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