HYPEROPIA, IN TH

By DR. MILTON M. IDZAL, Sioux City, Iowa
Trustee, Des Moines Academy of Ocular Science

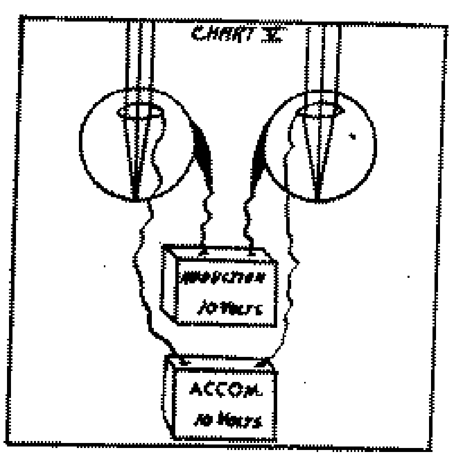
This is the second of a series of articles prepared by Doctor Idzal under the heading, "New Optometry; Making It Easy for Yourself." The first article, consisting of three chapters, appeared in the Jan. 1, 1935 issue. At that time, Doctor Idzal stated that the New Optometry discards the old purely mechanical or physiological basis on which refraction was formerly taught and deals in brain centers of accommodation and convergence; and innervations and end-results, instead of diopters and meter-angles. The former article treated especially the application of the New Optometry to presbyopia. In the present article, the author develops his thesis further, asserting that a little hyperopia represents a more or less normal condition—a lag or play between the accommodation and convergence provided by nature as a safety-valve.

IV

After a certain amount of investigating, we come to the conclusion that a little hyperopia may not be exactly a trouble requiring immediate relief.

Our research men tell us that a small amount of hyperopia—under one diopter—is normal for mankind. This means that if you go out and catch 100 Eskimos, 100 South African Swahilis, 100 Australian Bushmen, and 100 native Long Islanders, and test their eyes, you will find them averaging a hyperopia of somewhere under one diopter. Most of you have found this phenomena evidenced in your own practice. However, if you are one of the boys who do not believe everything you read, you are quite welcome to go out and capture your own specimens, and do your own eye-testing—and write your own book.

Of such figures are "normals" determined.



If most people die at the age of 70, barring accidents, then 70 becomes the "normal" span of life. If the average height of most men is 5 ft. 8 in., then 5 ft. 8 in. is the "normal" for men. If most men show a hyperopia of .25 to .75 D., then that amount of hyperopia is taken as "normal" and you can depend upon it that nature has a darn good reason for it—which reason we shall come to presently.

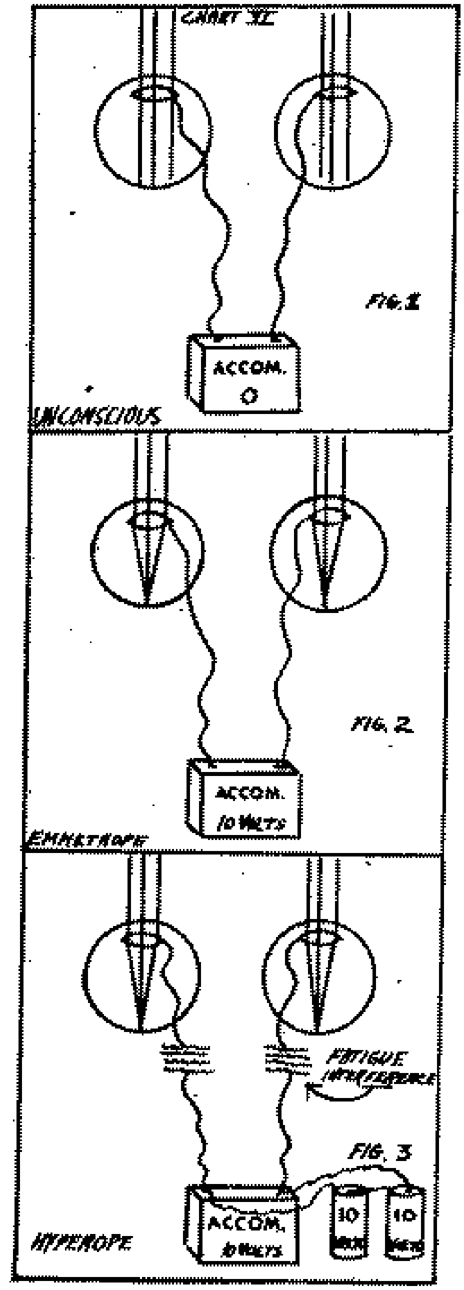
Such a universal condition then can scarcely be regarded as anything but a "normal" and, being aware of nature's well-known propensity for doing things for a good and sufficient reason, and having picked up a bit of Darwin's "survival-of-the-fittest" business, we prick up our ears and begin to wonder if maybe a little hyperopia is not good for us.

