A Leader in Physics

Enrico Fermi, Physicist. EMILIO SEGRE. University of Chicago Press, Chicago, 1970. xii, 276 pp. + plates. $6.95.

The title of this book is singularly appropriate. Fermi was a great man, a man of integrity, deep wisdom, and sensitivity. His real life and his whole life, however, was physics. There was nothing that he ever experienced, the honors of the Nobel prize, the academy elections, the honorary degrees, the attentiveness of senators and presidents, that compared with the pure, unadulterated pleasure he found in doing battle with nature, in understanding physical phenomena. Although he never shirked responsibilities either in academic life or in national affairs, he regarded all these things as distractions from his real purpose in life—doing physics.

At the first Rochester conference on high energy physics following Fermi's death, I. I. Rabi rose and said: "Fermi may have been the last one who was not an experimentalist or a theorist, but simply a physicist; we shall all miss his wisdom."

Segrè's description of Fermi's early life and his involvement with and commitment to physics is extremely interesting to those of us who knew Fermi only after he was an acknowledged scientific giant. The intensity with which Fermi attacked the problem of learning physics as a young man stayed with him throughout his life. He would in later years decide he wanted to learn a particular subject, say group theory. He would spend several hours a day (usually the early hours in the morning, because he was an insomniac) for some weeks mastering the subject. Although Segrè refers to his reading books, and the exceedingly interesting and revealing correspondence between Fermi and his friend Enrico Persico contained in the appendix often mentions explicit texts, one always had the feeling that he essentially reinvented everything for himself.

The way Fermi almost single-handedly raised Italian physics from obscurity into worldwide prominence is somewhat underplayed by Segrè, who modestly doesn't give adequate recognition to the extremely talented group of student-colleagues Fermi attracted, among whom Segrè himself played a prominent if not predominant role.

It is not too clear from the book what the relation between Fermi and his students was during the Italian years. For the most part, the age differences were apparently very small. Perhaps it was a result of the wartime Manhattan Project associations or maybe it was just Fermi's personality, but for those of us at Chicago who had the privilege, being Fermi's student was marvelous. There was an exceptional group of students right after the war at Chicago, many of whom had worked on the Manhattan Project, and there were very few caste distinctions between faculty and graduate students. Fermi himself took very few Ph.D. students (Geoffrey Chew and I were the first theoretical students he ever had in the United States) but, as Segrè recounts in detail, he was very much involved in the training, both formal and informal, of a very large number of students. Fermi often complained that he never had been able to establish a "school" as others like Oppenheimer and Uhlenbeck had done. History will record that he was mistaken; one need only examine the record of Chicago graduates from 1946–54 and the style that runs through their work.

Fermi's role as the intellectual leader at the Institute for Nuclear Studies (now called most appropriately the Enrico Fermi Institute for Nuclear Studies) is emphasized by Segrè; how extensive it was can only be appreciated by those who were there to see it. Fermi had the truly exceptional gift of concentrating all of his attention on any problem under discussion, and his always constructive critical evaluation of all seminars and colloquia gave a remarkable vitality to the institute.

Segrè understands and describes very clearly the outstanding characteristics of Fermi's theoretical work: clarity and completeness. Fermi's paper on the theory of beta decay should be required reading for all physics Ph.D.'s. The problem is stated clearly, the theory is developed in a simple, straightforward way, comparison with experiment is made, and definite conclusions are reached. There are no loose ends, no promises of future publications, no unsubstantiated claims. He was content to leave abstraction to those he called "the high priests," a term he used with a little contempt but with perhaps a little of the envy one has for people who do things one cannot oneself do well. Fermi was not modest, however, and felt that he did enough things superlatively well that he didn't have to worry about the accomplishments of others. Nor did he ever feel it necessary to put people down.

One cannot quarrel with the decision of an author as to how to present his subject. I wish Segrè had been less impersonal, especially about the exciting days of the early '30's in Italy when both he and Fermi were young. Of course this is the selfish reaction of one who knew Fermi well as physicist particularly during the last ten years of his life. Segrè has succeeded admirably in describing Fermi's entire scientific career, and this book is strongly recommended.

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Cartographic Embellishments

Animals and Maps. WILMA GEORGE. University of California Press, Berkeley, 1969. 238 pp., illus. $9.50.

Prospective purchasers should be warned at once that, although the author is a zoogeographer, *Animals and Maps* is primarily a history of the small pictures of animals with which early cartographers decorated their maps, and is not a zoogeography. As a contribution to a special aspect of the history of maps, the book should interest both cartographers and some general readers. It is fairly well written, is well produced (except for some illustrations), and has a nine-page reference list and a good index. However, many of the reproductions of old maps, although attractive at first glance, are disappointing in detail. They are drastically reduced and printed in halftone. The result is that most of the lettering and many of the animals on them cannot be made out at any magnification. For example, the author says, ". . . Ribeiro had filled the South American continent with some fifteen different types of animals (fig. 10.1)" and "among the animals on Ribeiro's map there occurs an animal with every appearance of an armadillo . . ." but, referring to figure 10.1, I can distinguish only three animal figures on it, not including an armadillo.

The book does have the appearance of a zoogeography. The first figure in it is an outline map of the now-accepted faunal regions; six of the ten chapters have as titles the names of the regions; and zoogeographic passages