Chapters on sediments, water, and life in the pond summarize two and a half years of continuous monitoring of temperature, salinity, water levels, and precipitation. Detailed inorganic and organic chemical analyses are related to hydrologic and productivity studies carried out in various parts of the pond during different seasons of the year. Budgets for water and organic carbon are derived by a variety of approaches. Plants and animals of the pond receive only a brief, quantitative summary.

Despite its small size, this is an important book. Limnologists, biologists, geologists, and geochemists, as well as sanitary engineers and students of pollution and eutrophication, will find this a valuable reference and source book. The consequences of environmental change, whether induced by geologic, climatic, or anthropogenic influences, are clearly and convincingly documented.

Although Emery has drawn freely upon the resources and techniques of his colleagues at Woods Hole, the availability of relatively inexpensive field kits for water analysis and the imaginative application of conventional laboratory equipment should make it possible for individuals or even high schools to undertake similar studies in different areas.

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Poisons in Foods

Toxic Constituents of Plant Foodstuffs. IRVIN E. LIENER, Ed. Academic Press, New York, 1969. xvi + 504 pp., illus. $20. Food Science and Technology, vol. 6.

Food Pharmacology. N. SAPEIKA. Thomas, Springfield, Ill., 1969. xiv + 186 pp., illus. $9.50. American Lecture Series, No. 732.

These books consider the main sources of food contamination: chemicals intentionally or unintentionally added by man during the growing, processing, or storage of foods; environmental contaminants; and toxins present because of their biosynthesis by the ingestible plant or animal. The first source has been the subject of much scientific and legislative activity. Perhaps because of the geographical factors associated with environmental contamination by radioactive or specific mineral toxins, the second source has received somewhat less attention. Regarding the third source, a most interesting issue is raised in the preface of *Toxic Constituents of Plant Foodstuffs*; that is, that our legalistic way of coping with health hazards is seriously deficient with respect to toxins made by plants or animals since "their elimination is not readily amenable to legislative action."

There are encyclopedias of poisonous plants (Kinsbury's *Poisonous Plants of the United States and Canada*, for example); *Food Pharmacology*, which deals mostly with the same topic, must be regarded as a dictionary of the subject. In his first chapter, Sapeika makes his penchant for brevity pay off by providing the reader with an excellent, brief classification of biologically active substances that can occur in food.

On the other hand, in the second, and longest, chapter, on foods of plant origin, the author disposes of the important topic of active principles from plants in seven pages. The remainder of this chapter is an alphabetical listing of poisonous plants with painfully brief annotations regarding characteristics of the plant and symptoms following ingestion, other miscellaneous comments, and a few references, but no suggestions for antidotal procedures. Mycotoxins are introduced as specific contaminants of the class of plants being discussed and then reappear in a later chapter as food contaminants. Pharmacologists who look for the often-cited food-drug problem of cheese and monoamine oxidase inhibitors will not be disappointed, for both pages 88 and 93 belabor this point. Such repetition recurs and does not seem justified in a book consisting of only 148 pages of text.

The short chapters on foods of land and marine animal origin often cite conflicting reports without offering any critical evaluation. Chapters on food additives and food contaminants cover, in a general way, the most important aspects of these topics. This reviewer was a bit surprised to see synthetic sweetening agents given a comparatively innocent verdict while sucrose is pointed to as an insidious culprit. For example, "there is no risk to health in allowing the use of cyclamates in food without limitation except for soft drinks and ice cream" and "continuous use of small amounts of saccharin is virtually harmless," whereas "much work has been done experimentally and clinically to prove that a higher consumption of sugar is an important factor in the causation of ischemic heart disease and that a person taking a large amount of sugar has a greatly increased chance of developing myocardial infarction." It is this sort of uncritical citation of selected references, without the necessary original data, which leads to inaccurate and sensational reports in the lay press. Meanwhile, the currently controversial topic of pesticides in food is shrugged off in less than two pages.

The chapter on beverages contains this incredible statement regarding tea: "It has virtues as a soothing agent and for relieving fatigue." Psychopharmacologists, students, and truck drivers, take note! If I wanted to buy a good source of information on food pharmacology, I would get a copy of the NAS/NRC monograph *Toxicants Occurring Naturally in Foods.*

Most of the topics covered in Liener's *Toxic Constituents of Plant Foodstuffs* also appeared in 1966 in the above-mentioned NAS publication. The newer book, frankly intended to complement the earlier one, covers fewer topics but covers them in considerable depth. This book was written for those who "consider plant proteins as the major source of dietary protein in the future." The selection of topics must then come from those classes of toxins which occur in plants of actual or potential dietary significance. The chapters concerned with specific classes of toxic constituents are presented in a rather uniform format: they generally cover phylogenetic distribution, assays for toxins, toxic manifestations, and mechanisms of action and are extensively referenced. An effort is also made to present the available details on physical and chemical properties of plant toxins and to suggest processing techniques suited to decrease or eliminate the toxicity. For example, in the chapters on allergens it is pointed out that some of these compounds are readily inactivated at 120°C but that normal cooking temperatures of about 100°C are less effective.

The chapters on protease inhibitors, hemagglutinins, goitrogens, cyanogens, saponins, gossypol, lathrogens, favism, allergens, and miscellaneous toxic factors are all done so well it is difficult to single out any one for particular laurels. Considering the importance of cycads in some tropical and subtropical countries and current knowledge of the toxic and carcinogenic properties of the active compound in the plant, however, a

chapter of less than eight pages does not seem adequate.

