great a mistake as it would be to change any other part of the formula. As it is impossible to give a pupillary distance for both near and distance in a monofocal lens it is best to leave the lenses decentered for distance when the eye is relaxed.

ADJUSTMENT.

Our experience suggested strongly the desirability of an optical inspector for the public school system. A nurse not only competent to make adjustments but capable of giving children a few simple instructions in the care of their lenses. If the child's frames are bent or the lenses are in any way out of the proper position they cannot receive either benefit or comfort from the most accurate corrections. It was found to be undesirable to permit children to wear rimless lenses. They are too easily broken and endanger the eyes. A small lens, an O. E., 1.75 m.m. thick, with an ordinary rim, has not been known to be the cause of an accident although it is advisable to have children remove their glasses when engaged in active sports.

SUMMARY.

1. About 98% of all children between the ages of 6 and 12 who suffer from optical defects in this climate are hyperopic.

2. Other things being equal the more the plus required in the correcting formula the more the reflex irritation before the correction is made.

3. Not all healthy hyperopes need correction.

4. More attention should be paid to the effect of the bright light of this climate on the eyes of children.

5. Simple forms of myopia are possibly more common than suspected, since they seldom give any reflex symptoms unless associated with a large or light-colored iris.

6. Myopes should never be over-corrected because the artificial hyperopia established thereby makes the condition for eye-strain possible.

7. Great care should be taken to differentiate simple myopia from ciliary spasm, as this is possibly the most common mistake made in the refraction of children.

8. The static method of retinoscopy is the most convenient for the differential diagnosis on account of the paralyzed accommodation, but as optical defects increase from the visual axis outward, the dynamic method by which the contracted pupil discards the confusing and unimportant shadows is the most accurate and the only method of making the correction for astigmatism for the near distance.

9. Not over one-half the corrections for hyperopic astigmatism made for 20 feet correct the near or working distance within one-quarter of a diopter in young children.

10. When a child and only one parent have optical defects the defects of each are of the same kind even to the axis of astigmatism in 90% of all cases.

11. Most cases of constant squint in one eye lose the power of binocular vision before the sixth year.

12. A diffused image from one eye such as caused by a scar when associated with binocular vision should be fogged out if the proper correction cannot be made or determined.

13. Children should be given instruction in regard to the care of their lenses.

14. The pupillary distance for near work should be given to school children.

15. Rimless lenses should not be prescribed for children. Small thick lenses properly mounted with rims will not produce any injury to the eye in case of an accident.

SOME OCULAR DEFECTS IN MENTALLY RETARDED CHILDREN.

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The affections of the eye in childhood are various and in many instances peculiar to the eye of the child or young adult—scrofulous Keratitis, some forms of blennorrhea of the sac, and some forms of conjunctivitis; interstitial luetic Keratitis, certain forms of tumor, as glioma, and a certain number of congenital defects, or at least congenital malformations, of certain structures. These latter are found, in my experience at least, very much more frequently in the eyes of mentally retarded children than in the normal child. Mentally retarded children, for the purpose of this paper at least, I will consider as being divided into two groups: those whose retardation is due to physical handicap which can be removed—tonsils, adenoids, highgrade myopia or other marked errors of refraction; second, those where in the absence of any marked general or local physical faults, a certain degree of mental retardation is present, evidenced often not only by negative inability to learn as others of the same age do, but also by positive traits; the children are unruly, disorderly, disobedient; petty thieving, constant truancy from school, confirmed lying and other evidences of abnormal mental status are common. It is of this second class particularly that I wish to speak. The visual tests display as the most common abnormality, either a marked difference in the vision of the two eyes or low vision in both equally. The first condition is perhaps slightly the more frequent. The poorer eye is inclined to stand slightly divergent in distant vision, though it usually, in fixing a near object converges as properly as its fellow. The muscular balance tests seldom even approximate the normal, but show marked degrees of either exophoria or esophoria, usually the former. Color perception centrally is usually normal but not so in the periphery, where a marked concentric contraction for colors is often evident. In the judgment of this latter condition one has to be particularly careful, as the mental status is often uncertain and the answers, unless checked up repeatedly, not to be relied on. The cause for this unilateral or bilateral poor vision may be (1) refractive in type (2) due to fundus changes, varying in type from the residue of a specific retinitis and choroiditis, to nothing more than an exaggeration of the limits of the normal types; this latter condition, which I will take up later in more detail, is very much the more frequent of the

