

only a guide and friend for the undergraduate, but it can also remain a stimulating companion in mature experience.

It is rather remarkable, but no doubt deliberate, that the conventional vector diagram of a.c. circuit theory is not utilized at all in the work even to illustrate skin effect phenomena to which this representation is well adapted. At least one group of minor misprints has been transmitted from the first edition, namely, the omission of 'dx' from several of the equations on p. 241. JAMES GREIG

SPECTROCHEMICAL ANALYSIS

Metal Spectroscopy

By F. Twyman. Pp. ix+569. (London: Charles Griffin and Co., Ltd., 1951.) 50s. net.

THE development of spectroscopy proceeds with ever-increasing pace: from the discovery of the spectrum by Newton in 1672, the use of flame spectra to distinguish between lithium and strontium by Talbot in 1834, the spectroscopic discovery of caesium and rubidium by Kirchhoff and Bunsen in 1861, and the first serious attempts at spectrochemical analysis by Hartley and de Gramont at the turn of the century, to the present, when the all-pervading science of electronics is being applied to spectrochemistry. The historical side is most readably presented in the opening chapter, but the importance of this book is in its complete and up-to-date treatment of recent developments in a rapidly expanding field. These rapid developments have led to the replacement of Mr. Twyman's "Spectrochemical Analysis of Metals and Alloys", which was written during the difficult early war years and published in 1941.

Mr. Twyman has been outstanding in the development of spectroscopic equipment and technique, and his experience in the field extends back half a century. Although he has been so closely associated with Messrs. Adam Hilger, Ltd., this book is not tied to the instruments of this firm, and the important contributions to spectrochemistry from Germany, the United States and other countries are given full weight, and the instruments of other firms are fully covered.

Practically every aspect of spectrochemical analysis is dealt with in more than five hundred closely written pages. There is a short chapter dealing with the fundamental principles of the theory of atomic spectra (the unusual notation of writing the upper state of a transition to the left may be noted), but thereafter the emphasis is on the instruments and experimental technique; this practical aspect may be illustrated by the section on shielding of sparks to prevent radio interference. Chapters on light sources, electrodes, X-ray spectrochemistry, and the present trend of developments are contributed respectively by A. Walsh, M. Millbourn, F. Brech and F. Holmes.

For the analysis of metals, especially in routine testing of numerous samples, or in detecting trace elements in soils, spectroscopic analysis obviously has many advantages; but it is not only for metals that it can be used, and the book also covers analysis of gases and of some non-metals such as sulphur, selenium, carbon and boron. Colorimetry and spectrophotometry, microphotometers, the infra-red region, and the use of spectrochemical analysis com-

bined with chromatography are also dealt with. An interesting suggestion is the possible extension to shorter wave-lengths, perhaps by the use of fluorite prisms, to reach more sensitive lines such as those of sulphur and selenium. Types of instruments are compared, and, while Mr. Twyman admits that gratings have some real advantages, the limitations due to overlapping orders, astigmatism and ghosts are pointed out.

This book is by far the most comprehensive and authoritative treatment of the subject available, and is strongly recommended. If there is a weakness it probably lies in the presentation: the table of contents only gives chapter headings, and as these are in general terms it is not always easy to find the section of interest—thus Raman spectra come under "Electronic Methods". There is a good bibliography, and the book is well produced. A. G. GAYDON

RHODODENDRON LEAVES

The Rhododendron Leaf

A Study of the Epidermal Appendages. By Dr. John Macqueen Cowan. Pp. xi+120+18 plates. (Edinburgh and London: Oliver and Boyd, Ltd., 1950.) 21s. net.

THE study of the rhododendrons has long been pursued in the Royal Botanic Gardens, Edinburgh, blessed by an ever growing wealth of living plants and by unswerving interest in taxonomy. Throughout this time a widespread view has come that, while specific status or generic rank may well be proved by form and stature of papillae or of hairs or scales retained on mature leaves, in other respects the forms and groupings of the hairs or scales may point to true relationships, the seekers of which have hitherto all assumed that species bearing scaly leaves are of distinct descent from all those that have hairy leaves or lack such dermal organs.

This broad assumed distinction was employed throughout "The Species of Rhododendron" (1930), both in the seriation of the plants described and often, too, as if it can denote for new-found or for doubtful plants some special series which already hold their nearer kith and kin. Although this standard book allowed that certain series then proposed embrace confusing plant assemblages, its plan again implied that plants with hairs or scales are rightly viewed as of distinct descent.

The present handsome book relates how, though so often contrasting in their forms and states, the hairs and scales which many species bear alike arise from single superficial cells, and how their products must be held of unit kind, though built on diverse plans. Since it shows, too, how dermal organs borne by hybrid plants may stand in all respects between hairs and scales, how certain species vary much in types of hair-display, and how, in others, hairs and scales are formed on every leaf, it seems the old assumption must be set aside until it is known what hair- and scale-formation mean to living plants themselves.

No matter how these findings bear on taxonomic problems, this book has interest far beyond the field of systematics or that of horticulture. It first relates how needful lines of study grew from those already traced, and how through simple technique knowledge came of many trichome-forms which had not always drawn comment or were misunderstood. Each one of these is then described and faithfully portrayed