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The
Basis of
Health



By
Philip Rice, M. D.

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The
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PREFACE

This little book is put out with a great deal of diffidence, knowing its shortcomings. The reason which leads me to permit its publication at this time is the insistent demand for something in print on the part of those who have heard me speak before women's clubs, parent-teachers' organizations and similar organizations on the subject of child development.

The method of approach to this all important subject, departing as it does from the usual or orthodox methods, it is realized, calls for a more complete and scientific presentation. It is hoped most sincerely that in time the publication of such a work will be made possible.

The aim in these few chapters has been to bring to parents and teachers in particular, in a brief and concise form, some conception of the principles that underlie the Science of Health and that are involved in the process of unfoldment of the growing child.

Viewed from the standpoint of physical

Preface

structure, through which alone function is made possible, it becomes clear that mental, moral and physical defects are primarily the result of imperfect unfoldment and development of the growing child. In other words we discover that we in reality *grow* into our defects and diseases.

Approaching the problem of health and efficiency from this standpoint means that we approach it from the positive rather than from the negative side. We make health the fundamental thing and disease that which is incidental.

What is presented in these few pages will, it is hoped, be recognized as being but the first step toward a great science. No attempt is made at completeness in the treatment of any topic considered. Completeness is at present impossible, since the Science of Human Morphology is still in its infancy, especially as it applies to the problems of a childhood development.

All that has so far been achieved in the development of a science must be placed to

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the credit of the late Prof. Achille De Giovanni of the University of Padua, Italy. To him great credit and honor is due for his notable contribution to the science of human welfare. Whatsoever is contained in these pages that has any merit is the result of his work. No claim to originality is made for any of the ideas, for method of study, the method of examination, or for the measurements herein presented.

Nothing has been attempted in this little book other than to put in simplified form some of the knowledge we at the present time have of the Science of Human Morphology and its relation to the problem of child development and to make this more helpful to troubled parents and teachers. The principles of the Science herein enunciated have time and again been proved absolutely true and of great practical value.

PHILIP RICE.

New York City,
1924.

Childhood is the most important stage of the total development of man and of humanity. (Froebel)

I am firmly convinced that all the phenomena of the child-world, those which delight us as well as those which grieve us, depend on fixed laws as definite as those of the cosmos, the planetary system, and the operations of nature; and it is therefore possible to discover them and examine them. When once we have assimilated these laws, we shall be able powerfully to counteract any retrograde and faulty tendencies in children, and to encourage, at the same time, all that is good and virtuous.

From (The Letters of Froebel)

CHAPTER I

THE NEED FOR A BETTER SYSTEM OF HEALTH

THEODORE ROOSEVELT once said, "Our national health is our greatest asset. To prevent any possible deterioration of the American stock should be a national ambition."

There are many reasons for believing that our stock has already begun to deteriorate. The evidence pointing to race decay is very strong indeed. It is quite safe to say that of the many problems with which we are confronted none gives reason for greater uneasiness and concern than that pertaining to the physical status of our people.

The statement of the medical profession that though 80 per cent of all children are normal at birth only 20 per cent reach a normal maturity clearly indicates that something is seriously wrong. These figures constitute a humiliating confession

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of the inefficiency of our ideas and methods. If it is true that the merit of a method is judged by its results, and if with our present methods of child development we quadruple the number of defectives that come into the world, there certainly is not much that can be said in their defense.

The general truth of this statement of the medical profession is supported by the report of the Surgeon General of the United States Army in which he presents the results of the physical examination of the drafted men in 1917. In this report he shows that of the 3,764,000 men who had been examined prior to December 15, 1917, only 2,700,000 were physically fit to entrain for service. 550,000 were rejected as unfit for service during the first examination, and a large per cent of another half million were rejected on re-examination. In short, 21 out of every 100 were rejected as totally unfit for service.

But this is not all: Of those accepted

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42 per cent were found with defects of sufficient gravity to require their being noted on the records. And we are further told that if the examinations had not of necessity been so hurriedly made in all probability a greater number of defectives would have been found.

Were this a record of examinations of men past middle life, we should be less surprised. But as they were young men at an age when we find the health and vigor at their highest, this record is nothing less than astounding.

But other examinations have been made which show how serious is the health situation. For instance: The results of 5,000 examinations made of supposed healthy persons by a certain organization showed that not one was absolutely sound and fit to be put in Class 1. Only 5, or one-tenth of 1 per cent were physically fit to be put in Class II; 16 per cent had to be put in Class III; 25 per cent in Class IV; while 51 per cent went into Class V, and 8 per cent into Class VI.

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Moreover, we are told by no less an authority than the actuary of the Equitable Life Assurance Society, that not only was the mortality rate among those past middle age not decreasing, but on the contrary that it was increasing at an alarming rate. He points to the fact that the mortality from heart and bloodvessel disease has increased 27 per cent since 1900, and from diseases of the kidneys 15 per cent.

These appalling conditions mean nothing if not that our ideas concerning child development and our conceptions of health are faulty and in all probability in a large measure entirely wrong. It is not reasonable to think that methods grounded on a clear and full understanding of the problem could or would prove so worthless as those employed thus far have.

What the present conditions make very clear, is that the supreme task before us, the task that should engage our earnest attention, is to seek to understand the laws of growth, that we may be able to main-

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tain the child in perfect adjustment of all the organs, and in perfect equilibrium with the external environment during the process of growth. It is during these years that the foundation is laid for health. The individual grows either a balanced and vigorous body or else one that is marked by excesses and defects in growth and characterized by functions that are discordant and that predispose to disease.

Harmonious functions cannot reasonably be expected from an organism that is not harmoniously constructed; and to be able to construct a normal body requires a knowledge of the laws of growth. Without this knowledge intelligent control and direction of the forces of life is impossible. Moreover, it is entirely impossible to know whether or not the process of unfoldment is proceeding normally. Without this knowledge a normal maturity is wholly a matter of chance.

Children have a right to expect, nay, demand the best of their elders; this fact

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we all recognize. That their elders are giving prodigally of their time, money and energy, is attested by the many institutions and organizations which are being maintained in the interest of the child; never have there been so many. We are ready to deal generously with the child; ready to exhaust our last resource, and because love of the child is the supreme emotion of the human race. Nothing so moves to tenderness the normal man and woman as does the appeal of the child. Its very helplessness inspires the tenderest emotions. Hence we are eager to do better for the child than we are at present able to do.

Now, what we must realize at the beginning of our task of gaining a better understanding and formulating better methods is, that the structural and functional phenomena of the human organism are determined by fixed principles and governed by fixed laws as certainly and in as great detail as are the movements of the heavenly bodies. In neither does

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chance play any part. The significance of this must be grasped; and once it is our ideas and methods will assume a more rational character, our achievements will be more creditable and our confidence in the future more hopeful and cheerful.

Before we set out on our task it will be well to briefly refer to the ideas and methods now generally held and employed, and try and discover wherein they are wrong, or at least inadequate.

First of all we find that we are seriously handicapped in not having a language of health. Every concept of health can only be expressed in terms of disease, every normal in terms of the abnormal.

Therefore, we are forced to approach the normal—health—from the negative standpoint. The absence of signs and symptoms of disease we are forced to assume to be health, and the residuum after symptoms have been removed, we likewise take to be a state of health.

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For example, a child that is free from large tonsils, adenoids, bad teeth, large glands or other obvious physical defects is pronounced healthy. The fact that he may be carrying over from one stage of development to another structural characteristics which he should have out-grown, seldom or never enters into the consideration unless accompanying them there are well marked signs of disease.

The same is true when a person makes application for a life insurance policy. Before a policy is issued he must undergo a physical examination. As in the case of the child, if he is free from obvious disease he is considered a good risk and is given a policy. The fact that he may be structurally quite far from normal and in consequence have strong predispositions to disease which may lead to severe acute disease and possibly early death does not enter into the consideration.

Now this is all because we have no formulated and recognized standard of the normal and, hence, no basic and positive

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idea of health. Lacking a language of health we are unable to think in terms of health. This is the most serious defect in our present ideas and methods concerning child development as well as in the treatment of the sick.

The second serious flaw is in a large measure an outgrowth of the first. Seeing the whole problem from the standpoint of disease, we have come to look for all cause of disease on the outside of the body, in the external world. We are constantly endeavoring to determine the power of external things to disturb the harmony of the functions. The influence of these, we seem to think, gets into the body and deranges the functions much after the manner of a burglar who gets into a house and deranges the orderly processes of the household. Hence the over-emphasis on externals.

We are much more concerned about the kind of shoes that are put on the baby's feet and the way his clothes are put on than we are about the fact that the relative

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growth between his lungs and his liver, or between some other organs, is not being modified in a normal way with the passing of the months, even years, or that in some other way the process of unfoldment is not going on in a normal manner. But unfortunately as we have a one-sided view of the problem, we have no knowledge of such matters.

The fact that the influence of a given environment or set of circumstances which make one person sick often restore another to health and vigor, or may have no effect whatever, ought to show us that the power of external influences to disturb the harmonious play of the functions is conditional. That is to say, before they can affect the functions there must first be a certain degree of receptivity or susceptibility, otherwise they can have no effect.

And, finally, we have made the problem of health unnecessarily difficult. We have been intrigued by the complex and intricate. We seem to think that because the

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human body is so wonderful in its structure, its functions must of necessity be shrouded in mystery or veiled in the occult. This belief, or habit of mind, has led us steadfastly to refuse to take into consideration evidence of the utmost importance, to reject, often with disdain, the most obvious and fundamental facts.

To sum up the most glaring defects in a word: We have concerned ourselves with the study of disease, we have sought for its cause outside the body, and we have insisted on the problem being very difficult. Three conditions which have made clear thinking and clear understanding and sound methods quite impossible.

CHAPTER II

MORPHOLOGICAL PRINCIPLES

THE study of the form and structure, that is, the study of the composition of the constitution of an organism is known as the Science of Morphology. Morphology is a branch of the Science of Biology, the study of life, or the processes of living beings. Its subject matter consists of the facts pertaining to the development, correlation and function of the organs and systems that compose the body. As the term morphology will be frequently used hereafter it will be well at the outset to get a clear understanding of its meaning.

Concerned as we are in the present inquiry with the problem of the human body, only those facts which present themselves in the concrete individual, and the method by which they may be determined and understood, shall engage our attention. The problem of how the human organism has come to be what it is, though very interesting and very im-

portant as a study, is beyond the scope of our present purpose.

In building any science the first demand which must be met is that of clearly conceived and well formulated propositions on which to build. These must be the foundation of the structure, as well as our guide in our investigations. And naturally the simpler and more nearly axiomatic these are the better.

When propositions are in themselves complex there is always danger of being led into by-paths and thus away from the main theme. The Science of Geometry is a beautiful illustration of the happy results which are achieved from following such a plan. Beginning as it does with the simplest proposition namely, "A straight line is the shortest distance between two points" and proceeding logically step by step, we have as a final product one of the greatest if not the greatest of all sciences.

Following this plan in a study of the

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physical development and function of the problem of health, the simplest proposition which can be laid down is, Organization Is Essential To Function. This is as clearly axiomatic as that a straight line is the shortest distance between two points. It is obviously true and, therefore, requires no explanation. Indeed, no amount of explaining could make it any clearer. The simplest minded person knows that if he had no physical body he could have no physical functions.

From this it naturally follows that the character of the organization determines the character of the functions. In other words, what the organism is determines what it has capacity for doing. Function, let it be remembered is nothing else than the active vital expression of living substance.

Admitting that function creates an organ—feeling the need of an organ, by constant repetition of certain acts, the living substance finally succeeds in con-

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structing it—yet the fact remains that once an organ has been constructed the character and scope of its functions are exactly what the organ is by the nature of its constitution enabled to express. The function of respiration, for example, is made possible by the character of the structure of the lungs. Beyond the power to exchange gases the lungs have no other function. Just so the character and degree of function of every organ and tissue are prescribed by the character of the structure.

