STUDIES IN PHILOSOPHY AND THE HISTORY OF PHILOSOPHY

General Editor: Jude P. Dougherty

Studies in Philosophy
and the History of Philosophy Volume 24

Revolution and Continuity

Essays in the History and Philosophy of Early Modern Science

edited by Peter Barker and Roger Ariew

THE CATHOLIC UNIVERSITY OF AMERICA PRESS
Washington, D.C.

The paper used in this publication meets the minimum requirements of American National Standards for Information Science—Permanence of Paper for Printed Library Materials, ANSI Z39.48-1984.
∞

LIBRARY OF CONGRESS CATALOGING-IN-PUBLICATION DATA
Revolution and continuity : essays in the history and philosophy of early modern science /edited by Peter Barker and Roger Ariew.
p. cm.—(Studies in philosophy and the history of philosophy : v. 24)
Includes bibliographical references and index.
ISBN 0-8132-0738-X (permanent paper)
1. Science—History. 2. Science—History—17th century. 3. Science—Philosophy—History. 4. Continuity. I. Barker, Peter, 1949– . II. Ariew, Roger. III. Series.
B21.S78 vol. 24
[Q175.3]
100 s—dc20
[501] 90-19633

Contents

3 Physick and Natural History in Seventeenth-Century England

HAROLD J. COOK

Among the many people affected by the "scientific revolution" were the physicians. Exploring some of the responses of physicians to the intellectual changes of early modern Europe can be quite telling, for they were well-educated men with a large stake in the intellectual establishments of their day. Since the one and only mark universally distinguishing physicians from all other kinds of medical practitioners was their higher academic degrees, their medical doctorates, any alterations in the framework of knowledge were felt keenly among these learned men. The physician's M.D. was supposed to certify, and ordinarily did certify, that he was well educated in "physic," a branch of university study that demanded much philosophical sophistication from its devotees. Because the physicians were well educated, and because that education alone separated them from other practitioners, physicians were very well aware of the implications of almost any significant change in the intellectual currents of the day. Their reactions to the development of the new philosophy, then, are a bellwether that can lead to a better understanding of what was important about the new philosophy to contemporaries, throwing light on some of the implications of the new philosophy commonly overlooked in studying the philosophical innovators alone.

Among the difficulties of the physicians in the seventeenth century were those arising from the competition of medical rivals. There had always been only a handful of university-educated physicians in comparison with the large number of medical practitioners. But by the early modern period, new forms of advertising and the growth of the market economy encouraged the commoditization of medical products and services.[1] Many of the people involved in the rapidly growing medical

1. For more on the growth of a consumer economy, see Margaret Spufford, *The Great Reclothing of Rural England: Petty Chapmen and Their Wares in the Seventeenth Century* (London: Hambleton Press, 1984); and Joan Thirsk, *Economic Policy and Projects: The*

marketplace were practitioners who offered explanations for disease and treatment that were at variance with the academic explanations given by physicians. Paracelsianism and other varieties of chemical medicine certainly posed a threat to the preeminence of learned physic.[2] But so too did the more mundane and more accessible vernacular medical tracts, the variety of which grew tremendously in the seventeenth century.[3] The ordinary, nonacademic practitioners who offered their services or medicines to the public commonly also offered rationales for their practices that either assumed a certain medical outlook on the part of the public or developed a novel viewpoint of their own.

The many controversies within the medical community of the period are often reduced to the somewhat simplistic terms of rationalism vs. empiricism. Many of the assumptions of the historical literature can be formulated in the following line of reasoning: (a) the physicians were well educated in a rational natural philosophy; (b) their medical rivals, some well educated, some self-educated, some reading only the vernacular or reading not at all, were called "empirics" because, like the ancient philosophical school, they relied almost entirely upon experience as their medical guide, declining to look closely into the causes of health and disease by the use of reason; (c) therefore, it seems sensible to view the physicians as supporters of intellectual traditions placing primacy on the ability to reason through to causes, and to view their rivals as advocates of new approaches that placed primacy on the ability to find out new things through experience. The intellectual battles between physicians and their rivals were therefore battles between old and new, public authority and individual liberty, university learning and craft tradition, reason and experience.[4]

Development of a Consumer Society in Early Modern England (Oxford: Clarendon Press, 1978); for the medical marketplace, see Harold J. Cook, *The Decline of the Old Medical Regime in Stuart London* (Ithaca, NY: Cornell University Press, 1986) pp. 28–69; R. Porter, *Health for Sale: Quackery in England 1660–1850* (Manchester: Manchester University Press, 1989).

2. Allen G. Debus, *The Chemical Philosophy: Paracelsian Science and Medicine in the Sixteenth and Seventeenth Centuries*, 2 vols. (New York: Science History Publication, 1977); P. M. Rattansi, "Paracelsus and the Puritan Revolution," *Ambix* 11 (1963): 24–32; Charles Webster, "English Medical Reformer of the Puritan Revolution: A Background to the 'Society of Chymical Physitians,'" *Ambix* 14 (1967): 16–41; and "Alchemical and Paracelsian Medicine," in C. Webster (ed.) *Health, Medicine and Mortality* (Cambridge: Cambridge University Press), pp. 301–34.

3. I am currently surveying the medical literature of seventeenth-century England; for a study of that literature in the sixteenth century, see Paul Slack, "Mirrors of Health and Treasures of Poor Men: The Uses of the Vernacular Medical Literature of Tudor England," in C. Webster (ed.), *Health, Medicine and Mortality*, pp. 237–73.

