finds great significance in a figure of Mercury used in the first work (1558), supposes that it "closely resembled" a Pythagorean construct in the second (1564), and asserts that "it was again to be displayed on the first page" of the *Praeface* (p. 6). This is historiographical alchemy in itself. The *Praeface* title-page has at the foot of a wood-cut border a tiny figure of Mercury, but above it rise figures of Arithmetica, Geometrica, Musica and Astronomia, and above them Hipparchus, Aratus, Ptolomaeus and others performing observations with instruments under a globe of earth surmounted by Time, the sun and the moon. This wood-cut occurs at least four times previously in diverse John Day editions as early as 1559; its relation to Dee's Euclid seems fortuitous. One brief paragraph names Astrology, a science to be distinguished from false and presumptuous notions of influence; influence like the moon's on the seas and the human body is to be studied by his "Mathematically furnished" method. Another paragraph names *Archemastrie* as the *Experimentall Science* which "procedeth, with the helpe of the foresayd Artes, to the performance of complete Experiences, which of no particular Art, are hable (Formally) to be challenged" (sig. A. iii). This is the (old and new) call for testing conclusions by controlled experiment: is it alchemy?

The editor, Allen Debus, Director of the Fishbein Centre for the History of Science (University of Chicago), has introduced this edition without indicating the value of the English Euclid itself for English scholars of the sixteenth century and after. He does not discuss *The Mathematicall Praeface* in its relation to the renewed geometrical science. Unfortunately Debus has also failed to mention John Dee's long "Advertisement" concerning the last proposition of *Elements* Bk. X, his demonstration (at the end of Bk. XII) of the proportionate weight of the contents of a sphere to that of a cube, and many other significant annotations. The editor reminds us that Dee's Paris lectures are still in manuscript and have not been compared with *The Mathematicall Praeface*. Nor has it been discovered whether the English printing by John Daye was merely sponsored by Henry Billingsley, or whether it was Billingsley's translation (quite an accomplishment for a Mayor of London) or that of his own St. John's College tutor Whytehead, who had retired to the haberdasher's household—as Charles Thomas-Stanford suggested in 1926. Further difficulty has been introduced by the reduction of folio pages to a quarto format: the volume is poorly printed and difficult to read.

All in all, one should begin with Euclid's work itself and with Dee's straightforward introduction of the sciences as such. He recommends mathematics and fully outlines its usefulness. He gives many practical examples for Geometria (such as land measurement) but hopes that the reader will also advance into Euclid's abstractions or *Megethologia*: pure demonstration of "Things Mathematicall." That is quite sufficient and important.

WESLEY M. STEVENS, *University of Winnipeg*

M. L. Righini Bonelli & William R. Shea, editors. *Reason, Experiment, and Mysticism in the Scientific Revolution*. New York: Neale Watson, 1975. Pp. vi, 320. \$20.

Bonelli and Shea have presented us with a collection of essays of rare excellence. The contributions of Debus on the chemical philosophers Fludd and van Helmont, of Guglielmo

Righini on Galileo's lunar observations, of Drake on Galileo's science of motion and of Westfall on Newton's alchemical work are fine examples of historical research and writing; and the shorter essays of Gingerich, Hartner, Costabel and Marie Boas Hall are no less excellent or controversial. The volume as a whole should do much to overcome the traditional attitude of scientists and historians of science that science was able to come into being only by shaking off the dead-weight of the religious and mystical influences of the Dark Ages; it should also do much to overcome the positivist conception of science as an inductive endeavour manifesting continual progress. Debus' essay demonstrates that it was the chemical philosophers, with their belief in the universal sympathetic action in nature, more than "respectable scientists" like Gassendi and Kepler, who championed the cause of experimental methods. Indeed, both Debus and Vasoli show that Gassendi and Kepler were not loathe to side with the dogmatism of religion and the Ancients against the alchemists. The issue of experiment and observation is taken up also by Gingerich, who points to the actual scarcity of observational data available to the early astronomers. "[T]he astronomer of the sixteenth or seventeenth centuries," he contends, "was generally far removed from the idealized scientist accruing observations with neutral open-mindedness for the day when some suitable hypothesis would suggest itself." Rather, these astronomers were the "architects of the heavens," rearranging essentially known data to fit new theories. Moreover, the visions which inspired Galileo and Kepler were no less mystical than those which inspired the alchemists—and, perhaps, no more mystical than those which inspired Einstein or Watson.

