problem, reviews the evidence concerning the real and potential hazards of excess nitrogen introduced as a result of technology. He points out that if fertilizer residues find their way into the river streams, the nitrate concentration can be so high as to induce eutrophication. In some cases this has also resulted in contamination of well water by amounts of nitrate-nitrogen compounds exceeding the public health limit for potable water. Commoner urges that new methods be explored as a substitute for the widespread use of inorganic nitrogen fertilizers. This view is disputed in a very brief article by T. C. Byerly, who claims that there is "no clear and present danger" due to nitrogen compounds used in crop production. The disagreement between these two experts points up the need for more interdisciplinary research on the matter. As is well known, excess fertilization of lakes, streams, and estuaries is caused also by phosphate products. Evidence for such "contamination" is presented by Arthur D. Hasler, who discusses in a clear manner the causes and consequences of man-induced eutrophication of lakes. It is heartening to read that where corrective measures have been taken degradation due to eutrophication has been effectively reversed.

One of the most serious possible effects of changes in atmospheric environment conditions, either natural or man-made, is on the climate. Yet because there does not exist any satisfactory theory of climatic variations it is not possible to state with certainty what climate change would result from any one of the myriad of suggested causes. Indeed, fluctuations in climate may well involve a whole set of stochastic processes. Attempts must nevertheless be made to understand and evaluate atmospheric variables as they may affect the earth's climate. Two of these factors that are of great concern, because they are closely tied to man's activities, are the increasing particulate load and CO_2 concentration in the atmosphere. These factors are reviewed in the third section of the book. In this group, the paper by J. Murray Mitchell, Jr., dealing with atmospheric pollution as a cause of recent global temperature fluctuations contains a reasonably well-balanced treatment of the problem with a strong appeal to physical reasoning. Mitchell points out that to the extent that the dust content of the atmosphere may have been responsible for temperature fluctuations in the past, natural (volcanic) rather than human activity would have been the chief causative agent. Man's contribution to the particulate load in the atmosphere could well become dominant over the next 25 years, however. A very brief paper by Manabe reviews an earlier study by Manabe and Weatherald on the effect of cloudiness on surface temperature. Manabe points out that although high clouds would have a negligible effect, an increase of about 3 percent in low clouds would (because of an increased albedo) result in a lowering of surface temperature equivalent to that produced by decreasing the atmospheric CO_2 content by a factor of 2. (The two brief articles in the book by Manabe should certainly have been combined for continuity and clarity.)

The final section discusses the problem of ocean pollution by toxic wastes. The subject is introduced by Edward Goldberg, who provides some interesting data on the injection rates of mercury, lead, DDT, and polychlorinated biphenyls into the oceans. An additional indication of the complexity of the pollution problem is the ironical fact pointed out in the contribution of George Woodwell that DDT, which is used to increase agricultural productivity, could destroy a significant part of oceanic fisheries.

A theme that recurs throughout the more thoughtful papers in the book is best expressed in the comment of Woodwell that the solution to worldwide pollution problems lies in controlling the pollutants and "equally importantly in providing a general context within which there is not strong, potentially overwhelming, pressure to use the earth so intensively as to pollute it. . . . It must quickly become the policy of nations to limit population and to restrict those aspects of technology that degrade the common resources, including air, water and land."

This volume is a mixed bag. However, it contains much material of value to the nonspecialist who wants a rational and balanced view of the impact man has had on his environment. In addition, most of the articles cited here have comprehensive references and suggestions for additional reading for those whose interest has been stimulated. The subject matter needs visibility, and this book helps to make that visibility possible.

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Antigens

Immunological Aspects of Neoplasia. ROBERT S. SCHWARTZ, Ed. Karger, New York, 1970. x, 222 pp., illus. $16.30. Progress in Experimental Tumor Research, vol. 13.

This monograph consists of four chapters, two of general interest and two that are relatively highly specialized. The book is not for those who are seeking a concise survey of knowledge relating to tumor immunity, since it makes no reference to tumor-specific or tumor-associated antigens and has only scant reference to the immune response against tumor antigens. F. M. Burnet's chapter, "The concept of immunological surveillance," is provocative but unsatisfying. Burnet discusses the hypothesis that antigenic polymorphism arose in cyclostomes as a defense against parasitism by other cyclostomes. He argues that if a cyclostome preyed on another cyclostome of a related species the result would be catastrophic, because the host would be exterminated and with it the parasite. He cites the devastation caused to Great Lakes trout by the influx of lampreys, but this is tangential arguing because the trout has a highly evolved immunologic system, must be antigenically far removed from the lamprey, and still apparently cannot defend itself adequately. The chapter was written in 1968, and Burnet was evidently unaware of the rapid development of information about tumor-associated antigens of man and laboratory animals, for he concludes his section on "Evidence from clinical sources" by stating, "In general, the more critically the work has been done the more consistently negative the results." His chapter is entertaining but dated.

M. Schlesinger's chapter, "How cells acquire antigens," provides an abrupt contrast in style and content. In discussing the passive acquisition of antigens by coating, he points out how important such a process may be in physiology and that apparent antigenic changes may really be a reflection of a physiologic change—a provocative thought well illustrated by reference to transferrin. The section on recessive genes is short, but compensated for by fuller treatments of "silent" genetic information and of the modifiers of antigenic expression. This and the two following chapters are complemented by comprehensive bibliographies.

