

Book Reviews

Earth's Satellite

The Measure of the Moon. Ralph B. Baldwin. University of Chicago Press, Chicago, Ill., 1963. xx + 488 pp. Illus. Maps. \$13.50.

Physics and Astronomy of the Moon. Zdeněk Kopal, Ed. Academic Press, New York, 1962. xv + 538 pp. Illus. \$16.50.

The appearance of two large books about the moon, in such close sequence, with so much to praise and so little to criticize, yet with such widely different choices of subject matter, testifies to the almost explosive increase in the study of our satellite that has been carried on by physical scientists since World War II. Although each book contains material of interest to the intelligent layman, both are directed primarily toward physical scientists, and especially toward the men who are attempting lunar research. Such men, if they lack technical library facilities, either because they are connected with small universities or because they are retired, will perhaps find that these books are the most used ones in their professional libraries. The space that any journal can allot to a review must be inadequate.

Baldwin's book is a new one, not a revised and enlarged version of his *The Face of the Moon*, published 14 years ago. The first 105 pages scarcely mention the moon! They bring together short, authoritative descriptions of some terrestrial craters, which are either definitely of meteoritic origin, or which at least bear evidence that favors such an origin. Those of us who are not geologists specializing in vulcanology have missed much of the material, and we welcome this digest with its voluminous list of references. The next hundred pages continue this introductory material on craters. There are theoretical discussions of diameters,

depths, rims, the distribution of material, the effects of shock waves, and especially of the relationships of parameters of craters produced by varying explosive actions that occur at different heights or depths from the original surface. Baldwin provides equations based on data from nuclear explosions, from terrestrial meteoritic craters, and, less certainly, from lunar craters which are assumed to be meteoritic. Here again his list of references is ample, and the brief characterizations of the research of selenologists are useful. The third major portion of the book concerns the shape of the moon, a matter that has worried students for a long time. He summarizes previous work and goes into some detail in presenting his own careful study and his new contour map.

The latter half of the book is devoted to the lunar data as we observe them visually, photographically, photometrically, and spectrographically. Baldwin considers craters, the different forms of maria, lava flows, the lunar rays, the atmosphere, the magnetic field of the moon, tektites, the testimony of varying albedoes concerning the nature of the moon's surface, the heat balance of the moon, the question of color, domes, rilles, possible changes of the surface, and all of the other subjects that must occupy the selenologist's time. In all of this he appears to have performed a masterful feat of summarizing. I must, however, plead guilty to a stubbornness which forces me to remain one of the minority who believe that, despite the great importance of meteoritic impacts on the moon, its internal conditions have been even more important in producing the surface we observe today.

In contrast to Baldwin's presentation, Kopal has gathered more than a dozen of the world's greatest authorities, each to write a chapter on the part of the subject for which he is best

known. One could almost believe that Baldwin and Kopal had mutually apportioned the general subject. The first hundred pages of Kopal's book are devoted to a subject barely touched on in the other: "The motion of the moon in space" by Dirk Brouwer and Gen-ichiro Hori, "Libration of the moon" by Karol Koziel, and "Dynamics of the earth-moon system" by Gordon W. Groves. The remainder is more conventional, with discussion of the polarization of moon light by Dollfus, lunar photometry by V. G. Fessenkov, eclipses by Link, topography by Kopal himself, the nature of lunar craters by Eugene Shoemaker, and outgassing by Kozyrev. There is an extremely important chapter by Sinton on temperatures of the lunar surface; Grainger and Ring consider luminescence; radio echo studies are beautifully summarized by J. V. Evans; and Urey presents his interpretation of the origin and history of the moon. Each author has carefully supplied references to original material.

In a general estimate of values, it is impossible to consider one book more important than the other.

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Physics and Biology

Physicomathematical Aspects of Biology. N. Rashevsky, Ed. [International School of Physics "Enrico Fermi," *Proceedings* (Course 16)]. Academic Press, New York, 1962. 524 pp. \$16.

This collection is presumably devoted to areas at the interface between biology and physics, as they are currently reflected in data and theory.

Let us examine how well the task has been accomplished. A. F. Bartholomay, in an excellent paper which may become a classic reference for students and teachers, provides a highly competent and instructive treatment of the developments of the reaction rate theory in the past hundred years; Bartholomay stresses the cooperation between experimental data and mathematical formalism.

Enzymatic reactions receive extensive discussions in this paper and in the following paper, which is by Boeri. In an attempt to relate physical theory and psychophysical data, M. A. Bouman