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# STRENGTHENING THE EYES

*A New Course in  
Scientific Eye Training  
in 28 Lessons*



By  
BERNARR MACFADDEN

Published by  
Physical Culture Publishing Company  
New York

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# CONTENTS

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This Course in eye strengthening is presented in 28 lessons, each lesson being called a Part. To render the study and use of the Course more convenient, the lessons are published in a series of fourteen booklets. Depending on their length, from one to three lessons appear in a booklet.

NAME OF PART	PART
Introductory . . . . .	I
Strong, Beautiful Eyes . . . . .	II
The Anatomy of the Human Eye . . . . .	III
How We See: The Physiology and Physics of Vision . . . . .	IV
Asthenopia: Weak Eyes . . . . .	V
The Imperfect Sight of the Normal Eye . . . . .	VI
Errors of Refraction: Their Cause . . . . .	VII
Errors of Refraction: Their Cure . . . . .	VIII
Amblyopia . . . . .	IX
Color Blindness . . . . .	X
Strabismus: Squint . . . . .	XI
Saving the Sight of the Children . . . . .	XII
Injuries to the Eye . . . . .	XIII

*Continued on Opposite Cover*

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PART

1

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HARDAWAY 31 May 39


THE LIGHT OF THE BODY IS THE EYE

*Matthew vi: 22*

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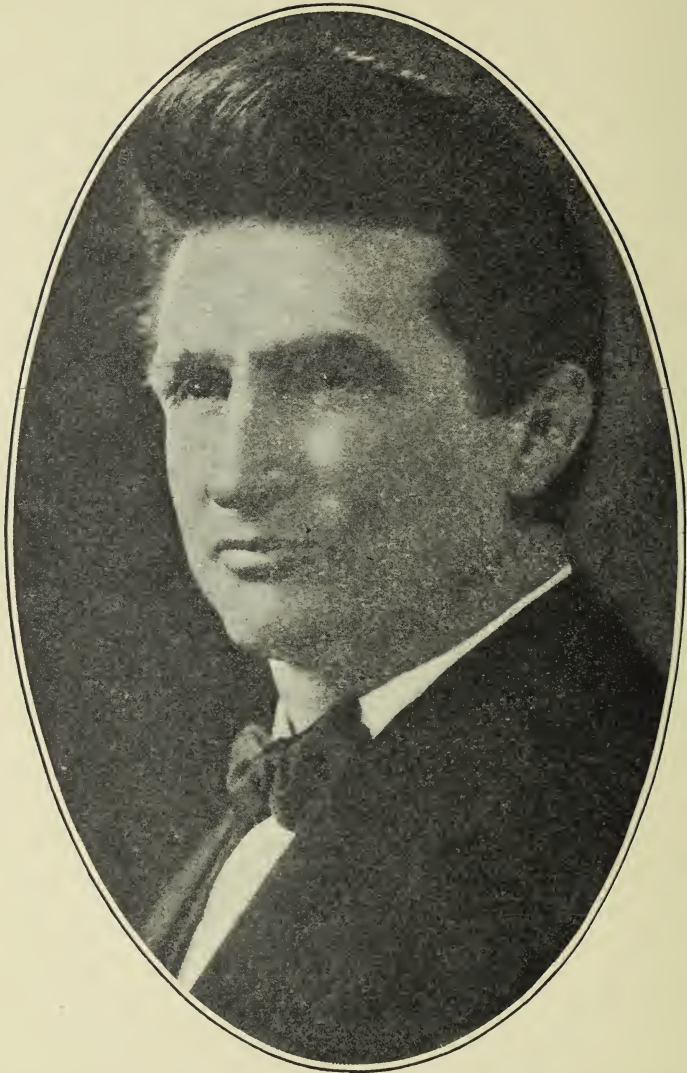
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Part I  
INTRODUCTORY



**Bernarr Macfadden, founder of the Physical Culture Magazine, author of "Vitality Supreme," "Encyclopedia of Physical Culture," "Building of Vital Power," "Manhood and Marriage," etc.**

# STRENGTHENING THE EYES

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## A COURSE OF SCIENTIFIC EYE TRAINING

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Eyes speak all languages; wait for no letter of introduction; they ask no leave of age or rank; they respect neither poverty nor riches; neither learning nor power, nor virtue, nor sex, but intrude and come again, and go through and through you in a moment of time.—*Emerson.*

### PART I

#### INTRODUCTORY

**N**EARLY eighteen years have passed since my interest was aroused in the problem of strengthening the eyes. It was the result of an experience that came near to being tragical.

No one can adequately measure the value of sight; but when we feel it failing we can in some degree realize what that value is. Such was my case on the occasion referred to. At the time I

## STRENGTHENING THE EYES

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was assuming unusual responsibilities in the editorial and business management of the **PHYSICAL CULTURE MAGAZINE**, the publication having recently leapt into a prominent position, making the work extremely difficult. I had also undertaken to write an important book, the correspondence I was receiving having led me to see that there would be a large demand for the information that I expected to include therein.

Before having done any work on the book, except to divide the important phases of the subject into chapters, I advertised it, thinking it could well be finished and printed, ready for sale at the time announced. My other duties, however, were so exacting that I was unable to begin writing when I expected to.

The demand for the work was extraordinary; orders poured into the office at the rate of two or three hundred a day, and further delay was out of the question. No one could assume my particular duties in editing and publishing the **PHYSICAL CULTURE MAGAZINE**; and moreover, at that time I had no assistant editors, or proof-readers, to relieve me of details. Therefore, in order to get any time for the book I was obliged to labor far into the night. By working night and day, however, I was able to finish it in about thirty days.

## INTRODUCTORY

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But, the morning after the last corrected proof had been returned to the printer, I was appalled by the condition of my eyes. Vision was imperfect in many ways, and on picking up a newspaper, the printed page appeared like solid black.

I realized in a few seconds the value of my eyesight, and I did some rapid and serious thinking.

I had no faith in oculists and less in other doctors; the thought of consulting them did not even occur to me. I knew that my eyes must have been affected both locally and constitutionally, for not only had they been subjected to extreme overwork, but this overwork had lowered my general vitality. Whatever my business responsibilities might be, I saw that a vacation was now necessary, and I accordingly took it.

After returning to my duties in about two weeks, my eyes were greatly improved, but their condition was still far from satisfactory. I finally concluded to take a fast of one week in order to thoroughly cleanse my physical organism. This benefited my eyes tremendously. Thereafter I began to experiment with various eye exercises together with the eye bath, massage, etc., and my eyes soon acquired their former vigor.

Oculists with whom I came in contact during this period warned me of the dangers of adhering

## STRENGTHENING THE EYES

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to my views. Blindness, they said, would surely be my fate.

In recent years I have been informed on numerous occasions that the eyes naturally begin to deteriorate after forty years of age, and that total blindness might result if I did not assist them with glasses. About five years ago (I am nearing my fiftieth year), when I was treating hundreds of patients at the Bernarr Macfadden Healthatorium in Chicago, one of my patients, an oculist, was very emphatic in his warnings as to the danger I was running by not wearing glasses, and he finally induced me to promise him that I would try a pair if he sent them to me after he returned home. The glasses arrived in due time, but after wearing them for about ten minutes my eyes pained me so severely that I had to discard them. No doubt, they were not adjusted to the condition of my eyes, but I did not try to improve upon them. I have refrained from adopting the "eye crutch" up to the present time, and I hope that for many years to come I shall be able to avoid them. As a result of the natural methods of treatment already explained, my eyes are excellent and I work strenuously with both brain and eyes regularly six days per week, and long, tedious days at that.

When my book, "STRONG EYES," was first published, the principles presented therein were to a

## INTRODUCTORY

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certain extent new, but I was thoroughly convinced of their correctness and thousands of readers have attested their value since the first edition of the book was issued. More than fifty thousand copies of the book have been sold, and in no instance have I heard of an injury to the eyes because of the use of the methods outlined therein; but, on the other hand, thousands have borne witness to extraordinary benefit derived from them, while numbers have been able to discard their glasses altogether as a result of their use.

Consequently this Course is presented, not as a mere set of complex and untried theories, but as an aggregation of definite and practical facts.

Some years ago I came in contact with the work of a prominent eye specialist who is a scientist of high standing in the field of ophthalmology, a graduate of the College of Physicians and Surgeons, Columbia University, New York, and a member of the American Medical Association. This physician began his studies in connection with his revolutionary theories in 1886. It was in this year that he cured his first case of myopia (near-sight). Encouraged by this success, he treated many patients at the New York Eye Infirmary with benefit, accomplishing some complete cures. While he was at the New York Post Graduate, his success was such as to bring about

## STRENGTHENING THE EYES

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the loss of his position, the eye specialist in charge there maintaining that such cures were impossible, and this notwithstanding the fact that the proof was there for investigation.

In 1903 this physician discovered that teachers could not only prevent the occurrence of myopia among their pupils, but could cure it by the use of the "Snellen test card." This was the first successful method for the prevention of myopia and other cases of imperfect sight in school children, and in itself is a discovery that will greatly benefit humanity. (See *New York Medical Journal*, July 29, 1911.) In 1912 this method was introduced into some of the public schools of the city of New York, the results being published in the *New York Medical Journal*, August 30, 1913. The teachers cured one thousand children of imperfect sight without the help of glasses.

During the last five years, this scientist has made many experiments on rabbits, fish, cats and dogs for the purpose of gaining information about the action of the external muscles of the eye. By this means he has been able to bring to light many facts which are entirely opposite to the theories about the eye published in text books at the present time. These experiments, some details of which may be found in the *New York Medical Journal* for May 8, 1915, together with

## INTRODUCTORY

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his untiring studies of the human eye, have further led this physician to formulate a system of eye training by means of which not only errors of refraction but almost every irregularity of the eye can either be cured or materially benefited without the help of glasses.

Directly opposed to the methods and theories of orthodoxy, this system is not only revolutionary in character, but far-reaching in its practical importance.

I feel sure that in collaborating with this eminent scientist I have been able not only to stamp my own theories with the approval of up-to-date science, but to present to the public a course of eye training which will bear the most searching criticism.

It is scientific and practical, and has been proven conclusively to be of inestimable value. It should enable you to so strengthen your eyes that glasses will not be needed later in life, while in many cases it will enable you to discard the glasses which you may now be wearing; it should also enable many to avoid the loss of a possession priceless in value—the sense of sight.

This course is sent out in the hope that it will be a boon to many who need the invaluable information contained herein. That it requires some effort on the part of each student should not in any way lessen its value. The rewards which

## STRENGTHENING THE EYES

await those who follow the instructions given will be beyond price.

Yours vigorously,

*Bernarr Macfadden*





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PARTS

2 and 3

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## PART II

### STRONG, BEAUTIFUL EYES

“Eyes,  
Of microscopic power, that could discern  
The population of a dewdrop.

—*Montgomery.*

**I**T is undoubtedly true that man comes into more intimate contact with the outer world through the sense of sight than through any other, or perhaps through all the others combined. In the case of the other senses, outside impressions or “stimuli” seem to come *to* the man—to impinge *upon* him, as it were; but in the case of sight, he apparently goes outside himself, and actually seems to project himself into the outer world—seeing what is there, actually existing. We know now that this subjective impression of the facts is not true; but the feeling is there none the less. We can also direct or govern the sense of sight more fully than any other. We can “turn away” from sights we do not wish to see, while we cannot readily stop listening to sounds we do not like or shut out smells which are disagreeable to us. Sight seems to be, more than any other sense, in touch with the true personality—the godlike self within.

## BEAUTIFUL EYES

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Yet, in spite of their great value, the eyes are among the most delicate organs in the human body. They are composed largely of liquid, are extremely sensitive, and can very readily be destroyed altogether. It is only the marvelous protective measures of nature which prevent a greater number of fatal injuries to these organs.

Man, more than any other animal, depends upon his sense of sight, for in his case the other senses, such as smell and hearing, are more or less "atrophied," or stunted, as compared with their keenness in other animals. They are sometimes almost lost through lack of use. To a certain extent this is true of the sense of sight also, but it is less true here than in the other instances, the conditions of modern life requiring the almost constant use of the organs of vision.

The eye in the lower animal, as well as in man, is one of the most highly specialized structures in the body, and so wonderful in contrivance that it is rightfully alluded to as one of the marked instances of the beneficences of God as displayed in creation. Yet, in spite of the depth to which the ingenious mind of man has penetrated of late years into the world of science, this most important and wonderful organ has not received the amount of attention given to many other matters.

Not only are the eyes important in themselves,

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## STRENGTHENING THE EYES

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but if they are strained or injured they in turn affect the general nervous system. It must be remembered that what we call "the eye" is only the eyeball; the whole optical apparatus is far more extensive than this, and is hidden away in the socket. By means of the optic nerve the eye proper is connected with the sight-centers in the brain; and, again, the eye is nourished by the blood, which circulates to and in these parts. All treatment of the eyes must, in a certain sense, be *constitutional* (that is, general) and not local; for the latter method of treatment would be very short-sighted, and fail to take into account the fundamental fact that the eyes are a part of the body and dependent upon and influenced by it.

Emotions and expressions are mirrored in the eye. The "love light in the eye" has been the theme of amatory verse in all ages and times, and throughout literature we find endless references to the expression of the varying emotions of the human soul by the eyes. Passionate, burning, cruel, mystic, gentle, cunning, hot, cold, etc., are among the adjectives applied to them. The character is depicted by the eye more plainly, perhaps, than by any other organ of the body, courage, dignity and power being expressed by the organs of vision when other external indications of these attributes are lacking.

Yet, though these varying motives and expres-

## BEAUTIFUL EYES

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sions can doubtless be read in the eyes, it is extremely difficult to say just *how* and *why* the eyes betray them.

Some authors are of the opinion that the eye itself never changes, but only the muscles directly around it. "These muscles vary the expression," and the theory seems to be more or less borne out by the fact that, in many cases, if the parts adjacent to the eyes be covered up, no change of expression can be detected. Other authors, on the contrary, contend that the eye itself changes in expression and have advanced arguments which seem to prove it. This is an interesting line of inquiry which the student might follow for himself with interest and profit.

The eye, to be beautiful, must be clear. It must be free from defects, such as squint or dullness; the lashes must be of the proper length, the lids healthy and the whites free from the discolorations of impure blood. A perfect digestion, a healthy and energetic circulation of the blood, a delicate nervous poise, are all physical prerequisites to beautiful eyes. Form, color and size avail nothing without the luster and brilliancy of expression imparted by general physical health and tone, and though the shape and color of the eyes can never be changed, they can be greatly improved in appearance by the rational system of constitutional and hygienic treatment to be considered later.

## STRENGTHENING THE EYES

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The unfortunate tendency of modern medical science is to specialize too much; and under the influence of this tendency, general conditions are often ignored. In the majority of cases the eye specialists are no exception to this rule. They are inclined to treat the eye, too often, along purely local lines, instead of recognizing that it is a part of the general nervous system and treating it also along constitutional lines. Effects have been treated instead of causes; yet it is plain that the causes must be removed if we are ever to cure the effects.

The prevalence of defective eyesight is indeed alarming, did we but realize it. It has been estimated that from 25 to 50 per cent of the inhabitants of the United States are more or less short-sighted—to cite this one defect alone. At the lowest possible estimate, therefore, *at least* 25,000,000 people in this country suffer from myopia, and probably a good many more than this! And if, to this, we add those suffering from hypermetropia (or long-sight), presbyopia (old-age sight), astigmatism, squint, color-blindness and other defects of vision, we are surely safe in saying that the great majority of the inhabitants of America are afflicted with imperfect vision, and all the ills that follow in consequence.

## PART III

### THE ANATOMY OF THE HUMAN EYE

A SIMPLIFIED exposition of the structure of this wonderful organ is imperative in a course of this character in order that the pupil may understand the terms which follow, but only a very brief summary can be attempted. For a more detailed account of the structure and physiology of the eye the student is referred to larger works.

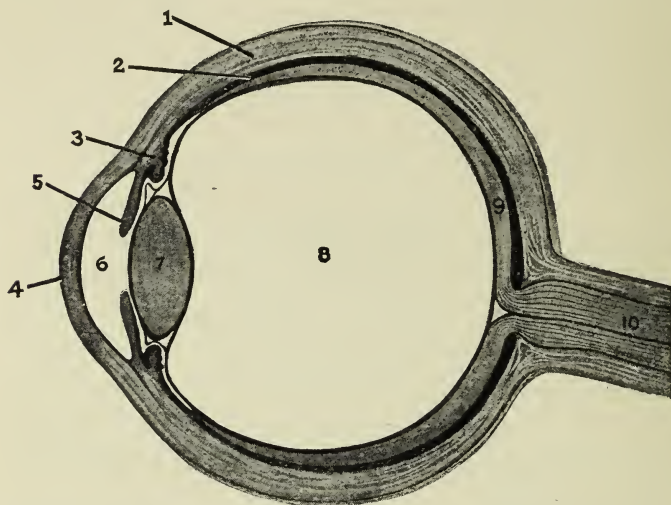
Normally, the eyeball is nearly spherical in shape, and has three *membranes*, or coats, and three *humors*. The external coat is a thin, tough membrane, which maintains the form of the ball; the *sclerotic*, as it is called, forms what is known as the "white of the eye," and includes the anterior four-fifths of the outer coat; the anterior one-fifth is the cornea, a transparent disk joined to the sclerotic somewhat as a watch-glass is set in its case. It can be plainly seen by looking at the eye sideways.

The next coat which lies against the inner surface of the sclerotic and is very vascular, is called the *choroid*.

The *choroid* is composed of a network of blood-

## STRENGTHENING THE EYES

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Horizontal and sectional view of the structure of the eye. (1) Sclerotic coat; (2) Choroid coat; (3) Ciliary body; (4) Cornea—the “watch glass” in front of the eyeball; (5) The iris; (6) Anterior chamber, containing aqueous humor; (7) Crystalline lens (pupil between Figures 6 and 7); (8) Vitreous Humor, filling the eyeball; (9) Retina; (10) Optic nerve.

vessels, and is lined with a layer of pigment cells, whose duty it is to absorb an excess of light.

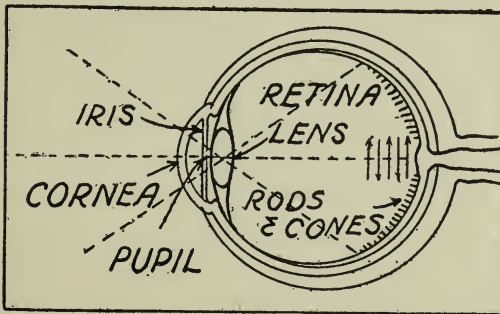
The *iris*, which forms a thin curtain behind the cornea, gives the eye its special color and to a large extent its beauty. The color of the iris in newly born babies is blue, and the differing colors which come later in life are due to the addition of a greater or lesser amount of dark pigment. The color is usually more or less in uniformity with the general coloring of the individual.

## THE HUMAN EYE

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The *pupil* is in the center of the iris, and appears black, though in reality it is clear and transparent. Through it the rays of light, coming from any object, must pass. The pupil has the power of contracting or expanding under the influence of light; and certain drugs, such as opium and belladonna, cause it to contract or dilate unnaturally for long periods of time. The pupils of cats, tigers and other animals appear to shine in the dark; and for long it was thought that this phenomenon was due to some form of phosphorescence, but it is now known to be merely a reflection from the cornea.

At the junction of the iris and choroid is found a narrow band of delicate muscular fibers, called the *ciliary muscle*. This little muscle has been thought to play a very important part in the workings of the eye, notably in its "accommoda-



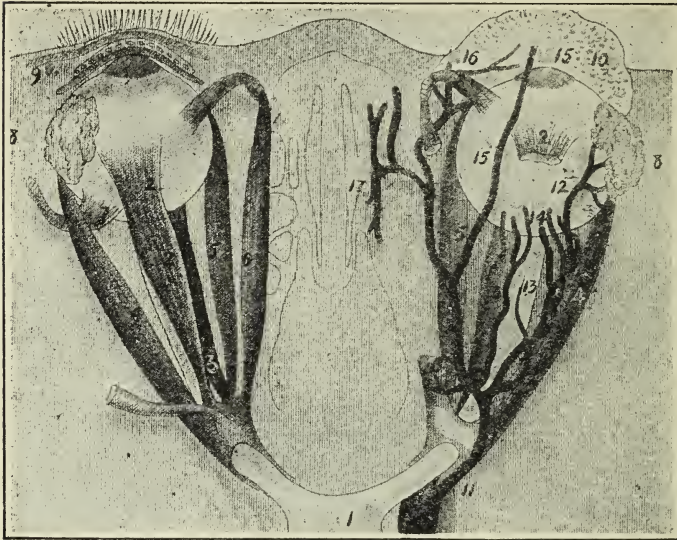
Simplified diagram, corresponding to figure on opposite page.

tion," and should be remembered, as it will be referred to repeatedly further on.

The *retina*, the

## STRENGTHENING THE EYES

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View of eyeballs from above, showing the muscles and arteries. (1) Crossing of the optic nerve; (2) Superior rectus muscle; (3) Inferior rectus muscle; (4) External rectus muscle; (5) Internal rectus muscle; (6) Superior oblique muscle; (7) Inferior oblique muscle; (8) Lachrymal glands; (9) Eyelid in section; (10) Eyelid from inside; (11) Infra-orbital artery; (12) Branch to the tear gland; (13) Branch to the retina; (14) Branch to the iris; (15) Branch to the upper eyelid; (16) Branch to the eyebrow; (17) Branch to the cavity of the nose.

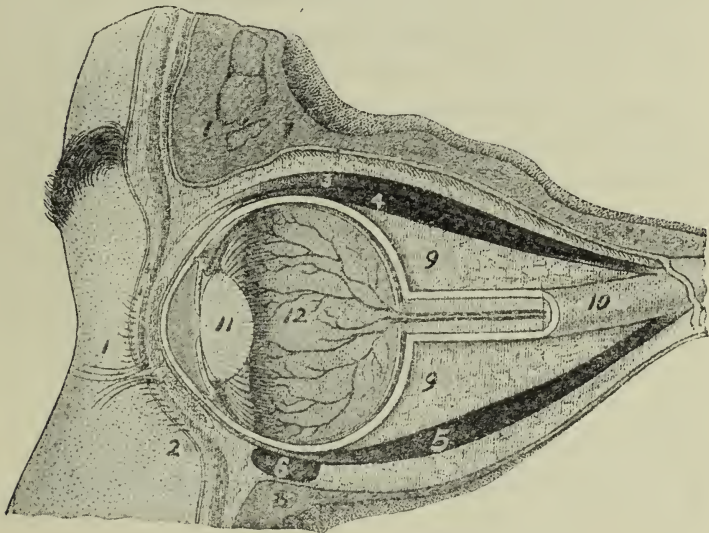
third or nervous membrane, lies at the back of the eye-wall, and upon it the light-rays entering the eye are thrown or "focused." It is an exceedingly delicate and sensitive structure, liable to injury and less than one-hundredth of an inch thick. Nevertheless about ten different layers have been found within it! The outer-

## THE HUMAN EYE

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most of these, called "Jacob's membrane," has been found to consist of minute columns arranged side by side perpendicular to the choroid, while the internal, or nerve-fiber layer, is composed of delicate nerve-fibrils forming a surface parallel to the choroid.