4. See, for example, Christopher Hill, *Intellectual Origins of the English Revolution* (Oxford: Oxford University Press, 1965); Theodore M. Brown, "The College of Physicians and the Acceptance of Iatromechanism in England, 1665–1695," *Bulletin of the*

Indeed, just these issues have often been raised in interpreting the causes of the scientific revolution;[5] and too, there is enough sense in this dialectical argument to use it as a staging post from which to push on. But there are also many reasons to think that while this dialectic captures much of the debate over ideas between the physicians and their rivals, it does not do so with enough nuance to be true to the contemporary content of the debate. We are all aware that there are difficulties in using any one term like "reason," "experiment," or the "experimental method," as the key determinate of the scientific revolution: for one thing, many "scientists" were hardly experimentalists by our lights. So, too, there are problems with speaking about the scientific revolution as a consequence of the "inductive method," or of Baconianism or Cartesianism, much less Platonism, Aristotelianism, or any other "isms." All these attempts to characterize the intellectual issues at stake in the intellectual struggles of the day are ultimately reductionistic, presuming that there is "a" scientific revolution that has a particular essence, outlook, world view, philosophy, or approach at its root, a kind of Hegelian spirit of the age into which historians can with effort finally, if incompletely, gain insight.

One basic problem with this manner of thinking about the changes characterized as the new philosophy is the tendency to pose the problem in terms of dialectical entities: reason vs. experience or physician vs. empiric. This fails to capture the nuances of the contemporary struggles for many reasons. Partly the failure is due to using terms that are abstractions rather than tangible entities. "The physicians," for instance, were deeply divided on many significant intellectual (as well as social and political) issues; so, too, were "the apothecaries," empirics, chemists, Helmontians, and so forth, not to mention the philosophers and virtuosi. Therefore, before making any larger statements about the *causes* of the scientific revolution, it is worth once again trying to sharpen the *description* of a part of it, leaving explanations for another time.

The description that follows, then, tries to give an overview of what some learned physicians, who as a group were particularly sensitive to shifts in the intellectual winds, thought to be new about some of the

History of Medicine 44 (1979): 12–30; and "Medicine in the Shadow of the 'Principia,' " *Journal of the History of Ideas* 48 (1987): 629–48.

5. For example, Paolo Rossi, *Philosophy, Technology and the Arts in the Early Modern Era,* S. Attanasio (tr.), B. Nelson (ed.) (New York: Harper and Row, 1970); P. M. Rattansi, "Early Modern Art, 'Practical' Mathematics and Matter Theory," in Rom Harré (ed.), *The Physical Sciences since Antiquity* (London: Croom Helm, 1986), pp. 63–77; J. A. Bennett, "The Mechanics' Philosophy and the Mechanical Philosophy," *History of Science* 24 (1986): 1–28.

changes of the day. These physicians clearly saw that many elements of the new philosophy were indeed far more empirical than the old. At the same time, however, although the new philosophy was more empirical, it was not without philosophical content. The particular combination of empiricism and philosophy that characterized much of the new philosophy is best captured in the phrase "natural history."

1. NATURAL PHILOSOPHY AND PHYSIC

To understand the responses of the physicians to various parts of the new philosophy, it is well to begin by trying to understand their intellectual traditions. That is, what was "physic," that profession practiced by physicians?

The distinction between "medicine" and "physic" was an important one in late medieval and Early modern English.[6] Like all linguistic distinctions, it was somewhat messy and ambiguous, with different authors using the words in different ways.[7] But like all linguistic distinctions, too, it deserves our attention, for it provides a useful analytical device. "Medicine," we can say, is the art of administering therapies to the sick (derived from the Latin *medico,* to apply drugs—or dyes). "Physic," on the other hand, is a word derived from the Greek *phusis,* or "nature." It was the art of counseling people to live their lives so as to live in accordance with nature (to retain health), or, if health had already been lost, to help them regain health by counseling them about how to reharmonize their lives with nature.

The ancient Greeks, who invented physic, had emphasized soundness of body along with soundness of mind as a fundamental constituent of living the good life. Soundness involved not just strength but harmony and balance with nature. Living in tune with nature meant retaining health and living a long life, while disharmonies and imbalances meant illness, possibly even death. In order to live harmoniously, people had to regulate their lives so that each person's unique "constitution" (or "temperament") might remain in tune with an ever-changing nature. The physician's task, then, was to help individual people regulate their lives according to universal principles of nature so as to help

6. Cook, *Decline of the Old Medical Regime,* pp. 62–66; Harold J. Cook, "Physicians and the New Philosophy: Henry Stubbe and the Virtuosi-Physicians," in R. French and A. Wear (eds.), *The Medical Revolution of the Seventeenth Century* (Cambridge: Cambridge University Press, 1989).

7. Jerome J. Bylebyl is working on a study of the Latin uses of "*physica*" and "*medica*" in late medieval Europe. See Bylebyl, "The Medical Meaning of 'Physica'," *Osiris,* 2d series, 6 (1990): 16–41.

them retain health and prolong life: that is, to advise on regimen.[8] In the early modern period, because the ideal of the best physic continued to stress the regulation of life according to nature, it was sometimes called "preventive" medicine or "dietetic" medicine, the Greek word *diaita* meaning a way of living or a mode of life. The principles of physic were therefore intended for the use of the healthy as well as the sick. Clearly, then, the art of physic entailed more than mere medical treatment by drugs or surgery.

Like its fellow professions of law and theology, early modern physic was a learned science obtained through university study and intended to affect the behavior of the person seeking professional guidance; in the case of physic, the end of the physician's advice was to retain health and prolong life. Since the client's behavior would, ideally, be reinforced or changed by the physician's counsel, the physician needed to be persuasive: that is, he had to be good at logic and rhetoric. The ultimate purpose of the physician was to keep his client a good or to make him a better person. *Care* rather than *cure* was the learned physician's first duty. To preserve health and prolong life required something more than mere skill in curing diseases: it meant acquiring the ability to give advice on how a person might regulate his or her life in order to remain in balance with the environment. Like his learned counterparts in law and church, then, the primary goal of the physician was to provide pastoral advice and care that would prevent difficulties, although a secondary end was to correct problems that had already occurred.

