The Milky Way. Bart J. Bok and Priscilla F. Bok. Harvard University Press, Cambridge, Mass., ed. 3, 1957. 269 pp. $5.50.

This is an excellent book, as were the two earlier editions, and the Harvard University Press dresses up the new volume in a very attractive format.

The first two chapters provide general background information: a description of the visual and photographic appearances of the Milky Way and a useful schematic model of the system, a summary of astronomical coordinates, examples of various kinds of telescopes, and an outline of the basic data of observation used in Milky Way research. The importance of cooperation in research is stressed, with special mention of the influence of the International Astronomical Union and the fact that "the National Science Foundation is taking the lead in promoting the growth of cooperative research facilities in the United States; a National Radio Observatory and a National Optical Observatory are important items on the high priority list."

The third and fourth chapters discuss the structure of the galaxy, from the sun's nearest neighbors to the distant globular clusters and the nucleus of the galaxy. The importance of the Hertzsprung-Russell diagram and of Baade's fruitful concept of the "two stellar populations" are fully explored. Blaauw's discovery of the expansion of the Zeta Persei association and subsequent work by Blaauw and Morgan on other associations have opened up a new field since the second edition appeared in print. The change in the zero-point of the classical Cepheids, with the consequent doubling of the distances of the external galaxies, has also come since the publication of the second edition.

Stellar motions, a valuable source of information about the physical properties and dimensions of the galaxy, are reviewed in chapter 5. The interstellar medium is thoroughly discussed in chapters 6 and 7.

The revolution in Milky Way research that has been brought about by radio astronomy is described in chapters 8 and 9. The remarkable work by Morgan and his associates in tracing the spiral structure of our galaxy in the sun's neighborhood was followed, in less than a year, by the Dutch radio results, which traced an outer arm halfway around the galaxy. Australian observations are filling in the rest of the picture.

Long-time evolutionary changes in the galaxy and the cosmic time scale are taken up in the final chapter.

On the very day this review was written, Bart Bok arrived in Australia to take up his new duties as director of the Mount Stromlo Observatory. Anyone who reads this book will realize how serious is our loss and how great is Australia's gain.

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Arizona's Meteorite Crater. Past, present, future. H. H. Nininger. American Meteorite Museum, Sedona, Ariz., 1956. 232 pp. Illus. $3.75.

The meteorite crater in northern Arizona is an outstanding topographic feature of the earth's surface and has attracted great attention. The crater has been well known since 1870. By 1909 its topographic features had been exhaustively described, and the most serious investigators agreed with the view that the crater was blasted out by the impact of a large meteorite. It is our largest authenticated meteorite crater. Since then, numerous surveys have been made of the crater, with various objectives in mind. In the main, these surveys were conducted by the Barringers, who are intent upon locating and, if possible, recovering the large meteorite that made the crater, and by Nininger, who has considerable scientific curiosity concerning the crater and who was also interested in augmenting his museum collection. It is fitting, therefore, that Nininger should summarize the information that is available on the crater. In general, he makes an exceedingly thorough and splendid job of the summary.

He describes the early history of the crater and the researches and surveys that have been carried on there and reviews critically all the findings to date. I found no serious omissions. In addition, he speculates extensively on the nature of the event that took place at the time of the earth's encounter with the meteorite. When did it strike? How fast was it moving? From what direction did it come? How large was it? Was it a single large meteorite or a swarm of meteorites? In many instances, his speculations are unsatisfying and inconclusive. This stems from the paucity of the data he has to work with and from his own enthusiasm. He takes the view that no large body of meteoritic material now lies buried in the crater.

There is a certain undercurrent of personal differences running through the book, but I found this more unfortunate than objectionable.

The book is well and interestingly written. It has both popular appeal and considerable scientific merit. The illustrations are excellent and the type is good. The very extensive bibliography will be of great help to anyone doing research on the crater.

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Dynamic Meteorology and Weather Forecasting. C. L. Godske, T. Bergeron, J. Bjerknes, and R. C. Bundgaard. American Meteorological Society, Boston, and Carnegie Institution of Washington, 1957. xvi + 800 pp. Illus. $15.

