correctly and then identify and classify the rock. The book may be divided into three parts.

The two short introductory chapters describe very briefly the collection and preparation of samples, the principles of mineral separation and the most important methods for further examination of the sample. Then follows a good chapter dealing with the microscopic examination of minerals and aggregates, with special emphasis on the determination of optical orientations. Next come an elementary account of the basic procedures for using the universal stage, and a little chapter on the graphical presentation of chemical data for rocks, which includes the procedure and tables for the calculation of the C.–I.–P.–W. norm.

The second part (pp. 91–283) deals systematically with the optical properties of the rock-forming silicate and non-silicate minerals. The treatment here is excellent and again emphasizes the use of accurately determined optical properties for mineral recognition and, where possible, estimation of the chemical composition. The text is supported by numerous microphotographs of somewhat variable quality, easily read optics–composition diagrams and good line drawings of important habits of many of the minerals, showing the orientation of the indicatrix. A very useful set of determinative tables concludes this section.

The final part of the book is devoted to the recognition, description and classification of igneous, sedimentary and metamorphic rocks. The igneous and sedimentary chapters are clearly written and enable the rock to be classified by combining optical mineral determinations with structural and textural features. The final chapter, devoted to the classification of metamorphic rocks, is very disappointing and is by far the least satisfactory section of the whole book. In adopting a structural approach, which of itself is quite useful, the author has failed to make any adequate reference to the chemical or mineralogical nature of the original rocks or to the conception of grade in metamorphism.

For its treatment of optic orientation, its presentation of the optical properties of minerals and its determinative tables the work can be highly recommended, but the early chapters, while providing adequate references, are too brief to be really useful and the later chapters are no real substitute for an adequate petrography. The book attempts to cover too wide a field and at 62*s.* can hardly be recommended to students for its optical mineralogy alone.

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Propagation des Ondes dans les Milieux Périodiques.

By Léon Brillouin and Maurice Parodi. Pp. 348 with 185 figs. Paris: Masson. 1956. Price 4,000 fr., bound 4,600 fr.

Strictly speaking, this should be described as a new edition, much enlarged, of Prof. Brillouin's book *Wave Propagation in Periodic Structures*, first published about ten years ago in English. In that time it has become something of a classic. The main thesis, which it admirably presents, is that there is an underlying unity in a great variety of physical problems, ranging in scale from the dynamics of crystal lattices to the engineering design of linear accelerators. This unity arises from the presence, in each case, of identical systems coupled in succession, and shows itself mathematically in the necessity for using the same methods in solving the equations. Of course there are special problems relevant to each case, but there must always be this basic isomorphism in the mathematics to match the basic similarity in the physical structures.

It is natural that, when a student is introduced to the theory of each particular problem, he should be taught by specialists who only see their own aspect of it. It is essential, before he plunges too deeply into the advanced theory, that he should read a book such as this to link all these specialized accounts together. The peculiar beauty of the present matter is its great simplicity. There is no need of high-brow mathematics. The emphasis is on the physical ideas, which are usually the simple mathematical invariants of the equations. Pass bands and stop bands, impedance, group velocity, reciprocal space, zones, transformation matrices, four-terminal networks, etc., are the concepts whose properties and uses are explained and developed. These are the abstractions in terms of which an engineer or physicist must learn to think. There is an enormous gain in seeing them in their most general context, not merely as special devices in a restricted field of application.

About two-thirds of the text reads as a direct translation of the original work, with a few minor additions, such as the rigorous proof that the separate pieces of a single zone may be translated to exactly cover the first zone. The new material has been concentrated mainly into four new chapters. Chapters 6 and 12 deal with the work of M. Parodi in systematizing the solution of problems involving propagation in finite arrays. An elegant formalism, using the Gegenbauer polynomials, is introduced, and provides the standard solutions rapidly and neatly. This looks useful, and should be better known. The two final chapters introduce essentially new topics —propagation in slotted wave guides and the interaction of electrons with moving periodic fields. The mathematical problems here are more complex, and only approximate solutions are offered. One has the feeling that the mathematical and physical analogies with the earlier, simpler cases might have been further exploited to make the argument clearer.

In the hope that a new English edition may soon appear, I offer the following criticisms in detail. The argument of § 47 is still as obscure in French as it was in English, and seems merely to be an attempt to fight again an old battle about the self-consistency of the Debye theory of specific heats. The treatment of Bloch's theorem in two or three dimensions is superficial. No mention or use is made of the group-theoretical methods which are fashionable nowadays in studies of crystal structure. Something more might be said about systems with cyclic boundary conditions, both as a device to avoid surface effects in crystals, and in models of cyclic molecules (or, perhaps, of cyclotrons).

But these are niggling points in an admirably lucid account which could and should be read by every physicist or engineer before he burrows into his professional speciality.

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