

more from the point of view of a teacher, and, in its early chapters, the theory of the internal-combustion engine is developed on the assumption of a constant specific heat. Later the variation of the specific heat with temperature is discussed in general terms, and the results of Clerk, Mallard, and Le Chatelier are given.

The principal feature of the work, however, is the very full account of the growth and development of the internal-combustion engine in America.

All the well-known types are described and generally very fully illustrated. In this respect the work is somewhat encyclopædic in character, and ought rather to be regarded as a reference book than a text-book. The same remark applies to other sections devoted to fuels, testing of engines, methods of regulation, gas-engine auxiliaries, and the like. In all these we find a mass of information, with copious references to the original sources.

Anyone wishing to obtain a good general idea of present-day practice in America will find this book a valuable work.

E. G. COKER.

OUR BOOK SHELF.

Abhandlungen zur Physiologie der Gesichtsempfindungen aus dem physiologischen Institut zu Freiburg-i-B. Herausgegeben von J. von Kries. Drittes Heft. Pp. 192. (Leipzig: Verlag von J. A. Barth, 1908.) Price 6 marks.

THIS volume comprises the third series of collected papers from the laboratory of Prof. von Kries at Freiburg. The communications have all been previously published in the *Zeitschrift für Psychologie und Physiologie der Sinnesorgane*, the earliest having appeared in 1903. It is doubtful whether their republication in this form will lead to recognition by a larger audience, not because of any lack of inherent excellence, but rather because of their highly specialised nature.

The first paper is an interesting note on the perception of flicker in normal and totally colour-blind persons. The researches of Schatarnikoff tend to show that the retinal rods possess a lower sensitivity for rapid periodic variation in the intensity of the incident light than the cones; hence more rapid rotation of the disc in the usual method of eliciting the flicker phenomenon is necessary to produce complete fusion with the eye adapted for light than with the dark adapted eye. It became of interest, therefore, to investigate the behaviour of the totally colour-blind eye in these circumstances. At the suggestion of Prof. von Kries, who had not a suitable case under his observation, Prof. Uthhoff carried out some investigations. He found that much more rapid rotation—about three times—was necessary with the normal eye to eliminate flicker than with the totally colour-blind eye.

Porter has investigated the relationship between the intensity of illumination and the frequency of change necessary to eliminate flicker. He found that the curves representing this relationship show two parts, each nearly straight, but having two different constants. These curves are analogous to those obtained by König for the relationship between visual acuity and intensity of illumination. In the one case the fusion frequency, in the other the visual acuity, is proportional to the logarithm of the illumination. Both, therefore, behave in identical fashion: with the smallest intensities of light both increase slowly; at

approximately the same intensity a much more rapid increase suddenly becomes apparent. The simplest explanation of these phenomena is that there are two mechanisms at work, one of which is influenced by light of low, the other by light of higher, intensity.

In succeeding papers Dr. Wilhelm Trendelenburg records quantitative estimates of the bleaching of visual purple by monochromatic light and (with Dr. Roswell P. Angier) of mixtures of complementary colours to form white. Siebeck has investigated the intensity of monochromatic light in extremely small fields, so small, in fact, as to eliminate the colour element (*Minimalfeldhelligkeit*). Prof. von Kries, in a paper founded on observations by Dr. Eyster, calculates in absolute terms the energy necessary for stimulation of the retina, and Dr. F. P. Boswell applies the same principles to the fovea. They thus attempt what has already been done for the ear by Lord Rayleigh and others. Other papers on colour mixtures and colour memory will repay perusal, and Prof. von Kries describes a simple apparatus for the mixture of monochromatic lights which may be commended to the notice of teachers of physiological psychology.

Fresh-water Algae from Burma, including a few from Bengal and Madras. By W. West and G. S. West. Pp. 175-260; 7 plates. (Annals of the Royal Botanic Garden, Calcutta, vol. vi., part ii.) Price Rs. 10, or 15s.

THE material was collected in certain districts of Burma, and a few species in the Burdwan district of Bengal and Vizagapatam district of Madras by Mr. I. H. Burkill, and was forwarded for determination by Lieut.-Col. Prain, at that time director of the Botanical Survey of India. The work is almost entirely systematic, as would be expected in dealing with material from districts where the algal flora was previously almost unknown, and has added very materially to our knowledge of the distribution of fresh-water algæ in the Indian region. Two new genera are described—*Euastridium*, a large and handsome Desmid. possessing peculiar morphological features, and *Burkillia*, belonging to the *Protococcaceæ*, occurring as free-floating colonies furnished with stout horns. Among the many new species described, *Mougeotia producta* is of special importance because of the presence of aplanospores in no way different from those which are found in the genus *Gonatonema*. In the last-named genus aplanospores only are formed, whereas in *Mougeotia*, aplanospores and spores, as a result of conjugation, are both present, hence it may be necessary to place *Gonatonema* merely as a section of the genus *Mougeotia*, in which spores resulting from conjugation have ceased to exist. *Urococcus tropicus* is remarkable in being green, whereas the cells of other species of the genus usually contain an abundance of a red-brown pigment.

The collection contained a number of interesting Desmids which, with previous records, are said to furnish material for a very interesting discussion on their distribution in the East Indies generally. Even from the knowledge forthcoming, certain Desmids appear to be confined to an area extending from India and Ceylon, across Burma and the Malay Peninsula to Sumatra and Java, and thence to Queensland.

As evidence of the wide geographical range of some species of algæ, *Nostoc humifusum*, first recorded from Scotland, and *Plectonema wollei*, from the United States, were included in the collection.

The number of varieties and forms hovering around many of the species suggests that, from the standpoint of de Vries, many incipient species are being produced.