

the assemblage been figured and described as a whole.

The most characteristic feature of Mr. Frohawk's two splendid volumes is the exact and careful description of each larval form in every period of its growth. These details have in all cases been worked out from actual living specimens, and the amount of labour involved in the completion of this task can only be fully appreciated by those who have experimented in the same field. In the case of species that are now extinct in Britain, such as *Chrysophanus hippothoe* and *Zizera semiargus*, or of occasional visitors such as "*Pieris*" *daphidice*, *Argynnis lathonia*, *Vanessa antiopa*, and *Anosia archippus* (*plexippus*), Mr. Frohawk has made use of eggs laid by females obtained from abroad. In spite of all difficulties, the industry and skill of the author have proved equal to the enterprise of describing and figuring, in all these instances, every stage from egg to perfect insect.

It is well known to all students of the lepidoptera that the life-history of the "Large Blue" (*Nomiades arion*) was a mystery which eluded solution by the efforts of every entomologist until the successive discoveries of Mr. Frohawk, the late Dr. Chapman, and Captain Purefoy furnished the key to the puzzle, namely, the extraordinary relations that exist between the larval *arion* and certain species of ant. Of this association an excellent account is given on pp. 144-149 of the present work, and a striking figure, sketched from life, of the larva signalling to the ant when ready to be carried off to the nest of the latter, is provided on a separate plate. It is noteworthy that German larvæ of *C. hippothoe* kept out of doors in England were visited by ants. Many points of bionomic interest in connexion with other species are mentioned in the text.

The artistic skill of the author is well known, and his beautiful drawings have been, on the whole, worthily reproduced. It may, however, be doubted whether the colour-process adopted is the most suitable that could have been chosen for representing very young larvæ of the natural size. Wing-venation also, in the case of small insects, requires a sharper definition than is to be found in some of the illustrations, e.g. on Plates 56 and 56A.

The style and get-up of these volumes is in the main excellent. A few slips may be noted: fig. 23 on Plate 12 has no legend; fig. 15 on Plate 37, called a female, must be a male; the "Mazarine Blue" is spoken of as *Lycaena acis* on p. x, and as *Zizera semiargus* on p. xi. An appreciative preface to this fine work has been contributed by Lord Rothschild, whose generous co-operation and continued encouragement are gratefully acknowledged by the author.

F. A. D.

Our Bookshelf.

Handbuch der Pflanzenanatomie. Herausgegeben von Prof. K. Linsbauer. Allgemeiner Teil: Cytologie. Band III/2: Die Zellmembran. Von Prof. Dr. C. van Wisselingh. Pp. viii + 266. (Berlin: Gebrüder Borntraeger, 1924.) 15 gold marks.

BOTANISTS will welcome a general survey on the plant cell membrane from the pen of the Groningen veteran, Prof. C. van Wisselingh. Inequalities of treatment certainly suggest themselves to the English reader when the chemistry of cellulose is handled without citation of Irvine and its physical structure discussed without reference to W. L. Balls (one recent paper is quoted in the appendix); but there is very real compensation in the individual treatment of the problems of the cell wall here receive from the viewpoint of a master of micro-chemical method, who avails himself when necessary of the results of as yet unpublished researches.

The usual plan followed in the monograph is a preliminary account of the chemistry of a wall substance, followed by a discussion of its distribution in the cell wall throughout the plant kingdom. As would be expected from the author, the treatment of suberin and chitin is particularly complete, but it is doubtful whether the reactions of the lignified wall have ever been so fully stated before, and the section upon the chemistry of the pectin substances is very full and up-to-date.

Mangin regarded cellulose, pectin, and callose as the three fundamental substances of the plant wall; the importance of pectin is now fully admitted, but van Wisselingh considers that the case for the identity of callose has yet to be made out. For all fat impregnated walls the author reports a new micro-chemical method. Sections are warmed in baryta water for some hours, so that baryta soaps are formed; acids are then released from these and the melting-points of the acids observed with the sections mounted in glycerine.

The section upon the structure and growth of the cell wall is entirely inadequate as a bibliographic treatment, but contains a most interesting statement of the author's own views, in which stress is laid upon the chemical heterogeneity of the wall and the possibility of its micro-chemical demonstration.

Sturly. By Pierre Custot. Translated from the French by Richard Aldington. Pp. 127. (London: Jonathan Cape, Ltd., 1924.) 5s. net.

THE zoologist does not need the aid of a poetic imagination to appreciate the wonderful panorama of marine life with its hosts of interesting phenomena and many absorbing problems. Yet it is not surprising that these things should have stirred the imagination of a man of letters and moved him to weave this delightful phantasy, with a sturgeon as the central figure, and the world of marine zoology as the setting. M. Custot has read widely and well, and has supplemented his extensive reading by constant observation of marine animals in the aquaria at Monaco. *Sturly*, the hero of this fairy tale, is a young sturgeon, born in the waters of the Rhône, whose life, from the time of his enthusiastic and unsophisticated youth to the crowning act of reproduction, is charmingly told.