

The History of Medicine and the Scientific Revolution

*By Harold J. Cook**

ABSTRACT

The “new philosophy” of the seventeenth century has continued to be explained mainly on its own terms: as a major philosophical turn. Twentieth-century modernism gave pride of place to big ideas and reinforced the tendency to explain the rise of science in light of new ideas. Such orientations subordinated medicine (and technology) to sciences that appeared to be more theoretical. In attempts to persuade historians of science of the importance of medicine, then, many authors took an approach arguing that the major changes in the history of medicine during the so-called scientific revolution arose from philosophical commitments. Yet because medicine is also intimately connected to other aspects of life, its histories proved to be recalcitrant to such reductions and so continue to offer many possibilities for those who seek fresh means to address histories of body and mind united rather than divided.

EVER SINCE THE SEVENTEENTH CENTURY, there have been debates about the relationships between medicine and the “new philosophy.” For most of the twentieth century, academic historians of medicine and of science agreed that the development of scientific concepts in early modern Europe affected medicine, but not the other way around. That is, twentieth-century modernism privileged big ideas and grand theories, making understanding the development of concepts the chief aim of historians. There was also a general consensus about which people and subjects required discussion in accounting for the rise of science, with Paracelsus, Vesalius, and Harvey representing the main topics within medicine: iatrochemistry, anatomy, and physiology. Though some historians of medicine pursued other agendas, including the social history of medicine, their impact on studies of the scientific revolution was limited. That seems to be changing, although only time will tell whether an important shift in relationships has occurred.

The twentieth century’s aesthetic modernism promoted a version of rationalism that saw radically simple concepts as fundamental in changing the conditions of human life. That belief was expressed most clearly in the fine and applied arts, but it also had a

* Department of History, Brown University, Providence, Rhode Island 02912; Harold_Cook@Brown.edu.

prominent place in many fields of academic study.¹ Between the wars, Gestalt psychology, art history, linguistics, ethnography, and many other disciplines were arguing that human beings interpret the world in ways that begin with conceptual expectations. Modernism found its scientific touchstone in Albert Einstein's general relativity theory, first published in German in 1915, which seemed to have arisen from thought experiments alone. When its chief British advocate, Arthur Eddington, announced confirmation of the theory at a meeting of the Royal Society on 6 November 1919, the London *Times* proclaimed a "scientific revolution" (apparently the first use of the term), and Einstein quickly became a popular hero. The myth of the scientific genius as like the artistic genius, gaining fundamental new insights from deep thought rather than labors in the field, collections, and laboratories, became widespread. For the mathematician-turned-philosopher Alfred North Whitehead, who had attended Eddington's lecture, the historical lesson was that past (materialistic) science was not like modernist (philosophical) science. Whitehead argued that while earlier science "never cared to justify its faith or to explain its meanings," in the modern age "if science is not to degenerate into a medley of *ad hoc* hypotheses, it must become philosophical."²

For a new group of historians of science, this involved reinterpreting early modern history not as part of a positivist progression, but as a conceptual revolution. An American, E. A. Burtt, who began by studying theology, wrote about a "metaphysical" revolution in the early modern period; so did a Dutch mathematician, E. J. Dijksterhuis; and one can easily identify similar arguments by authors in Britain, Poland, Germany, Italy, and elsewhere.³ Such an agenda lay behind a proliferation of conceptual "revolutions" laid out in the mid-twentieth century, not only in the revolution in physics associated with Einstein but in the chemical revolution of Lavoisier, the biological revolution of Darwin, and so on.

Unfortunately for the history of medicine, such modernist premises diverted attention away from "applied" subjects. For instance, A. Rupert Hall, one of the senior post-World War II historians of the scientific revolution, thought that medicine and natural history were pursued by medical people according to the unscientific methods of empiricism and trial and error. For Charles Gillispie in 1960, "Despite the very evident appeal of Vesalius' subject, or perhaps because of it, his achievements were of a lower intellectual order than those of Copernicus or Galileo. His were not the ideas which changed man's conception of the world."⁴ For the new history of science, then, even major discoveries about the body were nonscientific because they led to no new fundamental concepts.

