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978-0-521-56672-8 - Antoine Lavoisier: Science, Administration and Revolution

Arthur Donovan

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ANTOINE LAVOISIER

SCIENCE, ADMINISTRATION,
AND REVOLUTION

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Published by the Press Syndicate of the University of Cambridge
The Pitt Building, Trumpington Street, Cambridge CB2 1RP
40 West 20th Street, New York, NY 10011-4211, USA
10 Stamford Road, Oakleigh, Melbourne 3166, Australia

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First published 1993 by Blackwell Publishers, Oxford
Reissued by Cambridge University Press 1996

British Library Cataloguing in Publication Data available

Library of Congress Cataloging-in-Publication Data available

ISBN 0 521 56218 X hardback
ISBN 0 521 56672 X paperback

Transferred to digital printing 1999

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Illustrations 1 and 2 were originally published in Lavoisier, *Oeuvres* (vol. 5, plate I; vol. 3, plate IX); numbers 7 and 8 were first published in Grimaux's biography. The author wishes to acknowledge with thanks the provision of prints and permission to publish them from the following institutions: 1, 5, and 6, Division of Rare and Manuscript Collections, Carl A. Kroch Library, Cornell University; 2, 7, and 8, Special Collections, Van Pelt-Dietrich Library, University of Pennsylvania; 3, Département des Estampes, Bibliothèque Nationale, Paris; 4, Metropolitan Museum of Art, New York.

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General Editor's Preface

Our society depends upon science, and yet to many of us what scientists do is a mystery. The sciences are not just collections of facts but are ordered by theory, and this is where Einstein's famous phrase about science being a free creation of the human mind comes in. Science is a fully human activity; the personalities of those who practice it are important in its progress and often interesting to us. Looking at the lives of scientists is a way of bringing science to life.

Maybe what most people know about Lavoisier was that he was beheaded during the Reign of Terror in France. Before reaching the scaffold he had transformed the science of chemistry, with his theory that combustion involved combination with *oxygen* rather than emission of *phlogiston*; with his emphasis upon *weighing*; and with his presiding over the introduction of a new *language* for the science. The book outlining his new chemistry was published in 1789, the year in which the Bastille was stormed and the French Revolution began; and he saw his own work as a chemical revolution in which inherited but obsolete and ineffective ways were replaced by a new outlook, new theory, and new methods. Eighty years on Adolph Wurtz could say "Chemistry is a French science; its founder was Lavoisier of immortal fame." This

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tells us something about French nationalism, but there is truth behind it. Lavoisier is of enormous importance in the history of science, and modern ideas and arguments about how science progresses or changes, in evolutionary or revolutionary ways, involve using his work as one of the prime examples of a dramatic transformation. His chemical revolution has attracted a great deal of scholarly interest and attention in recent years; this book is particularly apt because 1994 marks the bicentenary of his execution.

Lavoisier did not spend very much of his time in the laboratory. People sometimes refer to men of science of his time as "amateurs"; if that means incompetent, it certainly does not apply to him, but if it simply means that science was not his job, then it was true of him and most of his contemporaries. Arthur Donovan, drawing upon recent scholarship and his own extensive research, portrays the man as well as the scientist. We see an ambitious person getting on in the pre-revolutionary years, trying to modernize the administration of government, especially the tax system, marrying well, and becoming a very important figure.

Then comes the chemistry: not really a French science, but with its most important work being done in Germany, Sweden, and Britain, where the isolation of different gases was the most striking phenomenon. Lavoisier's experiments were beautifully planned and carried on in splendid apparatus, and he first saw clearly how the new discoveries could be organized into a science if one adopted a different theory of burning. He was very conscious that it is not enough to hit upon truth; it must be propagated. Through the Academy of Sciences and through his writings he built up a team of disciples, though not everybody cared to be seen as part of the chorus supporting his solo. By the time of his death his new chemistry was coming to prevail all over Europe.

