## Physics

**Introductory Topics in Theoretical Physics**. Relativity, thermodynamics, kinetic theory, and statistical mechanics. Roald K. Wangsness. Wiley, New York, 1963. x + 315 pp. Illus. $8.50.

The subject matter treated by Wangsness in this deceptively slim volume is divided into four parts: (i) special relativity, (ii) thermodynamics, (iii) kinetic theory of gases, and (iv) statistical mechanics, with almost half of the book devoted to the fourth part. The last three parts, which deal with the same general class of phenomena, are closely tied to each other in the author's treatment, as they should be. In contrast, the section on relativity stands apart. Once completed, it is not referred to again in the book. It would be more appropriately placed had it been used as the final part of the author's recent book on classical mechanics and electromagnetism rather than as the first part of this volume, particularly in view of the fact that in this volume the discussion, aside from that of relativistic kinematics, touches only upon particle mechanics and on electrodynamics in empty space.

The present book developed from courses originally given by Wangsness at a naval laboratory, which probably accounts for the large number of applications that are included. The treatment is uncomfortably compact for an introductory volume. For example, the relativistic time dilation is dealt with in ten lines. Paramagnetism and ferromagnetism occupy less than ten pages, in which the magnetization is first expressed in terms of the partition function, then used to derive the Langevin theory of paramagnetism, the Weiss theory of ferromagnetism, and the heat capacities of systems described by the Weiss theory. In the presentation, which is aimed at senior undergraduate physics majors and first year graduate students, Wangsness succeeds in keeping the mathematics simple enough so that it should not cause trouble. There are two brief chapters that deal with mathematical topics—one with Lorentz transformations, the other principally with the properties of partial derivatives relevant to thermodynamics. However, the book is not recommended for students who intend to become physicists. The discussions and derivations are thin and sometimes done without proper care. Although no wrong conclusions are drawn, faulty reasoning mars the presentation. For example, instead of presenting Nernst's form of the third law as a plausible extrapolation from experience, a derivation is attempted, l'Hospital's rule for evaluating indeterminate fractions of the form 0/0 is invoked, and rigor is suggested, while in fact, it is nothing other than a plausibility argument. Such shortcomings are perhaps unimportant to a pragmatic person who is more interested in applying the several disciplines than in the disciplines themselves as parts of theoretical physics. For one with this bent, the book will serve as a reasonable and modern introduction.

GEORGE SALZMAN
*Department of Physics,
University of Colorado*

## History of Biology

**Georges Cuvier, Zoologist**. A study in the history of evolution theory. William Coleman. Harvard University Press, Cambridge, Mass., 1964. xii + 212 pp. Illus. $4.75.

To the modern biologist, Georges Cuvier was an eminent French zoologist who did not believe in evolution and who delayed the advent of the theory by winning his debate with his colleague, Etienne Geoffroy Saint-Hilaire, an amiable scientist who tried somewhat ineffectively to defend the doctrine of *transformisme*. Cuvier's famous victory was more than Pyrrhic for it placed the winner prominently on the losing side in the evolution controversy. Cuvier died, however, nearly 30 years before Charles Darwin assured the evolutionists of their ultimate victory. During his life, he was ranked among the greatest of scientists and what he believed and published carried great weight, but today he is remembered chiefly because of his intellectual limitations. This, of course, is hardly fair. Cuvier deserves a less partial evaluation.

In this small book, William Coleman has given us a more complete Cuvier. He has demonstrated convincingly that Cuvier was much too complex to fit any of the neatly labeled pigeonholes into which we have stuffed him. We need no longer classify him merely as an antievolutionist and file him away among the historical exsiccatae, for Coleman has reinjected him with revivifying human juices. Cuvier need no longer remain the type specimen of the dogmatic scientist who refuses to face the logical implications of his advancing science. Cuvier was, in fact, a very complex individual, and both his virtues and his limitations were truly outstanding.

Cuvier's accomplishments were many and important although, ironically, their value lay in their contribution to the theory that he himself rejected. His investigations of the fossils found in the Paris basin and his systematic work on living forms, especially on fish, did much to assemble the factual evidence on which evolution is based. That he should miss the implications of his own labors is, of course, ironic, but we can easily understand why he did. He had an extremely orderly mind and a passion for systematizing, and his intense desire for nature to be well arranged gave him a craving for species that were stable and firm—for species that would remain where a competent systematist would place them. To Cuvier an orderly and rationally designed nature could not be based on units that shifted and evolved.

Cuvier was a very religious French Lutheran, and this has led to the general assumption that it was his religion which caused him to reject evolution. Coleman has shown, however, that Cuvier, like the good taxonomist that he was, sought to bring order into the universe and to arrange its different aspects into separate compartments. It seems obvious that he kept his religion and his zoology in different compartments. If the twain ever met, they met only *en passant* and neither disturbed the other. Cuvier was even able to harmonize his well-planned, well-integrated universe with one that had experienced a series of catastrophes, the latest one being Noah's Flood. He assumed, however, that the catastrophes need not have been universal. Nearly always, he thought, some part of the earth was spared and many of the animals and plants survived. These were the species that reentered the devastated regions and populated them again. God, of course, knew what he was doing, and soon everything would return to normal and God would have another continent to devastate.

Coleman has given us not only a clear description of Cuvier's major accomplishments but also a number of