entific issues and approaches is actually a high compliment to the success of the volume. A graduate student preparing for an oral examination in ecology might do well to know the streams of effort and their issues of excitement and controversy as represented in this volume. If the European IBP effort is producing this kind of focus by concentrating on basic productivity as a theme, perhaps the broader, ill-defined, and do-nothing program of the U.S. should be narrowed to conform to the European pattern.

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Kepleriana

Kepler's Somnium. The Dream, or Posthumous Work on Lunar Astronomy. Translation (from the 1634 edition) and commentary by EDWARD ROSEN. University of Wisconsin Press, Madison, 1967. 279 pp., illus. $8.75.

Kepler's *Dream* is a curiously interesting tract on two accounts. First, its fantasy framework of a voyage to the moon makes it a pioneering and wondrously prescient piece of science fiction. Second, its perceptive description of celestial motions as seen from the moon produces an ingenious polemic on behalf of the Copernican system. The work takes the form of an interview with a knowledgeable "daemon," who explains how a man can be transported to the moon:

> In every instance the take-off hits him as a severe shock. . . . For this reason at the onset he must be lulled to sleep immediately with narcotics and opiates. His limbs must be arranged in such a way that . . . the shock will be distributed among his individual limbs. . . . After the first stage of the trip is finished, the passage becomes easier . . . so that finally the bodily mass proceeds toward its destination of its own accord.

In a note Kepler explains how to calculate this point at which the gravitational attractions of the earth and moon balance out; his incorrect answer reveals his theory of a gravity proportional to distance. Kepler goes on to describe the inhabitants of the moon and their adaptations to their peculiar environment.

Kepler first put forth his idea of a "lunar astronomy" in a student dissertation at the University of Tübingen around 1593 but did not write it out in its final form (including the dream sequence) until 1609. For years after that the work lay unpublished. Kepler was Imperial Mathematician in Prague, and his attention was occupied with his *Dioptrice* and *Epitome of Copernican Astronomy*. Not until 1621 did Kepler again return to the *Dream*; during the next nine years he extended it with the addition of 223 notes. Consequently in the finished work we see preserved two different stages of Kepler's scientific thought.

The *Dream* itself is very short, scarcely 19 pages in this edition. Kepler's notes, supplemented by 399 scholarly and exceedingly helpful footnotes by Rosen, run to 128 pages. Happily, the frequent complaints against previous translators that marred Rosen's notes to his translation of Kepler's *Conversation with Galileo's Sidereal Messenger* are entirely absent here. Even Marjorie Hope Nicolson, with whom Rosen disagrees about the interaction between Kepler and John Donne, comes off without attack; her punishment, apparently, is being omitted from an otherwise complete index.

Thirteen appendices, ranging from biographical notes on Jacob Bartsch (who became Kepler's son-in-law) and Ludwig Kepler to "the cold of Quivira," bring us a compendium of interesting Kepleriana, illuminated by those delightful flashes of erudition that we have come to expect from Rosen. Appendix 1, on Kepler's concept of inertia, is particularly suggestive. Kepler introduced the term *inertia* into the physical sciences. Although Newton scarcely mentions Kepler in his *Principia,* the idea of inertia is fundamental in his theory, and he may have been more indebted to Kepler than he was willing to admit.

Rosen's translation of the *Somnium* is the second to appear within the last few years. Patricia Frueh Kirkwood's very acceptable version was issued in 1965, accompanied by an enthusiastic interpretation by John Lear. When we consider the paucity of works by Kepler available in English translation, this duplication of effort is regrettable. In any event, Rosen's edition is much to be preferred, both because of his unquestionable mastery of scientific Latin and for his authoritative annotations.

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Atomism in the 1860's

The Atomic Debates. Brodie and the Rejection of the Atomic Theory. W. H. BROCK, Ed. Leicester University Press, Leicester, England, 1967. 196 pp., illus. 35s.

As the history of science becomes a more professional and specialized discipline, so the number of monographs devoted to minor characters and abstruse controversies begins to increase. In this latest study Sir Benjamin Brodie is the character, and his "calculus of chemical operations" the focus for the "atomic debates" of the 1860's.

Thanks to the editorial persistence of W. H. Brock we are now presented with three essays which seek to explore the context and significance of Brodie's long-forgotten work. The first essay (by Brock and D. M. Knight) sets the background of 19th-century scepticism about chemical atoms. The second (by D. M. Dallas) outlines the calculus itself, and the third reproduces a variety of correspondence relating to it, from such eminent men of science as Crum Brown, Odling, and Williamson. It is this third section which is in many ways most fascinating, not only for the glimpse it gives into the private attitudes toward atomism of an important group of mid-Victorian scientists, but also for the atmosphere of leisured grace it portrays. A far cry from today's world of "big science," massive research contracts, and multimillion-dollar atom-smashing machines!

Somewhat unfortunately, the authors have chosen to stress the fact that Brodie's calculus was a "form of *operationalism* which preceded and anticipated Bridgman's use of the term by some sixty years." While this may be true, the importance of Brodie's work does not lie in any anticipation of such a now-dated fashion as operationalism. Indeed, the writers seem uncertain as to quite how significant were the "atomic debates" that they report. This present volume, in raising more problems than it solves, highlights the need for further research on the uneasy marriage between practical success and theoretical doubts, so typical of the 19th-century career of chemical atomic theory.

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