He and others like him had been supporters of the Revolution, believing that France needed energetic modernizing, but his long and intimate association with the tax system ultimately proved his undoing. In Donovan's splendid study Lavoisier's history and that of France are intimately linked. He was a man of his time and his particular culture, the administrative nobility of France. He approached chemistry in the spirit of an accountant, with books to balance and sense to be made of reactions as of transactions; and in the Academy of Sciences he

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had backing and contacts with those in other branches of science (such as mathematics and experimental physics) which could not but be stimulating. He was a man perhaps more admired than loved. Donovan gives us a good idea of what he was like and of how his mind worked, and makes him accessible to us. I warmly commend the book.

David Knight
University of Durham

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Preface

The bicentennial of Lavoisier's death, commemorated in 1994, occasioned the appearance of several significant scholarly works. One of these is Jean-Pierre Poirier's *Antoine Laurent de Lavoisier, 1743–1794* (Paris: Pygmalion, 1993), a comprehensive biography based on extensive archival research. Poirier pays particular attention to Lavoisier's economic ideas and financial affairs; he provides, for instance, an informative account of the notes Lavoisier made in 1772 while reading David Hume's *Essays on Commerce*. Poirier also quotes extensively from letters that throw new light on the lengthy affair between Pierre-Samuel Dupont and Mme Lavoisier. While Poirier's portrait of Lavoisier differs in no essential way from the one presented in the book that follows, those seeking more detail about Lavoisier's many administrative activities should turn to this important study.

Bernadette Bensaude-Vincent's *Lavoisier, Mémoires d'une révolution* (Paris: Flammarion, 1993) complements Poirier's biography in several ways. While thoroughly grounded in the published literature and archival research, her study focuses on the context of ideas and beliefs in which Lavoisier worked rather than the details of his life. Being a philosopher of science, Bensaude-Vincent addresses questions such as what it means to talk of a revolution in chemistry and to what extent Lavoisier employed a distinctive method. She also brings her story

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into the present by analyzing nineteenth- and twentieth-century images of Lavoisier as a hero of science and progress.

Bensaude-Vincent has also, with Ferdinando Abbri, edited a valuable collection of essays presented at a 1994 conference sponsored by the European Science Foundation: *Lavoisier in European Context – Negotiating a New Language* (Canton, Mass.: Science History Publications/USA, 1995). This collection should be read in conjunction with Marco Beretta's comprehensive and illuminating *The Enlightenment of Matter – The Definition of Chemistry from Agricola to Lavoisier* (Canton, Mass.: Science History Publications/USA, 1993).

Volume V of Lavoisier's *Correspondence*, covering the years 1787–88, was also published in 1993. Edited by Michelle Goupil, this volume makes available documents that add arresting detail to what is known about Lavoisier and his circle during these eventful years. It contains, for instance, a letter that Hassenfratz, a chemist and friend of the Lavoisiers, wrote to Mme Lavoisier on 20 February 1788. She had asked him for suggestions concerning the portrait that the artist J.-L. David would be painting of the Lavoisiers. Hassenfratz's response adds considerably to what little is known about the composition of this most famous of all scientific portraits. Mme Lavoisier's own artistic training is the subject of another bicentennial publication (Madeleine Pinault Sørensen, "Madame Lavoisier, dessinatrice et peintre," *La revue*, published by the Musée des arts et métiers, no. 6, March 1994); this article provides the first documentary proof that Mme Lavoisier had in fact studied drawing in David's studio.

Historic commemorations serve many purposes; happily the bicentennial of Lavoisier's death stimulated the production of several works of enduring value. While much has been written about the entwined topics of Lavoisier, the eighteenth-century chemical revolution, and science in the French Revolution, these subjects are far from exhausted. New evidence and new perspectives continue to appear and re-examinations of Lavoisier and his time continue to reward those drawn to these topics.