The *optic nerve* passes from the eye to the brain, and carries the nervous impulses which, in the sight-centers of the brain, are converted into the "sensation of seeing." There is evidence that



Section through the right eye. (1) Upper eyelid; (2) Lower eyelid; (3) Eyelid lifting muscle; (4) Superior rectus muscle; (5) Inferior rectus muscle; (6) Inferior oblique muscle; (7) Frontal bone; (8) Superior maxillary bone; (9) Fat; (10) Optic nerve; (11) Crystalline lens; (12) Vitreous humor.

## STRENGTHENING THE EYES

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the optic nerve carries impulses that result in pain, but apart from this it can carry only one kind of nerve impulse, that of sight. Hence, when it is stimulated, by whatever means, whether normally by light, or by an electric current, or by a blow, we get the impression of light, or "seeing stars."

The three humors are the *aqueous*, *crystalline* and *vitreous*.

The *vitreous humor* occupies about four-fifths of the interior of the ball; it is colorless and transparent, and somewhat resembles an attenuated jelly. It is solid enough to maintain the shape of the eye, while at the same time yielding readily under pressure. It is firm, yet elastic.

The *crystalline humor*, or *lens*, is firmer than the vitreous, but not solid, and is shaped somewhat like an ordinary magnifying glass. It grows denser with age. This also is a very important part of the eye, and will be dealt with more fully in the discussion of errors of refraction.

The *aqueous humor* is nearly pure water, and is contained in the space between the cornea and lens.

The *orbit* is the hollow cone of dense protective bone in which the eye is set. The roof of the orbit, however, is very thin, and upon this the fore-brain rests. It may be injured by a blow

## THE HUMAN EYE

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from beneath; and duelists are said to have selected this spot for a fatal sword-thrust. King Henry II of France was accidentally killed at a tournament by a lance point which pierced his brain through this fragile bone.

The eyebrows are formed of muscle and thick skin, covered with hairs, and protect the eyes from drops of sweat, water, dirt, etc., which might otherwise find their way into the eye.

The eyelid is also a protective covering, composed of a layer of loose skin, and protects the eyes during sleep, when the ball is "everted," or turned upwards.

The polish and transparency of the cornea are maintained by frequent unconscious winking, which keeps its surface moist and free from dust. The mucous lining of the eyelids is always more or less moist, and is continuous with skin at the margin of the lids. After lining the inner surface of the lids it passes over to the ball, forming a loose fold, which is the only direct connection between them; hence its name, *conjunctiva*. It covers the front part of the sclerotic, the whole of the visible portion, and lining the walls of the tear-duct, becomes continuous with the membrane of the nose and throat, and, therefore, usually takes a part in a "cold in the head," or influenza. It is usually transparent, but may become "blood-shot," or yellow, as in jaundice. Yellowness re-

## STRENGTHENING THE EYES

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sults when the coloring matter of the bile is deposited in the conjunctiva.

The opening between the lids is called the *commissure*, and the apparent size of the eyes depends chiefly upon the width of this space. The almond shape of Oriental eyes is due to the unusual length of the fissure between the lids. In the Chinese, the outer angle of the commissure is much higher than the inner, giving the cleft an obliquity upwards and outwards. This has a marked effect upon the whole expression of the face.

The lachrymal apparatus consists of the gland for secreting tears and the passages for draining them off. The "tear glands" are situated just above the outer angle of the eye, and a number of small ducts carry the tears, when secreted, to the eye itself. After passage across the surface of the eye, the tears are taken up by passages, which commence near the inner angle of the eye, and are conducted into the nose. The tubes carrying the tears to the nasal passages are called the *lachrymal canals*. Two tiny holes or outlets permit the tears to enter these canals from the eye itself (its surface). Tears are usually drained off in this manner, and only "overflow" and drop off the lids when the glands are excited by excessive emotion or by local irritation. "Sniffing" is usually the first stage of a "good

## THE HUMAN EYE

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cry." Infants do not shed tears before the third to fourth month, and the elephant is the only one of the lower animals accused of this human weakness—the crocodile to the contrary notwithstanding!

The eyeball is moved in various directions by a number of muscles, attached to it at the back, top, bottom and sides. It can thus be turned upwards, downwards, inwards or outwards, or may be rotated. When these muscles are uniformly relaxed or acting in unison, the eye is normal. When, from any cause, one set of muscles exerts a stronger pull than its opposites, a squint is produced. When the muscles contract excessively, they squeeze the eyeball out of shape, elongating it or the reverse. The importance of this fact we shall see when we come to the chapter devoted to errors of refraction.



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## PART IV.

### HOW WE SEE: THE PHYSIOLOGY AND PHYSICS OF VISION

**T**HE act of seeing is one of the greatest mysteries in the world. To the ancients it was an even greater mystery than to us, and continued to be so until the great astronomer Kepler noted the resemblance between the human eye and the camera, and demonstrated that images of external objects are formed by the organs of vision exactly as they are by the photographer's apparatus. In the eye, the rays of light, coming from the object seen, traverse the eyeball and fall upon the sensitive retina (the "plate" of the camera), from which they are conveyed to the sight-centers of the brain by the fibers of the optic nerve. That is, the impression which they have created upon the retina is so conveyed.

In order to understand the optics and physics of the eye, and of sight, it is necessary to say a few words concerning light, and reflecting and refracting bodies and surfaces.

Light is primarily given forth by self-luminous bodies, such as a candle or the sun; and everything else is *reflected* light. The earth reflects

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## STRENGTHENING THE EYES

the rays of the sun, and this gives us our "day-light." When this reflection is cut off, dense blackness prevails. The spaces between the stars are inky black, for there is no solid body to reflect the rays coming from the sun. Rays of light are reflected when the body on which they shine sends them back. And if the light strikes a reflecting surface at an angle, the reflected angle—the so-called "angle of reflection"—is always equal to the "angle of incidence," or the direction of the shaft of light striking the object.

The white light we see is composed, as we know, of seven primary colors. Some bodies absorb some of these vibrations, and reflect others; and when this is the case such bodies are said to be colored in various ways. The color of any object is not inherent in it, but is due solely to the fact that some of the light-rays are reflected and some absorbed. Those which are reflected constitute its "color."

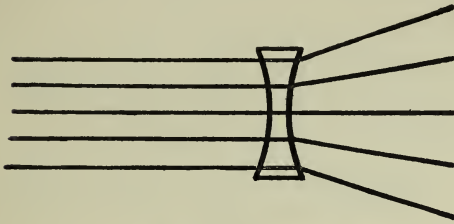


Refraction of light by the surface of water, illustrated by the coin which in an empty cup may be invisible and which appears to move upward and come within the range of vision when the cup is filled with water. Refraction is also seen in the appearance of the bending of a stick or pencil immersed in water, when looking at it from above.



## HOW WE SEE

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Refraction of light rays passing through concave lens, becoming divergent.

When rays of light pass from one medium into another of different density, they are bent out of their normal

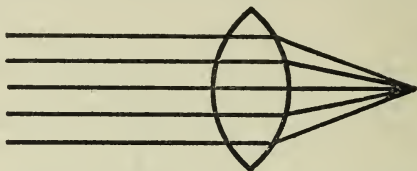
course, which is one of parallel lines. A simple experiment which demonstrates this is that in which a small coin is thrown into a basin of water. It appears to be in a certain place, but if an attempt be made to touch it in this place it is found to be not there at all, but somewhere else! "Appearances are deceptive." This is due to the fact that water, being of a density different from that of air, bends the rays of light and makes them take a different direction; they are, in short, "*refracted*." By suitable means, these light-rays can be straightened out again; they may also be refracted any number of times and in various ways.

Thus, a plain, flat sheet of glass will bend all the light rays which pass through it at the same angle. They are neither *diverged* (scattered), nor brought to a point (*converged*). When, however, the glass is double "convex," the rays of light are brought together into a "*focus*."

## STRENGTHENING THE EYES

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When it is double "con-  
cave," the light-  
rays are scat-  
tered, or di-  
verged.



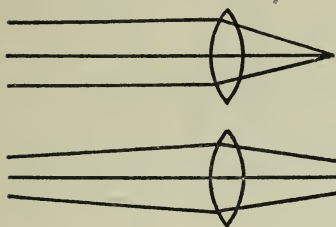
Refraction of light rays passing  
through convex lens, becoming con-  
vergent.

We have seen that light-rays passing through a double convex glass or lens converge at a certain point, and if, at that point, we place a screen, we catch an image of the object from which they proceed. In the eye, precisely this phenomenon takes place. The cornea and crystalline lens focus the light-rays upon the retina at the back of the eye, which catches the image, and from this point the impression is carried along the optic nerve to the brain, as before described. When the rays are focused exactly upon this delicate surface, the impression is clear and distinct. Otherwise it is blurred. or sight may fail altogether.

All parts of the retina are not equally sensitive to visual impressions. The most sensitive portion is a small space directly in the line of vision, called the *yellow spot*, from a yellow tinge seen in it after death. Indeed, this is the *only* spot which admits direct vision. In all other places it is more or less blurred. We can see only one thing at a time clearly; the rest

## HOW WE SEE

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Illustrating the refraction of rays of light from distant and nearby points. The parallel rays, from a distant point, are concentrated at a point much closer to the lens than the divergent rays from a nearby point, which are focused further back. This is also demonstrated by the familiar experience of focusing light rays in a camera.

fades out and becomes blurred as it recedes from the central point.

Not far from this

most sensitive spot there is a "blind spot" on the retina, which is unable to see anything.

We have one in each eye, but the eyes are so

adjusted that when one eye is blind the other sees, and *vice versa*. This blind spot is at the entrance of the optic nerve to the retina, and its locality can easily be seen in the accompanying diagram.

To prove the existence of the blind spot:

Close the left eye and direct the right eye to the small cross on the left hand side of the figure. Hold the page vertically before the eye, ten or twelve inches off, and then gradually bring it nearer, still keeping the gaze fixed upon the cross. The round spot will also be visible, except at a certain distance from the eye, about seven inches, when it will disappear from view. Its image falls upon the point of entrance of the optic nerve.

## STRENGTHENING THE EYES

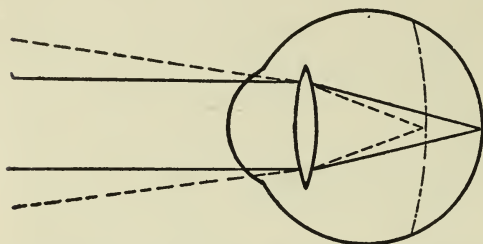
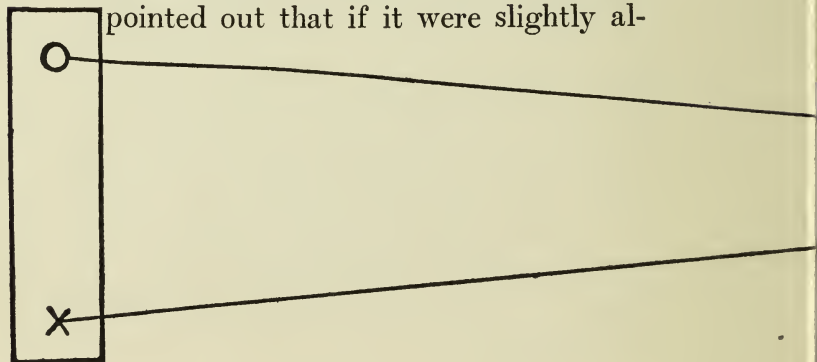


Diagram illustrating myopia or near-sightedness, rays of light from a distance falling in front of the retina.

We have seen that a double convex lens will focus light-rays at a certain point or distance

beyond it; this distance will depend upon the degree of convexity of the lens. If it is only slightly convex, the focal point will be some distance away, while if it is very much curved, the focal point will be very near. We have only to alter the degree of convexity of the lens to insure the focusing of the rays at any desired distance (within limits).

Now, the lens of the eye is like any other lens in this respect; and it was long ago pointed out that if it were slightly al-



## HOW WE SEE

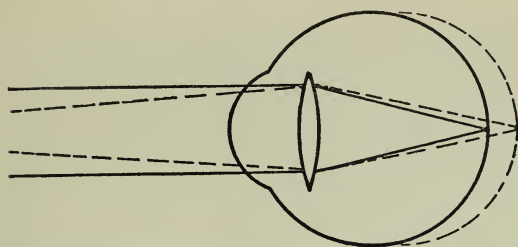


Diagram illustrating hypermetropia, or farsightedness, light rays from nearby points being focused behind the retina.

tered in shape, by means of muscular tension or otherwise, rays of light coming from

different distances could be focused accurately upon the retina. It has been believed for many years that the eye adjusts itself for vision at different distances by this means, and the theory, which was accepted mainly upon the authority of Helmholtz, is the basis of the teaching in all the text books on ophthalmology today. This change of focus is called "accommodation," and is supposed to be effected by means of the ciliary muscle.

It is upon this doctrine that the treatment of refractive errors by means of glasses is based, for the practice followed the doctrine. Rays of light,

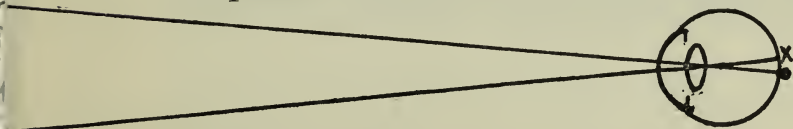
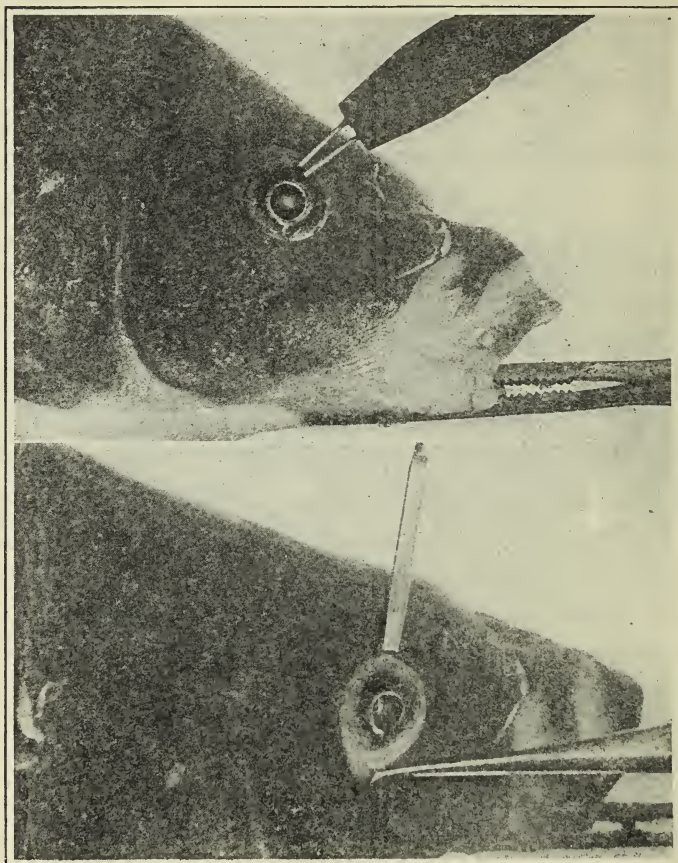


Diagram illustrating how the image is thrown upon the retina in the "blind spot" experiment. The circle marks the spot of entrance of the optic nerve (the eyeball in this Diagram is proportionately small).

## STRENGTHENING THE EYES

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An experiment on the eye of a carp demonstrating that the lens is not a factor in accommodation. In the upper picture the eye is normal and accommodates normally when stimulated by the electrode. In the lower the lens has been pushed out of the line of sight by an instrument the point of which can be seen in the pupil. The eye is then stimulated by electricity and accommodates precisely as in the upper picture.

## HOW WE SEE

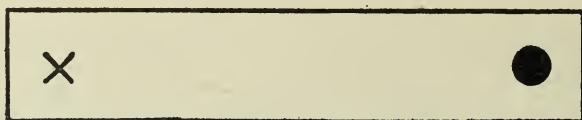
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**Production of astigmatism in the eye of a carp by changing the shape of the eyeball. In the upper picture the pull of two strings attached to the conjunctiva has made the cornea oval. In the lower one the string has been cut, the cornea has resumed its natural shape and the eye is normal.**

## STRENGTHENING THE EYES

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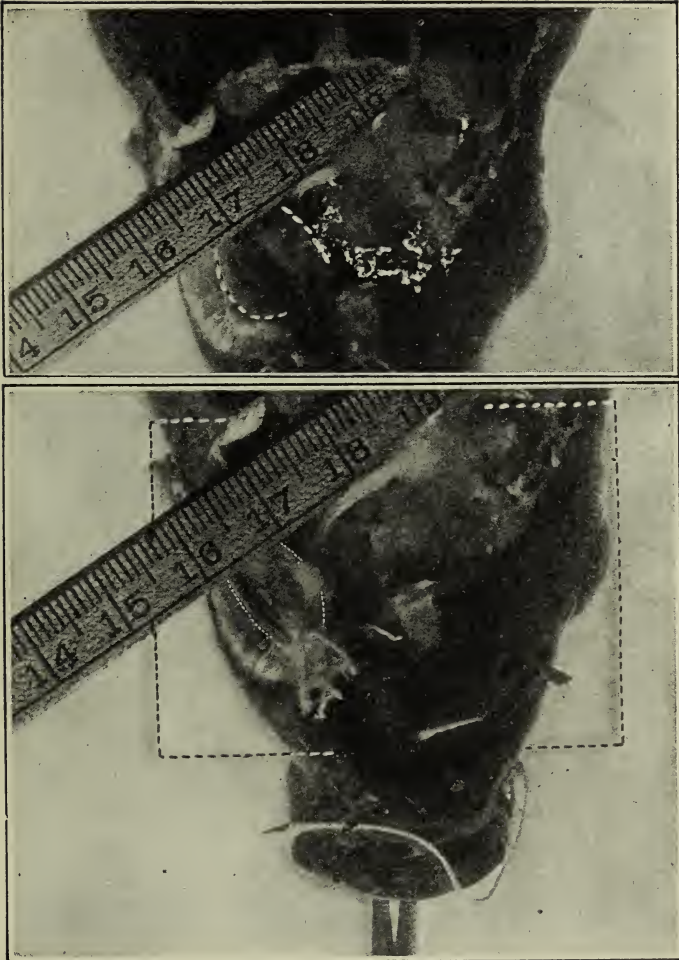


A diagram for demonstrating the "blind spot" on the retina which is the point at which the optic nerve enters. Closing the left eye and holding the diagram vertically ten or twelve inches in front of the right eye, look fixedly upon the cross and gradually bring the diagram nearer. At from seven to nine inches the black spot will suddenly disappear from the vision because the image falls upon the "blind spot."

we were told, were converged by the lens upon the retina very well so long as the eyes were normal and the lens "worked." But when this was no longer possible or easy, for any reason, then an extra lens was prescribed to assist in bending the light rays, so that they should fall precisely upon the retina, and enable the patient to see clearly. Theoretically, this removed the strain from the eyes, and assisted them in their efforts to see.

As we shall see, however, when we come to the discussion of refractive errors, this theory of accommodation, perfect as it may be theoretically, is erroneous, its general acceptance being due to the fact that eye specialists have never paused to consider the alternate explanation of the facts, namely, the possibility of *moving the screen* upon which the convergent rays ought to fall to the point at which they are focused. Leav-

## HOW WE SEE



Experiment on the eye of a carp demonstrating that the changes in the shape of the eyeball upon which errors of refraction depend are due to the action of the eye muscles. In the first picture the eye is normal. In the second the eyeball has been shortened and hypermetropia produced by strengthening the pull of the straight muscles, through shortening or advancement. The rule shows that both pictures were taken at the same distance from the camera.

## STRENGTHENING THE EYES

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ing the lens alone, in other words, might not the retina be brought forward, or moved farther back, by some internal muscular movement, according to whether the eye desired to adjust itself for near or for distant vision? That this is the true explanation of the facts has now been conclusively proven. It can be and has been demonstrated, both clinically and by means of anatomical dissections and observations, that the retina is moved backward and forward by muscular action in the process of accommodation, and that when this movement does not take place normally, the cure lies in getting control of the muscles concerned, not in the wearing of glasses.





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# STRENGTHENING THE EYES

*A New Course in  
Scientific Eye Training  
in 28 Lessons*

PAGE 13

PARTS

5, 6 and 7

*By*  
BERNARR MACFADDEN

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## PART V

### ASTHENOPIA: WEAK EYES

**N**ORMAL, healthy eyes should be strong, clear, alert and full of expression. When they are dull, weak or lacking in expression, we may be sure there is something physically or mentally wrong with their possessor. Everyone has noted the meaningless expression in the eyes of the drunkard—how they roll about in a heavy, lustreless way in their sockets. This sufficiently demonstrates the intimate relationship between the eyes and the general nervous system. Indeed, it may be said that the eyes are a fair indication of the condition of the stomach and of the whole system. Excessive eating, drinking, smoking, worrying or other debilitating practices are sure to be recorded sooner or later in these delicate and sensitive structures.

When the body is normal and healthy, the blood furnished to the eyes is pure and clear. Strong eyes are the result. If, on the other hand, the digestion is out of order and the blood is impure, or loaded with unassimilated material, then the eyes grow dull and heavy; their power of vision is impaired no less than their

2/21/39  
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## STRENGTHENING THE EYES

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beauty, and a wholesale degeneration of their tissues results.

Eye defects of this character are almost invariably due to some constitutional weakness or defect, and not to the local causes to which they are often ascribed. This will become more apparent as we proceed. Most oculists and opticians have a tendency to treat the eye as a detached organ, without any relation at all to the rest of the body, the blood stream or the nervous structure. This is irrational, and it is impossible that any permanent good should come of it. The connection between the eye and the rest of the body is most intimate, and any form of poisoning, or weakness, in the latter at once manifests itself in the former. Under these circumstances local treatment is useless without improvement of the general physical condition. Only vigorous bodily exercise, proper diet, deep breathing and general invigoration can build up the system and place it on that high plane of energy which is essential to the health, strength and beauty of the eyes.

The causes to which the deplorable condition of civilized eyes is usually ascribed, such as prolonged use for near work, improper lighting, etc., are only injurious, as we shall see later, when the eyes are not properly used.

It usually takes a long time to tire out the eyes, and they recuperate very rapidly under

## WEAK EYES

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proper care. Of course, if things have been allowed to go too far, a long course of treatment may be essential, but even then it is astonishing to see how rapidly recovery will take place.