In order to maintain the health of clients and to cure the ills of patients, the physician had to be able to probe the interior natures of each uniquely tuned human being so as to maintain or re-establish a harmonious balance with nature. To do this, the physician needed to know how nature worked: to know the general principles of nature, or natural philosophy. He also needed to know how to apply those universals to particulars: to apply general principles to unique individuals. Physic was therefore applied natural philosophy, and the physician needed to be very well grounded in the knowledge of nature as well as in the logical and rhetorical arts.

Consequently, academic books on learned physic had long divided the subject into *theoria* and *practica,* at least since the time of the ninth-

8. See esp. Owsei Temkin, "Greek Medicine as Science and Craft," *Isis* 44 (1953): 213–25; Ludwig Edelstein, "The Dietetics of Antiquity," and "The Relation of Ancient Philosophy to Medicine," reprinted in O. Temkin and C. L. Temkin (eds.), C. L. Temkin (trans.), *Ancient Medicine: Selected Papers of Ludwig Edelstein* (Baltimore: Johns Hopkins University Press, 1967), pp. 303–16 & pp. 349–66, respectively.

century translators at Baghdad. One of the most important authors of scholastic physic, known in Europe by his Latin name Joannitius (usually identified as Hunain ibn Ishaq), wrote a book that remained the best short summary of physic until the seventeenth century, the *Isagoge*. He wrote:

> Medicine is divided into two parts, namely theoretic and practical. And of these two the theoretic is further divided into three, that is to say, the consideration of the naturals, the non-naturals, and the contra-naturals. From the consideration of these arises the knowledge of sickness, of health, and of the mean state, and their causes and significations.[9]

The same division of the knowledge of physic into the naturals, non-naturals, and contra-naturals became standard in the scholastic curricula, built not only on Joannitius but on the works of Avicenna, Isaac Judeaus, a few of Galen's and Hippocrates' works, and so forth.[10]

But, by *theoria* and *practica* the learned physicians did not have in mind the kind of differences we commonly do. If one turns to Avicenna, one finds a typically lucid explanation of this point.[11] Physic, like philosophy, he says, has both theoretical and practical parts, but the difference needs explaining in regard to medicine because people often have the wrong idea about medical practice:

> Thus, when in regard to medicine, we say that practice proceeds from theory, we do not mean that there is one division of medicine by which we know, and another, distinct therefrom, by which we act—as many examining this problem suppose. We mean instead that these two aspects are both sciences—but one dealing with the basic problems of knowledge, the other with the mode of operation of these principles. The former is theory; the latter is practice.[12]

In other words, Avicenna determined to show that, in both "theory" and "practice," physic is a science rather than an art. Avicenna contin-

9. Joannitius, *Isagoge*, in E. Grant (ed.), *A Source Book of Medieval Science* (Cambridge: Harvard University Press, 1974), p. 705. The "naturals" were those principles of nature that made up the human body; the elements, temperaments, humors, faculties, spirits, and so on. The six "non-naturals" were those things that affected the naturals; the air, food and drink, labor and rest, sleeping and waking, evacuation and retention, and passions and perturbations of the mind. The "contra-naturals" were the host of things that operated against nature, including accidents and remedies.

10. On scholastic physic, see Charles C. Talbot, "Medicine," in David C. Lindberg (ed.), *Science in the Middle Ages* (Chicago: University of Chicago Press, 1978), pp. 391–428; Faye M. Getz, "Medicine at Medieval Oxford University," in J. Catto (ed.), *The History of Oxford University* 2 (Oxford: Clarendon Press, forthcoming).

11. The following point was first suggested to me by Faye M. Getz. Since this paper was delivered, Nancy Siraisi's excellent book *Avicenna in Renaissance Italy: The Canon and Medical Teaching in Italian Universities after 1500* (Princeton: Princeton University Press, 1987) has appeared. Siraisi has a fine discussion of the meaning of theoria and practica to Avicenna and his sixteenth-century commentators, esp. pp. 97–100, 226–38.

12. Avicenna, *Canon*, in E. Grant (ed.), *A Source Book of Medieval Science*, p. 716.

ues, in this important passage, to argue yet further that both parts of physic are sciences, i.e., based upon principles of reasoning rooted in fundamental truths about nature. "Theory" is utterly certain; "practice," the intellectual elaboration of true principles, results in somewhat less certainty.

> Theory is that which, when mastered, gives us a certain knowledge, apart from any question of treatment. . . . The *practice* of medicine is *not* the *work* which the physician carries out, but is that branch of *medical knowledge* which, when acquired, enables one to *form an opinion* upon which to base the proper plan of treatment. . . . Here the *theory guides an opinion,* and the opinion is the basis of treatment. Once the purpose of each aspect of medicine is understood, you can become skilled in both theoretical and applied knowledge, *even though there should never come a call for you to exercise your knowledge.*[13]

The practice of physic, then, concerned the ability to move intellectually from certain knowledge to opinion based upon that certainty; to associate the universal and the particular. The physician ideally did this based upon his skill in philosophy rather than upon his clinical experience, so that he could practice even if he saw no patients.

This tradition of the "practice" of physic, like a lawyer's or a cleric's practice of their sciences, was far from being an art rooted in mere clinical experience, much less the empirical skill of curing; and so the English university faculties made formal provision for study and debate, but none for clinical study.[14]

2. NATURAL HISTORY AND MEDICINE

But the idea was changing in the sixteenth and seventeenth centuries that academic physic was a science based on the established principles of natural philosophy. More and more learned men were arguing that the science of physic was at root rather the art of medicine, the *techne* of treating the sick with medicaments. Others argued that while physic ought to emphasize therapy more than it had, it could still be a science if it built upon new philosophical principles rather than the old. Naturally, there were disagreements among those who shared this viewpoint about which principles could establish the true foundations for a therapeutic science: chemical, "mechanical," or other principles. Among the various positions in favor of a renewed science of physic was a line of

13. Ibid., p. 716; my emphasis.

14. For more, see Phyllis Allen, "Medical Education in Seventeenth-Century England," *Journal for History of Medicine* 1 (1946): 115–43; Robert G. Frank, Jr., "Science, Medicine and the Universities of Early Modern England: Background and Sources," *History of Science* 2 (1973): 194–216, 239–69.

argument advanced by many of the English virtuosi and of the physicians most associated with the virtuosi. This proposition was that the new physic ought to be rooted in natural historical endeavors.

