

table on high-speed elution on p. 37, in that capillary columns have already achieved some of the calculated figures given. Practical aspects are described in the remaining four chapters with, as the author claims, sufficient detail and diagrams to allow at least simple equipment to be constructed by the reader. The general presentation is good with clear, if occasionally oversimplified, diagrams.

A. B. Littlewood's book is interesting as one of the first of the second echelon of text-books which eventually will replace the volume by Keulemans, the standard work for almost a decade. It is well arranged, with an introductory chapter on definitions and technical terms followed by two on the retention volume and relevant variables, three on column performance and preparation, four on detectors and a long final chapter on applications. The whole treatment shows an effective combination of the basic physical chemistry behind the technique and its more practical aspects, which is particularly well done in the chapters on retention volumes. Some mention of the effect of gas-phase interactions on the partition coefficient might well have been made. All aspects of column performance are well covered with a good theoretical background, but more emphasis on capillary columns both as a theoretical model and as a practical tool would seem appropriate. The weakest section is undoubtedly that on detection, mainly because of its confusing and somewhat unbalanced arrangement. To deal with quantitative analyses as an introduction to the subject is a little strange, but to ignore chronological development completely to the extent of describing ionization detectors first is distinctly irritating. A whole chapter devoted to catharometers is unjustified at this late stage, particularly since such important modern developments as the direct use of the mass spectrometer as a characterizing detector receive only passing mention in other parts of the book. The inclusion of the important topic of sample injection under ancillary apparatus looks almost like an afterthought. Applications are clearly and compactly covered on a molecular class basis.

The book is well produced with excellent diagrams and is strongly recommended for all those with a serious interest in the technique.

In principle, the appearance of books describing the applications of what is already a fairly specialized technique in a particular branch of chemistry seems an unwelcome trend, as it opens the way for an expanding pile of narrower and narrower texts. Fortunately, Burchfield and Storrs have, to a large extent, avoided this difficulty in their volume *Biochemical Applications of Gas Chromatography* by taking in examples from other fields, where important classes of compounds such as hydrocarbons are the subject of few, if any, biochemical investigations. They have also not hesitated to include other methods such as liquid chromatography and ion-exchange techniques when these are an essential part of the pre-fractionation procedure. This, together with an excellent first chapter covering all aspects of the technique in a general way, prevent the volume becoming a specialized instruction manual for biochemists.

Although methods of analysis for most groups of compounds are included, the authors have wisely chosen to orientate the arrangement according to the methods used to obtain the samples for gas chromatographic examination from the biological material rather than functional groups. This leads to organic acids, for example, being considered in several chapters but does allow a more coherent treatment from a practical point of view. Thus, there are chapters on volatile components of tissues, essential oils, resin acids, lipids and non-volatile components of tissues in rough volatility order, each group being further subdivided according to elemental composition, molecular structure or functional groups as appropriate. A number of applications less directly related to biochemistry are included in the final chapter. The section on elemental analysis and structure determination

is of general interest to all chemists and is seldom described in other books. Pesticides and pharmaceuticals are also covered briefly. There are useful appendices on equipment manufacturers, somewhat surprisingly, comparative sieve sizes and the hazards of manipulating diazomethane.

The general presentation is very good with a clear style firmly based on the authors' personal practical experience of much of the work described. It is unfortunate that the book is so expensive as it should obviously be read by all up-and-coming biochemists.

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¹ Desty, D. H., *Nature*, **194**, 822 (1962).

SALTING AND CHEMISTRY

A History of the Salters' Company

By J. Steven Watson. Pp. 161+7 plates. (London and New York: Oxford University Press, 1963.) 30s. net.

THE historical records of the twelve great City Companies certainly vary in detail, but they all have in common their ancient origin covering a span of several centuries, their inception as private guilds or fraternities of craftsmen associating for mutual assistance and for the maintenance of approved standards in the conduct of their craft, and their ultimate emergence as organizations dispensing benefactions for educational or charitable purposes. In fact, to-day these Companies find their closest counterpart in the trusts and foundations that have come into existence in quite recent years to serve similar functions. But the City Companies are motivated by the sense of tradition, an astonishingly long history that still continues to bind together a fraternity composed of men of very varied interests and experience, imbuing them with a common purpose in seeking to fulfil their functions to the best advantage.

All this is made very clear in *A History of the Salters' Company*, for the author, whose rich qualifications as a historian are well recognized, has treated his subject in a most illuminating and interesting exposition.

Like the other old City Companies, the Salters' Company in its early years had its tussles with the civic authorities and with the Crown over matters of finance and policy, and it sometimes found itself implicated in political wrangles. But following the grant of the Livery by Richard II in 1394 (though it is to be noted that even before that date there already existed a Guild of Salters), it retained its integrity and independence as a corporate institution concerned mainly with the craft of dry salting—in those days, of course, a very important and skilled craft. It also engaged in other activities, such as the collection and distribution of flax, logwood, cochineal, potash, and chemical preparations of one sort or another. It was therefore by a process of natural evolution that the Company was led in 1918 to inaugurate the Salters' Institute of Industrial Chemistry, and thus to devote the major part of its funds (apart from the maintenance of alms-houses) to the promotion of industrial chemistry by the annual award of fellowships and scholarships, grants to universities and schools for education and research in chemistry, the organization and financing of conferences, and so forth. In the year 1962-63, for example, the company contributed more than £16,000 to these ends.

It is pleasing to note that a number of its past Fellows have now reached positions of distinction in the chemical field, and that under the present director of the Institute, Prof. A. R. J. P. Ubbelohde, its activities continue to expand with rewarding success. The history of the Company makes salutary reading for those who are little acquainted with the good work now undertaken by the twelve great Companies the origin of which centuries ago arose from the organization of craftsmen in various industries with which the Companies now have only an indirect concern—and that by the nature of their long tradition.

W. LE GROS CLARK