainly these disorders are far more prevalent among us than they were five decades ago. Every physician knows to-day of the intimate connection between unhygienic living conditions, bad nutrition, poverty and disease. The in-

telligent man of the future will know how to attack such causes of sickness, and to overcome them.

The more highly specialized the human tissue becomes—and that of the nervous system is the most highly specialized in the body—the more difficult it is to remedy when afflicted by trauma or disease. Its resistance perhaps is as great as that of any other portion of the body, and access to it is difficult. Nevertheless such conditions as infantile paralysis, epidemic encephalitis, generally paralysis or locomotor ataxia do terrible damage to the brain of to-day and no one knows the effects of such disease on the brain of the future. But these infections should and, no doubt, will be brought under control.

Fundamental studies in biophysics indicate that sunlight has definite effect on tissue specialization and may bear some relationship to nervous stability. Major prophets in this field predict a future when the sunlight—the ultraviolet rays lost to man when he came indoors—will glow from every incandescent bulb. They predict a brown-skinned race of

man with a much more stable nervous system, less given to emotional upsets and thereby less susceptible to the degenerative diseases.

Much is said of the possibility of curing all of the disorders of the social and physical world by changing systems of government. Medicine is unwilling to consent to any system that will take away an individual patient from his individual physician and make him simply a unit in a great scheme of organization. The sick human being demands individualization. The more delicately constituted he may be, the more individual the brain that motivates him, the more important is the maintenance of that personal contact which forms the basis of medical practice. The individuality of the physician must be kept free in the application of modern medical knowledge to the man of the future.

The argument is repeatedly made that modern social and medical activities tend to interfere with the process of natural selection and thereby to perpetuate the unfit and to make them a drag upon hu-

manity in general. The arguments cannot be entirely dismissed, since the lame, the halt, the blind, the weak, and degenerate are already with us in alarming numbers. The correction of such defects does not absorb the inherent weakness. However, physical shortcomings do not necessarily imply mental defects. Even in times of great disaster such as earthquake, volcanic eruption, fire and flood, as many survive through exercise of the wits as through manipulation of the pedal extremities. Moreover, the world must have some men of strong bodies and feeble brains; homo stultissimus, possessed of great physical powers, provides the laborers and robots upon whom modern civilization so greatly leans.

H. S. Jennings has well emphasized the fact that the survival of a genetically defective individual does not increase the degeneracy of later generations; it is propagation that provides new defectives. The civilized man of the future will control propagation as well as survival. He will determine to a large extent the na-

ture of his populace as well as the physical factors in his environment.

The gradual growth of the population means greater demands on material resources. The eminent chemist Svante August Arrhenius, director of the Nobel Institute in Stockholm, warned some years ago that mankind must discover new sources of energy within a thousand years or that humanity would fall back to a state of civilization similar to that of the medieval period. The greatest problem of our times he considered the finding of new raw materials and new sources of energy and the conservation of what we have. The great center of population in the future will be at the source of new energy. Little did Arrhenius realize that vast untapped sources of energy must exist by which life goes on. The possibilities inherent in light as the medium from which tremendous energies may be developed are already the source of intensive researches by physicists.

The place of the physician in the social scheme is becoming more and more the

consideration of every forward-looking philosopher. Our hygiene is changing from a moral to a scientific hygiene. The world looks to the physician, as Stewart Paton expressed it, for a constructive program of living that will appeal to the imagination and the higher emotions of struggling humanity more than to statistical reminders of success in preventing disease and in prolonging life. The physician must determine what conditions are necessary to produce great men and great societies and then direct the steps toward race improvement.

Science has reduced the death rate and endowed our upper classes with knowledge and means for birth control. Our lowest and degenerate groups tend to disappear by the activities of disease and of physical forces. Our lower middle classes include the stupid, inefficient and thoughtless. This group constantly replenishes itself. Its death rate has fallen more rapidly in recent years and the birth rate scarcely changed at all. The freedom from disease by the progress of modern medicine, from war by the

changes in habits of thought, from famine by modern food distribution, and from all of the other ills of society, as shown by Ellsworth Huntington, makes it possible for men to increase enormously in numbers. It is not surprising that all great leaders call on our upper classes to increase their progeny to meet the great wave of births coming up from below. The hope of the future lies either in cutting off the surplus from below or in overcoming the deficit from above. The argument is cogent that even though birth control and its technic be taught to the group most in need of it, their very inability to look to the future with foresight makes such methods in their hands inefficient and useless.

"The advancement of society," said Dr. John C. Merriam of the Carnegie Institute in Washington, "depends on six important factors."

1. The securing of new knowledge by discovery, invention and research.
2. Unification of knowledge and the understanding of the interrelation of its parts.

3. The development of adequate means for establishing continuity in knowledge.
4. The physical and mental effectiveness of the individual.
5. Continued betterment of economic and political organization.
6. Enlargement of the fundamental or basic capacity of the individual.

In every one of these important processes the physician of to-day begins to take a leading part. He has devised schemes for conducting research, for carrying on his knowledge, for improving the individual, and for organizing medicine so that it will reach every individual in the community. Medicine unaided cannot, however, prepare the way for continuing the growth or evolution of the human being or of mankind in the mass. Just as medicine itself is to-day the adaptation to the human life of all knowledge.

The physician must meet his responsibility to the public in the changing order of human affairs. Beneath the great problems of mankind will always be

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medical problems; there can be but little happiness without health. The physician can no longer be merely an ambulance-hopper responding with a great rush to human suffering in time of emergency. He is to-day a part of the whole social, economic and political organization of mankind.

THE END