Arthur Donovan
Kings Point
August 1995

Acknowledgements

Anyone interested in the origins and nature of Lavoisier's achievements must contend with a vast and highly diverse body of scholarship. My debt to this literature is profound and I acknowledge with gratitude that the authors cited, several of whom I count as mentors, colleagues, and friends, have provided many of the facts and interpretations that inform this biography. When obliged to compress the discussion of certain topics, I have indicated in the notes where more extensive treatment can be found.

Those familiar with the literature on eighteenth-century science will recognize that, at a more detailed level, the story I tell draws from the work of, among others, Henry Guerlac, Carleton Perrin, Maurice Daumas, Charles Gillispie, William Smeaton, Keith Baker, Roger Hahn, Maurice Crosland, Robert Darnton, Frederic Holmes, John Heilbron, Jerry Gough, and Rhoda Rappaport. While I have usually followed happily where they and others have led, I have no doubt on occasion misunderstood or otherwise mangled particular topics and texts. In the best of all possible worlds I could cheerfully attribute these slips to innocent misperception. In the less sunny world we actually inhabit my personal responsibility for the errors that remain cannot be so easily evaded.

And finally, at the level of fine detail, I acknowledge with heartfelt

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ACKNOWLEDGEMENTS

thanks the invaluable contributions of those friends and colleagues who read and commented on the first draft of this work. This list includes William Smeaton, who saved me from innumerable errors of detail, Frederic Holmes, who has repeatedly and correctly reminded me that my treatment of Lavoisier's science is far from complete, Marco Beretta, Lorraine Daston, Rachel Laudan, Seymour Mauskopf, and two colleagues at the US Merchant Marine Academy, Jacques Szaluta and Albert Stwertka. Their encouragement and criticism have improved this biography immeasurably.

Preparation of this book was underwritten in part by grants from the Research Division of the National Endowment for the Humanities and from the Program for the History and Philosophy of Science and Technology of the National Science Foundation; I am truly grateful for this support. I also wish to thank Dean Warren Mazek and the members of the Department of Humanities of the United States Merchant Marine Academy for freeing me from many of my normal duties while I was completing this study. Thanks are also due to Professor Robert Darnton, Princeton University, to Dr Frances Kohler, University of Pennsylvania, and to Margaret Rogers, Cornell University, for providing prints of the illustrations. Other individuals too numerous to mention provided invaluable assistance in libraries and archives and commented helpfully on preliminary papers and drafts. I think of their willingness to share their time, knowledge, and enthusiasm whenever I hear mention of "the community of scholars."

If this biography aspired to being a definitive account of Lavoisier's life and work, the text and notes would bristle with critical assessments of the findings and interpretations of specialists. Conducting a secondary campaign of this sort would have required a much more extensive scholarly apparatus than could be included in this book. My decision to emphasize the flow of the narrative should therefore not be taken as an indication that there is a high degree of consensus among scholars on the many issues addressed. Those wishing to sample the disputatious delights available in less austere studies of Lavoisier are referred to the works listed in the notes. Two convenient points of entry are Guerlac, *Lavoisier*, and Donovan, "Lavoisier and the Origins of Modern Chemistry."

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Readers should also know there are masses of Lavoisier manuscripts that have not yet been adequately edited or interpreted. The monumental nineteenth-century edition of Lavoisier's works, although indispensable, omits many important documents and contains significant errors. The publication of his correspondence was being brought to completion under the able editorship of Michelle Goupil prior to her untimely death. The manuscript records of Lavoisier's scientific career deposited in the archives of the Academy of Sciences in Paris are at long last being adequately preserved and catalogued. I have perused these papers and those in the Cornell University Library, as have many others, and I have learned much from monographs based on detailed examinations of these records. As Lavoisier specialists know, these repositories contain many documents that deserve further examination. Other archives in France and elsewhere also contain additional papers of direct relevance to various aspects of Lavoisier's public life. Whether close study of these diverse manuscripts will significantly alter our current picture of Lavoisier remains to be seen; that such study would place our understanding of the man and his achievement on a firmer footing is beyond question.

All translations, unless otherwise indicated, are my own.

*Arthur Donovan
Kings Point
March 1993*