Now before plunging into my discourse, it may be well to offer a word or two of explanation. Being myself slow of mind and not in any sense of the word "quick on the trigger," it has long been my custom to attack all fancy involved and technical literature of optometry and reduce it to nice little easy words that I can understand. If somebody's book cannot be reduced to plain easy English, why I just sadly put said book away and, with hope ever born anew, wait for somebody else to write another.

To facilitate this understanding, I have designed a little diagram (Chart V) which shows the adductive function and the accommodative function, each activated by its own separate brain center which I represent as a storage battery, as explained and illustrated in my article in THE OPTICAL JOURNAL-RE-

VIEW of Jan. 1, 1935. As a way of picturing the elusive and problematical action of the visual brain centers, I modestly claim, these diagrams are hard to beat. In fact, with the aid of these diagrams, I can explain practically everything except why cabinet pudding is called cabinet pudding.

Those of you who have read the first of this series of articles on "Making It Easy for Yourself," know that I no longer consider a hyperopic eye as an eye that is "too short." There are a variety of scientific definitions for hyperopia, each one worded a little differently in order to take in all possible contingencies and possibilities. However, this is not a scientific article, so for our purpose we will consider a hyperopic eye as an eye that can wear a plus lens in comfort.



To further clarify my statements, I direct your attention to Chart VI. Fig. 1 illustrates an unconscious eye. This eye has no intrinsic refractive error except possibly corneal astigmatism. In other words, we do not really know if an eye has a refractive error or not until it consciously begins to try to see.

Fig. 2 shows a normally innervated eye seeing in comfort.

Fig. 3 shows a pair of eyes drawing upon some extra accommodative energy in order to see. This pair of eyes is not comfortable and this condition is called hyperopia. The wiggly cross-lines in the wire leading to the crystalline represent a "fatigue." And right here is where I better talk about fatigue a little bit.

V

There are all sorts of scientific definitions of a fatigue. Get hold of any good optometric or medical dictionary and take your choice. My own understanding is this: A muscle (for instance, the ciliary) is in itself an inactive, dormant thing until it is roused to action by that mysterious nerve impulse received over its own particular nerve from its own particular brain-center or nerve source—just as an electric motor might receive electrical force over a wire from a storage battery.

When the muscles are used, a chemical reaction takes place that finally results in an interference in the nerve conduction, which prevents the full force of the nerve-impulse having its customary effect on the muscle that has been used—a sort of a partial short circuit in the wires. This condition is called fatigue.

When you have a partial short circuit in some electrical set-up, it is sometimes possible to keep the motor going by crowding on more juice. This is exactly what the brain centers do when a fatigue interferes with the customary easy innervating of a muscle. The extrinsic and intrinsic muscles of an eye, being muscles, are subject to the same general conditions and handicaps as any other muscle of the body, and sometimes with queer results.

Briefly, a definite amount of "juice" may not always make the motor run a definite speed. It depends on whether the current is getting through O. K. or not. In other words, a *certain* amount of innervation may result in an *uncertain* amount of end-results. Again I ask you to notice Chart VI, Fig. 3, which shows the accommodative brain center calling in some outside extra help to overcome a fatigue interference and get the necessary "end-result" in the crystalline.

Now when you start calling in "outside" help to send more nerve-force to a function, the results are very uncomfortable indeed. If you do not believe this, try lifting a 50-lb. weight off the floor 50 times. The first time may be easy, but the 50th time will probably find you calling in all the outside help available, and puffing and blowing like a steam engine besides.

VI

Thus far, this fatigue condition existing in the accommodative function might conceivably be a simple matter and might be treated the same as a fatigue in any other part of the body, that is, just rest up until the fatigue no longer exists. However, we know that the accommodative function is closely associated with the adductive function.

In Chart VII I show how an electrician might illustrate this association. A flow of nerve "current" in the accommodative wires tends to sympathetically induce a current in the adductive wires. That is, you cannot accommodate much without converging, and you cannot converge much without accommodating. Or rather, since we have advanced to the stage of thinking in terms of brain center innervations, you cannot stimulate your convergence without reflexly stimulating your accommodation. And you cannot stimulate your accommodation much without reflexly stimulating your adduction. This is a habit that these two cooperating functions have fallen into.

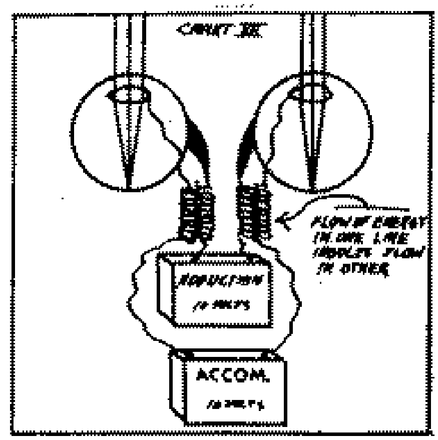
When I say *stimulate* a function, I mean merely sending some nerve force to that function. When I say *inhibit* a function, I mean merely cutting down on the nerve force sent to that function.

