Hadley rille Pease wrote: ". . . in fine weather one has the sensation of looking down upon a Grand Canyon as sharply cut in structure and as angular in its turning as that of the Colorado River. Abrupt bends forming acute angles occur in its length and small side canyons enter into it at these points."

The Soviet account of photographing the far side of the moon is especially interesting, and so is E. A. Whitaker's somewhat different interpretation of the Soviet photographs. Although taking these photographs was a magnificent technical achievement, I tell my graduate students that they had better do better, or else! It is surprising that nothing more along this line has been accomplished during the last 4½ years, but it may well be that new and better photographs will appear about the time this review is published. Detailed close-up exploration of the bleak lunar landscape should be one of the most exciting events of the 1960's.

The two major meteorite falls of this century were in Siberia, and in this volume they are treated by a recognized Soviet authority (in chapters 7 and 8). His conclusions are that the Tunguska fall (in 1908) was a collision with a small comet, while the Sikhote-Alin meteorite (in 1947) was probably a small asteroid.

The delayed acceptance of the impact origin of lunar craters has been caused, in part, by the fact that apparently such craters do not exist in any number on the earth. The discovery of several large fossil meteorite craters in Canada, by C. S. Beals and his associates, is therefore a major breakthrough. The Brent Crater in northeastern Ontario, an explosion crater some 2 miles in diameter, is at least 400 million years old and probably much older. These discoveries were made by examining aerial photographs, and it is likely that extending such investigations to the entire earth's surface would be richly rewarding.

Meteorites are chunks of primordial matter that have been collected and, in some cases, venerated by men since prehistoric times. We would know a great deal more about early planetary and preplanetary history if we could understand completely the curious structures of, and the chemical and isotopic variations in, meteorites. Until a decade ago, meteorites were studied by mineralogists; more recently important contributions have been made by geochemists and nuclear physicists, and the subject is one of explosive growth that is well told from the different points of view in this volume.

The relationships between meteors, meteorites, and comets are still somewhat obscure, because such totally different processes as asteroid collisions and comet disintegration by sunlight give rise to similar phenomena in the earth's atmosphere. There are probably at least 100 billion comets "in" the solar system, in a cloud that extends to distances comparable to the distances of the nearby stars. The nuclei of these comets should be stratified like geological sedimentary strata and should give the oldest and least disturbed record of ancient processes. For these reasons, Fred Whipple proposes a space probe that will land on the nucleus of a nearby, passing comet.

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Chemical Kinetics

How Chemical Reactions Occur. An introduction to chemical kinetics and reaction mechanisms. Edward L. King. Benjamin, New York, 1963. xi + 148 pp. Illus. Paper, $1.95; cloth, $3.95.

The improvement of science courses in secondary schools requires a corresponding improvement at the college level to avoid the undesirable prospect of subjecting college freshmen to instruction that is less informative and stimulating than that which they have already completed. In the case of general chemistry, King has helped meet this challenge with his introduction to chemical kinetics and reaction mechanisms for beginning students. His monograph accomplishes the difficult feat of presenting a mature, correct approach without being too advanced for freshmen, and it is a welcome contrast to many dull treatments that have been simplified to the point of being incorrect and abbreviated to the point of saying little.

In the text of *How Chemical Reactions Occur*, the author clearly and repeatedly emphasizes the difference between the macroscopic (empirical and phenomenological) rate laws, which are used to express experimental results in analytical form, and reaction mechanisms, which interpret the rate laws on a microscopic (molecular) basis. There are abundant examples and problems to help the student appreciate the distinction and to impress him with the fact that the elucidation of a correct mechanism is an accomplishment of relatively high scientific importance. In addition to logical development of the usual collision theory for bimolecular gas phase reactions, King emphasizes the role of intermolecular forces in any theoretical treatment. In this way he is able to treat properly the energy of activation as a potential barrier that separates the system of reactants from the system of products. Finally, chemical kinetics is shown to be a currently exciting subject by the discussion of recent sophisticated experimental procedures, such as relaxation methods and flash photolysis, for the quantitative study of reactions with half-lives that may be of the order of microseconds or less.

For a number of years I have taught chemical kinetics to college juniors, seniors, and graduate students. I would be happy indeed if these advanced students retained an understanding and appreciation of the fundamental concepts stressed by King.

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Note

Genetics

For 23 years the first and second editions of **An Introduction to Medical Genetics** (Oxford University Press, New York, ed. 3, 1963. 297 pp. Illus. $7), by J. A. Fraser Roberts, have served as outstanding textbooks for both medical students and clinicians. This third edition maintains the very high standard of the earlier volumes. The author has added an excellent chapter in which he clearly presents the new and very important developments in our knowledge of human chromosomal aberrations and their clinical implications. He carefully describes the recently discovered sex-linked blood group system and extends and amplifies, with fresh new examples, the treatment of biochemical genetics. The book is still the best of its kind.

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