The Structure of Scientific Revolutions. By Thomas S. Kuhn. 172 pp. Univ. of Chicago Press, Chicago, Ill., 1962. $4.00. *Reviewed by Richard Schlegel, Michigan State University.*

ONE widely held conception of science is that its development is an accumulative process: each working scientist adds his contribution, large or small, and as a result, science continually grows in adequacy and coherence. Even "revolutions" are but very extensive revisions of foundations, with resulting new achievements but little disturbance of what already exists. Professor Kuhn, who has a background training in physics but is now professor of the history of science at California, has written an argument against this view of science. He finds in the history of science a recurrence of a certain pattern rather than continuous progress toward a goal of final truth or completeness.

For Professor Kuhn, the key element in a science is the "paradigm", defined as an approach, to some domain of nature, that is "sufficiently unprecedented to attract an enduring group of adherents away from competing modes of scientific activity" and also "sufficiently open-ended to leave all sorts of problems for the redefined group of practitioners to resolve". Aristotle's *Physica,* Newton's *Principia,* Lavoisier's *Chemistry,* and Lyell's *Geology* provided such paradigms in their day. In current science, textbooks provide the introduction to the accepted principles of science and the foundations for further practice. Working within the framework of the paradigm, scientists carry out what Kuhn calls "normal science"; essentially, he writes, this is "problem-solving", a working out of solutions that are permitted by the paradigm, often with neglect of problems that could be treated under a previously accepted paradigm.

Generally, there are some questions that have received attention under the paradigm of a science, but remain unsolved; for the most part, however, during the period of dominance of a paradigm, the science moves forward steadily, and progress is through cumulative achievement. Eventually, not only unresolved problems but outright anomalies accumulate and discredit the paradigm. A period of search and confusion follows, but then a new paradigm is found and adopted. A scientific revolution has been effected. With the acceptance of the new paradigm, the scientist comes to live in a new world, for he selects different aspects of nature to study, and puts a different interpretation on old observations. Thus, science has gained new vigor—revolutions give the scientific community a selection by conflict of "the fittest way to practice future science".

The reader can raise objections as he goes through this book. The accumulation of scientific knowledge perhaps gives more continuity from one age of science to another than Kuhn recognizes. I doubt if the separation of "paradigm" creation from the doing of "normal science" is as clear as he implies. Still, to use his term, Professor Kuhn has suggested a challenging paradigm for the history of science itself—one that will enable us to see a clarifying order among the myriad annals of science. Further, he writes with a winning intelligence and modesty that invite questioning and revision of the interpretation of the history of science that he has presented.

Aristotle as depicted in a 16th century Italian edition of his works. (*The Bettmann Archive*)

Aristotle's Physics. Transl. by Richard Hope. 242 pp. Univ. of Nebraska Press, Lincoln, Nebr., 1961. $6.00. *Reviewed by Eric Mendoza, University of Manchester.*

THIS book is a new translation of the lectures given by Aristotle between the years 334 and 323 B.C. at Athens. As a physics text, it has exerted enormous authority for a longer time than any other, for it was rediscovered 1500 years after it was written, and it was one of those books whose study initiated our scientific era. Philosophers and historians of science therefore regard it as one of the basic texts for understanding the origins of modern science; they speak of its profound insights and call it one of the noblest accomplishments of the human intellect.

Readers of this journal might be more interested to take the viewpoint of a physicist today rather than that of a philosopher. (After all, one of the objects of reviewing a book is to suggest whether other readers' understanding of their subject will be enhanced or their knowledge of its development will be deepened by reading it.) Most physicists know that the ancient Greek texts, having been studied in highly debased versions for many centuries, were rediscovered in something like their original forms in mediaeval times, and that this rediscovery constituted the revival of learning. But then, these products of the lively ancient Greek mind soon became shackles which prevented knowledge from developing, for fear of flouting authority. Only when this authority was thrust aside could science progress. The works of Aristotle therefore have a dual aspect. On the one hand, they are indeed fascinating records of the speculations of one of the most profound of philosophers who ever lived; on the other, they were the dead weight which retarded the progress of science.