But quality and quantity of development of an organ are not the only factors which determine or influence function. Since independent existence and function of an organ is impossible, that is, since the organism functions as a unit, a definite relation or balance must exist between all the organs and systems in the body in order to have a balance of the functions. A hit-and-miss arrangement will not answer. One organ cannot be abnormally large and another abnormally small and

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harmonious functions be produced. "The excess and defect of development of the organs which compose the body, and of the tissues which compose the organs, are the fundamental factors which give rise to different constitutions of the organism and of its parts." (DeGiovanni)

However, owing to the power which the organism has to adapt itself to imperfections in structure, since one organ compensates for deficiencies in another, imperfections in function may not for some time be discerned. But as every compensatory effort is abnormal effort, being above the normal, unhappy results will sooner or later be produced.

Though we all have lungs, heart, liver, stomach, bone, muscles, etc., we do not have these equally developed or identically correlated. No two persons are alike in constitution, in function or in their power to react to any given set of conditions. Variety is the law of organized beings. From which we are led to see

Morphological Principles

that before we can reach any conclusion relative to the character of the functions, their peculiarities of expression, their differences in different types of individuals, we must first have a knowledge of the character of the structure of the various organs and systems and finally of the body as a whole.

The next proposition which suggests itself, and must be steadily kept in mind is, that vigor of function of an organ is in relation to degree of development. That is to say, other things being equal, a large organ has more vigorous functions than a small one. The reason for this is that the larger organ attracts and expels the blood in greater quantity than the small one, hence it has a more active metabolism (tissue change), better nutrition and, therefore, greater strength. This means greater resistance, and fewer predispositions and susceptibilities to disease.

Finally, the character of the reactions, —abnormal functions or symptoms of

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disease, are in relation to the vigor of the normal functions. In other words, large organs having vigorous functions will, when disturbed, have correspondingly strong reactions or symptoms of disease. Obviously, an organ that is poorly developed and that has weak functions habitually, is not likely suddenly to possess great vigor and produce strong reactions.

A person, for example, who has poorly developed lungs, heart and arteries, and a poor circulation will never be able to produce the high temperature and other symptoms which a large chested and full-blooded person will produce in an acute inflammatory process,—pneumonia, pleurisy and the like. His low vitality will not enable him to do so. Such deficiencies in structure produce low grade symptoms, sluggish processes, processes that usually very early in the disease assume a chronic character.

It is perfectly true that a small and weak organ may suffer great pain, but let

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it be remembered that pain is a matter of nerves in an organ and not one of development of the organ.

These several propositions are manifestly true. They may easily be elaborated, but they cannot be refuted. Could they be refuted we should not have left a single physiological principle on which we could depend. Indeed, the entire Science of Biology would be reduced to chaos.

They, if carefully studied, make clear that the cause of the special functions of every individual, normal and abnormal, resides in the special morphology or structure or constitution; and that to understand the functions and their special tendencies, one must first be acquainted with the characteristics of the morphology. We must, in other words, first know what the organism is like before we can form any conclusions as to what it does or is capable of doing.

Now structural defects of some degree are found in every one. Few have come

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into the world without some hereditary defect, and fewer still have had the benefit of an environment whose influences were so perfect as to permit of a flawless process of unfoldment. Adaptation to one set of influences causes in one person over-activity in certain organs with consequent over-development, while in another an entirely different set of influences causes over-activity and produces over-development in other organs.

The forces which lie behind the processes of growth and which result in differences in organization and the creation of different types, with different functions, predispositions and susceptibilities are found in the nourishment taken and in the environment which surrounds the child.

Were this fact better understood, the problem of health and human efficiency would be much simpler than it is. We should then really understand which are real and fundamental causes of disease and which incidental causes.

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And what is of greater importance is, that as we should then be able to control and direct the processes of the growing child intelligently, we should in the most effective way prevent many of the diseases which afflict adult age—not to mention the profound influence we should have upon the development of the race.

The question which now presents itself is: By what standard can we judge the degree of development of an organ; that is, how and when can we say that it is normal, excessive or deficient in development?

First, we must understand that the contour and proportions of the body are determined by the development of its organs; hence contour and proportions are an index of degree of development. A large chest presupposes large lungs and heart, these being the principal organs in the thoracic cavity. A large abdomen—not large because of an abundance of fat—presupposes large digestive organs, stom-

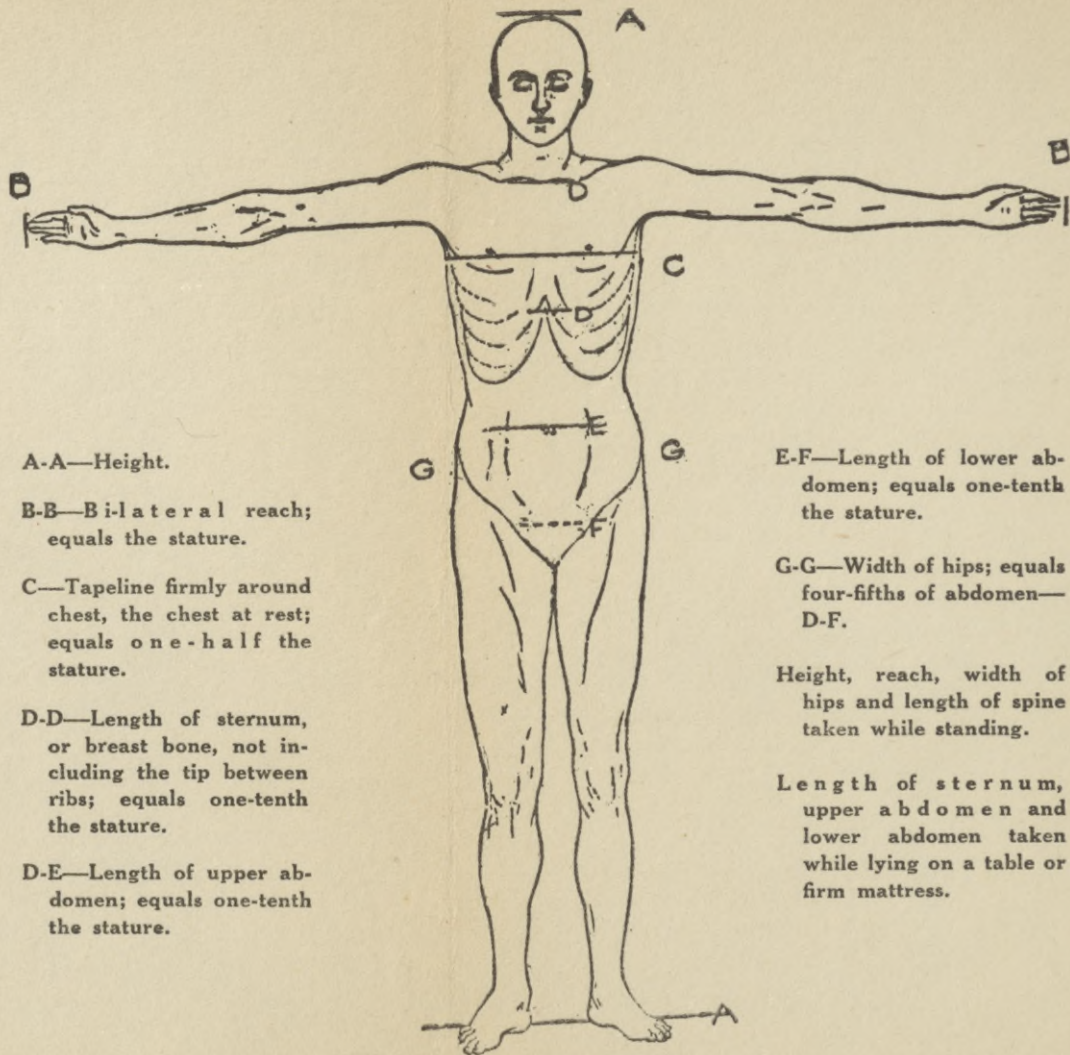
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ach, liver spleen, pancreas, intestines, etc. Large organs cannot be put into small cavities nor are small organs put into large cavities.

Hence we are justified in assuming that accurate measurements, taken of the exterior of the body, will furnish us with reliable data, data pertaining to the absolute and relative development of the organs and their correlations. From these we are enabled to draw practical conclusions concerning the character of the structure and of the functions of the body.

The standard of measurements formulated by Prof. De Giovanni, to whose splendid achievements reference has been made in the preface, has thus far proved absolutely reliable and exceedingly practical. This standard, let it be said, was not formulated until 40 years of the most arduous effort had been made to arrive at accuracy as well as to have one that was practical.

During this period many thousands of



A-A—Height.

B-B—Bilateral reach;
equals the stature.

C—Tape line firmly around
chest, the chest at rest;
equals one-half the
stature.

D-D—Length of sternum,
or breast bone, not in-
cluding the tip between
ribs; equals one-tenth
the stature.

D-E—Length of upper ab-
domen; equals one-tenth
the stature.

E-F—Length of lower ab-
domen; equals one-tenth
the stature.

G-G—Width of hips; equals
four-fifths of abdomen—
D-F.

Height, reach, width of
hips and length of spine
taken while standing.

Length of sternum,
upper abdomen and
lower abdomen taken
while lying on a table or
firm mattress.

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examinations and autopsies were made and case histories studied by him and his colleagues. It was found by them that adult persons who had the most vigorous functions, the highest degree of resistance and were freest from illness, had the following proportions: Equal stature and bi-lateral reach; chest circumference equal to one-half the stature; length of sternum (breast bone) equal to one-tenth the stature; length of abdomen equal to two-tenths of the stature, one-tenth from the end of the sternum to the center of the umbilicus (naval), and one-tenth from this point to the crest of the public bone; width of pelvis equal to four-fifths of the total length of the abdomen; and the length of spine equal to two-fifths of the stature. (See diagram for measurements.)

There are other proportions which in individuals must be considered, but, unfortunately, for these we have as yet no definite figures. Moreover, we are still without a standard of the normal child at various stages of the growing period. All

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we can say at present relative to the progress of development of a growing child is that with the passing of the months and years it must more nearly approach the standard of the normal adult. Failure to do so in any particular is evidence of imperfect unfoldment.

It is, of course, well understood that the proportions of the child are not those of an adult. The head, for example, of the new-born babe is equal to one-fourth of the stature in length, while the head of an adult is only one-eighth of the stature. The upper abdominal length of the infant, that is, from the end of the sternum to the center of the umbilicus, is greatly in excess of one-tenth of the stature. With the passing of the years these things must not remain so.

The fact is that there should be no increase in this latter measurement during the first 12 years of life. While others increase this must remain stationary. The chest circumference must increase, and,

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likewise the length of the lower abdomen, but this should not. During the process of unfoldment the structure is constantly being modified. Growth is a constant series of modifications. At no period can the organism be precisely what it was at any preceding period.

CHAPTER III

PROPORTIONS AND THEIR INTERPRETATIONS

IT will be seen that the standard of measurements presented in the preceding chapter is based on the assumption that the principle which says that the absolute and relative development which exists in and between organs determines the character of their functions is true, and that when all the data pertaining to the organization has been discovered we have a sound basis for forming a judgment as to the character of the functions. A little reflection will show that this is a justifiable assumption.

To illustrate: The development and functional capacity of the lungs must be of a degree sufficient to meet the demand of every cell and tissue for that essential element to life, oxygen. This means that the size of the lungs and their capacity to function must stand in a definite relation to every other organ and to the organism as a whole. A disproportion, either an ex-

Proportions and Their Interpretations

cess or a deficiency, is accompanied by corresponding excess or deficiency in the supply of oxygen and the creation of definite abnormal conditions and tendencies.

Now abnormal conditions and tendencies are created in an organ, for example, where a disproportion exists between the size of the organ and of the bloodvessels which supply it with nourishment. When the vessels are too small the consequence will be a deficient supply of nutriment and weak functions, if too large, there will be an excessive supply and engorgement.

Again a large development of the motive apparatus, skeleton and muscles, with a deficient development of the nervous system results in slow movements, sluggish reactions and torpor.

Let it be remembered that health is a balance in the functions; and to have this there must be a balance in the structure. *Health is a balance between supply and demand.* It is not a question of our sensations.