An abrupt change from a general to

a specific topic is provided by the next chapter, by June East, on "Immunopathology and neoplasms in New Zealand black (NZB) and SJL/J mice." However, just as Schlesinger's chapter is mostly devoted to antigens other than those associated with neoplasia, so much of East's paper is necessarily devoted to a general description of the immunopathology of the NZB mice, because relatively little is known about nonreticular tumors in these animals. The chapter gives enough of a general discussion of the immunological distortion in these animals to show how the different aberrations can be distinguished by comparisons between NZB and SJL strains, and presents some interesting data on the appearance of malignant reticulum cells, not known to be plasma cell precursors, in a lymphoproliferative spleen. Parts of this article are quite detailed, but as a whole it gives insights into differences in the immunopathology of spleen, lymph node, and thymus.

"Lymphocyte proliferation and lymphoproliferative disorders," by H. Rubin, L. I. Johnson, and S. M. Brown, is in part a general survey of these disorders but deals in considerable detail with ribosomal and RNA changes in lymphoid malignancies. There are several disturbing errors, for example the statement that "in the presence of PHA 60 to 80 percent of normal blood lymphocytes transform into DNA synthesizing blast cells in 2 to 3 days," the 60 to 80 percent having been shown by several excellent kinetic studies to be the result of clonal proliferation of a responding population. Such inexactitudes detract from the value that can be placed upon this otherwise most interesting paper, which does, as the editor claims, give the beginning of an understanding of the molecular biology of the phenomena.

As a whole the book does not give an adequate representation of the emphases and developments in tumor immunity. Perhaps it was felt that such topics as the carcinoembryonic antigen, the development of information about the cytotoxic effects of lymphocytes from cancerous subjects, and the blocking of these effects by serum have been adequately covered in other sources. In all, a very readable book, misleading in part, but also instructive and innovative.

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Metabolism of Plant Organs

The Biochemistry of Fruits and Their Products. Vol. 1. A. C. HULME, Ed. Academic Press, New York, 1970. xxii, 620 pp., illus. $30. Food Science and Technology.

About 50 years ago physiologists investigating the process of fruit ripening for the first time considered it a special aging phenomenon. They used the word "climacteric," with the meaning of "change in life," to designate biochemical changes taking place during ripening. With our increasing insight into particular aspects of the aging of plant organs, we now realize that fruit ripening is not distinctly different from other aging processes. The biochemical pathways, the induction of hydrolytic enzymes, and the changes in the respiratory patterns are very similar to those in other senescing organs. This has made the writing of this book difficult, but the result is very valuable. The authors, with the skillful guidance of the editor, have produced more than merely another plant biochemistry book. This is to say that the editor has carefully selected the topics, and the contributing authors have been so adept that the reader finishes the book with the feeling that he has read a book about fruits and not about general pathways common to many plant organs. At the same time, those who are interested in the pathways themselves will get detailed information.

Any book written by a group of authors will contain variations in its treatment of the subject. The chapters that are selected as best will depend on the reader. One certainly should mention the chapter on lipids by P. Mazliak and the chapter on physiology and nutrition of developing fruits by E. G. Bollard as clearly outstanding.

The book, of course, has shortcomings. I, for one, would like to see an anatomical discussion of the substructure of fruit cells. Most readers probably would not know that most of the mature fruit cells are filled with a single vacuole, nor would they know the biochemical consequences of this. Other shortcomings of the book are the chapters on physiological disorders of fruit after harvesting and on apple scald. Although much is known about the biochemical aberrations leading to physiological disorders, these chapters do not discuss them in depth. The authors consider only the inducing factors and never mention that the fruit can be protected if certain pathways are operational and that some of these pathways can be induced.

In the chapter on hormonal factors in growth and development, only the most general physiology, rather than fruit physiology, is discussed. Although the information presented is interesting, the authors include results obtained with corn kernels, bean seeds, pharbitis seeds, lupin seeds, and bean endocarp, which only loosely can be classified as fruits.

Other chapters deal mainly with the chemistry of the groups of compounds found in fruits, with special reference to their specific roles in the fruit metabolism. The reader will find a wealth of information in the book about sugars, amino acids, proteins, phenolic compounds, pectins, aroma components, carotenoids, and vitamins in addition to enzymatic and hormonal changes occurring during critical stages of maturation and senescence.

The present work and probably its companion volume to come will be among the most effective and widely used books on this subject. This volume stands by itself, however, and can be highly recommended to all plant physiologists and biochemists, student and professional alike, who have an interest in the physiology or biochemistry of fruits.

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A 1969 Flare

Intercorrelated Satellite Observations Related to Solar Events. Proceedings of a symposium, Noordwijk, the Netherlands, Sept. 1969. V. MANNO and D. E. PAGE, Eds. Springer-Verlag, New York, and Reidel, Dordrecht, 1970. xvi, 632 pp., illus. $38.20. Astrophysics and Space Science Library.

A solar flare is the most cataclysmic event that occurs in our solar system. Typically an energy equivalent to 10 billion 1-megaton hydrogen bombs is released in less than 15 minutes. Despite the enormous quantity of data already collected, the basic physics involved in the flare process is still the subject of much acrimonious debate.

The problem lies with the fragmentary nature of the observations. Different observers look at different