CAMBRIDGE TEXTS IN THE HISTORY OF PHILOSOPHY

MARGARET CAVENDISH, DUCHESS OF NEWCASTLE
Observations upon Experimental Philosophy

CAMBRIDGE TEXTS IN THE HISTORY OF PHILOSOPHY

The main objective of Cambridge Texts in the History of Philosophy is to expand the range, variety and quality of texts in the history of philosophy which are available in English. The series includes texts by familiar names (such as Descartes and Kant) and also by less well-known authors. Wherever possible, texts are published in complete and unabridged form, and translations are specially commissioned for the series. Each volume contains a critical introduction together with a guide to further reading and any necessary glossaries and textual apparatus. The volumes are designed for student use at undergraduate and post-graduate level and will be of interest not only to students of philosophy, but also to a wider audience of readers in the history of science, the history of theology and the history of ideas.

For a list of titles published in the series, please see end of book.

MARGARET CAVENDISH, DUCHESS OF NEWCASTLE

Observations upon Experimental Philosophy

EDITED BY

EILEEN O'NEILL

University of Massachusetts, Amherst

CAMBRIDGE UNIVERSITY PRESS

PUBLISHED BY THE PRESS SYNDICATE OF THE UNIVERSITY OF CAMBRIDGE
The Pitt Building, Trumpington Street, Cambridge, United Kingdom

CAMBRIDGE UNIVERSITY PRESS
The Edinburgh Building, Cambridge CB2 2RU, UK
40 West 20th Street, New York NY 10011-4211, USA
10 Stamford Road, Oakleigh, VIC 3166, Australia
Ruiz de Alarcón 13, 28014 Madrid, Spain
Dock House, The Waterfront, Cape Town 8001, South Africa

http://www.cambridge.org

First published 2001

Printed in the United Kingdom at the University Press, Cambridge

Typeface Ehrhardt 11/13pt *System* Poltype® [VN]

A catalogue record for this book is available from the British Library

Library of Congress Cataloguing in Publication data

Newcastle, Margaret Cavendish, Duchess of, 1623?–1673.
Observations upon experimental philosophy/Margaret Cavendish, Duchess of Newcastle: edited by Eileen O'Neill.
p. cm. – (Cambridge texts in the history of philosophy)
Includes bibliographical references (p. xlii) and index.
ISBN 0 521 77204 4 (hardback)
1. Philosophy of nature. I. O'Neill, Eileen. II. Title. III. Series.
B1299.N273 027 2001 192–dc21 00-050354

ISBN 0 521 77204 4 (hardback)
ISBN 0 521 77675 9 (paperback)

Contents

Acknowledgments

Desmond Clarke was not only the "proximate" cause that triggered my work on this edition, he was an "auxiliary" cause, aiding the "primary and sustaining" cause to the very end. I'm indebted to him for his sound advice and invaluable critical comments. I'd also like to thank Hilary Gaskin of Cambridge University Press for countless judicious suggestions. Peggy McKinnon did a remarkable job of swiftly and accurately keying in the unedited version of Cavendish's text. Edward Abrams provided research and computer assistance; Sylvia Howes handled numerous clerical and administrative matters. Few research projects can get off the ground without funding: for that I'm deeply grateful to Frederick Byron and Lee Edwards of the University of Massachusetts-Amherst. I've received valuable help from the librarians Richard Talbot, Jim Kelly, Susan Mathew, Mel Carlson, and MJ Canavan, the Interlibrary Loan Office and Microfilm Department of my home institution, the staff of the British Library, and the staffs of the rare book rooms at Harvard University, Smith College, Amherst College, the University of Pennsylvania, and the New York Public Library. Part of the Introduction was first presented at the 1997 conference on "Women Philosophers of the Seventeenth Century"; my colleagues Bob Sleigh and Vere Chappell were the moving forces behind that event. I thank them and my Department Chair, John Robison, for advice in regard to this edition and other research projects. Versions of the Introduction were also read at McGill University and the University of Pennsylvania. I'm especially grateful to Steven Gross, Alison Laywine, Eric Lewis, Susan Sauvé Meyer, and Tom Ricketts for feedback; to Allison Crapo, Gary Hatfield, Sarah Hutton, Christia Mercer, and Jim Ross for written comments; and

to Stephen Menn for extensive written comments on the entire manuscript. While I have not been able to respond here to all of the issues these folks have raised, the edition has profited immensely from their help. Special thanks also go to Barbara Meyer for our conversations. Finally, Gary Ostertag read the entire manuscript and saved me from a number of stylistic, and more substantial, errors. I thank him for this, and for our ongoing dialogues on philosophy and poetry. I dedicate this edition to him.

Abbreviations

Cavendish's works

Poems	*Poems, and Fancies*, London, 1653; facsimile reprint Menston: Scolar Press, 1972; reprinted as *Poems, and Phancies*, Second Impression, London, 1664, and as *Poems, or Several Fancies in Verse: with the Animal Parliament, in Prose*, Third Edition, London, 1668.
Fancies	*Philosophicall Fancies*, London, 1653.
Opinions	*Philosophical and Physical Opinions*, London, 1655; Second Edition, London, 1663.
Olio	*The World's Olio*, London, 1655; Second Edition, London, 1671.
Pictures	*Nature's Pictures Drawn by Fancie's Pencil to the Life*, London, 1655/56; reprinted as *Natures Picture Drawn by Fancies Pencil to the Life*, Second Edition, London, 1671.
Plays	*Playes*, London, 1662; followed by *Plays, never before Printed*, London, 1668.
Orations	*Orations of Divers Sorts, Accomodated to Divers Places*. London, 1662/63; Second Edition, London, 1668.
Soc. Letters	*CCXI Sociable Letters*, London, 1664; facsimile reprint Menston: Scolar Press, 1969.
Phil. Letters	*Philosophical Letters: or, Modest Reflections Upon some Opinions in Natural Philosophy, maintained By several Famous and Learned Authors of this Age . . .*, London, 1664; letters on Descartes reprinted in Margaret

	Atherton (ed.), *Women Philosophers of the Early Modern Period*, Indiana: Hackett Publishing Co., 1994.
Observations	*Observations upon Experimental Philosophy, To which is added, The Description of a New Blazing World*, London, 1666; Second Edition, London, 1668; the added text reprinted in Kate Lilley (ed.), *The Blazing World and Other Writings*, London/New York: Penguin Books, 1992.
Life	*The Life of the Thrice Noble, High and Puissant Prince William Cavendishe, Duke, Marquess, and Earl of Newcastle . . .*, London, 1667; Second Edition, 1675; Latin translation by William Charleton as *De vita et rebus gestis . . . Guilielmi Ducis Novo-Castrensis . . .*, London, 1668; numerous reprintings.
Grounds	*Grounds of Natural Philosophy . . .*, London, 1668; facsimile reprint West Cornwall: Locust Hill Press, 1996.

