

evolution of plant classification. The evolution of the art of botanical illustration (Chapter vii, pp. 185-246) is treated much more exhaustively, and to the general reader will perhaps be the most attractive portion of the book. It is evidently based on many years of study.

The doctrine of signatures, and astrological botany, are discussed in Chapter viii. The chief exponents of the doctrine were Paracelsus (1493-1541), Porta (fl. 1588) and William Cole (fl. 1657); but it had its origins in remote antiquity, a fact scarcely brought out by the author. In Dioscorides we find, for example, that the "seed" of "Ἐχίον" (*Echium vulgare*) resembled a snake's head and that the root was an antidote for snake-bites.

Dr. Arber points out in conclusion (Chapter ix) the incalculable debt which botany owes to medicine, and a further debt to the arts of printing and wood-engraving, through which the traditional lore recorded in the manuscript herbals was embodied in the printed herbals which succeeded them. In these, the finest period, as regards illustration, was between 1530 and 1614, while classification, nomenclature and description reached their zenith in Gaspard Bauhin's "Prodromos" (1620) and "Pinax" (1623).

There are three appendixes, the first consisting

of a chronological list of herbals between 1470 and 1670, the second being a list of historical and critical works consulted, and the third forming a subject index to the second.

Considering the book as a whole, one cannot fail to be impressed by the versatility exhibited by Dr. Arber in dealing with the varied aspects—morphological, taxonomic, historical, bibliographical and æsthetic—of the evolution of the printed herbal. There is only one criticism that may be made, that some account should have been given of the works of the Arab physicians, for example, Serapion, the younger Mesuë, and Avicenna, who are so frequently cited in the "Ortus Sanitatis", and of certain other pharmaceutical works which were much consulted during the fifteenth and early sixteenth centuries, such as the "Luminare maius" of Manlius de Bosco.

The new edition is even more fully illustrated than the first, containing 131 text-figures, 26 plates, and a frontispiece, showing a physician using a herbal, after a picture by Adrian van Ostade (1665). The printing reflects credit on the Cambridge University Press, and both text and figures show up better on the whiter paper employed in this edition. The only misprint noticed is "Isodorus" (pp. 301, 305) for Isidorus. T. A. S.

Chemical Thermodynamics

Physical Chemistry

By Prof. J. N. Brønsted. Translated from the Danish edition (1936) by R. P. Bell. Pp. xv + 390. (London: William Heinemann, Ltd., 1937.) Price 12s. 6d.

IN Prof. Brønsted's book, which has been very well translated and is attractively printed, the bias is towards thermodynamics. Kinetic theory is also treated adequately and is used throughout the book to supplement the thermodynamics. The rather abstract mathematical form of most of the book will tend to make it hard reading for many students. There does not seem to be a single description of an experiment or a piece of apparatus in the book. The thermodynamics is rather unusual, reminding one of Ostwald's 'energetics', with its intensity and capacity factors and the suggestion that the second law can be deduced from the first. This makes the derivation of the fundamental results longer than usual. Once they have been achieved, the thermodynamic laws are applied by Gibbs's method, which the author considers to be the easiest way of attaining simplicity and rigour.

As might be expected, the sections on electrolytes and the general theory of acids and bases are particularly full and interesting. Although activity coefficients are used throughout, the simple Debye-Hückel equation is merely stated without derivation, and its limitations are not emphasized. A rather full treatment is given of the Bohr atom model, but there is no mention of modern quantum theory or even of quantum numbers. Reaction kinetics receive brief but clear treatment, including the author's theory of the intermediate complex, and there is a short account of reaction kinetics in gases from the point of view of critical energy. The section on photochemistry is very brief. A derivation of the phase rule is given, with some very simple examples of its application. A section on surface and colloid chemistry is written mainly from the thermodynamic point of view.

The book will be found very interesting and stimulating by advanced students and by teachers. For honours courses it will require considerable supplementing, and general students will mostly find it rather difficult.