The Determination of Molecular Structure

Structure Elucidation of Natural Products by Mass Spectrometry. vol. 1, *Alkaloids* (245 pp., $10.50); vol. 2, *Steroids, Terpenoids, Sugars, and Miscellaneous Classes* (316 pp., $10.50). Herbert Budzikiewicz, Carl Djerassi, and Dudley H. Williams. Holden-Day, San Francisco, 1964. Illus.

These books, with the previously published *Interpretation of Mass Organic Compounds*, complete a three-volume compilation of the application of mass spectrometry to the determination of molecular structure. They also cap an amazing 2-year record of publications from the authors' laboratory. Their contributions have been a major factor in the explosive recent growth of this field—the majority of references cited in these books are dated 1963 to 1964.

Natural product structures covered include alkaloids, with iboga, aspidospermine, isoquinoline, colchicine, and lycopodium types; steroids, including alkaloid, ketone, estrogen, and sapogenin types; mono- through triterpenes; long chain derivatives; peptides; carbohydrates; and oxygen heterocyclics. Coverage and treatment is generally thorough and critical. A useful additional chapter is an authoritative summary of techniques for the specific introduction of deuterium into a variety or organic molecules. The authors frequently demonstrate the value of checking mechanisms with such labeling, and this summary should simplify the practice for others. Chemical derivatives that are useful for particular compound classes are also discussed—for example, the ethylene ketal group which can direct the fragmentation of steroids and triterpenes in a predictable manner.

As in *Interpretation of Mass Spectra of Organic Compounds*, detailed mechanisms are proposed for most of the abundant ions in the spectra examined. Despite the lack of full confirmation for many of these, they serve a very useful purpose in that they indicate generalizations and provide guideposts for future work. Some added clarifications are helpful—for example, in volume 2, the use of Shannon's symbol "$\dot{+}$" to designate a radical (odd-electron) ion.

The inclusion of an appendix on the calculation of molecular formulas by high resolution mass spectrometry (this has recently been published in book form) is indicative of the growing awareness of the potential of elemental formula information, although in these volumes only modest use is made of this method, or of computer techniques, for the reduction of data.

In summary, the authors have admirably accomplished their specific objectives, providing a much needed comprehensive reference to mass spectral data on natural products. Perhaps of even more value for the future is the clarification and stimulation provided for further research in the underlying mechanisms of mass spectra. A more thorough understanding and systemization of such mechanisms is necessary to provide a proper framework for the continued explosive expansion of this exciting field.

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Alkylating Agents

Cyclophosphamide (Cytoxan). Proceedings of a symposium (London), October 1963. G. Hamilton Fairley and J. M. Simister, Eds. William and Wilkins, Baltimore, 1965. xii + 200 pp. Illus. $9.75.

Nitrogen mustard and related substances have been under continuing laboratory and clinical investigation since 1946, and they have an established role in the treatment of cancer. Literally hundreds of alkylating agents have been synthesized and at least 50 have been administered to patients with various forms of cancer. The alkylating agents have been investigated for their mechanism of action in vitro and in various biological systems, their chemical reactivity under various conditions, their pharmacological and toxicological effects in animals, and their therapeutic activity in man. Various members of the group have been compared for therapeutic specificity against various forms of cancer in animals and man. The results of the clinical studies indicate that these drugs have a similar spectrum of therapeutic activity. Certain derivatives have distinct advantages—they are effective when given by mouth and only infrequently cause gastrointestinal disturbances.

One of the most intensively studied nitrogen mustard derivatives has been cyclophosphamide (Cytoxan). It differs from the other members of the group in that it is inactive in vitro, but on activation in vivo it produces injury to proliferating normal and neoplastic cells. This book contains the proceedings of a conference on cyclophosphamide, held at the Royal College of Surgeons of England on 4 October 1963. Seventy-four participants described their clinical experiences in using cyclophosphamide to treat cancer. The papers are short, and sometimes only a single case report is presented. The presentations are grouped according to various forms of the disease, but the therapeutic responses are not described in a consistent manner. Little attempt is make to compare the clinical benefits from cyclophosphamide with other alkylating agents. There is a brief section on the use of cyclophosphamide as an immunosuppressive agent. The pharmacology and mechanism of action of cyclophosphamide are not discussed, nor are data presented indicating how it may differ therapeutically from the other alkylating agents.

Cyclophosphamide is a useful agent in the treatment of cancer. It has certain disadvantages in comparison to other alkylating agents. It is more costly and, compared to other available alkylating agents, produces frequent and relatively unique toxicological effects; these include temporary alopecia, which is obviously distressing to female patients, and cystitis which is often hemorrhagic. To its credit, cyclophosphamide can be given intravenously or by mouth, and therapeutic doses appear to produce less platelet depression than the more conventional alkylating agents. It is useful in the treatment of the chronic leukemias, Hodgkin's disease and lymphosarcoma, multiple myeloma, and ovarian, breast, and lung cancers, but its therapeutic spectrum does not appear to differ qualitatively from other active alkylating agents. One exception may be the induction of occasional temporary remissions in acute leukemia in children, but this important observation is not clearly described in the proceedings.

