from our observation of his behavior in the West. It is obvious that different systems of ownership, employment, mobility, status, and authority will require some adaptation of the concepts which Lipset has found useful in this book. This does not in the least invalidate his concern for the development of a sociology of politics; it merely projects it onto a broader stage.

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The Transits of Venus. A study of eighteenth-century science. Harry Woolf. Princeton University Press, Princeton, N.J., 1959. xiii + 258 pp. Illus. $6.

Now that our age is designated as that of the Sputnik almost as often as it is designated that of the atom, it is interesting to reflect that astronomy, and not physics, has customarily been the trail-blazer of science for some 3000 or 4000 years. For less than a century of that time, physics has seemed to be the leading part of the research front, and astronomy has been relegated to subservience.

In earlier times, the roles were very different. Ptolemaic astronomical theory arose long before any comparably advanced mathematical formulations in the rest of physics. In the later Middle Ages and Renaissance, it was again astronomy that yielded the greatest and most shaking advances. A more equal balance was attained during the age of Galileo and Newton, but within a century of the death of Newton, the new science of electricity had shifted the scientific focus toward what is now known as physics.

This 18th century saw, however, two important astronomical events—the transits of Venus—that had considerable effect upon the organization and the content of the whole of science. It is most interesting that the transits happened when they did by virtue of the *force majeure* of slow astronomical motion rather than by any historical persuasion. The transits of Venus occur at intervals of about eight years, separated by gaps of 105½ and 121½ years, when no such phenomenon can be observed. In the 17th century they happened in 1631 and 1639. The former, but a generation after the development of the telescope, was not seen by anyone. The latter was observed only by Horrox, but no useful measurements were made. The next pair of transits, in 1761 and 1769, became the object of an endeavor similar in nature to the recent International Geophysical Year.

The importance of these transits was that they provided a means for measuring the size of the planetary system —one of the fundamental constants of the observed world. A yardstick for the universe is difficult to obtain. Before high-precision instruments were available, it was not possible, except through the transits of Venus, to obtain any but very approximate results. The transits of Mercury were not very useful, since that planet is too near the sun for much parallax to be observed against the solar backdrop. No other planet will suffice; no other method was possible in the 18th century. Astronomers had to sit patiently and wait for the great events of 1761 and 1769. Wait they did, and when the time came, the astronomers were strung out over the war-torn globe in accessible and almost inaccessible places.

The story of this international essay in science is a most exciting one, and has been admirably told by Harry Woolf. His treatment is monographic and authoritative. Among several entertaining stories is that of Pingré, who made observations on the island of Rodrigue. He improvised turtle oil for cleaning his corroded instruments, and finished by commenting on the excellence of turtle liver as a gastronomical delicacy. Although the historical discussions are so capably written, one might wish that more space had been devoted to the hard core of astronomical theory. Figure 2, which attempts to illustrate the geometry of a transit, appears to be drawn in two planes at once; the letter g should be a q, and this correction should also be made in the text. Furthermore, the letters e and w in the diagram are seemingly irrelevant and unused. The use of Bode's law is misleading in its context, since only Kepler's third law was needed, and indeed used, to obtain the relative distances of Venus and the Earth. There is no theoretical comment on the way in which the early astronomers were forced to abandon the possibility of using the transits of Mercury, and there is little appreciation of the huge difficulties involved in the mathematical technique needed to trace the predicted observabilities of the Venus transits at various points on the Earth. Thus, although the book could have contained more discussion of science from the inside, Woolf has done such a monumental job of editing, collecting, and commenting from the historical outside, upon the original sources related to this episode of science that he shall forever have our thanks and our heartfelt praise for his labors.

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Crystal Chemistry of Simple Compounds of Uranium, Thorium, Plutonium, and Neptunium. E. S. Makarov. Translated from Russian by E. B. Uvarov. Consultants Bureau, New York; Chapman and Hall, London, 1959. iii + 145 pp. Illus. $5.25.

This book has the two-fold purpose of presenting, in a systematic collection, the results of the many studies of the crystal structure of the chemically simple compounds of uranium, thorium, plutonium, and neptunium, and of developing and correlating the crystal chemistry of these compounds. A brief introduction stating the purpose of the book is followed by chapter 2 (21 pages) in which an attempt is made to present a short discussion of some of the main principles of crystal chemistry. Presumably this chapter is included to make the book more nearly self-contained. It would have been better had the author chosen, instead, to refer his readers to the standard texts on crystal chemistry, since his treatment is very naïve, and in part, completely erroneous. The following statement is one example of this: "In crystals with ionic bonding the valence electrons are completely localized in the atomic orbits of the anions and therefore the negative charge (electron density) is distributed periodically, roughly speaking, at lattice points." This is "roughly speaking" indeed! Many other misleading or completely wrong statements occur in this chapter, including the common mistake of calling the CsCl-type structure body-centered, and, as always, confusing the lattice with the structure.

