phrine Equivalent Method because of the great variability in the results. However, they took their blood samples at ½, 1 and 2 hours after the injection, intervals where the mean deviations are the greatest.

The blood sugar level after ⅛, ¼, ½, and the full dose ½ hour after the injection shows a steady rise in the blood sugar until the ½-dose is approached, after which the curve flattens out. Apparently, there is a maximum amount of stimulus to which the system will respond. Beyond this point, there is no increase in effects. The mean deviations vary from 13 to 29 mg., the smallest deviation occurring with the smallest dose.

Summary. 1. 1000 observations were made at 5, 15, 30, 45 minutes, 1, 1½, 2 and 4 hours after given doses of epinephrine. 2. The blood sugar reaches its highest level in 1½ hours and has not returned to normal in 4 hours. 3. With doses varying from ⅛ to the full dose, the blood sugar increases proportionately with the dosage until ½ the dose, where the curve flattens out. 4. The smallest deviations are obtained after the shortest interval after the injection, or, after the smallest dose.

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Perimetry with Stimuli of Minimal Duration.

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The utility of field defects as outlined by perimetry in localizing disease along the optic pathways is fully discussed by Traquair[1] and Peter.[2] With the advent of the McHardy[3] self-registering perimeter and its electrical test objects a comparison between white and colored lights became available.

During the course of some experiments upon the chronaxia of the optic nerves projected by Davis and Pollock, a method of perimetry with a light stimulus of very short duration has been developed.

[1] Traquair, H. M., Introduction to Clinical Perimetry, American edition, St. Louis, C. V. Mosby Co., 1927.

[2] Peter, L. C., Principles and Practices of Perimetry, 2nd Edition, Philadelphia, Lea and Febiger, 1923.

[3] McHardy, M., *Ophth. Rev.*, 1882, **1**, 107.

Our immediate problem was to compare the fields obtained by using a test object of varying size and color at infinite duration with that of a flash of light of a known and standard candle power and varying extremely short duration. Thus not only energy but time was considered a factor in our work. As the peripheral portion of the retina is stimulated there is a distinct varying limit to the recognition of light flashes of short duration, the more peripheralwards the stimulus, the longer must be its duration to be perceived. This has been amply confirmed by a previous study.[4] The work of Sheard[5] would seem to show that such a minute quantity as a quantum of light is enough to stimulate the fovea.

The instrument for producing such short flashes consists of a small neon bulb which is activated by condensor discharges through the use of "B" batteries. Flashes of the speed of 1/25,000 of a second were produced for this initial experiment. The neon bulb was blackened so that the light emitted occupied an area comparable to the ordinary 2 mm. test object, and the bulb was mounted on a hand perimeter where it would be freely movable. A norm was established by recording the averages of 3 determinations on the eyes of each of 20 normal individuals. As the neon light is red in color it was necessary to determine whether the color itself was a factor. It was definitely shown that the field with the neon lamp did not correspond with the ordinary field for red.

The cases studied have been grouped as follows: (1) Normal fields in suspected intracranial disease, (2) Fields in hysteria, (3) Fields in pituitary disease, (4) Fields in other intra-cranial lesions, and (5) Fields in intraocular disease.

In the first group it was shown that the flash field afforded a more accurate indication than a form field or at times other localizing signs. For example, in a patient with X-ray evidence of *sella turcica* destruction a normal flash field being found, operation failed to reveal any pathology interfering with the optic pathways. Ten cases were included in this group. In spite of the fact that ordinary perimetry with a white target was suggestive of a characteristic field defect in these cases, the examination by the flash method revealed normal fields. Subsequent examination of these cases confirmed the findings of the normal flash field.

The outstanding observation in the group of fields in hysteria was the fact that in *no* case was a tubular field demonstrated by the flash method although ordinary perimetry had shown this defect.

[4] Mayer, L. L., *Arch. Ophth.*, 1933, **9**, 353.

[5] Sheard, C., *Am. J. Physiol. Optics*, 1922, **3**, 126.

Twenty cases were in this group. Most of the patients were epileptics in whom an organic basis was suspected.

In a large group with pituitary disease the flash method more critically emphasized the field defect. For example, where the ordinary perimetric study revealed a temporal field including the ninetieth meridian, the flash method recorded this temporal field to only the fiftieth meridian. Even meticulous studies with the Bjerrum method[6] did not approximate the accuracy shown by the flash method. Detailed studies of the 28 patients of this group will be published later.

Group 4 in which other intracranial lesions were investigated consists of a heterogeneous group with various lesions. Here the outstanding features of the flash method were the ease with which the patient was able to determine the critical point, the definiteness of the test target, and certain deviations from the usual findings in ordinary perimetry, such as bizarre configurations of the fields, etc. Six patients in this group demonstrated the dependability of the flash method in comparison with ordinary perimetry. Definite and characteristic field defects were demonstrable earlier and more accurately.

Of the last group in which intraocular disease was investigated, it appears that a closer check on the reduction of the field due to glaucoma may be had by this method. Also a better method of prognosticating in operated cases of detached retina is at hand. Only 2 cases of retinal detachment and 2 of glaucoma are included in this group as the study of ocular conditions, *per se,* has just started.

Many of the patients examined by this method have been operated, others have been autopsied, and confirmation of the flash findings were made. These will be reported later.

Conclusions. 1. A method is described in which a rapid light flash is made use of as a perimetric target. 2. The technique of the examination is simple, neither the observer nor the patient become fatigued by the procedure and the perception of the flash being critical. The flash is recognized or it is not seen. Field defects are discovered to a degree not detectable by the older, far more painstaking method, which required greater cooperation and intelligence on the part of the patient. 3. Although a complete interpretation of all the findings delineated by this method must await further case study and subsequent confirmation by biopsied and autopsied materials, it appears that the method has certain advantages in localization of lesions of the optic pathways.

[6] Bjerrum, *Verhandl. d. X Internat. Med. Cong.,* Berlin, 1890, 466, (II).