THURSDAY, JUNE 24, 1915.

CHEMISTRY OF PETROLEUM.

The Chemistry of Petroleum and its Substitutes. By Dr. C. K. Tinkler and Dr. F. Challenger. Pp. xvi+352. (London: Crosby Lockwood and Son, 1915.) Price 10*s.* 6*d.* net.

A BOOK on the chemistry of petroleum, written for English students, arouses a special interest if only by the fact that, although it is largely used, the raw material is neither found nor refined in this country. In short, the industry, except as a matter of buying and selling, does not exist.

The title is, however, unintentionally misleading. Although it is called a practical handbook, the term does not imply any technical details of production, such as one finds in the volumes of Sir Boverton Redwood. It is concerned only with the chemistry of the subject—that is to say, its theoretical side—and such simple practical experiments and tests as can be performed in a laboratory. Moreover, "the substitutes" monopolise a large share of the volume. For example, the descriptive portion of the petroleum industry occupies less than one-twentieth of the total number of pages, and about the same amount of space is accorded to the distillation of bituminous shale, of coal, and of coal-tar, and to the production of ethyl alcohol and wood spirit, whilst tests of various kinds, including the determination of physical constants and a few simple organic preparations, fill up the rest of the volume.

The book is actually a treatise on the chemistry and valuation of liquid fuels, and is intended to serve as a text-book for a part of the curriculum which, together with the course on petroleum mining, forms one of the subjects for the diploma or B.Sc. degree of the University of Birmingham.

Having briefly indicated the scope and object of the book, we can only express our full agreement with the writer of the introduction (Sir B. Redwood) that, in providing a text-book for students who desire to become proficient in the chemical technology of petroleum, the authors properly consider that no man can become a successful technologist until he has fully mastered the underlying scientific principles of the subject.

There is no doubt that, at the present time, when such large quantities of liquid fuel are used for motive power and where so much ignorance of the methods of estimating the value of these substances prevails, a book of this character, the aim of which is to teach technical methods of analysis, ought to, and no doubt will, command general interest. If we have one criticism to offer it is that an attempt has been made to combine the study of organic chemistry with that of technology. The whole range of organic chemistry is run through in the first 62 pages, followed at intervals by the description of a few substances which the student is supposed to prepare in the laboratory.

As a preparation for the future expert technologist in so complex and so important a branch as the chemistry of liquid fuel, we should consider this wholly inadequate, and that a substantial course of theoretical and practical organic chemistry ought to precede its applications. Apart from this, we can cordially commend the volume and the excellence of the information it contains. J. B. C.

SIGNIFICANCE OF SEXUAL REPRODUCTION IN PLANTS.

The Evolution of Sex in Plants. By J. M. Coulter. Pp. ix+140. (Chicago: University of Chicago Press; London: At the Cambridge University Press, 1914.) Price 4*s.* net.

PROF. COULTER gives a luminous sketch of the probable history of sexual reproduction in plants. He deals with the origin of pairing gametes from spores, with the differentiation of (1) eggs and sperms, (2) specialised sex organs, and (3) sexual individuals (such as the male and female gametophytes of *Equisetum*), and with the special problems of alternation of generations and parthenogenesis. In the case of plants it is plain that the function of sex is not to secure reproduction, but to secure something in connection with reproduction which is not attained by the asexual methods. The sexual method is added on to the older asexual methods, and does not replace them. Before sexual reproduction was established there were three stages:—The primal capacity for cell-division led on to spore-formation by vegetative cells, and that to spore-formation by special cells.

The origin of sex was marked by the appearance of minute, motile gametes—reproductive cells that pair and fuse. If the material of a protoplast is divided only a few times there is spore-formation; if the divisions are more numerous the cells produced are probably gametes. Perhaps the ageing of cells stimulates the numerous divisions and the production of cells incapable of functioning as spores. Whether the pairing gametes appear similar (isogamy) or dissimilar (heterogamy) there is certainly physiological unlikeness. They are the bearers of sex-determiners and corresponding sex-inhibitors, which are passed on through generations of vegetative cells until conditions favour their expression in

©1915 Nature Publishing Group