added much detailed knowledge about nodule structure.

The author's background gives him particular competence with the nonleguminous plants and the blue-green algae. In chapter 3, the groups of nonleguminous plants which fix nitrogen are cataloged. Because the endophytes in these root nodules have been resistant to cultivation free from the host, information about them is indirect. However, the structure of nodules, their formation, and the site of fixation are covered very effectively.

In a chapter on the physiology of symbiotic nitrogen fixation, Stewart has chosen to discuss the carbohydrate-nitrogen ratio, the transfer of fixed nitrogen in the plant, the physical and nutritional factors influencing fixation, and the effect of gases.

The treatment of nitrogen fixation in free-living organisms is divided into chapters on blue-green algae, bacteria, and the physiology of the process. These chapters include helpful compilations on the species of blue-green algae and the groups of bacteria that have been reported to fix nitrogen. The interaction of blue-green algae with other organisms presents a number of interesting biological associations. Each group of nitrogen-fixing bacteria is discussed briefly in an attempt to put them in perspective. In chapter 6 Stewart also lists the organisms that have yielded active cell-free preparations and discusses the requirements of these preparations for nitrogen fixation.

Chapter 8 deals with the biochemistry of nitrogen fixation. The author perhaps takes the oxidative pathway of nitrogen fixation too seriously. The discussion of current concepts of the mechanism of nitrogen fixation is good.

The final chapter is concerned with nitrogen fixation in the field, and the difficulties in obtaining quantitative results are properly stressed. The best data available are organized in assessing the practical importance of the various nitrogen fixers.

The list of references is excellent, and only a few that are of real importance to development of the broad picture have been omitted. The index is comprehensive and well arranged. The format of the book is attractive and the price is modest.

The author accepts a number of points from the literature which I question seriously. Although these may reflect legitimate differences of opinion, it appears often that the data at issue really are questionable and should be labeled as such. Despite some lack of critical evaluation in the text, Stewart is to be congratulated on writing a clear, readable, and very helpful book on nitrogen fixation.

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Marine Biology

In **Meeresbiologie: Eine Einführung in die Probleme und Ergebnisse** (Borntraeger, Berlin, 1965. 434 pp., DM. 88), Hermann Friedrich surveys the scientific problems, goals, and results of marine biology, primarily for students and nonprofessional marine biologists; however, his book will also be useful to scientists familiar with the sea. The well-organized text treats the development of marine biology, methods, and abiotic and biotic ecological factors (98 pp.); animals and plants of the pelagic realm (76 pp.) and of the benthos (95 pp.); the distribution of organisms in space and time (83 pp.); inhabitants of the marginal zones of the sea, including brackish water (18 pp.); and economic aspects (9 pp.). Since sufficient introductory information is presented, the reader need not resort to other texts on the ocean. There are 220 figures, a moderately extensive index, and almost 800 references.

The book stresses the ecology of species; the physiology of marine organisms is not considered to any extent. Emphasis is placed on the animals; bacteria are merely mentioned. The chapter on the benthos seems to be stronger than that on the plankton. Both chapters deal intensively with form and functions ("Lebensformtypen," like feeding and locomotory types) and with reproductive biology. There are a great many suggestions for further investigations, although many of the phenomena are not accessible to experimentation. I wish the author had provided more detail in some places rather than referring to the literature. The slightly speculative treatment of evolutionary aspects might be taken as a challenge.

More is said on autoecology than on synecology because more information is available on the former. Although problems of the biological classification of the marine environment are not stressed, a better integration of the terminology would have been helpful. Use of the term "biocoenosis," with its implications of close biological relationships between the species of the associations, although explained, is avoided. Marine production is discussed in the chapter on distribution. This is essentially a consideration of standing stock; the treatment of processes and rates is not fully up-to-date.

A few literature quotations in the text are handled inconsistently. The figures are clear throughout, but the captions to some figures and tables are deficient or are not even given. Also, inconsistencies in the choice of dimensions used in the text and figures, and in labeling the figures (sometimes in English), could be remedied easily in a new edition or translation.

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Aspects of Biophysics

What does biophysics mean? A definition is not as illuminating as an inspection of what biophysicists are actually doing. I recommend **Molecular Biophysics** (Academic Press, New York, 1965. 462 pp., $19.50), edited by Bernard Pullman and Mitchel Weissbluth, to the nonbiophysicist who is curious about the nature of the field and to the biophysicist himself who could scarcely know all the subjects that are discussed in this book.

Molecular Biophysics is a collection of 15 essays—written by a biologist, a physicist, a biochemist, an applied mathematician, a biophysicist, and eight physical chemists—on a wide variety of topics, ranging from valence theory and radiofrequency spectroscopy through nucleic acid structure and function to muscle contraction. The papers were presented at an international summer school sponsored by the North Atlantic Treaty Organization and the Office of Naval Research and held at Squaw Valley, California, in August 1964. Some of the contributions are elementary, others rather sophisticated. Some authors deal directly with biological problems; others treat problems that are only tangentially involved in biology. The individual contributions are almost all of a very high order, although again some present new material and others are general reviews of classic subjects.

