


THE
SCIENTIFIC
METHOD

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The Man
or the Moment?

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NULAND

In a recent letter to the editor of *The New York Review of Books*, the eminent physicist and author Freeman Dyson was taken to task for his essay on a new biography of Isaac Newton. "Dyson unfortunately shows how little versed he is in scholarship on Newton," wrote the correspondent, a faculty member of the Division of Humanities and Social Sciences at the California Institute of Technology. The basis for this denunciation was Dyson's apparent failure to realize that "historical research requires deep understanding of very different technical issues of long-gone science, together with substantial knowledge of social and cultural circumstances of the period." Though the writer went on to accuse Dyson of specific factual errors, he seemed most exercised by what he considered his quarry's misunderstanding of the era in which Newton worked.

The letter made me chuckle, and I'm certain that it had a similar effect on many other observers of the decades-long conflict between the social historians of science and those who might be termed the technical historians. In the unlikely event that the characteristically unflappable Dyson felt any heat from his antagonist's discontent, he might enjoy knowing that the temperature is even higher among scholars who study the history of medicine.

Until some forty years ago, the technical historians of medicine dominated the field. They were almost all physicians, and hardly any of

them had even the most minimal training in the formal methods of historical scholarship. Their interest was in the landmark achievements of clinical and laboratory medicine, and in the lives of the men responsible for them. To their self-appointed

task they brought an expertise born of intensive medical training and extensive patient care. They focused only peripherally on wider historical currents. These doctors were, in the strictest sense of the word, amateurs. When they slipped away from their consulting rooms to dusty library stacks—or when they elected to forgo Caribbean vacations in favor of research trips to old hospitals in far-off countries—they did it for love of the grand tradition of their forebears, to which they considered themselves heir.

Things began to change in the 1950s, as the field of medical history became increasingly professionalized. After that time, the academic degree held by authors of scholarly articles was as likely to be Ph.D. as M.D., and before long the former predominated. Within twenty years, the majority of participants in the annual meeting of the American Association for the History of Medicine had earned doctorates in history. Among the most prominent were men and women who held both titles and had abandoned patient care to devote most or all of their time to historical studies.

With this shift came a change in focus from the technical and personal to the societal and cultural. No longer was it sufficient to investigate the exploration and the explorer; the intellectual atmosphere of an entire era was now scrutinized. Medical science was seen as the product less of individual genius than of the *Zeitgeist*. Discoverers were shaped by their times, not the reverse.

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The bedside doctors welcomed these new insights, but they were not happy to watch their perspectives being shoved aside by people with little or no clinical background. Though both medical doctors and social historians have something valid to say, the latter are currently in the ascendancy. The old-style physician-historians have been routed, and in the process, much has been lost.

By 1980, Leonard Wilson of the University of Minnesota, a Ph.D. and the editor of the *Journal of the History of Medicine and Allied Sciences*, warned of the consequences of a history grounded completely in cultural causes and dominated by scholars who "see little of the laboratory and less of the clinic." He said of such scholars: "They tend to neglect questions of clinical medicine, of the biology of disease, and of science, even when such questions had a direct bearing on the particular historical subject with which they are concerned. The result is incomplete and sometimes severely distorted history. . . . If such social history be considered medical history, . . . it is medical history without medicine." And one might add that it is medical history without the colorful characters who made it.

Beyond a doubt, there exists a cultural inevitability to scientific discovery. The sun would have been recognized as the center of our solar system whether or not Copernicus had lived, and probably soon after he published his monumental *De Revolutionibus Orbium Coelestium* in 1543; the debunking of the phlogiston theory was in the cards, and Lavoisier merely speeded the process; the discovery of the structure of DNA would have taken only a few more months had not Watson and Crick outsprinted everyone else to the finish line. In each case, the times were ready; the ambient culture and the state of contemporary science virtually ensured that these advances would occur, and fairly soon.