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Moreover, nothing can possibly establish and maintain health except a balanced organization. No kind of vaccination or inoculation can possibly make up a lack in function and resistance due to a defective structure, much as such modes of treatment may do to tide an individual over a danger period. Their effect at best cannot be other than transitory.

In making the measurements it is important that we differentiate between deviations from the normal standard which are due to disease and deformity and those which are the product of the regular processes of growth. A pigeon chest, for example, due to chronic asthma is the product of disease and must be considered in a different light from that of a very deep chest which is the product of a natural process of growth. Likewise a curvature of the spine due to disease of the vertebra gives us abnormal measurements, both as to the spine and the stature. Conditions like these must be very carefully and judiciously considered.

Proportions and Their Interpretations

One other condition regarding the chest needs special mention. Not infrequently do we find a chest that in circumference is equal to one-half the stature, indicating a normal. But analysis of the case shows habitual oxygen starvation, in other words, marked deficiency in function.

If we will examine the chest more carefully we will find that it is very flat and very broad. This is abnormal. It has been found on autopsy that in a chest of this formation the bloodvessels are long and of small calibre. This causes the resistance to the blood current to be abnormally high, the pulmonary circulation to be retarded, and the process of blood aeration to be defective.

As the purpose of the measurements is to gain an accurate understanding of the formation of the parts, that is, the natural structural formation, it is important that strained or abnormal positions are not assumed. The inclination of nearly everyone is to expand the chest the moment a

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tape is placed in position. This must not be permitted. The chest must be at rest, as at the end of natural exhalation.

The tape is placed at a level, not higher in front than at the back, and encircles the chest at about the fourth rib. It must be drawn very firmly; especially so, when the muscles are thick or the fat abundant. The shoulder blades must be as close to the chest wall as possible—a position easily obtained by having the hands placed behind the head in an easy manner and the elbows brought slightly forward.

In taking the measurement of the sternum care must be taken not to include the cartilage at the lower end of the bone. Passing the finger along and making moderate pressure the ridge at the point of the union between the bone and the cartilage is usually clearly felt.

From this latter point the upper abdominal measurement is taken. The chest and abdominal measurements are taken with the person lying on his back, and on

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something very firm, a table or hard mattress.

In taking the measurement of the upper abdomen it is important for the curve of the spine to be reduced to a minimum. It is often necessary for the person to flex his legs on the abdomen, that is, bring his heels close to the body. In taking the measurement of the lower segment, from the center of the umbilicus to the crest of the pubic bone, it is better to have the legs extended.

In taking the measurement of the spine the tape is placed well up under the head while the head is inclined forward, making firm pressure in order to make certain that the upper margin of the first vertebra is felt. The head is then brought into a natural position. Follow the tape down, keeping it in contact with the body all the way, and read the figures opposite the lower margin of the sacrum. The coccyx, the spine tip, is not included in the measurement.

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The simplest way to take the bi-lateral reach, is to have the person with out-stretched arms stand against the wall, touching a door frame or other fixed object with the tip of the middle finger of one hand, and while in this position a mark is made at the tip of the finger of the other hand. The distance between the two points is then easily measured.

Deviations from the normal are manifold; some being found in everyone. Disproportions may be found in any one or even all the organs. Any organ or system may be found greater or less than the normal. Their presence alone however, does not give us all the information necessary to form a judgment of the character of the functions. To these must be added the possible influence of bad hygiene—poor or inappropriate diet, bad air, faulty posture and faulty exercise.

A person may have an excellent constitution and yet be the victim of chronic indigestion because of a bad diet or bad

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habits in eating, while another, though he may have a perfect chest development, may suffer from habitual oxygen starvation because of bad postural habits.

Coming into the world with the organs in the upper abdomen relatively much larger than those in the chest and in the lower abdomen, it can easily be seen how a person, through faulty diet, posture and exercise, will carry these infantile proportions over into later life, even through life.

It is by no means an uncommon experience to find in persons past middle life proportions that bear the marks of their early childhood. The chest circumference is found to be less than one-half the stature, the upper abdominal length is in excess of one-tenth the stature while the lower is less than one-tenth.

In interpreting the meaning of disproportions we must first study these as they involve single organs or small groups of organs. After that they are studied in

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their relation to and influence on each other.

Taking first the organs of the chest: What is the significance of a large chest, one in which the circumference is greater than one-half of the stature?

In such a chest we find the lungs, heart and arteries large; and by arteries is meant not only those in the chest but the whole arterial system. The functions will be vigorous; oxygen will be supplied in abundance; the blood will be fully aereated; metabolism will be active; nutrition good; the general appearance will be one of robustness; the complexion ruddy and denoting good health. Everything denotes great vitality and high resistance.

But persons of this type are by no means free from disease or lacking in strong predispositions to disease. Because of their abundant vitality and vivacity they are strongly inclined to abuse their organs. Indulging excessively in the good things of the table they are not infrequently victims

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of indigestion, chronic liver troubles and a host of other more or less chronic ailments.

Their strongest predispositions, however, lie in the sphere of severe acute diseases, pneumonia, pleurisy, acute affections of the heart, inflammatory rheumatism, etc.

Their diseases are always very active. The onset is sudden and accompanied by rapid rise in temperature and other symptoms of inflammation. The crisis is usually reached early and the patient recovers quickly or else passes out quickly. Nothing is sluggish about persons of this type.

Owing to their great vitality they are prone to over-indulge in athletics, hence they are strongly predisposed to diseases of the heart—enlargement, dilatation and valvular lesions.

Though less predisposed to tuberculosis, they are not entirely free from this disease. What, however, invariably precedes the tubercular process is some acute inflammatory process of the lungs which

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was never entirely cleared up. The affected area later becomes the point of infection. The process usually runs a rapid course and is invariably accompanied by constant hemorrhage.

A deficient chest circumference denotes a primitive or infantile development. The lungs, heart and arterial system are poorly developed. The functions are weak, sluggish; the oxygen supply is insufficient, hence the blood is poorly aereated; metabolism slow and imperfect; nutrition poor; the general appearance denoting poor health, little vitality and low resistance.

Yet it is a fact that the mortality is no higher among this class than it is among those of opposite type. This is because they are less inclined to abuse themselves, either by work or indulgence in any bad habits. Many become habitual invalids and so drag on through many years, always thinking about themselves and caring for the health. Such diseases as they

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fall victim to usually take on a chronic character. Their acute diseases develop slowly and proceed sluggishly. Acute inflammatory diseases rarely reach a crisis, but rather drag on to the end. A high temperature is something that is impossible for them to produce. This is because of the poor arterial circulation.

The venous circulation predominates. The veins, both the superficial and deep veins, will always be found distended. The upper chest, shoulders and arms will be found covered with a network of small veins. Often the same will be found over the liver. When found, and wherever found, these veins indicate a retarded venous circulation in the deeper organs and tissues.

Since the lungs are small and their vessels poorly developed the circulation is more or less retarded. This results in the heart being forced to meet an excessive amount of resistance and in consequence it is disposed to become enlarged in the

right half. This is the result of the compensatory effort which it is forced to make.

But the effect of this retarded venous circulation is also felt by the liver. Owing to this back-pressure the liver and other abdominal organs are habitually engorged and their functions deranged correspondingly.

The glands and mucuous membranes are likewise in a state of chronic congestion or easily become so. These conditions create a strong predisposition to catarrhal diseases—frequent catarrhal colds, bronchitis and the like. This is particularly marked in the early years of life. Hence, the tonsils are large, adenoids are present and the lymph glands in the neck more or less hard or become so on the slightest provocation.

However, the most serious consequence which results from a deficient development and function in the lungs concerns the building of blood cells. Normal blood building can take place only when

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the blood is fully alkaline in character. The moment it is reduced in its alkalinity and becomes to that extent acid the normal process is reversed.

For example, in the normal process the albumins and phosphates pass from the blood serum to the cell and the chlorides from the cell to the serum. But when the blood becomes acid, even in a slight degree, the albumins and phosphates pass from the cell to the blood serum and the chlorides from the serum to the cell. The one is a constructive process and the other a destructive process. A change of this character in the blood is easily made possible, if not actually created, by a deficiency in oxygen and an excess of the carbonic acid gas.

It is clear that deviations from the normal in circumference of the chest are exaggerated or minimized by a long or a short sternum or other formations, as a very deep or very broad chest.

CHAPTER IV

INTERPRETATIONS CONTINUED

THE organs in the upper abdomen are rarely deficient in development. Being always relatively in excess at birth, they, because of our faulty knowledge of dietetics and other hygienic matters, remain so in the majority of persons throughout life. Even in the normally growing child the liver remains relatively large up to about the fifteenth year.

During the period before birth the duties of the liver are quite equal to that of all the other vital organs, hence at the time of birth it is not only larger but more perfectly developed. However, when the process of unfoldment proceeds normally it remains at the same point of development during the first twelve or fifteen years.

During this time the organs of the chest and those of the lower abdomen will have reached their normal, and the measurements will be approximately those of the

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normal adult. In other words, the trunk will divide into equal thirds in length, and each will be one-tenth of the stature.

Occasionally persons, even children, will be found whose upper abdominal organs are deficient in development. This will not be indicated by the length of the abdomen but by the circumference. Indeed, the length will indicate excess rather than a deficiency; but this will not be true excess. When this exists the chest circumference will likewise be less than normal. The long, tubular abdomen denotes small organs and weak functions.

These things will always be found in the habitually thin, withered and delicate persons, persons who live up to the limit of their vitality and who must ever conserve their strength. Though they are never robust, they frequently live to a ripe old age. But this, of course, is so only when they are happily situated, able to take their ease, and know how to live in conformity with their organic capacity.

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A child with this type of abdomen is unfortunate, indeed, for it means poor digestion, poor nutrition, slow growth, weak functions and low vitality. If in addition there is an excessive development of the nervous system, as not infrequently is the case, the condition is serious, requiring the most careful and intelligent attention.

A large upper abdomen, as indicated by a length greater than one-tenth of the stature, and when proportionately deep and wide, denotes large digestive organs—stomach, liver, spleen, pancreas, and also large kidneys. Moreover, it denotes large bloodvessels. All this makes for vigorous functions.

The appetite is excellent, even voracious. The individual is an habitual gormand; eating and drinking are his chief purpose in life. He will be fat, phlegmatic and is likely to be stupid; in short, he is a human cabbage. His tissues will be of low or poor quality, and though apparently well nourished and robust he will be without great vigor and resistance.

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All this is somewhat modified if the organs of the chest are specially well developed. The nutrition is then more normal and the quality of the tissues better. But when lacking in oxygen supply the process of combustion will be imperfectly performed. This results in two evils, namely, imperfect transmutation of the elements of digestion into normal red blood and imperfect burning up of waste. It must be remembered that the lungs play a most important part in the process of digestion, as well as in that of elimination. It is in soil of this character that large tonsils and adenoids originate and also, in which the microorganisms of measles, scarlet fever, diphtheria and of other so-called infectious diseases find their most favorable conditions.

When these facts are kept in mind it will not be difficult to see how useless, even absurd, the height and weight standard for judging normal nutrition is. With a little stuffing any child may have his weight brought up to what is assumed to

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be the normal. But this does not mean that the food has been properly prepared for tissue building and that the vitality and resistance are what they should be. Indeed, it is possible that the child is worse off because of the kind of tissue that has been built than when his weight was below the assumed normal.

The most serious diseases to which persons with excessive development of the organs in the upper abdomen are predisposed pertain to diseases of the liver. When a person is more or less given to gormandizing, the liver is habitually engorged. This in time leads to an actual increase in tissue and enlargement, or to what is known as cirrhosis of the liver.

This disease is characterized by increase in size and consistency of the organ; more or less constant pain of a dull and heavy character; often nausea and vomiting; jaundice. The color of the skin is at first of a lemon color later turning to a very dark color. Constipation; great

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weakness; aenemia, are some of the more prominent conditions. As the disease progresses the spleen and kidneys become involved, and dropsy is the quite common termination of the disease.

However, there is another form of cirrhosis in which the liver contracts as the disease progresses, resulting in what is known as hob-nail liver. This form of the disease is the product of a low grade inflammatory process due to the retention of irritating and poisonous materials in the blood. This form of the disease is very commonly found in hard drinkers.