If the accommodative function and the adductive function both fatigued equally at the same time, not many people would need glasses, as we shall presently endeavor to show. But such is, alas, not the case. These two functions are each innervated by a branch of separate nervous systems that exist in the body.

The adductive brain center being a part of the voluntary nervous system, and the accommodative brain center being a part of the sympathetic nervous system, you can converge your eyes voluntarily at will. But try accommodating at will!

But to get back to hyperopia. Let us take apart a very typical case that you have all experienced.

A child develops a fatigue interference in his accommodative function. He has been



sending say 10 volts of energy to his ciliary, which has always been just enough to curve the crystalline sufficiently to get a focus on the retina. Now he has to send an *extra* 10 volts to his accommodative function to overcome the fatigue interference. Does this curve the crystalline more than before? No. He is simply *drawing more current to accomplish the same result.*

Now what else happens? The adductive function has been getting along just fine—no fatigue, no trouble. But when this *extra* current started to flow along the accommodative wire, the adductive wires picked up some of this *extra* current that it did *not need.* The adduction is receiving some extra stimulation beyond its requirements. When the adduction is stimulated, it naturally tries to adduct—converge! This child is liable to become cross-eyed. If this condition is pronounced enough, he does become cross-eyed. Plus lenses often correct this condition without further treatment of any kind. You have done this yourself.

Fortunately, nature has provided a certain amount of "lag" or "play" between the two functions. That is, either one may become fatigued and require some extra nerve energy sent to it without immediately and positively affecting the other function.

Would you like to see

how much hyperopia you could stand before you start to get cross-eyed? Alright. Make Skeffington's No. 20 finding on yourself. Looking through your phoropter (with your proper correction in place) at the smallest size type, turn minus lenses before your eyes, minus .25 at a time, until the letters blur out on you. This usually takes place about minus 2.25; and the blur is not caused by your inability to overcome the minus, but by the fact that your adduction picked up some of that extra accommodative current you were using to overcome that minus 2.25, and your eyes crossed enough to cause the blur.

Now if we will reverse the proceedings and have the fatigue occur in the adductive function (the voluntary nervous system), we will discover what that normal hyperopia of .75 D. is there for.

Primitive man went hunting all day. After a while he got tired. All his voluntary functions became fatigued, his adductive function along with everything else. The voluntary brain-center controlling the adduction sent an extra amount of innervation to that function to overcome the fatigue interference. So far so good.

But what else happens?

Suppose the accommodative function has been getting along just fine—no fatigue, no trouble. Now this *extra* amount of current is flowing along the adductive wires and the accommodation picks up some of this extra current that it does not need. The accommodation receives some extra stimulation beyond its requirements—it *over-accommodates*, causing a blurred focus. That is very bad for a man who has to go out hunting.

But nature normally takes care of this contingency by *leaving the accommodation always in need of a little extra help.* This help might be supplied by a pair of plus .75s before the eyes, or it might be supplied by a little extra energy picked up from the extra energy being sent over the adductive wires.

So I deduce that a little hyperopia is not really hyperopia at all, but simply a safety-valve—a lag or play between the accommodation and the adduction. So *that's* why you have been under-correcting 'em a quarter!

The next time a .50 D. hyperope comes in, have him run around the block 15 times and test him again. The hyperopia should be gone!

A little "hyperopia" is a good thing to have.

In another article of this series, I expect to talk about myopia.

Turning a Discriminatory Article to Optometry's Advantage

An article of an anti-optometry character that recently appeared in the *Evening Copper Journal* of Hancock, Mich., not only drew a protest from Dr. Peter Scholler, of that city, president of the Michigan State Board of Optometry, but also gave him the opportunity to expose the nature of pro-oculist propaganda. The discriminatory statements appeared in an article on "Perfect Vision," by Brooke Peters Church, writer of syndicated articles on "Your Child—His Problems."

Doctor Scholler protested that the article not only erred in saying "only a competent oculist can deal with these eye troubles," but was also misleading in giving the impression that an examination of the refraction of the eye is a branch of medicine. He said it would have been more truthful to have said that "only a competent optometrist can—adequately—deal with these eye troubles." He cited a Pennsylvania Supreme Court decision, given in 1915, declaring that Optometry is not a branch of medicine, and this decision, he said, the medicos have always tried to nullify in the public mind through misleading propaganda.

A physician who engages in refraction is practising optometry and not medicine, Doctor Scholler said. Medical men, he stated, may refract without having to prove their qualifications to do so, and there is nothing to prevent any medico from calling himself an oculist. Doctor Scholler quoted from an address by the late George M. Gould, M.D., praising optometrists for their contributions to the knowledge and relief of eyestrain. The Hancock optometrist also pointed out that, in a later article in the newspaper, Mr. Church had indorsed the work of the optometrist in correcting myopia and in the orthoptic field.

Doctor Scholler's protest was published as a "Letter to the editor" and was prominently displayed, occupying parts of three columns.