The point of fixation is not on the *optical axis*, that is, the axis of revolution of the eye; the straight line joining the eye to this point is called the *visual axis*. These axes are approximately in the same horizontal plane, the visual axis being nearer the nasal side, and on the average the angle between them, α, is 5°.

The Visual Field. The *visual field* is defined as the field which includes all positions of a source perceptible to a fixed eye in a head which is stationary. Its theoretical limit is easily calculated for the schematic eye, in which the radius of curvature of the cornea is 8 mm. and the plane of the iris is 3·6 mm. from the cornea. The extreme incident ray, *AM* (Fig. 11), which can enter the eye is

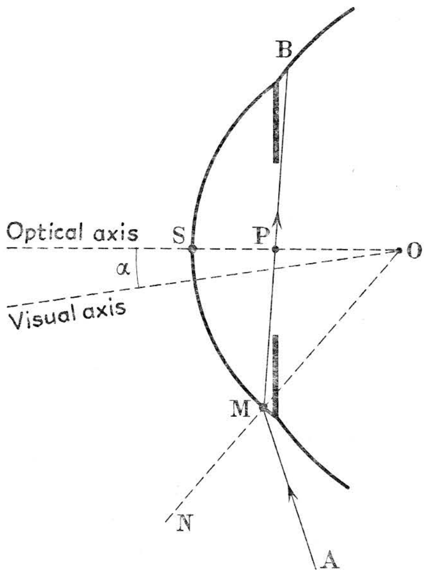

FIG. 11. Theoretical limit of the visual field

refracted along *MB*, passing through the centre *P* of the pupil close to the plane of the iris; it is nearly at right-angles to the optical axis (if *O* is the centre of curvature of the cornea, the angle *OPM* is obtuse but almost a right-angle).

Since cos *MOP* = *OP*/*OM* (approximately) = 4·4/8 = 0·55, the angle *MOP* is 56° 38′. The sine of the angle of refraction *PMO* has the same value and consequently

$$\sin AMN = 0{\cdot}55 \times 1{\cdot}336 = 0{\cdot}735$$

so that the angle of incidence (AMN) is 47° 17′; the angle between the incident ray and the optical axis is therefore about 104°. Since the eccentricity is measured from the visual axis, which makes on the average an angle $\alpha = 5°$ with the optical axis, the theoretical limit of the visual field corresponds to an angle η of about 109° on the temporal side and less in other directions.

Although no precision is claimed for this calculation, if only because the iris is neither plane nor infinitely thin, perimetry measurements give values of this order for rays arriving on the temporal side; for the nasal side η hardly exceeds 60° while above and below it is 70° and 80° respectively. (The words temporal, nasal, above and below refer to the visual field as seen by the observer and not to the position of the image on the retina.) These values vary appreciably from one subject to another and diminish by several degrees with age. In near vision, accommodation increases the field a little by deforming the surface of the iris.

It is interesting to note that the whole retina is not utilized, even at these extreme values of η; actually there exists, beyond the visual field proper, a band 10° to 15° wide which can produce a luminous sensation by diffusion across the translucent, though not transparent, sclero-corneal junction (the limbus).

The Effect of Duration of the Stimulus. Consider a certain monochromatic radiation and let radiant flux P fall on a receptor. The response of the latter obviously depends on the value of P and also on the time t during which the flux acts on the receptor. For simplicity let it be supposed that the flux is zero at zero time, that it assumes the constant value P immediately afterwards and returns to zero at time t.

First suppose the receiver to be photo-electric, in particular a vacuum cell with no lag. Then the intensity of the electric current produced is a function of P only and not of t. Naturally, if t is small, this current must be measured by an instrument without inertia, such as a cathode-ray oscillograph. The total *quantity of electricity* produced will therefore be a function of the product Pt, that is, of the total energy received; this quantity of electricity can be measured, for example by using the cell to discharge a condenser.

In the case of a photographic plate the optical density of the emulsion, after development and fixing, depends, to a first approximation, on the product Pt only; if the amount of flux is small,