But those with poorly developed chest organs are very commonly victims of this form of cirrhosis also. This is because of the defective function of the lungs and the imperfect aeration of the blood and consequent retention of waste and poisons. These cause the inflammatory process.

As can easily be imagined other organs become involved as this process goes on, and a long train of symptoms is produced.

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But each process and each symptom has its origin in an easily determined morphological or structural fact, one, moreover, that can easily be corrected; hence there is little excuse for any process ever gaining a foot-hold.

A small lower abdomen, as indicated by short umbilico-public line and by a narrow pelvis, denotes small intestines. The intestines may be either too short or too small in calibre; either condition results in deficient function.

The average length of the intestinal tract in the adult is 28 feet. However, on autopsy it has been found as short as 10 feet and as long as 40 feet. That the degree of function in cases where so great difference exists cannot be the same is not difficult to imagine. It is perfectly clear that, other things being equal, 10 feet of intestines cannot perform the same amount of function that 40 feet can.

The first direct affect of a small intestinal tract is defective digestion. The fact

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has been demonstrated by many distinguished physiologists that the vigor of the digestive function is in direct relation to the degree of development of the intestines. This is so, first, because accompanying large intestines are large blood-vessels which go to form the hepatic or liver circulatory system. Small intestines means a poor circulatory system and defective function of this important organ, and in turn defective function of the other organs in the digestive group.

The other explanation for the important part which the intestines play in the process of digestion lies in the fact that as vegetables form a large part of the human diet, and as vegetable protieids require an intestinal ferment for their digestion the process must be carried on very largely in the intestines. When these are defective in development of necessity the process cannot be normal.

The principal disease which results from a small intestinal tract is that of

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constipation. This may justly be called our national disease. No other is so common. The causes for it are imagined to be many; the most commonly assumed cause is charged to the liver, hence the enormous sale of liver pills, liver stimulants—calomel and the like. The abuse that is heaped on this defenceless and usually innocent organ is perfectly appalling!

The three principal or fundamental causes of constipation are defective development of the intestinal tract, inappropriate diet, and a neurotic constitution due to over-development of the nervous system. Not infrequently are these found in combination. Indeed, in the large majority of instances is this the case.

The reason for the defective development lies in the fact that as the intestines perform no very active function prior to birth they are in consequence relatively less developed than some of the other abdominal organs. Let something now occur to prevent perfect unfoldment and it is not difficult to see how naturally the

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infantile state is carried over into later life and the individual made a victim of constipation. And with our present imperfect knowledge of infant feeding few things are more likely to occur than imperfect unfoldment of the digestive tract.

Nine children out of ten are over-fed, in consequence of which the organs in the upper abdomen—the intake organs—are over-active and finally over-developed, while the intestinal tract is over-loaded and choked with waste. From this impaction and long retention of the fecal mass the intestinal wall becomes stretched and weakened by the mechanical pressure as well as by the disturbance that is caused in the circulation and nutrition of the tissues. The obvious result is an arrested development, the carrying over into a later period of life infantile character of structure, and converting a transient state into one that becomes permanent.

But one is often led to marvel that conditions are no worse; that young mothers

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get on as well as they do in the matter of feeding their little ones. The fact that they consult as few dieticians as they do probably explains the reason. Concerning few things is there so much confusion as there is about diet. No difficulty need be encountered by anyone, young or old, in getting a prescription for what he likes to eat or drink. He need but consult a sufficient number of dieticians; and usually two is enough. It is difficult to find two who agree. Certainly no three do.

But the influence of diet as a causative factor of constipation has undoubtedly been over-emphasized. It is by no means always the thing of first importance. Very frequently it is of distinctly secondary importance. And this is also true when we come to the matter of treatment.

For example, an individual in whom the general nervous system is over-developed and whose nervous functions are in excess of his normal requirements and who in consequence is habitually strained and

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sub-consciously tense is almost certain to suffer more or less from the disease. All of his involuntary functions are interfered with and are more or less irregular and unequal. To attempt to cure such a condition with diet alone is to attempt the impossible.

A regulation of the diet may be, indeed, very likely will be necessary to build up the general condition; and in this way the intestinal functions may in a measure be influenced. But this is a different matter.

The fact is now well established that anemia (a condition in which the red blood is deficient in both quality and quantity) is frequent in those who have a deficiently developed intestinal tract. When we recall what has been previously said, namely, that the vigor of the digestive processes is in relation to the degree of development of the intestines, this fact becomes quite clear. Though there is another factor of considerable importance, which will be more fully discussed when we come to consider the matter of diet.

CHAPTER V

THE NERVOUS SYSTEM

NO organic system has so wide and varied an influence as has the nervous system. This is because its structure reaches and affects every organ and tissue in the body. The whole organism is unified by the nature and extent of its development. Hence, it follows that in judging the constitution and character of function of an organ, the special aptitude—structure and function—of the nervous system must be fully taken into consideration. An organ may in itself be normal, even larger than normal, yet owing to a defective nerve supply have weak and unstable functions.

Or the reverse condition may prevail; that is, an organ may be somewhat deficient in size yet have power to react vigorously. Of course, such an effect would be more or less temporary. If at all prolonged the organ would gradually become weakened. This is a condition frequently seen in persons who live, as we say, on

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their nerves—a condition due to a lack of balance in the organic structure.

But it also happens that the nervous system is not uniformly developed. It may be excessive in one part of the organism and deficient in another. This results in unequal and unstable functions—exaggerated in one part and sluggish in another. The nervous system, in other words, in a large measure determines the special functional disposition of an organ and it must therefore be understood before that of the organ itself can be understood.

Experience teaches us that individuals in regard to their nervous functions and reactions may be classed as *normal*, that is, well poised; *erethistic*, that is, sensitive, irritable, unstable, neurotic; and *torpid*—weak and sluggish.

The two principal indications of a lack of balance in development of the nervous system are, (a) bi-lateral reach greater or less than the stature, and (b) length of

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spine greater or less than two-fifths of the stature.

A bi-lateral reach that is in excess of the stature is constantly found among those endowed with a highly developed brain and nervous system. This does not mean that such persons are specially intellectual, cultured and refined. It simply means that they have the organic or structural base and might be so.

A contrary state is a very common observation among such. They are often stupid, crude and most erratic. Having a large development they have correspondingly vigorous functions. These when uncontrolled and directed very frequently lead the individual to show his crudities in a glaring and conspicuous manner. They may then have great zeal but poor control and direction.

The predisposition to nervous manifestations in every disease and to actual nervous diseases is very strong in all those with a bi-lateral reach greater than the

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stature. Hence it can be seen how important it is to make this measurement in children and be guided in the course to be pursued in their training by the facts revealed. Unfortunately, only too often the abnormal disposition is fostered by habits and training that tend to make bad matters worse.

A child with a keen, active and retentive mind is encouraged in excessive reading and study, and is permitted to indulge in stimulating and exciting entertainment. In this the child is not infrequently encouraged by stupid parents and teachers. It is made a "show piece" by parents who fondly assume that its cleverness will be interpreted by others as being a reflection of their own, and by teachers as being a splendid commentary on their brilliant methods of teaching. Children of this type are often crowded through their school work in order that they may break the record. To be graduated from high school by the time they reach their "teens" is considered an achievement. Such folly

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cannot be condemned too strongly. It is nothing less than vicious.

Few of us really clearly comprehend what is involved in the statement that the child is the father of the man. We do not realize that it is the repetition of mental and nervous reactions in the daily life of the child which shapes the organism and determines the character of the mental and physical functions in later life. A Hindu proverb puts the thought in these words: "In the Great Journey, causes sown each hour bear each its harvest in effects, for rigid justice rules the world."

In other words, if we would have a race of men and women who are physically fit, intellectually sane and morally sound we must *build* them so through the intelligent control and direction of the forces which build body and brain during the years of childhood, youth and up to maturity. By habit and practice changes are wrought in the structure which if maintained for a sufficient length of time become fixed and

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establish functional states which determine moral and intellectual character. We must set in motion in these formative years causes whose effects will be what we would have them be.

Effects we are bound to have; and effects are always in keeping with the causes of which they are a product. This is a law of the universe; one which mortal man must understand and by which he must be guided.

And here it may be well to emphasize the fact that there is no such thing as a bad faculty in the child mind. Every brain faculty is normal and essential to our physical existence. Abnormal manifestations occur only in the immature mind when there is a lack of balance in the relative development between various portions of the brain.

Excessive reach is also found in the primitive types as well as in the over-developed. It is characteristic of the an-

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thropoids, the negroes, negritos, papuans and other primitive types.

But some one may ask, are these races neurotic? No, they are not when left in their own primitive surroundings and permitted to live the life that is natural to them. However, when taken away from these, or when they have forced upon them the habits and conditions of the white man then they easily become neurotic, and, as history shows, readily succumb.

Nothing is more characteristic of primitive types than emotionalism, hysteria and other exaggerated nervous manifestations. And, of course, the same is true of the higher types in whose morphology we find this same imbalance between the nervous system and that of the organism as a whole.

The only race in which a deficient bilateral reach is characteristic is the Chinese race. This fact enables us to understand the torpor of their nervous reactions. It is difficult to imagine an hysterical or

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flighty Chinaman. The disposition is always calm and placid. He, as a rule, calmly endures insults and injury. And this is as characteristic of the nation as it is of the individual.

When a deficient bi-lateral reach is found in the Caucasian we can be certain that he has been habitually under-nourished, that he was in his earliest years the victim of some nervous disorder, or the victim of constant repression and suppression of his natural instincts and emotions. Often these various conditions operated in conjunction and arrested the normal processes of development.

The functions are characterized by weakness and sluggishness. The person is never able to maintain a high degree of nervous activity. He may do so in spurts. He may begin a task with energy and enthusiasm, but if it is at all prolonged he is certain to weaken, even to give up before he reaches the end. He is susceptible to various disorders, including nerv-

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ous disorders. Though well developed in themselves organs are more or less weak in function because of the lack of nerve force when this condition of imbalance exists.

Persons of this type are also inclined to be neurotic, but for a different reason from those in whom the bi-lateral reach is excessive. In the latter class there is an over-development and exaggerated functions, and the neurotic manifestations are the result of the inability to use all the forces in an easy and natural manner, while in the other class there is a lack of development and weak functions, and the neurotic manifestations are the result of a constant struggle to meet the demand.

Children in whom this latter defect exists are unable to meet the unreasonable demands of the school curriculum which present day systems of education have built up. And when the present "half-baked" theories of mental tests are applied such children are almost certainly

classed as sub-normal or even as mentally defective and put into a separate group, given special instruction and thoroughly made to feel that they are inferior. What sufferings and insults children are made to feel because of the ignorance of their elders! The sins of the fathers truly are visited on their children, and the greatest of all their sins is that of ignorance.

What these mental tests determine is not what is wrong, but in an elaborate and more or less scientific way merely tell us what something is wrong. They merely concern themselves with effects, or possibly in a remote way with incidental causes. With fundamental, that is, organic causes they have not the slightest connection.

What children of this type require is not special school work so much as a suitable diet, one in which the elements which go to build brain and nerve cells are abundant, and a system of exercises which will go to build lungs, heart and an arterial system, and make normal nutritive processes and normal growth possible.

The matter of the spinal length also has a strong bearing on the problem. Were it possible for each parent to measure accurately the various segments of the spine—cervical, dorsal, lumbar and sacral—information would be gained which in certain instances would be helpful. Such a procedure, however, requires an understanding of anatomy as well as an amount of skill which the layman is hardly expected to possess.

Several points relative to the spine in its total length and in its relation to the stature deserve to be mentioned.

Let it be understood that the length of the spine in its relation to the stature is not uniform. It varies, often markedly. The spine of one person six inches taller than another has been found to be actually four inches less than that of the shorter person. This shows that to be satisfied with the statement that the average length of the spine is 0.75 meter, that is, approximately 29 inches is to be satisfied with very uncertain knowledge.

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We must cease to be satisfied with knowledge that has no better basis than averages furnish. Could we always deal with our problems on a general basis or wholesale plan such knowledge would probably be sufficient. But this is not possible when we are dealing with problems that have to do with individuals.

