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Betty Jo Teeter Dobbs

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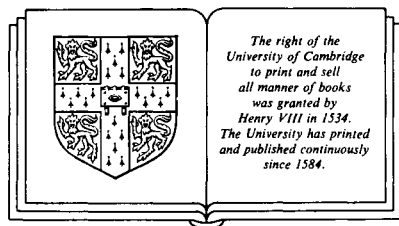
# The Foundations of Newton's Alchemy

or

*“The Hunting of the Greene Lyon”*

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BETTY JO TEETER DOBBS  
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TO MARY GLADYS GREER TEETER, MY  
MOTHER, WHO, FROM HER VANTAGE  
POINT IN THE SMALL TOWNS OF ARKANSAS,  
ALWAYS RECOGNIZED THAT THERE WAS  
MORE TO BE LEARNED

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## Preface

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This study, since its original conception, has contracted in its projected coverage of Newton's own alchemy as it has expanded in its coverage of the tidal waves of the Hermetic modes of thought that engulfed his period. Only a tiny fraction of Newton's own alchemical experiments have been explored in the event, but it is hoped that they have been made more comprehensible by placing them in their matrix in the intellectual currents of the seventeenth century. What has resulted here is a composite, and the word "foundations" in the title may be taken in three separate ways. One sense in which the word is used in this work is that of origins, and the origins of Newton's alchemy in Restoration England are emphasized. Another sense is that of the experimental and scholarly bases Newton provided for himself in his alchemical studies, and those foundations are examined also for the earliest period of his work. The last sense in which the word is to be taken is that of supports, and alchemy is seen finally as comprising one of the pillars which supported the structure of Newton's mature science.

This book is, in a small way, a work of both intellectual history and the history of science. Perhaps that is appropriate, even necessary, in studies dealing with scientific thought in the seventeenth century. For modern science in its nascence surely bore the marks of the ancient womb of human thought in which it had had its long period of gestation. Not all of those antique thought patterns are acceptable today as valid approaches to the world of phenomena or as genuine and honest efforts at making that world comprehensible. Modern science, like an adolescent, denies its parentage.

But the rich complexities of the seventeenth century produced a "century of genius," and it will perhaps do no harm to recapture what we can of its intellectual atmosphere. Newton is the century's epitome: his great synthetic mind wove its multiple strands together to make a brilliant new tapestry. In methodology he integrated the empiricism of Bacon and the mathematics of the ancients; in physics he integrated Kepler's planetary motions with Galileo's terrestrial ones. In both cases he added his own inimitable flourishes, making his productions something wholly new. In his chemical studies the same pattern may be detected, for Newton strove to integrate alchemical and Hermetic ideas with the mechanical philosophies of his day. The result was somewhat less successful in the realm of chemistry proper than were the results in



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some of his other undertakings. But in fact his efforts to integrate alchemy and mechanism seem to have produced one of his best virtuoso performances: the creation of a new concept of force. Newton's alchemy is the historical link between Renaissance Hermeticism and the rational chemistry and mechanics of the eighteenth century.

Two research tools which have been invaluable in this study are Maurice P. Crosland, *Historical Studies in the Language of Chemistry* (Cambridge, Mass.: Harvard University Press, 1962) and J. W. Mellor, *A Comprehensive Treatise on Inorganic and Theoretical Chemistry* (16 vols.; New York: John Wiley & Sons, 1960). They have been used freely throughout for innumerable problems in the translation and interpretation of seventeenth-century chemistry and alchemy and no further citation will be made to them. The symbols and names in Tables 1-5, drawn in part from those works, in part from various dictionaries and lexicons cited in the Bibliography, and in part from primary sources cited in the text, may be of some use to the reader.