In chapter 3 (16 pages) data on the crystal structure of the several polymorphic varieties of the elements are collected, and in chapter 4 (72 pages) similar data are given for a large number of simple compounds, including metallic phases, borides, oxides, hydrides, and halides. In chapter 5 (5 pages) the crystal radii of the actinides are discussed, and in chapter 6 (18 pages) the rival "actinide" and "thoride" hypotheses for the explanation of the chemical behavior of the elements are considered. A detailed table of contents and a list of the literature cited are given, but no index is included.

The strength of this book lies in the fact that it does collect in one place a great many factual data, and for this reason it should be very useful to persons interested in the subject covered. On the other hand, throughout the book the theoretical or interpretive parts are very poor.

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The Viruses. Biochemical, biological, and biophysical properties. vol. 2, *Plant and Bacterial Viruses*. F. M. Burnet and W. M. Stanley, Eds. Academic Press, New York, 1959. xvi + 408 pp. Illus. $13.

This book is the second of a three volume series written and edited by scientists who are authorities in their several fields. Volume 2, *Plant and Bacterial Viruses*, contains ten essays, four devoted to the plant viruses and six to the bacteriophages. The book differs from a collection of reviews, which might be garnered from other sources, in that each author has made a conscientious effort to present his subject as a whole without placing special emphasis on his own contributions to it. The book differs from an old-fashioned textbook, written by a single author, in that each chapter is suffused by intellectual and factual local color that seldom emerges from the laboratory except in monograph form.

Wildman introduces the plant viruses by describing the growth of tobacco mosaic virus in plant tissues. Markham writes a monumental chapter on the chemistry of plant viruses, which serves both as a handbook on purification and analysis of virus particles and as a review of pertinent theoretical principles. Knight's chapter on hereditary variation and its chemical correlates among mosaic viruses summarizes this pioneering but, so far, relatively unrewarding topic. The presentation is marred by confusing ellipses involving the use of the word *strain*. Black reviews the evidence from which it has been concluded, in recent years, that certain viruses multiply both in their plant hosts and in their insect vectors, a glaring exception to the rule of host specificity in viral growth.

The bacteriophages are introduced by Lwoff in a chapter that defines the place of viruses among other things and bacteriophages among viruses by a wry and slightly perverse logic that recalls to mind the schoolmasters of fiction. The main features of bacteriophage infection are then described in detail by Garen and Kozloff (initial steps), Stent (intracellular multiplication), Levinthal (genetics), and Jacob and Wollman (lysogeny). Each of these chapters is factually comprehensive, thoughtfully interpretive, and uncluttered by controversial issues. The radiobiology of bacteriophages, summarized by Stahl in a final chapter, can be regarded, for reasons explained by its author, as a subject unconnected with the rest of the book. (Stahl perhaps exaggerates; almost the same accusation concerning genetics is made and rejected by Levinthal in his chapter. The facts are that satisfying connections between these subjects and chemistry remain to be made.) Stahl's chapter is unique in other respects, even among the chapters of this excellent book; the elegently conceived, clearly and economically presented, subject matter might lead the unguarded reader to suppose that writing it was an easy task. As an amateur writer sometimes interested in radiobiology, I can assure him that it wasn't.

The book will need no recommendation to virologists; it may be recommended to all who wish to become virologists, and it will serve as a convenient reference source for others.

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Minerals of New Mexico. Stuart A. Northrop. University of New Mexico Press, Albuquerque, rev. ed., 1959. xvi + 665 pp. 1 map. $10.

This revision is the transformation of an inexpensive, paper-bound bulletin into a 665-page, cloth-bound volume. In its original form *Minerals of New Mexico* was useful to mineralogists and mineral collectors traveling in New Mexico. The new version should be of broader interest. Stuart Northrop has made extensive additions to the 1942 text. He has brought old descriptions up to date by adding the names of new localities, and he has added enormously to the number of minerals discussed by including localities discovered in New Mexico as a result of intensified mining and studies of minerals in the war and postwar years.

Interest in the new addition will be more than local, for the book contains many unpublished facts that Northrop has learned by personal correspondence, and reports he has abstracted from publications that a geologist compiling a bibliography might not encounter. The descriptions of some minerals have grown: calcite takes 13 pages instead of 7, carnotite 2 instead of ½; tyuyamunite, a new addition, covers a whole page. At the end, we find an extended bibliography and list of mining districts. The revision, an ambitious undertaking, is justified by the results, for the book is now of much greater value to general readers than before.

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90° South. Paul Siple. Putnam's, New York, 1959. 384 pp. $5.75.

On 18 September 1957 the temperature at the United States' IGY Station at the South Pole reached a record low in man's experience, −102.1°F. It was officially recorded by the first 18 scientists and navy men to live and work through man's first winter at 90° South. Paul Siple, internationally recognized as one of America's most versatile scientists, was the scientific leader at this remote scientific outpost, established in a forbidding environment of nothing but snow, wind, and flesh-splitting cold.

This saga of modern scientific exploration is brought into preliminary focus by a perceptive, historical chronicle of man in Antarctica since the continent was first sighted. Then, with undertones of tolerance and magnanimity, Siple recounts the story of the conception, planning, construction, and operation of the station during its first year, against the background of how this was made possible through the concerted national efforts of our armed forces, scientists, and industry.

Siple, a veteran of four antarctic