Editions and translations of other works frequently cited

AT	*Œuvres de Descartes*, ed. Charles Adam & Paul Tannery, nouvelle présentation (Paris: CNRS/Vrin, 1964–74)
CSM	*The Philosophical Writings of Descartes*, ed. and tr. John Cottingham, Robert Stoothoff, Dugald Murdoch and Anthony Kenny, 3 vols. (Cambridge: Cambridge University Press, 1984–91)
CWA	*The Complete Works of Aristotle*, revised Oxford translation, ed. Jonathan Barnes, 2 vols. (Princeton: Princeton University Press, 1984)
EW	*The English Works of Thomas Hobbes of Malmesbury*, ed. Sir William Molesworth, 11 vols. (London, 1839–45; reprinted Germany: Scientia Aalen, 1962)
LP	*Letters and Poems in Honour of the Incomparable Princess, Margaret, Dutchess of Newcastle* (London, 1676)
WRB	*The Works of the Honourable Robert Boyle*, ed. Thomas Birch, Second Edition, 6 vols. (London, 1772)

Introduction

One of the main projects that seventeenth-century European philosophers undertook was that of providing a metaphysical framework for the new mechanical science – a scientific picture of nature that eventually replaced the Aristotelian world-view. In their attempt to achieve this end, they turned to the writings of the ancient Greek and Roman philosophers, which the Renaissance humanists had rediscovered and published. Thus, Pierre Gassendi (1592–1655) rehabilitated the philosophical doctrines of the ancient atomist Epicurus. Figures as diverse as René Descartes (1596–1650), Anne Conway (1631–79), Henry More (1614–87), and Mary Astell (1666–1731) drew on Platonic doctrines in the formation of their metaphysics.

But not all philosophers were willing to overthrow Aristotelianism. Kenelm Digby (1603–65) attempted to conserve many of the Aristotelian doctrines, and to make aspects of the mechanical science compatible with these doctrines. And there were many camps of anti-Aristotelian naturalists who rejected the picture of nature as a grand machine, and who endorsed various "vitalist" views of corporeal nature as self-moving, living, and knowing. Among these thinkers were the physicians and chemists, for example, Johannes Baptista Van Helmont (1579–1644), who followed in the tradition of the vitalist naturalist Paracelsus (1493–1541); while others included practitioners of natural magic, for example, Robert Fludd (1574–1637), who were part of the hermetic and occult traditions. Finally, Joseph Glanvill (1636–80), who despaired of producing the true system of nature, and who fully endorsed neither Aristotle nor the mechanists, rehabilitated arguments from the ancient sceptics.

These were the complex crosscurrents of philosophical and scientific

thought in reaction to which Margaret Cavendish constructed her system of nature. Just as the mechanists had, she would reject the Aristotelianism of the schools; and as Van Helmont and other vitalists had, she would reject the view that mechanism provides the fundamental explanations of natural phenomena. Cavendish would draw on the doctrines of the ancient Stoics, and among her main philosophical contributions would be her Stoic-inspired attacks against the limitations of seventeenth-century mechanical philosophy.

While, as we have seen, the writing of natural philosophy was far from unusual in this period, the writing of it by a woman was. We now know that in the seventeenth century numerous women published philosophy, had translations of their work appear in print, and were discussed in the scholarly journals.[1] A few of these women were prolific writers of texts with philosophical content, for example, Antoinette Bourignon (1616–80), Madeleine de Scudéry (1607–1701), and Mary Astell. But very few published entire books on natural philosophy. There is Anne Conway's *The Principles of the Most Ancient and Modern Philosophy* (Latin, 1690; English, 1692) and Jeanne Dumée's *Entretien sur l'opinion de Copernic touchant la mobilité de la terre* [A Discussion of the opinion of Copernicus concerning the mobility of the earth] (n.d.; ms. *c.* 1680). Cavendish, on the other hand, is singular in having published some half dozen books in this area.

Nor was this all she wrote. Cavendish also published poetry, plays, orations, letters, fiction, an autobiographical sketch, and a biography of her husband. Of the almost six hundred and fifty books in English published between 1640 and 1700 by women, over a dozen were original works by Cavendish, subsequent editions of which raised her total number of publications to twenty-one. Hers was an extraordinary writing career, but it was eyed with suspicion by her contemporaries. For one thing, in an era in which anonymous authorship for women was standard, Cavendish adamantly published under her own name. In her autobiographical sketch she admitted that she was "very ambitious," not for wealth or power, but for fame. In her first publication she writes that man "hath a transcending desire to live in the world's memory, as long as

[1] See the groundbreaking Mary Ellen Waithe (ed.), *A History of Women Philosophers*, 4 vols. (Dordrecht: Kluwer Academic Publishers, 1987–95); and Eileen O'Neill, "Disappearing Ink: Early Modern Women Philosophers and Their Fate in History," in Janet Kourany (ed.), *Philosophy in a Feminist Voice* (Princeton: Princeton University Press, 1998).

the world lasts; that he might not die like a beast, and be forgotten; but that his works may beget another soul . . . which is fame" (*Poems*, p. 52).

However, unlike most of her male philosophical counterparts – and even a few women of the period, such as Anna Maria van Schurman (1607–78) who had studied philosophy, theology and ancient languages at the University of Utrecht – Cavendish had received no formal training in philosophy. And unlike some of the royal women, such as Princess Elisabeth of Bohemia (1618–80) and Queen Christina of Sweden (1626–89), she had not been privately tutored in languages and the sciences. (Indeed, despite years spent on the Continent, it appears that Cavendish never acquired the ability to read philosophical texts in any language other than English.) Further, Cavendish did not have a philosophical mentor in the way that Michel de Montaigne (1533–92) was a mentor to Marie le Jars de Gournay (1565–1645), and Henry More to Anne Conway; nor did she have a famous philosopher as interlocutor, in the way that Elisabeth could exchange ideas with Descartes, or Damaris Masham (1658–1708) with Gottfried Wilhelm Leibniz (1646–1716). These facts make her philosophical accomplishments all the more remarkable. In order to see how Cavendish gained access to the views of the ancient and modern philosophers, and what the influences on her own anti-Aristotelian, anti-mechanist natural philosophy were, we need to turn to some of the details of her life.