Resorting to glasses as soon as any visual discomfort is experienced is a mistake—for reasons to be set forth later. The eyes are thus supplied with a crutch which partially supports them, but which, at the same time, keeps them artificially strained. The natural result is that they call for more and more powerful lenses. The proper thing to do in such cases is to find out and remove the cause of the condition, whether constitutional or local. Then all palliative measures will become unnecessary.

## PART VI

### THE IMPERFECT SIGHT OF THE NORMAL EYE

In the following discussion, based upon the experience of a scientist who has specialized in the field of ophthalmology, are presented facts of the greatest practical importance, not only to all those who desire to have perfect sight, but to those whose safety depends upon the sight of others. Revolutionary as these statements are, they are supported by such wealth of evidence that they cannot well be questioned.

**I**T is generally believed that the normal eye has perfect sight all the time.

It has been compared to a perfect machine which is always in good working order. No matter what the object regarded may be, whether new, strange or familiar, whether the light is good or imperfect, whether the surroundings are pleasant or disagreeable, orthodoxy teaches that the normal eye is *always* normal and that the sight is *always* perfect. Even under conditions of nerve strain and bodily disease, the normal eye is expected to have perfect sight always.

This idea is very far from the truth. Thirty years of special study given to the refraction of the eye have proven that the normal eye *has imperfect sight most of the time*. It is unusual, in fact, to find persons who can maintain perfect sight continuously for longer than a few minutes

## SIGHT OF NORMAL EYES

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even under the most favorable conditions. Of twenty thousand school children more than half had normal eyes with perfect sight, but not one of them had perfect sight in each eye every day. The sight of many of them might be good in the morning and imperfect in the afternoon, while many with imperfect sight in the morning would have perfect sight in the afternoon.

Many children could read some letters of the alphabet perfectly, but were unable to distinguish others of the same size under similar conditions.

The degree of the imperfect sight varied within wide limits from one-third of the normal to one-tenth or less; the duration of the imperfect sight of the normal eye was also variable. Under some conditions in the classroom, the imperfect sight might continue for only a few minutes or less. Under other conditions, however, a small number of pupils (sometimes all the pupils with normal eyes) would have sufficient loss of sight to prevent them from seeing writing on the blackboard for days, weeks, or even longer.

Neither do adults with normal eyes have perfect sight all the time; what has been said of the normal eyes of school children being equally true of their elders. Age is no exception, for persons over seventy years of age with normal eyes have had attacks of loss of sight variable in degree and duration. A man aged eighty with normal

## STRENGTHENING THE EYES

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eyes had periods of imperfect sight which would last from a few minutes to several hours or longer. The retinoscope always indicated an error of refraction when the sight of the normal eye was imperfect.

Many adults with normal eyes, as well as children, have attacks of color blindness. One patient, with normal eyes, perfect sight and perfect color perception in the daytime, had always been color-blind at night; he had no perception of colors after sunset. It is also true that all persons with normal eyes are less able to distinguish colors correctly during the time that their sight is imperfect in other respects.

Accidents on railroads, at sea and on the streets occur, usually, because the normal eyes of the responsible persons, *for a time*, had imperfect sight. When nervous children or adults cross the street, they become confused, and are struck down by automobiles or trolley cars for the reason that *they lose their sight, although they have normal eyes*.

Unfamiliar objects almost always produce eye strain and are imperfectly seen. School children with normal eyes, who can read small letters one-quarter of an inch high, at a distance of ten feet, always have trouble in reading strange writing on the blackboard, although the letters may be as large as two inches high. Myopia, either tem-

## SIGHT OF NORMAL EYES

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porary or permanent, is always produced. Strange maps always produce imperfect sight in the normal eyes of school children because they cause a strain or effort to see.

The strain may be an unconscious one, or it may produce pain, discomfort or fatigue. Often the strain may be a conscious effort without the production of discomfort. However, in all cases of strain, conscious or unconscious, it can be demonstrated that the eyes do not see best where they are looking.

When normal eyes are used for near work, they are seldom properly focused. The retinoscope demonstrates to us the fact that, when an effort is made to see more clearly at either twelve inches, twenty inches, or less than twelve inches, the eyes are always focused at a greater distance with the production of astigmatism. This is usually temporary, but may become permanent. School children and adults learning to read, write, draw, sew or to do mechanical work, suffer from defective vision, although they have normal eyes. This matter is of such great practical importance in the education of children that the attention of teachers should be called to the facts.\*

Many children lose interest in their school work

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\* See New York Medical Journal, August 30, 1913, Myopia Prevention by Teachers.

## STRENGTHENING THE EYES

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and actually become truants and incorrigibles from this one cause.

Light has a very important effect on the vision of the normal eye; an unexpected strong light always produces defective vision. The vision of all persons is imperfect when the eyes are first exposed to the strong light of the sun, or to any strong artificial light. Rapid or sudden changes in the intensity of the light always produce defective vision, not sufficiently great to be manifest to the individual, but always to be demonstrated by careful test of the vision and by use of the retinoscope. The defective vision produced by strong light may be temporary, but it has been observed to continue in many cases for a number of weeks, frequently running into months, although it is never a permanent disability. If persistently regarded, a strong light, after a time, becomes beneficial. Some persons have become able to look directly at the strong light of the sun without any loss of vision whatever.

At night, or in a dim artificial light, the vision becomes imperfect and the retinoscope always indicates an error of refraction.

Noise is a frequent cause of defective vision of the normal eye. All persons see imperfectly when they hear any unexpected loud sound. Familiar noises do not usually lower the visual power, but unfamiliar, new or strange noises,

## SIGHT OF NORMAL EYES

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which cause shock, always do, with the production of a temporary error of refraction. Country children from quiet schools, after they move to a noisy city, often suffer from defective vision for long periods of time. In the classroom they rarely do well with their work because of impaired sight. It is a gross injustice for teachers and others to criticise, scold or humiliate such children.

The reading of distant small familiar letters for a few minutes, at least, every day is very successful in preventing the imperfect sight of the normal eye, as it tends to prevent strain in looking at unfamiliar objects. Not only the Snellen eye chart, but a calendar, a sign with small letters, or even a single small letter, may be used for such practice. The good results of this simple system of eye training justify its use in schools, in the Army and Navy, in the Merchant Marine and on Railroads, as well as by every one who desires or needs continuous perfect sight.

## PART VII

### ERRORS OF REFRACTION: THEIR CAUSE

In the two Parts following are presented the results of over thirty years of labor upon the part of a physician of high scientific standing. Until he discovered that errors of refraction were merely functional derangements, it was universally believed that they were incurable. His experiments have proved beyond the possibility of doubt that these conditions are due to the abnormal action of the muscles and that their cure is therefore a mere matter of muscular control. The details of these experiments may be found in the *New York Medical Journal*, May 8, 1915.

**E**RRORS of refraction are responsible for most cases of defective vision and often lead to actual disease of the eye. These errors fall into four classes: Myopia, Hypermetropia, Astigmatism and Presbyopia.

In myopia, commonly called short, or near-sight, rays of light coming from a distance fall in front of the retina.

In hypermetropia they are focused behind the retina. This condition is usually called long, or far-sight; but in reality the sight is defective both for near and for distant vision.

In astigmatism the rays are not brought to a focus at all because the curvature of the refracting surfaces is greater along certain meridians than along others. There are six different kinds

## ERRORS OF REFRACTION

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of astigmatism, which is usually combined with other errors of refraction. When one meridian is correct and the other myopic or hypermetropic, the condition is called simple astigmatism, while a combination of myopia and hypermetropia is called mixed astigmatism.

Presbyopia is a form of hypermetropia in which only the vision for near distances is defective. It is supposed to be peculiar to old age, but may appear at any age, and has even been known to occur in children. Furthermore, old people occasionally regain normal vision after having been presbyopic for years.

It is stated in all the text books on ophthalmology that these conditions are incurable. The first three are attributed to permanent deformations of the eyeball, and it is said that the eye endeavors to correct the resulting errors of refraction by altering the shape of the lens, through the agency of the ciliary muscle. It is to relieve this supposed strain, as well as to correct actual failure of vision, that glasses are prescribed. Presbyopia is attributed to the hardening of the lens, and consequent inability to alter its curvature.

Abundant evidence can be adduced to show that these theories are erroneous; that the lens and the ciliary muscle have nothing whatever to do with accommodation; and that errors of re-

## STRENGTHENING THE EYES

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fraction are due to the abnormal action of the outside muscles of the eye, which squeeze it out of shape and make it, for the time being, either too long or too short. Myopic refraction is produced by excessive contraction of the oblique muscles, which form an almost complete belt around the eye and lengthen it when they contract, as a rubber ball might be lengthened if one squeezed it in the middle. Hypermetropic refraction is produced by the excessive contraction of a set of muscles known as the recti, or straight muscles, while astigmatism is produced by a modification of the action of these various muscles. This abnormal action of the muscles is the result, in every case, of a strain or effort to see.

The truth of these statements has been demonstrated by long observation of the human eye and many experiments on the eyes of lower animals. When the eyeball, or certain nerves, are electrically stimulated, errors of refraction are produced, whereas such conditions can not be produced after the muscles concerned are prevented from contracting by some surgical operation. In other words, by manipulation of these muscles any error of refraction can be produced without reference to the lens at all. Furthermore, *after the lens has been removed altogether*, errors of refraction can be produced, in precisely the same

## ERRORS OF REFRACTION

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way as before, by suitable electrical stimulation and surgical operations upon the outside muscles. In such cases, the lens and ciliary muscle can have nothing to do with the results.



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# STRENGTHENING THE EYES

*A New Course in  
Scientific Eye Training  
in 28 Lessons*

*Central Fixation*  
PARTS

8, 9 and 10

*By*  
BERNARR MACFADDEN

*Published by*  
Physical Culture Publishing Company  
*New York*

## PART VIII

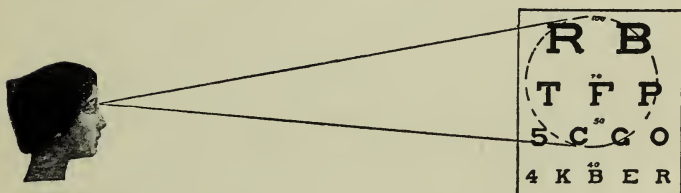
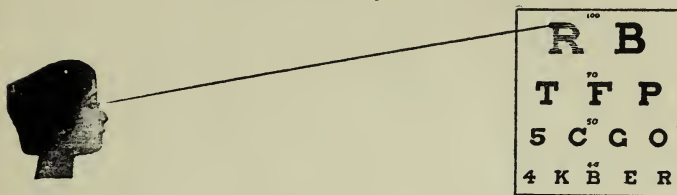
### ERRORS OF REFRACTION: THEIR CURE

**I**N the last chapter it was shown that errors of refraction are purely functional troubles, produced at the moment of vision by conscious or unconscious muscular strain. The cure must obviously consist, therefore, not in wearing glasses, but in learning to look at things without effort.

In order to do this it is necessary to learn how to use the eyes correctly. This means seeing best with the center of sight of the retina, the yellow spot that we have previously alluded to, everything being less distinctly seen according to its distance from this point. This is called *Central Fixation*, and is the basis of the treatment of errors of refraction without glasses. When the eye looks at objects with central fixation it is at rest and maximum vision is attained.

Central fixation is opposed to *Eccentric Fixation*, in which the eye partially or completely suppresses the vision of the center of the retina and sees best with other parts. When a person with normal eyes looks at letters, or words, with eccentric fixation, not only the objects regarded, but

# ERRORS OF REFRACTION



In the upper picture the sight is centered upon one spot, the upper left-hand corner of the letter R, which is seen more clearly and appears to be blacker than the rest of the field of vision. This is central fixation. In the lower picture the subject is endeavoring to see every part of her field of vision equally well at the same time. This is eccentric fixation and always accompanies eye strain.

those in other parts of the field of vision appear less distinct than when regarded with central fixation. Black letters appear less black, white letters upon a black ground appear less white, and colored letters of a lighter shade than they normally would. The letters are not clear, having a shadowy margin. Their size is altered, and they appear larger or smaller than with normal vision. Their shape is also distorted, and a square letter may seem to be round. Illusions of sight may occur and multiple vision is common. Pain, fatigue or discom-

2/21/39 J. H. M. Dunlap - c. c. tate

## STRENGTHENING THE EYES

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fort of some kind is usually felt and headaches are frequently produced.

An important symptom is twitching of the muscles of the eyelids, or eyeballs. This is usually unconscious, but may be felt if the patient lightly touches the closed eyelid of one eye while the other is looking at a letter by eccentric fixation. The appearance of the eye is usually expressive of effort, and a greater or less degree of squint is always present. Even redness of the margins of the lids and dark circles under the eyes may be produced by eccentric fixation.

When the eyes look at objects without strain they always do so with central fixation. The first thing for the patient to do, therefore, is to learn to relax the eyes. This can be done by seeing and remembering black. When the eyes are in a state of strain they will see bright lights and colors even when closed, and covered with the palms of the hands to exclude the light; but by looking at a black object before closing the eyes, and then keeping it in mind, they will gradually become able to see plain, unrelieved blackness. When they are opened it will be found that a noticeable, if temporary, improvement in vision has taken place. This should be done for a few minutes, a half hour or longer, about six times a day or more frequently. It may, in fact, be done as frequently and for as long a time, as cir-

## ERRORS OF REFRACTION

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cumstances and inclination permit. The more, the better. Between times the color should be kept constantly in mind. A black period is the object most easily remembered.

This practice alone is often sufficient to restore and maintain the normal habit of central fixation, but usually it is necessary to consciously practice seeing those parts of one's field of vision not directly regarded worse than the part fixed. The Snellen test card is best for this purpose, and the patient should select for practice the smallest letter he can see at a distance of ten feet or more. At first the letter may be seen by central fixation only occasionally. Later it will be seen more frequently and then continuously. A distinct feeling of relief will usually be experienced whenever central fixation is attained.

To secure central fixation at a near point, which is usually more difficult than in the case of distant vision, a dot of about the size of a pica-type period on a blank card is used. The patient is directed to look at it at about twelve inches and note its clearness. It is then held nearer and farther off until the point is found at which it appears clearest to both eyes and to each eye separately. By practicing in this way the patient becomes able to see the point both nearer and farther than at the beginning. He is then given diamond type to read, directed to look at a

## STRENGTHENING THE EYES

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period at the distance at which he can see it best, and told that when he sees it by central fixation it will appear blacker than any part of the adjacent letters. The distance may be lessened to three inches and increased to twenty or more by daily practice. By looking alternately at the diamond type at reading distance, and the Snellen test card at twenty feet, the vision for both near and far distances is improved.

This training is usually successful in curing myopia, hypermetropia, and astigmatism and presbyopia. Patients with presbyopia, combined with other errors of refraction, and even incipient



In the picture at the left the subject is looking at a Snellen test card with normal vision. At the right she is trying to see a picture at twenty feet, and the strain has produced compound myopic astigmatism.

## ERRORS OF REFRACTION

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cataract, have been cured at sixty, seventy and even eighty years of age. Persons with high degrees of myopia have been cured by practicing only a few of the directions presented here. It is not necessary to understand anything about the anatomy and physiology of the eye—however interesting and useful it may be to know these things—to be cured of errors of refraction. All that is necessary is to follow the simple directions given, literally and persistently, every day for a sufficient length of time.

. If the methods recommended for the prevention of myopia in schools later were practiced by people generally, whether they are old or young, or whether their eyes are good, bad or indifferent, that one thing alone would be of inestimable benefit. If any child under twelve faithfully reads the small letters of the Snellen test card or any small letter, or letters, at a distance of ten feet or more, with each eye separately every day, he will be cured of errors of refraction in from three months to two years, without any supervision or any other treatment. Adults of all ages will also be cured, if they are sufficiently persistent. By such practice both children and adults will usually discover for themselves the facts about central fixation, strain and other fundamental truths about the eyes. But persons who have worn glasses for a year or longer can

## STRENGTHENING THE EYES

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Seeing without strain, the all-important factor in preserving normal and healthy sight. This is possible only through central fixation.

not expect very much or any benefit so long as they wear their glasses.

The time required for a cure varies greatly in different cases. Some persons are relieved immediately. In other cases weeks and months of training are required. The practice should always be continued for a few minutes daily to avoid relapses. Even the normal eye requires practice in normal vision to avoid falling into errors of refraction.

## PART IX

### AMBLYOPIA

Most physicians at the present time believe that amblyopia is incurable, but it has been proved that it can be successfully treated by means of new methods of eye training. During the last ten years numerous patients, ranging in age from six to seventy-five years, have secured normal vision by this means. The facts were first reported in *La Clinique Ophthalmologique*, December, 1912.

**A**MBLYOPIA is a term applied to a condition of the eyesight in which there is a lowering of visual power which can not be relieved by glasses and is not dependent on any visible changes in the organ of vision. It has been facetiously defined as a condition in which neither the patient nor the doctor can see. The patient suffers from poor vision, while the doctor can find nothing wrong with his eyes. The disease usually affects only one eye, and is so often associated with squint that it has been erroneously supposed to be both the cause and the effect of that condition.

The text books enumerate many different types of amblyopia. The one known as amblyopia ex-anopsia was so named because it was supposed to result from a suppression of the sight of the af-

## STRENGTHENING THE EYES

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fectured eye during early youth, owing to some defect, such as a squint or error of refraction. Such defects were supposed to prevent the retina from attaining the functional capacity of normal eyes, and the literature of the subject is full of the impossibility of cure. "The function of the retina never again becomes perfectly normal," says Fuchs, "even when the cause of the trouble has been removed."

There are, nevertheless, many cases of spontaneous cures on record, these usually occurring when the perfect eye has been lost by accident. In such cases the amblyopic eye in the course of time frequently becomes normal.

The ailment is simply the result of eccentric fixation, and it is gratifying to know that the authorities are wrong in supposing that it can not be cured. All cases have been relieved by eye training, and complete cures have been effected when the exercises were faithfully practiced. The progress has sometimes been very rapid, the sight occasionally improving in a few minutes from one-fiftieth of the normal to one-tenth.

In order that patients may understand the condition, they are taught how to produce amblyopia in the better eye and how to increase it in the amblyopic eye by improper efforts to see. After they have learned to lower their vision voluntarily they become better able to improve it. The fol-

## AMBLYOPIA

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lowing case illustrates the method. A girl of fifteen had had amblyopia and squint since childhood. The vision of the right eye was  $1/40$ , while that of the left was  $2/3$ . Glasses did not improve either eye. The patient was seated twenty feet from a Snellen test card and the right or poorer eye was covered with an opaque screen. She was then directed to look with her better eye at the large letter on the card and to note its clearness. Next she was told to look at a point three feet to one side of the card, and her attention was called to the fact that then she did not see the large letter so well. The point of fixation was brought closer and closer to the letter until she appreciated the fact that her vision was lowered when she looked only a few inches to one side of it. When she looked at a small letter she readily recognized that an eccentric fixation of less than an inch lowered the vision.

After she had learned to increase the amblyopia of the better eye this eye was covered, while she was taught how to lower the vision of the other or poorer eye by increasing its eccentric fixation. This was accomplished in a few minutes. She was told that the cause of her defective sight was her habit of looking at objects with a part of the retina to one side of the true center of sight. She was advised to see by looking straight at the Snellen card. In less than half an hour

## STRENGTHENING THE EYES

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the vision of the left eye became normal, while the right improved from 1/40 to 1/10. The cure was complete in two weeks.

Unconscious of the fact that they were looking at objects with their eyes turned to one side, many amblyopic patients had difficulty in realizing that this was the case. When they did come to understand it, it helped them to secure central fixation, and their sight immediately improved.

## PART X

### COLOR BLINDNESS

**B**OTH because of its scientific interest and its practical bearings, this curious defect of the eyes occupies a large place in ophthalmological literature. Although it must have existed for centuries, the first case on record was discovered in the practice of a Dr. Tuberville in 1684. Nearly a hundred years later an English chemist by the name of Dalton, who was color-blind himself, and could see no difference between the color of a laurel leaf and that of a stick of red sealing wax, published the first accurate description of the condition. For this reason continental scientists gave it the name of Daltonism.

Although it would seem to be obvious that a condition of color blindness must be very dangerous, when it exists in persons responsible for the lives of others on railroads and steamers, it was not until the latter part of the nineteenth century, after much agitation by the medical profession, that its practical bearings were recognized. Owing to the remarkable tendency of color-blindness to conceal itself both from the subject and his associates, managers of transportation com-

## STRENGTHENING THE EYES

panies distrusted the scientists and could not be brought to believe that such a defect could exist in persons who had been in their employ for years without its being discovered.

Sweden was the first country to pass a law forbidding the employment of any man upon a railroad until his color vision had been tested. This action was taken as the result of the investigations of Prof. Holmgren of the University of Upsala, who discovered thirteen color-blind men among 266 railroad employees, and his book on "Color Blindness in Its Relations to Railroads and the Marine," had the effect of concentrating the attention of the world upon the subject. Today most shipping and railway companies require employees whose duties include the recognition of variously colored lights and signals to submit to a special examination for color blindness.

There are various degrees of color blindness. The condition in which no color can be recognized, and the world looks like a steel engraving, is rare, and its existence is denied by some. In cases where this total lack of color perception has been recorded, there has also been a considerable reduction of visual acuity in other respects. Usually only one color is lost by the subject in this odd manner, but sometimes more than one. Thus the subject may be color-blind for red, for blue,

## COLOR BLINDNESS

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for green, etc., as the case may be. The most common form is that in which red is deficient.

Many theories have been advanced to account for color blindness, and it is generally supposed to be incurable, but as a matter of fact it has been found that it always disappears when the eyes have acquired the normal habit of central fixation.



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# STRENGTHENING THE EYES

*A New Course in  
Scientific Eye Training  
in 28 Lessons*

*Snellen Test Card*

PARTS

11, 12 and 13

*By*  
**BERNARR MACFADDEN**

*Published by*  
**Physical Culture Publishing Company**  
*New York*

## PART XI

### STRABISMUS: SQUINT

In the following is presented a cure, the efficacy of which has been tested in numerous cases, for one of the most distressing and disfiguring of eye complaints. Only approximately curable by any of the means heretofore used, it has been found that squint always yields to eye training when persistently and intelligently used.

**S**QUINT, or strabismus, as it is called scientifically, is one of the vexed problems of ophthalmology. Many curious suggestions, both popular and scientific, have been made as to its cause. None of these theories come anywhere near to agreement, and while some seem to fit some cases, they leave many others unexplained.

The first definitely scientific theory advanced to account for squint was that it was due to an abnormality of the muscles which turn the eyeball in the socket. This theory seemed so plausible that it was almost universally accepted at one time, and an era of operations ensued, with many disastrous results.

Then Donders advanced his accommodation theory, which immediately came into vogue. This theory is based on the fact that when the eyes look at a near object there is not only a change of

## SQUINT



A typical case of convergent squint or  
"cross eyes."

focus, but the visual axes, which are parallel when the object of vision is a distant one, are turned slightly inward. These two acts, accommodation and convergence, be-

ing always performed together, have become associated by hereditary habit so that it is difficult to converge without accommodation. Donders concluded, therefore, that an abnormal effort of accommodation resulted in abnormal convergence.