Given the prestige of scientific modernism, the response of many midcentury historians of medicine was to look for the origins of scientific medicine in a new philosophy. Walter

¹ See Lawrence S. Rainey and Robert Von Hallberg, "Editorial/Introduction," *Modernism/Modernity*, 1994, 1:13.

² Alfred North Whitehead, *Science and the Modern World* (1926; Cambridge: Cambridge Univ. Press, 1927), pp. 20, 21–22. On the importance of British science in creating the Einstein legend see Alastair Sponsel, "Constructing a 'Revolution in Science': The Campaign to Promote a Favourable Reception for the 1919 Solar Eclipse Experiments," *British Journal for the History of Science*, 2002, 35:439–467.

³ Edwin Arthur Burtt, *The Metaphysical Foundations of Modern Physical Science* (1924; Garden City, N.Y.: Doubleday Anchor, 1954). Eduard Jan Dijksterhuis published articles in the 1920s that were elaborated in his book of 1950; it was translated into English as *The Mechanization of the World Picture: Pythagoras to Newton*, trans. C. Dikshoorn (1961; Princeton, N.J.: Princeton Univ. Press, 1989).

⁴ A. Rupert Hall, *The Scientific Revolution, 1500–1800: The Formation of the Modern Scientific Attitude* (London: Longmans, 1954), e.g., p. 289; and Charles C. Gillispie, *The Edge of Objectivity: An Essay in the History of Scientific Ideas* (Princeton, N.J.: Princeton Univ. Press, 1960), p. 57.

Pagel, a doctor who emigrated to England in 1933, provided an example for many. He drew on his excellent classical education and his private collection of books to elucidate the philosophical foundations of physician-scientists of the seventeenth century. In keeping with the midcentury interest in metaphysics and mysticism, he used his work on Jan Baptiste van Helmont to explore the religious motivations for the “medical biology” of the seventeenth century; he made Paracelsus into a philosopher; perhaps most significantly, he turned William Harvey from an experimenter and pragmatist concerned only with scientific observation into a deeply committed Aristotelian. Such work also made Pagel’s brand of the history of medicine acceptable to historians and philosophers of science: Hall, for example, accordingly somewhat revised his opinion of selected medically related subjects in a later version of his survey of the scientific revolution.⁵

There were of course authors who objected to the supposedly fundamental role of philosophy for modern science—not only some historians of medicine and now old-fashioned positivists, but also Marxists, Christian socialists, and others committed to social movements.⁶ Equally, the history of medicine as an independent professional field, while not neglecting “philosophies,” was also shaped by a concern for a healthier society. Several German medical historians who had escaped the rise of Nazism by settling in the United States, most notably Erwin Ackerknecht, Ludwig Edelstein, Owsei Temkin, and, above all, Henry Sigerist, the director of the Johns Hopkins Institute for the History of Medicine from 1932, continued to note how social, political, and natural environments, as well as diagnosis, treatment, and prevention, affected medical ideas, which were in turn in the service of larger ends.

During the Cold War, horizons narrowed. The new subject of the “history and philosophy of science,” led in the United States by Alexandre Koyré and in Britain by Herbert Butterfield, rallied around the modernist, conceptualist ideal, which saw itself in contradistinction to a politicized Marxist science; with the departure of Sigerist from the United States and other changes within the history of medicine, that field tended to follow the conceptualist track as well.⁷ While a new generation in the 1960s began to develop new approaches to the causes of conceptual change, the explanandum continued to be framed by the history of philosophy. Even Charles Webster’s important *Great Instauration*, which fought hard against anachronism and reductionism and owed much to the tradition of British Marxism, opened with the familiar assertion that “it is not an exaggeration to claim that between 1626 and 1660, a philosophical revolution was accomplished in England”—though Webster allowed that the explanation called for uncovering “the conceptual

⁵ Walter Pagel, “Religious Motives in the Medical Biology of the Seventeenth Century,” *Bulletin of the History of Medicine*, 1935, 3:97–128, 213–231, 265–312; Pagel, *Paracelsus: An Introduction to Philosophical Medicine in the Era of the Renaissance* (New York: Karger, 1958); Pagel, *William Harvey’s Biological Ideas: Selected Aspects and Historical Background* (New York: Hafner, 1967); Pagel, “William Harvey Revisited,” *History of Science*, 1969, 8:1–29, 1970, 9:1–41; and A. Rupert Hall, *The Revolution in Science, 1500–1750* (London: Longmans, 1983).

