with the theory of hearing; three with information-theoretic aspects of spoken speech, two with mechanical recognition of spoken sounds; others deal with the behavior of telephone users as affected by circuit properties, the communication rate of a speech link, and speech synthesis; the concluding heterogeneous group of four papers is labeled "associated studies." These four are devoted to an application of information theory to optics, an information theory of the statistical structure of language, an attack on the problem of semantic information (as distinguished from the engineering problem of transmission of choices from a sequence of alternative symbols with no account taken of possible "meanings"), and a discussion of information generators, that is, machines from which "meaningful" information, rather than messages made by a monkey with a typewriter (noise in a semantic but not in an engineering sense), can come.

The contributors are important workers in their fields, the quality of presentation is generally excellent, and the level of discussion is advanced. Many trees in the forest of communication theory are examined, and the discussions after each paper are often quite illuminating. The international flavor of the symposium is another indication of the current vitality of the field, with Great Britain, the United States, Holland, Germany, France, Sweden, Switzerland, Israel, and Poland-in-exile represented among the contributors. The specialist will find the book a useful reference.

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Energy Metabolism and Nutrition. Raymond W. Swift and Cyrus E. French. Scarecrow Press, Washington, D.C., 1954. 264 pp. Illus. $5.75.

The stated objective of this book is

> . . . to bring together various methods of direct and indirect calorimetry and to point out the applicability of each in modern nutrition science. . . . It is the hope of the authors that mature but relatively inexperienced students in biochemistry and physiology . . . may find this book of value as a guide in forming a coherent understanding of theory and practice.

The typical problems in the appendix are extremely valuable in presenting the principles and practices of energy metabolism to the student of nutrition, physiology, and biochemistry at the senior and graduate levels. The footnote references with full titles in the original languages, which range over nearly two centuries, give the book a time dimension. However, the authors missed a grand opportunity by not presenting their investigations in a historical framework for the following reasons.

The authors are senior members of the recently organized Department of Animal Nutrition, The Pennsylvania State University. This department is successor to the famous Institute of Animal Nutrition, Pennsylvania State College, that was organized at the turn of the century by Henry Prentiss Armsby (1853–1921), the ablest American investigator of farm-animal nutrition, particularly that of cattle, during the previtamin era. In 1898 the U.S. Department of Agriculture provided Armsby with funds to build an Atwater-Rosa type respiration calorimeter for cattle. Use of the resulting calorimeter began in 1901 and continued until Armsby's death. The researches of the Armsby group on the net energy values of cattle feeds and on many related problems of the greatest interest will forever remain one of the most brilliant chapters in the history of cattle (ruminant) nutrition. Unfortunately, only scattered references are casually given to Armsby's epochal contributions.

E. B. Forbes, Armsby's successor as director of the institute, gradually shifted from the use of this respiration *calorimeter* to the use of the respiration *chamber,* of which there were already several in use; and later the Forbes group drifted from cattle to rat calorimetry. This work on rats is being continued by the authors of this book. The effect of plane and composition of diet on its productive energy as determined on rats is of great interest. It is, however, a pity that the only direct respiration calorimeter for cattle in the world is not being utilized for solving problems that cannot otherwise be solved. For instance, nothing is known about the amount of heat produced in the rumen by anaerobic fermentation, and how this heat production is influenced by the nature and amount of feed supply, breed and species, and environmental temperature. This rumen heat production could be estimated by taking the difference between the heat produced by direct calorimetry and that produced by indirect (O_2 consumption) calorimetry.

The major value of this book, then, consists in bringing together the research methods and aims of three successive research groups—Armsby *et al.,* Forbes *et al.,* and the authors—at the same institution although of a different name. The major defect is the failure to give the student a historical perspective to a massive landmark in the history of nutrition research in this country. Institutions, departments, and research projects, like individual men and women, have fascinating histories with triumphs and tragedies. The scheduled appearance of a biography of Armsby by the senior author in the Sept. (1954) issue of the *Journal of Nutrition* does not justify this historical omission in a book designed for senior and graduate students who are in particular need of historical orientation and broad perspectives.

The other parts of the book furnish condensed reviews of the scattered literature on nutrition and related subjects, including acid-base balance; endocrine secretions; muscular activity; work efficiency; basal metabolism and surface area; undernutrition, obesity, and energy metabolism; metabolism of diabetes; and so on.

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