Book Reviews

Messenger RNA

Progress in Nucleic Acid Research and Molecular Biology. Vol. 19, mRNA: The Relation of Structure to Function. Papers from a symposium, Gatlinburg, Tenn., Apr. 1976. WALDO E. COHN and ELLIOT VOLKIN, Eds. Academic Press, New York, 1976. xxxiv, 524 pp., illus. $35.

The general tenor of this excellent volume is best expressed by a quotation from the summary by James Darnell: "I think it is clear that the study of eukaryotic mRNA is truly coming of age. We are now learning molecular details about messenger manufacture which I, at least, felt 10 years ago we would never know. The prospects appear bright to truly learn about regulation within the next 10 years."

As the editors note in the foreword, this volume, as a collection of papers from a conference, is a departure from the usual format of the series of which it is a part. Although much of the material contained in the book has been published since the conference, the volume is still a valuable collection that puts forth in considerable detail advances in our knowledge of the post-transcriptional modifications of mRNA and recent evidence and thoughts on the relation of these modifications to the functioning of mRNA in the cytoplasm. There is also provocative evidence from several sources concerning the untranslated portions of some mRNA molecules. A number of papers serve to detail and emphasize the continuing uncertainty about the relation between the primary nuclear RNA transcripts and the mRNA that finally appears in the polysomes. Considered together, the papers suggest that the estimated size difference between the primary transcript and the finished mRNA is diminishing as the reported studies continue. The section on chromatin structure and template activity yields a sampling of the advanced ideas on the subject, some treated in depth. There are in the section on control of translation the details of some revealing experiments exploring the roles of the terminal portions of the mRNA in the translation process. The valuable summary relates, amplifies, and puts in context the previous portions of the volume.

The excellence of the forward-looking summary serves to attract attention to the regrettable lack of a retrospective introduction, save for those few comments made as part of the fitting dedication of the volume to Jacques Monod. The inclusion of such a historical review would have enhanced the considerable value of this well-edited volume as a teaching and reference source.

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Ecological Physiology

Adaptation to Environment. Essays on the Physiology of Marine Animals. R. C. NEWELL, Ed. Butterworths, Boston, 1976. xiv, 540 pp., illus. $59.50.

"Adaptation" and "environment" are words with sufficiently broad meaning to encompass the subjects of the review-essays collected in this book. Several of the contributors highlight that adaptation is an opportunistic process; one might surmise the selection of the chapters for the book to have been the same. Chapters 1 and 2, on intertidal life (R. C. Newell) and settlement responses (D. J. Crisp), put emphasis on variable factors in the environment and use as a secondary theme the stresses generated by this variability. Chapter 1 is a good deal longer than most of the others and more comprehensive than chapter 2, which suffers from the lack of generalizing conclusions. It is a pity that chapter 6, a discussion of estuarine life by A. P. M. Lockwood, was not put second. If it had been, overlapping environments and their denizens subjected to frequent periodic and aperiodic changes would have been treated in revealing contrast, first with the emphasis on environment and then with the emphasis on physiology.

Chapters 3, 5, and 9, all by G. N. Somero and P. W. Hochachka, deal with adaptation, mainly enzyme adaptation, to variations in temperature, oxygen, and pressure, respectively. Given the relation in nature between pressure and temperature some repetition is bound to occur—for instance, the same diagram is used in chapters 3 and 9 to illustrate weak interactions between enzyme and substrate—but there is hardly sufficient account of the physicochemical relations between the two variables. It would have been a challenge to the authors to put together in one chapter a treatment of the adaptations in cellular mechanisms to coincident changes in these variables, the relation between which has been known ever since Boyle's law was set down. Still, the chapters as they are cover their topics well, and the wealth of material given in each is perhaps ground enough not to have attempted further synthesis. The chapter on oxygen metabolism centers mainly on glycolytic mechanisms of coping with anaerobiasis in a representative variety of tissues of vertebrates and invertebrates, but also treats nonglycolytic mechanisms. These three chapters have good generalizing conclusions.

Chapters 4, 7, and 8 also deserve comment: the first of them, by C. P. Mangum on primitive respiratory adaptations, has a strong evolutionary slant. It deals with gill structure, blood cells, and respiratory pigments of annelids, a phylum that successfully invaded the soft sea bottom to great depths and thus colonized a large portion of the earth's surface. The worms, Mangum stresses, could accomplish this only by being as innovative on the respiratory "front" as were the arthropods and vertebrates in their later air-water migrations. E. Naylor's treatment of rhythmic behavior and reproduction (chapter 7) relates environmental to endogenous rhythms. It has some similarities to the chapter on settlement responses in that both authors dwell on behavior more than do other contributors to the book. Chapter 8, by J. K. Bowmaker on vision in pelagic animals, has some anatomical background material and more macrofaunal than planktonic examples. True, much more is known about the vision of the larger animals, but even with respect to them the treatment is selective. Distance accommodation in clear-water fishes is not mentioned, for instance.

In general, the book is a good, up-to-date reference work. The title may be read to promise more than the book holds, as only some aspects, albeit important ones, of the physiology of marine animals are covered. The articles are well referenced and there are lots of figures, which Newell says, in his one-page preface, were all drawn especially for this book. It is evident that some authors (the editor among them) brought more creativity than others to the preparation of figures.

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