

the existence of a bone of this nature deep in the sole of the foot. Both Pfitzner and I myself have seen this several times in feet which present no sign of any pathological process. I have a specimen of it in a beautifully formed foot of a girl of nineteen.

Now it is evident that the persistence of such an occasional bone may give rise to x-ray negatives that are liable to misinterpretation. Many years ago, before the x-rays had been thought of, an excellent anatomist and surgeon thought that he had found in the dissecting room a fracture of the astragalus, because the external tubercle at the back of the astragalus was distinct. This is now known as the *os trigonum*, which may be found in all degrees of fusion, from complete distinctness to absolute incorporation with the astragalus. No one knows how many of these distinct centers of the wrist and ankle there may still be to discover. I had the luck a year or more ago to find a new bone in the ankle (the *os intercuneiforme*), and I think I have found a new one this winter in the wrist. To be sure, these discoveries at first may seem of no more value than that of one more asteroid or of a one-horse comet, which nevertheless are telegraphed all over the world; but I am sure that many of them have their very practical significance. Conversely the fusion of bones usually distinct is of practical importance. I have just mentioned one way in which it occurs, but it is not likely that it is the only one. Fusion of distinct bones is not only a disturbing circumstance to the operator who expects to sweep his knife gracefully between them, but it is of greater importance to the orthopedist who is studying the relations between structure and, let us say, flat foot. Thus the *os calcis* occasionally is connected by cartilage or fibro-cartilage with the outer end of the scaphoid. Though I believe the opposite opinion has been maintained, I think from my experience that it is associated with a high instep. What influence it may have on the movements of the foot is a more abstruse problem.

And so on, and so on:

"Though I'm anything but clever,
I could talk like this forever,"

and keep on showing you peculiarities which once were (perhaps still are) considered mere curiosities, but which in point of fact are alike of great scientific and of great practical importance. Let no one say that anatomy is exhausted. On the contrary, we are just entering on a new era, and on one which concerns especially the practitioner who would be eminent.

THE NEED OF A SUPPLEMENTARY LANTERN TEST FOR THE PROPER EXAMINATION OF COLOR PERCEPTION.¹

BY CHARLES H. WILLIAMS, M.D., BOSTON, MASS.

The test for color vision most commonly used at present is that proposed by Professor Holm-

gren. It consists of a collection of skeins of worsted of various colors, one hundred and twenty-five or more in number, well provided with different shades of red, green, blue, brown, gray and other colors. In addition to these there are two or three larger test-skeins, one of green, one of rose and one of bright red, the last being omitted in some of the test sets.

The principle on which this test is based is the fact that when a person who has a decided lack of perception for red or green looks at the solar spectrum, he sees in the green part of the spectrum a band of gray or neutral color, and this green test skein is carefully selected so as to correspond to that part of the green spectrum where the gray band is seen. To a person who is defective either for red or green, this green test-skein will appear of the same color as the light grays, or browns, and he will select as looking like it other grays, greens or browns, and will show by this mixing of confusion colors with the true colors that he is defective in his color perception, either for red or green, or both of these colors. The second test is made by placing a rose test-skein at one side of the pile of worsteds and having the person examined select such colors as look to him like this test-skein. If he is more defective for red, he will select with the rose or reds some of the blues or violets; but if he is more defective for green he will select with the rose some of the grays or greens. The green test-skein, which has generally been furnished with our American sets of worsteds, has been too light in shade, and on comparing it with the green test-skein in some sets of Holmgren worsteds imported from Upsala by the writer, and which were prepared by the person who made them under the direction of the late Professor Holmgren, it was found that the green test-skein of the Swedish sets was much darker and of a more decided green than ours, and was better adapted for use as a test-skein; and in some of the American sets of worsteds now made this defect has been corrected.

Some ten years ago the writer prepared fifty sets of Holmgren worsteds for use on the Burlington system of railways. In these sets all the skeins were numbered with small metal tags, the odd numbers being the true colors and the even numbers the confusion colors. By making a record of each examination as it proceeded, noting on proper blanks the numbers selected as looking like the test-skeins, a permanent record was kept of all examinations, which was sometimes of great use. Formerly the only record of the examination was the statement of the examiner who conducted the examination, as to whether the applicant's color vision was satisfactory or not.