The chapter "Adventitious toxic factors in processed foods" is concise and complete. It provides a competent review of food additives, processing contamination, and chemical items reaching food by accidental means. Again, the effects of simple processing techniques such as washing or boiling are critically presented. Perhaps the authors felt that other sources have adequately covered artificial sweeteners; discussion of these agents is not presented in this chapter.

Several factors which limit extrapolation to man of results obtained in toxicological studies on animals are noted in the Liener book. These include the lack of suitable animal models for testing plant foods containing goitrogens, lathyrogens, or allergens; the problems of identification and purification of plant toxins; and alterations in toxicity due to differences in mode of administration. Sapeika also suggests that some toxic symptoms may be exacerbated in persons suffering from starvation.

The most didactic chapter in Liener's book is on favism. This condition, in which acute hemolytic anemia follows ingestion of fava beans, is perhaps the most complex and interesting of the food-induced toxicities. The authors note that both inhalation of pollen and ingestion of the beans from the *Vicia faba* plant elicit symptoms in susceptible individuals. The mosaic of epidemiological, biochemical, and genetic factors contributing to this disease illustrates the multifarious nature of the basic studies required in food toxicology.

In the chapter on protease inhibitors the authors point out that the literature dealing with these substances is "fraught with inconsistencies, claims, and counterclaims." Some of these problems apparently arise from "variations in experimental conditions involving such factors as species, . . . strain, age, and sex, composition of the diets employed." Their further complaint that there is often a "failure to use well-defined preparations of the protease inhibitor" is basic to all toxicological investigations and should explain why toxicologists insist that testing be done on adequate amounts of material of high (or at least known) purity.

Although Liener's book is intended primarily for food technologists, it is sufficiently broad in scope to warrant inclusion in the library of any scientist interested in the occurrence of poisons at any point in the food chain. From the number of public statements currently being made, there appear to be many individuals interested in this topic, and if they will take the time to read an excellent text such as *Toxic Constituents of Plant Foodstuffs* some knowledge will be added to their interest.

This reviewer is sure that any manpower utilization survey would show that, for such a universally important commodity as food, there are too few bench scientists involved with methods of assuring its safety.

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Bacteria

Microbial Growth. Nineteenth Symposium of the Society for General Microbiology, London, 1969. PAULINE M. MEADOW and S. J. PIRT, Eds. Published for the Society of General Microbiology by Cambridge University Press, New York, 1969. xii + 452 pp. + plates. $16.50.

The symposia of the Society for General Microbiology have a commendable tradition that makes the resulting publications especially useful. In general, each article combines a particularly thorough introduction and review of the literature (many papers have five to ten pages of references) with a discussion of the particular author's work and views. This volume further benefits by a timely choice of topic—microbial growth—and the decision to define the subject very broadly. Included in the first section, Growth of Populations, are papers on energy production and utilization in growth, regulation of enzyme synthesis (from the standpoint of determining the physiologically important effectors of a pathway controlled by a balance of induction and catabolic repression), effects of oxygen and carbon dioxide on growth, and growth in extreme environments. And included in the second section, Growth and Differentiation of Cells, are papers on control over the cycle of DNA synthesis, the development of subcellular organelles, growth of animal and plant cells in tissue culture, spore formation, and slime mold differentiation.

This symposium differs from most recent works on the determinants of cell growth in that the talks stress more the unknown and yet-to-be-accomplished than the known. Indeed, if one has become blasé about the accomplishments of studies of microbial subsystems, such as are exemplified by the characterization of the *lac* repressor protein, then reading any one of the articles concerned with a greater-than-subsystem view of the cell should return one to what I think will prove to be a more realistic position.

Three articles in particular underline the dearth of knowledge on the regulation of cell growth: J. Maynard Smith's introductory remarks on the limitation of the growth rate of a cell, B. C. Goodwin's "Growth dynamics and synchronization of cells," and that by A. G. Marr and his collaborators, "Growth and division of individual bacteria." In each of these three instances we see that for the particular question at hand, the maximum rate at which a cell can grow, the periodicity of enzyme synthesis, and the periodicity of cell division, we do not know even which cellular components have primary roles in the regulatory networks controlling these functions.

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Books Received

ABM. An Evaluation of the Decision to Deploy an Antiballistic Missile System. Abram Chayes and Jerome B. Wiesner, Eds. xxii + 282 pp., illus. Harper and Row, New York, 1969; cloth, $5.95. Signet (New American Library), New York, 1969; paper, 95¢.

Abundant Nuclear Energy. Proceedings of a symposium, Gatlinburg, Tenn., August 1968. W. W. Grigorieff, Coordinator. Division of Technical Information, U.S. Atomic Energy Commission, Oak Ridge, Tenn., 1969 (available as CONF-680810 from Clearinghouse for Federal Scientific and Technical Information, Springfield, Va.). vi + 354 pp., illus. Paper, $3. AEC Symposium Series, vol. 14.

Achievement-Related Motives in Children. Papers presented at a research conference, New York, October 1967. Charles P. Smith, Ed. Russell Sage Foundation, New York, 1969. viii + 264 pp. $8.75.

Administration and Policy-Making in Education. John Walton. Johns Hopkins Press, Baltimore, ed. 2, 1969. xii + 228 pp. $6.95.

Advances in Enzymology and Related Areas of Molecular Biology. Vol. 32. F. F. Nord, Ed. Interscience (Wiley), New York, 1969. vi + 546 pp., illus. $19.95.

Advances in Geophysics. Vol. 13. H. E. Landsberg and J. Van Mieghem, Eds.

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