two; indeed it is present in the great majority of these children. Concerning ourselves with the refractive status for a moment; by far the great majority are farsighted with some astigmatism, some are high astigmatics in addition to being farsighted; a very small number are myopic. This brings us to a not uninteresting biological point. Many animals are farsighted, the carnivora and birds especially; so are practically all new-born children. The markedly hypermetropic eye harks back somewhat to the build of eye of animals lower in intelligence than we; while of positive advantage to the animal it is of detriment to us. Our visual needs do not call for excessively clear distant vision, or for excessively keen judgment of space, such as the eagle and hawk undoubtedly employ by the sense of accomadative contraction of their ciliary muscle. This eye then—the excessive hypermetropic one—is in the human more akin to the animal eye, and less adopted to our needs than the emmetropic or slightly myopia eye. That this latter condition is met quite infrequently in the cases under discussion is of interest from diametrically the opposite standpoint. It is the eye of the student, the type of eye most often transmitted to their progeny on the hereditary basis, from families of students or close observers in skilled employments—such as watchmakers for instance. That the children under discussion come mostly from a class of people of low intellectual attainment and therefore not of the artisan class we all know. The vision can in many instances be brought to normal with the proper glasses. If, however, fundus changes, either distinctly pathological or of the type touching on the extreme border of the normal variations, be present, it is seldom possible to improve the vision materially. In those with pathological changes—pepper and salt retinitis, for instance, we of course do not expect marked improvement, though we may obtain some. Those with changes just outside of the normal variation, but not of a pathological nature—that is, not due to disease of the structures as such—we also are seldom able to improve materially by glasses. What are these changes? Clinical experience has formed a small chapter on this subject in my mind, an abstract of which would be as follows:

(1) Fundus without or with very little pigment.

(2) Excessively hyperemic discs, margins not distinguishable, vessels, especially veins, dark and dilated (psuedo-neuritis).

(3) Disc normal, veins and arteries though normal in calibre, forming many small curves in their course over the fundus.

(4) Discs of normal color and outline, but vessels branching off fan-shaped. ("Sprawling" off the disc is the descriptive phrase most applicable.)

(5) Excessively pale disc, vessels of normal size.

(6) Extensive preservation of the myelin sheathes in certain bundles of nerve-fibres usually near the optic nerve entrance.

Any of the types mentioned militate against much improvement of vision by glasses. Why they should, is another question. The first one is easily explained. Flooded by light, due to the lack of pigment covering, as fine distinctions cannot be made as can by sensory elements possessed of enough protective covering to filter out the excess of light: we know how much sharper the values of a picture come out when viewed through a small tube or through one's hand held up as a shading device—or more familiar still, the sharpening of an image on a photographic plate by the proper amount of closure of a diaphragm. The second, third and fourth types owe their subnormal vision probably to anomalous blood supply, though in what specific way this militates against acute vision is hard to say. The fifth, probably to excessive glia formation about the nerve fibers and the last is distinctly a reversion to a lower type; in many animals the myelin sheathes are not entirely dropped at the lamina cribrosa; in the rabbit this is most beautifully observed. These in brief are the fundus findings of a considerable number.

As regards the muscular balance of their eyes. In general I feel that "muscular imbalance" has been popped at the laity and the medical practitioner like a bugaboo in a jack-in-the-box—its prevalence and importance grossly exaggerated and all ills that flesh is heir to laid to the mistake Providence made in not giving us a rigid steel globe and iron cables to haul the eye about, instead of our soft and elastic eye with its give and take pulleys and ropes. In spite of the fact that it is "grossly exaggerated," as Mark Twain said of the report of his death, it is of importance in mentally retarded children. These, partly due to their fundus defects, partly because of their refractive error, do not see well, have often no especial desire to see objects acutely, or if they have, find that they must strain too much to do so; as a consequence, they give up trying to correct their visual defect, and with this an abnormal relation between their accommodative and converging impulses is established, with the result that one or both eyes incline to swing in or out. This, as it would result in diplopia, they attempt to overcome by excess nervous impulses, resulting often in headache, irritability and facial contortions of varying degree. As before stated, muscular imbalance of marked degree is a frequent finding, and its correction by the proper glasses often changes markedly the habitus of the child. From these imbalances a fixed strabismus frequently develops; often amenable to cure by glasses if attended to early, but more often do we find that a cosmetic operation only must be resorted to, as the child has lost its vision by reason of an established squint over a period of some years. Considered in large groups, we do not find that anatomical congenital malformations—such as colomboma of the iris and choroid, dermoids of the conjunctiva, epicanthus, micropthalmus, aniridia, cataract and so forth—are more frequent among these children than among mentally normal ones. They are, however, more frequent in idiots and imbeciles than in mentally normal children. A certain relation between ocular defects and the general appearance of the child has often struck me. Those with the poorer vision, whether due to fundus conditions

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or to refractive error, are usually physically more backward than those with normal eyes. They form a group distinguished by being shorter, thinner, sallower and less active physically than their companions. Exceptions of course occur frequently.