Margaret Lucas was the youngest of eight children born to Thomas Lucas and Elizabeth Leighton Lucas of St. John's near Colchester, Essex. The exact date of her birth is unknown, but is usually taken as 1623. Although her father was a gentleman of property, his death in 1625 left her in later years without a dowry. Her education was typical for girls of her rank: she was taught to read and write, and she studied singing, dancing, and music. Two important features of her psychology, which would incline her toward certain choices in life, especially her choice of career as a philosophical writer, were already apparent in her youth. First, she was painfully shy when speaking with anyone outside of her immediate family; second, she had a powerful desire to communicate her views to the world at large, and to receive recognition thereby. At an early age, she found that writing provided her with a painless vehicle for achieving her desire, and she filled numerous "baby books" with her thoughts.

In 1643, her desire for recognition dominated and led her to leaving

home to become a maid of honor to Queen Henrietta Maria. Away from her family, and in the midst of the intrigues of the court at Oxford, her bashfulness soon overwhelmed her; she begged for permission to return home. However her mother feared that this move would irritate the Queen and disgrace her daughter; permission was denied. So in 1644, in response to increased danger from anti-royalist forces, she followed Queen Henrietta Maria into exile in Paris, where, in the following year, she met William Cavendish. After a largely epistolary romance, she left the service of the Queen, and married William, a widower thirty years her senior.

In addition to being one of the world's most skillful horse trainers, William Cavendish was also a patron of the arts, a writer of poetry and plays, and something of an amateur scholar. He owned telescopes and alchemical equipment, and was interested in the contemporary debates in philosophy. In England in the early 1630s, he and his mathematician brother, Charles Cavendish (1591–1654), had been given instruction in philosophy by Hobbes. The two brothers encouraged Margaret Cavendish's interest in philosophy, and helped to further her philosophical education. William Cavendish later defended his wife's writing of philosophy and praised it in print. In Paris from 1645 to 1648, the three gathered about them a group of exiled English philosophers influenced by the mechanical philosophy. This group, known as the "Newcastle Circle," included Hobbes, Digby, and Charleton among others. The circle also had contact with the continental mechanical philosophers Descartes, Gassendi, and Marin Mersenne (1588–1648). It is not clear how much philosophy Cavendish learned through her social encounters with these figures. Some of her published remarks suggest that she did not speak at all to Descartes, and that her dealings with Hobbes were minimal. Here her shy nature was an issue. Still, the excitement about atoms and corpuscles was contagious; it later inspired her first literary endeavor. And there is no question but that, of all the mechanists, Hobbes most strongly affected Cavendish's philosophical development. She would be one of the few seventeenth-century thinkers to dare to side with Hobbes in espousing a materialist philosophy that denied the existence of incorporeal souls in nature.

And for all that, her own system of nature would challenge the view that mechanical explanation could account for all natural phenomena. It is important, then, to see what early influences might have moved her in

the direction of an alternative to mechanism that was nonetheless anti-Aristotelian. One possibility is the philosophy of Francis Bacon (1561–1626). In his earlier work (not published until 1653), Bacon had been sympathetic to the Democritean doctrine of the existence of unchanging atoms and the vacuum, but by the time he published his *Novum Organum* [New Organon] in 1620, he rejected these doctrines and now held that the properties and activities of all animate and inanimate bodies could be accounted for by various combinations of active spiritous matter with gross matter. Bacon's "spirits" or "pneumaticals" are invisible, rarefied bodies, endowed with appetition and perception, which interact with each other through non-mechanical processes, such as concoction. Bacon's mature theory bears a striking resemblance to Cavendish's treatment of matter in her early work, e.g., *Philosophicall Fancies*.

Another possible influence on Cavendish's anti-Aristotelian alternative to the mechanical philosophy is the work of the chemist Johannes Baptista Van Helmont. As we shall see, Cavendish would later criticize Van Helmont's vitalist natural philosophy, but in the early 1650s, his work may have inspired her to attempt to construct a system of nature that would rival that of the mechanists. The only material of Van Helmont's in print at this time were the three essays translated by Walter Charleton as *A Ternary of Paradoxes* in 1650.

A final early source of influence may have been Stoicism. As we shall see, Cavendish increasingly added Stoic doctrines to her developing system of nature. It is significant that when the Cavendishes were in Antwerp, they rented the house owned by the painter, Peter Paul Rubens, before his death. This famous baroque painter had been part of an important Neostoic circle. His brother had been a disciple of Justus Lipsius (1547–1606), who, with the publication of *De Constantia* [On Constancy] in 1584, had initiated the Neostoic movement. Among Lipsius' important contributions to seventeenth-century philosophy was the 1604 *Physiologia Stoicorum* [The Natural Philosophy of the Stoics]. In this milieu, Cavendish may have been exposed to Stoic doctrines.

When Cavendish returned to England in 1660, she began a serious course of study of the natural philosophy of her contemporaries. Her hope was that she could press this knowledge into the service of clarifying her own philosophy in future publications, by contrasting her views with those of recognized scholars. In addition to reading a number of works by Descartes and Hobbes, she also turned to the writings of Henry

More. She found that she needed to distinguish her own organicism, which admitted no incorporeals in nature, from the vitalism of More with its incorporeal "spirit of nature." It was also at this time that she read Van Helmont's treatise in chemical vitalism *Oriatrike, Or, Physick Refined* (1662). Cavendish's further studies included an examination of the views of the scientists Galileo Galilei (1564–1642) and William Harvey (1578–1657).

Between 1664 and 1666 Cavendish was engaged in two intellectual projects. The first was her critical reading of scholars working in dioptrics, meteorology, hydrostatics, thermochemistry, and magnetic theory. Besides the writings of Hobbes, Descartes, Digby, Van Helmont, and Charleton, she also examined the experimental science of the members of the Royal Society of London, especially the work of Robert Boyle (1627–91), Robert Hooke (1635–1703), and Henry Power (1623–68). Second, she attempted to master the natural philosophy of the ancients. Since she read no Greek or Latin, she turned to Thomas Stanley's *The History of Philosophy* (1655–62), which provides paraphrases of the source material for reconstructing the views of the various ancient sects. In her publications that followed this period of study, she criticized the views of Plato, Aristotle, Pythagoras, Epicurus, and the sceptics; but notably absent was any discussion of the Stoics. It is possible that Cavendish's silence here was fueled by the fear that her critics would charge her with a lack of originality, arguing that she had simply repeated the views of the Stoics. And if there was one thing Cavendish wanted as much as fame, it was to have views that were as singular as her dress and manners (against all of which her critics, including the diarist Samuel Pepys, tirelessly railed).

