preferable to any single one of the above-mentioned methods.

NOTE.—I refer the reader to Dr. St. John Roosa's article in *The Postgraduate*, November, 1899.
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HOW TO PLACE LENSES BEFORE THE EYES SO THAT DISTANCE OF THEIR RESPECT- IVE ANTERIOR FOCI SHALL BE THE SAME.*

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Not every ophthalmologist seems to realize the extreme importance of having the anterior focus of each eye at exactly the same distance, and many who try to obtain this fail because of the improper methods used.

If the anterior focal points are not exactly at the same place the ciliary muscles in their ceaseless efforts to find a position of rest will be under a constant see-saw. Every ophthalmologist finds cases in which comfort and good vision can be obtained for each eye separately, yet when the patient looks with both eyes, he complains of discomfort and dizziness and of not being able to see clearly. The problem is how to remedy this.

Many patients with glasses have the same visual acuity in each eye. After refracting such cases, and while

they view distant test-types with both eyes, I take a plus and minus sphere of .25 diopter strength and place one before each eye, wait a few moments, when I quickly interchange them. If the patient has any choice it shows me that I must raise the correction of one or lower that of the other, or do both.

If, however, the acuity of vision of one eye is the slightest amount better than that of the other, I take the same lenses, and, placing first one and then the other before the same eye, find which is better, and repeat the same process before the other eye. If a change is needed, the patient will accept a plus before one eye and a minus before the other; this method also indicates in what manner to proceed.

For the sake of convenience, I have combined four lenses, as shown in accompanying diagram. In the first test I hold the two lower lenses in front of the eyes a few moments, and then quickly lower the upper two into position.

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In the second test, and in fitting for near, I use one side of the combination, putting first one and then the other before the same eye. It is not to be forgotten, in making the last test if the eyes are not completely under the effect of a cycloplegic, the patient will often choose a minus glass for both eyes, because there is a tendency to accommodate.

In all cases, after having finished these tests, always try stronger convex or weaker concave glasses of the same amount on both eyes.

In presbyopia the amount to be added to the refraction for distance may differ in the two eyes on account of differences in the progress of sclerosis of the lenses and the consequent changes in the ciliary muscles. The common method of fitting presbyopia is to add the same amount to the distant refraction of each eye, and to decide if the desired location of the near test-type is the same for each eye separately. This method can not be relied on, because, not being able to appreciate slight differences in the distance from the eyes to the test-card, and making a probable mistake in each eye, the patient claims that both see better at, say a distance of thirteen inches, whereas, in reality, the one is focused for twelve inches and the other for fourteen inches. It may be supposed that the eyes are now focused at the same distance; but they are not, until you have made a difference in the strength of the lenses equal to 40/12 diopters minus 40/14 diopters, or more than .38 diopters.

By virtue of the fact that the patient is not able to distinguish slight differences in the distance from the test-card to the eyes, you can not get a good result while the test-card is held at a fixed distance.

I increase the spherical strength of lenses to what I think will be necessary to make the anterior focus at the proper distance from the patient's face. Then I have him hold the test-card at the place of best and easiest vision, and use the last method spoken of for distance. If he chooses a plus glass on one side and a minus glass on the other, I proceed as before mentioned. If, however, he chooses plus in front of both, I have him hold the card a little farther off, and if minus, a little closer to his eyes, and then repeat the process. When he can not choose between the plus and minus glasses the eyes are balanced.

DISCUSSION.

DR. JAMES THORINGTON, Philadelphia.—In making this final test in estimating the refraction I think it is always well that we proceed slowly with the previous steps, for that is the way to perceive any decided benefit after we have proceeded carefully in testing each eye separately. There are two points that ought to have careful consideration—the first is to have the lenses used in testing the vision for distance placed very close to the eye, and the next is to have the lenses properly centered before the eye. To do this you have to ignore the trial frame as a rule, because so many of them are not adjusted to the patient's face. I often use the trial frame attached to the Risley phorometer and having tested each eye separately and then testing the eyes together in the way the doctor suggests I find there is very little advantage and that very few patients will appreciate the +.25D., but will quite frequently accept the —.25D. This is decidedly the case with myopes. Then there is this danger, that if you do not place Dr. Stevenson's instrument close to the lenses you get something of a periscopic effect. In presbyopia I find that a certain percentage can not always differentiate 0.25 plus or minus, with any degree of certainty; I therefore hesitate to embarrass them by asking for a positive answer. Patients come to us to have their glasses selected by us, and depend on our judgment; if they must decide for themselves then they think they might just as well visit an optician.

DR. MARK D. STEVENSON, Akron, Ohio—As a rule patients very quickly decide which lenses they prefer, and I consider that lenses of .25 diopter strength are sufficiently strong and I often use lenses of .12 diopter. When the patient is not under the effect of a cycloplegic and there is a tendency to accommodate, if the vision of the two eyes is unequal the patient would be apt to choose a minus glass before the better eye, but when the vision in both eyes is equal there should be no choice for the purpose of accommodating. I have failed to find any reference to this method of fitting in literature.