Sir Francis Bacon had been among those Englishmen who had declared that the "advancement" of science had to be rooted in new natural historical endeavors;[15] Robert Hooke penned a tract explaining the foundations of the new science as a natural historical endeavor;[16] and Robert Boyle wrote many treatises on "physiology" (or natural investigation) that focused on physic and "specific" medicines.[17] But it was a physician who authored one of the most popular English natural historical books of the century. A physician of Norwich, Thomas Browne (knighted in 1671), wrote *Pseudodoxia Epidemica,* which broke important ground by publishing an account of many things in nature presumed to be true but that were in fact false. He told the reader in his Preface that the model for his work was James Primrose's *De vulgi in medicina erroribus,*[18] a book that examined and dismissed many popular misapprehensions concerning medicine, while just a few pages earlier his first remark about mistaken beliefs concerned the "fruitlesse importunity of Uroscopy" burdening his time:[19] that is, the public coming to him for prognostications based upon the inspection of urines.[20]

It would certainly be wrong on our part to think that Browne's work was directly concerned with medical matters, when in fact it went far toward avoiding the subject covered so well by Primrose. Rather, Browne's book exhibited his approach to learning more than any immediate medical utility: he meant the book to be edifying rather than remedial.[21] His effort to pay close attention to detail, and to correct

15. For example, Francis Bacon, *The Plan of the Great Instauration,* prefixed to his *New Organon* (London, 1620). Of Bacon's published work, the largest amount (if the least read) is of a natural historical nature.

16. D. R. Oldroyd, "Some Writings of Robert Hooke on Procedures for the Prosecution of Scientific Inquiry, Including His 'Lectures of things Requisite to a Natural History,' " *Notes and Records of the Royal Society* 41 (1987): 145–67.

17. See esp. Robert Boyle, *Some Considerations Touching the Usefulness of Experimental Natural Philosophy, Propos'd in Familiar Discourses to a Friend, by way of Invitation to the Study of it* (Oxford, 1663), which is addressed to the five parts of the "physical" institutes, and *Of the Reconcileableness of Specific Medicines to the Corpuscular Philosophy* (London, 1685).

18. James Primrose, *De vulgi in medicina Erroribus Libri quatuor* (London, 1638); and *Popular Errors, or the Errours of the People in Physick,* Robert Wittie (tr.) (London, 1651).

19. Thomas Browne, *Pseudodoxia Epidemica: or, Enquiries into Commonly Presumed Truths* (London, 1646), "To the Reader."

20. For other physicians attacking the inspection of urines without the patient being present, see Peter Forrest, *The Arraignment of Urines* (London, 1625); Thomas Brian, *The Pisse-Prophet* (London, 1637).

21. Browne's views were probably formed during his medical studies at Montpellier, Padua, and Leiden (where he took his M.D. in 1633), places that promoted a natural historical approach to nature; he did not refer to Bacon as an inspiration for his work.

error, was deeply affected by a view of learning spelled out in the opening sentences. If truth were an active principle,[22] "we could be content, with Plato, that knowledge were but Remembrance. . . . [But] to purchase a clear and warrantable body of Truth, we must forget and part with much we know."[23] That is, we have to give up our common assumptions and inquire into everything anew. To do so demands far more than deep philosophical discourse; it demands labors in nature's own garden, that is, examining the particulars closely.

Browne's project suggested not only an attention to detail but a task that would be open-ended for many years. Such a sentiment was clearly voiced by that other great mid-century English natural historian and virtuoso, Izaak Walton. His book is still warmly regarded for its sentiments about fishing. But his intention was not only to speak of the edification and spiritual peace brought by the "experience" of angling, but to convey a wealth of information about the sport and fish themselves:

> I undertake to acquaint the Reader with many things that are not usually known to every Angler; and I shall leave gleanings and observations enough to be made out of the experience of all that love and practise this recreation, to which I shall encourage them. For Angling many be said to be so much like Mathematicks, that it can ne'r be fully learnt; at least not so fully, but that there will still be more new experiments left for the tryal of other men that succeed us.[24]

For some physicians, the new emphasis on natural history provided a foundation for a new kind of learning that would have direct utility for physic. The utility of natural history was contained both in the therapeutical improvements growing from a better knowledge of natural detail and in the way that it provided the foundations for a new kind of certainty in medical knowledge. One of Browne's correspondents, Christopher Merrett, is an excellent example of an English virtuoso-physician who argued for the central importance of natural history for physic.[25] Merrett was a stubborn defender of the rights of the academically trained physicians in London, throwing himself into the campaign during the Restoration to re-establish the prestige and authority of academically trained physicians over other practitioners, and into both the contemporary disputes between apothecaries and physicians and the

22. Browne's phrase was, "Would Truth dispense. . . ."

23. Browne, *Pseudodoxia Epidemica*, "To the Reader."

24. Isaak Walton, *The Compleat Angler* (1653) (London: Oxford University Press, 1935), p. 7, "To the Reader."

25. Much of Browne's correspondence with Merrett, begun after Merrett published his *Pinax Rerum Naturalium Britannicarum, Continens Vegetabilia, Animalia, et Fossilia, In haec Insula reperta inchoatus* (London, 1667) is printed in Thomas Browne, *Notes and Letters on the Natural History of Norfolk . . . from the MSS. of Sir Thomas Browne, with notes by Thomas Southwell* (London: Jarrold and Sons, 1902), pp. 57–89.

