

court and Esson and of *Wilhelmi* are readily accessible, and well known, at least to English chemists, the impression on the reader is far from satisfactory. Other instances of like nature could be quoted.

J. R. P.

Our Bookshelf.

The British Charophyta. By James Groves and Canon George Russell Bullock-Webster. Vol. i. Nitelleæ. With Introduction. Pp. xiv + 141 + xx plates. (London: The Ray Society, 1920.) Price 25s.

THIS monograph of the British Charophyta is a valuable addition to the literature of British botany. It has also a personal interest for many British botanists as representing the work on this group, embracing much of the leisure of forty years, of the brothers Henry and James Groves, to the former of whom the volume is fittingly dedicated. In 1880 Messrs. H. and J. Groves published in the *Journal of Botany* a "Review of the British Characeæ," in which an attempt was made to give an account of all the then-known British species, with illustrations and some particulars as to their variation and distribution. This was the first of a series of papers by the same authors, in which have been included descriptions and figures of fresh species added from time to time to the British list, records of distribution, and other notes. The present monograph, in which Canon Bullock-Webster co-operates, is the carefully considered outcome of these years of work. The systematic portion, which includes the first of the two subdivisions (Nitelleæ and Chareæ) of the group, is preceded by an introductory section dealing with the growth and structure of the Charophyta generally, and their distribution and affinities; this is well illustrated by numerous text-figures from various sources, and several plates. Each of the species is beautifully represented in a lithographed plate, mainly from drawings by Miss Mary Groves. The authors recognise six genera of Charophyta, five of which, *Nitella* and *Tolypella*, comprising the Nitelleæ, and *Nitellopsis*, *Lamprothamnium*, and *Chara*, included in the Chareæ, are represented in Britain. The key to all the British species, which precedes the general systematic account, includes thirty-two species, in several of which distinct varieties are recognised. Under each species there is a complete account of the synonymy with reference to previous publications, a full description in English, and an account of the distribution; notes on variation, affinities, and nomenclature are also added.

Monografia de l'Ordre dels Rafidiòpters (Ins.).

By R. P. Llongi Navas, S.J. (Publicacions de l'Institut de Ciències.) Pp. 93. (Barcelona: Institut d'Estudis Catalans, 1918.)

FATHER NAVAS is well known as a student of the taxonomy of that miscellaneous assemblage of insects formerly included in the old Linnean order

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of the Neuroptera. In the monograph before us he deals with the curious and remarkable "snake-flies." Their position in any scheme of classification has long been a difficulty, and opinions thereon are very diverse. Father Navas prefers to follow Handlirsch and to regard them as constituting an order of their own—the Raphidioptera. Others merge them along with the "alder-flies" (Sialidæ) to form the order Megaloptera, while a third alternative is that followed by some entomologists of combining the Megaloptera with the Plannipennia into a single order, Neuroptera. We are inclined to follow the intermediate course, as there is little doubt that the Raphidiidæ have their nearest allies in the Sialidæ, although they are more highly specialised than the latter.

The present monograph is exclusively systematic—only eight lines are devoted to the larval stages, for example—and the sole observations on structure deal entirely with those characters of the external anatomy which are utilised by the systematist. Two families are recognised, comprising thirteen genera and seventy-one species. The greater number of genera occur in Europe and North America; only one genus is African, and four are Asiatic, but none are peculiar to either of those continents. In Britain we have four species comprised within three genera, but the group has been hitherto so little collected that in the next decade we shall probably totally revise our views on its geographical distribution. The author has done a service in bringing together the various species within a single memoir, and his keys and descriptions will enable the different forms to be identified. Of the forty odd figures, many are sketchy and rather deficient in detail.

A. D. I.

Some Famous Problems of the Theory of Numbers and in particular Waring's Problem: An Inaugural Lecture delivered before the University of Oxford. By Prof. G. H. Hardy. Pp. 34. (Oxford: At the Clarendon Press, 1920.) Price 1s. 6d. net.

THE theory of the integral numbers is a subject in which it is frequently easy to conjecture new results and extremely difficult to prove them. An example of a result which must have been based on conjecture is known as Waring's theorem, that every positive integer is the sum of nine (or fewer) positive cubes, of nineteen (or fewer) biquadrates, and so on. A proof of this result, asserted in 1782, was first approached by Prof. Hilbert, of Göttingen, who showed in 1909 that every integer n is the sum of a finite number not exceeding $g(k)$, independent of n , of exact k th powers. It has been established, by transcendental analysis developed long since the days of Waring, that $g(3)=9$ as asserted by him, but whether $g(4)=19$ is still uncertain, though this number has been shown not to exceed 37. The only positive integers known to be inexpressible as a sum of eight cubes (at most) are 23 and 239.

Prof. Hardy and Mr. Littlewood have recently developed a new method of applying properties of