of experimental factors in the system—predictable if we know enough about the system. By designing experiments so as to maximize (under proper control) the appearance of "artifacts," and by carefully distinguishing those due to the intrinsic nature of the migrating species from those due to extrinsic effects (temperature, physical condition of the paper, *p*H, and others), Nakamura has developed methods of great sensitivity and wide applicability in the study of the interactions of proteins with other proteins and with smaller molecules.

The basic idea is very simple: two substances are brought together and caused to interact by appropriate application of electrophoretic migration and endosmotic flow in a paper sheet or gel slab. The crucial interaction may be preceded by a preliminary one- or two-dimensional electrophoretic separation. Interaction is shown by distortions of the pattern compared to patterns in which interaction is absent. Semiquantitative estimates of interaction can be derived. The results are similar in some aspects to those obtained by thin-layer chromatography or gel filtration, but cross electrophoresis affords increased experimental control through the additional variables of electrophoretic mobility and geometrical design.

The Japanese group have applied their procedures to the study of diphtheria toxin, snake venoms, concanavalin A (a protein reacting specifically with a wide variety of other proteins), curare and other drugs, tissue proteins, trypsin inhibitors, enzymes, and substrates. Out of 140 references to this work, 120 are available only in Japanese. (There are also 260 background references.) This book will therefore be almost wholly new material to most of its readers. It will well repay careful study followed by practical application.

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The Cell Cycle

Control of Cellular Growth in Adult Organisms. A Sigrid Jusélius Foundation symposium, Helsinki, Oct. 1965. H. TEIR and T. RYTÖMAA, Eds. Academic Press, New York, 1967. xxiv + 434 pp., illus. $17.50.

Here is a book that is both timely and out of touch with the times. It is timely because, increasingly, critical attention must be paid to the cell cycle and its controls, to mechanisms of cell replication and their role in differentiation, and to the maintenance of balance between cell loss and cell reproduction in the adult—in relation to aging, malignancy, and tissue repair. It is out of touch with the times not just because two years were required for publication but because many of the 30 articles were "old" when they were presented. It is true that the problems themselves are old—and difficult, as difficult as ever before. However, a symposium should provide an occasion for restating the problems in modern terms (which, if it is done well, can be a considerable accomplishment) and for effecting a synthesis of old and new. This book falls short of these objectives. The fault lies principally with the authors, but the editors must be held responsible for including articles that are trivial. At the root of the problem is the insistence of funding agencies, societies, and scientists themselves that the proceedings of symposiums be published in full. Usually the papers of invited speakers are accepted without critical review. Few are ever declined. Should the only "required" publication from a symposium be a brief "meeting report"? If that were the case, then speakers who wished to do so could submit review articles to the regular review journals, where they could compete for space.

The weakness of this volume does not mean that the subject lacks interest or importance. The basic question whether the mechanisms controlling cell replication in the tissues of vertebrates, including kidney and liver, muscle and nerve, conform to a common pattern remains unanswered. Is the genome in adult muscle or nerve completely and irrevocably "closed" or repressed? If not, what DNA-directed functions remain active? Following infection by polyoma and Rous sarcoma viruses, DNA synthesis is initiated in mature muscle, in vitro. But what part of the DNA is synthesized? What is the mechanism of "closure" of the genome? Are there, as is argued by Osgood, Glinos, Iversen, and Bullough and Laurence, among others, tissue-specific "chalones," functioning in tissue autoregulation?

There are a few highlights in the volume. For example, R. J. Goss, whose own book *Adaptive Growth* effectively covers much of the same ground as this volume, has provided an excellent introductory chapter, "The strategy of growth." On the whole, however, the volume falls short. Possibly those already working in the field may find it useful, in a limited way, but it is not sufficiently clear or critical to serve as a source for students of cellular, developmental, and molecular biology who should be entering the field.

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Organic Chemistry

Topics in Stereochemistry. Vols. 1 and 2. NORMAN L. ALLINGER and ERNEST L. ELIEL, Eds. Interscience (Wiley), New York, 1967. Vol. 1, xii + 254 pp., illus., $12.50; vol. 2, xii + 252 pp., illus., $12.50.

One of the major changes in the nature of organic chemical studies in the last decade has been the introduction of mechanistic concepts, which has enabled workers to predict and to rationalize the results of a wide variety of seemingly unrelated chemical reactions. The recognition of the stereochemical consequences of molecular reactions can be likened to a keystone, supporting the structural edifice of physical organic chemistry. During the last five years a number of thought-provoking textbooks on stereochemistry and conformational analysis have been published. It is particularly appropriate at this time that a secondary reference source has become available, not only to deal with "advances" in the field but also to supply greater detail and a critical review of topics that could not be treated at the introductory level. Such is the intended function of *Topics in Stereochemistry*. The series is meant for the teacher, the advanced student, and the researcher and presumes a knowledge of stereochemistry and conformational analysis at the level of *Stereochemistry of Carbon Compounds* (Eliel, McGraw-Hill, 1962) and *Conformational Analysis* (Eliel, Allinger, Angyal, and Morrison, Interscience, 1965). Each of the articles contains a detailed bibliography including references to introductory material that pro-

vides background information on the topics discussed.