controversy between Henry Stubbe and the virtuosi.[26] He was also a strong proponent of the new philosophy. At Oxford he had been part of William Harvey's circle.[27] When he moved to London he took part in the "1645 group" of natural philosophers.[28] And from its founding until the end of the 1670s, he actively participated in the Royal Society.[29] Merrett's own book on natural history was among the "exceptional books by English authors," according to the Italian visitor Lorenzo Magalotti.[30] Merrett also published a translation of Antonio Neri's *The Art of Glass, how to colour Glass* in 1662, to which he added his own *An Account of the Glass-drops* (or Prince Rupert's Drops). He had his work on cold published as an appendix to Robert Boyle's *New Experiments touching cold* (1665). He presented at least six formal papers on natural history to the Royal Society.[31] And he headed up the Society's committee on the history of trades.[32]

This is how Merrett put the physician's task in a work of about 1680:

> The word Physician, derived from the Greek *pusikos,* is plainly and fully rendred by the word Naturalist, (that is) one well vers'd in the full extent of Nature, and Natural things; hereunto add the due, and skilful preparation and application of them to Mens Bodies, in order to their Health, and prolongation of Life, and you have a comprehensive Definition of a Physician.[33]

26. Cook, *Decline of the Old Medical Regime,* pp. 162–80.

27. Robert G. Frank, Jr., *Harvey and the Oxford Physiologists: Scientific Ideas and Social Interactions* (Berkeley and Los Angeles: University of California Press, 1980), pp. 74–75.

28. See the letters of John Wallis on the background to the Royal Society, reprinted in Sir Henry Lyons, *The Royal Society 1660–1940: A History of Its Administration under Its Charters* (Cambridge: Cambridge University Press, 1946), pp. 8, 11.

29. Thomas Birch, *The History of the Royal Society of London* (London, 1756), vols. 1, 2; Michael Hunter, *The Royal Society and Its Fellows 1660–1700: The Morphology of an Early Scientific Institution* (Chalfont St. Giles, Buck., 1982), pp. 162–163.

30. Merrett, *Pinax Rerum Naturalium Britannicarum;* W. E. Knowles Middleton (ed. & tr.), *Lorenzo Magalotti at the Court of Charles II: His* Relazione d'Inghilterra *of 1668* (Waterloo, Ontario: Wilfrid Laurier University Press, 1980), p. 149. For a modern evaluation of Merrett's book, see Charles E. Raven, *English Naturalists from Neckam to Ray: A Study in the Making of the Modern World* (Cambridge: Cambridge University Press, 1947), pp. 305–38.

31. Christopher Merrett, "A Paper Concerning the Mineral Called Zaffora by Dr. Merrett found amongst Dr. Hook's papers by Mr. Waller" (Royal Society, RBO.RBC.9.360); "The Arts of Refining Lead" (RS, Cl.P.IX[ix]1); "Some Observations Concerning the Ordering of Wines" (RS, RBO, RBC.1.278; later published at the end of Walter Charleton's Discourses on the Wits of Men [1692]); "An Account of the Tynn Mines and working of Tinn in the County of Cornewall" (RS, RBO.RBC.2.119); "Observations concerning the Uniting of the Barks of Trees cut, to the tree itself" (RS, RBO.RBC.2.301). These works appeared between 1660 and 1675.

32. Birch, *History of the Royal Society* I, p. 439.

33. Christopher Merrett, *The Character of a Compleat Physician or Naturalist* (London, 1680?), pp. 2–3.

Merrett believed, then, that the physician should become what he called a "naturalist." If the physician did so, Merrett argued, he would know the foundations of physic with certainty and also find many new cures for diseases.[34] Being a naturalist instead of merely a philosopher would end the strong criticisms of physic being made by many people outside the profession who claimed to be superior to the physicians because they worked with things themselves instead of ideas.[35]

But perhaps the most famous mid-century application of natural history to medicine originated with neither Browne nor Merrett, but with Thomas Sydenham.[36] Sydenham became known as the "English Hippocrates"; the Hippocrates represented in the phrase was thought to be the epitome of the natural historian.[37] Sydenham's publications emphasized case histories (carefully noting the changing symptoms a patient experienced over the whole course of the disease), together with a discussion organized by season of the weather and diseases prevailing in a locality and what kind of constitutions were most affected over the course of a year. In fact, this method is perfectly exemplified by the Hippocratic work *Epidemics I,* with *Epidemics II* and *III* being further collections of case histories. Sydenham also became known for his support of the idea of specific diseases: that is, that each disease had a precise set of distinct symptoms, and could be classified according to these outward signs in the same way that plants could be known and arranged. According to one recent commentator on Hippocratic medicine, "At the centre of Hippocratic pathology is the concept of specific disease."[38]

The physician's task, then, according to Sydenhamian medicine, was to be a natural historian of disease: to examine the clinical cases carefully and exactly, to identify and classify the specific disease entity as one would any other natural object, to describe that species in its precise

34. The connection between Merrett's stress on natural history and his discovery of new treatments is nicely made by the fact that he later publicly advertised his cures: Barbara Simons kindly alerted me to Merrett's single sheet folio advertisement in the Bodleian Library, Rawlinson MS C. 419, fol. 17.

35. This is the argument of the preface to Merrett's *Pinax Rerum Naturalium Britannicarum,* as well as the thrust of his arguments against the apothecaries and Henry Stubbe: see Cook, *Decline of the Old Medical Regime,* p. 169; Cook, "Physicians and the New Philosophy."