⁶ Gary Werskey, *The Visible College: A Collective Biography of British Scientists and Socialists of the 1930s* (London: Lane, 1978).

⁷ See, e.g., Michael Aaron Dennis, “Historiography of Science: An American Perspective,” in *Companion to Science in the Twentieth Century*, ed. John Krige and Dominique Pestre (New York: Taylor & Francis, 2002); A. Rupert Hall, “On Whiggism,” *Hist. Sci.*, 1983, 21:45–59; and, more generally, Peter Novick, *That Noble Dream: The “Objectivity Question” and the American Historical Profession* (Cambridge: Cambridge Univ. Press, 1988). For history of medicine see Frank Huisman and John Harley Warner, eds., *Locating Medical History: The Stories and Their Meanings* (Baltimore: Johns Hopkins Univ. Press, 2004).

framework of economic, social, political and religious ideas” during the “Puritan Revolution.”⁸

The development during the 1970s of what came to be called the social history of medicine, however, reasserted the importance of studying the history of medicine on its own, independent terms—and in relation to social betterment. Some exponents came from demography, sociology and social medicine, and similar fields, while some were also historians of science.⁹ Stimulated by the new social history of the day, two collections of essays in American medicine asserted that medical change was the outgrowth of social rather than intellectual change. A pioneering study on early modern English medical practitioners by Margaret Pelling and Charles Webster appeared at about the same time. Another British version explored the relationship between political transformation and the emergence of a consumer economy in the eighteenth century and fostered a growing concern for events and persons as evidence of historical contingency. Roy Porter soon became the best-known voice for this line of argument, especially for further advancing the importance of patients and commerce in promoting eighteenth-century medical practices and ideas. He drew on the “history from below” school inspired by E. P. Thompson, but also on the innovative approach to patient patronage by a Marxist medical sociologist, N. D. Jewson.¹⁰ For the most part, though, such developments were little noticed in accounts of the scientific revolution by historians and philosophers of science.

New Left critiques of medicine, however, made its history attractive in ways that also had implications for arguments about the development of the new science. Intellectual activists such as Thomas Szasz, Michel Foucault, and Ivan Illich found psychiatry and medicine to be rich subjects for exploring and critiquing the relationships between knowledge and power, using the word “medicalization” to indicate the means by which official experts came to dominate modern self-consciousness. Moreover, the so-called *Annales* school (named after the journal *Annales: Économies, Sociétés, Civilisations*) came to be especially well regarded in the 1970s, not only for developing and exploring quantitative data such as population figures and disease statistics in innovative ways, but for making good use of anthropological views of “culture.” These scholars popularized the term “*mentalité*,” to indicate unspoken habits of thought that were rooted in ways of life rather than in learned discussions. *Mentalité* provided a tool for integrating socioeconomic and intellectual history, including the ways in which “popular culture” could shape learned cultures. Jean-Pierre Goubert’s study of medicine in Brittany before the French Revolution drew on *Annales* methods, and Michael MacDonald’s ground-breaking study of madness in early modern England, *Mystical Bedlam*, combined that orientation with a critical approach to psychiatry and expertise. Working in a social history of medicine

⁸ Charles Webster, *The Great Instauration: Science, Medicine, and Reform, 1626–1660* (New York: Holmes & Meier, 1976), pp. xiii, xiv.

⁹ An interdisciplinary group dominated the early leadership of the Society for the Social History of Medicine, inaugurated in 1970.