This remarkable treatise is a fitting monument to the memory of Vilhelm Bjerknes, the great leader of modern meteorology. Written by four of his closest associates, of whom two were his active partners from the early days of frontology, the book is produced in continuation of the earlier works: *Dynamic Meteorology and Hydrography* (1910) and *Hydrodynamique Physique* (1933) by V. Bjerknes and various collaborators. As a monument, it is both massive and elegant.

The conception of the book goes back to about 1935. In the foreword we read that the manuscript was completed in 1948, was submitted for publication in 1951, and was finally published in 1957. Although not explained, the circumstances underlying this delay are readily understood and reflect the difficulties encountered nowadays when it comes to publishing a work of extraordinary dimensions, except in the rare cases where there is a ready market.

Progress in theoretical meteorology, as well as in other branches of geophysics, depends on talent, with thorough background in classical physics. More than 50 years ago, V. Bjerknes set out to transform meteorology into a branch of classical physics. As early as 1904 he formulated the problem of weather forecasting as an initial value problem. In our time, when teaching of classical physics in the universities has been pushed into the background, to give space for nuclear physics, electronics, photography, and so on, it is refreshing to read *Dynamic Meteorology and Weather Forecasting* and to find that its roots are where they truly belong. Undoubtedly, the authors have set an example and a standard which cannot easily be ignored.

The book is divided into five major parts. Although a complex science does not readily lend itself to division into compartments, the arrangement is logical and convenient. The first three parts deal with (i) thermodynamics and statics, (ii) kinematics, and (iii) hydrodynamics. This is what is commonly called theoretical meteorology, and nowhere else will one find a treatment which is so complete and inspiring as the one here given by the principal author, C. L. Godske. On occasions, and particularly in the treatment of simple atmospheric motions, one could wish that fewer details had been included, but the chapters and sections are so well arranged, and the headings are so eloquent, that large portions may be skipped without loss of

continuity. The reader will miss a treatment leading up to numerical prediction of motion systems. Although this is regrettable, particularly in view of V. Bjerknes' early formulation of the initial value problem in meteorology, it should be remembered that the manuscript was completed in 1948 before any substantial development took place in this most modern branch of meteorology.

Part IV, which is written mainly by J. Bjerknes and T. Bergeron, is called "Climatological and synoptic models." It is more than this. It is an extraordinarily cogent presentation of atmospheric structures, characterized by great simplicity and a wealth of information, and it is well connected with the foregoing theoretical parts. This, indeed, is pleasant reading.

Part V, which deals with weather forecasting, may be criticized on many scores, but, again, it should be remembered that the manuscript was completed in 1948, before the practices developed during World War II could be properly evaluated and the winnowing process completed. The presentation is often formalistic and shows little connection with the treatment in the theoretical parts. One may question the wisdom of including, in a treatise of this kind, descriptions of meteorological codes and operational practices, the life of which is not comparable with that of a basic text. In reading the historical notes one becomes impressed with the difficulties in the way of avoiding bias.

At the end, one may well ask: what use can the book be put to? Will it be used in instruction at the university level? On the whole, it is a book for researchers and instructors rather than for students, and, as such, it will do much to raise the level of learning. One may hope that it will be often revised and kept up to date. Like all true monuments, it should enjoy a long life.

The meteorological profession will be grateful to the authors for the immense work that has gone into the writing and to the American Meteorological Society and the Carnegie Institution of Washington for the excellent manner in which the book has been produced.

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Social Sciences

The Structure of a Moral Code. A philosophical analysis of ethical discourse applied to the ethics of the Navaho Indians. John Ladd. Harvard University Press, Cambridge, Mass., 1957. 474 pp. $8.

