most of the changes in our fisheries because this proved to be the case in my first effort in the field of population study."

In the case of marine fisheries for species that have a high reproductive potential, such as the sardine, environment may properly be assigned a relatively important role, if not a dominant one, in designating the possible factors that determine numerical population changes. Supporting this side of the debate, Merriman concludes (*Sci. Monthly,* **68**, 13 [1949]) ". . . in fisheries with large numbers of eggs the fluctuations in abundance are likely to be due more to the environment than to the size of the adult stock."

The symposium review article does not overlook the importance of ecological factors in their relation to natural fluctuations. Quite the contrary, it points out (p. 2) that "Knowledge of how the ecological factors of the marine environment influence the size and composition of the catch is quite as important as an understanding of how fishing intensity affects the population," and again (p. 4) that "In the ocean, interest centers on the effect environment exerts on population numbers." Here, we are clearly in agreement. In fact, from what I am able to glean from Burkenroad's communication, we may be more in agreement than in disagreement. Obviously, one should hesitate to jettison, arbitrarily and without comparable supporting record, the findings and hypotheses of some of the most widely experienced fishery investigators—such as Thompson and Taylor—much less to relegate a serious consideration of their contributions to the realm of naïveté.

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Erratum

In the article entitled "The Use of an Ion Exchange Resin for the Hydrolysis of Casein and Coffee Proteins" (SCIENCE, **115**, 95 [1952]), we have inadvertently omitted glycine 4.53 and 4.38 mg of nitrogen for the HCl and resin hydrolysates, respectively, in Table 1.—G. E. UNDERWOOD and F. E. DEATHERAGE.

Book Reviews

Biochemistry and Physiology of Protozoa, Vol. I. André Lwoff, Ed. New York: Academic Press, 1951. 434 pp. $8.80.

In the introduction the editor states, "For the future development of protozoan biochemistry, it seems of utmost importance that an atmosphere develop in which more biochemists may feel, without external pressure, that many problems of the biochemistry of Protozoa are now ripe for further investigations. . . ." The book aids in creating such an atmosphere.

A section on phytoflagellates by S. H. Hutner and L. Provasoli discusses, with extensive references, the comparative biochemistry and photosynthesis, including suggestions for demonstrating in phytoflagellates types of photosynthesis similar to those found among bacteria, and for testing postulated first products of photosynthesis by supplying them as nutrients to obligate phototrophs; evolution and biochemistry of photoreceptors; biochemistry of "acetate" flagellates; induction of apochlorosis with streptomycin; vitamin requirements, with particular reference to B_{12} nutrition and assays of bound vitamins using phagotrophs; mineral requirements and chelating agents for mineral buffering; and sexuality in *Chlamydomonas.* Many speculative ideas are developed that should stimulate experimental investigation.

In "The Nutrition of Parasitic Flagellates (Trypanosomidae, Trichomonadinae)," M. Lwoff reviews the requirements of trypanosomes for hematin and the evidence that ascorbic acid is an essential growth factor. The effect of changes in chemical configuration on thiamin activity is of particular interest. The anaerobic nature and the sugar fermentation of *Trichomonas* are described. Cailleau's detailed work on the cholesterol requirement of *T. columbae* is reviewed, including the experiments on the influence of chemical configuration on activity. These experiments constitute some of the most convincing evidence that protozoa may contribute notably to biochemistry.

Von Brand's extensive researches on the metabolism of parasites qualify him for the authoritative discussion of the "Metabolism of Trypanosomidae and Bodonidae." The high oxygen consumption of certain trypanosomes and its variation with developmental state are described. The carbohydrates fermented and their fermentation products are given, and fat and protein metabolism is briefly reviewed. The mechanism of host injury and the action of drugs on trypanosomes are discussed in detail.

A short chapter on the "Nutrition of Parasitic Amebae" by M. Lwoff emphasizes the oxidation-reduction potential and the requirement for cholesterol.

In "Biochemistry of *Plasmodium* and the Influence of Antimalarials," R. W. McKee discusses the blood changes accompanying infection, *in vivo* and *in vitro* nutrition, metabolism, natural immunity, and antimalarials. Investigations in this field have proceeded so rapidly since the war that this organization of results is particularly appropriate.

The section on "Biochemistry of Ciliates in Pure Culture" deals chiefly with *Tetrahymena,* the most studied ciliate. G. W. Kidder and Virginia Dewey, themselves active contributors in the field, have pro-

vided a detailed account of the nutrition and metabolism of pure cultures of ciliates. The complexities in the nutrition of these "simple" animals, and the few species that have been pure-cultured, constitute a challenge to biologists and biochemists.

The entire volume, with its repeated emphasis on comparative biochemistry and physiology, should prove stimulating not only to protozoologists but to biologists and biochemists generally. It is quite clear that the "little animals" present many intriguing problems.