The publications in natural philosophy

Cavendish's first publication, *Poems, and Fancies* (1653), contained prose epistles arguing for women's suitability for writing poetry and apologizing for her own specific undertaking. While the poems deal with such themes as man's relation to animals, the passions, the comparison of animate and inanimate things, and fairies, it was the initial fifty pages of poems on atoms that set the stage for Cavendish's later foray into a more serious examination of natural philosophy. The numerous apologies for writing in verse and the Epicurean subject matter suggest that she was

taking the *De Rerum Natura* [On the Nature of Things] of Lucretius (*c*. 94–*c*. 55 BC) as her model. Cavendish may well have been attracted by Lucretius' materialism, but this first book was not intended to give her considered views on natural philosophy. There she notes that "the reason why I write it in verse, is, because I thought errors might better pass there, than in prose; since poets write most fiction, and fiction is not given for truth, but pastime" ("To Naturall Philosophers," unpaginated). In subsequent writings she makes clear that "the opinion of atoms, is fitter for a poetical fancy, than for serious philosophy; and this is the reason I have waived it in my philosophical works" (*Observations*, p. 129). But the issue, fancifully handled in the poems, of the correct system of nature was to become the focus of her developing philosophical interest.

Three months after the publication of her first book, she published her largely prose composition, *Philosophicall Fancies* (1653). In this short, recondite text, Cavendish suggested, for the first time, an organicist alternative to the mechanical system of nature. Two years later, she republished this work as the first part of an expanded defense of her organicist materialism, *The Philosophical and Physical Opinions* (1655). Here she reveals that she has read Descartes' *Passions de l'âme* [Passions of the Soul] and Hobbes' *De Cive* [On the Citizen], and that she has learned the "terms of art, and the several opinions of the ancients" from her brother, husband and brother-in-law. But she argues at length for the originality of her philosophical views and even includes as frontispiece an engraving of herself in an empty study with the verse: "Her library on which She look's / It is her Head her Thoughts her Books . . ." By this point, Cavendish not only viewed her work in natural philosophy as her means of achieving literary fame, she began to harbor philosophical ambitions. This is especially clear in light of the further revisions of the work, and commentaries on it, that she would proceed to publish.

In 1663, a revised version of her treatise appeared, and in the following year she published a "commentary" on it: *Philosophical Letters* (1664). She now defended her system, and highlighted its originality and strengths, by pitting it against the mechanical materialism of Hobbes, Descartes' dualism, More's version of Platonism, and the chemical vitalism of Van Helmont. The genre she used this time was neither verse nor the treatise. She realized that there is no way to make opinions more intelligible "than by arguing and comparing other men's opinions with

them" ("Preface," unpaginated). And since she had been unable to obtain critical responses to her previous publications from the acknowledged giants in the field, Cavendish now devised a pseudo-epistolary genre: she wrote "letters," to a presumably fictitious woman, in which she criticized the competing systems of nature, while expounding her own.

In 1666, she published another "commentary," *Observations upon Experimental Philosophy*. This work provided the most complete exposition of her system of nature, and did so by setting her views in relief against those of a range of "speculative" philosophers, "dioptrical and experimental" writers, and ancient philosophers.[2] It was followed in 1668 by the final revision of her philosophical opinions, the more concise and organized statement of her system *Grounds of Natural Philosophy*.[3] While this work summarized her considered views, it did not include the details of argumentation that appear in *Observations*.

It is clear, then, that beginning with her *Philosophicall Fancies*, Cavendish gradually developed an anti-Aristotelian alternative to the mechanical system of nature; this project runs throughout her subsequent publications on natural philosophy. Of this project she said, "I . . . [do] not persuade myself, that my philosophy being new, and but lately brought forth, will at first sight prove master of understanding, nay, it may be not in this age; but if God favour her, she may attain to it in after-times: And if she be slighted now and buried in silence, she may perhaps rise more gloriously hereafter . . ." (*Observations*, pp. 12–13). Cavendish's anticipations were more accurate than she might have wished; the scholarly response to her work was initially negligible.

The critical reception of these works

How did Cavendish's contemporaries respond to the fruits of her philosophical ambition? If we examine the collection of letters, published by her husband after her death, it emerges that she had not attained general recognition by the scholarly community. Kenelm Digby and Thomas Hobbes were polite, but they did not grace her natural philosophy with

[2] For evidence that Cavendish clearly took *Phil. Letters* and *Observations* to be commentaries, see *Observations*, pp. 11; 13.
[3] Cavendish is explicit that *Grounds* is the second, and much revised, edition of *Opinions*; see *Grounds*, "To All the Universities in Europe," unpaginated.

critical responses.[4] In 1667, her friend Walter Charleton, wrote her this backhanded compliment: "For your natural philosophy . . . may be, for ought I know, excellent: but give me leave, Madam, to confess, I have not yet been so happy as to discover much therein that's *apodictical*, or wherein I think myself much obliged to acquiesce . . . This Madam, can be no discredit to your philosophy in particular, because common to all others: and he is a bold man, who dares to exempt the physics of Aristotle himself, or of Democritus, or Epicurus, or any other hitherto known" (*LP*, p. 111). Henry More was harsher. In response to her *Philosophical Letters*, he confided to Anne Conway that Cavendish "may be secure from anyone giving her the trouble of a reply."[5] Aside from Charles Cavendish, the scholars who seem to have taken her natural philosophy most seriously were Constantijn Huygens, with whom she briefly corresponded on the phenomena of "exploding glasses," and Joseph Glanvill.[6] Glanvill carried on earnest debates with her about such views as the world soul, innate ideas, the pre-existence of human souls, evidence for the existence of immaterial spirits and their compatibility with the Scriptures.

If Cavendish was slighted and "buried in silence" in her own day, the response of some modern critics was hardly more sympathetic. In 1918, Henry Ten Eyck Perry published a detailed study of Cavendish's life and works in which he concluded that for her "lack of rational power she unconsciously substituted an overactive imagination." He referred to her publications as "so-called philosophical books."[7] In a similar vein, Virginia Woolf lamented that Cavendish "should have frittered her time away scribbling nonsense and plunging ever deeper into obscurity and folly."[8] Of course, Perry and Woolf were both literary critics, not scholars of early modern philosophy.

In 1966, the historian of science, Robert Kargon, argued that Caven-

[4] Hobbes did say that one of her books had "truer ideas of virtue and honour than any book of morality I have read . . ." (*LP*, p. 68).

[5] *The Conway Letters*, ed. Marjorie Nicholson, revised edition by Sarah Hutton (Oxford: Clarendon Press, 1992), p. 237.

[6] See Further Reading for the references for Huygens' and Glanvill's letters. On exploding glasses see R.[obert] Hooke, *Micrographia: or Some Physiological Descriptions of Minute Bodies Made by Magnifying Glasses, with Observations and Inquiries Thereupon* (London, 1665), "Observation VII: Of Some Phaenomena of Glass Drops."

