Instrumental Aspects

Introduction to Infrared and Raman Spectroscopy. Norman B. Colthup, Lawrence H. Daly, and Stephen E. Wiberley. Academic Press, New York, 1964. xiv + 511 pp. Illus. $12.

Recently there has been a big crop of books dealing with the chemical aspects of infrared and Raman spectroscopy. Most of them cover much the same ground and refer to essentially the same range of scientific literature. They differ in their degree of clarity and detail, in their varying emphasis on different aspects of technique or application, and in the flavor that stems from an author's personal experience in the field.

This book combines many excellent qualities, and brings together a wealth of information, set out clearly and concisely. It is well illustrated by diagrams of all sorts (those relating to molecular vibrations are particularly noteworthy). The first chapter is an account of molecular energy levels, the rules for transitions between them, and the essential features of infrared and Raman bands. Chapter 2 outlines the experimental methods for both infrared and Raman work, involving sources, dispersing systems, detectors, methods for sample handling, and other accessories. There is a useful account of vibrational modes in crystalline solids and the significance of using polarized radiation. The third chapter deals with molecular classification in terms of symmetry considerations, point groups, and group theory, and leads to the use of selection rules and other methods of assigning molecular vibration frequencies. The designation of vibrations according to their geometric form is then explained, and factors that affect the vibration frequencies—such as bond force constants, internal molecular structural features, coupling effects, and hydrogen bonding—are discussed.

Chapters 5 through 12 provide a detailed commentary on the characteristic localized vibrations of key groups when present in organic or inorganic compounds. For a given class of compound, not only the key group vibrations are given, but also other bands that usually arise. Chapter 13 should be very valuable to all who are concerned with molecular structure. It includes, first, a set of correlation charts that show the probable location of key group vibrations in the range 4000 to 200 cm^{-1}, and also a table that indicates the ranges over which different solvents can be used. There follows a set of more than 600 spectra of all kinds of compounds, on each of which the main absorption bands are identified with the corresponding vibrating group concerned.

Chapters 14 and 15 provide a complete treatment of the assignment of the vibration frequencies of chloroform, a study of the molecular force field, and the calculation of the thermodynamic properties.

There is no doubt that this book will be welcomed not only by workers in industry, but also by university students and others who wish to obtain a good appreciation of the main principles of this subject.

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Limnology

Ergebnisse der Limnologie. vol. 2, *Remains of Animals in Quaternary Lake and Bog Sediments and Their Interpretation*. David G. Frey, Schweizerbart'sche, Stuttgart, Germany, 1964. ii + 114 pp. Illus. Plates. DM. 23.

The appearance of the new series of publications *Ergebnisse der Limnologie* by the editors of the *Archiv für Hydrobiologie* will arouse considerable interest among limnologists. If the paper under review represents the standards to be maintained, we can be satisfied that an extremely useful series of review articles is well under way.

Remains of Animals in Quaternary Lake and Bog Sediments and Their Interpretation, by David G. Frey, is a detailed review of the present state of information on the occurrence of recognizable fossils in lake sediments and the ecological interpretations that can be based on the fossils.

As a lake ages and fills in, the sediments that build up contain fragments of organisms, some of which are recognizable to genus or species, and considerable information exists about the change of biota over time in several lakes. Much of Frey's own work has been directed toward making specifically recognizable the little chips of chitin that are parts of the head capsules of chydorid Cladocera, and it is now possible for him to write a complete list of species of these animals in lakes at different ages in the past. This work provides greatly expanded knowledge of natural succession in lakes and enables development of improved concepts of species composition and succession in aquatic communities. The present paper will be an important source of information to those who wish to enter this field and to those who wish to learn what is available in it.

Nipkow's remarkable results in hatching rotifer eggs from sediments of known age suggest that other fossils may not be beyond the reach of the neolimnologist, and one might suggest that an attempt to develop resting stages of other organisms from sediments might permit much more interpretation than is presently available from dead fossils.

Frey's review is entirely concerned with morphological characteristics of fossils, and it seems likely that the most complete and detailed interpretations will be based on them. Biochemical knowledge of fossils is not as advanced and seems inherently more limited, but the exciting discovery of a pigment specific to *Oscillatoria rubescens* in lake sediments gives hope that there can be a development of knowledge based on chemical components of sediments, which will give equally useful information.

The paper under review is a fine example of a type of publication that we need, and the list of titles in preparation is promising.

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Scientists at Work

The Management of Scientists. Karl Hill, Ed. Beacon Press, Boston, Mass., 1964. xvi + 143 pp. Illus. $4.95.

This book consists of a collection of six essays that were delivered in a lecture series under the same title, sponsored by Northeastern University in 1963.

The fact that the book has been published underscores the need for a discussion of the whole problem of the management of scientists. One can infer from the title that there is a need to manage scientists and that the process is necessarily different from that of managing other categories of mankind. One cannot deny that these things are true. There is an undeniable tendency for scientific projects to grow larger, and in most areas of science we have