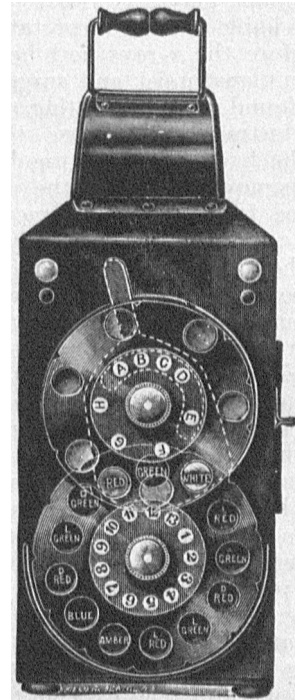
A very extended use of the Holmgren test in the hands of many examiners is now showing that some cases are able to pass this test correctly and without hesitation, who when examined with the lights from a distant signal, may be unable to distinguish the red or green with any reasonable degree of certainty, and, in fact,

¹ Read at the Medical Meeting of the Boston Medical Library, April 6, 1903.

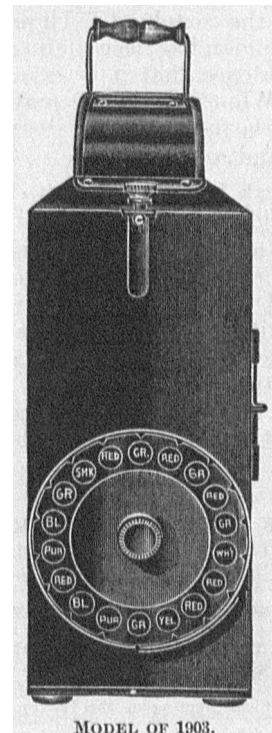
often confuse these colors. This occurs most frequently in cases of acquired defect in color-vision caused by excessive use of tobacco or alcohol, or by a combination of the two. In such cases there is often a small defect in the central part of the retina, so small that the retinal image of the skein of worsted is large enough to be formed partly within the affected area and partly beyond it, and if at any part it falls on healthy retina its color can be at once recognized. If the object is small, like a distant signal light, the retinal image is formed wholly within the affected area, and the color is not recognized. At night there is often no other means of distinguishing between safety and danger except by the quick and accurate recognition of the color of a railway signal or the side light of a ship, and it is of special importance that the test for color perception should include a test resembling as nearly as possible the conditions of service, and of such a kind as to show conclusively, after the test has been made, whether the person can be relied on to recognize quickly and accurately the color of a distant signal light. For some years the Dutch railways have required a test with the Donders lantern, in addition to the worsted test, but my experience with this lantern showed that it was not well adapted to tests made by railway officials, as is often done in this country.

In 1892 the writer devised a wheel with sixteen colored glasses, which could be brought in succession before a light by revolving the wheel; there was also a diaphragm to vary the size of the colored area, and this test is still used as a reference test on the Burlington road. In 1899 a smaller and more portable lantern was arranged for use on the N. Y. N. H. & H. R. R., when they revised the methods of examining their men

This lantern showed only one light at a time, and was soon replaced by another in which either one or two lights could be shown at a time, and where the colors of the glasses in the lower disc could be modified by combinations with the glasses of the upper disc, and where the area of the colors could be varied.



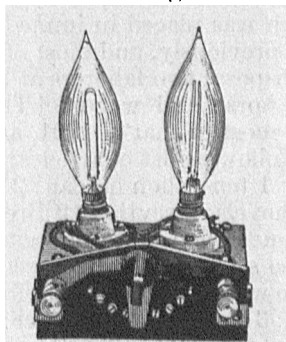
This lantern is now in use on the N. Y. N. H. & H. R. R., the Great Northern, the Boston & Maine, the Canada Atlantic and some other roads. It has been found in practice that the



MODEL OF 1903.