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The Vitamin B Complex. F. A. Robinson. New York: Wiley, 1951. 688 pp. $9.00.

Knowledge of the individual compounds that comprise the vitamin B complex, and of their significance in nutrition and metabolism, has grown tremendously in recent years. Despite this fact, and the difficulties in orientation that it entails for the newcomer to the field, no up-to-date monographic treatment has been available until recently. This book was written to fill the gap; in the meantime, another monographic treatment of the same field has appeared (Williams *et al. The Biochemistry of B Vitamins,* Reinhold [1950]).

The present book treats each of the B vitamins (thiamin, riboflavin, niacin, vitamin B_6, pantothenic acid, biotin, folic acid, vitamin B_{12}, *p*-aminobenzoic acid, inositol) in a separate chapter, each organized under 6–22 subheadings. These include topics such as history, isolation, synthesis, properties, stability, methods for determination (chemical, biological, and microbiological), distribution in foodstuffs, effect of deficiencies in man and animals, effects on microorganisms, metabolism, analogs, etc. Bibliographic references are given at the end of each of the subsections, a practice that increases the ease of referring to them. This tends to create a discontinuity in the text, however, and frequently necessitates several printings of the same reference at different places in a single chapter. Good author and subject indexes are provided.

The diversity of the topics covered, and the large number of original papers surveyed, preclude an intimate knowledge of each topic by a single author; consequently, it is not surprising to find a considerable number of factual and interpretative errors in the text. Some of these, but by no means all, result from an uncritical acceptance of claims made in the original literature, but later corrected. For example:

N. sitophila can utilize pyridoxal, pyridoxamine, or pyridoxine with equal facility in satisfying its vitamin B_6 requirement, despite the statement (p. 313) that it utilizes only pyridoxine. Similarly, *Streptococcus faecalis* R and *Leuconostoc mesenteroides* P-60 grow without added riboflavin, despite the statement (p. 204) to the contrary. The reported growth and antianemic properties of α- and β-pyracin, emphasized at several points in the text (pp. 320, 336, 344, 459), have never been confirmed, despite repeated attempts. Few nutritionists now believe that pernicious anemia is due to inability to utilize folic acid conjugates, or that vitamin B_{12} is specifically required for the cleavage of such conjugates (p. 526). An inconsistency in nomenclature, which has the sanction of common usage but is nonetheless confusing and misleading, is continued in this book—namely, frequent use of the term *pyridoxine* as a name both for the specific compound, 2-methyl-3-hydroxy-4,5-bis(hydroxymethyl) pyridine, and as a term synonymous with vitamin B_6, and hence including the forms pyridoxal and pyridoxamine. One must judge from the context whether the specific or general sense is meant. Considerable space is devoted to chemistry of α-biotin. Most investigators in the field will feel that the existence of this substance as a distinct entity from synthetic biotin (β-biotin) remains to be proved.

Quantitative relationships are occasionally overlooked. Thus, the claim that *p*-aminobenzoic acid is required in the diet of trout is reported without comment (p. 552), despite the fact that the amounts reported as necessary (10–20 mg/100 g of diet) could scarcely be obtained by ingestion of any assortment of natural foodstuffs, if the data for distribution of this compound, reported elsewhere in the text, are correct. In general, the coverage of individual topics is quite complete to the date of printing. A notable exception is the treatment of distribution of the vitamins, where only illustrative values appear to be given, and little attempt is made to arrive at the most reliable estimates of potency in terms of present-day knowledge of assay techniques, extraction procedures, etc.

Individually, errors or drawbacks such as those illustrated above are perhaps of little importance; collectively they seriously lessen the usefulness of the monograph as a source of authoritative information. Nonetheless, the book contains a large amount of well-organized and generally reliable information that has not been summarized elsewhere. It is well printed and extensively documented. It thus provides a useful addition to the literature on vitamins, and one that merits extensive use.

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Scientific Book Register

Textbook of Electrochemistry, Vol. I. Rev. ed. of *Lehrbuch der Elektrochemie.* G. Kortüm and J. O'M. Bockris. Houston–Amsterdam: Elsevier Press, 1951. 351 pp. $7.00.

The Anthropology of Iraq: The Northern Jazira, Part II, No. 1. Papers of the Peabody Museum of American Archaeology and Ethnology, Harvard University, Vol. XLVI, No. 1. Henry Field. Cambridge, Mass.: Peabody Museum, Harvard University, 1951. 116 pp., tables and plates. $6.50.

Antibiotic Therapy. Henry Welch and Charles N. Lewis. Washington, D. C.: Arundel Press, 1951. 562 pp. $10.00.

Stages in the Evolution of Plant Species. Jens Clausen. Ithaca, N. Y.: Cornell Univ. Press, 1951. 206 pp. $3.75.

Internal Constitution of the Earth. Rev. 2nd ed. Beno Gutenberg, Ed. New York: Dover, 1951. 439 pp. $5.50.