papers he has written several books that are fascinating in their accounts of how it really happened. He became a Fellow of the Royal Society and a Nobel laureate at an early age, though he was not quite so meteoric as the book cover suggests, which starts his career ten years after he did himself.

First and Last Experiments in Muscle Mechanics follows Hill's recent book *Trails and Trials in Physiology*. Once again the old master takes us behind the scenes and makes clear how the simple joys of discovery are intertwined with the perplexities of results that didn't fit, of theories that "took, like Charles II, an unconscionable time dying."

The book starts with part of the famous paper of Gasser and Hill on "The Dynamics of Muscle Contraction" (*Proc. Roy. Soc. B* **96**, 398–437 [1924]), which described many of the more intriguing properties of isolated muscle, such as the relation between force and velocity, and the remarkable effects of quick releases and quick stretches. Much of this is still not completely understood. The book finishes with Hill's inaugural address to the Congress of the International Union of Physiological Sciences in Tokyo in 1965 and explains why the book is dedicated to "Ryotaro Azuma—physiologist, oarsman, public servant and friend."

In between Hill presents his last experiments on these problems, which show, for example, that his famous Hill equation does *not* predict the maximum velocity at which an unloaded sartorius muscle can develop tension. He imposed a velocity on the muscle and found that some fibers had very high intrinsic speeds. Some, however, were much slower. He first presented this work at an informal discussion at Churchill College, Cambridge, in December 1967, and it is good to see it finally in print.

In the past, Hill has issued "A Challenge to Biochemists" and "A Further Challenge to Biochemists." After paraphrasing a statement from Horace (*Satires* I, i, 24), "There is nothing to stop you from announcing your results with a laugh," he now asks physiologists to clear up several problems. These include "Will anyone undertake the laborious task of measuring v_0/l_0 and/or ATPase activity in a number of single fibres in a frog sartorius?" and "Will someone please make the experiment in this way?" A section called "The effect of a stretch on a collapsing structure" is followed by, "This seems rather an obscure title: its purpose is to induce someone to try to make the nature of the effect less obscure."

Without doubt, this book should be read carefully by everyone interested in muscle. Parts of it should be of interest to almost everyone else who cares about disinterested research.

ROBERT E. DAVIES
Department of Animal Biology, School of Veterinary Medicine, University of Pennsylvania, Philadelphia

Cellular Relations

Organization and Control in Prokaryotic and Eukaryotic Cells. A symposium, London, April 1970. Published for the Society for General Microbiology by Cambridge University Press, New York, 1970. xii, 460 pp. + plates. $16. SGM Symposium 20.

This is an excellent symposium volume, consisting of 16 original articles, a reprint of E. C. Dougherty's abstract (1957) introducing the terms "prokaryon" and "eukaryon," and a useful glossary of cytological terms. The organizers are to be commended for bringing together a group of outstanding scientists of diverse interests and at the same time maintaining focus on a common theme. Each contributor "does his thing," but with specific regard to the relations between eukaryotes and prokaryotes. R. Y. Stanier's article "Aspects of the biology of cells" provides the framework for the book. Stanier exhibits his breadth of knowledge and unique ability to sense and communicate important problems in biology. After defining the "least common denominators" of eukaryotic and prokaryotic cells in modern terms, Stanier goes on to speculate on the evolution of eukaryons from prokaryons. Stanier's arguments rely heavily on ultrastructure as a source of evidence and inspiration and, in this reviewer's opinion, slight the more fundamental underlying biochemical processes.

The genetic codes of eukaryotic and prokaryotic cells are compared by C. R. Woese. Although the codon catalog is universal, there are interesting differences in the translation machinery of the two cell types. These subtle differences are utilized to derive some thought-provoking, admittedly speculative ideas on the evolution of the genetic code. H. G. Whittman and U. E. Loening present critical reviews on similarities and differences in the structure, function, and biosynthesis of ribosomes. There are five excellent articles dealing with the structural, functional, and possible evolutionary relationship between eukaryotic mitochondria and chloroplasts and bacteria. One fine example is the paper by Hughes, Lloyd, and Brightwell on the distribution of organelles in prokaryotic and eukaryotic microorganisms. In addition, there are some papers on selected aspects of comparative molecular genetics—the quantity, organization, and replication of DNA in prokaryons (Richmond) and eukaryons (Holliday) and the role of mutation (Holliday), diploidization (Raper and Flexer), and bacterial plasmids (Richmond) in evolution. Geneticists will find W. F. Bodmer's article "The evolutionary significance of recombination in prokaryotes" particularly interesting.

This volume is recommended highly to all serious students of cell biology. It is up-to-date, informative, and critical. The challenge, intellectual stimulation, and excitement of current cell biology are all here. At a time when certain molecular biologists claim that the era of discovery is finished, this book points clearly to some fundamental unresolved problems.

EUGENE ROSENBERG
Department of Microbiology, Tel-Aviv University, Tel-Aviv, Israel

Intellectual History

Eclosion and Synthesis. Perspectives on the History of Knowledge. SALOMON BOCHNER. Benjamin, New York, 1969. xiv, 274 pp. Cloth, $10; paper, $3.95.

This essay "offers an overall characterization of twentieth-century knowledge," on the basis of which Bochner proposes a sharp distinction between present knowledge and "knowledge in preceding centuries." A comparison and contrast are made between the half century 1776–1825, designated as the "Age of Eclosion," when "most of our present-day knowledge evolved into its main organizational divisions," and the 20th century, an "Age of Synthesis."

The main part of this essay deals with science and mathematics (and notably various "aspects of the conception of space"). But there are some "excursions into the social sciences and humanities," so that a test may be made of the thesis "that Eclosion and Synthesis, especially Eclosion, apply to all intellectual pursuits."