At least in medicine, the precedents were in place for every discovery by the time it was presented. Even the transcendent contributions of Harvey and Pasteur would have been made had those two brilliant men never been born, though they would have taken place

somewhat later. But they would have been made in a different way, usually as the result of a different process—because part of the process is the distinctive personality of the discoverer.

Far more often than most social historians are willing to admit, a discovery made at a particular time and place—and the form in which it is brought to the community of medical thinkers—is unique to the person who is responsible for it. Not only that, but it not uncommonly arises from the idiosyncrasies of that one individual, and may even be the expression of his or her personality, background, or personal situation. Similarly, when a contribution is not readily accepted, the failure can often be ascribed as much to the way the innovator has come to it and brought it to attention as to a cultural milieu not yet ready to embrace it. Of all that is "incomplete" and "severely distorted," and of all that is lost by the social historian's downplaying of individual effort in favor of surrounding influences, the one missing factor that most diminishes the ultimate narrative is the unique personality of the contributor, and the ways in which it plays into the process of discovery and the overall cavalcade of history.

Regardless of the surrounding culture, some scientists are aggressive while others are mild-mannered; some are resentful of authority while others do precisely what their teachers expect; some are intolerant of delay while others achieve their ends through patient persistence. These characteristics profoundly affect the nature and timing of landmarks in medicine. When Thomas Carlyle wrote that "history is the essence of innumerable biographies," he was referring specifically to the role of inimitable individuality in shaping the events of our world. Even today, when discoveries are often team efforts, it is ultimately the single observer or experimenter who must initiate the process of his or her own contribution to science. The fact that the same contribution would eventually have been made by someone else does not in the least vitiate the force of that truth.

Examples abound. Throughout the twenty-five-hundred-year history of Western scientific medicine, progress has repeatedly been

spurred or slowed by the personal behavior of an individual. Most prominent in this regard during the classical period was Galen of Pergamon, the second-century physician whose many public demonstrations of animal experimentation energized the doctors of his time and explained physiological phenomena previously obscured by a hodgepodge of spurious theories. So powerful was the effect of his research, his performances, and the many dozens of books he left to posterity that his influence towered over the meager efforts of his successors. But Galen was a vain, fiercely competitive self-promoter, driven as much by the search for eternal glory as by the search for knowledge. Summoning all the authority he had earned from his scientific and clinical contributions, he declared that his teachings were to be regarded as the unchanging gospel of medicine. There was no point, he taught his eager acolytes, in attempting to seek new information about health, disease, or the structure and function of the human body; he had created a complete and sufficient system of medicine.

Such was the forcefulness of Galen's personality, as expressed both during his life and through the enduring influence of his writings, that his teachings were blindly followed for nearly a millennium and a half. Medicine stagnated in his honor until the sixteenth century. At that point, along came Andreas Vesalius, an ambitious and endlessly curious young man as contentious as his Greek predecessor, among whose most striking personality characteristics was a love-hate attitude toward authority figures that culminated again and again in angry conflict. He stood up to his teachers, first at the University of Paris, then at Bologna and Padua. Finally, he took on Galen himself, denouncing the ancient master for the more than two hundred errors he had made in his anatomical descriptions and exposing the reason: all of Galen's work was done on monkeys and dogs. In 1543, at the age of twenty-eight, Vesalius wrote a monumental book, *De Humani Corporis Fabrica*, that founded the scientific study of anatomy and established for medicine the principle that progress can be made only by taking tiny

steps—and by challenging authority. Henceforth, medical innovators would abandon the old reliance on the conception of grand theories into which observations must be uncomfortably pigeonholed.

