ent monograph by Vand and Pepinsky. These authors agree that, except for certain approximations that are probably of little importance, Hauptmann and Karle's derivation is correct. But they claim that the most probable phases will not always be the true phases and, moreover, that the discrepancies will not be random but systematic and of such nature as to produce in general an incorrect structure, resembling the Patterson function (self-convolution) of the structure more than the structure itself. In a simple case that they present this is indeed what happens, but their case may be too simple to meet the basic requirements of any statistical method.

The controversy is by no means settled yet. But such a controversy, if pursued in good spirit, can benefit the science greatly. Vand and Pepinsky's monograph is a case in point. They have presented their case admirably, and they have put forward a considerable number of new ideas.

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Mammalian Hybrids. A check-list with bibliography. Annie P. Gray. Commonwealth Agricultural Bureaux, Bucks, Eng., 1954. 144 pp. 21s.

This annotated compilation of records of hybridization of mammals lists more than 300 cases, a surprising number. It is also surprising how many of these hybrids have been fertile.

A bibliography of more than 600 titles and an excellent index are included. There are interesting notes on behavior, fertility, and physical characters.

Naturally, in a work of this sort there are a number of omissions, but this book will be welcomed by biologists, especially those interested in mammalian genetics, as a reference and as a guide.

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Autotrophic Micro-organisms. Fourth Symposium of the Society for General Microbiology held in April 1954. B. A. Fry and J. L. Peel, Eds. Cambridge Univ. Press, New York, 1954. ix + 305 pp. Illus. $5.

In the beginning there must be synthesis. Autotrophic microorganisms are independent of the more elaborate forms of carbon compounds, being able to live and multiply in an environment containing carbon dioxide as the sole source of carbon. Many organisms may live autotrophically—others have to. In this book a group of scientists from Britain, the U.S.A., Norway, and Holland record the discussion at a meeting in London regarding the physiology, biochemistry, metabolism, production, and economic importance of these organisms. Early chapters simplify the nomenclature, describe connections with other types of organisms, and show that although simple in the nutritional sense the autotrophs have a greater range of biochemical accomplishment than any other living creatures. Later chapters delineate present knowledge of these simple and mainly aquatic bacteria and algae and indicate many possibilities for the development of this knowledge in the future. Thiobacilli, nitrifying bacteria, blue-green algae, photosynthesis, the utilization of organic compounds, and energy relationships are dealt with in turn.

The economic importance of the autotrophs is discussed in the final chapter. By accumulation of chemical energy by the phytoplankton (photoautotrophs), by the nutrition of higher green plants, by improvement of eroded soils, by sewage disposal, by increasing the yield of fish, or by the production of sulfur, they can or may in the future be of great use. Destructive effects such as corrosion of iron, ships, rubber, and cement, and the occasional mass mortality of fish, are dealt with.

This is a valuable collection of data for workers in this field. Its interest to others arises both because of the substantial conformity that these microorganisms show in their metabolic pattern with all forms of life and because of the occasional striking biochemical differences that are present. The book, well produced and well written, has accomplished its aim of providing an account of the present position in this expanding field of knowledge.

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Elements of Food Engineering. vol. II: *Unit Operations.* Milton E. Parker. With the collaboration of Ellery H. Harvey and E. S. Stateler. Reinhold, New York, 1954. vi + 360 pp. Illus. $8.50.

This is the second volume of a three-volume series. In the first volume, published in 1952, the authors described different classes of refined food products and *what* is usually done in the way of processing to produce the product. Processing equipment was only incidentally mentioned. This second volume places more emphasis on *how* the processing is done.

The 10 chapters (chapters 14–23) in this volume cover unit operations concerned with assembly, preparation, and conversion of raw materials. The book is profusely illustrated with pictures and diagrams showing typical equipment and processing layouts for operations in a diversified group of food industries. For example, the cleaning of raw materials is illustrated by pictures and diagrams covering gyrosifters, Entoleters, spinach dry cleaners, automatic bottle cleaners, hydraulic scrubbing equipment, whirlpool washers, air purifiers, filters, clarifiers, and so forth. The treatment is descriptive rather than critical.

