

contains elementary properties of characteristic functions, the inversion formula, the Helly theorems, the continuity theorem, and the Bochner-Khinchine theorem.

The most exciting chapter is chapter 9, on infinitely divisible distributions. Here the author limits himself to distributions with finite variance; he derives, in this case, the canonical representation of the characteristic function of such a distribution, and he proves limit theorems for sums of independent random variables. Chapter 10 is a masterful introduction to the theory of stochastic processes. Included in this chapter are the following topics: Poisson processes, Markov processes, processes with stationary independent increments, stationary processes and their spectral representation, and the Bochner-Khinchine ergodic theorem. Except for the last chapter (chapter 11, on the elements of statistics), all the chapters are good. What the author does well in the last chapter is his presentation of the Kolmogorov-Smirnov two-sample test. However, the rest of this chapter seems to be too hurried and inadequate. One such case is on pages 403 and 404, where a rather confused explanation is given of errors of type I and II in hypothesis testing.

The negative side of this book is small in comparison to its positive attributes. However, one negative aspect is that the mathematical prerequisites are not clearly stated. At first one gets the impression that the prerequisite is a rigorous course in advanced calculus. However, some measure-theoretic results of an advanced nature are assumed and used later, thus creating an uneven mathematical level for the book. Thus, if knowledge of a standard amount of measure theory had been assumed of the reader, not only could the mathematical level of the book have been kept even, but also certain basic topics that had to be omitted could have been included. For example, this book should contain a development of conditional expectation as a Radon-Nikodym derivative, the martingale convergence theorem, Kolmogorov's zero-one law, and the three-series theorem.

In general, Gnedenko's book is a milestone in writing on probability theory, and it will undoubtedly find its way to the bookshelves of mathematicians devoted to this field.

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A Challenging Puzzle

The Planet Saturn. A history of observation, theory, and discovery. A. F. O'D. Alexander. Macmillan, New York, 1962. 416 pp. Illus. Plates. \$12.

To those people who have had an opportunity to see Saturn through a large telescope, it is perhaps the most esthetically pleasing object in the heavens. But to the cosmogonist, it is perhaps the burial crypt of many of the secrets of the origin of the solar system. Its oblate globe together with its rings strongly resembles the lenticular cloud of dust and gas from which it is believed the sun and planets were formed. Saturn was probably formed from a similar smaller cloud of the same nebula, and the rings may be a remnant of that cloud.

This book is but the third extensive treatise concerning Saturn to have been written. It follows the study of the planet in a historical and chronological fashion from 650 B.C. until A.D. 1960. The extensive visual phenomena as seen by many observers as well as the recent astrophysical studies are all included, often with quotations from and references to the original papers. But as a reference volume this book suffers from its chronological approach. For example, the rings are discussed on practically every page following the chapter which treats the introduction of the telescope. If one wants to find information about subdivisions in the rings, the index refers him to 41 pages scattered between pages 122 and 420.

A reader will probably find many parts fascinating, such as the one that treats the eventual realization by Huygens that the puzzling appearances and disappearances of "ears" on the globe were produced by rings encircling the planet. On the other hand the reader will possibly be bored by many of the plodding visual studies presented near the middle of the book. However, much of this material does not yet have an adequate physical explanation, and some of it seems contradictory.

I noted an important error. The author states that the presence of molecular hydrogen cannot be ascertained from a planet's spectrum. He was quoting H. N. Russell who was apparently thinking only of dipole absorption. G. Herzberg, in 1952, found lines due to induced-dipole absorption by hydrogen in spectra of Uranus and Neptune.

C. C. Kiess published spectra of Jupiter in 1960 showing quadrupole absorption by hydrogen. This year H. Spinrad found the quadrupole lines in Saturn's spectrum.

On the whole this is a useful book to the researcher, for it brings to light much of the little-known and unexplained visual phenomena that occur on the ball and rings of the planet.

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Natural History

The Senses of Animals and Men. Lorus and Margery Milne. Atheneum, New York, 1962. x + 305 pp. Illus. \$6.95.

Since remotest antiquity man has been fascinated by animal life and conduct. As if drawn by an irresistible allure, he wove fanciful tales about the animals he knew and romanticized freely about the ones he invented. The tall stories recounted by Pliny, frequently with due apology for their extravagance, and the utterly charming concoctions of the numerous medieval bestiaries bear full testimony to this inherent and characteristic curiosity of man in his fellow creatures.

The present volume may be said to cater to this same basic curiosity, but in a manner that reflects the new, sound, and no less intriguing horizons of modern science. The book is natural history at its very best, full of the fascinating aspects of animal behavior that are effected mostly by sensory intervention. It brings together, in readable prose and logical organization, virtually all that has recently been brought to light, through keen observation or ingenious experimentation, concerning the little-known world of animal conduct. From Steche's experiment with the electronically controlled dance of a mechanical bee sending forth a live swarm to a predesignated region, to the sea lamprey's electric arc, emerging from and reentering its body, with which it detects obstacles that affect it, to the remarkable adaptations of the wax-eating birds of the genus *Indicator*—incident piles upon incident, chapter follows chapter, unfolding adaptive behavior, mostly genetic in nature, whose functional expressions never lose their attraction and wonder. The mediation