

of electromagnetic waves (dealing largely with propagation of electromagnetic energy and developed in the first instance particularly for optics). It is a pleasure to see that post-war books on this subject from the Clarendon Press are displaying the new spirit in electromagnetic theory.

To sum up, it may be said that, as a connected account of classical contributions to fundamental aerial theory, the book is well worth reading and well worth keeping to hand. H. G. BOOKER

BRITISH BUTTERFLIES

Butterfly Lives

By S. Beaufoy. Pp. 128. (London: Wm. Collins, Sons and Co., Ltd., 1947.) 12s. 6d. net.

THIS book of nearly two hundred pictures will give pleasure to many who are interested in animal photography.

Mr. Beaufoy has illustrated, in all stages, twenty-two of the sixty-eight British butterflies, representing every indigenous family, though the distribution of the species selected is rather uneven. Thus there are seven Nymphalidæ, five Pieridæ, five Lycaenidæ, but only two Satyridæ: the others are the 'Duke of Burgundy', a 'Skipper', and, of course, the 'Swallow Tail'. We feel that it would have been a more notable feat to show more of the Satyridæ with which the public is less familiar, and omit some of the well-trying favourites.

Dr. Ford points out in his preface that the species are selected to show the characteristics of every indigenous family, and these are indeed brought out. We particularly appreciate the photographs of eggs, of which the shape and sculpture proper to each are beautifully shown. The figures of very young larvæ are a welcome novelty. Most people are familiar with a series of pictures of a butterfly emerging from the chrysalis: less often studied is the remarkable escape of the freshly formed pupa from the hampering larval skin, as shown in a series of six pictures of the small Tortoiseshell at this crisis in its life-history. This seemed to me one of the most instructive series in the book.

Lycaenid pupæ are less successfully figured: perhaps a little less magnification would have been better suited to their rather shapeless obesity. On the other hand, the picture of the pupa of the Duke of Burgundy is particularly revealing. The fragrant osmeterium of the larva of the 'Swallow Tail' is well shown.

The letterpress adequately discusses the illustrations, with a few notes on habits, etc.: but the book is, primarily, a picture book. The photographs are certainly "from life", but so is a photograph of a tiger in a cage, and the phrase must not be taken always in its fullest implication. Mr. Beaufoy freely admits that, in photographing butterflies, "really good results, out of doors, are rare", and tells us how, with artificial lighting, he provides "a suitable" setting of foliage or flowers. However, as Mr. Beaufoy's object was "to depict the detailed characteristics of the different species" the question whether, for example, the beautiful picture of the variety of the 'White Admiral' on bramble blossom was taken within or without the studio need not worry us unduly. There can be little doubt about the 'Swallow Tail' feeding from *Buddleia*! Two errors "Aphantophus" (p. 10) and "Lycaenidine" (p. 79) should be corrected.

G. D. HALE CARPENTER

FIREPROOFING OF FABRICS

The Fireproofing of Fabrics

By J. E. Ramsbottom. Pp. vi+121+11 plates. (Department of Scientific and Industrial Research; H.M. Stationery Office, 1947.) 2s. 6d. net.

ONE of the major defects of most textile fabrics is their inflammability, and as early as 1638 attention was directed to the use of clay and plaster-of-Paris to reduce the fire risk of canvas used in theatres, while in more recent times the need for fireproofing is periodically emphasized by the comments of coroners on the inflammability of children's flannelette garments. Fireproofing is also of considerable importance to the Services, and in 1930 a preliminary account of investigations carried out at the Royal Aircraft Establishment at Farnborough was given in the second report of the Fabrics Co-ordinating Research Committee.

The present publication is a description of further studies by Dr. Ramsbottom and his colleagues on the subject of fireproofing, together with a new presentation of some of the information given in the earlier report. The object of the investigation was two-fold to examine the effectiveness of the various fireproofing processes described in the technical and patent literature, and to develop a theory of fireproofing. A treatment which is to be successful commercially should have no adverse effect on the material, and this aspect must be taken into account when assessing the relative merits of various methods. The proofing of kapok, for example—a problem which has been considered in some detail—must not affect the buoyancy of this material. Work of this type has necessitated the development of new methods of experimentation, and the description of these constitutes a valuable guide for other investigators.

The theoretical aspects of fireproofing were first studied by Gay Lussac in 1820, but until recently it was not possible to account for the differences in effectiveness of closely related compounds. As a result of Dr. Ramsbottom's work, however, it may be concluded that fireproofing agents are in general effective because they act as catalysts which modify the changes accompanying the thermal decomposition of cellulose. This hypothesis, which is elaborated in detail for both soluble and insoluble fireproofing agents, will serve as a useful basis for further investigations.

Dr. Ramsbottom's monograph is not a text-book of the usual type—it is primarily an account of his own experimental work—and is written clearly with the detail associated with original contributions. It is authoritative except when dealing with the relative inflammability of various textile materials. This section could with advantage be modified; certainly the term 'artificial silk' should not be used, and some indication should be given of the different fire risks associated with the many types of modern rayons.

Although the booklet does not deal with all aspects of fireproofing, it is an important contribution to the subject and should become a standard work.

A particularly useful feature is a comprehensive list of fireproofing reagents, and the suggestions of the authors as to suitable methods of fireproofing will be of great assistance to practical men called upon to produce fireproof goods. C. S. WHEWELL