and discusses the reasons for the occurrence of these pigments.

A description of a deep-sea squid, an account of the distribution of Pogonophora in the Atlantic Ocean, a summary of the results of the continuous plankton recorder survey of the North Atlantic, and an analysis of the seasonal movements of sperm whales are provided by other reports. Thus the volume as a whole, while not attempting to summarize or review the field, presents authoritative and reflective accounts of significant recent investigations. It is well worth the attention of those working in marine ecology and biological oceanography.

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Definitions and Derivations

The Dictionary of the Biological Sciences. PETER GRAY. Reinhold, New York, 1967. 612 pp., illus. $14.75.

Peter Gray is well known in the biological community as an indefatigable organizer, an encyclopedist, a gourmet, and, as the present volume confirms, a brave man. His introduction is a vigorous and enjoyable statement of definite purpose and convictions. The publisher's jacket informs us that the work contains 40,000 definitions, including botanical and zoological taxa down to families, mutant genes and their symbols, and organic compounds of biological importance: an impressive array.

Without question such a dictionary is needed. Our schools and colleges are full of students and teachers struggling (or so we hope) to master an increasingly diversified biological literature. The only similar volume of which I am aware is the much more restricted *Dictionary of Biological Terms* by Henderson and Henderson (revised by Kenneth; 8th edition, Van Nostrand, 1963).

An analytic arrangement has been adopted: entries are listed by roots wherever possible. An advantage of this sometimes cumbersome system is the attention called to derivation of words. Unfortunately, the typography and layout do not reinforce the organization. All headings are of the same size boldface type, and indentations are too inconspicuous to help the eye.

The essence of a dictionary, however, lies in the quality of definitions. A student asks for information, that is, clarity and accuracy of statement. One may also hope for some insight and some incisiveness. What one finds here too often is, according to my sampling, some carelessness of detail and an imprecision of focus that may be misleading. (Let me say at once that this failing is not limited to the present volume).

To illustrate by two random examples: *Dialysis* and its derivatives have a long history of ambiguous usage. Gray lists *dialysis* under *-lys-* and gives two meanings: "*1* . . . the separation of large from small molecules by their passage through a membrane of suitable pore size (*cf.* dialytic)" and "*2* . . . a separation of parts of a plant usually associated." Under *dialytic*, however, one finds only a botanical usage. There is no entry for *dialysate*. The Henderson dictionary defines *dialysis* as "Separation of dissolved crystalloids and colloids through semipermeable membrane, crystalloids passing more readily; permeation." *Dialysate* is defined as the substance passing through the membrane. *Webster's Third International New Dictionary* says, "*Dialysis* . . . the separation of substances in solution by means of semipermeable membranes . . . through which the smaller molecules and ions diffuse readily whereas the larger molecules and colloidal particles diffuse very slowly or not at all. . . ." *Dialysate* is defined as either the material passing through the membrane or that failing to do so. Second example: we all know what the cell nucleus is. Gray: "that organelle with [*sic*] the cell in which almost all of the nucleic acids are concentrated." Henderson: "Complex spheroidal mass essential to life of most cells." Webster's disquisition is too long to quote in the present space. Among these versions the reader may make his choice, or perhaps be impelled to write his own. We may agree that the essential qualities listed above are not universally displayed by people who write dictionary definitions.

Gray has asked for corrections. It is to be hoped that this undoubtedly useful volume will have a long career and will gain precision in the course of its use.

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Liquid Helium

Experimental Superfluidity. R. J. DONNELLY. Compiled by W. I. Glaberson and P. E. Parks. University of Chicago Press, Chicago, 1967. 272 pp., illus. Paper, $3.50. Chicago Lectures in Physics.

Now, 60 years after Kamerlingh-Onnes first liquefied helium and 30 years after Kapitza's experiments characterized superfluid flow in liquid helium II, there are still many deep, unsolved problems in the subject. Donnelly's book is an introduction to some of the important problems in superfluidity, with emphasis on problems of rotating helium and mobility of charges in liquid helium. It derives from notes taken during a course the author gave at the University of Chicago in 1966. Although the book is intended for experimentalists, the theoretical background is supplied in such detail and clarity that it can be recommended for all theorists as well.

The book provides first a brief chapter, of interest to everybody, on low-temperature physics. In it Donnelly discusses several ways of reaching low temperatures, including adiabatic demagnetization and He^3-He^4-mixture refrigerators, and of measuring the temperatures involved.

Experimental physicists will find that a particular charm of the treatment is the description of recent key experiments in close association with the appropriate theories. For example, a series of modern experiments on viscosity and critical velocities of He-II is used to introduce the two-fluid model of liquid helium, and details of the theory are brought out by reference to several experiments on fluid oscillations and isothermal flow. The treatment of the two-fluid model is naturally extended to a discussion of observed wave modes in bulk helium and helium films and then to a lucid description of the breakdown and modification of the model in application to macroscopic quantum effects. The quasi-particle model of liquid helium is used to calculate the phonon and roton contribution to thermodynamic properties in an elegant application of quantum statistical mechanics to the problems. These results are used to relate experiments on the mobility of ions to the excitation spectrum and liquid structure factor of liquid helium. The last chapter of the book is a detailed modern account of all aspects of ions in liquid helium, one of the specialties of