36. David Reisman, *Thomas Syndenham Clinician* (New York: Paul B. Hoeber, 1926); Kenneth Dewhurst, *Dr. Thomas Sydenham (1624–1689): His Life and Original Writings* (Berkeley: University of California Press, 1966); Donald G. Bates, "Thomas Syndenham: The Development of His Thought, 1666–1676," Ph.D. dissertation (Baltimore, MD: The Johns Hopkins University, 1975).

37. See Wesley D. Smith, *The Hippocratic Tradition* (Ithaca, NY: Cornell University Press, 1979), pp. 13–60.

38. Paul Potter, *Short Handbook of Hippocratic Medicine* (Quebec: Les Editions du Sphinx, 1988), p. 40.

surroundings (or what we would call environment), and to carefully note the treatments given and their various effects. He wrote that there were two ways to improve physic: first by "a History, or Description of all Diseases, as graphically and naturally as possibly may be, and, secondly, by a perfect and stable Practice or Method respecting them."[39] He went on to quote Francis Bacon on the difficulties of natural history. Then, in describing how actually to carry out a natural historical program in physic, he listed four points:

> It is necessary that all Diseases should be reduced to certain and definite Species, with the same diligence we see it is done by Botanick writers in their Herbals. . . . [I]n writing a History of Diseases, every Philosophical Hypothesis that has . . . inveighed the Writers Mind, ought to be set aside, and then the clear and natural Phaenomena of Diseases, how small soever they are, should be exactly marked, as Painters express the smallest Spots or Moles in the Face. . . . It is necessary in describing any Disease to mention the peculiar and perpetual Phaenomena apart from those which are accidental and adventitious. . . . Lastly, the Seasons of the Year, which chiefly favour any kind of Diseases, are carefully to be observed.[40]

Such a natural historical approach had great utility "with respect to practice," especially "in comparison wherewith the nice Discourses, which nauseously stuff the Books of modern Authors are of no value."[41]

For a generation or more Sydenham's "clinical" teachings became the foremost example for many physicians of how to establish a new certainty in physic in both its principles and its therapies, based upon the application of natural historical methods. Many of Sydenham's followers stressed the "practical" knowledge of diseases and remedies following upon natural history over the study of natural philosophy. For instance, John Pechy, the translator of Sydenham's works, made several typical comments in the preface to one of his own books intended for practical physicians. "Romancing on the Nature or the Causes of Diseases" has obstructed the art of physic, "so that in some [authors] scarce a Page can be spared for the Cure, that which is the main of the Business being huddled up or touch'd on by the by."[42] That is, natural philosophy and its attendant dietetics were not the point of the "art of physic"; curing specific diseases was.

Another translator of Sydenham, William Salmon, argued that while some authors divided physic into five parts (physiology, pathology, se-

39. Thomas Sydenham, *The Whole Works of that Excellent Practical Physician Dr. Thomas Sydenham*, John Pechy (trans.) (London, 1696) sig. Av.
40. Sydenham, ibid., sigs, A2-A2v. 41. Sydenham, ibid., sig. A3.
42. John Pechy, *The Store-house of physical practice* (London, 1695) sig. A2.

miotics, hygiene, and therapy), he preferred a division into three parts: physiology, pathology, and therapy. That is, semiotics and hygiene were of no use to the modern "practical" physician who simply wanted to cure diseases. As Salmon went on to explain, the practical physician had to know a bit of physiology (in which category of natural knowledge he included not any theory but rather a bit of human anatomy and a greater knowledge of *materia medica,* the preparation of medicines, and pharmacology), and a lot more about specific diseases and therapies.[43] While the books of Pechy and Salmon were not intended for academic audiences, similar changes in the direction of natural history rather than natural philosophy are seen even in contemporary Latin texts rooted in the scholastic tradition of Avicenna. One such text, the *Fundamenta medicinae physico-anatomica,* had its origin in the curriculum of Louvain university.[44] Originally written by François van den Zype, or Zypaeus,[45] and first published in 1683,[46] it was altered and republished in London by Joannes Groenevelt.[47] So successful was this introduction to the science of physic that it had two entirely separate English translations in the eighteenth century.[48] As the second English translator put

43. John Dolaeus, *Systema Medicinale, A Compleat System of Physick, Theoretical and Practical,* William Salmon (tr.) (London, 1686): Salmon's preface.

44. The seventeenth-century medical statutes of Louvain required the teaching of the five medical institutes "iuxta seriem doctrinarum Avicennae": L. van der Essen, *L'Universite de Louvain (1425–1940)* (Bruxelles: Editions Universitaires, 1945), pp. 253–54.

45. On Zypaeus, a teacher at Louvain, see Joannis Jacobi Mangeti, *Bibliotheca Scriptoribus Medicorum Veterum et Recentiorum* (Geneva: Perachon & Cramer, 1731), vol. 2, p. 699; CC. Broeckx, *Essai sur l'Histoire de la Medicine Belge Avant le XIX siecle* (Zaventem: Sequoia, 1981), pp. 114–15.

46. Francois Zypaeus, *Fundamenta medicinae physico-anatomica* (Brussels, 1683); his *Fundamenta* was republished at Brussels in 1687 and 1693, went through a fourth edition at Lyons in 1692, and yet a fifth (at Brussels) in 1737.

47. Johannes Groenevelt, *Fundamenta Medicinae Scriptoribus, tam inter Antiquos quam Recentiores, Praestantioribus deprompta, Quorum Nomina Pagina sequens exhibet* (London, 1714); *The Grounds of Physick, Containing so much of Philosophy, Anatomy, Chimistry, and the Mechanical Construction of the Humane Body, as is necessary to the Accemplishment of a Physitian: with the Method of Practice in Common Distempers* (London, 1715); and *Fundamenta Medicinae Scriptoribus . . . editio noviss* (Venetiis, 1743). A comparision of the versions of Zypaeus and Groenevelt shows that Groenevelt introduced only a few significant changes in the course of making Zypaeus's discourse into a dialogue between a teacher and pupil; but for the sake of brevity, what follows is from the 1753 translation of the second Groenevelt edition (see next note).

