The only other jarring note that I found in this biography was the abrupt shift at the end of the book when, in discussing Dr. Coolidge's retirement years, the reader is suddenly faced with the author's calling both Dr. and Mrs. Coolidge by their first names. To those of us who have known and been inspired by Dr. Coolidge, stripping him of the dignity of his title seems to me an unfortunate quirk of biographical technique.

In spite of these few quarrels with this biography, I recommend it highly as a labor well done and commend the concept of highlighting the full life of this very modest man.

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Man in the Universe

The View from a Distant Star. Man's future in the universe. Harlow Shapley. Basic Books, New York, 1963. xii + 212 pp. $4.95.

The 15 chapters of this small volume are good reading, and stimulating to the thought of the reader. This is what Harlow Shapley intended, and what we might expect of him. As the title suggests, the book presents an appraisal of man's place in the enormous, almost inconceivably long-lived, inexorably developing universe, as that position is seen from the point of view of a nonhuman appraiser. Of course such a presentation is not really possible—the views of the viewer from a distant star bear a remarkable resemblance to those of the human being Harlow Shapley—but the attempt is rewarding.

An introductory chapter sounds the theme of the noncentral location of man in space and of man's relatively primitive and insecure stage of development. Then three chapters give a very fine description of the astronomical universe in space and time, as it is known today. The style is easy and vivid, the organization superb. It would not be easy to find an equally effective star's-eye view of the cosmos in 50 pages. Chapter 5 considers the origin and development of life on this planet, the multiplicity of planets (the only possible homes of life), and the probability that elsewhere among the galaxies exist living beings comparable to or superior to ourselves.

From time to time through these chapters emphasis is laid on the presumption of man in considering himself to have importance, and on his actual insignificance in space and time. Chapter 6, "The human response to an expanding universe," is devoted to readjusting his perspective, as is chapter 14, "Is mankind entering the psychozoic kingdom?" Here I must confess to a certain lack of sympathy with the author's position, and a certain impatience with what seems to me a rather shallow treatment of a difficult philosophical question; namely, what *are* "importance" and "significance"? This is not the place for argument; suffice it here to quote side by side the statement from the catechism—"The chief end of man is to glorify God and enjoy him forever"—and the sentence from chapter 6—"We have the potentiality not only of conforming to the cosmic theme of Growth but perhaps even of elaborating or revising some of its natural rules."

The remaining nine chapters are less closely connected. They deal with various aspects of contemporary life as a scientist sees life. "Stars, ethics, and coexistence" calls for international cooperation, "The one world of stars" points out that, among astronomers, one world exists now. "Must we climb steeples?" is a protest against specialization; "Science and non-science" ridicules flying saucers, astrology, and water-dowsing. "A design for fighting" recalls William James's "Moral equivalent of war," but with a difference.

Your reaction to Shapley's reflections on man in the universe may be enthusiastic, or critical, or slightly disappointed. But you will not find them dull.

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Cloud Physics

Thermodynamics of Clouds. Louis Dufour and Raymond Defay. Academic Press, New York, 1963. xiv + 255 pp. Illus. $10.

This monograph consists of two portions. Part 1 deals with the thermodynamics of the surface region. The approach, quite unfamiliar to most American workers, is that of De Donder as elaborated by Prigogine and Defay (in *Chemical Thermodynamics*, Longmans, New York, 1954). This treatment permits the discussion not only of systems at equilibrium but also of systems in partial equilibrium. Thus, for surfaces one may consider the situation in which the bulk and surface regions are in mechanical and thermal equilibrium but not in chemical equilibrium. In this nonequilibrium discussion, it is necessary to introduce the concepts of "affinity" and "extent of reaction" and, for the surface region, lateral thermodynamic functions. In the later application to cloud physics, however, little use is made of the partial equilibrium concepts.

The development is quite sophisticated and demanding; considerably more background in thermodynamics than the authors indicate as necessary is required for understanding. The approach is formal and mathematical; frequent references are given to more generalized works. The thermodynamic content is restricted almost entirely to systems of one component or to solutions in which the solute is nonsurface active. The term "surface tension" is used throughout to refer both to mechanical tension and surface free energy. The correlation between the surface properties of liquids and solids is outstanding.

In part 2 the principles developed are applied to a limited set of problems in cloud physics. It is shown, for example, in a somewhat lengthy fashion, that a mixture of air and water vapor may be treated as a mixture of two perfect gases. Several other approximations are also shown to be valid. The behavior of a water droplet and an ice crystal suspended in the atmosphere is dealt with fully; this is by far the best account of this subject that I have encountered.

The work concludes with an account of homogeneous nucleation. The treatment is largely classical and has been extended to quite complex situations; it is of particular value in dealing with the formation of solid phases. Nonequilibrium thermodynamic concepts are applied in the discussion of nucleation kinetics. The practical problem of heterogeneous nucleation is not considered.

This monograph should be of great value not only to those concerned with cloud physics but to those working in the field of surface chemistry and physics.

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