[7] Henry Ten Eyck Perry, *The First Duchess of Newcastle and Her Husband as Figures in Literary History* (Boston/London: Ginn and Company, 1918), pp. 188; 197.

[8] Virginia Woolf, *A Room of One's Own* (New York: Harcourt, Brace and World, 1929), p. 65.

dish's system is Epicurean atomism, and that she herself played "an interesting role in the establishment of atomism in England which has been largely overlooked." However, he noted that it has been overlooked "in part because it is difficult for the modern historian to take her seriously," for her atomism "was fanciful and of little use to the natural philosophers . . ."[9] In short, Kargon simultaneously gave her views a place in the history and philosophy of science, and put a damper on interest in them that lasted for more than a decade. It is important to note, however, that Kargon's treatment of Cavendish focused on her first book of poems, but, as we saw earlier, there is good reason not to count that work as providing her definitive philosophical position.

In the following decade, Carolyn Merchant decried "the almost total neglect by historians of philosophy of . . . a cluster of women who studied and contributed to philosophy, science, and educational literature of the seventeenth and eighteenth centuries."[10] In response to Merchant's work, and that of other revisionist historians, a number of more detailed studies of Cavendish's system began to appear. For example, Londa Schiebinger's examination of Cavendish's mature natural philosophy led her to characterize it as an eloquent statement of "the vitality of matter and the dignity of animals; and within contemporary discourse, these views were consistent with her anti-Cartesianism."[11] But Schiebinger admitted that it was still unclear why Cavendish endorsed vitalistic materialism over the stance of Cartesian dualism.

One recent account of Cavendish's system of nature has offered political reasons for her choice of vitalistic materialism. On this interpretation, the natural philosophy of her early works was a nonvitalist atomism. But between 1661 and 1663, for feminist political reasons, Cavendish allegedly attacked the authority of the "male-dominated" and "masculinist" mechanical science. An "underlying feminist ideology" moved her toward a "more organic and nurturing view of nature," such that her resulting system was an amalgam of "some of the basic axioms of the new science, for example the pervasiveness of matter in motion,

[9] Robert Hugh Kargon, *Atomism in England from Hariot to Newton* (Oxford: Clarendon Press, 1966), pp. 73; 75.
[10] Carolyn Merchant, *The Death of Nature* (San Francisco: Harper and Row, 1980), p. 268.
[11] Londa Schiebinger, "Margaret Cavendish, Duchess of Newcastle," in Mary Ellen Waithe (ed.), *A History of Women Philosophers* (Dordrecht: Kluwer Academic Publishers, 1991), vol. 3, p. 9.

within an organic and vitalistic universe."[12] Attempts have been made to specify the "masculinist" feature of her early mechanical atomism in reaction to which Cavendish had formulated her mature "animist materialism." According to one scholar, "it is difficult to imagine anything but the most patriarchal conclusion derivable from Hobbes' ruthless, scientistic view of the priority of physical strength. Mechanism provided masculine dominance with a powerful organizational sanction, and . . . it was precisely the untenable nature of such conclusions that impelled Cavendish to distance herself from the mechanical explanation of natural change . . ."[13]

According to this account, Cavendish transformed her atomistic system of nature into an organicist one between 1661 and 1663 – the period culminating in the revised edition of the *Philosophical and Physical Opinions*. But that seems implausible, given the chronology of her writing. The original 1655 edition of the same work already contained a preface entitled "A Condemning Treatise of Atomes," and the book presented an "animistic materialist" system of nature. In addition, since the first section of the book is a reprint of the 1653 *Philosophicall Fancies*, her commitment to an animistic materialism dates from far earlier than 1661. A further difficulty which this account must face is that, in her publications, Cavendish did not explicitly discuss the political consequences of views in natural philosophy. But she did attempt philosophical justifications for her rejection of atomism and on behalf of her organicist materialism.

Quite recently scholars have begun to examine the details of these arguments and to compare them with those of Cavendish's contemporaries.[14] On the one hand, work is being done on the differences between her brand of anti-mechanism and the vitalism of seventeenth-century Platonists, for example Anne Conway. On the other hand, scholars are examining the influence of Hobbes' views on Cavendish's and analyzing the differences in their respective versions of materialism. Another recent project has been the reexamination of her position on atomism. One scholar has argued that her mature system was not a rejection of atomism as such, but only a rejection of *mechanical* atomism. According

[12] Lisa Sarasohn, "A Science Turned Upside Down: Feminism and the Natural Philosophy of Margaret Cavendish," *Huntington Library Quarterly* 47, 4 (1984): 299–307; see pp. 290; 295.
[13] John Rogers, *The Matter of Revolution: Science, Poetry and Politics in the Age of Reason* (Ithaca: Cornell University Press, 1996), p. 188.
[14] See the articles by Sarah Hutton and Susan James cited in Further Reading.

to this account, there is enough continuity between her atomistic concepts and those of Hobbes and Digby to term the views of all three "particulate matter-theories."[15]

Cavendish's natural philosophy has, in a sense, been resurrected after centuries of silence. Although it may not be a "glorious rising," and although we still may not have entirely mastered an understanding of her system, nonetheless, her work is now receiving the serious critical attention that she had so passionately desired.

Cavendish's system of nature

In *Philosophicall Fancies*, Cavendish began outlining a materialist system of nature in which body, rather than being inert and inanimate, is self-moving, animate, sensitive and knowing. Furthermore, instead of being atomic in structure, it is continuous. What accounts for these features is the "spirits of nature or innate matter," an active material principle which permeates gross matter. In speaking of these spirits, Cavendish claims that "those figures they make by several, and subtle motion, may differ variously, and infinitely. This innate matter is a kind of God, or Gods to the dull part of matter, having power to form it, as it please . . ." (*Fancies*, p. 12). She stresses that change in the configurations of matter, made by the self-moving spirits, gives rise to all natural phenomena (*Fancies*, p. 20). She further claims that "whatsoever hath motion hath sensitive spirits; and what is there on earth that is not wrought, or made into figures, and then undone again by these spirits? So that all matter is moving, or moved, by the movers; if so, all things have sense, because all things have of these spirits in them; and if sensitive spirits, why not rational spirits? For there is as much infinite of every several degree of matter, as if there were but one matter: for there is no quantity in infinite; for infinite is a continued thing" (*Fancies*, p. 54).

This vague picture of nature already has a number of affinities with the ancient Stoic system.[16] Like the Stoics' *pneuma*, Cavendish's "rational and sensitive spirits" are a unified corporeal principle which not only

[15] See the article by Stephen Clucas in Further Reading.