A length of spine that is greater than two-fifths of the stature at birth indicates a pre-natal or embryonic condition of development. At the fifth month of foetal life the spine is equal to three-fifths of the stature. During normal unfoldment this is reduced, so that at birth it is two-fifths; and unless arrested in growth by disease, defective nutrition or by abnormal psychological processes, so remains during life.

Hence when we find a length of spine greater than two-fifths we may know that we are dealing with an embryonal condition—one that belonged to a pre-natal period. And, according to the principle which says that character of function is in

relation to character of organization, we may know that the individual's functions are embryonal in character, therefore, inappropriate to the later period of life. In such a case we have an arrest of development in the true sense of the word.

Observation shows that with deviations from the normal in spinal length the same mental and nervous conditions prevail as with deviations from the normal in bi-lateral reach. Therefore, when the deviations in spine and reach correspond, the mental and nervous manifestations are exaggerated. If, on the other hand, the spine is normal and the reach abnormal the manifestations are modified, are less pronounced.

In forming a conception of the character of the development and vigor of function of the nervous system, it is exceedingly important that we keep constantly in mind the character of development of the arterial system and the vigor of the arterial circulation. This, in truth, applies

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with equal force when studying any other organ or system.

It is through this circulatory system that nutrition is made possible. It is the red blood of the arterial circulation which carries the nutritive materials for building and repair of tissues. Therefore, if during the years of growth anything interferes with the quality and quantity of the arterial blood—if it is deficient or in any way faulty—some degree of defect in structure is certain to take place.

If the defect in the circulation takes place in a later period of life, after the organs have attained their growth, then we may be absolutely certain that the functions are below normal; that their action is sluggish and their resistance is low.

Now it is true that a defect may exist in one part of the arterial system and not in another. Thus one part of the body is properly nourished and another is not. This fact may be determined by the degree of development of parts and often by the feeling of warmth or the absence of it in parts.

CHAPTER VI

ANALYSIS OF CLINICAL CASES

BEFORE taking up the subject of the hygienic treatment of structural abnormalities it will be well to study a few clinical cases in order to show how the data discovered by the morphological measurements is to be dealt with and what may be learned from it. It is understood, of course, that in addition to what the measurements reveal other data must be sought for in order to have a complete picture of the case and a comprehensive understanding of the condition. The heredity, the social environment, the habits in general, the diet, the history of the diseases in the past and the mode of recovery from these, all this must be considered before a definite conclusion is formed.

It is entirely possible for a person to have well developed and perfectly correlated digestive organs and yet be a victim of indigestion or constipation because of a bad diet. Or, again, a person may have

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perfectly developed lungs and yet be a victim of oxygen starvation because of bad air or vicious postural habits—drooping shoulders, crouching position when sitting, etc.

One who sleeps in a poorly ventilated room is certain to suffer from want of oxygen though he may have perfect lung development. And that certain sequelae often follow acute disease and affect the course of the growth of a child and thus its functions is well known.

In all but the last two of the following cases the home life, diet, general environment and hygiene were quite all that could be desired. In each instance the environment was wholesome.

The first case, that of a young man of 18, is typical of the large chested type in mental as well as physical habits and tendencies.

The measurements were: Stature 170 centimeters; bi-lateral reach 175; chest circumference 93; length of sternum 17;

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length of upper abdomen 20; of lower abdomen 16; width of pelvis 27; length of spine 70.

Compared with the normal we find the reach 5 centimeters in excess; the chest circumference 8 in excess; the upper abdomen 3 in excess; the lower abdomen deficient 1; the width of the pelvis deficient 1; the spine excessive 2.

According to the principles laid down in a previous chapter we are led to the following conclusions: Excessive nervous functions with tense, strained, excitable and unstable disposition; disposed to indulge excessively and strenuously in everything that is done—eating, drinking, exercising, etc., in other words, knows little of self-restraint or poise.

Predisposition to inflammatory diseases, such as pneumonia, pleurisy, bronchitis, inflammatory rheumatism, inflammatory affections of the heart with valvular lesions, enlargement, and in later life possible dilation; occasional attacks of indi-

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gestion from over-indulgence; constipation.

This diagnosis was based on the facts of the large and active vital organs, supplying abundant nutrition. The history revealed the following: He was intemperate in everything he did. He indulged madly in athletics; was contented nowhere except on the athletic field or in the gymnasium. He had an inordinate appetite, and was satisfied with nothing other than foods that were rich in proteids—meat, eggs and the like. These constituted the chief elements at each meal.

In his early years he was subject to bronchitis. He twice had pneumonia, once pleurisy, and twice inflammatory rheumatism, once being confined to bed with it for three months. The deficient development of the intestinal tract, as shown by the short lower abdomen and narrow pelvis, naturally predisposed to constipation. Of this he had been a victim for many years. In short, the morphological diagnosis was

confirmed by every detail in the case, in the past as well as in the present history.

The second case is that of a young woman of 20, a student in college. She was the daughter of a well-to-do manufacturer, reared in a home of culture and refinement.

The measurements were: Stature 167.5 centimeters; bi-lateral reach 162.5; chest circumference 74; length of sternum 15.2; length of upper abdomen 21; lower abdomen 16.5; width of pelvis 28.5; length of spine 65.

Compared with the normal we find the reach 5 centimeters deficient; chest circumference 9.5 deficient; the sternum 1.5 deficient; the length of the spine 2 deficient; the length of the upper abdomen 3.2 excessive; the lower normal; the width of the pelvis 1.7 excessive.

The functions in consequence were: Respiratory insufficiency, with oxygen starvation; poor arterial circulation; sluggish metabolism and poor nutrition,

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though the abdominal organs were all large; low nerve force and little resistance.

Her appearance denoted good nourishment and good vitality. She was up to the normal in weight, but the quality of her tissues was poor, being soft and with little resistance or tone. This was so because of the lack of oxygen. The abdominal organs performed their part in the digestive process well enough, but owing to the deficiency in the oxygen supply the lymphatic elements were imperfectly transmuted into red blood cells and into normal building material.

All her life she had been a victim of acute catarrhal colds, affecting especially the upper respiratory tract; frequently ill with influenza; had had all the eruptive diseases—measles, etc. Though ambitious and energetic she was seldom able to successfully carry out her plans. The beginning of a task would be conducted with energy and spirit, but if it was at all prolonged she would be exhausted before it

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was completed. Monday was always a satisfactory day in her class-work, but Friday was frequently a day of physical and mental exhaustion and torment.

The diagnosis in the case was exceedingly simple, as was also the treatment appropriate to her need. And this, it may be said, restored her to a normal in the course of a few months.

But not only was the diagnosis of the condition at the time of the examination a simple matter, it was equally simple to predict what the future held in store for her. That she would, if the tendencies inherent in the particular morphology were not eradicated, become fat, phlegmatic, neurotic, possibly tubercular, one could assert with all assurance.

The next case is that of a puny, sickly lad of 7. The stature was 123 centimeters; bi-lateral reach 121; chest circumference 56.5; the length of sternum 11; length of upper abdomen 20; of lower ab-

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domen 11.5; width of pelvis 17; length of spine 48.5.

Compared with the normal the reach is 2 centimeters deficient; the chest circumference 5 deficient; length of sternum 1.3 deficient; the lower abdomen .8 deficient; the width of pelvis 5 deficient; the length of spine normal; the upper abdomen 7.7 centimeters excessive. .

The functions in consequence were in many ways quite like those in the preceding case—respiratory insufficiency, oxygen starvation; very sluggish metabolism; poor nutrition; poor circulation; torpid nervous functions; low resistance; low vitality. But instead of there being normal bowel function or a tendency to diarrhoea there was habitual constipation. A comparison of the lower abdominal measurements shows a structural difference and explains the difference in the functions.

The high blood pressure in the pulmonary vessels had caused the right side of the heart to become enlarged and one

valve to weaken and produce a distinct murmur.

A marked tendency to glandular enlargement existed, and from early infancy he had suffered from bronchial catarrh. The tonsils and adenoids had been removed by an operation. Indigestion and chronic constipation had always existed. The mental and nervous reactions were so far below normal that his removal from school was made necessary.

Here, as in the preceding case, an hygienic program based on the morphological data restored the boy to a normal in one year.

The next case, that of a lady of 35 years, presented as wretched a morphological combination as could be imagined, and her previous history was one of extreme misery from childhood right on.

The stature was 157; the bi-lateral reach 148.5; chest circumference 70.5; length of sternum 14; length of upper abdomen 19; of lower abdomen 17; width

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of pelvis 26; length of spine 62.5. The heart was small.

Compared with the normal we find the reach 8.5 centimeters deficient; the chest circumference 8 deficient; the length of the sternum 1.7 deficient; the upper abdomen 3.3 centimeters excessive; the lower 1.3 excessive; the width of the pelvis 1 excessive; the length of the spine normal. The muscular development was poor, especially the chest muscles. The heart, as has been said was small, and the arteries small in consequence.

The functions of all the organs were of necessity below normal. Though the abdominal organs were excessively developed, the deficiently developed and weak lungs, heart and arterial circulatory system and the low nervous functions made normal activity on their part utterly impossible. There was neither nerve force to energise the organs, nor sufficient oxygen to complete the process of digestion.

The result was that rapid disintegration

of the lymphatic elements took place and abdominal dropsy had been one of the trying diseases in days gone by, and chronic diarrhoea had existed for fifteen years. There was a marked dilation of the stomach with prolapsus, and a similar condition of the intestines. At one time in the past there had also been a prolapsus of the organs in the pelvis. Five years of her life had been spent in bed or in the wheel chair. During this time the most distressing condition suffered was dropsy.

Now extreme as her condition had been and, indeed, was at the time of the examination, there was nothing in it that could not be traced directly to the morphological defects. The mode of development of her symptoms was in close accord with the predispositions created by the character of the structure and the functional correlations, that is, the influence exerted by one organ or group of organs on others.

Case five was that of a man 65 years of

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age, a victim of tuberculosis in an advanced stage.

The stature was 167.5 centimeters; bilateral reach 165; chest circumference 69; length of sternum 14; length of upper abdomen 21; lower abdomen 12; width of pelvis 26; length of spine 59; heart small.

Compared with the normal we find the reach 2.5 deficient; the chest circumference 9.7 deficient; the length of the sternum 2 deficient; the lower abdomen 4 deficient; the width of the pelvis 2.2 deficient; the spine 4 deficient; the upper abdomen 6 centimeters excessive. The latter, though excessive in length, was very small in circumference and in depth, a condition which denotes deficient development of the organs.

Not only were the lungs very seriously involved in the tubular process, but likewise a number of the joints. The process was one of very slow development, characteristic of all morbid processes in indi-

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viduals in whom the vital organs, particularly the chest organs, are poorly developed. Strong reactions and rapid action of the disease is rarely or never seen in such cases.

The nutritive functions were exceedingly low, as can easily be imagined, and the emaciation extreme. He was utterly unable to take food in normal amount or digest and utilize what he took.

Though the lungs were extensively affected there was no history of hemorrhage; which absence is the almost invariable experience when the lungs are poorly developed and where the progress is slow. The disease in such cases usually begins in and largely confines itself to the lymphatic glands in the chest cavity.

The next case is that of a man 64 years of age and also a victim of pulmonary tuberculosis.

The stature was 164.5 centimeters; bilateral reach 170; chest circumference 99; length of sternum 17; length of upper

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abdomen 22; lower abdomen 17.5; width of pelvis 31; length of spine 68; heart large.

Compared with the normal we find every measurement excessive; deficiency is found nowhere. Every organ is found to be above the normal in development; a condition the direct opposite of that of the preceding case.

Until four years previous to the examination the health had been excellent. At the time in an accident several ribs were fractured. This was followed by pneumonia. Certain areas involved in the pneumonic process failed to clear up, and in a comparatively short time became the seat of the tubercular infection. Hemorrhage characterized the process from the beginning. The general nutrition was excellent, and though the morbid process was active his vitality was amazingly good.

A comparative study of these cases shows a striking similarity between in the character of the functions and character of the diseases and tendencies.