In my own specialty, surgery, there are abundant examples of men whose personalities left their mark on the course of medical history, *Zeitgeist* or no *Zeitgeist*. In 1837, a young Hungarian obstetrician named Ignac Semmelweis, in a moment of inspired brilliance, discovered the reason why almost 20 percent of the obstetric patients in virtually all of the major European hospitals were dying of childbed fever: the obstetricians were not washing their hands after performing autopsies on the pus-ridden bodies of the women who had died of the same disease within the previous twenty-four hours. Without a microscope, and long before germs had been recognized as the agents of disease, Semmelweis intuited that “invisible organic matter” on the hands of the doctors was being conveyed into the genital tracts of women in labor, consigning them to an anguished death. But he was a self-righteous and combative man, and he alienated his superiors and most of his colleagues by accusing them of remorselessly murdering women when they would not accept his theory without experimental proof. After a halfhearted attempt to provide such evidence using a few rabbits, he refused to do further laboratory work, contemptuously declaring the truth of his assertion to be so self-evident that no additional studies were needed. He saw every attack on his doctrine as an attack on himself. Semmelweis would die in a Vienna mental asylum, beaten to death by orderlies trying to restrain him. His great discovery was forgotten, and the promulgation of the germ theory, which would have occurred around 1840 had he been less bull-headed, was delayed until 1867.

When the theory was finally brought forth in that year by the gentle, supremely patient Quaker surgeon Joseph Lister, the notion of microscopic organisms causing disease seemed so outlandish—and even foolish—to the physicians of the time that it found little

general acceptance. It was the quiet persistence and good-natured equanimity of Lister—along with his continuing experiments, his demonstrations, his writings, and his willingness to travel from hospital to hospital to disseminate his beliefs—that finally won the day, though that day was delayed for some two decades.

Two more examples from widely separated historical periods illustrate the significance of the role sometimes played by an innovator's personality, each presented independently of the era and aura in which he worked. The first is the story of an introverted, asthenic little Breton physician, René Théophile-Hyacinthe Laennec, who stood five feet three inches tall and, at the age of thirty-five, had never spent an hour alone in the company of a woman who was not a relative or a servant. One day in 1816, on hospital rounds, Laennec faced the terrifying obligation of putting his ear—in the manner of the time—directly against the chest of an intimidatingly pretty young woman in order to hear the transmitted sounds of her lung disease. The pathologically shy little man backed off and hurried home. En route, he chanced upon some boys playing a game familiar to him, in which the scratchings of a pin on one end of a long rod of wood were interpreted by a lad listening at the other. Struck with inspiration, he hurried back to the hospital, rolled up a sheaf of papers into a cylinder, placed it under the left breast of the amused girl—and in that historic moment invented the instrument he called *le baton*, soon to be refined into what we now know as the stethoscope. Laennec carved his own *batons*, which could be purchased for three francs as a sort of supplement to the thirteen-franc book he would write three years later, describing the many uses of his new diagnostic tool.

The second example is culled from the annals of American medicine. William Halsted, a brilliant and dashing young New York surgeon known for his speed and technical derring-do in the operating room—as well as for

his high living—was among the first experimenters with cocaine after it was shown, in 1884, to induce local anesthesia when injected into skin or muscle. Having no idea of the drug's dangers, Halsted used himself as an experimental subject and soon became our nation's inaugural cocaine addict. Following a long period of attempted recovery, he secured an appointment as the first professor of surgery at the new Johns Hopkins Medical School shortly after it opened in Baltimore in 1893. Halsted emerged from the darkness of his cocaine-saturated period as a very different man from the fearless risk taker of his early career: a methodically slow, meticulous operator whose painstaking methods would be emulated by the many surgeons he trained. The so-called Halstedian technique in time spread throughout the country and made possible a new "surgery of safety," as it became known, and the introduction of many innovative operations that required great gentleness and minute attention to detail. This withdrawn, asocial professor is remembered today as the father of American surgery. His methods of dealing with tissues and organs, essential if further progress was to be made, would not have been introduced for years or even decades had it not been for the personality alteration that resulted from their inventor's cocaine addiction.

Though my own fascination with medical history lies most with the people who have made it, I would never claim that this perspective is always the most effective one. Several factors—social, cultural, technological, and personal—can be explored separately, and for the sake of analysis they may be treated as independent variables. Nevertheless, the process of discovery arises from all of them working together, each in its proper proportion. Some variables may be more consequential than others in any given case, but they are all crucial to the evolution of the bit of progress being studied. The punishment for devaluing the significance of any of them is the writing of bad history.