Volume 1 contains articles on stereoisomeric relationships of groups in molecules (Mislow and Rabam), stereochemistry of metallocenes (Schlögl), and applications of optical rotary dispersion and circular dichroism (Crabbé) and a table of conformational energies (Hirsch). Volume 2 contains papers on helix models of optical activity (Brewster), polymer stereochemistry (Goodman), stereochemistry of 1,2-anionic additions to cyclohexenones (Toromanoff), and methods for determining optical purity (Mislow and Rabam). As is usual in a text of this sort, despite high editorial standards, not all the articles are as clearly written and illustrated as well as might be desired. On the other hand, the chapters by Mislow and Rabam and by Goodman constitute examples of the highest form of technical writing. These papers are clearly written, legibly illustrated, and develop their subjects concisely and logically. All the material contained in the books is technically accurate, and despite some minor difficulties due to poor illustrations in the chapters by Schlögl and Toromanoff the books are to be highly recommended.

Of particular interest is the chapter by Mislow and Rabam, which contains a detailed discussion, based on symmetry considerations, of the three relationships similar types of groups or atoms in a molecule may have to each other. The concept of equivalent, enantiotopic, and diastereotopic groups makes possible a single uniform set of criteria for molecular asymmetric synthesis and enzyme reactions. The general principle that underlies asymmetric synthesis, as well as magnetic nonequivalence, is developed in terms of group properties.

Goodman's chapter on polymer stereochemistry outlines the concepts of polymer tacticity, and the geometric forms of polymers are analyzed. A number of stereoregular structures are studied in detail. This review also deals with the mechanisms of stereoregular polymerization. The author shows that the fundamental rules and mechanisms of stereochemistry that apply to low-molecular-weight compounds apply also to polymer systems, thus linking the rigorous approach and well-defined model systems of the organic stereochemist with the approach of the biophysicist who deals with complex biopolymer systems.

This new series may become the principal reference source for critical summaries of recent developments in stereochemistry, particularly if the editors extend the series to deal with complexes and inorganic chemistry. The topics treated in these first two volumes are of fundamental importance to organic chemists and biochemists whose work lies in the area of stereochemistry, and the volumes could usefully serve a wider audience of molecular physicists and physical chemists.

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Interactions in Nuclei

Theory of Finite Fermi Systems and Applications to Atomic Nuclei. A. B. MIGDAL. Translated from the Russian by S. Chomet. Interscience (Wiley), New York, 1967. viii + 319 pp., illus. $17.50. Interscience Monographs and Texts in Physics and Astronomy, vol. 19.

Although a translator's note says that the manuscript was originally written for Interscience Publishers, this book appears in English two years after the Russian edition. This means that many of the parameters entering the theory developed here have undergone major changes, and even much of the theory has been developed further in essential ways. The printing, however, is beautiful technically—far superior to that of the Russian edition, where some of the equations are difficult to read—and it is useful to have the basic theory presented in English in one volume.

The Landau theory of Fermi liquids is adapted here to finite nuclei. This involves major assumptions, such as that the valence particles in a finite system correspond to the Fermi surface in an infinite system. This idea has been revised somewhat since the writing of this book, and the Migdal school now believes the last two filled shells and first two empty shells in nuclei to correspond to the region of the Fermi surface in the infinite system [see for example, V. P. Krainov and V. V. Malov, *Yadern. Fiz.* **6**, 252 (1967)], so that various polarization processes involving these shells must be introduced explicitly. Stripped of philosophy, the Migdal theory amounts, in present practice, to the use of a zero-range, density-dependent nucleon-nucleon interaction in shell-model calculations. The zero-range property is not essential for the theory, but simplifies calculations immensely.

The philosophy of the Landau theory, at least that on which its contemporary application in the Soviet Union is based, is extremely interesting to me. The theory reduces, in an elegant fashion, the description of long-wavelength excitations to a few parameters, which are evaluated from certain experimental quantities, such as the velocities of sound and zero sound and the specific heat. The feeling is that in liquid He^3—and in nuclei, according to the tenor of the Migdal school—many-body interactions are so strong that it is impossible to go by direct calculation from the interaction between two isolated particles to the effective interaction between particles in the many-body system.

This is quite opposite to the direction of the Brueckner-Bethe approach taken in this country, which is almost completely unstudied in the Soviet Union. (The Landau theory is, of course, used here, as well as there, very extensively in the description of many-body phenomena, and few would dispute its power.) In the Brueckner-Bethe approach, one does calculate effective interactions in the medium directly from the two-body interaction. Of course, there is still much controversy about the accuracy of these methods (although I believe them to be adequate for many problems).

In short, there is at least a feeling running through Soviet work that the elementary two-body interaction is hidden behind a veil, not unlike the Kantian *Ding an sich* (although no one would deny that the two-body force could be investigated by itself in other situations), and not susceptible to direct connection with the effective interactions in many-body systems. Making such direct connections is hard work, involving heavy computation, and part of the Soviet attitude may stem from some reluctance to go to computers. More, it reflects Landau's tastes, which permeate Soviet physics.

The book opens the work of the Migdal school to the Western audience. This approach certainly provokes many interesting questions; time and physics will judge how successful it is.

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