

EXCURSUS 33

PARACELSUS WAS NOT A RENAISSANCE MAN

Summary:

“Paracelsus is the Luther of medicine, the very incarnation of the spirit of revolt. At a period when authority was paramount, and men blindly followed old leaders, when to stray from the beaten track in any field of knowledge was a damnable heresy, he stood out boldly for independent study and the right of private judgment.”

William Osler¹

In this excursus the famed but controversial physician, Paracelsus (1493-1547), is presented as paradigmatic of Reformation thinking that led to modernity. Rather than venerating and deductively extending the thinking of classical authors, his many contributions to medicine reveal the importance of inductive reasoning based on objective experience and observation. Brazenly presented and vigorously opposed, most of his writings were published posthumously. But in the aggregate, he demolished the reputation of the scholasticism that had evolved over centuries under Canon Law. Curiously, he and his near contemporary, Vesalius, were both of the Roman Church, but Vesalius leaves religion unmentioned in his revered and extensive anatomical writings, whereas Judeo-Christianity in its foundational principals pervades all works of Paracelsus. Renaissance humanism and medieval scholasticism come off poorly, for the Catholic Paracelsus was a product of the Reformation.

Introduction

In Excursus 17 of volume 4 of *The Natural State of Medical Practice* Paracelsus (1493-1541) was not mentioned in the context of post-Reformation medicine. Its prominent practitioners, beginning with William Harvey (1578-1657) and Morgagni (1682-1771), were selected because of the direct relevance of their work to modern medical progress. The work of Paracelsus preceded them by one and two centuries, respectively, and specifics of his various theories were often bizarre and inconsistent with modern science and medicine. Nevertheless, his contemporary fame was great and was based on results of his apparently superior medical care. Despite this, he was considered contemptible by the medical establishment of the university elite and threatening by the Roman Church. Opinions of his personality were inconsistent, varying from fraudster to genius. Swiss-born, his numerous biographers have described his unprivileged childhood, travels, university affiliations, discoveries, prominent friends and enemies. This excursus will attempt a more balanced picture of his place in the history of medicine in the context of the Reformation.

¹ Osler, W., *The Evolution of Modern Medicine*, New Haven, 1921, chapter 4.

The ingenuity of Paracelsus, one of many

In reviewing the various aspects of medical knowledge and practice proposed by Paracelsus, it is important to consider their modern context. In doing so, two observations stand out. One is the broad range of his ideas, a breadth that is independent of his fantastical concepts regarding nature and the universe. The other is the obviousness of his conclusions, bearing in mind the shallow understanding of biology of the time. These observations clearly show that Paracelsus grasped the significance of objectivity in practical management of disease and that, while he probably was intelligent, his conclusions based on that objectivity were logical. They required no unusually gifted intellect to be grasped. The intricacy of concepts underlying calculus, theory of computation, and regression analysis were not involved in his reasoning. It is proposed that his “genius” was his ability to observe without prejudice. He was using common sense. And since common sense and ingenuity are universal attributes of mankind, one can conclude that the intellectual environment in which he worked, the turbulent years following Luther’s triggering of the Reformation, contributed to his identification as a “genius.” Another factor for his transcendent fame may have been his personal oddities, intolerance, and stubbornness that led him to broadcast his findings and explanations.

Consider the following items for which Paracelsus has been acclaimed:

1. Identification of silicosis – Silicon was identified as a chemical element in the 19th C, and the term “silicosis” for a specific type of lung disease is relatively recent, neither being the work of Paracelsus. Instead, he identified causation of respiratory and other diseases with the hazardous respiratory environment surrounding mining and processing of ores. This also was an ancient observation.² There is novelty in his work in that, from childhood on, he had firsthand experience with mining and the remarkable variety of ores and chemical changes from smelting. His concept of pathogenesis of respiratory diseases as the consequence of invisible gaseous spirits of a chemical nature based on an astral theory is not particularly useful. But the important point is that he objectively described the externality of that causation, one that was chemical rather than numinous.
2. Mechanical ventilation – Paracelsus used bellows in an attempt at pulmonary resuscitation. This apparently was not successful for technical reasons, but his idea was perfectly valid. Like early recognition of miners’ lung disease, respiratory resuscitation was not a new idea. Hippocratic physicians attempted pulmonary intubation to bypass upper airway obstruction, tracheotomy was described by Aretaeus (2nd C), and Galen inflated the lungs of animals with a bellows to study respiration.³
3. Cretinism and goiter – Goiter has been recognized in various populations around the globe since ancient times, especially in mountainous areas. It takes no medical degree to spot the large neck swellings of goiter, especially in low iodine environments. The same can be said about cretinism. Paracelsus’ description was unique in that he recognized cretinism in infancy associated with goiter in parents, and a chemical cause of goiter was proposed in that he blamed goiter on the nature of local water, although the issue with endemic goiter is the *lack* of iodine in water and food rather than some contaminant.