upper disc of these lanterns is seldom used, and it brings in a complication which is not desirable. It is very necessary that these tests should be made as simple as possible, so that a person of good intelligence can be easily instructed to make them in such a way as to give reliable results, especially when they have printed instructions and forms to guide them. For this reason a new lantern was constructed this year having on its face a single disc with eighteen colored glasses, and within the lantern two lights and a shutter, so arranged that either two or one of the colored glasses can be illuminated at one time. By revolving the disc all the colors can be brought before the lights in succession, and it is found that with two lights showing at one time, a person with defective color-perception is often more confused than when he has only one colored light to look at; for instance, with a light and a dark red he will often call one of them a green and the other a red. The shutter, beside regulating the lights as single or double, also changes the area, so that two lights with the full opening, half size, or the smallest opening can be shown, or one light of each of these sizes. Under each colored glass in the disc is an opening with a transparent number, which is lighted at the same time as the color above it. This number can be seen by the examiner, but is screened from the person examined, and by means of these numbers a record of the examination can be kept, the number under the color and the name given to this color being noted as the examination proceeds. The lantern is placed in a dark room twenty feet from the person to be examined, and on a level with his head. The area of the largest opening at this distance then corresponds to the apparent size of a standard switch light at a distance of 160 feet, and the smallest opening to such a light at a distance of 1,300 feet.

This form of lantern is already in use on the Canadian Pacific Railway and the Northern Pacific Railway, and is to be preferred, on account of its greater simplicity, to the previous models.¹ In addition to the test with different colored lights, it is important to make the test with a light whose intensity can be varied by fixed amounts; for in some cases those who are defective depend on the intensity of the light to distinguish between red and green. For this pur-



¹ Since this paper was written, twenty of these lanterns have been ordered for use on the different divisions of the Southern Pacific Co.

pose the writer made an electric lamp with a specially constructed rheostat in the base, through which the current for the two incandescent lamps can be passed.

By means of a handle projecting through the door at the back of the lantern the resistance introduced by the rheostat into the current for the lamps can be varied from nothing to 150 ohms, and the candle power of the lamps can thus be reduced or raised by fixed amounts at pleasure. Oil lamps are used in case an electric current cannot be obtained, but the latter is preferred. This lantern test is now used on the above roads *in addition to* the Holmgren worsted test. If a person calls red green, or green red, in the lantern test, or selects confusion colors with both the green and the rose test-skeins, he is rejected as showing an unsafe degree of defective color-perception.

With these two tests carefully made it is reasonably certain that no dangerous case of defective color-sense will be passed; but with either test alone it is possible to have men pass the test who are so defective that they may be dangerous in positions where it is necessary to distinguish quickly and accurately between red and green. In cases where the trouble is due to an acquired defect, as from the excessive use of tobacco, a considerable improvement may result from stopping the tobacco; but in the congenital cases no treatment will be of much use. Some men can learn by constant practice to give the correct names to certain colors or even to select correctly the proper colors in a given set of worsteds, but when tested with new colors that they have not previously seen and practiced with, they will generally be unable to recognize them correctly.

EFFORTS TO ABATE THE MOSQUITO NUISANCE IN BROOKLINE.

BY H. LINCOLN CHASE, M.D., BROOKLINE, MASS.

THE great prevalence of mosquitoes every spring, summer and fall in certain sections of Brookline, the increasing number of citizens in every part of the town, the comparatively recent discovery that intermittent fever is transmitted from a patient to well persons through the bite of a mosquito,—these facts induced the Board of Health in August, 1901, to consider the feasibility of suppressing the mosquito nuisance.

The Board of Health voted to refer the matter to its agent, the writer, for an investigation and report, with recommendations. The report was duly made, and summarized most of the information then available on the subject, much of which was secured from Dr. Theobald Smith's valuable and interesting paper on the subject given before the Massachusetts Association of Boards of Health at its meeting in July, 1901; partly from Dr. L. O. Howard's book entitled "Mosquitoes" and much also from the experience of our medical officers in Cuba in suppressing the mosquitoes that transmit malaria and yellow fever. The Board promptly authorized its agent