¹⁰ Judith Walzer Leavitt and Ronald L. Numbers, eds., *Sickness and Health in America: Readings in the History of Medicine and Public Health* (Madison/London: Univ. Wisconsin Press, 1978); Susan Reverby and David Rosner, eds., *Health Care in America: Essays in Social History* (Philadelphia: Temple Univ. Press, 1979); Margaret Pelling and Charles Webster, “Medical Practitioners,” in *Health, Medicine, and Mortality in the Sixteenth Century*, ed. Webster (Cambridge: Cambridge Univ. Press, 1979), pp. 165–235; Roy Porter, “The Patient’s View: Doing Medical History from Below,” *Theory and Society*, 1985, 14:175–198 (one much-cited example of his work); E. P. Thompson, *The Making of the English Working Class* (New York: Random House, 1966); and N. D. Jewson, “Medical Knowledge and the Patronage System in Eighteenth-Century England,” *Sociology*, 1974, 8:369–385.

tradition but inspired by Foucault, Mary Fissell found that the eighteenth-century medicalization of some institutions for the poor—the hospitals—showed both growing social differentiation and the power of certain kinds of knowledge/practice.¹¹

Given the explosion of such new approaches to the history of medicine in the 1970s, it became possible to craft new examinations of the so-called scientific revolution as seen through the medical milieu. It became more common to note that early modern physicians lived among a myriad of kinds of medical practitioners, from occasional assistants to part-time and traditional healers to those who lived from the monetary economy by selling their medicine and services—and these latter took the form of itinerant empirics to members of corporate bodies such as apothecaries and surgeons, as well as physicians. The published “ideas” of physicians therefore responded to their contexts. My own studies led me to conclude that the holistic medical ideas of the learned physicians, best exemplified in their individualistic advice about preventative and therapeutic regimen, were challenged by the more experiential and particularistic claims to expertise offered by empirics and those practitioners—some of them also physicians—who thought that a grasp of the material details of nature would benefit their patients. “Philosophical” debates about medical knowledge were therefore taken very seriously because they both shaped and responded to the medical market. But the most deeply felt general concerns had to do with the nature of the sources of evidence as applied to particular ends—especially experience versus study—rather than with corpuscularianism, atomism, Cartesianism, or other “theories.”¹² Examples of other such studies were Katharine Park’s explorations of the relationships between medical practitioners and intellectual life in Renaissance Florence and Lawrence Brockliss and Colin Jones’s magnificent study of medicine in early modern France that integrated social and intellectual analysis through the use of terms like “core” and “penumbra.” Such works made it apparent that medical practitioners and their patients, and medical interests more generally, did not simply illustrate the debates about the new science but determined many of them. Even so, one of the leading authorities on the scientific revolution could still express surprise at finding a very great proportion of early modern “scientists” having medical and other practical occupations.¹³

Since the mid-1980s, historians of science, too, have undergone many changes, most importantly in often considering their subject to be a set of activities—of practices—rather than a set of concepts. Sociologists of science who developed historical interests, especially those of the Edinburgh and Bath schools, highlighted the many ways in which

¹¹ Thomas S. Szasz, *The Myth of Mental Illness: Foundations of a Theory of Personal Conduct* (New York: Hoeber-Harper, 1961); Michel Foucault, *The Birth of the Clinic: An Archaeology of Medical Perception*, trans. A. M. Sheridan Smith (New York: Vintage, 1973) (the original French edition appeared in 1963); Ivan Illich, *Medical Nemeses: The Expropriation of Health* (New York: Pantheon, 1976); Jean-Pierre Goubert, *Malades et médecins en Bretagne, 1770–1790* (Paris: Klincksieck, 1974); Michael MacDonald, *Mystical Bedlam: Madness, Anxiety, and Healing in Seventeenth-Century England* (Cambridge: Cambridge Univ. Press, 1981); and Mary E. Fissell, *Patients, Power, and the Poor in Eighteenth-Century Bristol* (Cambridge: Cambridge Univ. Press, 1991).

¹² See, e.g., Harold J. Cook, *The Decline of the Old Medical Regime in Stuart London* (Ithaca, N.Y.: Cornell Univ. Press, 1986); and Cook, “The New Philosophy and Medicine in Seventeenth-Century England,” in *Reappraisals of the Scientific Revolution*, ed. David C. Lindberg and Robert S. Westman (Cambridge: Cambridge Univ. Press, 1990), pp. 397–436.

