

in the brightness of the illumination reaching the slit. The determination of the wavelength range in which the spectrum continues to be observable at the lower levels of illumination is effected with the aid of the discrete lines in comparison spectra of low intensity viewed through the same slit for a brief period of time sufficient to enable the observer to fix their positions.

Results of the Investigation.—The results of the study made with artificial light sources are in full agreement with those described above using skylight at various levels of illumination. We may now sum up the conclusions reached. The spectrum of white light consists of four sectors, the wavelength ranges in which they appear being respectively from 400 $m\mu$ to 500 $m\mu$ for the blue sector, from 500 $m\mu$ to 560 $m\mu$ for the green sector, from 560 $m\mu$ to 600 $m\mu$ for the yellow sector and from 600 $m\mu$ to 700 $m\mu$ for the red sector. At high levels of illumination, the yellow sector is the most conspicuous, the red, green and blue sectors following it in that order. When the level of illumination is lowered sufficiently, the red sector is the first to pass out of sight, and is then followed by the yellow sector. At the lowest levels of illumination, the blue sector also disappears till finally we are left only with the green sector covering the wavelength range from 500 $m\mu$ to 560 $m\mu$. It then exhibits no observable colour, but the maximum of brightness is at about 530 $m\mu$. Thus, it is this restricted range of the spectrum which actually enables us to perceive and recognise the most dimly illuminated objects. This statement is valid alike for the fovea and

for the outlying regions of the retina, there being no noteworthy differences between them at such levels of illumination.

Some remarks are here called for regarding the so-called "visual purple" which has in the past been identified as the material present in the retina that enables dim light to be perceived. The absorption spectrum of "visual purple" has been studied by several investigators. It exhibits a maximum of absorption at 500 $m\mu$, the absorption diminishing to smaller values both at higher and lower wavelengths. The absorption covers the entire range of wavelengths from 650 $m\mu$ to 400 $m\mu$, and should therefore be effective in the perception of all the sectors of the spectrum. The behaviour of "visual purple" thus inferred is wholly different from the characteristics of human vision at low levels of illumination established by the present investigation. It would seem, therefore, that the identification of the "visual purple" as the material which makes vision possible at such low levels is a misconceived idea.

One need not doubt that the "visual purple" is actually present in the living retina and that it subserves some physiological purpose. This purpose may be that of a protective material for preventing damage to the delicate structures of the retina by the incidence of strong light, especially in the region of shorter wavelengths. The photochemical decomposition of the material by strong light and its reconstitution in dim light may, in fact, be the means by which this protective action is brought into play.

MAGNETOHYDRODYNAMICS

THE volume under review* embodies the addresses delivered and the papers presented at a Seminar on the subject of magnetohydrodynamics sponsored by the University Grants Commission and held at Bangalore in May 1963. Of particular value and interest are the contributions to the Seminar by Dr. P. L. Bhatnagar by whom it was organised and directed. Besides an admirable general introduction to the subject, mathematical presentations of the following topics by him appear in the volume: The Equations of

Magnetohydrodynamics; Non-linear Waves; The Kinetic Equations of Plasma. These memoirs will be found to be very illuminating by those who desire to make a fuller study of the subject and enter this fascinating field of research.

The numerous other articles appearing in the volume are all by Indian authors and have been written by members of the staff at the centres of advanced study and research located at various places in the country, viz., Bangalore, Bombay, Madras, Delhi, Kanpur and Kharagpur.

The volume is well printed and is modestly priced. It is a notable contribution to the literature of science produced in the country.

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* *Proceedings of the Summer Seminar in Magnetohydrodynamics*. Edited by Dr. P. L. Bhatnagar and published by the Department of Applied Mathematics, Indian Institute of Science, Bangalore-12, 1965. Pp. ix + 376. Price Rs. 12.50.