The authors have assembled a large and diversified list of standard pieces of food processing equipment, along with descriptions of how each fits into normal commercial operations. This should provide undergraduate students of food technology with an excellent introduction to the broad scope of food process-

ing and acquaint them with the types of standard commercial equipment available to carry on the different elements of processing in the many special areas of the food industries.

This is not an engineering textbook in the usual sense but a descriptive introduction to food processing. Since it attempts to cover everything from washing spinach and dehairing hogs to freezing and canning in a total of 347 pages, there can be no exhaustive treatment of any of these operations. However, because so many engineering students have little or no acquaintance with food processing, this book should provide them with a needed general view of the types of operations and, in particular, the kind of equipment normally used in the food industries. The information is sufficient to indicate the principles involved in the handling of food products as differenitated from other materials.

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Heat Transmission. William H. McAdams. McGraw-Hill, New York–London, ed. 3, 1954. xiv + 532 pp. Illus. $8.50.

The third edition of this outstanding textbook and reference book reflects the progress made in the area of heat transmission since the publication of its predecessor 12 years ago. New information and data have been added to provide an up-to-date presentation of practically all phases of heat transfer that are of interest to practicing engineers, scientists, and students. The book provides a critical review of much of the existing experimental data, thereby relieving the design engineer of comparing and evaluating data from several sources.

The general modes of heat transfers, conduction, radiation, and convection are covered in 15 chapters. The chapter titles are "Introduction to heat transmission," "Steady conduction," "Transient conduction," "Radiant-heat transmission," "Dimensional analysis," "Flow of fluids," "Natural convection," "Introduction to forced convection," "Heating and cooling inside tubes," "Heating and cooling outside tubes," "Compact exchangers," "High-velocity flow," "Condensing vapors," "Boiling liquids," and "Applications to design." Many useful tables and charts are included in the appendix. An extensive and important bibliography and author index are presented for each chapter.

One of the significant modifications in the third edition is a revision of the chapter, "Radiant-heat transmission," which was prepared by H. C. Hottel. New charts have been included for evaluating the emissivity in the section on gas radiation. The carbon dioxide and water vapor charts have been expanded to allow the engineer to estimate the gas radiation at temperatures encountered in rocket work. A new generalized procedure based on the use of determinants has been incorporated to cover the case of radiant energy exchange in a multisurface gray enclosure containing a nongray absorbing and emitting gas.

Another new feature of the third edition is the addition of chapters entitled "Natural convection," "Compact exchangers—packed and fluidized systems," and "High-velocity flow; rarefied gases." Much of the material in the latter two chapters was heretofore available only in scattered technical publications.

This is an authoritative treatment of the field of heat transfer and is highly recommended for engineers and scientists who are engaged in analyzing problems in this area of engineering.

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Technical Papers

Nuclear Volume and Testosterone-Induced Changes in Secretory Activity in the Submaxillary Gland of Mice

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The secretory activity of the tubular portion of the submaxillary gland in mice is stimulated by androgens (*1*), and it has been demonstrated that this is correlated with a significant increase in the volume of the nucleus (*2*). These findings favor the view that the nuclear volume is related to the secretory activity of the cell (*3*).

Junqueira (*4*), Rabinovitch (*5*), and Fernandes and Junqueira (*6*) have shown that ligature of the excretory duct induces a considerable diminution of the secretory activity of the cells. The glands, however, do not degenerate and are able to respond in the normal way to stimulation by testosterone. Such findings offer new approaches to the study of nuclear phenomena as related to cell secretion, since they permit control of the secretory activity of the cells.

Male white mice were used in the present study. The ducts of the right submaxillary glands were ligated, the left glands serving as controls. In a first set of experiments, 20 mg of testosterone propionate in powder form was implanted under the skin of adult mice 30 days after the ligature of the excretory ducts. Control animals were submitted to the same operation, the implantation of the drug being omitted. The animals were killed 15 days later, and the submaxillary glands were removed and fixed 6 hr in Helly's fluid. In a second set of experiments, immature animals weighing 15 g were castrated, the right submaxillary glands