¹³ Katharine Park, *Doctors and Medicine in Early Renaissance Florence* (Princeton, N.J.: Princeton Univ. Press, 1985) (for an earlier period see Nancy G. Siraisi, *Taddeo Alderotti and His Pupils: Two Generations of Italian Medical Learning* [Princeton, N.J.: Princeton Univ. Press, 1981]); Laurence Brockliss and Colin Jones, *The Medical World of Early Modern France* (Oxford: Clarendon, 1997); and Richard S. Westfall, “Science and Technology during the Scientific Revolution: An Empirical Approach,” in *Renaissance and Revolution: Humanists, Scholars, Craftsmen, and Natural Philosophers in Early Modern Europe*, ed. J. V. Field and Frank A. J. L. James (Cambridge: Cambridge Univ. Press, 1993), pp. 63–72.

scientific knowledge was constructed without assuming that it was due to a simple congruence with a “natural” world “out there.” Most importantly for early modern science, the many studies of Steven Shapin stressed the ways in which local actors built up trust among one another so as to come to agreement about what “really” happened in experimental activities.¹⁴ Such literature renewed an interest in investigative activities rather than contemplation, so making Robert Boyle more studied than Isaac Newton, for example.¹⁵ At the same time, a new kind of ethnography of scientific practice associated with the writings of Bruno Latour emerged that considered scientific facts (as well as theories and communities) to be constructed as networks.¹⁶

But exciting as such work was for changing the discussion about the causalities of the development of knowledge, it little altered the main narrative lines of the scientific revolution inherited from the aesthetic modernists, which continued to give only minor attention to medicine (or technology).¹⁷ And while practitioners of the social history of medicine sometimes drew on ideas from the constructivists to help make points about medical knowledge, the early modernists, at least, continued to take more interest in how communities of patients and practitioners shared assumptions and expectations than in how social interactions created new concepts. In their work, the word “culture” came to carry more weight than “society,” while the need to make a living from medical practice grew in causal significance.¹⁸

Perhaps both the modernism of the twentieth century that emphasized grand ideas and the postmodernism that attacked its causalities but remained focused on mental outlooks are now waning. New frameworks may be emerging in which historians of science and historians of medicine are both looking for fresh descriptions of what changed as well as fresh analytical methods of understanding the sources of change.¹⁹

¹⁴ See, e.g., Steven Shapin and Simon Schaffer, *Leviathan and the Air-Pump: Hobbes, Boyle, and the Experimental Life* (Princeton, N.J.: Princeton Univ. Press, 1986); and Shapin, *A Social History of Truth: Civility and Science in Seventeenth-Century England* (Chicago: Univ. Chicago Press, 1994).

¹⁵ But also see the many careful studies of Boyle by Michael Hunter and his colleagues, which did consider medical interests, as in Michael Hunter, “Boyle versus the Galenists: A Suppressed Critique of Seventeenth-Century Medical Practice and Its Significance,” *Medical History*, 1997, 41:322–361.

¹⁶ Bruno Latour and Steve Woolgar, *Laboratory Life: The Construction of Scientific Facts* (Princeton, N.J.: Princeton Univ. Press, 1986); this volume was first published in 1979 with the subtitle “The Social Construction of Scientific Facts.” For an overview see Jan Golinski, *Making Natural Knowledge: Constructivism and the History of Science* (Cambridge: Cambridge Univ. Press, 1998).

¹⁷ See, e.g., Steven Shapin, *The Scientific Revolution* (Chicago: Univ. Chicago Press, 1996); James R. Jacob, *The Scientific Revolution: Aspirations and Achievements, 1500–1700* (Atlantic Highlands, N.J.: Humanities, 1998); Peter Dear, *Revolutionizing the Sciences: European Knowledge and Its Ambitions, 1500–1700* (Basingstoke, Hampshire: Palgrave, 2001); and John Henry, *The Scientific Revolution and the Origins of Modern Science* (1997; Basingstoke, Hampshire: Palgrave, 2002). A recent authoritative volume on the current state of the field contains several essays on mathematics, and several innovative studies of scientific culture, but only one piece on medicine: Katharine Park and Lorraine Daston, eds., *Early Modern Science* (Cambridge History of Science, 3) (Cambridge: Cambridge Univ. Press, 2006). For an alternative see Lisa Jardine, *Ingenious Pursuits: Building the Scientific Revolution* (New York: Doubleday, 1999).

