BOOK REVIEWS


This book contains an account of a vast series of experiments designed to test the extent and distribution of individual differences in colour vision. The work was carried out in the Psychological Department of Glasgow University, and in a period of 8 years more than 1,100 individuals were tested. Many subjects were questioned about their colour experiences in everyday life and about any family history of abnormal colour vision. The object of the research was to design tests applicable to individuals with all types of colour vision, to decide what theory of colour vision would most readily explain the results, and to study the problem of inheritance of colour deficiency.

As the author himself emphasizes in the first chapter, this is a psychologist's book. To the psychologist the sensation is of first importance, just as the physiological mechanism to the physiologist, and the stimulus to the physicist. No one could quarrel with this point of view, but those who attempt to deduce the nature of the physiological basis of colour vision taking the sensations of hue as their foundation (and until recently no other method has been open to those working in the field) are liable to run into a serious difficulty which this author has not completely succeeded in avoiding.

Until we come much nearer to understanding the real relationship between mind and body, any deductions about bodily mechanisms based on sensation—a purely mental phenomenon—can only be extremely tentative. The concept of a "pure" sensation, so important to the psychologist, is, at present, without meaning to the physiologist, to whom the idea that a psychologically pure sensation must result from the activity of a single physiological mechanism is a dangerous fallacy.

In the field of colour vision most psychologists feel that the psychological purity of yellow makes it unlikely that this sensation can arise from the summation of stimulation of red and green receptor mechanisms in the retina. There must be a yellow mechanism. Dr. Pickford feels it desirable that "simplicity of sensation (should be) made to correspond as far as possible with simplicity of receptor system, especially in colour vision". He sees that this is apparently impossible on the basis of a trichromatic theory, but adds that if it were satisfactory in all other respects this requirement might have to be relinquished. However, the trichromatic theory is not at all satisfactory to him, mainly because of his own researches but also because of other well-known difficulties, such as the necessity for negative coefficients in the fundamental sensation curves at present proposed on the basis of trichromatic matching experiments. He therefore favours some modification of Hering's four-component theory of colour vision. It is not clear whether the psychological purity of white forces him to accept Hering's third (black-white) pair of receptor mechanisms.

This is not the place to discuss the difficulties in accepting the trichromatic theory. It can only be emphasized that, although the theory does not explain all the facts (a failing shared by every colour vision theory) the most serious criticisms usually brought forward can, in the opinion of its adherents, be satisfactorily met. These points are not adequately considered in the first chapter of this book in which several colour vision theories are discussed, a failure which appears to be partly due to a rather naive concept of retinal physiology. It will now be necessary for trichromatists to explain the results of Dr. Pickford's own experiments on a trichromatic basis. He believes that they are not.

There is little doubt that Dr. Pickford's results are valid, or that anyone with the
skill and patience to repeat his experiments would confirm them, but it is questionable whether his is the only possible interpretation.

The new tests were all of the dichromatic matching type ordinarily used for the determination of the Rayleigh equation. They consisted fundamentally of determinations of the amounts of two colours which, when mixed, would match a given standard (e.g., the amounts of red and green required to match a standard yellow, or of blue and yellow to match a standard grey, in both hue and intensity), and these amounts were then compared with the normal values. The results were dealt with on a statistical basis in order to find the range and type of the individual variations.

In discussing his results, Dr. Pickford does not take the possible effect of the yellow macular and other intra-ocular pigments into account. All his variant yellow-blue mixture results could be due to differences in the amount of such pigments, and the fact that all these results fall on a normal frequency-distribution curve also suggests that such an explanation is likely to be correct. Since there is no reason why the depth of pigmentation should be correlated with red or green colour deficiency, one would not expect any necessary association of red or green "weakness" with yellow "weakness". For "red-green blind" subjects there was a positive correlation. The yellow pigmentation of the ocular media is known to increase with age: unfortunately no correlations of the results with the ages of the subjects are given, but such calculations might provide a clue to the importance of intra-ocular filters in such tests. Until more is known about the normal variation of intra-ocular pigmentation it is doubtful whether the results here reported are in fact at variance with the assumptions of the trichromatic theory.

Finally, a word must be said in praise of the way in which these tests were conducted, especially with regard to the handling of the subjects. Dr. Pickford's remarks on the precautions necessary to prevent a subject, especially if he is colour blind, picking up unintended clues from the experimenter are very much to the point and should be taken to heart by everyone concerned in testing colour vision.

Die Nervenkrankheiten. By G. Schaltenbrand. 1951. Georg Thieme Verlag,

This considerable text-book of neurology contains much of ophthalmological interest. The whole field of central nervous disease is adequately covered and in consequence many syndromes affecting the eye and its adnexa are described. Among the most useful sections from this point of view are those on cerebral tumours, developmental anomalies, pituitary diseases, endocrine disturbances (wherein exophthalmic disorders are fully described), the muscular dystrophies, and the heredo-degenerative conditions of the central nervous system. The chapters on diseases of the peripheral nerves, organisinal and virus infections, and arterial disease, as well as those on central nervous injuries and poisoning, contain a wealth of material in which the ophthalmologist will find himself very much at home. The book is to be recommended both for the clarity of its presentation and for the large number of excellent and informative illustrations. A considerable and representative bibliography is appended.

H. K. Lewis, London. Pp. xiv + 337, 81 figs (44 col. pl.). (£8 12s. 6d.).

This is, in the main, an excellently produced book. The didactic manner of presenting the subject springs from the fact that the book is based on material used for lectures. It contains many statements that would, of necessity, not be endorsed by every ophthalmologist. Being translated from the German, the composition is at times a little stilted and words are used which have a different connotation in Great Britain. For example, it is said that such and such a lesion may be "visualized" where the word "seen" would be more correct.