

THE EFFECT OF DARK ADAPTATION AND OF LIGHT UPON
THE ELECTRIC THRESHOLD OF THE HUMAN EYE

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When an electric current of adequate strength is passed through the eye, a visual sensation or phosphene is perceived. With strong currents the sensation may be colored, but when strengths close to threshold are used a whitish flash is perceived which is strongest in the peripheral part of the visual field, and closely resembles the flashes produced by alternating magnetic fields. In our previous paper (Barlow, Kohn and Walsh, 1946) some evidence was given localising the structures sensitive to magnetic fields and alternating currents to the retina. In order to define more closely the structures sensitive to electric currents we have investigated the effect of dark adaptation and of light upon the threshold for electric stimulation.

This problem has been investigated previously by a number of workers but the results are somewhat contradictory; for instance, of the authors who stimulated with D.C. three (Muller, 1897; Nagel, 1904; Bruckner and Kirsch, 1913) found no change in threshold during dark adaptation, whilst the later workers (Bogolovsky, 1934; Bouman, 1935; Schick, 1935) found an increase. More consistent results were obtained by the workers who stimulated with condenser discharges; all five agreed that the rheobase increases during dark adaptation (Verrijp, 1925; Achelis and Merkulow, 1929; Fischer and vom Hofe, 1932; Gersuni, 1935; Katasima, 1939). A discontinuity in the strength duration curve for the light adapted eye was found by Achelis and Merkulow (1929) but not confirmed by later investigators, and Bouman suggested that this kink was the result of random variations. A study of these papers shows that the chronaxie does not change, or changes very little with dark adaptation; on the other hand there is apparently a ten fold increase in the rate of accommodation during dark adaptation (Bouman, 1939). One author (Lasareff, 1924) stimulated with faradic current and detected no changes, and Cords, (1907) using A.C., also reported no change in the maximum frequency at which flicker could still be perceived.

Three papers have dealt with the effect of increased illumination on the threshold. Fischer and vom Hofe (1932) and Schick (1935) found an increase in rheobase, whilst Bogolovsky (1934), who covered the eyes during the determinations of threshold, found a transient decrease.

A study of these papers coupled with our own results leads us to believe that most of the discrepancies are more apparent than real, being due to differences in technique. During the course of this work it has become apparent that light plays a dual rôle. Depending on the attendant circumstances, both with respect