According to another theory, the essential or underlying cause is a congenital defect in the "fusion faculty," or the power of coordinating the two visual images, resulting in the development of a squint on the slightest provocation.

The truth is that squint is a purely functional defect. Some persons can produce it at will, and

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## STRENGTHENING THE EYES

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it is frequently produced in persons with normal eyes, both children and adults, when they try unsuccessfully to read the Snellen test card. When the eyes are not properly used, the optic axes are never parallel, although the defect is not usually sufficient to attract attention.

Squint is cured by the same methods recommended for errors of refraction, and is not curable by any other means. Operations are both dangerous and uncertain. At the best they are

n e v e r  
more than  
a p p r o x i m a t e l y  
s u c c e s s f u l ,  
and when  
they fail  
they often  
produce a  
c o n d i t i o n  
m u c h  
w o r s e t h a n  
t h e o n e  
s o u g h t t o  
r e m e d y .



The same patient cured by rational methods of eye training.

## PART XII

### SAVING THE SIGHT OF THE CHILDREN

In the following pages the first successful attempt to cure defective vision and prevent myopia in schools is described. The details may be found in the *New York Medical Journal*, July 29, 1911, and August 30, 1913, and are worthy of more attention than they have received. The prevention of myopia among school children is of vital and far-reaching importance. Eye defects, with the nervousness, headaches and irritability for which they are responsible, not only prevent children from availing themselves of the educational opportunities offered to them by the state, but are often a serious handicap as well as a discomfort and an expense in after life. If there is any way of preventing such tragedies it ought to be adopted without a moment's delay. Meantime parents can protect their children by using the methods advocated at home. Since it is difficult to prove a negative proposition, it cannot, of course, be absolutely proven that these methods actually prevented myopia, but since all cases of defective eyesight were improved by them there can be no reasonable doubt that they also prevented this condition.

**O**NE of the most serious problems which civilization has been called upon to solve is that of saving the sight of children. Ever since the introduction of popular education it has been recognized that the system was disastrous to the eyesight of the rising generation. Voluminous statistics, collected both in this country and in Europe, show that whereas most children on entering school have perfect sight, the

## STRENGTHENING THE EYES

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percentage of eye defects steadily increases during the educational process, reaching its climax in the higher institutions of learning.

In Europe, where the military system has made the matter one of great practical importance to the State, much effort has been made to find a remedy for the evil, and millions of dollars have been spent in carrying out the suggestions of the eye specialists. The lighting of the schools, the furniture, the print in the school books, the position assumed by the pupils at work, were all regulated in accordance with expert opinion. In some cases the suggested reforms were carried out with such thoroughness that "face-rests" were attached to the desks to prevent the children from getting their eyes too near their books.

The injurious effects of the educational process were not, however, appreciably arrested. Cohn reports, indeed, an increase both in the percentage and degree of myopia in those schools in which he had especially exerted himself to secure reforms, while Just found that the excellent hygienic arrangements in the high school of Zittau, where he examined the eyes of 1,229 of the pupils, had not in any degree lessened the percentage of myopia.

All these efforts to prevent myopia failed because they were based on a wrong conception of the cause of the condition. It was naturally sup-

## SAVING THE SIGHT

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A case of divergent vertical squint ultimately cured by educational methods. In the picture at the left the right eye turns out and up, while the left eye looks straight. At the right the patient has learned to look straight with the right eye, while the left turns down and out.

posed that the cause of the failure of the eye to see distant objects was its too constant use for near work. The retinoscope has demonstrated that this assumption is erroneous, and that the true cause of myopia is a strain to see distant objects. When trying to see unfamiliar writing, or figures on the blackboard, distant maps, diagrams or pictures, it has been found that all children with normal eyes strain and become temporarily myopic. When regarding familiar distant objects it is quite otherwise. Daily exercise in the distant vision of familiar objects, therefore, suggests itself as the best method of preventing the tendency to strain in viewing unfamiliar dis-

## STRENGTHENING THE EYES

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tant objects and thus of preventing permanent myopia. This method has been tried in many public schools during the last ten years and has been uniformly successful, not only in preventing myopia, but in curing it where it already existed.

The Snellen test card was found to be the best distant object for exercises in distant vision. When memorized it becomes a familiar distant object. Its daily use for half a minute or longer both prevented and cured myopia, and also improved the vision for near objects, many pupils stating that they were able, after its introduction



The same patient after a complete cure had been effected. All four pictures were taken within fifteen minutes of each other, the patient having learned to reproduce the conditions represented voluntarily

into the classroom, to study with less or no discomfort. The test card was placed permanently where all the pupils could see it from their seats, and the children were instructed by the teachers to read it daily with each eye separately, the other being covered with the palm of the hand in such a way as to avoid pressure on the eyeball. Records of vision

## SAVING THE SIGHT

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were made either with the same card or with an unfamiliar one.

This method of preventing myopia was used for eight years continuously in the public schools of Grand Forks, North Dakota, and reduced the percentage of myopia from six to one per cent.

Later it was introduced into a number of public schools in New York with a total attendance of ten thousand children. The cards were received with considerable scepticism, the teachers being unable to believe that such a simple method, and one so entirely at variance with previous teachings on the subject, could produce results. Some of the teachers neglected to use them, but others, in spite of their miscellaneous and often trying duties, gave the matter serious attention, and were



**A part of the treatment. The patient has learned to turn both eyes in by looking at a pencil held over the bridge of the nose. Later she became able to turn them in without the pencil, or to turn either eye in while the other remained straight.**

## STRENGTHENING THE EYES

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able to present complete reports covering five thousand children. Of this number three thousand had defective eyesight and the reports showed that more than a third of this number gained perfect vision in both eyes after the test cards were introduced.

In one case in which there had been twenty-seven defectives in a class, twenty-five were reported cured and two much improved, while one incorrigible and one truant had become good students because, after they had obtained normal vision, they were able to study without pain or discomfort.

The Snellen test card, illustrated elsewhere, was devised for the purpose of testing the sight by means of differently sized letters and figures, but has been found equally valuable for eye training. Each line is designated by a number indicating the distance in feet at which it should be read by the normal eye. The records of vision are written in the form of a fraction, the upper line indicating the distance in feet of the reader from the card, and the lower the line read. When the numerator and denominator are equal, the sight is normal. The school records were made as follows, the vision of each eye being recorded separately:

	February, 1913		April, 1913		June, 1913	
	R.	L.	R.	L.	R.	L.
John D. . . . .	20/100	20/50	20/50	20/40	20/20	20/20
Sanford G. . . .	20/50	27/70	20/30	20/40	20/15	20/20

## SAVING THE SIGHT

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That the improvement shown by the records was due to the use of the cards was demonstrated not only by the fact that when the cards were removed relapses occurred, but also by comparative tests made with and without the cards. In one case six pupils with defective sight were examined daily for one week without the use of the test card. No improvement took place. The same six pupils were then given daily exercises in distant vision with the test card. At the end of that time they had all improved and five were cured. In the case of another lot of six defectives in the same school the results were similar. No improvement was noted during the week that the card was not used, but after a week of exercises in distant vision all had shown marked improvement, while at the end of a month all were cured.

In a considerable proportion of cases the children learned in a few minutes how to look at things without effort and were thus cured of their myopia. Many of the teachers were also cured of eye troubles and enabled to discard their glasses.

## PART XIII

### INJURIES TO THE EYE

**T**HE eye is one of the most delicate portions of the human body; and although Nature has endeavored to protect it from injury by embedding it deep within the skull, surrounding it, so far as possible, with a circular orbit of bone, and veiling it with lids that close at the slightest hint of danger, it can not always escape injury. This lesson will treat of the most common of the accidents to which it is liable, and of the speediest and most efficient measures that can be adopted in such cases.

**FOREIGN BODIES IN THE EYE.** The most common form of injury from which the eyes suffer, probably, is that resulting from the intrusion into it of small particles of dust, cinders, etc. These cause extreme discomfort, if not actual pain, accompanied by a rush of tears. This watering of the eye is really an effort on the part of nature to expel the offending substance, the water tending to wash the particle from the eyeball, and into the lachrymal canals, which carry it into the nose. If the particle lodges in the corner of the eye, it can be removed by means of the point of a

## INJURIES TO THE EYE

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handkerchief. Most foreign substances can readily be removed in this manner—provided the eye be not *rubbed*. If you rub the eye, it tends to embed the grit, or whatever it may be, more deeply in the eyeball, and if the substance has sharp points, it is liable to become so deeply embedded that it becomes difficult to remove. If the temptation to do this, when a foreign body finds its way into the eye be resisted, the substance can readily be removed in practically every case.

Smooth bodies rarely cause much trouble, but bodies having rough cutting edges may often lodge in the conjunctiva and cause intense pain. The right method of extraction is to *evert the eyelid*, when it will be found easy in the majority of cases to remove the cinder, or whatever it may be, by means of a small paint brush or the corner of a handkerchief. Direct the patient to look downwards, if the body has lodged on the upper eyelid, then turn the eyelid back on the finger, or over a pencil or match. If the body is seen to be near the edge of the upper lid, it can often be removed by lifting the lid up by means of the eyelashes, and bringing it over the lashes of the lower lid. These then act as a sort of broom, and sweep out the foreign body. As in all such cases, the free flow of tears is helpful.

When a foreign body has lodged in the firmer

## STRENGTHENING THE EYES

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tissue of the cornea, its extraction is not so simple a matter, and rubbing only presses it in more firmly. In such cases, the particle is often driven in with considerable force, and it is usually so small that a magnifying glass must be employed to see it clearly. If the body be of iron or steel, it may be extracted by means of a magnet made for that purpose, otherwise a surgeon had best be sent for at once, as lasting injury may result if the substance be left in the eye too long, or if the eye be perforated, and the interior liquids allowed to escape.

WOUNDS made with pointed instruments, such as a knife, scissors, pin, etc., sometimes injure the cornea and lens, and the after effect is frequently a cataract, even when the eye is not lost. These cataracts are usually absorbed in young people, but in older persons they may require an operation for their removal

LIME may be splashed in the eye, and this is a dangerous form of injury. Quicklime is a powerful caustic, and often causes complete blindness by destroying the cornea. When this substance gets into the eye, it should be washed out as quickly as possible with water, and then with a solution of weak acid and water—say, a teaspoonful of vinegar to a glass of water. An equally efficient and more soothing method, however, is to bathe the injured eye in sweet oil.

## INJURIES TO THE EYE

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In case of injury by *acids*, one part of lime-water to three of water may be used, or the eye may be freely bathed in milk. These alkalis offset the acid.

**SYMPATHETIC INFLAMMATION.** When one eye is injured by the entrance of some foreign body, or by a wound, the injury does not always limit itself to that eye. The other eye is also affected, and becomes inflamed by sympathy. This is noticeable even in slight injuries; but in grave cases it may become so serious as to necessitate the removal of the injured eye (that is, if the injured eye is so badly hurt as to render it blind and useless). In our days, this operation is not so serious as it used to be.



Showing the method of everting the upper eyelid for examination or removal of cinders or foreign bodies.



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# STRENGTHENING THE EYES

*—A New Course in  
Scientific Eye Training  
in 28 Lessons*

PART

14

*By*  
BERNARR MACFADDEN

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## PART XIV

### COMMON DISEASES OF THE EYE

**I**N addition to "errors of refraction," there are certain diseases of the eye and its appendages which require special mention, since these are quite frequently met with, and their treatment is often limited, in orthodox practice, to purely local measures, neglecting the constitutional treatment which is usually so necessary.

The eye is made up, as we have seen, of various parts, and each of these parts may become diseased, thus we have diseases of the iris, conjunctiva, retina, eyelids, optic nerve, etc., as the case may be. We shall mention the most important of these, giving their chief causes and most effectual means of cure in each case.

**CONGESTION OF THE CONJUNCTIVA.** This often results, in a mild form, after exposure of the eyes to smoke, or even to strong winds. The conjunctiva is, however, nearly always inflamed in measles, and frequently in scarlet fever and smallpox. Occasionally a diphtheric membrane is formed over it, either with or without an accompanying infection of the throat. These, however, are exceptionally severe cases. In most in-

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stances, a more or less readily curable congestion results—partly from the causes mentioned, and partly from the general physical condition of the patient. The blood, being full of impurities, aggravates the congestion. These cases are relieved from within by those hygienic and cleansing measures which tend to purify the blood stream, and carry away this material.

As regards the external treatment of the eye, frequent eye baths in moderately cold salted water will be found beneficial. These may be followed by the application of cold wet cloths to the eyes, changing them as frequently as occasion may require. The patient must rest the eyes as much as possible, avoid reading in a poor light or straining the eyes with sewing or fine print.

CATARRHAL CONJUNCTIVITIS, or “Catarrh of the Eye,” results largely from a prolonged continuation of conditions similar to those which produce congestion. Those suffering from this complaint often feel as though sand were in the eyes. It is frequently met with in large cities, where dust and smoke tend to keep the eyes inflamed. The eyes are often found glued together on awakening. The mucous membrane of the eye is affected in much the same way as those of the nose and throat, and often at the same time. The eyes may be sore or tender to the touch.

Constitutional and local treatment, as advised

## DISEASES OF THE EYE

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for congestion, with complete rest for the eyes, is unquestionably about the best remedy for this trouble. When the lids are swollen and the eyes red and hot, an eye bath in salted water may be employed to advantage several times a day. If inflammation is especially severe, a weak solution of boric acid may be employed. Poultices, eye waters and remedies of that sort should be avoided. Burning of the lids can nearly always be alleviated by an eye bath.

**GRANULAR CONJUNCTIVITIS: TRACHOMA: GRANULATION OF THE EYELIDS.**—All these are names for the same malady, which is merely a severe form of the two former complaints. Violent inflammation of the eye, which is covered with numerous nodules, is the principal characteristic. It is a tedious and obstinate complaint, unless treated in a prompt and efficient manner. The inner surface of the lids often becomes thickened and rough, like sandpaper, and, by constant friction, impairs the transparency of the cornea. Trachoma is very contagious and in all cases precautions should be taken to avoid communicating the disease by allowing the smallest particle of the discharge from the eyes to come into contact with a healthy eye. Appropriate antiseptic treatment will be helpful. An eye-wash made from sulphate of zinc—about one grain to an ounce being the usual strength—is often effec-

## STRENGTHENING THE EYES

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tive in terminating the symptoms of this unpleasant difficulty, though this suggestion does not in any way eliminate the necessity for careful constitutional treatment.

**PURULENT CONJUNCTIVITIS** is often found in the newly born, and results from gonorrhoeal infection from the mother. It often produces blindness, unless promptly treated with nitrate of silver under proper medical supervision. This should be followed by the strictest care and cleanliness. The discharge, which is thick and yellowish, and, in bad cases, very copious, is undoubtedly and virulently contagious. Fortunately, the disease is rarely met with among adults.

**STYES** are a very painful species of small boils which form generally on the edge of the eyelids. The disease usually follows more or less the course of ordinary boils, and is nearly always brought about through constitutional causes, general debility, a disordered stomach, impure blood, etc. If treatment is begun at the first sign of the appearance of the styes, they may be absorbed without suppuration, but if well started, relief may be secured more speedily by allowing them to come to a head. Usually they will open themselves when ready to discharge the pus, though in some cases it is necessary to open them with a lance. A permanent cure can be effected only by adopting constitutional treatment. Pimples, boils

## DISEASES OF THE EYE

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and such conditions are nearly always produced by abnormal physical conditions, and can be cured by the same methods that are applicable in other conditions of the sort. It is hardly necessary to say that strict cleanliness and adequate drainage of the parts are essential in this condition.

**DISEASES OF THE CORNEA.** These are troublesome and often difficult to treat and still more difficult to diagnose properly by an unqualified practitioner. Says Dr. Black, in his work on the eyes:

“Diseases of the cornea may destroy or impair its transparency, or the ulcers that are frequently formed may extend through its substance, allow the aqueous humor to escape, and involve the iris. Even when such ulcers heal most favorably, they leave a permanent scar in the form of a white speck. Inflammation of the cornea is usually painful and accompanied by distressing sensitiveness to light. It occurs most frequently in persons whose health has been subjected to some depressing cause, or in children who have inherited a delicate constitution. Many of the latter are subject to repeated attacks for years, but the tendency to their recurrence generally disappears before adult life, and if care be taken to prevent each attack from leaving a permanent mark, the eyes may finally remain sound and

## STRENGTHENING THE EYES

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strong. . . . A large, white opacity of the cornea is often mistaken for cataract, and not many years ago, when a knowledge of diseases of the eye was not so general as now, this mistake was sometimes made by physicians, and such patients were sent hundreds of miles to have the cataract removed."

It is hardly necessary to point out that, though "delicacy of constitution" might *predispose* certain persons to this disease, the actual *causes* are an overloaded circulation, poor digestion, poor light, excessive use of tobacco and alcohol, etc.

This being the case, the treatment for all forms of these diseased conditions is obvious. A rigid diet, preceded, if possible, by a few days' fasting; plenty of water-drinking; eye baths; fresh air; exercises which tend to build up and strengthen the general bodily tone, etc., are all essential. Plenty of good light and sunshine are imperative at all times.

IRITIS, or inflammation of the iris, often destroys the sight by closing the pupil and shutting off the light from the interior of the eye. It may be accompanied by inflammation of the conjunctiva, and hence be overlooked until well developed. It should always be suspected when, in an acute affection of the eye, the sight is decidedly diminished and there is some pain in the ball, and particularly in the brow, the latter being always

## DISEASES OF THE EYE

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more severe at night. The cause is usually syphilis or rheumatism, and one of the chief after effects to be feared is the permanent contraction of the pupil. Local treatment is of little avail, but the application of hot and cold cloths alternately to the eye will usually assuage the pain. The patient should be careful not to use the eyes more than is absolutely necessary.

CATARACT is a disease of the crystalline lens, in which this body gradually loses its transparency. The pupil may lose its natural blackness, the whitish surface of the opaque lens being seen just behind it. Cataracts are not "on the eye," as is commonly supposed, but *in* it. Until lately, it has been contended that the surgeon's knife was the only remedy, but other methods of cure are now coming in, and it is highly probable that as soon as these newer methods become more widely known and recognized by the medical profession, operations will not be found necessary in any but advanced cases.

There are two kinds of cataracts—the old, hard cataract, and the so-called "soft" cataract. In the majority of cases a hard, stonelike substance forms in the lens, and this has been removed by operation successfully in many instances. In such well-advanced cases, it is probable that all the physical culturist can do is to encourage such a condition of good health that the operation can

## STRENGTHENING THE EYES

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be well borne, and keep the blood as pure as possible, to carry on the good work of repair afterwards. By preserving the health, however, and using the eyes properly, cataract may be prevented; and prevention is better than cure here as elsewhere. In the second place, in their earlier stages, cataracts have been permanently cured by focusing the sun's rays on the lens for several seconds at a time by means of a burning (magnifying) glass, until a slight pain is experienced, allowing the eye to rest for a short period, then resuming the treatment. However, such treatment should under no consideration be given except by a thoroughly qualified physician. In its incipient stages, there is every reason to believe, further, that cataract can be cured merely by proper use of the eyes, for it is now known that cataracts are functional at first and only become organic later on; in other words, cataract is produced by eye strain. Rest, central fixation and the proper care of the eyes will not only prevent this condition, but will cure it when it has not gone too far.

The reason for this is simple enough. It is this: The lens is composed of a number of transparent layers superimposed one upon another—like a number of sheets of glass laid flat one upon another. When these all lie flat and even, the light can penetrate them all equally and without

## DISEASES OF THE EYE

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interference; but if any of them become separated or warped, then the light-rays are bent and warped, and the otherwise transparent medium becomes more or less opaque. This is what happens in the case of cataract. By improper use of the eyes these delicate layers are disarranged. Instead of lying flat, some of them are bent or warped, preventing the free passage through them of the light-rays. When this state has been maintained long enough a degenerative change within the eye takes place. When this happens, the only thing to be done is to remove the lens, and thanks to the advance of modern surgery, this may now be done in the majority of cases with relative safety.

Both clinical and experimental proof that this theory of the facts is correct is forthcoming. If you take a bullock's eye, and squeeze it, you can *instantly* produce cataract—with the typical white, glassy look in the pupil. As soon as the pressure is removed, the eye again becomes normal. The little "plates" have been bent and warped, and functional cataract has been produced. This theory of cataract is also sustained by the fact that such patients actually do get well, under the influence of eye education, whereas formerly there was considered to be no help for them. The reason the pupil of the eye appears white, instead of its customary black, in

## STRENGTHENING THE EYES

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such cases, is because the light-rays entering the eye are interfered with.

The régime which sufferers from incipient cataract should adopt, therefore, is the following: Comply strictly with all the laws of health, including an abstemious diet with plenty of fruit and water and no alcohol; use eye-baths and all similar local measures of relief; and practice daily exercises in central fixation and relaxation by means of visualizing blackness. These methods and exercises will rest and relax the internal mechanism of the eye; and the cataract will be cured. If these measures are adopted and adhered to, at the very beginning of such cases, there is every reason to believe that the majority of cataracts can be overcome in their initial stages, and before they develop to the point where they become organic.

GLAUCOMA is a disease which frequently results in blindness and about which little is known. It is thought that an excess of fluids in the eye makes the ball tense and hard, and exerts injurious pressure upon its delicate contents. In acute cases, it is intensely painful, and rapidly destroys sight by pressure upon the optic nerve. In its earliest stage, its progress has been checked by an operation which consists in cutting out a piece of the iris; but when the nerve is once paralyzed, other complications arise.

## DISEASES OF THE EYE

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In no other disease is early diagnosis and treatment more important, and many of its victims have been condemned to blindness by delay. No one with a violent pain in the eye and head, particularly if it is accompanied by flashes of light, rainbow colors and dimness of vision, should allow himself to be lulled into a sense of security by thinking it is "neuralgia."

Although the ultimate and true causes of glaucoma are as yet unknown, the thing to do, immediately it has been diagnosed, is to adopt a very abstemious diet, following a fast of a few days, if possible; use all those measures which tend to build up the general health, and practice central fixation and relaxation of the eyes by visualizing black. Frequent cold eye-baths may also be useful. In all cases a specialist should be consulted at once.

**DISEASES OF THE CHOROID AND RETINA.** These diseases can be detected only by means of the ophthalmoscope, but may be foretold by increasing dimness of vision. They usually develop painlessly, and hence are as insidious as they are unfortunate. It is probable that the excessive use of tobacco and alcohol are great contributory causes of these conditions, and hence the necessity of omitting them completely when treatment is begun. Syphilis and kidney disease are also common causes.

## STRENGTHENING THE EYES

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**ATROPHY OF THE OPTIC NERVE.** This is a very serious progressive disease, resulting in total blindness. Syphilis is a frequent cause, and it goes without saying that such a condition would be impossible in a healthy body, or in one wherein the seeds of disease had not been sown.