48. Johannes Groenevelt, *Fundamenta medicinae Scriptoribus, Tam inter Antiquos quam Recentiores, Praestantioribus . . . Secundum Dictata D. Zypaei, M.D. et Medicinae Professoris Eruditissimi in Academia Lutetiana.* Editio Seconda (London, 1715); *The Rudiments of Physick Clearly and Accurately Describ'd and Explain'd, in the most easy and familiar Manner, by Way of Dialogues between a Physician and his Pupil . . . First collected from the instructions of a celebrated Professor of Medicine in the Royal Academy of Paris: And since Improv'd from the Authors, Ancient and Modern by John Groenevelt* (Sherborne and London, 1753). The fact that the second translation was done without apparent knowledge of the first suggests

it, "Dr. Groenvelt by a most happy Genius, has contracted the whole Substance of Physick into so small a Compendium, that he hath rendered the Study of it both easy and pleasant." In doing so, he had written something far more than a book of medical receipts. It was because the book introduced the student of medicine to theory that "there has been nothing yet of this kind in our language."[49]

On a basic point, Avicenna and the *Fundamenta* are in complete agreement: both argued that the end of physic was two-fold. To quote the author of the seventeenth century text: "Physick is the Art of preserving Health, and restoring it, when lost; or it is that Science . . . by the knowledge of which Life and Health are preserved, or lost Heath Restored."[50] But in other respects, the *Fundamenta* differs from Avicenna. In the first place, like many of the textbooks of the seventeenth century, in place of what Avicenna had called *theoria* it put the "Institutes," or the five parts of what had been *practica*.[51] That is, what had been "theory" (the description of the elements, qualities, four causes, form and matter, naturals, non-naturals, and contra-naturals) is jettisoned after a few general remarks, while the parts of scholastic medicine that had been "practice" become the new "theory." As the translator explained, all the "Systems" of the ancients were "rigidly accomodated to the particular Problems of Philosophy then in Vogue," problems that were of no concern to modern readers.[52] Groenevelt wrote that previous doctrine had been changed by a revival of "the Doctrine of Hippocrates . . . in the Academies of France,[53] [and] by the Experiments of the Chymists." Physic was further "improved with the greatest Pains, by Observations made in Mechanics, Natural Philosophy, and Chymistry, without Regard to any particular Sect."[54]

But this generous and eclectic view meant that no particular theory on the frame of nature was offered. Instead, Groenevelt immediately remarked that the art of physic is acquired by means of "Observation and Reasoning." Observation must be of "all Things in the human

---

the continuing value of the Latin edition and the disappearance of the first English translation into private hands.

49. Groenevelt, *Rudiments of Physick*, 1753, pp. vii, viii.

50. Ibid., p. 17.

51. The five institutes were ordinarily taken to be physiology (which included a discussion of the elements), hygiene, pathology, semiotics, and therapeutics: Siraisi, *Avicenna In Renaissance Italy;* Avicenna, *Canon*, p. 101.

52. Groenevelt, *Rudiments of Physick*, 1753, p. vi.

53. See I. M. Lonie, "The 'Paris Hippocratics': Teaching and Research in Paris in the Second Half of the Sixteenth Century," in A. Wear, R. K. French, and I. M. Lonie (eds.), *The Medical Renaissance of the Sixteenth Century* (Cambridge: Cambridge University Press, 1985), pp. 155–74, 318–26.

54. Groenevelt, *Rudiments of Physick*, 1753, pp. 22–23.

Body, either well, sick, dying, or dead," while reasoning is "an accurate Observation, by which those Things which pass in the human Body, unobservable by the Senses, are discovered and demonstrated."[55] Such a view of observation and reasoning is only very slightly more "rational" than the less academic views of Pechy and Salmon. Observation and "experience" provide a foundation for practice; physic is now rooted not in philosophical principles but in natural historical investigation. Instead of philosophy, then, the book began with a discussion of the five institutes, which had been Avicenna's *practica.*

Then, where Avicenna had placed *practica,* Groenevelt moved immediately to a description of various therapies, which Avicenna had not considered part of the science but the art of physic.[56] In other words, the new academic account of learned medicine dropped any discussion of foundational natural philosophy (the old "theory"), began with what had been the old "practice" (the five institutes), and elevated the knowledge of the empirical details of disease and drug lore to the rank of *practica.* The principles by which one could preserve health (the old *practica*) had become the new *theoria,* while mere empirical details of therapy had become the new *practica:* a division of theory and practice more like that we would expect today.

Apparently, then, even academic textbooks were beginning to treat physic more like medicine. Academic physic still placed weight on *theoria,* for the five institutes remained as subjects to be mastered by study and discourse. Among the five institutes, hygiene (understanding how one should live in order to prevent illness) still preceded therapy. But such doubt had been cast on the principles of natural philosophy that they were no longer taught as the necessary propaedeutic to understanding that part of nature concerning the physician. The five institutes remained the last bastion of scholastic *theoria* in physic. More and more, even universities began to teach what Avicenna had considered to be the art of medicine rather than the science of physic, the knowledge derived from experience rather than the philosophical search for causes that had formerly carried the presumption of certainty, an experience oriented far more toward therapeutic management than preventive advice.

