

Review for Nat. Foundation for the History of Chemistry.

The Excitement and Fascination of Science: Reflections by Eminent Scientists. Vol. 3. Compiled by J. Lederberg. Annual Reviews, Palo Alto, CA. 1990.

The Annual Reviews, starting with Biochemistry (1932), have proved to be so useful that they have grown to 27 series, the last addition being Computer Science (1986). Editors of two-thirds of the series have adopted the practice of including in each volume an autobiographical "prefatory chapter" by a distinguished senior scientist. Given a free rein, the authors focus in varying degree on their personal background, scientific and administrative accomplishments, and views on the status and the future of their field (or of science in general).

The present volume is the third in a series of collections of these essays; it comes from the Annual Reviews of 1977 to 1988 and totals 2400 pages. With the expectation that it will interest a wide audience, the editors have left out those chapters that seemed too technical. Of course, all the chapters include technical material, sometimes quite detailed; but the non-specialist can easily skip these sections and still enjoy the more personal and general parts of the essays.

Chemists might be interested to know that the section on Physical Chemistry includes essays by Eyring, Hirschfelder, J. E. Mayer, Zimm, Herzberg, Stout, and Pitzer. There are also essays from Biochemistry, Materials Science, and Biophysics and Biophysical Chemistry. Biochemistry is also frequently encountered in Microbiology, Pharmacology and Toxicology, and

Plant Physiology and Plant Molecular Biology. Physics does not have an Annual Review, but there are essays from Astronomy and Astrophysics, Earth and Planetary Sciences, Fluid Mechanics, and Nuclear and Particle Science.

Though few scientists have had colorful enough lives, or have enough literary talent, to yield interesting full-length autobiographies, the Annual Review format, of up to 25 printed pages, is ideal -- it can give the reader insight into the scientist's personality, a rounded survey of his or her accomplishments, and perspective on the process of discovery. However, I found myself wondering whether republication in these collections would contribute much more than a convenience for historians, since the essays in each field would already have been available, in the widely distributed original review volumes, to those who would be most interested in them. On the contrary: I ended up reading much more of this formidable volume of material than I had intended, and my wife, who is not a scientist, enjoyed picking out the personal parts of many of the stories. I can well imagine that these volumes might provide inspiration to many high school and college students.

Indeed, the vision of that audience may be what led to the choice of a title that seems to me somewhat banal. Excitement and fascination are perhaps better inferred than announced, and I prefer the subtitle, *Reflections of Eminent Scientists*.

While the paths to success in science are seen to have been extremely diverse, a couple of themes ran through many of the essays. First, it is clear that these eminent scientists derived

pleasure not only from being recognized, but also from their victories over nature and from generous interactions with colleagues and students. The overwhelming competitiveness of Watson's "The Double Helix" is not seen (though there was no doubt often more competitive spirit than is revealed, and it may now be increasing as the culture of science changes). An evening with these articles would be a valuable exercise for those people who believe that science is suffering from a crisis of integrity, and that scientists cannot be trusted to run their own enterprise. Joshua Lederberg, in a compact introductory essay on the goals of scientific biography, put it very well: "If the confidence and support of the larger society are to be sustained, the public must understand how in the practice of science a system of reward for personal ambition is melded with, and only rarely contravenes, the search for truth."

In another frequent theme, many of the authors came from a poor farm, in a small rural community where a particular teacher recognized talent and offered great encouragement. The children of another "disadvantaged" group, Jewish immigrants from Eastern Europe have also been prominent in certain fields but are not heavily represented in this volume -- perhaps most are still too young. Molecular genetics is represented only by an essay by Maclyn McCarty on bacterial transformation -- an indication of the recency of the explosion in this field.

To compare various articles for their quality or interest would be an invidious job. But I would note that Birgit Vennesland has particularly provocative, feisty things to say on a number of general issues of science and society, including

objection to measuring equal opportunity for women in terms of numerical representation. Some of the most memorable moments are the descriptions by Martin Kamen and Elvin Kabat of their encounters with McCarthyite tactics on the part of the government, which prevented one from working in science and prevented both from travelling abroad. This history is worth keeping in mind, as we face increased governmental involvement in problems of fraud and of quality in research.

The book closes with two essays from Annual Review of Sociology. I am struck by the difference between their language and style and those of all the other essays. This difference reflects a major underlying tension in the social sciences: while they have deep roots in philosophy, they are now seeking greater strength by adopting the approaches of the natural sciences. But particularly in political "science" and sociology only a small fraction of their questions can be approached by methods that are readily recognized as scientific; much of their subject matter is heavily invested with questions of values, which science cannot answer. To point this out is not to belittle these questions: in fact, in our daily lives they are more important than the natural scientist's questions about the nature of the external world. But the value of their study is not increased by exaggerating its scientific aspects or disparaging its philosophical aspects.

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