**THE HEREDITARY TRANSMISSION OF EYE DISEASES.** There is evidence to show that a certain number of eye diseases— or rather the *tendency* to these diseases—may be acquired by means of heredity. In color blindness this is particularly marked, as well as in certain peculiarities or conformations of the eyes. Actual *diseases* are probably not inherited, and errors of refraction are probably acquired in each generation. A tendency to gouty or rheumatic iritis, it has been contended, may be inherited; but here again it is probable that no more than the *tendency* is ever passed on in this way. A peculiar affection, “retinitis pigmentosa,” which is recognized, with the ophthalmoscope, by the presence of black spots upon the retina, shows a marked tendency to hereditary transmission. It also occurs in several members of the same family, though there may be no history of it in the family. The prominent symptoms are “night blindness” and a gradually increasing contraction of the field of vision. (This is also a characteristic of certain forms of hysteria.) It is also probable that “nyctalopia,” or

## DISEASES OF THE EYE

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the reverse condition—ability to see in the dark—is to some extent hereditary. But it may be laid down as a general rule that eye diseases—like all other diseases—are not hereditary, but are acquired by each generation, and by each individual for him or herself.



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# STRENGTHENING THE EYES

*A New Course in  
Scientific Eye Training  
in 28 Lessons*

*Series*  
PART

15

*By*  
BERNARR MACFADDEN

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## PART XV

### EYE EXERCISES

**N**OTHING could be more evident than the fact that exercise of the eyes will strengthen these organs just as exercise of any other part of the body will strengthen that part.

Exercise of any group of muscles not only tends directly to strengthen those muscles, but it so improves the circulation as to build tone in the adjacent parts. If any part of the body is weak, flabby, ineffective, exercises which involve the use of the muscles in that region will have a strengthening and toning-up effect. This applies with special force to exercises for the muscles of the eye.

Most persons will be surprised, perhaps even amazed, at the improvement in the condition of the eyes accomplished by two or three weeks of proper exercise of the eye muscles. This does not mean that one should keep up this work for only two or three weeks. If you will make it a daily practice you can expect to enjoy strong eyes and good vision to perhaps the end of life.

You will find that these exercises are very

# EYE EXERCISES



Exercise 1.—Turn and stretch the eyes far to the left.



Exercise 1 (Continued).—Then turn and stretch them far to the right, continuing the movement back and forth from left to right ten times or more

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*2/21/39*

## STRENGTHENING THE EYES

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**Exercise 2.—Turn the eyes upward, that is to say, look as high upward as possible without raising the head.**

## EYE EXERCISES



**Exercise 2 (Continued).**—Then, without moving the head, lower the eyes looking as far down as possible. Continue raising and lowering the eyes ten times or more.

## STRENGTHENING THE EYES

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Exercise 3.—Raising the eyes, look upward obliquely to the left.

## EYE EXERCISES

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**Exercise 3 (Continued).**—Then lower them obliquely to the other side, looking downward toward the right. Repeat ten times or more.

## STRENGTHENING THE EYES

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Exercise 4.—Raise the eyes upward obliquely to the right.

## EYE EXERCISES



**Exercise 4 (Continued).**—Then stretch them obliquely downward to the left. Continue back and forth ten times or more.

## STRENGTHENING THE EYES

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**Exercise 5.**—Roll the eyes around in a circle, to the left upward, to the right downward, so on around. Then reverse, rolling them the other way around. Continue until slightly tired.

## EYE EXERCISES



**Exercise 6.**—Shut the eyes tightly and vigorously, squeezing the eyelids together as firmly as possible. Open and repeat ten times or more.

## STRENGTHENING THE EYES



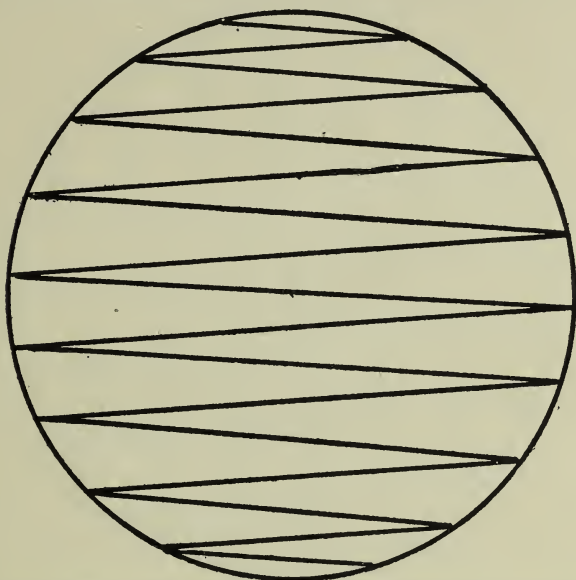
**Exercise 7.**—This is an exercise that should be performed without strain, and at first with only two to four repetitions at a time. Simply look cross-eyed as though trying to see the bridge of the nose with both eyes at once.

simple indeed. You should practice them not once a day, but a number of times each day. You can practice them while dressing in the morning, while undressing in the evening, while out on your walks, while sitting in the car, or even while taking your meals. But you should set aside some particular time for this special purpose, whether it be morning or evening, else they are more than likely to be crowded out. At this time you should follow the eye exercises by a little of the massage treatment described in another lesson, and in the end use the eye bath, also elsewhere described.

One of the most vigorous of eye exercises, and one extremely effective for gaining voluntary control of the muscles of the eyes, is the practice of looking cross-eyed. A great many persons will naturally shrink from the thought of such an exercise from the fear that looking cross-eyed will have a detrimental and possible permanent effect upon the eyes.

## EYE EXERCISES

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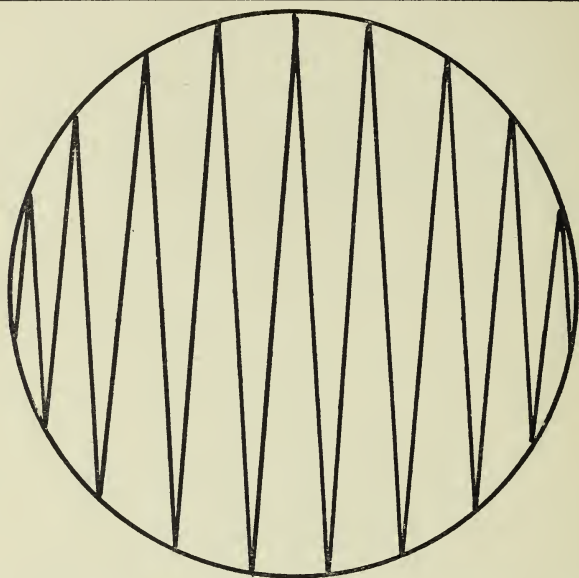
Eye Exercise Diagram No. 1.—(Explanation in text.)

The fact is that looking cross-eyed voluntarily indicates a good muscular condition and good control of the muscles concerned. It is also an exercise which will strengthen these muscles. If a person with a tendency to squint will learn to look cross-eyed voluntarily, and practice it as an exercise, thereby strengthening the muscles concerned and gaining control of them, this will be found the very best way in the world to correct the condition.

Another very simple method of exercising the eyes will be found in a system of following lines drawn within a large circle, or an imaginary sys-

## STRENGTHENING THE EYES

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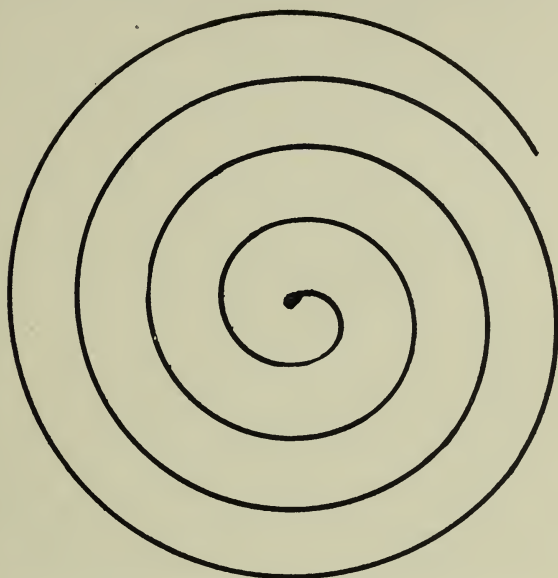


Eye Exercise Diagram No. 2.—(Explanation in text.)

tem of lines based upon various diagrams, such as those illustrated in the accompanying drawings. Suppose that the circle represents the complete range of vision attained by rolling the eyes around. Imagine, then, that this circle occupies the space on the wall of the room, in front of you, that you can see by rolling your eyes around. Then imagine a series of lines or a continuous line running from side to side, as in Eye Exercise Diagram No. 1, from the top of the circle to the bottom. Now, starting at the top, follow on the wall with your eyes just such an imaginary scheme of lines as that in the dia-

## EYE EXERCISES

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Eye Exercise Diagram No. 3.—(Explanation in text.)

gram. Practice this a few moments with one eye first, then with the other, finally with both eyes together, and then go on to the exercise suggested in Diagram No. 2. In Diagram No. 3 the eye starts in the center, then tracing out a circular, or to be more exact, an imaginary spiral line, until the circling of the entire range of vision is attained. The head must not be moved.

If you follow the eye exercises offered in the photographic illustrations there will be no need of adding these imaginary line tracing exercises. But you may occasionally find them interesting as a change.



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BERNARR MACFADDEN

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## PART XVI

### EYE-FOCUSING EXERCISES

**T**HE exercises given in this chapter are of a type quite different from those recommended in the preceding lesson. They are designed to strengthen the power of accommodation, that is, the power of changing the focus of the eyes for vision at different distances, and will be particularly valuable to those who are either near-sighted or far-sighted.

Shut one eye and hold a pencil point five or six inches in front of the other. Now, look through the window at some point on the horizon or any distant object. After looking for two or three seconds at this distant point, focus the eye on the pencil point. If your eyes are normal you will be able to change the focus without any consciousness of effort, but otherwise you may experience very clearly the sensation of muscular effort in and about the eyeball. This muscular effort, whether one is conscious of it or not, accompanies all changes of the focus of the eye, and the power of making these changes must obviously be improved by the daily practice of some such exercise as this.

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**An eye-focusing exercise for both eyes. (See text.) Looking first at the point of a pencil held near by as in the upper photo, shift your view to look closely at a distant cloud, or some tree or building on the horizon. Immediately upon seeing the distant object, concentrate the sight again upon the pencil point until you see it sharply. Continue alternately concentrating the sight far and near from ten to twenty times.**



**A similar eye-focusing exercise, using one eye at a time. First concentrate on the nearby pencil point or any close object, then concentrate on some distant object, return to pencil point and continue, making it a point to see both near and far objects sharply and clearly for an instant. Same with both eyes.**



Another eye-focusing exercise. Closing one eye, first look at the end of the nose with the open eye, trying to see it as sharply as possible as in the upper photo. Then, concentrate the sight upon some distant point for a moment. Repeat ten to twenty times. Same with the other eye.

## EYE-FOCUSING

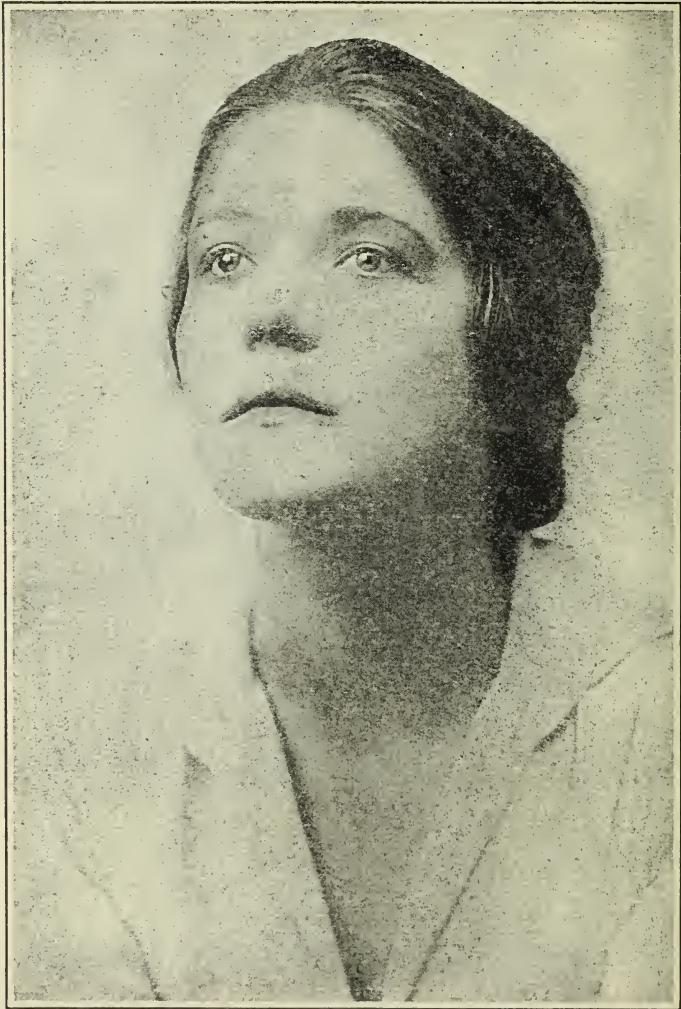
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**A combination eyeball exercise and eye-focusing exercise. First try to see the end of the nose as sharply as possible as in the above photo. (See next photo.)**

## STRENGTHENING THE EYES

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Then, shift the gaze to some distant point for a moment. Look again at the end of the nose and continue, repeating only four or five times at first.

## EYE-FOCUSING

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The exercises should be practiced with one eye at a time, and with both eyes together. At first you may not be able to see things very close to the eyes, but gradually you will find yourself able to diminish the distance. Begin by holding your pencil at whatever point you can see it most clearly, concentrate the sight upon it and then look at some distant object, such as a cloud, a tree, a house or a chimney. You can vary the exercise, if you like, by looking at intervening distances, from a few feet up to fifty feet, one hundred feet, three hundred feet and so on. Then you can begin to hold the pencil point, thimble, needle, printed card or whatever it is you choose to use, nearer to the eye. The nearer to the eye the more vigorous the effort required to focus the sight upon it. You will, in time, find that you can easily shift your vision from a distant object to your pencil or thimble held perhaps four or six inches in front of the eye, and see clearly and sharply at both distances.

A fairly good plan is to go to the window, and instead of using a pencil find some speck or imperfection in the glass upon which you can concentrate for the nearby point, and then alternately shift the sight from this point to a cloud or distant tree.

Another plan is to throw the head back, shutting one eye, and with the other trying to see

## STRENGTHENING THE EYES

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sharply the end of the nose, afterward looking to the distance and then back to the end of the nose. A combination of this exercise and that of looking cross-eyed may be practiced by using both eyes, looking first at the end of the nose with both eyes, then to some distant point, and then at the end of the nose again.

## PART XVII

### EXERCISES FOR THE PUPIL OF THE EYE

**I**T is a comparatively simple matter to exercise the little sphincter and dilator muscles which have to do with the enlarging and diminishing of the pupil of the eye. Under normal conditions of vigor these muscles scarcely need attention. It is only when the eyes are weak, and these muscles do not respond readily in accommodating the opening to various degrees and intensities of light, that special exercise is required.

Naturally, the only practical way to exercise these muscles is to find a method of exposing the eye in rapid succession to degrees of light of varying intensity. At night this may be done by turning an electric light on and off repeatedly for a minute or two. In the daytime one can stand in a room with one window, pulling the shade down to darken the room, and then raising it and looking out of doors. In either case try to see the various objects in the room when it is darkened. It is through this effort to see in the dark that the dilator muscles will be especially



Exercising the pupil of the eye. This is best done in a dark room. At first, do not look directly at the light but at some white object, turning the light off and on at intervals of two or three seconds. You can soon accustom yourself to looking squarely at the light while turning it on and off. One minute or less will be sufficient for the purpose.

## PUPIL OF THE EYE

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stimulated, as the pupil enlarges as much as possible to enable you to see.

When the electric light is turned on, or the shade raised, the greatest stimulation will be derived from looking directly at the light, or at the sun, for an instant, provided this does not involve the sensation of eye strain or discomfort. It might not be wise, however, to do this unless you are sure that your eyes are fairly strong. You can get sufficiently good results in looking at any white object when the light is turned on, for instance, the blank page of a book. Turn the light on and off at intervals of two or three seconds. If your eyes are sensitive to artificial light it may be better to practice this exercise in the daytime, pulling down the window shade and then raising it. One or two minutes of this exercise usually should be sufficient.







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## PART XVIII

### EYE MASSAGE AND RESISTANCE

**I**N conjunction with the various methods for strengthening and invigorating the eyes outlined in this book, massage of the eye and adjacent tissues will be found, in many cases, to be of great practical value.

Massage is known to be beneficial in its effects upon all parts of the body. The nerves are stimulated, the blood stirred into greater and more active circulation, and the muscles and tissues generally stimulated into more vigorous life. It is now employed to advantage in many forms of disease. The professional beauty knows these facts, and lays the greatest stress upon both facial and bodily massage, while athletic trainers rub and massage the bodies of their charges before and after any event of importance.

Why, then, should some form of modified massage not be of value in the treatment of the eyes? Of course, one can not very well massage the eyes in the same way one would a muscle, but they can certainly be strengthened and invigorated by manipulation which quickens the circulation of the blood and stimulates the nerves.

g. H. M. Dunlap see Tate

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Probably the best eye massage is applied with the heel of the hand, either at the base of the thumb or opposite as in the above photo. With gentle pressure give the hand a twisting movement. At the same time, contract and relax the eyelid muscles. This is in line with the natural impulse often felt to "rub the eyes."

## STRENGTHENING THE EYES

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Placing the thumb and finger upon the upper and lower eyelids as illustrated, impart a very gentle massaging motion. You should gently "feel" the eyeball in applying this massage. A half a minute or less should be sufficient.

## EYE MASSAGE



With two fingers placed one on each side of the eyeball make a gentle upward and downward movement. Use no pressure. The gentlest movement will suffice.

## STRENGTHENING THE EYES

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A gentle resistance exercise. Either close or partly close the right eye, placing the forefinger at the right of the eye. Then turn the eye to the right and resist very slightly with the pressure of the finger upon the eyeball. Relax and repeat a few times only.

This massage treatment, if used, should follow the eye exercises. It is a good plan to follow the massage with the eye bath.



A continuation of the preceding eye resistance exercise. Shift the same finger to the inner side of the left eye, resisting slightly as before while turning the eye to the right. The left forefinger can be used on the left side of each eye.

## PART XIX

### THE EYE BATH

IT is a good plan to follow the massage of the eyes with an "eye bath." A *weak* solution of salt and water, or a dilute solution of boric acid and water, is the best for this purpose, under ordinary conditions. These solutions must on no account be *strong*. The water must not be brine, nor the boric acid solution too strong. The water should usually be cool, or lukewarm; but the temperature must depend upon circumstances. In certain inflammatory conditions of the eye, it is often advisable to have the water quite cold, while on the other hand, in all injuries and local affections, which render the eye sore or tender, it is best to bathe it in warm or hot water—at least, at first. The bath, as a rule, should not last more than twenty or thirty seconds for each eye, and should be followed by a blinking of the eye—which, however, will probably follow automatically.

The eye-bath may be taken in two ways. The first method is to fill an ordinary bowl with water, hold the breath, immerse the face in the water, and then open and close the eyes a number of

## STRENGTHENING THE EYES

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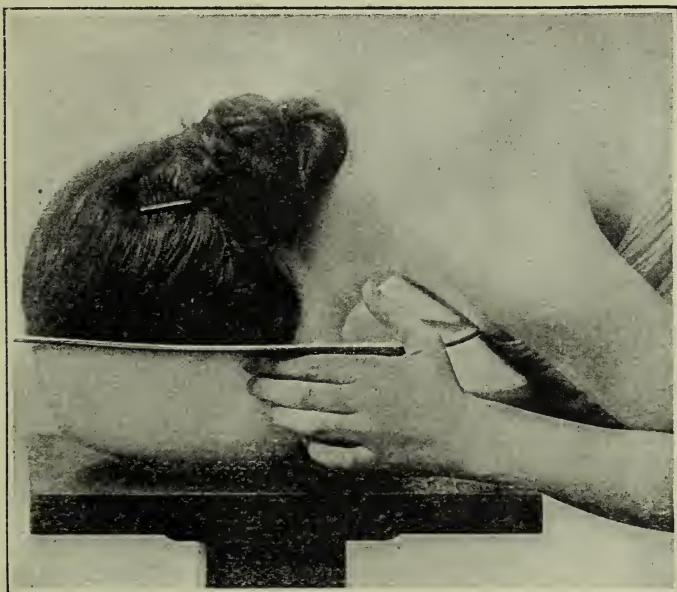


For taking the eye bath, the simplest plan is to fill an ordinary wash bowl with a weak solution of salt water or dilute boric acid.

times while the eyes are well under water. This can be repeated two or three times. This is the first method, and while it has the disadvantage of wetting the whole face, has the advantage of lack of suction, which the second method entails.

**THE EYE-CUP.** Eye-cups are now easily obtained, at a low figure, and are very useful little appliances, enabling one to bathe the eyes, with-

## THE EYE BATH



Taking the eye bath in a basin. Immerse the face in the salt water or boric acid solution and open the eyes under water, then moving them from side to side, up and down, and rolling them around.

out immersing the whole face, as in the method just described. In this case, the eye-cup is filled with whatever solution is to be used and then the head is tilted backward, and the eye under the cup opened and closed a number of times. The same operation is repeated in the case of the other eye. It is a good thing not to keep the cup against the eye for too long a time, owing to the suction which develops in consequence. It should be removed several times, and then applied again.

## STRENGTHENING THE EYES

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**Taking an eye bath with the eye-cup. The eye-cup filled with boric acid solution is so placed as to fit the eye socket with the head bent forward over it. Then tip the head back as in the illustration and open the eye and move it about in the solution.**

## THE EYE BATH

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As regards medicinal substances to be used in the water, there are but few of these which can be recommended. A small percentage of salt is often strengthening to the eyes, but a heavy brine is irritating and injurious. A dilute solution of boric acid is often beneficial, as it tends to cleanse the eye and wash out irritating substances. Apart from these solutions, it is safe to say that the further the patient keeps, ordinarily, from "eye lotions" and concoctions of that sort, the better.

These eye-baths should have the effect of strengthening and stimulating the eyes in a wholesome, hygienic manner, without irritation. Cases of weak and dull eyes are especially helped by them, and they are helpful in practically every case of eye disease and defect, where they are not distinctly contra-indicated.



The eye-cup. A convenient device for taking the eye bath with a minimum of boric acid or salt water.

## PART XX

### EYE STRENGTH THROUGH SUNLIGHT

Here is presented a most remarkable discovery to the effect that the rays of the sun have not only a beneficial, but a curative effect upon the eyes. The physician who conducted these researches, and who affirms the validity of these statements, does not attempt to explain this benignant influence of the sunlight, but the fact is attested by numerous proofs.

