his insistence that the physiological approach in general, and vivisection experiments in particular, offered a more reliable guide to the investigation of vital phenomena than did the chemical approach. Unlike most students of Bernard, Holmes examines this position critically and concludes that Bernard simply assumed that what worked best for him would work best for others. In fact, Bernard's two major discoveries in digestive physiology depended primarily on his operative skill and ingenuity, and both came only after he had devoted almost five years of frustratingly inconclusive work to the problem of gastric digestion, where his modest chemical talents proved unequal to the challenge. To establish this point, Holmes describes the years of Bernard's travail with gastric digestion at least as fully as he does the two subsequent, triumphant years. Holmes also stresses the achievements as well as the shortcomings of Bernard's chemical rivals, and his scrupulously balanced handling of controversies sets his book apart from any previous study of Bernard. So does his richly detailed account of the scientific context, which illuminates the ways in which Bernard sometimes surpassed, sometimes lagged behind, and sometimes depended upon his scientific contemporaries.

Even the most sympathetic reader may wonder, however, whether Holmes could not have accomplished his aims in much less space with greater economy and force of expression. Indeed, Bernard appears so rarely in the first half of the narrative (after the introduction he disappears until chapter 6, and then again until chapter 10) that inattentive readers may sometimes forget that he is the central figure in the story. Perhaps no general intellectual historian, very few philosophers of science, and too few historians of science will have the patience (or technical competence) to wade through this part of the book in order to reach those chapters (especially 17 through 20) where the pace accelerates and where the subtlety and importance of the long prelude suddenly becomes manifest.

Holmes obviously recognizes the difficulty, warning that his "exposition of details . . . may sometimes grow tedious." But he insists that "tedium is itself an essential side of scientific research . . . and it is difficult to sense the quickening pace at climactic moments if one has not felt the slowness of movement during the interludes between them" (p. xvii). In the end, Holmes refuses to compromise either technical rigor or wealth of contextual detail for the sake of a wider readership. That is a defensible, perhaps even brave, response to a problem faced by any historian of science whose material is inherently technical. Unfortunately, it will severely restrict communication with those who perhaps most need to know why Holmes clearly and responsibly doubts the influence on Bernard of general philosophical currents, and why he rejects the view that Bernard's research suddenly hit stride when he discovered, or adopted, some quasimagical "scientific method." To spread that message widely, another vehicle will almost certainly be required. But those who are patient, technically prepared, and fascinated by Claude Bernard or the science of his time should find a prominent place on their shelves for Holmes's distinguished book. It will remain there for a long time to come.

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Amphibian Genetics

The Control of Gene Expression in Animal Development. J. B. GURDON. Harvard University Press, Cambridge, Mass., 1974. x, 160 pp., illus. $6.50.

The major part of this book consists of a detailed summary of the elegant and important work from the author's own laboratory on the early development of amphibians. It is an outgrowth of a popular three-lecture series Gurdon presented at Harvard last year, and the book follows the lectures rather closely. The first chapter deals with transplantation of nuclei from somatic cells into enucleated eggs and the evidence that stable, qualitative changes in the genome do not take place during the course of amphibian cell differentiation. The second deals with translational control of protein synthesis and the microinjection of messenger RNA (mRNA) into living oocytes and eggs. It reviews the evidence that shows that oocytes will not only translate faithfully and at very high efficiency any added eukaryotic mRNA but also can modify or process properly the protein product. The third chapter deals with the control exerted by the cytoplasm of eggs and oocytes over RNA and DNA synthesis by injected nuclei. Among the important results summarized here is that the cytoplasm of eggs contains some component that can "turn off" ribosomal RNA synthesis in a normally active nucleus. A good many experimental data are given in figures and tables, and in a welcome appendix there is a detailed description of the microinjection technique. The discussion and interpretation of the author's own work are unusually complete and articulate.

Perhaps inevitably, because of its small size, this book is much less successful in its treatment of other areas of developmental biology. Much of the background sections is written in a rather terse style, and many crucial experiments are described in little detail. Although there is a detailed glossary, defining such terms as "actinomycin," "activation of an egg," "adenocarcinoma," and "allele," the author assumes a good background on the part of the reader. Some of the discussion of the genetic analysis of adult nuclear-transplant frogs in chapter 1 makes intricate reading for the nonspecialist. Many important topics—for instance, RNA-DNA hybridization and the function of the various types of DNA sequences within the chromosomes—are discussed very briefly.

This book is warmly recommended for advanced students in cell biology or developmental biology. It would make an excellent supplementary text for an undergraduate course in developmental biology.

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Organic Semiconductors

Energy and Charge Transfer in Organic Semiconductors. Proceedings of a seminar, Osaka, Japan, Aug. 1973. KOHZOH MASUDA and MARVIN SILVER, Eds. Plenum, New York, 1974. x, 200 pp., illus. $18.50.

The papers collected in this volume are of interest to the physics and chemistry community as indicators of the status of a potentially important field of research. For the reader who is willing to dig and sift through a series of terse articles by specialists, the book provides a sampling of the understanding of organic semiconductors (as of August 1973) upon which further