TABLE 1 *Metals*

Symbol	Metal	Celestial analogue
☿	Mercury	Mercury
♄ or ♅	Lead	Saturn
♃	Tin	Jupiter, Jove
♀	Copper	Venus
♂	Iron	Mars
♁	Silver	<i>Luna</i> , Moon
☉	Gold	<i>Sol</i> , Sun

TABLE 2 *Antimony*

Symbol	Name and modern symbol
♁	Antimony ore, stibnite, $Sb_2S_3$
Regulus of ♂, ☉, and [in Keynes MS 55] R	Metallic antimony, Sb
* [in Keynes MS 55]	Star, star regulus, Sb
R ♂, Regulus of iron	Metallic antimony prepared by the use of iron, Sb

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TABLE 3 *Other chemicals*

Symbol	Seventeenth-century name	Modern name and symbol
⊕	Sulphur	Sulfur, S
℞	<i>Aqua fortis</i>	Nitric acid, HNO <sub>3</sub>
⊕	Vitriol	Any sulfate but probably usually that of iron or copper, FeSO <sub>4</sub> or CuSO <sub>4</sub>
* [usually]	Sal ammoniac	Ammonium chloride, NH <sub>4</sub> Cl
⊕	Salt peter, nitre	Potassium nitrate, KNO <sub>3</sub>
⊖	Tartar	Potassium hydrogen tartrate, KH(C <sub>2</sub> H <sub>2</sub> O <sub>3</sub> ) <sub>2</sub>
⊖	Salt	Sodium chloride, NaCl, or other salt
☿	Mercury sublimate	Mercuric chloride, HgCl <sub>2</sub>
---	Sal alkali	Probably sodium or potassium hydroxide, NaOH or KOH

TABLE 4 *Measures, apparatus, and processes*

Symbol	Name
℥	Ounce
β, ss	½
+	<i>Crucibulum</i> , crucible
∇	<i>Tigillum</i> , crucible, cupel
āāā	Amalgam, amalgamate
℞ [usually]	Take or prepare

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TABLE 5 *Miscellaneous*

Symbol	Name
‡, q̄. ē.	Quintessence
ℋ	<i>Leo</i> , lion

Where square brackets occur in quotations from Newton's manuscripts, they are Newton's own. The arrows up and down set off Newton's interlineations; the carets indicate probable readings supplied by the present investigator where the manuscript is damaged or otherwise illegible and where it has been necessary to interject an explanatory remark.

References are cited in full when they are introduced for the first time. Subsequent citations to the same work will utilize a shortened form but will include also a parenthetical direction to the full title, such as (1, n. 5), to direct the reader to Chapter 1, note 5, if he desires the fuller form.

Many libraries and their staffs have assisted with books, manuscripts, microfilms, and Xeroxes: the several branches of the library of the University of North Carolina at Chapel Hill; University Library, Cambridge; the libraries of Trinity College, King's College, Queens' College, and Gonville and Caius College, Cambridge; The Fitzwilliam Museum, Cambridge; The Bodleian Library, Oxford; The British Museum; Babson College; the libraries of Stanford University, Cornell University, Harvard University, Duke University, the University of Wisconsin, and the Yale Medical School; Burndy Library, Norwalk, Conn.; Mercantile Library, St. Louis, Mo.; and the Jewish National and University Library, Jerusalem. Special thanks are due to the University of Wisconsin for a copy of Newton's copy of Eirenaeus Philalethes' *Secrets Revealed* and for the use of a copy of the 1650 edition of Sendivogius' *New Light of Alchemy*, and to the Syndics of University Library, Cambridge, to the Provost and Fellows of King's College, Cambridge, to the Master and Fellows of Trinity College, Cambridge, to The Frederick E. Brasch Collection of Sir Isaac Newton and the History of Scientific Thought of Stanford University, to Babson College, the Bodleian Library, the Fitzwilliam Museum, the Burndy Library, and the Yale Medical School for permission to quote from or describe manuscript material in their possession, and to the editors of *Ambix* for permission to use material previously published in that journal, which comprises parts of Chapters 2 and 3.

The inclusion of the illustrations was made possible through the courtesy of the Syndics of the Fitzwilliam Museum, Cambridge; the Provost

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B. J. T. DOBBS

30 September 1974

## Note to the paperback edition

In her review of this work in 1977 Karin Figala quite correctly pointed to certain problems in my interpretation in Keynes MS 18 of the antimony regulus as the "regulus of leo," offering instead an interpretation of it as the "regulus of Aries." Though the change in no way modifies the basic thrust of my argument regarding Keynes MS 18, at this writing her interpretation seems both more accurate and more plausible, and I should like to call the interested reader's attention to it. Cf. Karin Figala, "Newton as Alchemist," *History of Science* 15 (1977), 102–38, esp. 108–10.

B. J. T. DOBBS

4 October 1982