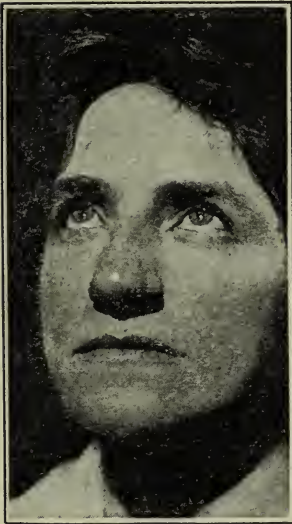
The publishers, however, suggest caution in attempting any home treatment of this kind. The policy of "safety first" has come to be a recognized principle of modern life, and it would undoubtedly be wise to experiment carefully with radical measures of this sort. Any one can experiment with sun-gazing in the early morning or late afternoon, but caution is suggested in attempting to outstare the noonday sun in June. The burning glass should never be used by inexperienced persons.

**W**HILE it is recognized in a general way that light is good for the eyes, most people entertain a fear of what they call "strong light." For this reason, as well as because the light often causes them actual discomfort, people protect their eyes from the sunlight with smoked and amber glasses, broad-brimmed hats and parasols, while persons working under artificial light use eye-shades and similar devices. All this is, to a large extent, superstition.

## EYE STRENGTH

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The eyes need no protection either from the light of the sun or from any other light. No artificial light can equal the rays of the sun in intensity, and the sunlight, far from being harmful, is the best thing in the world for the eyes. The eyes were made to react to the light, and in its absence they deteriorate and become weak. Fishes which live in sunless caves become blind; miners and people living in dark tenements develop all sorts of eye troubles. Their eyes



Persons with normal sight can look directly at the sun without injury or discomfort. Note that the eyes are wide open, with no evidence of pain and no watering.

become increasingly sensitive to the light-rays until after a time they cannot look at strong light at all without pain. Then they are advised not to do so, but to rest the eyes by remaining in a dark room until they have recovered! As a matter of fact, the eyes are weak just *because* they have lacked the benefit of the sun's rays; and what they need more than anything else, in order to get well, is the thing of which they have been deprived. Sun-

## STRENGTHENING THE EYES

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Demonstrating again that the normal eye can regard the orb of day without injury. With the sun shining almost directly into her eye, the subject reads the Snellen test card with normal vision.

of the eyes the sun's rays concentrated upon them by means of a burning glass exert a remarkably curative effect. This has been mentioned in another chapter in the case of cataract, and the treatment has been used with astonishing success in other conditions. The following are examples of hundreds of similar cases that might be cited:

A man suffering from inflammation of the eyelids was unable to attend to his work, because,

light is one of the best curative agents we can employ for the eye. Persons with weak and defective eyes should gaze up in the direction of the sun every day, until they are able to look straight at it without pain or injury.

Not only is it beneficial to look at the sun, but in most diseases

## EYE STRENGTH

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as soon as he left the house and went into the sunlight, the discomfort he experienced was so great that he was unable to see, and had to return home. He had been in this condition for more than fifteen years, and had received all kinds of treatment from many physicians. After a few treatments with the burning glass he was able to return to his work without further trouble.

Another man suffering from trachoma was unable to open his eyes in the sunlight, and



Concentrating the rays of the sun upon the eyeball with a lens or "burning glass," demonstrated to be an effective curative measure in conjunctivitis, iritis, ulcers of the cornea and other diseases of the eyes.

therefore had great difficulty in finding his way about. One treatment enabled him to open his eyes and go into the sunlight without discomfort.

These cases are interesting, because they serve still further to illustrate the baselessness of the present fear of strong light.



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## PART XXI

### CONSTITUTIONAL IMPROVEMENT FOR STRENGTH- ENING THE EYES

**I**F your eyes are weak or your sight impaired in any manner whatsoever, one of the first requirements for improvement is to build up a better state of the general health.

It may have been your experience, just as it has been that of countless others, that signs of weakness of the eyes, failing of the sight, twitching of the eyelids and a smarting and burning sensation have accompanied a condition of depleted vitality. After your health has been restored you have found that your eyes grew stronger and better, giving you little or no further trouble.

Practically every one has had some such experiences. At all events, it is undeniably true that the condition of the general health is very largely reflected in the eyes, just as it is in the voice, in the complexion, in one's whole mental and physical bearing. As soon as you build vitality, strengthen the nervous system and improve

## HEALTH IMPROVEMENT

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the condition of the blood, the eyes acquire new vigor.

The reason for all this is obvious. The eyes depend upon the blood supply. If it is of the proper quality and purity it will tend to keep these organs vigorous, just as all parts of the body are thus kept vigorous. If the blood is in poor condition, filled with impurities and sluggishly circulated, then you can not expect to keep your eyes, or any other part of your body, in the best condition. It is for this reason that good digestion, active elimination and general functional vigor must be considered if you wish to improve the condition of your eyes. In other words, constitutional treatment is necessary.

One of the first lessons for every man, woman and child to learn is that illness is one's own fault. It is purely a matter of cause and effect. Sickness comes as an inevitable result of habits and conditions of life which would logically produce such a result. Health is merely the effect of normal and natural habits of life. If you live in accordance with the laws of Nature you make illness practically impossible.

The truth is that it requires more energy to be sick than to be well. In a state of health the organs function properly, naturally and easily. There is no special effort upon the part of any one of them. Life proceeds smoothly and

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## STRENGTHENING THE EYES

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easily. But when one is sick the body has to struggle against poisons, against various handicaps, and the work of each organ of the body becomes a serious effort. Sickness means hard work for the body. Good health means freedom from all these troubles. It is, therefore, far easier to be well than to be sick.

If you have strength enough to resist illness and still live, you certainly will have energy enough to recover normal health and to keep it. But you cannot secure health in a drug store. You cannot build health simply by conversing with a physician and paying him regrettable sums of money. You can build health only by obeying the laws of Nature, by cultivating habits and conditions such as will increase your strength, help your organs to function more perfectly and smoothly, and purify and improve the condition of your blood.

The cornerstones of health may be said to be exercise, air, food and sleep.

Exercise is probably the most neglected of all these vital health essentials. The first characteristic of all life is movement or the capacity for movement. You see an insect, a reptile, a lobster or any other animal lying motionless, and you wonder whether it is alive or dead. Perhaps you poke it with a stick. If it moves you know that it is alive. Our lives are based upon the

## HEALTH IMPROVEMENT

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capacity for movement. This applies not merely to the muscles which move the body about, but to the muscular organs which maintain the vital processes, such as the heart, stomach and blood-vessels, which have muscles in their walls to keep the contents circulating.

Forty per cent or more—that is to say, from two-fifths to one-half—of the weight and bulk of the body in a state of health and vigor is made up of muscular tissue. Most of the food is consumed in the muscles. It is inevitable, therefore, that a healthy state of the muscular system is a prime condition of what we call health. We are essentially muscular creatures. Therefore, to permit our muscles to degenerate and deteriorate means not only a loss of strength, but it means a poor and weak circulation, a loss of tone in all the organs, and consequently a general impairment of the health.

You will see from all this that muscular activity is absolutely essential to health. Inactivity means stagnation. Stagnation not merely of the muscles, but of the blood and of all those vital forces which together make up what we call life. Out-of-door exercise is undoubtedly the best. You should make it a point to get enough of it. But whether you can spend much time outdoors or not, you should certainly take enough exercise of a strength-building character in your own

## STRENGTHENING THE EYES

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home, or in your own room, to maintain the muscular system in a state of full development and normal vigor. More detailed consideration of the subject of exercise for constitutional purposes will be given in a subsequent lesson.

## PART XXII

### EXERCISES FOR CONSTITUTIONAL IMPROVEMENT

**T**HE value and necessity of exercise as a factor in constitutional improvement has already been pointed out. Every one needs a proper amount of exercise for the sake of the general health, irrespective of the effect upon his eyes.

Without going too deeply into the physiology of exercise, it may be said that there are two general results to be gained from any good system of physical training. In other words, exercise may affect one in two ways. It may have chiefly a muscle-building value. Or it may have what is commonly called a constitutional or health-building value. Muscle-building exercises are intended chiefly to build strength and enlarge the muscles. Constitutional exercises chiefly affect the heart, the lungs, the vital organs generally, and, in consequence, the purity and quality of the blood.

Now, nearly all exercises partake of this two-fold purpose. They strengthen and enlarge the muscles and, at the same time, they build up the general health through their effect upon the heart

## STRENGTHENING THE EYES

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**Exercise 1.**—With the hands at the hips bend far forward in the manner illustrated. Repeat five or ten times according to strength. It is best to commence with a few repetitions and increase the number with the increase of strength.

## CONSTITUTIONAL EXERCISES



**Exercise 2.**—Bend well backward in the manner illustrated. It is usually most convenient to combine exercises 1 and 2 in one movement. Repeat as desired.

## STRENGTHENING THE EYES

and lungs, the digestive and eliminative systems. That is why almost any form of activity, if one secures enough of it, is likely to fulfill all requirements in both these respects. At the same time there are some exercises which are particularly of the muscle-building type and are only slightly constitutional in their influence. There are others which have only a small muscle-building value, being useful mainly because of their effect in toning up the vital organs.

All those types of exercise which call for endurance are of the greatest value from a constitutional standpoint. In other words, any exercise which may be continued for a considerable length of time and which, therefore, keeps the heart working energetically and causes one to breathe deeply and freely during that period, will inevitably tone up the internal organs.

The shallow breathing of the inactive man or woman is not calculated to fill the blood with oxygen, and the brain and all of the structures of the body suffer more or less from the lack of this life-giving element. Exercises which cause prolonged deep breathing will naturally increase the oxygen intake until your entire body from top to toe is literally charged with it. This will make you more alive. It will make you brighter and more energetic, and the improved circulation will tend to tone up every cell and every structure of the body.

## CONSTITUTIONAL EXERCISES

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Exercise 3.—With feet well apart to give a better base of support, bend the body far sideways, to both sides, five or ten times.



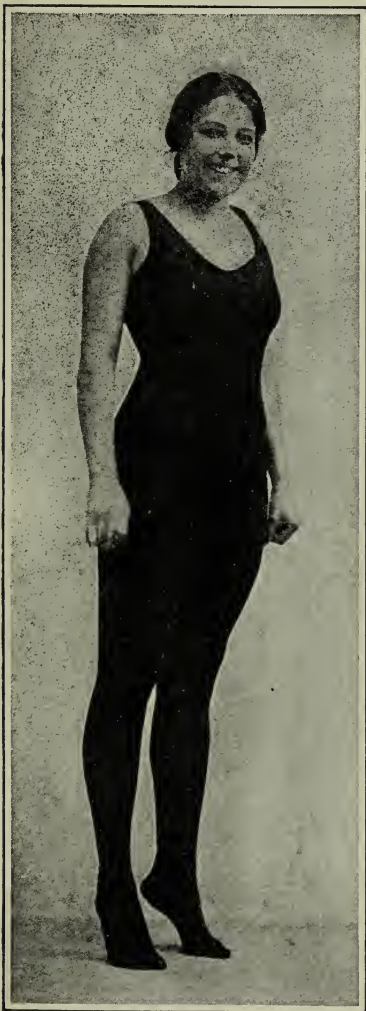
**Exercise 4.**—Turn or twist first far to one side and then far to the other in the manner illustrated. This is a spine twisting as well as an organ stretching movement. The more action, the better.



**Exercise 5.**—With fists clenched stretch vigorously upward, lower the arms, then stretch upward again. This can be varied by stretching forward and sideways.

## CONSTITUTIONAL EXERCISES

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**Exercise 6.**—Raise the body high on the toes as illustrated. If too easy, do it on one foot at a time.

It is for this reason that a long walk is one of the best of all forms of constitutional exercise. Every time you step you lift the weight of your entire body and move it the distance of your stride. Although there may be little effort in walking, nevertheless considerable energy is consumed, and the largest muscles of the body are brought into play. It is because walking is accomplished by the largest muscles that the effort seems easy. Nevertheless it calls for a large supply of blood and of oxygen. This means increased circulation and deeper

## STRENGTHENING THE EYES



**Exercise 7.**—Starting in a standing position with the arms at the sides, bend the knees and lower the body to the squatting position. It is easier to maintain balance and requires less effort if the arms are swung forward and upward as the body is being lowered, as illustrated.

## CONSTITUTIONAL EXERCISES

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**Exercise 8.**—Bring one knee at a time upward as high as possible with a snappy, kicking movement. A little more action is secured by swinging the arms upward at the same time. Repeat five or ten times or more with each leg.

## STRENGTHENING THE EYES

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Exercise 9.—Lying on the back with the arms folded, raise the body as illustrated to a sitting position. Repeat according to strength and fatigue. If necessary use a weight over the feet.

## CONSTITUTIONAL EXERCISES

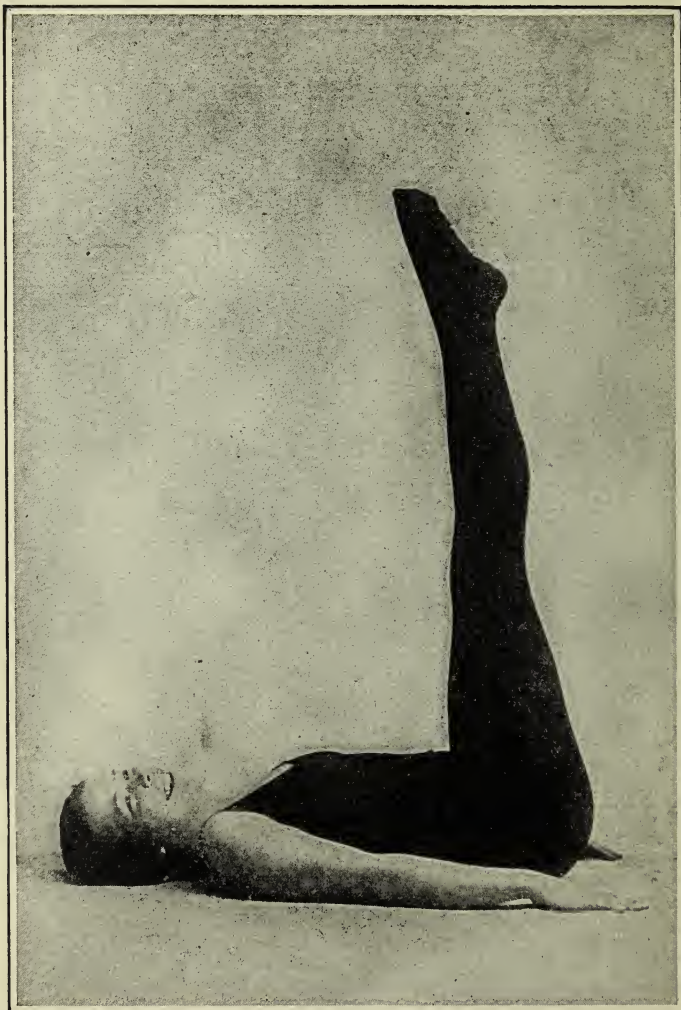
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breathing. Walking for a distance, therefore, means the continuation for a period of time of moderate exercise for the body's largest muscles, without involving any strain. There is the very least expenditure of nerve-force in proportion to the physiological benefit.

There are other forms of constitutional exercise which do not involve any severe strain upon the muscles, and which are beneficial largely because of their endurance-building quality. Cycling at moderate speed, hill climbing, rowing for pleasure, horseback riding, golf, gardening and other varieties of exercise may be included in this class. Of course, some of these, like gardening or rowing, may be made very strenuous indeed if one wishes to exert oneself.

The exercises which we are illustrating herewith are useful both for their constitutional and their muscle-building value. They are particularly designed to keep the trunk of the body firm, strong and vigorous. Exercises that bend and twist the trunk of the body not only build up and strengthen the external muscles, thus supplying the lower trunk with strong, firm muscular walls, which prevent any prolapses or sagging of the internal organs, but they indirectly affect the internal organs, toning them up and making them far more vigorous. They also help to keep the spine and its cartilages strong, flexible and youthful.

## STRENGTHENING THE EYES



Exercise 10.—Lying on the back with the arms at sides, raise the legs to the perpendicular position illustrated. Repeat as desired.

## CONSTITUTIONAL EXERCISES



**Exercise II.**—This is a variation and extension of the preceding movement. It is a little more vigorous but also more interesting. Continuing the preceding movement, raise the hips and back from the floor as illustrated.

## STRENGTHENING THE EYES

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Either the system of exercise presented herewith, or any other system which answers the same purpose, should be practiced at least once each day. It will be best to take the movements in your bedroom before dressing. If taken in the morning, they will wake you up and warm you up, so that a cold bath will be not an ordeal but a pleasure. You will find it advantageous to give the skin of the entire body a brisk rubbing following the exercises and preceding your bath. If you do not find it convenient to take the exercises in the morning, however, they may be taken either late in the afternoon or in the evening—a half hour before retiring.

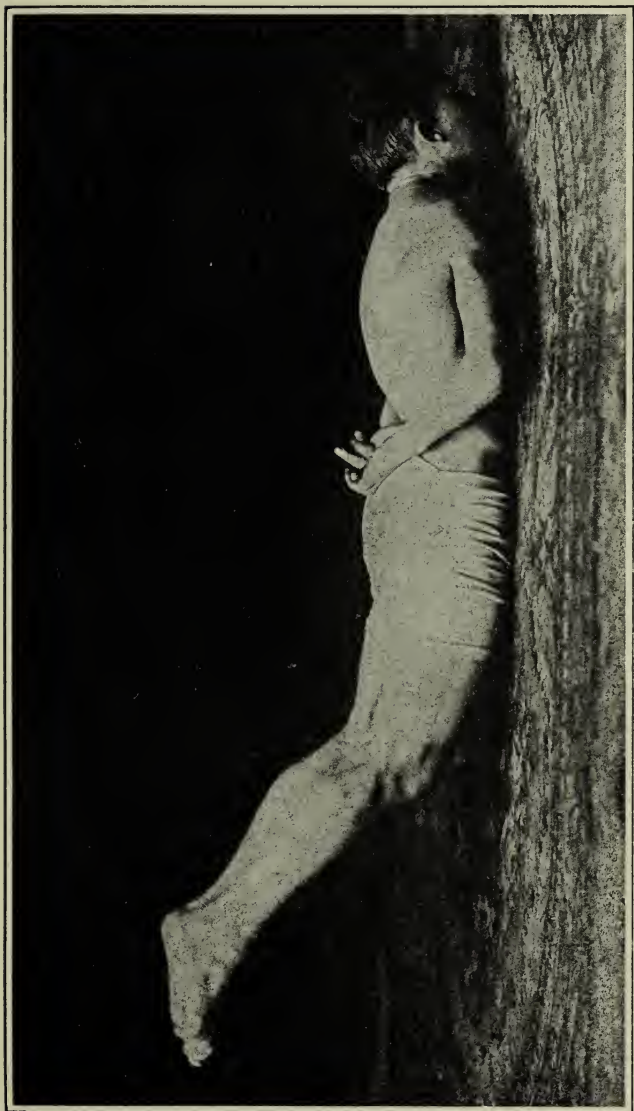
Special attention is called to the exercises for the neck which are illustrated. There are two ways in which they are especially valuable: first, in improving the circulation about the neck and head; and second, in improving the upper spine, or, to be more exact, the cervical spine.

The question of active circulation is always important. These neck exercises will not only affect the neck itself, strengthening and building up the neck muscles, but they will improve the circulation throughout the head because of the quantity of blood sent in this direction in response to the exercise.

Congestion about the neck is known to produce a “fullness” in the head with consequent conges-

## CONSTITUTIONAL EXERCISES

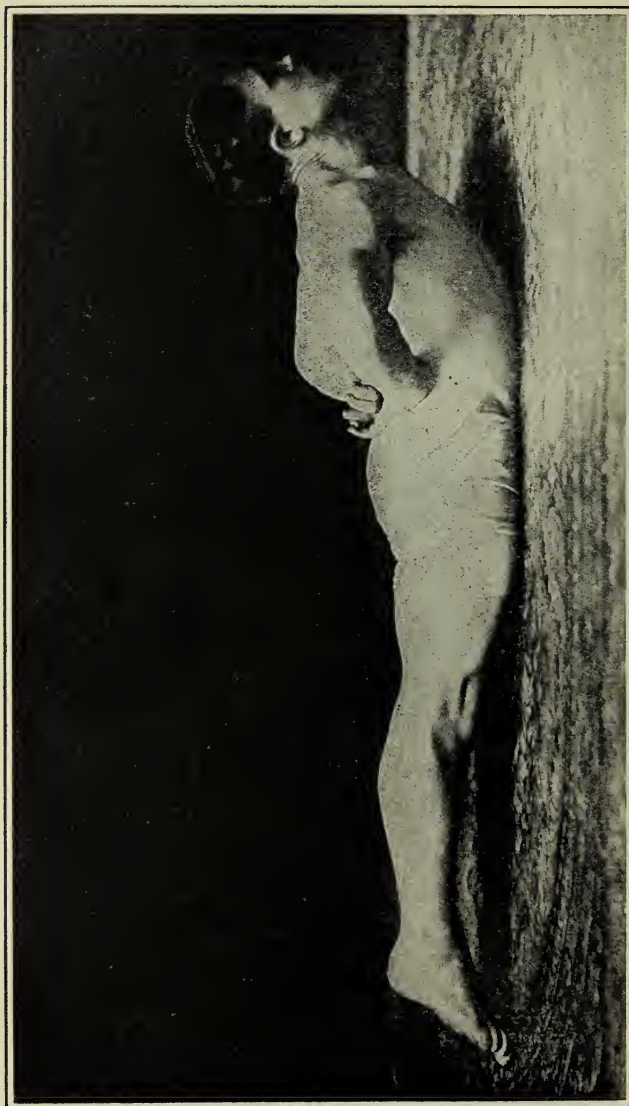
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Exercise 12.—Lying prone with hands behind the back, raise the feet and if possible, the entire length of both legs as high as possible. This involves the muscles of the lower or lumbar region of the back and the hips.

## STRENGTHENING THE EYES

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Exercise 13.—Again lying prone, raise the head and shoulders as high as possible, as illustrated. This involves the muscles of the middle and upper back.