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Cases one and six had large development of the vital organs, particularly of the chest organs, and both had been victims of acute inflammatory diseases, diseases which were characterized by great activity. All the other cases show a deficiency in development of the chest organs, and their diseases were characterized by sluggishness, by symptoms that had a distinctly chronic aspect.

In the former the nutritive processes were very good; metabolism excellent, while in the latter not one had anything like a normal process. Even those in whom the abdominal organs were found quite normal or above normal digestion and assimilation were imperfect. This can be accounted for by the fact of the deficient development of the lungs, heart and arterial circulation.

In each of these cases the character of the predispositions and susceptibilities and the disease was in strict accord with the principles laid down in an earlier chapter.

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Excesses and defects in the structure led to certain excesses and defects in function—to discords in the vital processes—which, in turn, ended in certain morbid states. The connection between the individual morphological state, the functions and the disease was direct and unmistakable in each case.

CHAPTER VII

DIET

IT is a well recognized fact that during the years of growth no factor equals that of diet in its influence in determining the character of the organic structure. The elements out of which or with which the body is constructed are contained in the diet which the individual consumes. And when we say "body" we include the brain—the physical instrument of the mind.

Now, since function on every plane is possible only through the medium of physical organs, and, therefore, in character determined by the character of the structure of the organs, it is exceedingly important what kind of material we supply for their building.

Throughout the entire life of an individual diet remains the factor of greatest importance. Health depends more on this than on any other one thing. Obviously how a person breathes, thinks and acts are matters of very great importance.

These things have a great deal to do with what happens with the food after it gets into the stomach.

Mental depression, for example, greatly interferes with the functions of the stomach, liver and other organs, and is almost certain to militate against a normal digestive process. Likewise, a deficient supply of oxygen—either because of poor lung development or bad breathing habits—makes a normal process impossible.

We must not forget that the process of transmuting food substances into normal healthy blood and tissue cells is entirely a chemical process. This means that to have normal chemical processes we must see that the necessary chemical elements are supplied, and supplied in the right proportion. There cannot be too much of one thing and too little of another.

One of the most, if not the most important element necessary is oxygen. No process in any living organism is or can be normal when there is a lack of oxygen.

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And since the supply of this essential element comes through the functioning of the lungs, it necessarily follows that we must include the lungs,—the degree of their development and the vigor of their function—in every consideration involving the digestive and nutritive processes. Not infrequently are they the principal determining factor. A defect in their structure and function will often cause the nutritive processes to be exceedingly poor though the abdominal organs are perfectly normal and doing their share of the work of digestion in a perfect manner.

This fact is well illustrated by several of the cases presented in the preceding chapter. *Life simply cannot be adequately sustained without a full supply of oxygen.* This fact cannot be too strongly emphasized. Many other things are necessary, but none of such essential importance. We are able to live for weeks without food and days without water, but we cannot live more than a few minutes without oxygen.

Let us then cease to lay all blame for our indigestion and other digestive troubles on the stomach and liver. These and the other abdominal organs may be doing their share of the work in turning out the right kind of building material in a most efficient manner.

The problem of diet is always an individual problem; though we usually try to solve it on a class, group or wholesale basis. Diets are usually prescribed without any regard for the fundamental morphological factors involved. Our prejudices more often sway our judgments than our reason. Some of us are vegetarians because of prejudice and some are against vegetarianism for no better reason. And our prejudices are often the outgrowth of the benefits we personally derived from one system or because of the imagined harm from the other.

Many of us are unaware of and many refuse to recognize the fact that there are carnivorous types of humans and also herbivorous types, and that it is as unwise

and as unscientific to feed all on the one kind of diet as it is to feed the different kinds of animals in the "Zoo" on one kind. Unfortunately the "Emotional hypothesis" prevents our recognizing this common sense fact as well as the fact that we are prejudiced.

In a broad way foods may be classified as (a) nitrogenous or albuminous and (b) carbohydrates or carbonaceous. All contain proteid—nutritive material—but those in the first class have a much richer supply. Proteid, let us understand, is a complex substance containing carbon, hydrogen, nitrogen and sulphur. It is a necessary substance in the diet of all organized beings. The proteids are often spoken of as the albuminoids, because proteid is similar to the white of the egg. This is the best illustration as well as the richest proteid that enters into the human diet.

The foods richest in proteid are all the meats, especially lean beef and mutton, fish, eggs, beans, peas, lentils, nuts and the dairy products. All the grains—wheat,

barley, oats, rye, Indian corn—and the vegetable contained proteids but in a lesser amount than the meats.

The grains and many of the vegetables contain in addition to proteid other substances, notably starch. This is not found in the meats.

The animal proteids are digested largely, almost wholly, in the stomach while the vegetable proteids are very largely digested in the intestines, requiring, as they do, an intestinal ferment for digestion. This is a fact of very great importance, which will be discussed later.

The foods that are classed as carbonaceous or as carbohydrates—so called because of the presence of large amounts of carbon—are the starches, sugars, oils and fats. Their chief function in the body is to produce heat. Those richest in starch are rice, potatoes, sago, macaroni, tapioca, the grains, parsnips, Hubbard squash, and a few of the other vegetables.

Those richest in sugar are honey, cane

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and beet sugar, fruits—both fresh and dried. Those most easily digested, entering most directly into the blood stream are honey and the fruit sugars. Cane and beet sugar, especially the refined and granulated, require special digestion, hence are less desirable as foods, and, therefore, should be as completely eliminated from the diet as possible. Indeed in most instances should be entirely eliminated. Children should under no circumstances be allowed to have either cane or beet sugar in any form.

The chief sources of the fats are, dairy products, cream, butter and cheese, pork, mutton, fish, peanuts—which are really not a nut but a legume—and all other nuts. These are the most concentrated of all the foods.

Foods must also be classified from the standpoint of their inorganic content and the vitamins. No elements are so essential to the body building as the inorganic salts—sodium, calcium (lime), phos-

phorus, potash, iron, manganese and sulphur. A deficiency in the supply results in a stunted growth of the skeleton and in weak tissues. It is therefore obvious that in selecting a diet for the growing child we must choose carefully of those which not only supply the proteids in goodly amount, but above all things choose from among such as are rich in the inorganic salts. It is these salts that make the building of a boney framework possible.

Let us not forget that no child will or can grow into a strong healthy man or woman if the skeleton is weak or poorly developed. It is to this that all the organs and soft tissues are attached. If the frame is weak or under-developed the body cannot be strong.

The foods richest in the inorganic salts are, wheat, rye, barley, oats, beans, peas, lentils, green vegetables, lean beef and mutton, cheese, and the various fruits. Raisins are especially rich in iron, as also is spinach.

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Concerning the vitamins there is much that is uncertain, and probably much that is entirely unknown. However, we are certain of a great deal concerning their place and value in the diet.

The vitamins are classified as A, B, C, D and X. Others are being discovered and classified by letter, but their place in the science of diet is still too uncertain to permit of their being mentioned.

Vitamins are believed to be the substances in our foods which make life possible. The five so far discovered and whose properties have been quite accurately and fully determined are: "Fat-soluble A" which is found in butter, eggs, meat, milk and in some of the vegetables. In other words, it is found in foods that are richest in protein and fat. A deficiency of this particular vitamin predisposes to rickets.

"Water Soluble B," which is chiefly found in fresh milk, sugars, whole wheat, the hull of all the grains and rice, fruit

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juices, green vegetables, nuts. That is, it is found very largely in the carbonaceous foods, though in a few of the others. And yet it is not in the starchy parts of the grains and rice that it is found, but rather in the hull. When these have been put through a process which separates the hull what is left is almost pure starch and completely robbed of this vitamine.

Unfortunately this is what many of us demand in the way of wheatflour, oatmeal and rice.

A deficiency of this vitamine in food predisposes to various diseases of the nervous system, notably polyneuritis, commonly called beri-beri. This is a disease accompanied by paralysis and a gradual atrophy of the whole muscular system.

“Water-soluble C” is found chiefly in potatoes, cereals and the starches generally, and fresh meat. Its absence from the food predisposes to scurvy.

“Vitamine D” is found chiefly in yeast, and is necessary for the growth of many

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kinds of cells. It is at present not fully understood either as to its source or its influence on the growth and functions of the organs.

“Vitamine X” is found chiefly in lettuce and probably in other leafy vegetables, and in whole grain wheat. Its influence on the physical economy has, like Vitamine D, not yet been fully determined.

“Vitamine B” is credited with having a direct influence on the endocrine or ductless gland functions, stimulating the function of secretion and through this exerting a powerful influence on all the bodily functions.

Whether these substances, called vitamins, possess all the properties claimed for them may be doubted by some. But it is certain that foods in their natural or raw state—and it is these in which they are principally found—possess something which the refined and processed foods do not possess. And when we remember that primitive peoples live largely and some

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wholly on raw or natural foods and that they are free from many of the structural defects and functional diseases from which the races suffer who demand and feed almost wholly on the refined and processed foods, it is quite evident that there is something distinctly worth while in these mysterious substances.

The American Indian, for example, has little use for a dentist, while the white man living in the same community has crowns, and plates and cavities galore.

That we are constantly undermining the health by catering to our cultivated and artificial tastes is a fact which can easily be proved. The neglect of or refusal to eat green vegetables and raw fruits, which are all rich in the various vitamins and inorganic salts, is a reproach to good sense.

Says one writer. "We have learned how to combat and control all those terrible diseases which scourged the world in the past, such as plague, cholera, typhoid fever, smallpox, yellow fever,

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malaria, hookworm, pellagra, scurvy, tuberculosis, etc., but people are still sick, dental decay is universal, cancer on the increase, heart disease in the children of our cities appalling."

Isn't it possible that the diet has something to do with this state of affairs?

CHAPTER VIII

DIET CONTINUED

THE three principal factors to be considered in selecting a diet for the individual are (a) age, (b) morphology or constitution, (c) occupation.

The growing child, obviously, requires certain elements in far larger amounts than does the person in advanced years. Then there are others which he requires in smaller amounts. The growing child must build a skeleton and for this purpose must have the mineral salts, especially lime and phosphorus, in larger amounts than a person whose boney frame is completely formed. The latter requires these salts in sufficient quantity merely to keep up the process of repair.

The growing child must also have the proteids supplied in *relatively* larger amounts. He still has a body to build. But this must not be taken to mean that he must have the proteids in larger

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amounts or in an amount equal to that of an adult. Unfortunately for most children this is the idea that guides their elders in their feeding. In relation to the size of their bodies the amount of proteids is larger than that of an adult, but in actuality it is and must be much less.

The demands of a child are more uniform than that of an adult; and they are simpler; hence the diet must not be too varied. It is a grave mistake to have many different articles of food in the diet of a child. And to make various tempting dishes because the child does not want to eat is most reprehensible.

Every normal child will eat sufficient of a few simple wholesome dishes properly prepared. If he does not care for these it is because he is not hungry, or else not well, or because his tastes have been spoiled by the stupidity of his elders. The only occasion for ever deviating from this rule of simple feeding is that which is created by the peculiar physical or morphological make-up of the child. Spe-

cial demands must be met, and these may call for special articles of food. This is scientific feeding.

The natural and perfect food during infancy is milk. After the nursing period other foods must be added which contain, besides proteid the fats, carbohydrates (starches) and the earthy salts. Milk is sufficiently rich in proteid and the fats to meet the requirements for a number of years, but it is poor in starch and the earthy salts. Therefore, these must be introduced at the proper time and in the most suitable form to assure proper digestion. Moreover the vitamins must also be supplied.

The most perfect form in which the earthy salts and vitamins can be given is in raw fruit and raw vegetables. But as many of these, especially the vegetables, cannot be given a small child, their juices should be expressed and given. Then again it is always possible to use the water in which vegetables have been cooked and these elements utilized.

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However, how extensively vegetables, either in the raw or cooked state, should enter into the dietary, not only of children but of adults also, depends a great deal on the degree of development of the intestinal tract.

It must be remembered that a vegetable diet is a bulky diet, and too, that the vegetable proteids are digested in the intestines, requiring an intestinal ferment for digestion. If an individual has a small intestinal tract, as indicated by lower abdominal measurements that are less than one-tenth of the stature and a width of pelvis that is less than four-fifths of the length of the abdomen, it is clear that he is not prepared to take care of a large mass nor able to supply the essential ferment in the amount required.