In a virtuoso performance, J. S. Griffith contributes a succinct chapter on electron spin resonance in certain biologically important iron compounds and a fascinating one on information theory and memory.

The overall effect of the book is that of a delicious smorgasbord. It is unfortunate that the cost of the menu ($19.50) will limit the number of diners at this restaurant. Isn't it time for all of us to recognize the fact that the future belongs to the mass-produced journal and to the mass-produced textbook rather than to a group-written reference book with inarticulated contributions and a limited press run and sale? The material in this book deserves a far better fate; I hope that those parts which have not yet been published in journals will eventually appear in a more accessible form.

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Animal and Human Nutrition Series

More than 800,000 Americans die each year from diseases of the heart and blood vessels, and millions more who struggle to do their daily work are handicapped by afflictions of the cardiovascular system. Many of these mortalities occur when the individuals are at the peak of their productive powers and in the age range of 35 to 65 years. The two diseases that account for most of the cardiovascular deaths are coronary heart disease and high blood pressure. In the past both were regarded as inevitable consequences of an aging population, but today a new and dynamic approach considers them the result of factors in the human environment that interact in susceptible individuals. The key causative environmental factor is the food that man eats. In the past, deficiencies of food produced disease. Today, overconsumption of certain foods and food additives are believed causative of many cardiovascular disorders.

Eörs Bajusz's book, **Nutritional Aspects of Cardiovascular Diseases** (Lippincott, Philadelphia, Pa., 1965. 264 pp., $12), is concerned with the role of nutrition in the genesis of cardiovascular disease. Bajusz appropriately stresses two dietary ingredients: (i) fatty foods derived from animals (saturated fat and cholesterol) that are important in the causation of coronary heart disease, and (ii) minerals in the diet that are significant in the problem of high blood pressure. The author, an adherent of the Selye school of thought, interweaves dietary mineral intake with stress and hormonal output from the adrenal gland as related factors in the causation of heart disease.

A classic example of his discussion might be the man with coronary heart disease who dies suddenly while shoveling snow from his driveway. This man has had circulatory impairment for years. Large atherosclerotic plaques in the coronary arteries impede the flow of blood that supplies the heart muscle with nutrients and removes the end products of metabolism. Two problems exist in such cases: the atherosclerotic plaques that are presumably derived from a lifetime of excessive intake of animal food, and the cardiac standstill or necrosis which occurred during snow shoveling and which led to sudden death. Bajusz suggests that both problems are preventable. Human atherosclerosis may be prevented by a reduced intake of animal food and a change in the amount of fat consumed. Particular emphasis is placed on the electrolyte imbalance that occurs in heart muscle cells. Perhaps the stage was set for sudden death by a previous high dietary intake of sodium and a low intake of potassium, ions most important in determining the cellular levels of potassium. Other dietary minerals important in cardiac disease may be magnesium and chloride.

The hypotheses put forth in this book are supported by a wealth of experimental data, many derived from the author's own investigations. The evidence that dietary factors causes atherosclerosis and coronary heart disease in man is strong and well supported by data from both animals and man. The evidence that dietary minerals cause cardiovascular disease in man is more circumstantial and is derived largely from animal experiments. As the author states, "the most conspicuous weakness of the present volume is its failure to present . . . data" providing direct proof that dietary changes in sodium and potassium would prevent certain heart diseases in man. Such investigations should be done in the future, just as there are now many human trials of altered dietary fat and cholesterol content aimed at changing coronary heart disease mortality. Bajusz has offered a refreshing challenge.

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Mammalian Genetics

In this book, **Genetics of the Norway Rat** (Pergamon, New York, 1965. 814 pp., $30), Roy Robinson has performed a useful service in bringing together an impressive bibliography on rat genetics, with chapters on pelage and color, growth and metabolism, reproduction, endocrinology, skeleton and viscera, sense organs, nervous system, hematology and immunogenetics, pharmacogenetics, disease resistance, tumorigenesis, learning and behavior, chromosomal variations, named unit genes and inbred strains, changes during domestication, and failure of attempts to prove acquired inheritance. The longest chapter (168 pp.) is concerned with psychogenetics, the second longest (57 pp.) with growth and metabolism.

Some of the information, particularly certain studies of growth, reproduction, and susceptibility to dental caries, and recent studies of behavior, has come from carefully designed and performed genetic experiments. These are paraphrased fully and faithfully. Other information has come as a by-product of the use of laboratory rats of varying genetic origin in a wide variety of experiments and assays. Robinson has located and recorded an amazing number of entries of this second type. Some of these are of great potential value—for example, as evidence of genetically controlled metabolic differences disclosed in biochemical and pharmacological experiments. Others are only of anecdotal interest. Both types are reported through brief summaries, frequently lacking in sophisticated genetic insight. However, where original findings appear to conflict, good attempts are made to reinterpret and collate.

A chapter mistitled "Cytogenetics" provides a check list of gene symbols, including mutants at 34 genetic loci plus 15 antigenic differences representing alleles at an unknown number of loci. In this same chapter there is a list of 57 established inbred strains, with brief descriptions of rec-