

THURSDAY, SEPTEMBER 1, 1910.

## COLOUR-VISION.

*Colour-Blindness and Colour-Perception.* By Dr. F. W. Edridge-Green. Second edition. Pp. xii+322. International Scientific Series. (London: Kegan Paul, Trench, Trübner and Co., Ltd., 1909.) Price 5s.

DR. EDRIDGE-GREEN has been engaged for more than twenty years in advocating opinions about colour-blindness which he has not the gift of stating with extreme lucidity, which most people find it by no means easy to understand, and it is therefore somewhat difficult either to accept or to refute. The general basis on which the opinions rest appears to be his conception of something called by him a "psycho-physical unit," by which he appears to mean the limit, in any individual, of the power to perceive actual difference between two things closely resembling one another, as, for example, between two similar colours, or between two masses of the same substance that are of nearly the same magnitude. There are, no doubt, great personal differences of this kind, differences which may be partly congenital and partly the results of training; but it does not appear to us that the prefix "psycho," whatever it may mean, bears any intelligible relation to them. The differences are differences of the acuteness of sense-perception, and, if we regard simple sense-perception, colour-perception, for example, as "psychical," we must postulate the activity of a "psyche" in the humblest fly which is guided to the nectary of a flower by the colour of the corolla.

We do not know whether Dr. Edridge-Green is prepared for such an extension of the domain of "psychology," and may leave him to settle the question with the professors of that branch of speculation, but we may admit that the condition known as "colour-blindness" may fairly be said to consist of an inability to respond by accurate sense-perception to the impact of light-waves of certain amplitudes, and of a consequent liability either to ignore them completely or to confound them with waves of other amplitudes. It is at least highly probable that minute differences of this kind are extremely common, and Lord Rayleigh long ago showed that some persons, whose colour-sense could only be described as normal, nevertheless differed from others in respect of the precise admixtures of light from different portions of the spectrum, more especially in respect of the admixtures of red and green, which they were prepared to accept as a perfect "match" for a test-spot given as a standard.

It is probable that such terms as "red-blind" or "green-blind" might be extended not only to the six classes (hexachromic, pentachromic, &c.), described by Dr. Edridge-Green, but to a much larger number; and, by the way, we do not know on what ground our author regards the normal-sighted as "hexachromic" only, and so apparently excludes from the spectrum, as they see it, the seventh distinct colour, indigo, which was described by Newton, and has com-

monly been accepted by later observers. The limitations of our space forbid us to follow these questions into detail, and the chief practical importance of colour-blindness depends upon the fact that a liability to make mistakes about colour-signals involves dangers to life and property on railways and in navigation.

As regards protection against these dangers, we do not see that Dr. Edridge-Green has furnished us with any increased security, or, indeed, that any better security is needed than is obtained from Holmgren's wool test, when this is employed in the precise manner directed by its originator, whose very definite instructions are too often departed from. The elaborate lanterns and slides described by Dr. Edridge-Green are in all essential respects identical with many of the tests used by the Royal Society's committee; and, if we may admit that they afford means of distinguishing one case of colour-blindness from another of a slightly different type, we cannot admit that they are calculated to afford any increased security to the industries in which the power to distinguish promptly between different signal colours is required.

## A HISTORY OF BIOLOGICAL THEORIES.

*Geschichte der biologischen Theorien.* By Dr. Em. Rádl. II. Teil. Geschichte der Entwicklungstheorien in der Biologie des XIX. Jahrhunderts. Pp. x+604. (Leipzig: W. Engelmann, 1909.) Price 16 marks.

THE author of this scholarly work attaches great importance to the cultivation of the historical sense among biologists, believing that progress is impeded because there is relatively little of it, and one of the aims of his book is to stimulate a study of the history of the science. To this end it is admirably adapted. It is learned, but at the same time wisely selective; it is at once appreciative and critical; and it is written in a fresh, interesting way. We had the pleasure of welcoming the first volume, published four years ago, which dealt with ancient history, and we would congratulate the author again on the success with which he has accomplished a very difficult task in dealing with what has occurred in biology, or in biological ætiology, since the end of the eighteenth century. It seems to us, indeed, that the author has added to his strength since he completed the first part of his great work.

There are forty-one chapters in the book, and we may note some of the titles to suggest the range of discussion:—Lamarck and Cuvier, idealistic morphology, embryology before Darwin, the cell-theory, physiology before Darwin, transition from Naturphilosophie to modern science, origin of Darwinism, Darwin, Wallace, reception of Darwin's theory, influence of Darwinism, Haeckel, spontaneous generation, anthropology, Darwinian morphology and embryology, geographical distribution, palæontology, natural selection, heredity, psychology, Lamarckism, species, reproduction, crossing, developmental mechanics, Driesch, decline of Darwinism, the history of science.

What the author aims at is a historical appreciation of the significance of the various stages in the development of ætiology, and this involves a critical judgment