REVIEWS

Vistas in Astronomy, Vol. 9: *New Aspects in The History and Philosophy of Astronomy,* First Joint Symposium of the "International Astronomical Union" and the "Union Internationale d'Histoire et de Philosophie des Sciences," held at the University of Hamburg. Arthur Beer, ed., (Pergamon Press; Oxford, 1967) vi + 316 pp., illustrated, $22.00.

This is probably the most uneven collection of articles that has so far appeared in the *Vistas of Astronomy* series. The 31 papers (one in German, four in French, and 26 in English) vary in length from 14 lines to 46 pages and in quality from nearly unintelligible to superb. Unfortunately, the only truly uniform aspect of the volume is the awkward English prose style of contributors whose native language is not English. A small amount of careful editorial work could have made the book far less embarrassing to readers and authors alike. In spite of this complaint and the minor misnomer—there is no mention of any aspect of the philosophy of astronomy—the volume holds a great deal of interest to nearly every astronomer and historian.

The papers with most general appeal fall naturally into four main classes (not related to the editor's three-fold grouping). There are about nine bibliographical articles relating the location and significance of manuscripts and artifacts of importance to the history of astronomy. In this class one relatively popular article, "Some Reflections on Reserach in th History of Astronomy," by Ernst Zinner stands out above the other useful but more pedestrian offerings. Zinner's delightful reminiscences offer both a guide to interesting astronomical exhibits in Europe and the United States and an insight into the personal fascination offered by historical studies of the astronomical tradition. Secondly, there is a series of sketches of national traditions in astronomy, including articles on Armenian, Tibetan, South African, Polish, and Irish astronomy and on the American observatory movement during the nineteenth century. D. F. Musto's emphasis on the importance of disputes between astronomers and public financers of science in America seems particularly suggestive for further research. The third group of papers analyzes the historical interaction between instrumental and scientific progress in astronomy. In the course of describing the evolution of large astronomical clocks, Zdeněk Horsky's article

on astronomy and the art of clockmaking during the Renaissance provides solid documentation for the suggestion made previously by Lynn White, Jr. that astronomical clocks provide a major stimulus for the interpretation of the system of the universe in terms of a clock-like mechanism. Articles by Doris Hellman and Michael Hoskin illustrate how changes in observational precision made possible by instrumental advances led to theoretical changes in astronomy in the sixteenth and nineteenth centuries.

A final class of articles summarizing extended and on-going programs of research provides the most fascinating material in the volume. Arthur Beer's discussion of astronomical dating of works of art and Owen Gingerich's summary of the opportunities available for applying computers to problems in the history of astronomy should be of great interest to astronomers and to a much wider audience, including historians of all persuasions.

In short, like earlier volumes of *Vistas in Astronomy,* Volume 9 raises a number of important current issues; and in almost all cases, contributors provide adequate references to guide the reader to further involvement.

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Second or Singular Thoughts Upon the Theory of the Universe, by Thomas Wright, M. A. Hoskin, ed. (London: Dawsons of Pall Mall, 1968), 93 pages, £5.

This work, edited from papers written by Thomas Wright of Durham between 1755 and 1771 but brought to light only in 1966, provides a series of illustrations of the influence that religious ideas, semipopular doctrines like the great chain of being, and philosophical systems like Berkelian Idealism had on the exact sciences during the mid-eighteenth century.

A number of interesting astronomical conjectures appears among Wright's speculations. He argues, for instance, that there had probably once been a planet between Mars and Jupiter which was destroyed by a comet; he speculates that there may be planets in the solar system beyond Saturn which have not yet been observed because of their dim light; and he joins a handful of

eighteenth century astronomers in suggesting that heavenly bodies evolve over periods of "a million of millions of years" by a kind of condensation process. To most astronomers who remember Wright as the author of the theory of the universe which inspired Kant to contend that the Milky Way is a disk-shaped distribution of sun-like stars, however, this *Second Thoughts* will appear to be a retrogression. It repudiates the earlier theory and interprets the fixed stars as volcanos on the inner surface of a solid spherical shell. Variable stars are held to be periodically erupting volcanos, and comets are seen as globs of hot lava spewed out into the cavity which contains the solar system. This unique interpretation of the visible heavens takes its place in a theory of the universe which is theologically inspired. All matter is "an eternal and infinite mode of the Devine Imagination" and the spatially-extended universe is a set of spheres nested within one another and extending from the infinitely small to the infinitely large. Thus, argues Wright, "orbs inorb'd, or by a concatination of orbs successively insphered within each other the solid substitutions, or modified ideas of ye Devine Nature may be conceiv'd to fill all space with its activity and infinitely diversified with restless oporations, perpetually to exert in both all endlessly, and co-eternally with himself."

The present work will be of greater value to readers who are interested in intellectual history and to those who desire to know what it was like to be an astronomer in the eighteenth century than it will be to those who seek the sources of modern astronomical ideas. It will be a source of insight for the former and of frustration for the latter.

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NEW BOOKS RECEIVED

The Origin of the Solar System, by H. P. Berlage (Long Island City, N.Y.: Pergamon, 1968) vii + 130 pages, $1.85 paperback. This book is one of the Pergamon International Popular Science Series. It explains many of the more worth-while theories about the origin of the solar system which have developed over the last three hundred years. It is sutiable for anyone who has a high-school background in science.

All About Telescopes, by Sam Brown (Barrington, N. J.: Edmund Scientific Co., 1968) 192 pages, $6.75 hard-cover, $3.00 paperback. Fully illustrated with charts and drawings, this book describes how to grind, polish, and test telescope mirrors. Also included are discussions on telescope optical design and telescopic photography, as well as descriptions of time calculations in astronomy. It is geared both to the beginner seeking information about the type of telescope to build or buy, and to the advanced amateur who desires help in ray tracing or optical formulae.

Astronomy: Globes, Orreries, and Other Models, by H. R. Calvert (London: George Putnam and Sons, 1967) 50 pages, $1.20 paperback. This is one of a series of paperback booklets put out by the London Science Museum. It contains descriptions and excellent color photographs of 20 astronomical globes, armillary spheres, and orreries that form part of the astronomical collection in the Science Museum.

Other booklets in the series cover such topics as timekeepers, ships, chemistry, aeronautics, lighting, and cameras. All may be purchased through the British Information Service.

Theory of Stellar Spectra, by V. V. Sobolev (Washington, D.C.: National Aeronautics and Space Administration, 1967) v + 279 pages, $3.00 paperback. This is a translation of the Russian book *Teoriya Zvezknykh Spektrov,* by V. V. Sobolev, published in Moscow by Nauka Press in 1966. It deals with atomic processes, theory of radiation transfer, problems in the formation of spectra of stars and nebulae, and ultraviolet spectra of celestial bodies.