In such a case fermentation, of an abnormal character, and flatulency are certain to take place. Moreover, it often happens that constipation of a stubborn character results from a vegetable diet.

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These things are clear proof that digestion is imperfect and the diet inappropriate.

Persons who have a large abdomen, both in the upper and lower segments, may be given a bulky diet, and, hence may have vegetables in their natural or even cooked form.

But what they should not have in large amounts is a diet rich in the carbohydrates. Owing to the ease and rapidity of digestion of these they are invariably taken in excess and lead to obesity and lymphatism—a lymphatic and phlegmatic or flabby constitution.

The tendency to this condition is accentuated when there is a deficient development of the lungs. Requiring, as the carbohydrates do, an abundant supply of oxygen for complete combustion, a lack of this leaves digestion in an incompleting and imperfect state.

And this is true in the early as well as later years of life. Persons of this type appear well nourished and robust,

but their tissues are never firm. They have soft flabby tissues, tissues that are without normal resistance. This fact should be kept in mind by parents who insist on the children eating a large bowl of cereal every morning.

Another fact relative to carbohydrate digestion must be kept in mind, namely, that in addition to an abundant supply of oxygen the ferment, ptyalin, in the saliva is absolutely necessary for complete digestion. When this is lacking digestion is imperfect. And that it is lacking more often than not is a fact which one can observe by watching people eat a soft and mushy dish—cooked oatmeal, mashed potatoes and the like.

The cereals, soft and mushy to begin with, are treated with milk, or milk and cream, and the potatoes are treated with butter or gravy and made more mushy, with the result that no chewing is done. Their stay in the mouth is no longer than it takes the tongue and muscles to pass them on to the esophagus and send them

down into the stomach. This is a very serious matter, especially since cereals constitute so large a portion of the breakfast of many adults as well as children.

Concerning cereals another fact deserves consideration. Probably nothing that we as a race have done has had more serious consequences than our craze for refined and processed foods. Every grain and seed which we use as a food that has been put through a refining process has been robbed of its best part. The highly refined flour, the processed cereals, the polished rice and the like are absolutely unfit for human consumption.

Except the natural grains—cracked wheat, cracked oats, barley, corn meal and natural brown rice—there are no cereals on the market that equal these in the richness of their earthy salts and vitamine content, or even their proteid value.

Why we should go out of our way to avoid things that are best for us and seek

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those that are harmful is one of the great mysteries of human nature.

Eggs and scraped beef, the latter either slightly broiled or raw, and cheese supply the animal proteids in the best form. Hence when milk ceases to be the best food for the growing child, ceases to meet all the requirements, then these in some form should be judiciously added.

Lean beef and mutton, besides being rich in proteid are according to some authorities rich in the earthy salts. Therefore, to eschew them because of a prejudice is most unwise, and in the case of a child that has a deficiently developed intestinal tract it is unwarranted cruelty. A child with this structural defect who is made to live on a pure vegetable diet is punished in the cruelist manner imaginable. A diet of this character will mean for it early dilatation of the stomach and bowels, very likely constipation, but certainly undernourishment, anemia, imperfect development in some way, and a handicap for life.

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But equally stupid is the excessive ingestion of the heavy proteid foods by persons who are not actively engaged in some laborious physical work—with pick and shovel, for instance. The man or woman that is engaged in some indoor occupation and who must have in addition to other things two or more eggs for breakfast, a slice of cold meat at noon and a slice of a roast in the evening is incompetent to look after himself. A guardian is urgently needed. And there are in our cities thousands whose daily menu is composed of about 80 per cent of the animal proteids: eggs, meat and fish.

Then we wonder why appendicitis, tonsillitis, boils and other suppurative diseases are so common. These conditions are the direct product of nitrogen poison, nitrogen constituting a large per cent of all the animal proteids. Consumed in larger amount than is used it becomes a virulent poison in the system.

A person with a full or excessive abdominal development in all of its parts

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should never satisfy his craving for meat. Since vigor of function is always in proportion to degree of development of the intestinal tract, other things being equal, he will be certain to eat too much; and with assimilation active, more nutriment will be taken up than can be used, and with serious consequences. The fact that he may have one or more copious bowel movements every day is no proof that elimination is perfect and complete. This only shows that the direct waste product, that which remains in the bowel after absorption has taken place, is being eliminated.

However, as normal nutritive elements that have been taken up, but which are not or cannot be used in the normal process of building and repairing of tissues become waste also, these must be eliminated just as certainly as the waste in the bowel. The task of eliminating this waste falls largely on the kidneys, hence the prevalence of diseases of the kidneys among men whose days are spent at a desk and other indoor work.

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Foods may also be classified as nerve builders, muscle builders and bone builders. A number of articles meet the demand of all three processes more or less perfectly. Among these are the grains which have been mentioned, meat, fish, eggs, and milk. These all supply phosphorus and lecithin (nerve fat) for nerve building, the proteids for muscle building and the earthy salts for bone building. The various elements are contained in these different foods in varying amounts, naturally.

It is obviously impossible to give more than a general idea of what a rational menu should consist of. What will meet the requirements of one person may be most inappropriate for another. Age, constitution and occupation are extremely important factors in the problem. Indeed, they are the deciding factors in every instance.

For the average child between the ages of two and five years the following will meet the requirements more or less perfectly:

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For breakfast: One-half hour before eating, a medium sized glass of orange juice, or a dish of well-cooked prunes, or an apple either raw or baked. For the meal some whole wheat product, oatmeal, brown rice or corn meal mush with cream and sweetened with honey or maple syrup and a glass of milk. If a table spoon full of seedless raisins or dates is added to the cereal its flavor as well as its value as a dish is enhanced.

For dinner: Occasionally a cup of vegetable soup; an egg in any form but fried, twice a week; a slice of crisp bacon once a week; on days when neither eggs or bacon are served cottage cheese two or three times a week; some cooked vegetables, and for the older children now and then a salad of various raw vegetables finely chopped or ground, while for the younger the juice of various raw vegetables; whole wheat bread and butter; fruit or a custard for dessert and a glass of milk. Cooked vegetables and a salad at the same meal are unnecessary. A

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baked potato or rice may occasionally be served.

For supper: A baked potato, or brown rice or baked macaroni, a slice of whole wheat bread or a graham or corn muffin, a glass of milk, dates, figs or a baked apple for dessert, or occasionally a dish of good ice cream.

As the years advance the child must have a slight increase in the quantity as well as the addition of other things. A sandwich of scraped beef, either raw or slightly broiled, or an occasional lamb chop will prove of value. A dish of baked beans, baked without pork, may be allowed.

These things are rich in proteid and are necessary as the child grows older and becomes more and more active. However, as they are productive of a superabundance of the lymphatic elements care must be taken not to give them in too large amounts. It must be remembered that it is from an over-supply of these elements

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that habitual glandular congestion and ultimate enlargement results—adenoids, large tonsils. etc. Evidence of congestion of the membranes in the nose and throat, obesity, a lymphatic or phlegmatic disposition are positive indications of over-feeding with foods that are too rich in proteid.

No normal child above two years of age requires more than three meals a day. Under that age four feedings a day is sufficient. Between meals nothing but water should be allowed. So-called under nourished children that appear to thrive when given a glass of milk in the middle of the forenoon, and the same possibly again in the middle of the afternoon, require attention of some other sort. The glass of milk may help along, but we are deluding ourselves when we think that nothing more important is required; that we are dealing with the fundamental factors and meeting the conditions fully.

As has been said, a grave mistake is made when we give or permit a child to have a great variety of things at a meal,

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but a greater mistake is made when we allow it to eat when excited, hurried, angry or in any other than a calm and happy state of mind. And this applies to grown-ups just as much as it does to children.

A good average breakfast for the average adult is the following:

Half an hour before eating, a glass of orange juice or grape fruit juice. Later a dish of well-cooked whole grain cereal with cream and sweetened with honey or maple syrup, two or three times a week a couple of eggs served in any way but fried, occasionally a slice of bacon, whole wheat bread toasted, a cup of cereal coffee. For many a breakfast of fruit is sufficient.

For lunch a plate of vegetable soup two or three times a week; a salad of green vegetables with nuts, raisins or dates, cheese; whole wheat bread or pumpernickel; and fruit either fresh or dried for a desert.

For dinner a meat or fish course not

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oftener than three times a week, one or two cooked vegetables (if a salad is taken one vegetable is sufficient), baked or boiled potato, a salad of various green vegetables as suggested for the lunch, and a dessert similar to the lunch dessert, or possibly a custard, or with a meatless meal, a dish of ice cream.

On days when neither meat or fish are taken, then a dish of beans that have been baked without pork, or a dish of macaroni and cheese. When either of the latter are taken then potatoes and other starchy foods must be eliminated.

The following makes a very delicious and satisfactory salad:

Chop finely or grind a combination of raw vegetables as chicory, cabbage, cauliflower, dandelion, lettuce, inner leaves of spinach, carrots, beets, etc., serve on lettuce leaves, garnish with nuts, raisins, dates, cheese, or onion, a dressing of pure olive oil and lemon or other fruit juice, and if a little sweetening is desired add a little honey.

CHAPTER IX

BREATHING EXERCISES

CONCERNING breathing and other exercises there are quite as many theories as there are concerning the question of diet. Their number is legion. For the greater part, they, like the theories concerning diet, are based on assumptions, framed into doubtful systems and presented to the world with zealous enthusiasm.

And, unfortunately, they all have a certain amount of merit, just sufficient amount to prevent their demerits from being clearly seen. The amount of harm that has been done by the extensive employment of these slightly meritorious systems will never be known.

Another phase of the problem of diet and exercise which has done an incalculable amount of harm is that both subjects have been made ultra-scientific, ponderous and mystical. Instead of being brought within the comprehension of ordinary

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mortals they have been made super-scientific and removed beyond even the understanding of most of the intellectuals. Instead of being made simple and common sense, which they might easily have been made, they are, in large part without science or sense.

The matter of normal and perfect breathing we find is a simple thing once we have freed our minds of the rubbish which has been gathered by the reading of some of the books on the subject.

Let us think of the lungs as being bellows; and that so far as taking the air in and expelling it, they act in exactly a like manner. They expand and contract. A perfectly simple act. They expand more or less in all directions—must do so in order for the air to enter the lobes of the lungs, *but chiefly expand downwards*. This fact should never be lost sight of. And this is because the floor on which they rest is the only extensively movable wall to the cavity in which they are contained.

Breathing Exercises

The diaphragm, being a muscle, has a quite extensive range of motion.

But do we make the right use of the diaphragm in breathing? Very rarely! Not one person in a thousand does so unless he be an infant or has been properly instructed, or it may be he does so when sound asleep. Ask anyone to take a deep breath and he will at once raise his chest, draw the diaphragm up and the abdomen in. Instead of allowing the floor of his bellows to descend and thus make more room for his lungs, especially for the lower lobes, he draws it up and makes the cavity smaller.

But this is not all: During exhalation the reverse movement is made. That is to say, the diaphragm instead of being drawn up and the air forced out it is allowed to relax and settle down towards the abdomen, thus removing compression and allowing a great deal of the air in the lower lobes to remain. This is the invariable movement during exhalation. The act is invariably a collapsing of the

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thoracic walls, with the result that a certain amount of impure air is always in the lungs.

Why adult humans, without exception, breathe in this way is something that has never been fully explained. No infant does, nor does anyone of the lower animals.

Abdominal or diaphragmatic breathing is the only normal way to breathe. Yet there are physical culture teachers who tell us that it is wrong, and for proof point to the pendulous abdomen. They tell us that in time abdominal breathing will cause the organs to prolapse. This is nothing less than arrant nonsense. The fact is if properly done it will tend to replace organs that have already become prolapsed. A pendulous abdomen, if ever it is created by diaphragmatic breathing is nothing but evidence of unpardonable stupidity.