This book is a series of clinical impressions displayed in case reports that are repetitious, and often in-

complete and muddled as well. The clinician who is well informed with respect to the treatment of cancer will find the information contained here of little value, and the novice may be mislead by the lack of balance and perspective. The publication of a monograph on cyclophosphamide with only passing reference to the effectiveness of related compounds does not do credit to those who organized the conference or to the company that supported it. Sir Ronald Bodley-Scott's closing statement seemed particularly relevant. "I will end with an unsolicited testimonial. One of our patients with chronic lymphatic leukemia did very well on cyclophosphamide. He was so pleased with the effects of this drug, he told us, that whenever his wife felt off-color, he gave her a tablet and it made her feel much better."

The book contains a complete bibliography, and the index refers to the text as well as to papers in the bibliography which are relevant to the topic.

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Behavior Studies

Imprinting and Early Learning. W. Sluckin. Aldine, Chicago, 1965. x + 147 pp. Illus. $5.

In general, review articles (or books) fall into one of two categories: they may summarize the literature pertinent to a particular field with the object of presenting to the reader a reasonably complete picture of what has been done, and why, and by whom. Alternatively, a review may be highly selective, the author's intent being to consider only those articles that meet his own criteria for rigor and relevance. In the latter instance, the onus rests on the author to explicate and to justify those criteria. Apparently, reviews of the latter type win few friends. In any case, they are rarely written.

Sluckin's book clearly falls into the first category, and, given the limitations of such a treatment, he has done a first-class job. P. Gray's checklist of avian imprinting papers, [*Psychol. Rec.* **13**, 445 (1963)], provides a fair measure of the thoroughness of Sluckin's coverage; and thorough it is. This is not to suggest that Sluckin has done no more than prepare another checklist; the theoretical significance of each reference has been explored, and incompatibility in results dispassionately discussed. Indeed, the book's one feature that disappoints me is just this absence of a modicum of passion and fervor. Some of the many experiments Sluckin discusses do not measure up to his own professional standards: inadequate sample sizes, the absence of appropriate controls, improper statistical treatment—these shortcomings characterize some of the studies on imprinting he has cited. The field of behavior would not be ill served by an explicit recognition of the fact that some papers should be accorded more respect and treated more seriously than others; and that, in fact, a few should be ignored altogether.

My bias should be made clear: I would like to have a more critical assessment of the imprinting literature. It is thus hardly fair to criticize Sluckin for having followed what I personally judge to be only a second-best course. But I must emphasize that he has marked his trail well. The organization of the chapters of his book is both clear and reasonable; the discussions are pithy; the extrapolations and speculations insightful and intriguing; even his use of English is pleasing to eye and ear. In short, no one interested in imprinting, whether he is of the laity or has a professional commitment to behavior studies, will find this book a poor investment.

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Plant Communities

Native Vegetation of Nebraska. J. E. Weaver. University of Nebraska Press, Lincoln, 1965. vi + 185 pp. Illus. $4.75.

Thanks to our rapid increase in population and the largely indiscriminate spread of urban, industrial, and transport facilities, the time is not far distant when land-use capabilities must receive much more attention than they have enjoyed. Natural, that is presettlement, vegetation, integrating as it did the manifold factors of environment, is unexcelled as a guide to potential land use.

This slender volume presents the varied pattern of "native" plant communities in a great state that extends eastward from the foothills of the Rockies, across semiarid to subhumid grasslands, and into the western margin of the deciduous forest region. For 50 years J. E. Weaver and his students in the Botany Department of the University of Nebraska have investigated the increasingly rare remnants of original vegetation, both above and below the ground line. They have also extended these studies to cultivated crops and range land.

The evident intent is to make more widely available material that has appeared in numerous technical publications, particularly two books—*North American Prairie* and *Grasslands of the Great Plains*. To this end many fine photographs, both of individual plants and representative communities, are included, as well as drawings taken from the author's distinguished studies of root systems.

Another device is the exclusive use of vernacular names for plant species. This will present no difficulty to those who have at hand the books just listed, or to students of range management, accustomed as they are to such terms as "needle-and-thread grass," "purple three-awn," and "muhly grass" (for members of the genus *Muhlenbergia*). In the absence of a glossary it may trouble botanists from other regions, while its utility in schools will rest largely with the teacher.

The key illustration in the book is based on Condra's map of the topography of Nebraska, showing a surprising number of regions and subregions in a state that many think of as monotonously uniform. Preceding this map is one of mean annual rainfall, ranging from 33 inches in the southeast to 15 inches in the extreme west. Evaporation is not shown, although its inverse relation to rainfall is mentioned.

If only the climatic gradient were involved, the picture would be one of a relatively simple movement from deciduous forest in the east, through tall grass prairie, a transition zone of mixed mid and short grasses, to short grass plains in the west. But relief, exposure or slope aspects, and soil conditions complicate the situation. Tongues of deciduous forest run westward along flood plains. Sandy soils, unless disturbed, permit outliers of more humid vegetation west of their normal limits. The foothill elevations of the northwest encourage the growth of Rocky Mountain conifers.