¹⁸ See, e.g., Sandra Cavallo, *Charity and Power in Early Modern Italy: Benefactors and Their Motives in Turin, 1541–1789* (Cambridge: Cambridge Univ. Press, 1995); David Gentilcore, *Medical Charlatanism in Early Modern Italy* (Oxford: Oxford Univ. Press, 2006); Mary Lindemann, *Health and Healing in Eighteenth-Century Germany* (Baltimore: Johns Hopkins Univ. Press, 1996); and Gianna Pomata, *Contracting a Cure: Patients, Healers, and the Law in Early Modern Bologna* (Baltimore: Johns Hopkins Univ. Press, 1998). For recent reflections on the “medical marketplace” see Mark S. R. Jenner and Patrick Wallis, eds., *Medicine and the Market in England and Its Colonies, c. 1450–c. 1850* (Basingstoke, Hampshire: Palgrave Macmillan, 2007).

¹⁹ For instance, the concern for accurate information that was considered a critical innovation by early modern people themselves expressed itself in Hippocritism and the publication of medical “observations”; see Gianna Pomata and Nancy G. Siraisi, eds., *Historia: Empiricism and Erudition in Early Modern Europe* (Cambridge, Mass.: MIT Press, 2005).

Another move has been to examine the history of emotions rather than reason.²⁰ At the same time, the decentering of stories about “the rise of the West”—in which science and scientific medicine have had a very important place—poses yet new challenges. While we have learned an enormous amount about how local cultures shaped medicine, there is now a growing desire to discern the relationships among local knowledges and how best to understand the apparent universalism of scientific knowledge.²¹ In recent interactionist accounts, many authors seem to be trying to find new methods of analysis that accept multiple causalities and in which material interests and institutional forms indicate channels of collective activity for certain kinds of people—channels that sometimes swell and even overflow and at other times may shrink and even dry up for reasons beyond the comprehension of any single actor. That a single and autonomous person’s intellectual brilliance can on its own change the world now seems a modernist fantasy, and that shared concepts are all down to “culture” seems a postmodernist version of idealism. The history of ideas is better relegated to but a chapter in the metaphorical book of the scientific revolution, for if science is no longer an autonomous topic of study, then the search for methods to improve material life and power, and to ameliorate human suffering, becomes a critical part of a re-envisioned landscape, affecting not only how we account for change but also what needs to be accounted for. The Galileos and Newtons, Van Helmonts and Harveys, are still there, but a new appreciation of the early modern ecology shows a complex and interdependent environment rather than the relations among a few of the larger animals alone.

The sources of the human spirit remain mysterious, but they deserve to be tracked through the thickets of embodied life rather than treated as if they exist apart from it. If the development of science and medicine (and technology) is not the result of conceptual breakthroughs but a matter of transformations intimately connected to other aspects of humanity, in many places, then these transformations need to be integrated into much larger accounts of the early modern period. Urban, economic, political, and military history may now be as necessary as the history of philosophy or religion—perhaps more necessary. So long as they continue to seek authentic modes of analysis, topics like the history of medicine, which attend to the interdependence of mind, body, and environment, will continue to throw much light onto obscure corners of the human condition.

²⁰ See, e.g., William M. Reddy, *The Navigation of Feeling: A Framework for the History of Emotions* (Cambridge: Cambridge Univ. Press, 2001).

²¹ These are problems that helped to frame my own *Matters of Exchange: Commerce, Medicine, and Science in the Dutch Golden Age* (New Haven, Conn.: Yale Univ. Press, 2007). See also the examples of James A. Secord, “Knowledge in Transit,” *Isis*, 2004, 95:654–672; and Simon Schaffer *et al.*, eds., *The Brokered World: Go-Betweens and Global Intelligence, 1770–1820* (Sagamore Beach, Mass.: Science History Publications, 2009).