The influence of the hermetic tradition on the "scientific revolution" is apparent from all the papers; but, from the point of view of the general reader, the most interesting account of the relationship between the old and new approaches will surely be Westfall's on Newton's alchemical work. Undoubtedly, there are those who would prefer to forget that the author of the *Principia* dabbled so much in the occult, but Westfall's careful research shows that "Newton's interest in the art was neither a youthful frolic nor an aberration of senility." There are hints, however, that even Westfall believes that Newton's alchemical work and his more acceptable scientific contributions can be dissociated completely. Newton may have seen his alchemical endeavours as more important than his mathematics, dynamics and optics, but Westfall seems to attribute Newton's interest almost totally to his isolation in Cambridge, away from the "more orthodox scientific community." This separationist attitude is reflected by Marie Boas Hall, who suggests that "[t]o study Newton's alchemy is to study failure, and a dead form of intellectual endeavour," and that "[i]f Newton was truly an alchemist, he was boringly pursuing a boring chimaera." To counter the idea of a boring Newton, Hall attempts to make the case that Newton employed only the vocabulary of alchemy, but that really his work was reputable chemistry. In view of such reactions to Newton's alchemy, a contribution detailing the actual influence of alchemical ideas on the scientific work of Newton would have been in order.

It is scarcely surprising that such a volume dedicated to the scientific revolution should contain some comment on the possible epistemological repercussions of recent trends in historiographical theory. Paolo Rossi's essay "Hermeticism, Rationality and the Scientific Revolution" criticizes both Feyerabend and Popper. Rossi claims, rightly, that "it is time that historians of science assert the need for a careful and detailed examination of the historical process." As Rossi's own positive contentions would indicate, however, historio-

graphy without some theory of the historical process and man's part in it would be an impossibility. Rossi himself deplores the excessive geneticism in historiography and the concomitant depreciation of the contribution of individuals. Such trends, he maintains, lead to epistemological relativism and irrationalism. Rossi's defence of a rational science, however, suffers in that he nowhere defines "rational" and fails to show that geneticism is incompatible with a rigorous individualism. Despite these failures, his essay is, nonetheless, an important contribution to the current debate on epistemology. From the point of view both of an enlightening and provocative historical analysis of the scientific revolution and of a general critique of historical and scientific methodology, therefore, this volume is a major contribution to contemporary research.

PAUL LANGHAM, *University of New Brunswick*

Jean Bodin. *Colloquium of the Seven about Secrets of the Sublime*, ed. and tr. Marion Leathers Daniels Kuntz. Princeton, N. J.: Princeton University Press, 1975. Pp. lxxxii, 510. \$25.

If one thinks of the Renaissance as a period of individualism, Jean Bodin assumes a place of central importance. He was a busy man, and during the last half of the sixteenth century he advised or opposed the most powerful authorities in both church and state. He was also an influential author, and his *Six livres de la république* (Paris, 1576), *De la démonomanie des sorciers* (Paris, 1580), and *Universae naturae theatrum* (Lyon, 1596) were widely read. In advance of his age, he advocated freedom of thought—the license of the individual conscience in all matters of religion and of politics. He has been called an intellectual libertine, and even a skeptic; but more rightly, Bodin should be seen as that sort of enquiring mind which set humanistic philosophy apart from scholasticism without a breach of continuity.

Bodin's summary work was the *Colloquium heptaplomeres de rerum sublimium arcanis abditis*, which Professor Kuntz has chosen for translation in the volume under review. It was written in 1588 (or 1593), though for reasons not entirely clear was left unpublished during Bodin's lifetime. Nonetheless, it is probably the most interesting item in the Bodin canon—essential, certainly, to understanding and assessing his other writings. And we owe Professor Kuntz an inestimable debt of gratitude for bringing it so irresistibly to our attention.

The *Colloquium* is in form a platonic dialogue, a symposium at the dinner table of a cultured Venetian, Paulus Coroneus, who consistently argues the orthodox Catholic point of view. The other disputants are Fridericus Podamicus, a dogmatic mathematician who represents the Lutheran position; Hieronymus Senamus, a skeptic; Diegus Toralba, a naturalist in science and a fundamentalist in religion; Antonius Curtius, a Calvinist; Salomon Barcassius, an old Jew who is wise in the ways of the Cabala; and Octavius Fagnola, a convert from Catholicism to Islamic beliefs. The *Colloquium* is purportedly recorded by a self-effacing first-person narrator (a *persona* for Bodin), who not only reads Plato to the gentlemen during their meals, but also makes shorthand notes of their conversation. The discussion begins with a passage in the *Phaedo* where Socrates comments about the skill of the Egyptians in preserving their mummies from putrefaction, and it takes off from there