The attack on physic by nonacademic practitioners clearly picked out

55. Ibid., pp. 22–23.

56. Siraisi finds Santorio Santorio asserting in 1625 that the task of the medicus "was not to treat individuals but to treat diseases; hence an effective medicine should be understood as one that cured the same disease in any number of people, an idea that gave therapy a universal [and hence "scientific"] aspect" (Siraisi, *Avicenna in Renaissance Italy,* p. 237).

preventive physic as the last place where theory was still supposed to give the learned physician an advantage over his rivals. These "practical" men stressed, instead, the importance of an experienced mastery of the details of medical therapy alone. One author simply stated that "Preventive Physick [is] a cheat, and a trick to get Money by."[57] Another argued that according to the new manner, medicine was divided into two parts; but instead of *theoria* and *practica,* both of which are to be mastered by study, he divided medicine into the prophylactical and the therapeutical. While prophylaxis, which depended on dietetics, might "in theory" prevent disease, "in practice" regulating dietetics exactly enough to prevent disease was impossible, he wrote. Therefore, this author's first chapters were devoted to a criticism of five of the six non-naturals (all except exercise); the rest of the book argued that disease was caused by an improper fermentation of the blood, and that the author had two sovereign remedies to promote fermentation, red coral and steel. He ended with this advertisement: "The true prepared coral and sugar of steel to be sold by Mr. Nathaniel Brook at the Angel in Cornhil and Mr. Simon Miller, Stationer, at the Star and Bible at the West end of St. Paul's Church."[58] The match between contemporary medical "empiricism" as both an attack on the last vestiges of academic physic (an understanding of individual hygiene via the non-naturals) and salesmanship for specific drugs could hardly be clearer.

Most seventeenth-century medical books in vernacular English stressed therapy, especially a knowledge of curative remedies. A great many of them, Pechy's and Salmon's included, also promoted the skills or the remedies of the practitioner who published the book. The intellectual assault of the new philosophy on scholasticism gave them added cachet: like Sydenham, many took to quoting from Bacon or Boyle.[59] The nonacademic authors tended to stress the empirical details of curative therapies, most commonly the drugs that they recommended. While regimen remained an important element in one important vernacular genre,[60] in it the new advice about regimen was good for everyone rather than tailored for the individual's unique temperament. The

57. Robert Godfrey, *Various injuries and abuses in chymical and Galenical physick; committed both by physicians and apothecaries detected* (London, 1674), p. 199.

58. Richard Browne, *Coral and Steel: A most Compendious Method of Preserving and Restoring Health. Or, a Rational Discourse, grounded upon Experience* (London, 1660).

59. For example, see Marchamont Nedham, *Medela Medicina. A Plea for the free Profession, and a Renovation of the Art of Physick* (London, 1665).

60. Virginia Smith, "Physical Puritanism and Sanitary Science: Material and Immaterial Beliefs in Popular Physiology, 1650–1840," in W. F. Bynum and R. Porter (eds.), *Medical Fringe and Medical Orthodoxy 1750–1850,* (London: Croom Hel, 1987), pp. 174–97.

older connection between the universals of nature and the particulars of the specific constitution were not necessary anymore, because the rules were general enough to apply to everyone.

In this new medical literature, unlike the literature on physic, the authors tried to derive universal principles from the groundwork of their experiences. The empirical "facts" had become more certain than the principles of natural philosophy—hence the privileged place of the natural historical method among many physicians. Only a well-prepared and knowing mind could discern the true from the untrue "fact," the natural historians argued; only they could derive useful rules for treatment.

3. CONCLUSION

By the end of the seventeenth century, then, the attack on learned physic had succeeded almost entirely. The foundational principles of natural philosophy ("physical" *theoria*) from which scholastics could derive rules for understanding individual cases (*practica*) had been dropped. Even the last vestiges of academic learning in physic, the rules of individualistic hygiene, were under attack from those who privileged experience-derived medical therapy. As physic declined, the clinic, where medicine could be learned through experience, became essential to the training of medical practitioners. Even studying books could help the educated physician, not by supplying philosophical certainty, but by supplying examples of previous cases, by extending the learned man's clinical experience.[61] Physic had become something more like our medicine.

Viewed through the eyes of the university-educated physicians, then, there was indeed something that approaches a "scientific revolution" in the early modern period—although it occurred over a long period. That fundamental change was connected to the rising importance placed by physicians on the experience of nature rather than on its universal principles: on natural history rather than natural philosophy. The scientific revolution occurred not so much in the details of natural history or natural philosophy (however important these precise changes were) but in a reordering of intellectual values. The revolution came in giving primary intellectual value to those things that had formerly been valued less. Whereas in the scholastic tradition certainty had been found in the principles of philosophy, in the natural historical

61. For example, see John Freind, *The History of Physic* 1 (London, 1725), pp. 309–10.

tradition certainty was found in the investigation of the "facts" of nature. In physic, certainty no longer stemmed from the study of natural philosophy but from the study of what had been "practice"—even, for some people, in the study of therapy alone.

The significance of this transformation in the categories of medical knowledge is fundamental to understanding the transformations wrought in physic by the "new" philosophy. The new philosophy was new because it tended to place a knowledge of natural history (or "practice") close to the top of the hierarchy of knowledge, and in so doing, shifted the content of the established meanings of "theory" and "practice" to those that we are more comfortable with today. Thus, the new philosophy did not emphasize mere empiricism; it rather emphasized the ability to engage in what the scholastics had called "practice," that is, the ability to connect universal and particular; but when universals were in doubt (as they were), they had to be derived from the particulars, not vice versa. The point is that, by emphasizing the "natural historical," "practical," or "art" at the expense of the "natural philosophical," "theoretical," or "science," the new philosopher-physicians helped cascade the knowledge of physic down the ladder of certainty, with things of formerly less intellectual value becoming more important. Physic was becoming medicine.

The natural historical endeavors of the physicians, then, do not arise simply out of the botanical interests of people who still found medicaments in plants; they reflect a larger shift in intellectual values, a shift that had implications of great magnitude. Much of the new philosophy, we might say, had to do with paying closer attention to natural historical details, for the sake of edification as well as for utility. While some physicians encouraged these endeavors, they did so, not so much because there was a necessary connection between curing and collecting, but because they responded to the changing intellectual climate: they responded to the growing search for certainty in natural events rather than in philosophical principles. Perhaps we should not separate their natural historical efforts from the new philosophy as a whole.