The empirical part of this book undertakes, primarily through the interviewing of selected wise men of a Navajo community, to elicit and exhibit the moral code of that particular nonliterate society. But John Ladd, a philosopher by trade and training, has not merely done extracurricular service in an alien discipline. He has also endeavored to frame a general theory and methodology for descriptive ethics, the latter being distinguished, on either side, from overt moral teaching and from philosophic analysis of moral utterances. The method he has outlined and employed is presumed by him to be available and utilizable by any anthropologist who may wish to discover and reconstruct the moral code of any group whatsoever.

The moral code of a group is imbedded in the general ethical system of that group, while the ethical system also includes the "ethical conceptions and argumentation" to which the group subscribes. To disinter a moral code is to do a bit of social science, in the sense that a proper reconstruction of the code will, ideally, permit both explanation and prediction of the sorts of moral statements likely to be uttered by members of the group over whom the code holds. The reconstruction will, however, not permit either prediction or explanation of the *conduct* of those individuals, nor will observation of their conduct apparently help in determining their moral code.

The author is quite resolute in excluding matters of behavior from consideration, though his reasons for doing so, if understandable on the practical level (he spent about 5 weeks "in the field"), are theoretically questionable. Most of us, after all, would regard, as the most decisive evidence of a man's moral beliefs, not what he says but the way in which he makes choices. And it must seem perverse or arbitrary when someone proposes that "evidence (such as actual behavior) will be considered irrelevant."

So far as Ladd's technique of reconstruction is concerned, it seems chiefly to consist in finding major premises for arguments which natively occur as enthymemes—that is, where prescriptive conclusions are directly drawn from factual premises. Thus, "don't steal, because it will get you in trouble!" can be validated as a piece of moral reasoning (and can be effective as a piece of moral dissuasion) only in cases where the parties who utter and heed it are prepared to adhere to the missing prescriptive premise, "don't do anything that will get you in trouble!" When this same major premise is found to be required by a significantly large number of moral arguments, one is likely to have a "basic prescription" in one's hands, and accordingly the logical wherewithal to deduce (hence, predict) specific prescriptions—provided that one is also aware of what sorts of acts are regarded as trouble-producing. Different groups will, of course, wield different basic prescriptions, and wield them in different ways, but a given group may be depended on to wield its basic prescriptions in a manner sufficiently consistent to allow some general characterization of that group's ethical slant.

The ethical slant of the Navajos, according to the thesis advanced here, is both "teleological" and "egoistic." That is, an action which is morally relevant must (i) produce (or avert) some "end-state-of-affairs," and (ii) the latter must in some sense conduce to the personal welfare of the individual agent. Accordingly, the typical Navajo may be expected to be unmoved by other kinds of moral reasons—for example, that an act is forbidden from on high, or will conduce to the social good, or has been sanctioned by ancestral practice. One verifies these theses by asking leading questions and seeing whether or not the anticipated responses are forthcoming. Within the limits he sets himself (namely, to restrict himself exclusively to verbal evidence), I should say that Ladd's reconstruction is reasonably well verified. He is a good interviewer and, despite a formidable linguistic barrier, manages to get his informant to think about certain moral situations which, though almost classical in our ethical experience, are clearly novel to the Navajo.

The book suffers from that kind of running methodological patter which lengthy books in the social sciences so often display. And Ladd's epitomization of the Navajo code as "a Hobbesian ethical system, modified by an Epicurian psychology and a Spinozistic sociology" sounds just the sort of crashing chord that will lift the spirits of some men and set other mens' teeth on edge.

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The Foundations of Science and the Concepts of Psychology and Psychoanalysis. vol. I of *Minnesota Studies in the Philosophy of Science.* Herbert Feigl and Michael Scrivens, Eds. University of Minnesota Press, Minneapolis, 1956. 346 pp. $5.

In the tradition of the close relationship that has prevailed for the past few decades between the philosophy of science and the science of psychology, the Minnesota Center for the Philosophy of Science has published a volume containing a dozen methodological papers (several of which have been published elsewhere) that are directed at the behavioral sciences. The combined papers, especially those of the members of the center (Feigl, Meehl, Sellars, and Scriven), do not offer any methodological