Optical Department.

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The Eye at Rest.

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When is the *eye at rest?* The frequency of this question, and its paramount importance to opticians is sufficient to warrant attention again to this well threshed subject. The eye at rest is tantamount to saying "The ciliary muscle is at rest," *i. e.* "The accommodation of the eye is at rest;" hence to understand what is meant by the "eye at rest," the reader must be intelligibly familiar with the philosophy of the accommodation of the eye, which is presupposed in all who peruse this article. When we speak of the *refraction of the eye*, we mean the ability of the eye in a state of rest to refract parallel rays of light.

The refraction of the eye in a state of rest is called the *static refraction*, and is made up of the sum total of the refraction of the three refracting surfaces, and three refracting media of the dioptrics of the eye, viz. (1). The anterior surface of the cornea; (2). The anterior surface of the crystalline lens; (3). The anterior surface of the vitreous humor; (4) The aqueous humor; (5). The crystalline lens; (6), The vitreous humor.

By *the dioptrics of the eye* is therefore meant the above three surfaces and three media—in a state of rest. The following three expressions, therefore, (1). The eye in a state of rest; (2). The static refraction of the eye; and (3) The refraction of the dioptrics of the eye, mean one and the same thing. But inasmuch as the eye possesses a potential force to add more refraction to itself we speak of this potential force as the *dynamic refraction of the eye*, *i.e.*, the accommodation of the eye, which is accomplished by the combined action of the ciliary muscle and the crystalline lens. The dioptrics of the eye remain the same until about the age of sixty years and hence whatever the static refraction of the eye is at twenty years it will be the same at sixty years of age. After this age the eye flattens somewhat, rendering the static refraction thereof less and less as age increases. The result of this flattening is to cause the emmetropic eye to become hypermetropic—the hypermetropic eye more hypermetropic and the myopic eye less myopic. The amount of this decrease of the static refraction of the eye after sixty years of age amounts to about .50 D. for every five years above sixty. This decrease of the static refraction of the eye above sixty years of age is known as *acquired hypermetropia*. When we speak of an *emmetropic eye* we mean one whose static refraction unites parallel rays of light to a focus on the retina.

A *hypermetropic eye*, one whose static refraction unites parallel rays of light to a focus behind the retina.

A *myopic eye*, one whose static refraction unites parallel rays of light to a focus in front of the retina.

Whenever to the static refraction of the eye is added any of its dynamic refraction (accommodation) the eye is no longer in a state of rest. The emmetropic eye is therefore, only in a state of rest when looking at objects situated at infinity from whence only parallel rays of light can come.

The myopic eye is only at rest when looking at objects situated at its punctum remotum or beyond. The hypermetropic eye is never at rest no matter at what distance the object is situated. All eyes can, of course, be put into a state of rest by a cyclophlegic (atropine, etc.) which paralyses the ciliary muscle so that it cannot act so as to allow any dynamic refraction.

Old age also puts all eyes at rest from hardening of the crystalline lens, thus in another manner preventing any dynamic refraction.

In all examinations of the eyes for glasses it is the aim of the optician to ascertain as nearly as possible the static refraction of the eye and thus determine whether a convex glass is needed to increase or a concave glass to diminish the static refraction of the eye to make it emmetropic.

In all examinations of the eye, when not in a state of rest, the resultant glasses found must necessarily be more or less speculative.

In the absence of the privilege or license to use a cyclophlegic, opticians should resort much more than they do to the practice of "fogging," which is nothing more than placing convex lenses before the eyes to render them myopic. The convex lenses (usually +4 00) render the use of any accommodation superfluous, and the ciliary muscle will therefore have a strong incentive to assume a state of rest. By gradually reducing the convex lenses before the eyes you can often by this method induce the eyes to accept a much stronger convex correction than otherwise would be obtained by the old method of working up from weaker to stronger convex. Of course it is to be understood that fogging is only valuable usually under the age of about thirty years. There is a marked tendency of eyes to assume a state of rest in the dark room during the practice of retinoscopy, which accounts for the value of the shadow test even without a cyclophlegic in many cases. The older the patient the less tendency is there to use the accommodation, and *vice versa* in young children. In the latter, neither the dark room, retinoscopy, or fogging suffices to approach that state of rest desired, and I have long taught and firmly believe that opticians should under no circumstances order glasses for children under fifteen years of age without first ascertaining the refraction of the eye in a state of rest by means of a cyclophlegic. Few opticians there be who will not say: "I constantly give glasses to children without using anything but the trial case, and have perfectly satisfactory results." Without doubting either their statement or honesty of purpose, let me say that I regret to admit my experience is just the opposite, and I seldom obtain either a correct fit or satisfactory result in children without the use of a cyclophlegic, and the more I refract, observe, analyze, verify, the more I am convinced of the correctness and truth of my contention.

Optical Notes.

By a Chemist-Optician, in *The Chemist and Druggist.*

A PRACTICAL HINT.

I formerly had considerable trouble with the tenderness and soreness caused by the pressure of pince-nez on the skin of the nose in the case of people first wearing glasses. I now recommend customers to bathe the part with rectified spirit, and find that the discomfort soon disappears. If the spring of the pince-nez is weakened too much the glasses do not sit firm on the nose, and there is danger, in the case of cylinders, of getting the axis displaced. It has often surprised me to find how a little pressure causes soreness of some skins.