

funds, at the request of leading members of the University. At the time of its erection the observatory was one of the largest and best-equipped in the world, and its equipment has been well maintained by the recent addition of a splendid telescope of 24-in. aperture for photographic work, and one of 18-in. aperture for visual work, on the same mounting. Just previous to the foundation of the observatory the trustees sanctioned the building of the Radcliffe Infirmary, which has ever since remained the chief county hospital.

In addition to a description of the Radcliffe foundations, Dr. Nias (himself an ex-travelling fellow) gives a brief but interesting biography of Radcliffe. The book contains numerous portraits and illustrations, and is beautifully printed and produced, but it is to be feared that its circulation will be limited by its somewhat excessive price.

H. M. V.

#### OUR BOOKSHELF.

*Elements of the Electromagnetic Theory of Light.*

By Dr. Ludwik Silberstein. Pp. vii + 48. (London: Longmans, Green, and Co., 1918.) Price 3s. 6d. net.

THIS little volume is re-written from the author's Polish treatise on electricity and magnetism (3 vols., Warsaw, 1908-13). It is a compact *résumé* of the main results of the electromagnetic theory of light in so far as it can be carried without reference to the electron theory. The main purpose seems to be to present the subject to the English reader in vectorial notation, following the symbolism of the author's "Vectorial Mechanics" (Macmillan, 1913). It would have added to the usefulness of a book designed for beginners in the subject if a short exposition of the meaning of the notation had been prefixed, an addition which would have helped to familiarise the rising generation with a very important calculus.

A useful historical survey of earlier æther-theories is given in the second chapter.

*The Exploitation of Plants.* By Various Writers.

Edited by Prof. Oliver. (The Imperial Studies Series.) Pp. vii + 170. (London: J. M. Dent and Sons, Ltd., 1917.) Price 2s. 6d. net.

PROF. OLIVER has done a useful piece of work in bringing together, within the compass of a small volume, a series of lectures on "The Exploitation of Plants in the Service of Man," which was delivered at University College, London, in 1917. In such a collection it is inevitable that there should be differences in relative values, but the standard of the best is very high. Amongst those which strike us as particularly good are the contributions of Prof. Oliver himself, and that of Dr. Willis, formerly director of the celebrated gardens at Peradeniya. As might perhaps have been anticipated, these are concerned with the reclamation of waste lands and with the rubber industry respectively. Both are characterised by first-hand knowledge and that indefinable but very real quality that attaches to pioneer work. Dr. Balls con-

tributes a suggestive article on cotton and its problems, but here and there he is inclined, perhaps, to assume a more extensive technical acquaintance with the subject on the part of the reader than the latter could actually justify.

One essay is markedly egotistical, and the instructed reader will find some entertaining "information" in the lecture dealing with the plant as healer. Amongst other curious statements, the account therein given of the cinchona enterprise in Ceylon manages in a few lines to convey a thoroughly misleading impression of the causes which led to the collapse of that particular industry in the island.

But a book of this kind should, after all, be judged on its merits as a whole, and while it must be admitted to contain some dross, the greater part of it is good, and the best is really first-rate.

#### LETTERS TO THE EDITOR.

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##### The Perception of Sound.

I DO not think that Helmholtz's theory of audition, whatever difficulties there may be in it, breaks down so completely as Dr. Perrett represents (NATURE, November 7). According to him, one consequence of the theory would be that "when a tuning-fork is made to vibrate, no note can be heard, but only an unimaginable din." I cannot admit this inference. It is true that Helmholtz's theory contemplates the response in greater or less degree of a rather large number of "resonators" with their associated nerves, the natural pitch of the resonators ranging over a certain interval. But there would be no *dissonance*, for in Helmholtz's view dissonance depends upon intermittent excitation of nerves, and this would not occur. So long as the vibration is maintained, every nerve would be uniformly excited. Neither is there any difficulty in attributing a simple perception to a rather complicated nervous excitation. Something of this kind is involved in the simple perception of *yellow*, resulting from a combination of excitations which would severally cause perceptions of red and green.

The fundamental question would appear to be the truth or otherwise of the theory associated with the name of J. Müller. Whatever may be the difficulty of deciding it, the issue itself is simple enough. Can more than one kind of message be conveyed by a single nerve? Does the nature of the message depend upon how the nerve is excited? In the case of sound—say from a fork of frequency 256—is there anything periodic of this frequency going on in the nerve, or nerves, which carry the message? It is rather difficult to believe it, especially when we remember that frequencies up to 10,000 per second have to be reckoned with. Even if we could accept this, what are we to think when we come to nerves conveying the sensation of light? Can we believe that there are processes in action along the nerve repeated  $10^{15}$  times per second?

I do not touch upon the anatomical matters treated by Sir T. Wrightson and Prof. Keith, or upon the phonetic evidence brought forward with authority by Dr. Perrett.

RAYLEIGH.