DR. J. A. LIPPINCOTT, Pittsburgh—I would like to say that I think this little apparatus a very convenient one and it may serve a useful purpose. I have used the same principle for a great many years by simply holding a $+ .25$ and $- .25$ in either hand and transferring them during the examination. This apparatus will enable us to save time and trouble and I think there is no question of the value of making this test with both eyes open after you have completed the test with both eyes separately.

KERATITIS BULLOSA, WITH REPORT OF CASE.*

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My reason for reporting this case is because it is one of great rarity. Statistics go to show that keratitis bullosa is the least frequent of all corneal troubles. It is fortunate for both the physician and the patient that such is the case, for it is one of the most painful affections that the eye is liable to, and in the majority of cases baffles all therapeutic and surgical measures adopted for its relief. The disease occurs in the eyes, the cornea of which is more or less clouded and sensitive, or in eyes with a large corneal cicatrix, or eyes which have been rendered blind by iridocyclitis or by increase of tension.

Jansen¹ describes a primary form occurring as the result of an abrasion of the cornea by the finger-nail, a twig or some such object. But the majority of cases are secondary and occur as the result of the diseased processes above mentioned. This disease is characterized by the formation on the cornea of large tremulous bullæ which last for several days before they rupture. They are not tightly distended, but form a lax, tremulous, somewhat dependent sac. After their rupture the lax anterior wall still lies upon the cornea, and can readily be made out by the way in which it can be displaced by the movements of the lids. In all cases the bullæ show a great tendency to take on frequent recurrences, in each of which the irritative symptoms set in anew. Violent symptoms of irritation, such as ciliary injection, lachrymation, photophobia, and more especially great pain, are usually present during the development of the bullæ. These doubtless are caused by the pulling upon the corneal nerves which pass into the epithelium, and which, in the process of formation of bullæ are first stretched and finally torn in two.

The irritative symptoms ordinarily disappear with the rupture of the bullæ. The bullæ appear to have a double origin. 1. According to Fuchs, the lymphatic stasis of glaucomatous eyes produces an interstitial edema of the epithelium, which tends to the production of vesicles, etc. 2. The continual irritation of the corneal epithelium alters the nutrition of the cells. Above all, the cells of the middle layer are transformed into clear vesicles, which in places acquire a very large size. The cellular membranes of these larger vesicles are destroyed,

and in this manner a lacuna is produced, which is often rather large, and becomes more and more distended; such a vesicle is covered by epithelium that separates it also from Bowman's membrane.

The first mode of formation produces vesicles covered by epithelium and resting upon Bowman's membrane; the second method furnishes the intraepithelial vesicles. Vesicles which lie in the substance of the corneal membrane have also been described; they are said to be developed underneath Bowman's membrane. This point, however, merits further research.

The prognosis is so far unfavorable in that the disease often recurs, on which account the affected eye, besides being useless for purposes of vision, is the source of constant discomfort to the patient. The treatment should aim at relieving the condition of irritation produced by the eruption of the bullæ, and at preventing the recurrences. Sometimes we do not put a stop to the recurrences until we have improved the conditions for the nutrition of the eye by means of an iridectomy or posterior sclerotomy; we may even find ourselves compelled, as the operator was in this case, to perform enucleation of the diseased eye in order to give the patient relief.

Mrs. L. presented herself at my office July 12, 1898. She was of German descent, about 50 years of age; had always had good health; was the mother of several children. Subjective symptoms: Patient said that she had had the present eye trouble for about a year; had been better at intervals; no history of any injury; was suffering great pain at this time. An examination showed the presence of a large tremulous bulla measuring 4 by 5 mm., situated nearly in the center of the cornea. The remaining portion of the cornea was clear, anterior chamber of normal depth and T. normal. There was ciliary injection, lachrymation and some photophobia. Further examination revealed the presence of a cataract and complete posterior synechia of the iris; V.=0. This condition was undoubtedly the cause of the keratitis.

I adopted the usual mode of treatment, namely, opening the bullæ and touching the raw spot with nitrate of silver solution. I also used a strong solution of atropia, with the hope that I might break up some of the adhesions of the iris, and thus improve the nutrition of the parts. But I soon found this to be fruitless, and had to limit the treatment to simply opening the bullæ, which would give the patient relief for the time being, and perhaps a night's rest, but the next day another large bulla would develop on the same spot and the patient would again suffer excruciating pain. She would beg me to remove the eye, saying that she could not stand it. This I was loath to do, as the eye ball was perfect and not in the least unsightly, and most of the time there was not even congestion of the bulbar conjunctiva.

On August 24 I determined on making an iridectomy. Cocainizing the eye, I made the usual incision with a keratome, but I experienced considerable difficulty in dragging forth the iris; as before stated, it was firmly bound down by adhesions, which were hard to loosen, the iris tearing first. But I succeeded in making a fair-sized coloboma, dressed the eye as usual in such cases, and awaited results. The case progressed nicely, patient suffering no pain, and there was no sign of a return of the bulla after several days had elapsed. I began to feel quite hopeful of success, and had arranged to dismiss the patient from the hospital, when, behold! one morning when I removed the bandage preparatory to dressing the eye, I discovered a completely formed bulla on the

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¹ Arch. d'Ophthal., April, 1898.