

Control of eye movements

The Theory of Binocular Vision. By E. Hering. Edited by B. Bridgemann and Lawrence Stark. Pp. 218. (Plenum: London and New York, 1977.) \$29.40.

THIS admirable translation of Hering's monograph on the control of eye movements will be of unfaded value to present-day workers in the field; but it will also interest historians of science, for Hering prepared his monograph largely in response to Helmholtz's *Physiological Optics*, and it illustrates the nature of the systematic controversy between the two physiologists. The translation will help to dispel the two textbook myths, that Hering eschewed detailed experiments and that he adopted a rigidly nativist position; and it serves to emphasise how much Helmholtz and Hering shared—common problems, common assumptions, common experimental techniques and common criteria for the acceptability of evidence.

Central to the monograph are the

idea that the two eyes should be treated as a single organ (the *Doppel-auge*) and the principle that corresponding muscles are always equally innervated, whatever the initial position of the eyes before a movement (Hering's Law). In opposing the Helmholtzian view that the two eyes come to be used together only by habit, Hering is led to discuss the movements of occluded, suppressed and blinded eyes; asymmetrical vergence movements; cases of unilateral paresis of eye muscles; and the coordination of the eyes in infants.

B. Bridgemann's translation is both careful and readable (although some obscurities survive in chapter 17) and he has added a helpful Introduction. L. Stark has independently provided summaries and commentary interleaved in the main text. Internal evidence suggests a curiously strained relationship between the two editors and this is to be regretted, for the task was a very worthwhile one. **J. D. Mollon**

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Inhomogeneous optical waveguides

Inhomogeneous Optical Waveguides. By M. S. Sodha and A. K. Ghatak. Pp. x+269. (Plenum: New York and London, 1977.) \$35.40.

ELECTROMAGNETIC THEORY as formulated by Maxwell has been with us for a good hundred years but the interest in it has shown no signs of abating. New potential applications (in this case the promise of optical communications) have brought the need for new analyses which after a period of digestion could be profitably presented in book form. The authors of this book are particularly suited for the task of writing on inhomogeneous optical waveguides since they have themselves written no less than twenty papers on the subject. The product is a book which anyone interested in the mathematical approaches is well advised to study. Apart from a few omissions (for example, the complex ray method) the authors provide a detailed and interesting review.

The strength of the book lies in giving copious answers to the question 'how to solve it?', its weakness is that the equally important question of 'what is it good for?' is sadly neglected. After all, the sole justification for the existence of these waveguides

is that they can perform some useful function. An engineer would like to know why certain structures have been chosen, what are their comparative advantages and disadvantages, and would like to see the conclusions presented in simple form. Unfortunately, this kind of discussion is entirely missing and 25-page appendix on manufacturing techniques is hardly a compensation for it. The descriptions are so sketchy and the links with the calculations so tenuous that they could have been replaced by a list of references.

There are also some minor inconsistencies in the presentation. For example, under the heading of "General Theoretical Considerations" in section 2.2, the particle current is taken as zero and the solution in section 2.3 is obtained on that assumption. In section 2.4, however, complex dielectric constants suddenly appear, and the reader is told without any explanation that the real part of the dielectric constant of a metal is negative. Such minor flaws are likely to confuse undergraduates and less well equipped graduate students. On the whole, however, the book may be recommended to those already familiar with a wide range of electromagnetic problems and wishing to move into this new field. **L. Solymar**

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