

detection of adulteration of horseradish with parsnip roots. Several chapters are devoted to background information on infrared instrumentation, theory of molecular vibrations, and rather general aspects of the interpretation of infrared spectra. There is extensive discussion of characteristic group frequencies and recipes for the identification of unknown compounds. Other chapters deal with applications in particular areas such as research on pharmaceuticals, polymers, essential oils and cosmetics, and coal. There is also an interesting chapter on the use of infrared spectroscopy by governmental regulatory agencies. Finally, there are a number of chapters covering specialized experimental techniques. These include microsampling techniques, attenuated total reflection, infrared plant stream analyzers, and the use of computers in spectroscopy.

The chapters on particular applications and specialized techniques are generally well written and often quite enlightening. They provide concise but comprehensive surveys and include extensive bibliographies which should be quite helpful to anyone contemplating the use of infrared techniques in these areas. Unfortunately, the chapters on background material leave much to be desired. There is considerable repetition by different authors, and even by the same author in different chapters. The organization is generally poor, and some sweeping generalizations and simplifications are made which could be quite misleading to a person attempting to learn the theory of vibrational spectra. The discussion of such a basic point as the Beer-Lambert law is thoroughly muddled, and units are incorrectly handled in several cases. The discussion of selection rules is rather confusing, particularly in that no clear distinction is made between symmetry-selection rules and harmonic-oscillator rules. There are a number of misleading statements, such as the generalization on page 7 that ionic compounds such as NaCl do not absorb infrared radiation.

This book should prove useful to many chemists in industry and government who have specialized problems which may be amenable to infrared techniques. However, it cannot be recommended as an introduction to the field of vibrational spectroscopy.

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Early Papers on Chemotaxonomy

It is a pleasure to review James B. McNair's recently published book, even though there is nothing new in it. **Studies in Plant Chemistry, Including Chemical Taxonomy, Ontogeny, Phylogeny, Etc.** (the author, 818 South Ardmore Avenue, Los Angeles, Calif., 1965. 399 pp. Illus. \$12) is a reprinting of 26 papers, the first of which appeared in 1916—when I was a schoolboy—and the last of which appeared in 1945—the year in which I wrote my first paper on chemotaxonomy.

I have read most of these papers with close attention, especially those dealing with the history of chemotaxonomy, for McNair is a pioneer. He was using masses of chemical data and applying them to taxonomic problems when few botanists were showing any interest in this field. He tried to show, for example, that tropical plants differ from temperate ones in the natures of their oils, fats, and waxes (paper 3); that the types of alkaloids produced are dependent upon climate and taxonomic relationships (paper 14); and that molecular weights and the numbers of fatty acids from seeds increase with advance in evolutionary position (paper 18).

To illustrate the scale upon which McNair worked we may refer briefly

to paper 9, "Some properties of plant waxes in relation to climate of habitat" (1931). For this brief paper he assembled data on on fewer than 232 waxes. He concluded, among other things, that "wax hydrocarbons, acids, and alcohols from the tropics have lower melting points, greater molecular weights, and larger empirical formulae than those of the temperate zone." Nearly 30 years later I was told by Barber (then of Tasmania) of the importance of the melting points of their leaf-waxes to the survival of *Eucalyptus* species in that southern island.

In many cases McNair tried to do the impossible: to reach major conclusions from the then inadequate data. How different would have been his task today. We may not agree with his conclusions, but we must read his papers if we are to know the history of chemotaxonomy, and it has been difficult to get hold of them conveniently. McNair has done a great service by having them reprinted in a single handy volume—a book that should be in every botanical library. One bit of criticism: there is no index.

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Civilization in the Diyala Plains

The increasing use of extra-archeological evidence, techniques, and viewpoints is an indicator of the maturing and refining of traditional archeological research. **Land Behind Baghdad** (University of Chicago Press, Chicago, 1965. 231 pp. Illus. \$8.50), by Robert McC. Adams, is a superb example of what imaginative cooperation between dirt archeologists, natural scientists, and historians can produce.

With its origins going back to a routine archeological reconnaissance by Thorkild Jacobsen in 1936–37, the Diyala Basin Archeological Project of 1957–58 completed the survey of over 867 sites in the Diyala region of east central Iraq. The coordinating of data from archeological field reconnaissances, ancient textual records, aerial photographs, and geomorphological studies provides the base on which Adams traces "successive phases of advance and decline over six millennia of man's slowly changing relation to the land." The little-used technique of view-

ing the overall developments of a complex ancient civilization through a multidisciplinary study of one particular region within the sphere of influence of the civilization is given encouraging support by this study.

The book opens with a detailed description of the contemporary setting with its major natural variables—climate, flora and fauna, water resources—and a study of recent human settlement patterns. The second part of the book outlines the changing patterns of ancient occupation, from the formation of walled towns (4000–2100 B.C.) through the period of Islamic revival and decline (A.D. 637–1900). Probable causes for the changing configurations in settlement patterns and irrigation systems are then analyzed.

Three appendices provide the data upon which the studies are based. Appendix A describes the methods of "topographic archeology" employed. Appendix B describes the ceramic-dating criteria used for determining the