[16] My discussion of Stoic physics derives largely from A. A. Long and D. N. Sedley (eds.), *The Hellenistic Philosophers*, 2 vols. (Cambridge: Cambridge University Press, 1987), S. Sambursky, *Physics of the Stoics* (New York: Macmillan, 1959), Josiah B. Gould, *The Philosophy of Chrysippus* (Albany: State University of New York Press, 1970) and Emile Bréhier, *Chrysippe et l'ancien stoïcisme* (Paris: Press Universitaires de France, 1951).

binds the natural world into a single, continuous body, but also gives rise to all its physical qualities. The Stoics thought of this fiery breath or spirit, which they called "God," as the knowing and intelligent force that makes the whole of nature through which it extends a single living and intelligent organism. Thus, this force may be viewed as the soul of the world. Cavendish implicitly acknowledges the affinity between her "spirits or innate matter" and the Stoics' active principle in calling it "a kind of God . . . to dull part of matter"; and she explicitly agrees with the Stoics that "the innated matter, is the soul of nature. The dull part of matter, the body" (*Opinions* (1655), p. 30). What the Stoics have to say about the infinite can also help us to understand Cavendish's obscure remark that "there is no quantity in infinite; for infinite is a continued thing." When asked about the ultimate or least parts of nature, Chrysippus urged us "to think of each body as consisting neither of certain parts nor of some number of them, either infinite or finite."[17] Just as the Aristotelians did, the Stoics rejected the atomic theory, according to which bodies are composed of indivisible particles. Chrysippus' aim here was to show that since bodies are not aggregates of atoms, there is no point to the question of whether the body's atomic parts are finite or infinite in number. Rather, bodies are parts of the corporeal continuum, whose unity is brought about by the continuous tensional motions of the *pneuma*. It seems that, by 1653, Cavendish is already experimenting with the possibility that the structure of corporeal nature is continuous and held together by something subtle – which position the Stoics had urged in opposition to the Epicurean view. And she even stresses how the parts of this unified, continuous, animate nature are filled with sympathies and antipathies. The Stoics also had argued that the fiery spirit gives rise to the whole of nature being in sympathy with itself. That is, an occurrence in one part of nature has a non-mechanical effect upon all the other parts of the universe, analogously to the effect the condition of an organ has on the condition of the human body as a whole.

There are, of course, a number of anti-atomist Stoic views that are conspicuously absent in Cavendish's initial version of her materialist organicism, notably the doctrine of "blending" or "complete mixture," and the denial of the existence of an intracosmic vacuum. Since for both Cavendish and the Stoics, the presence of the active breath or spirit

[17] Plutarch, *De communibus notitiis contra Stoicos* [On Common Conceptions Against the Stoics] 1078E–1080E, in A. A. Long and D. N. Sedley (eds.), *The Hellenistic Philosophers*, 50C.

throughout the universe is what accounts for the "sympathy," by which the universe becomes a single body with a unified structure, they need a theory of how the active principle is everywhere mixed with matter. In her mature works, Cavendish will embrace a Stoic-like theory of complete blending, according to which the active spirits will so interpenetrate matter, that they will not simply be juxtaposed to matter by surface contact, but will be mutually coextended with matter, so that both the spirits and matter will be present in any part of the universe you pick, no matter how small. And in order to protect the unity of the sympathetic corporeal world, thoroughly blended with *pneuma*, the Stoics had argued: "In the cosmos there is no void as can be seen from the phenomena. For if the whole material world were not coalescent (*sumphues*) the cosmos would not be by nature coherent and ordered, neither could mutual interaction exist between its parts, nor could we, without one binding tension and without the all-permeating pneuma, be able to see and hear. For sense-perception would be impeded by the intervening empty spaces."[18] By 1655, Cavendish is still unsure how it will be possible to eliminate the vacuum. She writes in verse: "For what's unequall, cannot joyned be / So close, but there will be Vacuity" (*Opinions*, p. 4).[19] But in the 1660s, armed with a theory of complete blending, she will attack the doctrine of the void, arguing that its existence would produce causal chaos and unglue the unity of the corporeal continuum. This mature system of nature of the 1660s contains five major features:

(1) Materialism

Cavendish is a thoroughgoing materialist, with respect to the natural world. In opposition to the views of Descartes, More, Glanvill, and Van Helmont, she maintains that there are neither incorporeal substances nor incorporeal qualities in nature (*Observations*, p. 137). Still, she is at pains to make the thoroughgoing materialism of her natural philosophy consistent with certain Christian doctrines.[20] While holding the orthodox

[18] Cleomedes, *De motu circulari corporum caelestium* [On the Circular Motion of Celestial Bodies], 1, 1; the translation appears in Sambursky, *Physics of the Stoics*, p. 41.

[19] On this same page, Cavendish also offers considerations in favor of eliminating belief in the vacuum; she notes in the margin that "the readers may take either opinion."

[20] With respect to the human soul, which according to Christianity is immaterial and immortal, she writes that "the soul of man is part of the soul of nature, and the soul of nature is material: I mean

view that God is a "spiritual, supernatural and incomprehensible infinite,"[21] she nonetheless argues that God "being immovable, and beyond all natural motion, cannot actually move matter; neither is it religious, to say, God is the soul of nature; for God is no part of nature, as the soul is of the body . . ."[22] Instead she suggests that God made matter to be self-moving by a supernatural, general act of his "immutable will and all-powerful command."

For Cavendish, there is a single principle of all natural phenomena, namely matter, which comes in two "degrees" : "animate matter," which parallels the ancient Stoics' active principle, and "inanimate matter," which parallels the Stoics' inactive principle (*Observations*, p. 211). In an effort to underline her materialism, Cavendish has jettisoned the earlier ambiguous terminology of "spirits." She breaks from the Stoic tradition, however, in further specifying the functions of the active principle: animate matter is itself composed of "sensitive matter" and "rational matter." "Sensitive matter," whose motions, like a "labourer or workman," carry along the inanimate matter, gives rise to the variety of configurations in nature and makes nature a single living body filled with diverse bits of sensitive knowledge. "Rational matter," like an "architect, designer or surveyor," imbues parts of nature with a more general knowledge of the whole; when it moves within itself, it produces "fancies, thoughts, imaginations [and] conceptions," and when it moves in tandem with the motions of sensitive matter, it produces sense perception (*Observations*, pp. 150–65).

(2) Complete mixture

As noted above, in her mature work Cavendish makes use of the Stoic theory of "blending" or "complete mixture" in her account of the

only the natural, not the divine soul of man, which I leave to the Church. And this natural soul, otherwise called reason, is nothing else but corporeal natural self-motion . . ." (*Observations*, p. 221). But sometimes Cavendish argues for a stronger thesis, namely, that no incorporeal entity – other than God himself – can exist: "An immaterial cannot, in my opinion, be naturally created; nor can I conceive how an immaterial can produce particular immaterial souls, spirits, and the like. Wherefore, an immaterial, in my opinion, must be some uncreated being; which can be no other than God alone. Wherefore, created spirits, and spiritual souls, are some other thing than immaterial . . ." (*Grounds*, p. 239.)

