The papers are reproduced by a photographic process to hasten publication and the consequent differences in style and format are sometimes disconcerting, especially when the text appears to run on into the legends of tables and figures.

Overall, the impression gained from this volume is one of muted optimism. Professor Schneiderman points out that young larvae seem to be quite insensitive to the compounds, which is unfortunate since these stages often cause most damage. Moreover, insects can inactivate, sequester or excrete juvenile hormone at certain stages in their development, so the hope of not developing immunity to exogenous hormone is unlikely to be fulfilled, even more so with foreign chemicals. The results of the field trials are disappointing, although some compounds show promise in the control of certain insect pests. The hormones and their mimics operate during critically short developmental periods, so that application must be precisely timed or the compounds must persist for adequate periods. Results described here suggest that field stability is low. The compounds do not have the dramatic knockdown properties of current insecticides and the effects of application may not be manifest until the next generation. Their use as ovicides seems the most encouraging, for they can be applied to the adult female or her freshly laid eggs, and if embryogenesis is not interrupted, metamorphosis may subsequently be prevented. Considerably more needs to be known of the detailed developmental life-histories of insect pests and the ways in which juvenile hormone and its mimics control and affect morphogenesis, reproduction and behaviour before the hope of specifically tailored insect pesticides becomes a reality. But these "third generation insecticides" will undoubtedly play a major part in any programme of integrated control of insect pests.

Insect Sex Pheromones also contains a chapter on natural chemicals in insect pest control: sex attractants can be used to lure members of the opposite sex in large numbers to particular sites. Or the atmosphere can be saturated with the attractant, causing confusion and disruption of the normal orientation mechanisms so that mating is prevented. This form of control suffers from one of the disadvantages of the juvenile hormone mimics—that the damaging young stages are unaffected and the agriculturalist must look beyond the loss of his current infected crop to subsequent pest-free growth. The author has collected an enormous amount of factual information on the occurrence, identification and synthesis of insect sex attractants, but presents it in this volume in a catalogue style with

little attempt at synthesis or the development of concepts and theories. With 1,337 publications listed, the book will be invaluable as a reference source.

Both *Insect Juvenile Hormones* and *Insect Sex Pheromones* illustrate the results of fruitful marriages between chemistry and biology, which should engage the hopeful interest of all those concerned with the environmental problems of current insecticide pollution.

K. C. HIGHNAM

Carbohydrates

Stereochemistry of Carbohydrates. By J. F. Stoddart. Pp. xi+249. (Wiley Interscience: New York and London, 1971.)

ONLY infrequently is a new textbook sufficiently unusual to have no near competitor. Dr J. F. Stoddart has written such a book and in doing so has presented carbohydrate chemistry in a new light, and moreover in a way designed to attract the attention generally of organic chemists. In the past there has been a tendency to treat carbohydrate chemistry as an isolated aspect of organic chemistry, rather than as part of aliphatic and heterocyclic chemistry. However, many of the problems which arise in carbohydrate chemistry are stereochemical in nature and answers are to be found in a knowledge of the structural and dynamic aspects of stereochemistry. In this book there is a thorough but concise account of carbohydrate chemistry in stereochemical language. The important role of isomerism in carbohydrate chemistry is high-lighted and the account serves to illustrate the almost unique status amongst organic compounds of the sugars, because constitutional, configurational and conformational isomerisms are often superimposed on each other in this group of natural products. The author has achieved a happy union of stereochemistry and carbohydrate chemistry.

The book has five chapters, each concluded by a list of references, and an author and subject index. In the first two chapters basic principles are presented and so to use the book little previous knowledge of modern stereochemical concepts is required. Definitions are clearly stated. Other chapters are devoted to the constitutional, configurational and conformational isomerism of sugars; the interplay of these forms is explored. To avoid confusion arising from the specialized and often bewildering nomenclature of carbohydrates, many illustrations are provided, to the extent that a formula is given for almost every compound mentioned. Discussion of the stereochemistry of polysaccharides has been inte-

grated with that of simpler carbohydrate derivatives.

The physical methods which are particularly suited to providing answers to stereochemical problems posed by carbohydrate molecules are surveyed. These include X-ray diffraction, mass spectrometry, infrared and nuclear magnetic resonance spectroscopy, dipole moments and optical rotations. This coverage is commendable because in the investigation of stereochemical problems it is desirable to employ as many physical techniques as possible.

The book is excellent for its description of the systematic application of conformational principles. It is surprising, and even unfortunate, that those concerned with conformational analysis have not drawn extensively on carbohydrates to exemplify conformational principles. It is not always appreciated that carbohydrate chemistry has made important contributions to conformational theory. For example, the term "conformation" was first introduced by Haworth in 1929 in connexion with the shapes of sugar molecules, and cellulose is probably the first molecule in which the chair shape of the six-membered ring was detected through X-ray analysis. The effect of conformation on reaction rate was probably first recognized in carbohydrates by Isbell in 1937, and Reeves's discussion in 1949 of the conformations of sugars antedates by a year Barton's pioneering paper on conformational analysis. The first major recognition of the importance of conformation in n.m.r. spectroscopy is found in a paper in 1958 by Lemieux, Bernstein and co-workers. The author's readable account of the facts (both qualitative and quantitative) of carbohydrate conformations, and his discussion of concepts, should stimulate investigators in other branches of organic chemistry to turn to carbohydrates as suitable, and often readily available, models to illustrate or confirm stereochemical principles.

The book will be of interest also to graduate students and research workers in organic stereochemistry and natural product chemistry, as well as to those specializing in carbohydrate chemistry and conformational analysis. Teachers of degree courses in chemistry will find valuable reference material. Extensive use of the book over a period of months has shown it to be both reliable and informative. The selection of topics for discussion in the book is necessarily personal to the author, but is sufficiently wide to achieve adequately the aim of bridging the gap between carbohydrate chemistry and stereochemistry. This is a textbook which was badly needed. The author is to be congratulated on his efforts and his book is strongly recommended.

W. G. OVEREND