## CONSTITUTIONAL EXERCISES

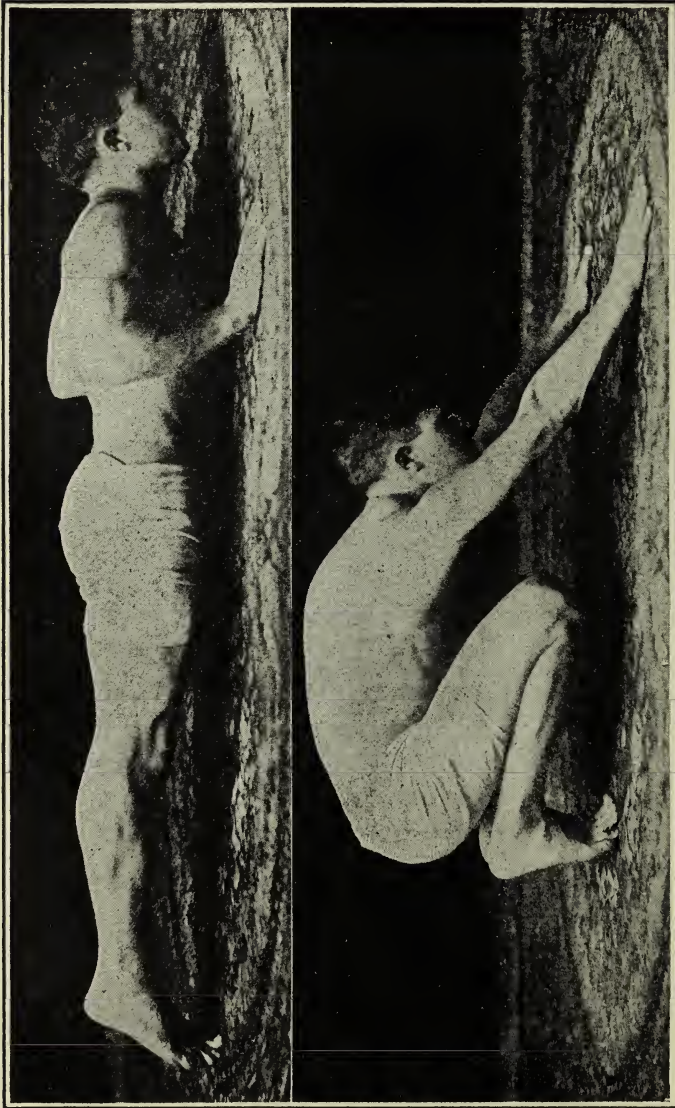
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Exercise 14.—Starting from a standing position, bend down and place the hands on the floor in the manner illustrated. Then with a jumping movement, kick the feet back until the body is straight with the weight on hands and feet. (See next photo.)

tion in and about the eyes. Measures which relieve this condition will naturally tend to lessen the strain upon the eyes themselves, making for more perfect and easier sight.

Deep breathing, water drinking and relaxation, as well as exercise, are useful for this purpose. Conscious relaxation of the neck muscles with deep breathing will often relieve congestion in the head very quickly, but active exercise pro-



Exercises 15 and 16.—Next lower the body in the manner shown in the upper photo. Push up and repeat until slightly tired. A variation is shown in the lower photo. Keeping the arms stiff, straighten the legs, projecting the body forward with the head well in front of the supporting position of the hands. Then swing back and repeat as desired.

## CONSTITUTIONAL EXERCISES

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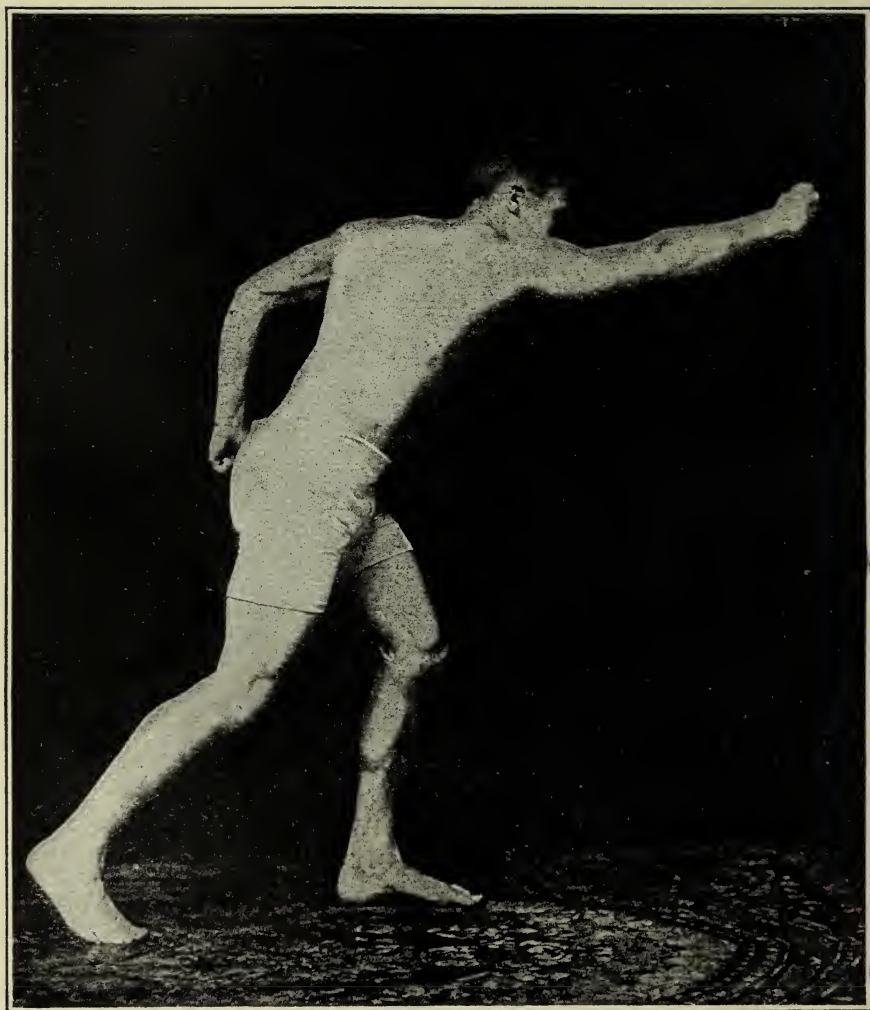
moting a vigorous circulation is one of the most effective means known for overcoming either a state of congestion or an anemic condition of any part of the body.

These neck exercises will also tend to keep the upper spine flexible and in normal alignment. Exercise for spinal strength and flexibility is, perhaps, even more important, generally speaking, than exercise for muscular development, for the reason that the spine would otherwise tend to become rigid, and the little cartilages or cushion-like disks between the vertebræ hardened and compressed. Exercise will prevent this, keeping these cushions elastic and healthy. Furthermore, any displacement of the vertebræ causes a pinching of the spinal cord, or spinal nerves, and consequent interference with the currents of nerve force, with more or less derangement of various functions of the body. Osteopaths claim to accomplish very marked results in many cases of eye trouble through the proper mechanical adjustment of the spine and the freeing of the nervous impulses. Proper neck exercise will prevent adhesions of the vertebræ and tend to keep the upper spine in such perfect alignment that the spinal cord is free from any disturbing factors of this kind.

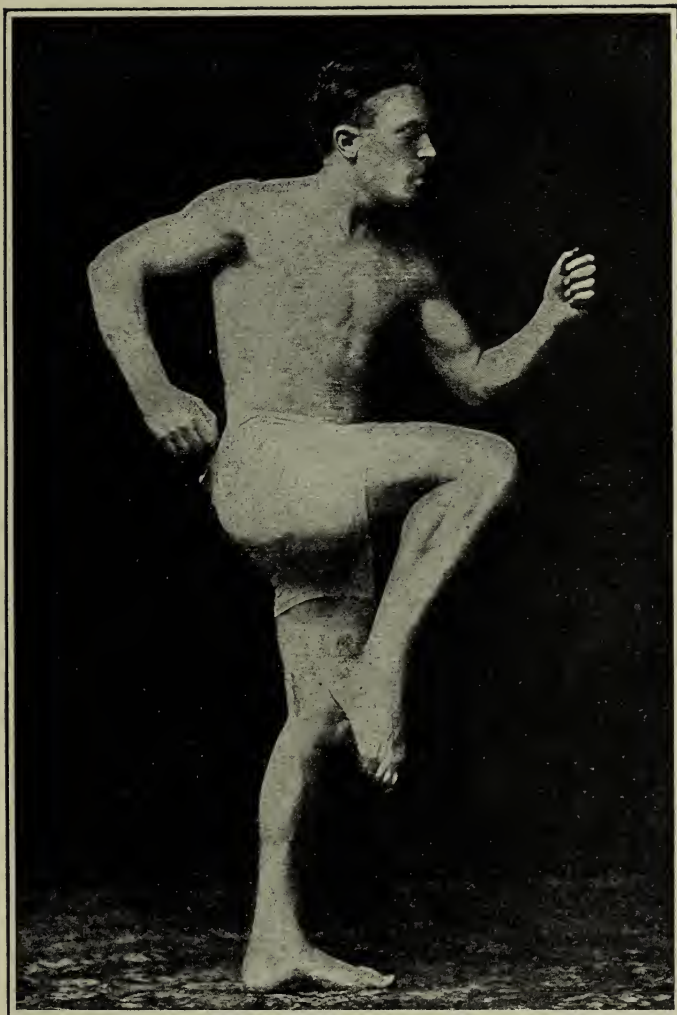
If you have not been accustomed to muscular exercise, a word of caution is necessary in order

## STRENGTHENING THE EYES

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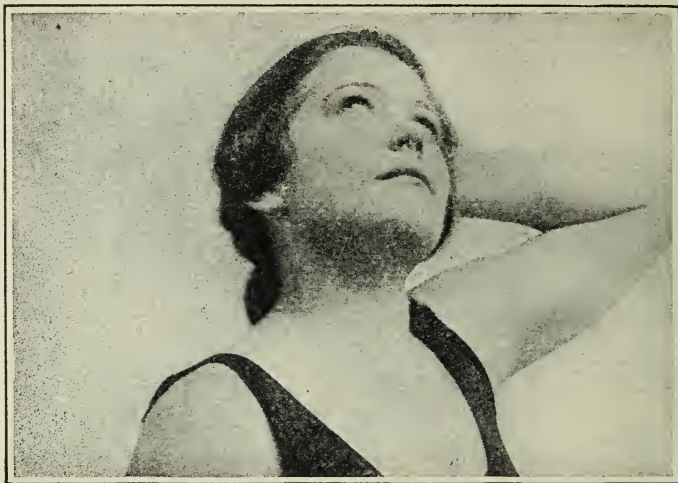
**Exercise 17.**—A vigorous and stimulating exercise is found in shadow boxing as shown in the above photo. Strike out forward vigorously first with one fist and then with the other, continuing to alternate until slightly tired.



**Exercise 18.**—What is usually called the “stationary run,” a running action without going forward, is a splendid constitutional exercise and a method of inducing free respiration and perspiration. It makes an excellent means of finishing up any type of indoor exercise. Anywhere from a half minute up to five minutes or longer will be satisfactory in various cases.

## STRENGTHENING THE EYES

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**Exercise 19.**—A neck resistance exercise. Placing one hand back of the head, bring the head backward, resisting the movement with the hand in the manner illustrated. Five to ten movements.

that you may not overdo the work the first day, and thereby produce a condition of lameness and stiffness of the muscles that is likely to be very discouraging. Enthusiasm in the beginning may lead one to take too much exercise. It is best to try only about half as much as you think you could comfortably do to start with. Never carry any exercise to the point of pronounced fatigue. As you get stronger you can increase the vigor of your movements.

If you should experience any lameness or stiffness of the muscles, the local application of hot water, or a complete hot bath, will give relief,

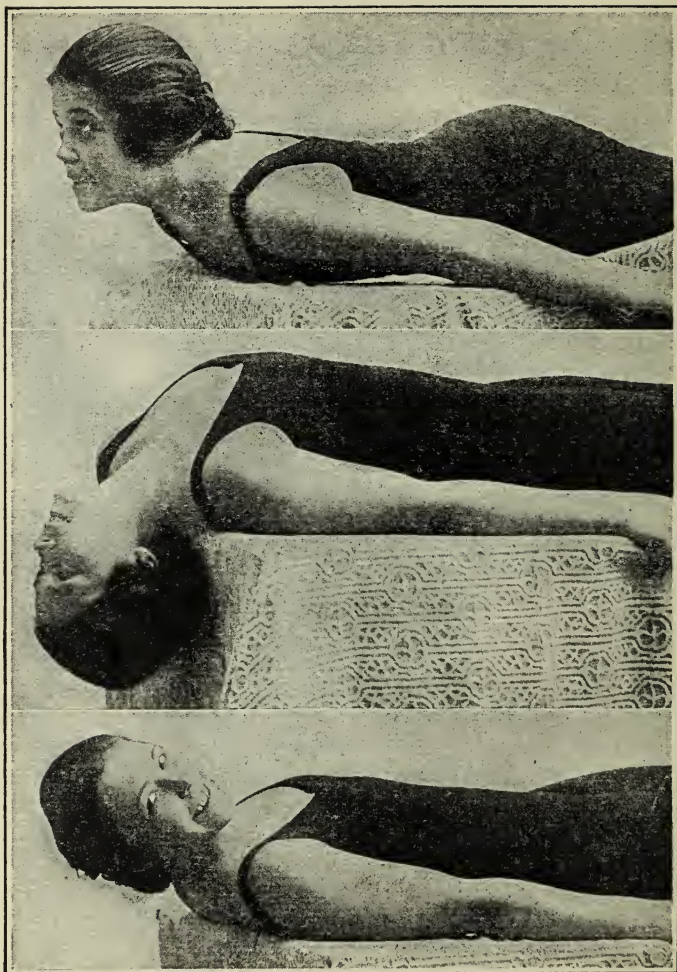
## CONSTITUTIONAL EXERCISES



**Exercise 20.**—Another neck exercise. Place the hand against the forehead and bring head forward and downward against resistance.



**Exercise 21.**—A simple neck exercise, bringing the head first far to one side and then to the other, placing it as nearly as possible upon the shoulder on each side. This may be varied by a head circling movement, and a head turning or neck twisting movement.



Exercises 22, 23 and 24.—In this series of free movement neck exercises, the horizontal position is assumed so as to secure the natural resistance provided by the weight of the head. In the first position, lying upon the stomach, the head is first lowered as far as possible and then raised high, as in the upper photo. In the next exercise, lying on the back, the head is first lowered as shown, and then raised straight upward and brought over the chest. In the last exercise (lower photo), the raising of the head is combined with a head turning or neck twisting action, very valuable for its effect upon the vertebrae of the upper spine.

## CONSTITUTIONAL EXERCISES

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especially if followed by energetic rubbing of the parts. In any case, the soreness will disappear in a few days and should not prevent your continuing with the exercise.

It is, of course, understood that all exercises will be taken with the windows open, so that you may have the advantage of fresh, pure air. Much of the benefit of your exercise will be lost if you breathe stale or stagnant air while you are taking it. Much of the benefit and energy that you derive from your exercises will also depend upon how much energy you put into them. Exercise vigorously. Put life, vim, determination into every movement. Ten or fifteen minutes energetically spent in these exercises will keep you vigorous and fit.

In addition, try to spend at least two or three hours a day in the open air. It may be well to start with a walk of one or two miles. Then increase the distance by a quarter of a mile each day until you are covering anywhere from five to six miles and upward. If in addition to the vigor-building exercises which are illustrated you will make it a point to take at least one good walk each day, you will have established for yourself an ideal scheme of physical culture.



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# STRENGTHENING THE EYES

*—A New Course in  
Scientific Eye Training  
in 28 Lessons*

PARTS

23 and 24

*By*  
BERNARR MACFADDEN

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## PART XXIII

### EATING FOR HEALTH AND STRENGTH

**I**F your eyes depend largely upon the condition of your general health and your general health depends very largely upon the condition of your stomach, you will see that it is highly important that you make no serious errors in the matter of what, when and how you eat.

What you eat is important. Your sustenance and strength depend upon it. But there are other important factors in the food problem. The question of how you eat, how much you eat and how often you eat requires nearly as much consideration, and people go wrong in these matters, perhaps, even more often than in regard to what they eat.

The first thing to learn is to follow your appetite. This means not only that you should eat when you are hungry, but also that you should not eat when you are not hungry. The greatest dietetic crime in the world is eating without appetite. Do not eat merely because the custom of the country calls for three meals per day at stated hours. If you are not hungry when meal time comes, or if you are excited, nervous, sick or for any other reason without an appetite, then

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## STRENGTHENING THE EYES

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do not think of eating. Wait until appetite appears.

In other words, you should put your stomach on a natural and not on a forced régime. To force food down your throat when you do not desire it and cannot enjoy it means that you are placing an unnatural burden upon your stomach. If you are not hungry and your stomach seems a little bit upset, then drink water. The quickest relief for any form of stomach trouble is found in the drinking of hot water. This is an old-fashioned, old lady's remedy, but the best in the world. If you are "sick at your stomach" and the hot water induces vomiting, this will be the best thing that could possibly happen, for it will relieve you of the burden of the fermenting and poisonous load. And if the drinking of more water is followed by a second vomiting, it will mean that the stomach has been well washed out. You will then quickly recover.

In any case the drinking of hot water has a tendency to flush or wash out the stomach, as well as the entire alimentary canal, particularly if you drink enough of it. Nothing in the world is so effective in the case of indigestion or loss of appetite, as several cups of hot water, taken at intervals of five or ten minutes, or even more frequently, if you can take it faster. I mention this for the sake of any emergency in which you

## EATING FOR HEALTH

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may have lost your appetite or suffered from temporary indigestion. You will find that hot water, taken before meals, will improve your power of assimilation. It is to be hoped, however, that you will not need even this simple treatment for this purpose. If you have no appetite, the omission of one or two meals can be depended upon to give you an appetite such as even a child might have reason to envy.

Do not think that you must eat three times a day irrespective of appetite just because farmers and piano-movers have that kind of an appetite. For many people, especially office workers, the two-meal-per-day plan is far superior. You may take your meals either morning and evening, or noon and evening, as you choose. This is no untried theory. Millions of people eat such a light breakfast that it is practically no breakfast at all—merely coffee and rolls. Thousands of others have found by experiment that the two-meal-per-day plan means a better appetite, better assimilation and consequently better health.

Almost as bad as eating without an appetite is eating too fast. Do not swallow your food without thorough chewing. The work of digestion is commenced in the mouth, through the treatment of the food with saliva. You should try to chew your food to a liquid before passing it on to the stomach.

## STRENGTHENING THE EYES

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On the subject of what you eat one may well hesitate to give any sweeping advice. There is no special menu or diet that will suit every one. It is not strictly true that "what is one man's meat is another man's poison," and yet there is a small measure of truth in this old saying. Do not eat anything advised by dietetic experts as ideal if you cannot enjoy it. On the other hand, do not follow the course of eating "palate ticklers" to the exclusion of plain and substantial foods.

If you have a normal and natural appetite this should dictate as to your food requirements. To a large extent the entire problem of diet may be narrowed down to the question of eating natural foods, as against those which are too much refined, or tampered with, in the process of preparation.

For instance, take the case of wheat. Wheat is a perfect food just as it is grown. It will nourish every part of the body. In the making of white flour, however, much of the best nutrition in the wheat is thrown away to be fed to stock.

A similar food crime is committed in the polishing of rice. The best part of the rice is in the natural light brown coating. When this is removed in the polishing process, leaving practically pure starch, rice is no longer an adequate or satisfactory food. The same thing applies to

## EATING FOR HEALTH

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the refining of sugar. White granulated, or fine white powdered sugar, does not contain the nourishing elements found in the juice of the sugar cane from which it has been made.

To a large extent, the nutrition loss involved in the refinement of food is due to the wastage of the mineral salts. Old books on dietetics, after discussing the importance of protein, fats and carbohydrates (sugar and starch), were accustomed to refer to these mineral salts under the collective term of "ash," and then to dismiss them. These organic minerals form only a very small percentage of any food, but they are a vitally important percentage nevertheless. Because they are limited in quantity it is all the more important that they should not be eliminated from any of our foods.

Not only are mineral salts lost in the commercial manipulation of flour, rice, sugar, corn and other foods, but they are often lost, also, in the kitchen. The woman who boils her potatoes, cauliflower, peas, beans and other vegetables and then throws the water down the drain commits an equally serious food crime, inasmuch as these mineral salts are, to a large extent, dissolved in the water and thus lost when the latter is thrown away. What to do about it? These vegetables should be cooked in no more water than is necessary, and simmered down so that only a moderate

## STRENGTHENING THE EYES

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amount of juice, which should be served and eaten with them, is left. Don't follow the cook-books that tell you to boil your vegetables and then "drain." Too much cannot be said about the criminal stupidity of this wastage of iron, lime, phosphorus and the many other organic mineral salts which Nature has so carefully built into the structure of plant life. The same consideration applies to draining water from other foods.

To make this discussion of food as brief as possible, therefore, it is earnestly recommended that you endeavor to follow the plan of eating foods in their natural condition as nearly as possible. If cooked, they should be as unchanged as possible. Honey is a more perfect, more digestible and more satisfactory form of sweetening than sugar. Brown sugar, being less refined, is better than white sugar.

As foods contain elements which are destroyed by cooking, the diet should contain a liberal proportion of raw foods, such as lettuce, celery, watercress, onions, peppers, tomatoes and fruits. Fruits not only help digestion, but they are especially valuable for supplying mineral salts.

The question of meat eating is one which may be left to the individual with the caution that the use of large quantities of meat is neither desirable nor necessary to health. Nearly every one would do better to eat one-fourth of the amount of meat

## EATING FOR HEALTH

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which he consumes. It may even be just as well to eliminate meat entirely, if one uses a sufficiency of eggs, cheese, milk or buttermilk in the diet. Lentils, beans and peas are also valuable protein foods, and may be used as substitutes for meat.

Milk is the ideal food for infants and young children. It should continue to form the most important part of the diet of young children up to six or eight years of age, one quart a day being required for each child. Eggs are a substantial protein food and for tissue building may be classed with meat, fish, poultry, cheese, milk and buttermilk. Many men and women who do not care for milk will find buttermilk, or fermented milk, which answers the same nutrition requirements, more palatable and agreeable.

Constipation is an almost universal problem. It is invariably the direct result of improper diet and irrational habits of life. Given proper muscular activity, a natural diet and a sufficiency of water, constipation would be a rare condition.

What then is the victim of this stubborn and chronic complaint to do about it? The first thing is to revise the diet, using natural foods and especially a considerable amount of fruit and raw green salads. White bread is probably the greatest enemy of the constipation victim. An immediate change to whole-wheat, or graham, flour and such whole grain cereals as oatmeal and

## STRENGTHENING THE EYES

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shredded wheat will be helpful. Rice, tapioca and spaghetti are likewise constipating. Macaroni, or spaghetti, with cheese, is particularly so, but when spaghetti and macaroni are served in the Italian style, with a plentiful sauce made of olive oil, tomatoes and onions, this objection is practically eliminated.

The drinking of a sufficient amount of water is an important factor in preventing constipation. The hot water suggested earlier in the lesson is very effective indeed. Laxatives or cathartics should never be used because of the detrimental after effects. They tend to make the condition more stubborn. An enema should be used when necessary, although even an enema should be regarded as an emergency treatment. The refined mineral oil, which is sometimes known as Russian oil, and sometimes as liquid petrolatum, offers a very satisfactory means of relief and prevention. It is not assimilated, and serves merely as a lubricant.