[21] *Observations*, p. 220; on God's immateriality, see *Observations*, II, ch. 9.

[22] *Observations*, p. 230. See also *Observations*, I, ch. 17, where Cavendish criticizes Descartes for conceiving of God as setting and conserving the world in motion analogously to the mechanical way a workman spins his lathe; see *Observations*, II, ch. 7 for her criticism of occasionalism.

relation of the two degrees of matter. She maintains that "there is such a commixture of animate and inanimate matter, that no particle in nature can be conceived or imagined, which is not composed of animate matter, as well as of inanimate" (*Observations*, p. 158). So the mixture of animate and inanimate matter is not simply a juxtaposition or meeting at a surface. For if we took a tiny portion of animate matter which so joined a tiny portion of inanimate matter, we could still find a tinier subsection of the former that was not in contact with any subsection of the latter. But complete blending requires that any particle you pick, no matter how small, will be composed of both types of matter. We should not think, however, that she has in mind some type of fusion. The two degrees of matter "do constitute but one body, because of their close and inseparable conjunction and commixture; nevertheless, they are several parts (for one part is not another part)" (*Observations*, p. 127). In other words, animate and inanimate matter, insofar as they are blended, have not lost their specific characters, rather they remain distinct "degrees" of matter, which nevertheless are found completely blended together throughout nature.

(3) Pan-organicism and pan-psychism

Cavendish stresses that the blending with inanimate matter includes not just sensitive matter, but rational as well. She denies that rational matter, or mind, exists only in the brain or some other region of the human body. Rather, animate matter moves throughout nature with the result that nature is everywhere filled with "sensitive and rational knowledge" (*Observations*, p. 207). Pan-organicism and pan-psychism, then, follow directly from Cavendish's application of the theory of blending. She sums up this feature of the system of nature in this way: "As infinite nature has an infinite self-motion and self-knowledge; so every part and particle has a particular and finite self-motion and self-knowledge, by which it knows itself, and its own actions, and perceives also other parts and actions . . ." (*Observations*, p. 138).

(4) Continuum theory of matter

We might think that, due to complete blending, there is pan-organicism and pan-psychism all the way down in nature to its least parts, or atoms.

We might suppose that nature is the sum of the elaborate combinations of atoms, and, thus, that atoms are the first principles of natural phenomena. But this is not Cavendish's position.

Some of Cavendish's objections to atomism turn on conceiving of the atom as that which is conceptually indivisible. For example, Cavendish argues that since an atom is corporeal, and since what is corporeal is conceptually infinitely divisible, "there can be no atom, that is, an indivisible body in nature" (*Observations*, p. 125). A second piece of reasoning for denying the existence of atoms turns on her doctrine of complete blending. According to Cavendish, if we pick the smallest unit in nature, it would not be conceptually simple, it would be a composite blending of animate and inanimate matter. Thus, there cannot be atoms, which are by definition the *simples* out of which composite bodies are composed (*Observations*, I, ch. 31). Most of the seventeenth-century corpuscularians, however, denied that atoms are, like the mathematicians' points, conceptually indivisible; they are simply the least parts or *minima* of nature – the parts which are not found further divided in nature. Cavendish needs to offer further arguments against her contemporaries' atomic parts, and she does.

For example, she also makes use of a widely held attack against Epicurean atomism: it is highly improbable that the orderliness of the causal nexus of the universe is due to the random impact of "senseless" particles upon one another. Rather, it is more probable that the complexity, harmony and predictability of causal interactions is due to an animate intelligence ordering change in the universe (*Observations*, pp. 129; 169; 207–08). A special case of Cavendish's worry is how the random motion of inanimate smallest parts could give rise to sensitive, intelligent animate body (*Observations*, pp. 263–65).

Now if these three arguments against the existence of atoms constituted her complete arsenal, we might hold that the target of her attacks is simply a crude mechanical atomism. This would leave open the possibility that Cavendish herself is committed to providing structural explanations of all macro phenomena in terms of the self-moving smallest parts of "innated matter." In short, it would leave open the possibility that Cavendish is a vitalistic corpuscularian of sorts.

However she has further reasoning that would indicate that her target is not just mechanical atomism; rather she is attacking all particulate matter theories. For Cavendish, complete blending confers a unity on

animate and inanimate matter, making of them a single, continuous self-subsistent organism. The parts of this continuous organism are not themselves self-subsistent, but depend for their existence and properties on their relation to each other and to the whole of nature: "[T]he head, although it has a whole and perfect figure, yet it is a part of the body, and could not subsist without it. The same may be said of all other particular and perfect figures: As for example, an animal, though it be a whole and perfect figure, yet it is but a part of earth, and some other elements, and parts of nature, and could not subsist without them . . . All which proves, that there are no single parts, nor . . . composition of loose atoms in nature . . . because nature is a body of a continued infiniteness . . ." (*Observations*, pp. 126–27). She further argues that if there were such self-subsistent parts, "nature would be like a beggar's coat full of lice: Neither would she be able to rule those wandering and straggling atoms, because they are not parts of her body, but each is a single body by itself, having no dependence upon each other. Wherefore, if there should be a composition of atoms, it would not be a body made of parts, but of so many whole and entire single bodies, meeting together as a swarm of bees" (p. 129). In other words, the sum of "single parts," or atoms related to each other solely through contact at a surface, could only constitute an aggregate or heap; but such a sum would not be unified, as the continuous body of nature is. Cavendish explains: "When I speak of the parts of nature, I do not understand, that those parts are like grains of corn or sand in one heap, all of one figure or magnitude, and separable from each other: but, I conceive nature to be an infinite body, bulk or magnitude, which by its own self-motion, is divided into infinite parts; not single or indivisible parts, but parts of one continued body, only discernible from each other by their proper figures, caused by the changes of particular motions . . ." (pp. 125–26). So while she can talk about portions of the continuous body of nature, and even distinguish one portion from another on the basis of the ratios of rational, sensitive, and inanimate matter, which give rise to perceivable configurations, this does not commit her to the atomic account of matter. That is, it does not commit her to the view that there are self-subsistent atoms, the sum of whose aggregates is corporeal nature.

