

sible for the reaction, must be raised. Of further compelling interest are observations, previously published, of Schwartz and Beldotti and of Walford which suggest the possibility of *escalation* of transplantation disease to malignant lymphoma in mice. The transcribed discussions after each paper are excellent and add much intellectual zest to the proceedings.

This is a book that can be highly recommended. The challenge, intellectual stimulation, and excitement of current biology are all here. Would that examples from these chapters be incorporated into undergraduate and even secondary-school biology curricula. Here, indeed, are challenges to the young, eager mind, worlds to conquer. This workshop approach, oriented toward a defined, interdisciplinary problem, would seem to offer many advantages over the usual series of 10-minute scientific papers at meetings.

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Chromatography Updated

Chromatography. ERICH HEFTMANN, Ed. Reinhold, New York, 2nd ed., 1967. xlii + 851 pp., illus. \$27.50.

This book brings up to 1965 the literature survey on thin-layer, paper, ion-exchange, gas, and liquid chromatography, electrophoresis, and gel filtration. Fundamentals and applications in biochemistry, nutrition, and pharmacology are reviewed, as well as chromatographic methods for the separation of inorganic ions, phenolic compounds, nonhydrocarbon gases, and hydrocarbons.

Of the 40 authors, 20 contributed to the first edition; 11 nationalities are represented, so the coverage of the international literature is good. No previous chapters have been deleted, and chapters on paper chromatography, thin-layer chromatography, and the separation of antibiotics have been added. Except for chapter 1, all chapters have been rewritten. It is, in fact, a new book. The format is pleasing, the figures effective, the type attractive, and the paper good. There is no author index. This edition is supplementary and complementary to the first edition. It is a generally useful compendium of the state of the art up to 1965 which

is likely to be needed by all serious students of chromatography and which should be available in libraries.

This having been established, some criticisms are in order.

The historical introduction is disappointing. It highlights developments only to 1949. This is a serious omission, for since 1949 the advances in ion exchange, gas chromatography, thin-layer chromatography, and gel filtration have been phenomenal. In fact, the entire content of the book concerns fundamental improvements that have been made since the time the historical introduction leaves off. Of particular note has been the evolution of theories of chromatography at the hands of many brilliant theoreticians. Historically this has been a real breakthrough, for thanks to the theoreticians chromatography is on a much more rational basis than it was in 1949, and future developments will have their origins in the insights and predictions made by theory. A good opportunity was missed to indicate the gradually growing unity of general concepts and approaches that are now being recognized as applicable to all chromatography.

Considering the important role that theory has played and will play, it is also disappointing to find that each theoretical treatment grinds its own ax. For example, chapter 3 is based on the stochastic concepts of Giddings. Chapter 9 details that of van Deemter, Keulemans, *et al.*, which had its origins in the mathematical analysis of Lapidus and Amundson. Chapter 12 presents the theory of Glueckauf. No attempt is made to reconcile these theoretical expositions (and they can be reconciled). As a result the reader is left with three (at least) apparently unrelated sets of ideas, symbols, and units which, unless he has more than ordinary curiosity, will remain unrelated. The criticism above is valid, but it is minor. However, future writing will be forced to give greater attention to theory, and theory should bear a closer relationship to the state of the art.

One notes also the virtual absence of any reference to data processing. The conversion of analog data to digital form for further processing is of major concern and is even now an integral part of chromatography. Only one brief, casual reference to this important aspect of chromatography was noted.

A third criticism is of the apparent

lack of information of some specialists concerning significant events in other fields. For example, on page 88, the statement is made that normal glass tubing will withstand a pressure of approximately 10 pounds per square inch, whereas in fact pressures of from 200 to 800 pounds per square inch have been used with glass tubes in ion-exchange chromatography since 1959, and pressures in this latter range are now routine in many laboratories.

A serious defect in most such texts as this is that they do not report, even briefly, on the significant developments, and they can be great, that take place between the time of writing and the time of publication. One may philosophically accept the proposition that a text is out of date before it is published. But need it be? A brief addendum to each chapter submitted at the time galley proofs become available would do much to dispel this difficulty.

In part 2, Applications of Chromatography, the treatments are generally of a high order. The chapters on the chromatography of proteins and on the separation of nucleic acids and related substances are particularly good. The chapter dealing with the separation of amino acids and peptides places a major emphasis on paper chromatography and in consequence is rather inadequate in its treatment of ion-exchange methods.

The comments above notwithstanding, and in spite of the unevenness that is characteristic of books with many authors, the text is a worthwhile record of advances in the field.

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An Important Friendship

Darwin and Henslow: The Growth of an Idea. Letters, 1831-1860. NORA BARLOW, Ed. University of California Press, Berkeley, 1967. xii + 251 pp., illus. \$6.50.

There is no doubt that the Reverend Professor John Stephen Henslow (1796-1861) had a great if indirect impact on the development of science. It was Henslow's influence and instruction that enabled Charles Darwin to develop his interests in natural history, and it was Henslow who was responsible for Darwin's being offered the place of naturalist on the famous voyage of H.M.S. *Beagle*. Thus Henslow did much to advance the theory of evolu-

tion. Ironically, he could never accept the theory himself.