The condition of the alimentary canal is such an important factor in the preservation of health that the above suggestions should be very carefully studied and assiduously followed. Keep at peace with your stomach and avoid constipation, and you will have little or no trouble in building up that condition of vigorous health which is conducive to the strength of your eyes.

## PART XXIV

### EYE REST THROUGH SLEEP

**T**HE health-building, strength-restoring influence of sleep is an important factor in those cases in which the condition of the eyes is particularly concerned.

Sleep restores the reserves of nerve force and gives an opportunity for exhausted tissues to rebuild and refresh themselves, and at the same time may afford rest for the eyes. This is not always true, however, because most people strain their eyes during sleep. Persons with eye trouble, as well as others, should endeavor to relax the eyes before going to sleep by "seeing black," in the manner described in "Errors of Refraction: Their Cure." How long this relaxed condition will continue in the individual case it is impossible to say, but some persons report great benefit from this practice.

Opinions vary as to the amount of sleep required. The truth is that different individuals vary. It is a well understood principle among students of the subject that duration of sleep is not as important for constitutional purposes as depth of sleep. In other words, many hours of

## STRENGTHENING THE EYES

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light sleep are not as refreshing as half that number of hours of profound slumber. Great depth of sleep means complete mental relaxation, whereas light sleep may mean dreams, or a degree of mental activity bordering on dreamland, which does not yield the same complete relaxation and the same degree of recuperation.

There are two primary factors involved in healthful sleep. First, the surrounding conditions, and second, the condition of the slumberer himself.

Darkness and quiet are essential to refreshing sleep. One may train oneself to sleep in spite of more or less noise. Yet the more quiet and peaceful the surroundings, the easier it becomes to arrive at a condition of complete mental and nervous relaxation. Sounds tend to excite the nervous reactions, which are disturbing.

In the same way, light interferes with restful sleep, for even though the eyes may be closed the lids are not entirely light-proof and a certain amount of light penetrates. This light is more or less stimulating and prevents absolute relaxation of the optic nerves. Complete darkness is much more conducive to sound sleep and, for this reason, one should avoid having any light burning in the sleeping room. For this reason also it is best that one should retire fairly early in the evening and rise early in the morning. Sleep in

## EYE REST

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the late morning, during several hours of daylight, is not conducive to complete rest. "Early to bed and early to rise," may not make a man wealthy and wise, according to the old saying, but it unquestionably does have some relation to making him healthy.

Fresh air is even more important than darkness or quiet as a factor in inducing restful sleep. The need for oxygen during the building-up processes of sleep is self-evident, but the influence of fresh air *as a means of enabling one to sleep more soundly* is not always appreciated. If you want to know what truly refreshing sleep, beginning as soon as the head touches the pillow, really is, try sleeping out of doors. The next thing to that is sleeping in a room with several windows wide open, so as to approximate the condition of outdoor life as nearly as possible.

In winter bodily warmth is a necessary factor in sleep. The feet, particularly, should be thoroughly warm. On the other hand, an overheated condition is always conducive to restlessness. Do not cover too heavily. The nerve pressure incidental to heavy coverings is disturbing. In other words, while warmth is necessary, one should have no more covering than is absolutely required to maintain warmth. Cotton blankets and quilts are extremely heavy, but have little warmth. Wool is light and, whether in the form of blank-

## STRENGTHENING THE EYES

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ets or wool-filled quilts, is ideal for cold-weather use. Down comforters likewise provide warmth without weight. During the hot summer nights it is best to sleep absolutely without covering and sometimes even without any night apparel.

A reasonably hard bed with a good, firm mattress is preferable to undue softness of bedding. If one lies on one's back, it would certainly be better not to use a pillow. A pillow is likewise unnecessary if one sleeps on the chest, so to speak, or partially on one side. This is probably the best position for sound and refreshing sleep. If one sleeps on the side, then a pillow is desirable for comfort.

The best remedy for sleeplessness is probably a hot foot bath, as it draws the blood away from the brain. This treatment may be supplemented by cold cloths applied to the forehead in case of mental stimulation, emotional excitement or congestion of the brain due to any cause. A little hot water or hot milk will draw the blood from the brain to the stomach.

A condition of normal muscular fatigue is always favorable to slumber, and if you have taken the exercises described in another chapter and spent sufficient time out of doors either in walking or in any other exercise, you can almost depend upon a condition of healthy fatigue that will enable you to sleep well.

## EYE REST

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The air bath is another invaluable means of soothing the nervous system and bringing about a condition favorable to sleep. Simply remove all clothing for a half hour before going to bed, providing the room is not too cold.

In many cases a walk in the open air just before bedtime is to be recommended. Although walking for the purpose of exercise should be brisk and vigorous in order to be beneficial, the walk before bedtime for the sake of inducing sleep will be more effective if taken at a leisurely gait.



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25 and 26

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## PART XXV

### FRESH AIR, BATHING AND OTHER HEALTH FACTORS

**I**T goes without saying that an outdoor nation will be infinitely more rugged than a race of people that lives chiefly indoors. We may not be altogether an indoor race, but we are far too much so. Great numbers of people can measure the average amount of time spent daily in the open air in minutes, whereas it should be measured in hours.

Outdoor life is one of the most potent of all factors in maintaining and restoring health. Pure outdoor air has a tonic effect upon the digestion, upon the quality of the blood, upon the nerves, upon the brain and upon the entire organism. Fresh air in large quantities is one of the first essentials to health.

Every one should make it a point, therefore, to spend a certain part of each day in the open air, irrespective of the weather. It is not sufficient to spend fifteen minutes or a half hour out of doors. You should make it two or three hours at the very least, and more if possible. Many people will object that they can not find time for such a

2/21/39 G. H. M. Dunlap State

## STRENGTHENING THE EYES

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purpose, but often it will be found that they devote more than the two or three hours in question to indoor recreation of one kind or another. It is a very simple plan to choose outdoor recreations in place of those taken indoors. Even motoring is commendable because it takes one into the open air.

The practice of bathing is one of the marks of civilization, although primitive peoples instinctively take to the water when they have the opportunity through pure enjoyment of the bath. Bathing has two functions. It serves as a means of cleanliness and as a tonic.

Cold baths may be said to be chiefly tonic in their influence. They are stimulating. They have a pronounced effect upon the circulation, and may be useful in strengthening the heart. They have, however, very little cleansing value, unless used in combination with plenty of soap.

A cold bath offers an ideal means of waking one up and toning up the nervous system, as well as arousing or stimulating an active circulation. In this respect it may supplement any exercise that one may take each morning. The cold bath should always follow the exercises which warm one up to such a degree that the sensation of the cold water upon the skin is a pleasure.

The benefit of a cold bath may be measured

## HEALTH FACTORS

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in a general way by the pleasure one finds in it. If the bath is something in the nature of an ordeal, if one dreads it and feels thoroughly chilled both during and after the experience, then it can not be of any value. To those who are of too frail a constitution to be able to react or recuperate from a cold bath, it can not be recommended. It is absolutely necessary that one should react with the feeling of warmth and comfort immediately after.

Unless you are fairly rugged, therefore, do not attempt a cold bath except when you feel thoroughly warm, and can take it in a warm room. See that your hands and feet are not cold. Preliminary exercise is usually desirable for the sake of insuring thorough warmth. Following a hot bath also one is naturally disposed to enjoy cold water and a quick cold sponging or shower is usually desirable at such a time to close the pores.

A cold tub or cold shower will offer a rather strenuous form of cold bathing. If you are not vigorous enough for such measures, then try a sponge bath, if necessary, sponging only one part of the body at a time. A fairly good plan, if your recuperative powers are weak, is to take a preliminary hot foot bath, or to stand with the feet in hot water while taking a cold sponge. Do not try to use water that is too cold in the begin-

## STRENGTHENING THE EYES

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ning. Use water of a moderate temperature at first and gradually accustom yourself to a colder bath. You will find it a delightful tonic when you have once hardened your body in such a way that you can thoroughly enjoy it.

A warm bath in soap and water is valuable not only for cleanliness, but for its quieting and soothing effect upon the nerves. A hot bath, in which classification may be placed any bath from 102 degrees up to 110 degrees, is very effective for breaking up a cold and for eliminating poisons from the system, in kidney trouble and various other diseases. A cabinet steam bath, or dry hot-air bath, will, to a large extent, serve the same purpose as a regular Turkish bath, but if a cabinet is unavailable an improvised Turkish bath may be arranged by means of a hot foot bath taken in a warm room while wrapped in blankets. Drinking hot water or hot lemonade will help. The hot water bath will, however, answer just as well in many cases and is far more convenient. It is best to use a bath thermometer so that you can determine the temperature beforehand.

Air baths and sun baths are tonics of no small value, especially so far as the nervous system is concerned. Modern methods of clothing tend too much to smother the skin. Let your skin breathe. An air bath of half an hour or longer before going to bed, or at any other time of the day that may

## HEALTH FACTORS

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be convenient, will have a tonic effect upon the entire nervous system, besides stimulating the activity of the pores. The same is even more true of a sun bath. A little sunshine each day is almost a necessity. It may be said, however, that those of exceedingly fair skin should be careful not to expose themselves too much to the noonday sun in midsummer. The rays of the sun may be as deadly to blondes as they are beneficial to others.

A dry friction rub constitutes another very stimulating and refreshing form of dry bathing. This may be applied either with soft flesh brushes, a rough Turkish towel or by vigorous rubbing of the entire body with the bare hands. Five minutes of this will have a splendid tonic effect, improving the circulation and also the smoothness and texture of the skin.

The condition of the skin and the care of the skin are important because this wonderful covering of the body is not merely an external coating, but an organ with very important functions. The skin constitutes one of the channels of elimination. Its health and activity are necessary to keep the blood pure. It is related to the nervous system in a most important way; our sense of touch is dependent upon its millions of infinitesimal nerve endings. Through the power of contraction or relaxation of this wonderful surface of

## STRENGTHENING THE EYES

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the body, the circulation is controlled and the body enabled to adapt itself to the varying changes of the temperature. It will be seen, therefore, how and why the care of the skin is important.

For all these reasons the clothing that we wear has a decided effect upon the general health. The more porous it is, admitting the free circulation of air upon the surface of the body, the more satisfactory and healthful it will be found. Avoid tightly woven or air-tight garments. They do not permit of the "ventilation" of the skin. The loosely woven fabrics are also much warmer.

A very good general rule is never to wear any more clothing than is absolutely necessary. This does not mean that in severe winter weather one should go about in a chilled condition. It is better, however, to depend upon a good circulation for warmth than upon excessive clothing, or bed covering. In summer, the more nearly your clothing enables you to enjoy a continuous air bath the better.

Open-mesh linen or cotton underwear is especially recommended for summer. For those who work indoors heavy underwear is probably undesirable at any time of the year, for the reason that homes and offices are usually heated to a summer temperature. Comfort outdoors should be secured by using sweaters, gaiters and overcoats.

## HEALTH FACTORS

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Another factor in clothing of some importance and interest is the question of color. Black and dark-colored fabrics shut out the light, whereas white, tan, light gray and other light-colored goods permit the light to penetrate, thus giving one a light bath, so to speak, when in the sunshine. Light-colored clothes are superior for summer wear for the additional reason that they are cool. White and light-colored materials reflect the heat and transmit the light. Dark-colored clothes absorb the heat, but do not transmit the light. Black clothing in the sunshine is very hot indeed. It may be advantageous in winter for this reason. Some students of this and allied health problems have adopted the practice of wearing tan-colored or other light clothing the year round, holding that even during the evening the body receives some benefit from the electric light rays.



Part XXVI

EYE HEADACHES



## PART XXVI

### EYE HEADACHES

**A**S already mentioned, the eyes and the whole nervous system are very intimately connected; and it is well known that a constant strain upon the eyes will induce a general condition of strain, nausea, backache, etc., in addition to frequent and sometimes severe headaches. Some physicians have gone so far as to assert that true and organic diseases have been induced in this manner; but this view is no longer generally held by the medical profession. Hewetson, Noyes, Weir Mitchell and others, however, have published numerous facts showing the close connection between defective eyesight and headache and general nervous and physical impairment of the health; and when we consider the constant strain involved, the reason for this is obvious. Some of the early symptoms are a feeling of fatigue and tension, especially above the eyes, with indistinct and confused vision in reading, writing and other close work. Following this, slight headaches will be experienced, at the base of the brain; and these will be followed

## STRENGTHENING THE EYES

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or accompanied by nausea, vertigo and general nervousness. Other physical and mental symptoms may follow. When these appear, it is high time to begin treatment of the eyes.

The usual treatment in cases of this kind is a prescription for glasses; and there is no doubt that relief has often been obtained by their use.

Such measures, however, are only palliative and not ultimately curative. Glasses correct the results of the strain, but do not remove it. The only real remedy is to be found in the central fixation treatment described in "Errors of Refraction: Their Cure." In the absence of such treatment, however, glasses will doubtless prove useful; but they should be carefully fitted to the eyes by a competent oculist, and should not be worn any more than is absolutely necessary, as they serve to confirm the eyes in the bad habits they have acquired.

Eye headaches can often be relieved in a short time by proper hygienic methods. It is hardly necessary to say that the general health should be built up. Massage of the back of the neck and head will often bring material and instantaneous relief from the pain, and cold wet compresses to these parts will soothe and relieve the local congestion. A salt eye bath often relieves.





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# STRENGTHENING THE EYES

*A New Course in  
Scientific Eye Training  
in 28 Lessons*

PARTS

27 and 28

*By*  
BERNARR MACFADDEN

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## PART XXVII

### EYE HYGIENE

**M**UCH that has been written about the care of the eyes is erroneous and misleading.

We have been exhorted not to read in bed, and told with much detail just how the various unnatural positions in which the body and the book must be held disarranged our internal machinery. We have been warned against reading on the train, the only place, in many cases, where people have time to read. Even that delightful practice, reading at meals, has been condemned in unmeasured terms. We have been instructed as to the distance which should intervene between reading matter and the eyes, and even the angle at which the book we are reading, or the paper on which we are writing, should be adjusted. The effect of light has been discussed endlessly, and we have been warned against the evil effects both of too much and too little. Most of us pay no attention to any of these instructions, reading when, where and how we please and can, and therefore, it is gratifying to learn, that none of them have any material bearing upon the preser-

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## STRENGTHENING THE EYES

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vation of our sight. The essential thing is to learn how to use the eyes properly. Then all such details as the foregoing can safely be left to the inclination and convenience of the individual.

In the case of light there is much evidence to show that the views commonly held have no basis in fact.

Rabbit's eyes have been exposed to the most intense light known, avoiding heat, but subsequent examination of the eyes with the microscope revealed no change either in the retina, the optic nerve or the brain. A teacher of fifteen years' experience complained that because her classroom was in the basement and the light poor, the sight of her pupils was worse at the end of every school year than it was at the beginning. The classrooms where the light was good, however, had the same experience; and when the Snellen test card was introduced into both the well-lighted and the poorly-lighted classrooms, and the children used it every day, the sight of all improved, regardless of lighting conditions. In Germany it was demonstrated by the statistics of Cohn and others that improvements in the lighting of the schools made in the hope of staying the progress of myopia did not have that effect.

These and other observations show that light has very little, if anything, to do with the eye-

## EYE HYGIENE

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sight becoming defective. On the contrary, reading by a poor light successfully is a rest to the eyes because it cannot be done unless they are free from strain, while in a good light people with defective eyesight can read in spite of the strain.

People who have perfect sight think very little about the light, but it is undoubtedly more comfortable to have it so arranged that no shadow is thrown upon the work, either from the head, hand or any other object, and so that it shines upon the page which one is reading, or upon the desk at which one is writing, not into the eyes.

Protection of the eyes from strong light is not necessary. In fact, the light is beneficial, as we have already demonstrated. The glare from snow or water may be trying, and smoked or amber glasses will conduce to comfort, but no harm will be done if they are not worn.

Since the moving pictures came in we have heard much about the strain imposed upon the eyes by this new appurtenance of civilization, and predictions of dire results to our already very bad eyesight, in consequence of our constant attendance upon these exhibitions, have been made. Theoretically, this view of the matter seems a reasonable one. The ordinary rate at which the film runs through the projecting machine is about a foot a second—sixteen pictures a second. That

## STRENGTHENING THE EYES

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is to say, sixteen distinct pictures are thrown upon the screen in each second of time, and the shutter comes down and is raised that number of times each second also. Between each projected picture there must be a black period, for if this were not the case, the pictures would all run into one another, in a hopeless blur.

It might have been expected that these rapid alternations of light and darkness would be very trying to the eyes, and they often do produce much temporary discomfort, particularly in persons suffering from errors of refraction. Some years ago when the mechanical process involved was less perfect than it has since become, the strain was probably much greater than it is now. Today there is no reason for supposing that the movies are injurious to the eyes. Instead of avoiding them it is well to go to them frequently, practice central fixation and become accustomed to the flickering light. Afterward other lights and reflections from smooth surfaces will be less annoying.

The fact is that the eye is a much less fragile instrument than we have generally supposed it to be. If properly used, it is fully able to withstand all the strains of modern life.

Part XXVIII

TEST YOUR OWN EYES



## PART XXVIII

### TEST YOUR OWN EYES

**I**T does not require any special training, or even any expensive apparatus, to test the vision. With the aid of a Snellen test card any one can test his own sight, and with the assistance of a second person a retinoscope can be used.

A test card, which is sometimes difficult to buy, accompanies this course. You can also make one for yourself by painting black letters of an appropriate size on a white background.

A retinoscope can be even more easily made than a test card, all the material required for the purpose being a small piece of looking-glass about one inch wide and three inches long. A small mirror that will answer the purpose can be bought at the five-and-ten-cent stores, and a glass-cutter, which is as easy to use as a pair of scissors, can also be bought at these stores. For a few cents, too, a glazier, or painter, will cut a piece of mirror glass of the right size. About three-quarters of an inch from the top of this mirror, and midway between the sides, scrape off the silver backing on an area a little larger than

## STRENGTHENING THE EYES

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Testing the eye with the retinoscope.

the lead of a lead-pencil. If it is a little larger, or a little smaller than this, it will not matter. By means of the mirror the observer reflects light from a lamp, or other source of light, into the eye which is being examined, and the opening serves as a sight-hole through which he looks into the pupil. The room must be darkened, and the light placed a little behind and over the head of the subject.

When the observer, who stands off a few feet from the subject, looks through the sight-hole, he observes that the pupil, instead of being black, is more or less red. This is the color of the retina, which is not ordinarily seen, because the eye of

## TEST YOUR OWN EYES

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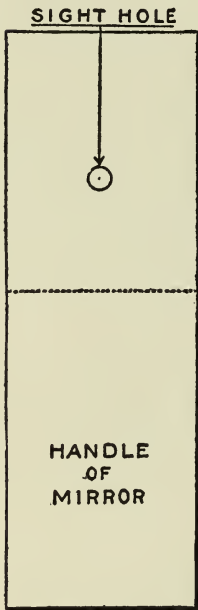
the observer is not placed in position to receive the rays of light coming from the interior of the eye. When the light is moved slowly in different directions across the pupil, a dark shadow will be observed at the edge of the latter. If the eye is near-sighted, this shadow moves in a direction opposite to that of the movements of the mirror. If it is far-sighted it moves in the same direction. If it is normal, the shadow remains stationary. When the shadow moves in one direction in one meridian, and in the opposite direction in another, the eye has mixed astigmatism. The shadow may, for instance, go with the light when the mirror is moved up and down, and in an opposite direction to it when the mirror is moved from side to side. In the case of other kinds of astigmatism the observer may note that the shadow moves more decidedly in one meridian than in the other. When errors of refraction are corrected by glasses there will be no movement of the shadow.

The retinoscope can be used as an ophthalmoscope simply by lessening the distance between the observer and the subject. The principle is just the same as that involved in looking through a keyhole into a room. The closer you come to the keyhole the more you will see. At a distance of about half an inch, by looking a little toward the inside of the eye, one will begin to see the optic nerve, an area whiter than the rest of the

## STRENGTHENING THE EYES

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interior of the eyeball and apparently about one-quarter of an inch in diameter. Radiating from the center one sees fine streaks of branching blood vessels, the darker being the veins, the lighter the arteries.



A simple home-made retinoscope, made by scratching a small hole in the silver back of a small mirror, to be used for self testing in conjunction with another larger mirror.

It requires no experience to make these observations, and children of ten have used the instrument successfully. The larger the pupil the easier it is, just as in the case of the keyhole. The larger the opening the more one sees in both cases. The normal eye is more easily examined than a defective one, and young adults than older or younger persons. The light should be thrown on the blind spot, the entrance of the optic nerve, as the pupil contracts when it is thrown on the center of sight. The red light should be seen constantly in the pupil. When it is lost the observer should withdraw a little and get it again, afterward bringing the instrument up close to the eye.

The Snellen test card is an arrangement of letters and figures

## TEST YOUR OWN EYES

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of different sizes, and the distance at which the normal eye can read each row is marked in small figures above it. Letters half an inch square should be read in a good light at thirty feet by the normal eye, and if they can be read only at fifteen feet the vision is half normal and would be indicated by the fraction  $15/30$ , whereas  $30/30$  would indicate that the sight was normal. Letters to be read at two hundred feet are about  $3\frac{1}{2}$  inches square and those to be read at fifteen feet  $\frac{1}{4}$  inch square. Each eye should be tested separately.

There are also various other ways in which the vision can be tested. If the subject, when looking at the letters on the Snellen test card, can remember anything blacker, the vision is imperfect, no matter what the light, or the distance. Another way is to squint the eyes, or to look through a small opening, such as a hole in a card, or an opening between the fingers. If this enables you to see better, your vision is imperfect. A third method is to look at any distant object from the window of a moving train—a tree, an animal, a house, etc.—and try to remember a perfectly black period. If you can not do so, your vision is imperfect. The ability to remember anything else will serve as a test, but the period is the most convenient object to use for

## STRENGTHENING THE EYES

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the purpose, as with it the accuracy of one's memory can always be tested. If the train is moving very rapidly the ability to remember the period will be impaired when the sight is imperfect at the same time.





## CONTENTS—Continued

NAME OF PART	PART
Common Diseases of the Eye . . . . .	XIV
Eye Exercises . . . . .	XV
Eye-Focusing Exercises . . . . .	XVI
Exercises for the Pupil of the Eye. . . . .	XVII
Eye Massage and Resistance . . . . .	XVIII
The Eye Bath . . . . .	XIX
Eye Strength Through Sunlight . . . . .	XX
Constitutional Improvement for Strengthening the Eyes . . . . .	XXI
Exercises for Constitutional Improve- ment . . . . .	XXII
Eating for Health and Strength . . . . .	XXIII
Eye Rest Through Sleep . . . . .	XXIV
Fresh Air, Bathing and Other Health Factors . . . . .	XXV
Eye Headaches . . . . .	XXVI
Eye Hygiene . . . . .	XXVII
Test Your Own Eyes . . . . .	XXVIII

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