The act of complete exhalation causes the diaphragm to be drawn up and the abdomen in, thus lifting the organs into a

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more normal position. The forcible contraction of the abdominal muscles accompanying this act or movement of the diaphragm tends to strengthen them and results in supplying a firmer support to the abdominal contents.

Still another distinct benefit is derived from this method of breathing, namely, an increased activity of the abdominal circulation.

The upward and downward movements of the diaphragm, acting in the nature of a pump, draw the blood out of congested organs and tissues and thus overcomes stagnation, improves metabolism and nutrition. Hemorrhoids, varicose veins, and not infrequently distressing menstrual symptoms, are due entirely to stasis in the abdominal circulation. Emptying the organs of stagnant blood by vigorous diaphragmatic breathing gives almost instant relief.

A certain amount of muscular force is necessary to completely empty the lungs,

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but none is required to fill them. Filling the lungs in normal respiration, providing they have been completely emptied, simply requires our letting go and allowing the air to flow in. Air does not have to be drawn or forced in. The external atmospheric pressure of fifteen pounds to the square inch takes care of its getting into the smallest bronchioles.

Exercises which are supplementary to deep inspiration and complete expiration and which assist in increasing the chest capacity and vigor of the functions involve the use of the arms in various movements, as raising and lowering them, either in front or to the side of the body, and swinging them in various directions. It goes without saying that the various movements must be done with some order and system. Merely throwing the arms about, more or less vigorously, and breathing with equal irregularity, is worse than useless. Such effort uses up more vitality than the system is able to create during the time, and the person is worse off for his exercise.

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The important point to be remembered in exercising is that inspiration should be made during the movements that tend to lift up the chest walls and expand the cavity, and expiration should accompany the movements that tend to lessen the chest cavity. For example, the act of lifting the arm should be accompanied by inspiration and the downward movement by expiration.

Never should the movement of the arms or other bodily movements be antagonistic to the respiratory movement. That is to say, any movement which tends to decrease the size of the thoracic cavity, as dropping and crossing the arms as in club swinging, while the inspiratory effort is made is wrong, and results in wasted effort.

Coordination and rythm are absolute essentials in the exercise, and, indeed, in all exercises, in order to have free, easy and normal movements and to obtain the best results.

The movements, whatever they are, should always be slowly made. Raising

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the arm, for instance, should be of a speed to allow for full inspiration, and the downward movement such as will allow for complete expiration.

The following exercises if done regularly night and morning will in a very short time show splendid results:

Exercise I. Raise the right arm, bringing it directly forward and up as high as possible, inhaling slowly, and at the same time rising on tiptoe. Then slowly bring the arm down, exhaling at the same time.

Exercise II. The same as the preceding but with the left arm.

Exercise III. Bring both arms up together, inhaling on the upward movement and exhaling on the downward, rising on tiptoe as before.

Exercise IV. Bring the arms up from the side, inhaling on the upward movement and exhaling on the downward.

Each of these movement is executed ten times night and morning during the first

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week. During the second week they may be increased to fifteen times, and gradually brought up to twenty.

Exercise V. Slowly bring one arm up from the side, bending the body at the waist to the opposite side as far as possible, keeping the feet firmly on the floor. Inhale on the upward movement and exhale on the downward. Do this five times toward one side and five times toward the other, gradually increasing to ten.

Exercise VI. Bring both arms up over the head as far as possible, inhaling at the same time, then slowly bend the body, but not the knees, and touch the floor with the tips of the fingers. Inhale and exhale as with the other exercises. This is to be done from five to ten times.

As this latter is an exercise for the spine be careful that the spine is made to curve. Don't hold the spine straight and merely bend at the hips. This would be an exercise of no value whatever.

Exercise VII. This is also for the spine.

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While sitting on the floor with legs extended reach forward and, if possible, touch the feet. Exhale as the body is sent forward and inhale as it is raised to the sitting position. This exercise strongly curves the spine. This is done five to ten times.

To avoid having these exercises become monotonous to children and causing them to lose interest, they can be varied. For example, bring the arms up from the side to the level of the shoulders, then forward, then up over the head, etc. With a little thought other movements can be devised.

Still another thing that can be done to vary the procedure is: have them interrupt the inspiratory act, that is, have them take strong sniffs, three, four and five times during one inspiration.

This not only proves in a measure interesting but is of distinct benefit. The reason for it is this: Only a small portion of the air inhaled during ordinary breathing comes in contact with the mucus

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membrane lining the bronchial tubes; and as only that which comes in contact with the membranes can deliver its oxygen and take up carbo-dioxide it follows that but a very small amount of oxygen inhaled is actually taken up.

All that which remains in the current of air in the tubes, and this is by far the greater amount, is again exhaled. With interrupted breathing this is not the case. The air that is taken in at one sniff is agitated and set in motion by the next, with the result that by the successive sniffs the greater portion of the air in the tubes is brought in contact with the membranes and so enabled to deliver its oxygen and to take up carbon-dioxide.

But what about running and other more violent exercises as lung developers?

Such exercises are anything but lung developers! They are, in fact, the very opposite. They rather arrest development.

This can easily be understood when we stop to think that the more strenuous the

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exercise, the more rapid the breathing, and the more rapid the breathing the more shallow or superficial the breathing. Fifty respirations per minute during violent exercise is not at all extreme. Indeed, the number is frequently higher.

Now the fact can easily be demonstrated that it is an utter impossibility to completely fill and completely empty the lungs fifty times a minute. It is physically impossible. Moreover, the more strenuous the exercise the more "set" are the muscles. and the more "set" the muscles the more are the movements of the chest inhibited. This fact is also easily demonstrated.

From this it can easily be seen that superficial respirations and restricted chest movements tend to arrest rather than develop the lungs. The investigations of Prof. Herkheimer prove this conclusively. He found that trained athletes had, as a rule, slow pulse, low blood pressure, a contracted and narrow heart and an excess of the lymph cells in the blood. And

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these results have been confirmed by other investigators.

If running develops the lungs and increases the vigor of function, why is tuberculosis more common among the trotting "rickshaw" men in Japan than it is among other laborers?

Again, if it is such a splendid exercise, why is heart disease so common among our athletes? And why do athletes seldom live out their expectancy? Athletes are considered notoriously bad risks by every life insurance society.

All forms of exercise have some merit. It is altogether a question of an individual's needs and how *regularly* they are indulged in, and, too, how *sensibly* they are indulged in. The best system yet devised may prove injurious if it is inappropriate or is indulged in too strenuously, or is not combined with other things in a proper manner.

How is the individual organized? What are his special needs? What is his age?

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What his occupation? These are a few of the questions which must be considered before he should be allowed to go to work on the gymnasium floor, or on the athletic field.

Many a young man has been crippled for life because he was allowed to have his own way, or possibly because he was encouraged to do things which were beyond his structural and physiological capacity.

A person with deficient lung development has no business to indulge in any strenuous muscular exercises until he has first brought his lungs up to a normal with proper breathing exercises.

Deficient lung development, as has before been said, means deficient vigor of function, insufficient oxygen supply, imperfect metabolism. Add now to this the increased breaking down of tissue cells which results from the increased activity, and there results early decay and early death. And a physical director who thinks that young men and women will have their

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lungs developed by indulging in strenuous exercises and encourages them in this is a menace to the community in which he is working. He is a distinct liability.

Then too let us remember that a person who spends his days at a desk has no use for the muscles of an athlete, and least of all if he has reached middle life. What persons approaching old age require is a system of exercises and a diet that will keep the muscular system soft, supple and pliable; that will keep it in a state where it can be made to execute nimble movements. This does not mean flabby and putty-like muscles, but well-rounded, freely movable and responsive muscles.

Proper exercise and proper diet will give every man and every woman a muscular system of this character. Every boy and every girl can have it also, and best of all, be taught how to carry it along into their old age.

But before humanity can enjoy this great blessing of health and vigor it must

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know some things of which it today is quite ignorant. A knowledge of the laws of growth and being must be the common heritage of all. What is more, humanity must be governed by this knowledge; must not only understand these laws, but must be governed by them—trust in them and live by them. The future of the race depends on this. The way we are now going is the way to degeneration, as the evidence clearly shows, and this is the way to ruin.

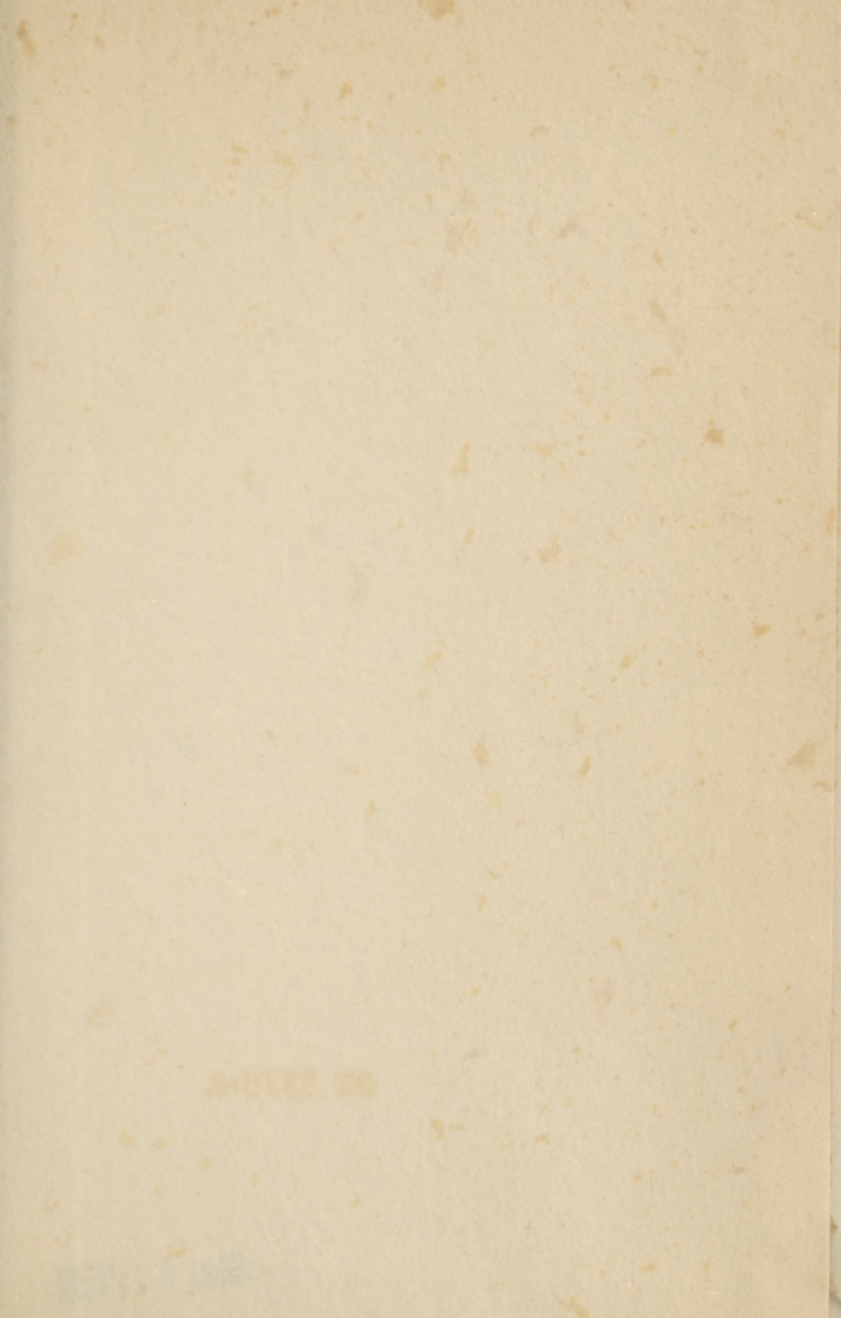
In these few chapters the object aimed at has not been to lay down a complete set of rules for the application of principles underlying the Science of Health. Space has not permitted of this nor has it been deemed advisable.

What we stand more in need of at the present time than rules governing particular circumstances is an appreciation of general principles and some understanding of them. Only when we have this are we likely to succeed in laying a proper foundation for set rules and a science.

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To point out some of these principles and indicate the course to be pursued in order to gain a practical understanding of them is all that has been attempted.

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