Darwin's letters to Henslow began in 1831, the year the *Beagle* sailed, and the earlier letters show that Darwin looked upon Henslow as his mentor. After the voyage ended in 1836 and Darwin had become a well-known naturalist in his own right, the tone of the letters changed, but they retained their cordiality undiminished. Even after Darwin published the *Origin of Species* in 1859, he and Henslow remained close friends, and although Henslow never became an evolutionist, he defended Darwin several times against some of the scurrilous attacks that were made on him.

Nearly all of the 121 letters published in *Darwin and Henslow* were written by Darwin to Henslow, but to clarify certain points several of Henslow's letters to Darwin and to others are included. The letters show the development of Darwin's changing concept of species, although, in order not to annoy his friend, Darwin never emphasized his evolutionary views.

The letters are accompanied by the usual scholarly apparatus including, in the appendix, Darwin's published recollections of Henslow. The illustrations are well chosen and include maps of the voyage of the *Beagle*. The editor, Nora Barlow, is a granddaughter of Charles Darwin. She has added a great deal to our knowledge of her grandfather in her earlier books. In *Darwin and Henslow* she is continuing the good work.

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The Idea of an Ice Age

Studies on Glaciers. Preceded by the Discourse of Neuchâtel. LOUIS AGASSIZ. Translated from the French and edited by ALBERT V. CAROZZI. Hafner, New York, 1967. lxxii + 213 pp., illus. \$27.50.

"On July 24, 1837 . . . Agassiz gave his opening address known as the *Discours de Neuchâtel*, which is the starting point of all that has been written on the Ice-age." So writes the translator and editor of one of the classics of geologic literature, in which the concept of a glacial age of secular proportions was formulated. The concept started one of the great controversies in the history of geology. Recent research in the Antarctic, minute study

of sea-floor sediments, and the revealing results of potassium-argon and carbon-14 dating have brought into new focus the significance of late-Cenozoic climatic changes and the glaciation that accompanied them. As a result, interest in "ice-age" problems has widened, and this handsome book appears at a very appropriate time. Its appeal will not be confined to scientists concerned directly or indirectly with glacial ages; its language will be clear to anyone, and Agassiz's reasoning from the well-described field evidence can be followed without difficulty. Far from being either dry or old-fashioned, the exposition is both lively and modern, with a clear, direct style that has solid personality. Much of the argument constitutes a quite elegant essay, proceeding from field details to larger and larger syntheses. Toward the end, however, the highest synthesis becomes very speculative and in places almost wild, and it is apparent that Agassiz was carried away by his enthusiasm for an idea which, in its essentials, was wholly valid.

The book is more than a mere translation of *Études sur les Glaciers*. The translator has wisely included the slightly earlier, spontaneous *Discours de Neuchâtel*, said to have been written in a single night, and published so obscurely that it has always been little known. Also included in the book is a thoughtful and entertaining editor's introduction, first published in a slightly different form ["Agassiz's amazing geological speculation: the Ice-Age," *Studies in Romanticism* 5, No. 2, 57-83 (1966)]. This document skillfully sets the historical stage for the two translations and makes them more meaningful than they could have been otherwise. Finally, the volume includes a reprint of the atlas accompanying Agassiz's book, with its 18 fine lithographs by Nicolet. Being large, the original atlas has become separated from many of the original copies of Agassiz's treatise and is therefore not often seen.

The translation is extremely tight; in his effort to stay close to the original text, the translator has sacrificed English idiom in some places, and occasionally he betrays the fact that English is not his native language. These matters do no harm, however, to an excellent and highly readable work. I recommend it.

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Physics at Erice

Strong and Weak Interactions: Present Problems. International School of Physics "Ettore Majorana," Erice, Italy, June-July 1966. A. ZICHICHI, Ed. Academic Press, New York, 1966. xx + 859 pp., illus. \$26.50.

Physics establishments concerned with the welfare of high-energy physicists at relatively isolated places have discovered that a summer school is the most convenient and economical and often the only practical means of promoting informal contact between young physicists and the leaders in their field. In view of the sharp increase in the number of young physicists during the last decade, the global proliferation of summer schools is an understandable phenomenon. Unfortunately, however, the number of gifted and creative individuals available as lecturers, as well as the number of serious students with adequate preparation for advanced courses, has not yet increased in proportion. It is not surprising, therefore, that the participants of a typical summer school generally include not only some good scholars and desirable students but also an incongruous assortment of court jesters, professional critics, and salesmen. If the published proceedings are a faithful rendition of the deliberations of the summer school, they will generally contain some grain mixed with a lot of chaff. The volume under review, with its 879 pages, is no exception.

The proceedings of the 1966 Erice summer school are "dedicated to the memory of Ettore Majorana on the anniversary of his sixtieth birthday." It is fitting and proper, therefore, that the technical lectures are preceded by a very informative and occasionally moving account of Majorana's life and work, by E. Amaldi. Amaldi's article will be of interest to all theorists; it may be of special interest to aficionados of infinite-component wave equations.

The inaugural speeches are followed by nine lectures on various theoretical topics (including current algebra, CP, and Reggeology), two experimental lectures on the zoology of mesons and baryons, seven seminars, and a straight transcript of 26 discussion sessions.

Most of the lectures are standard reviews of material available in journals, conference proceedings, and the like; this does not, however, detract from their value as useful adjuncts to the conventional literature. Among the articles which do not quite conform