To close—thorough ocular examination of mentally retarded children should never be omitted. A small number will be remarkably improved by proper glasses. In those not amenable to ocular improvement, we obtain by this examination, from the social and economic standpoint, an index of what kind of work in the future as far as their vision is a factor, they may be expected to do, and educate them accordingly.

CONGENITAL OCCLUSION OF THE CHOANAE OF THE NOSE.*

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Congenital occlusion of the choanae of the nose has been recognized since the year 1830, when the condition was seen post mortem by Otto. It was later first reported as seen in the living by Emmert in 1854. Up to 1904 Schmielglow had collected sixty-four cases from the literature and in this series it was shown that more women than men were affected and that when the condition was unilateral, occurred more on the right than left side. Although so far, only about one hundred cases have been reported, there are reasons for believing that they are of more frequent occurrence than generally supposed.

One reason for this belief is that cases of unilateral occlusion have been discovered during examination of patients who were unaware of its existence or who suffered so little inconvenience that they had never sought relief for it. Another reason is that certain cases of supposed asphyxia neonatorum have been observed in which such occlusion has been the cause. Such a case was reported by Richardson in 1914. It is only too possible that many such cases have been classed as asphyxia neonatorum in the past. The causative factor is, of course, some departure from the normal embryological development.

It may not be amiss here to briefly review the development of part under discussion. "The primitive nasal capsule develops as a part of the primordial cranium. From that part which extends forward beyond the anterior portion of the notochord a core is formed for the frontonasal process—a relatively broad mass of tissue separating the nasal pits. The nasal pits are symmetric depressions, at first pyriform in outline, with the small ends toward the primitive mouth cavity. As the processus globularis on the lateral portion of the medial nasal process approximates the lateral nasal and maxillary processes, there is a deepening of the primitive nasal fossae and a change in their form, which becomes oval and bordered by broad folds. The broad median process separating the depressions later becomes narrowed and forms the septum nasi. By the approximation of the nasal processes inferiorly, their ectodermal coverings are brought into contact. The intervening ectoderm is resorbed, and the processes become united by mesoderm, which forms the floor of the primitive anterior nares. In the fifth week, or shortly thereafter, by the partial resorption of ectodermal cells filling the remaining interspaces between the median and lateral nasal processes, there is formed behind the os intermaxillare the primitive ductus nasopharyngeus. Posteriorly, there persist for a short while the membranae bucconasales, which break through and form the primitive choanae at a time somewhere between the twenty-eighth and fortieth day—the observations of the different embryologists varying to that extent."

Now a failure of absorption of this membranae bucconasalis would result in membranous occlusion and it is conceivable that bone deposits might ultimately change the character of this barrier.

Hocheim believed the growth arose from the palate bone. Luska believes it occurs from the upward and backward growth of the horizontal plate of the palate bone. Kundrat, to an ingrowth of the vertical plates of the palate bone. The condition may be either uni or bilateral and the septa complete or only partial.

The symptomatology differs, of course, with the degree of obstruction. In adults with both sides completely occluded, the chief symptom is nasal obstruction. Headache may be complained of and a nasal voice is noticeable. Deafness in some degree usually results and anasmia exists in all cases. When only one side is occluded the patient may not know he has any obstruction to breathing. The secretions of the nose cannot be expelled and are found to be of a peculiarly gelatinous character and may irriate the lip and alae. A symptom mentioned by one author is that when the patient cries the tears run out of the nose. However, these diagnostic signs are all secondary to that of direct inspection and are not pathognomonic of this type of obstruction.

In asphyxia in infants due to this cause the symptomatology is important, as here inspection is difficult or impossible. Richardson has described such a case. He says that a child born with complete nasal occlusion will not be able to breathe, as mouth-breathing is an acquired habit, so the child becomes cyanotic and cries. This crying relieves the cyanosis. The cyanosis being relieved, the child stops crying and soon becomes cyanotic again. In the diagnosis of the condition in new born he suggests the use of the probe and also filling the naris with solution which should run back into naso-pharynx, if no other obstruction exists. So that where we see this cycle in the new born we should think at once of nasal occlusion. The treatment of this condition in children consists in keeping the mouth open and the tongue pulled forward till surgical relief can be secured.

In adults the operative efforts have all been directed towards destroying the obstruction and afterwards keeping the choanae open. They have all been of the same type and have all had to cope with the obliteration of the opening by granulation tissue, which occurs with great rapidity in this space. Katz suggested burring out the plate and also removing part of the posterior end

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