And her examples show that her objections to atomism are not just to the mechanists' atoms. Even if the *minima* of nature were animate, like bees or lice, aggregations of such *minima* would not yield unified,

middle-sized bodies. Nor could such vital atoms yield the continuous body of nature as a whole. Self-subsistent atoms (be they inanimate or animate) cannot be the items we refer to in our ultimate explanations of phenomena. Rather explanation, at the most fundamental level, works from the top down. Features of the continuous self-moving matter – such as its unity, or the changes in the speed or direction of its motion – explain the unity and change in its parts, i.e., in middle-sized objects. For Cavendish, self-sufficient atoms would be the "effects of matter, and not the principles of nature, or natural beings" (*Observations*, p. 231).[23]

Among the arguments Cavendish offers against the existence of vacua, the one upon which she places the greatest stress is one which underlines her commitment to the continuum theory of matter. She argues that since the orderliness of the causal nexus is due to the fact that a single, rational force (the sensitive and rational motions) unifies and brings about all the changes in the universe, vacua would sever the unified organism of nature. They would create parts of nature separated from each other spatially and causally. That is, they would give rise to the self-subsistent parts, which Cavendish has already attacked, and thereby engender causal chaos: "For, were there a vacuum, there would be no successive motions, nor no degrees of swiftness and slowness . . . The truth is, there would be such distances of several gaps and holes, that parts would never join, if once divided; insomuch, as a piece of the world would become a single particular world, not joining to any part besides itself; which would make a horrid confusion in nature . . ." (*Observations*, p. 129).

However there is an important difference between Cavendish's position on vacua and that of the ancient Stoics. For the same reasons that Cavendish gives, the Stoics had denied the existence of a void inside the cosmos, but they had also argued for an infinite void outside of the cosmos. Cavendish, on the other hand, takes nature to be quantitatively infinite in extension. On her view, there can be no space outside of the unified body of nature (*Observations*, pp. 130–31). Other worlds, should they exist, would just be parts of this single infinite body (*Grounds*, p. 256). So the Stoic reasoning against an intracosmic void becomes, for Cavendish, reasoning for denying any void.

[23] Cavendish sometimes makes use of structural explanation, as when she suggests that the figures of the particles of salt water are pointed, which accounts for such things as salt's penetrating quality (*Phil. Letters*, p. 118). But she holds that her occasional use of structural explanation in no way commits her to a particulate matter theory (*Phil. Letters*, pp. 117–21).

(5) Non-mechanical natural change

The mechanical philosophers explain natural change in terms of the impact of corporeal bodies on one another. Typically such explanation makes reference to the translation of motion or motive force. Cavendish argues, as Leibniz subsequently will, for the contentious view that a transfer model of causation underlies all such mechanical explanation. She has two main objections to this model. First, if motion is a mode of body, as many seventeenth-century mechanical philosophers held, then motion cannot travel outside of the bodily substance in which it inheres in the process of being transferred into another body (*Phil. Letters*, p. 98).[24] For, this would be to give motion the dubious status of the "real qualities" of the scholastics: things that are just properties, but nonetheless possessing the status of "complete things," rather than of modes. And mechanical philosophers, such as Descartes, denied the existence of real qualities. Second, since for Cavendish motion is inseparable from material body, if motion could be transferred, this would require that a portion of material body be transferred. Each translation of motion upon impact with another body would, then, diminish not only the motion in the agent of change, but also the agent's "substance and quantity" (*Phil. Letters*, pp. 77; 98).[25] Cavendish's point is not to deny that any diremptive actions take place in nature; rather her point is that the mechanical transfer of motion via impact does not underlie all natural change.

Cavendish offers the following account of changes in the quantity of motion in individual bodies, as an alternative to that of the mechanical philosophy:

> One body may either occasion, or imitate another's motion, but it can neither give nor take away what belongs to its own or another body's substance . . . Wherefore every creature being composed of this commixture of animate and inanimate matter, has also self-

[24] Cf. Thomas Hobbes, "[I]t is not to be thought that an accident goes out of one subject into another . . ." (*Elements of Philosophy*, II, ch. 8, § 21; *EW*. I, 117) and Gottfried Wilhelm Leibniz, *Monadologie* [Monadology], § 7.

[25] Walter Charleton, in *Physiologia Epicuro-Gassendo-Charltoniana, or a Fabrick of Science Natural Upon the Hypothesis of Atoms* . . . (London, 1654), discusses an argument, which he attributes to Alexander of Aphrodisias (fl. *c*. 200 AD), according to which "a continual efflux of substance must minorate the quantity of the most solid visible" (p. 140). One of Charleton's responses is that while bodies are continually losing minute parts of themselves in acts of natural change, these same bodies are also continual recipients of substantial effluvia from other agents of change.

> motion, that is life and knowledge, sense and reason, so that no part hath need to give or receive motion to or from another part; although it may be an occasion of such a manner of motion to another part, and cause it to move thus or thus: as for example, a watchmaker doth not give the watch its motion, but he is only the occasion, that the watch moves after that manner, for the motion of the watch is the watch's own motion, inherent in those parts ever since that matter was . . . Wherefore one body may occasion another body to move so or so, but not give it any motion, but every body (though occasioned by another, to move in such a way) moves by its own natural motion; for self-motion is the very nature of animate matter . . . (*Phil. Letters*, pp. 98; 99–100).

First, we need to clarify Cavendish's understanding of an "occasion" and distinguish it from a "prime or principal cause" (*Phil. Letters*, p. 79). We also need to determine whether her commitment to an account of change in the quantity of motion in bodies in terms of occasional causes implies that the parts of nature are causally inefficacious with respect to each other. That is, does Cavendish deny transeunt causation?

Consider the following scholastic textbook characterization: an "occasion" is anything that aids, or is favorable to, the action of a principal cause such that: (1) the occasion has no intrinsic connection with the effect; (2) it is not necessary for the production of the effect; and (3) it has no direct influence on the production of the effect. The condition or circumstance of darkness, then, will count as an occasion of theft for the burglar. But the term "occasion" was also used by the scholastics to pick out things that were more than mere conditions favorable to the act of a prime cause. Take the example where bad company is an occasion for sin. The concept of an occasion operative here contains two further features: (4) an occasion has an indirect influence on the production of the effect by inducing the primary cause to act, and (5) insofar as it exerts this sort of influence, it counts as a partial efficient *moral* cause of the effect.[26]

As opposed to a "physical cause," a "moral cause" is one that indirectly produces its effect by applying or inducing the primary cause, via example, command, advice, solicitation, or even local motion, to produce this effect. For example, a general is the moral cause of the fighting that

[26] See St. Thomas Aquinas, *Summa theologiae*, II–II, q. 43, art. 1; see also the recent scholastic textbook of Peter Coffey, *Ontology or the General Theory of Being: An Introduction to General Metaphysics* (Gloucester, Mass.: Peter Smith, 1970), p. 359.