

preface to the Russian edition (1958) is written by Prof. M. M. Krushchov and the first four papers deal with his investigations with his colleagues of the wear of non-homogeneous materials including steel and cast iron. It includes the use of replica electron microscopy to examine the damage to the surfaces. The emphasis is on materials which are of engineering and practical importance. The second series of papers is by Prof. I. V. Kragel'skii and his associates on the friction of solids, the effect of surface roughness, relaxation oscillations in elastic friction systems and a useful practical paper on the development of high frictional composite materials which are valuable as brake materials. The rest of the papers deal with fluid lubrication, with the behaviour of dynamically loaded bearings and with the influence of temperature and of viscosity. Some experiments with a four-ball machine for testing lubricants are also described. At the end of the book there is an extensive and useful bibliography of relevant papers published both in Russia and elsewhere during the years 1954-55.

Because of the time which has elapsed since the papers were first written much of the work is necessarily now out of date, but the book can serve as a source of reference and it is interesting to see collected together this account of the able and effective work which the Russian scientists and engineers have been doing in this field.

F. P. BOWDEN

### Gas Chromatography of Metal Chelates

By Ross W. Moshier and Robert E. Sievers. (International Series of Monographs in Analytical Chemistry, Vol. 23.) Pp. viii+163. (London and New York: Pergamon Press, Ltd., 1965.) 35s. net.

THIS book has been written for the mutual interest of both gas chromatographers and inorganic chemists and should prove of considerable value to both. Liberally supplied with references, it not only constitutes a comprehensive survey of the literature of metal chelate gas chromatography but also indicates several potential avenues for future investigation.

In discussing the general conditions required for successful gas-liquid chromatography of metal complexes, volatility and ease of formation are considered. Among the special complexes singled out are the metal acetylacetonates and their fluorocarbon derivatives. In the former case, their value is diminished by some lack of stability at the column temperatures required for gas-liquid chromatography. The greater volatility of the fluoro-derivatives (the most thoroughly studied of which are the tri- and hexa-fluoro compounds) makes possible separation at lower temperatures, which provides more suitable conditions for quantitative analysis. Thus for hexa-fluoro complexes, which can be eluted at little above room temperature, thermal degradation gives no cause for concern.

As a general indication of viability for gas-liquid chromatography, sublimation behaviour is discussed; for example, while the neodymium chelate with tri-fluoroacetyl acetone resists chromatography, the hexa-fluoro complex which can be sublimed slowly at 100° C/0.05 mm presents a more hopeful possibility.

After general considerations there follows a sufficiently comprehensive description of gas chromatographic technique, in the context of the compounds discussed, to initiate those unacquainted with this technique and to remind the esoteric of the special considerations which must be borne in mind when chromatographing these compounds. The relative merits of several applicable detectors is discussed. A chapter on "Analytical Determinations" deals with the practical problems of metal chelate preparation, extraction and chromatography. Useful detailed examples are included together with information on retention times. The authors conclude with a consideration of some of the applications of gas

chromatography of the metal chelates, including the resolution of optical and geometrical isomers and its application to kinetic studies. An appendix of metal compounds of  $\beta$ -diketones is also included.

E. A. WALKER

### Beiträge zur Biochemie und Physiologie von Naturstoffen

(Festschrift Kurt Mothes zum 65 Geburtstag.) Pp. 581. (Jena: Veb Gustav Fischer Verlag, 1965.) 105 MDN.; 179s. 2d.

THIS volume celebrates the sixty-fifth birthday anniversary of Kurt Mothes. It includes an introduction by Prof. A. Butenandt, followed by fifty articles on subjects concerned mostly with plant biochemistry, and particularly with the biosynthesis of plant constituents, including alkaloids. Fifteen of these articles are in English, one is in French, and the rest in German.

An article by Sir Robert Robinson entitled "Retrospect" surveys some of the author's many contributions to ideas and experiment in the field of plant biosynthesis, including the celebrated *in vitro* synthesis of tropinone. Prof. M. Florkin, of Liège, under the title "Paleoproteins", surveys briefly the evidence for the presence and nature of proteins in fossils, while the veteran Prof. K. Freudenberg writes about the biogenesis of lignins in a most interesting article.

The collection of essays in this volume emphasizes how successful in many instances has been the purely chemical approach to the problem of biosynthesis in plants. Although any generalization is dangerous, animal tissues, with their greater complexity and in general more rapidly effective synthetic processes, are firmly dependent on enzyme-catalysed and directed processes in a manner that does not hold so completely for plant tissues. Be that as it may, the subject of phytochemistry is one the lines of which were foreshadowed and elucidated by the methods of organic chemistry in a way that has not in general held for zoogenesis. And the contributions of organic chemistry to phytochemistry are widely and interestingly surveyed in this book.

F. G. YOUNG

### The Thread of Life

An Introduction to Molecular Biology. By John C. Kendrew. (Based on the series of B.B.C. Television Lectures.) Pp. 110+52 photographs. (London: G. Bell and Sons, Ltd., 1966.) 21s. net.

THIS book sets out to tell the story of the "revolution in biology" represented by our new understanding of the relationship between molecular structure and biological function—in short, molecular biology. In the informal personal style preferred by television audiences (or, anyway, by producers) Dr. Kendrew outlines the way proteins are constructed, moves on to nucleic acids and the idea of coding, and ends with viruses. The last chapter speculates on how genes (operons) are switched on and off.

Needless to say, no one is better qualified for the task. The only doubts which rise concern the adaptation from a visual to a written medium. Though Dr. Kendrew writes "You can easily see . . .", the fifty-two photographs—excellent in themselves—are all placed at the end of the book. Since they are an essential part of the explanation, they should have been married with the text. Moreover, the density of information is pretty high: the whole story in 30,000 words. On paper, one might relax the pace a bit. The lectures were given early in 1964: so, though footnotes have been added to cover Holley's structure for RNA and Phillips's work on lysozyme, the publishing delay has made the story not fully up to date. In short, an opportunity to produce something exceptional missed through lack of publishing enterprise. Even so, Dr. Kendrew's lucid summary will be welcome to any layman who seriously wants to try to grasp this fascinating subject.

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