² See: Rosen, G., *The History of Miners' Diseases; A Medical and Social Interpretation*, New York, 1943.

³ Hippocrates, *Diseases III*, 10; Baker, A. B., Artificial Respiration, the History of an Idea, in *Med. Hist.*,15(4):336–351, 1971.

4. Cleansing of wounds - This was promoted by Celsus. He said that clean wounds heal, and that cleansing was to be done daily with the patient's own urine. The idea, of course, is not new, and I remember my medical school professor of Pathology, a former German physician, saying that during the war it was advisable, when dealing with a dirty wound and no clean water, "to piss on it" because normal urine is virtually sterile. This was especially good advice in Paracelsus' day because some fomentations advised for wounds were quite disgusting.
5. Syphilis – The "French disease," or as Paracelsus termed it in 1530, "gonorrhoea franzosisch," was epidemic when Paracelsus was a child, and its disastrous consequences were well recognized by the time he dealt with patients. It was commonly held to be a particularly dangerous form of venereal disease, with gonorrhea seeming the obvious source, although "leprosy" was another contender. His important contributions were (1) recognition of fetal transmission of syphilis from the mother, and (2) treatment of what was later termed syphilis. He considered the element mercury to have specific astral and chemical compatibilities, and he advised ointments and cautious doses of mercury in its treatment. Mercury and its compounds had been used for centuries for a variety of diseases, and their usefulness in ointments for skin disease was recommended in Arabic medical writings. Despite their toxicity, mercurial salts and ointments for syphilis therapy were still in use into the 20th C.
6. Toxicology – An important pharmacological conclusion of Paracelsus was the concept of dose. Too much of any chemical or medication was toxic, and safety lay in knowing the proper dose. This was not a new idea. Dr. Chauncey Leake pointed out that in the Ebers papyrus (*ca.* 1500 BC) eighty percent of the oral therapies are quantitated, whereas only thirty percent of topical therapies are so treated.⁴ Predictable quantitation of dose to prevent toxicity is but common sense. William Withering (1741-1799) was famous for "discovering" digitalis, and that fame in part rests on his uniquely careful quantitation of effective vs. dangerous doses, a point clearly made by Paracelsus two centuries earlier.
7. Pharmacological innovation – Bypassing standard herbal therapies that he judged useless, Paracelsus introduced specific chemical remedies. His many pharmaceutical preparations had varied organic makeup, with liniments and "tinctures and alcoholic extracts" differing from those of previous ages. Chemistry was now to be a component of medical knowledge because he observed physical changes of inert substances in mining and alchemy, concluding similar changes must also occur in the body.
8. Bloodletting – The concept of bloodletting for curing disease is detectable in ancient China, Greece, and India. While admitting it had some value, Paracelsus explicitly minimized its importance because it made no sense to him that removing blood from the body would improve its quality. Phlebotomy as a therapy is still used today for a variety of diseases. But those treating President George Washington during his last illness should have listened to Paracelsus.
9. Detection of protein in the urine – Rather than just looking at urine (uroscopy) as had been done for centuries as advised by Protospatharius (7th C), he noted in some persons that the addition of vinegar to urine could produce cloudiness. Hippocratics had recognized the increased bubble formation in the urine of some patients indicated disease. This, like the addition of vinegar or the heating of urine, could be used as a chemical test for an abnormal increase in urinary protein, a common finding in kidney diseases.

⁴ Leake, C., *An Historical Account of Pharmacology to the Twentieth Century*, Illinois, 1975, p. 51.

10. Anesthesia – Paracelsus noted from his chemical studies that the “white vitriol” he distilled, when taken orally, would put chickens to sleep. This was presented in his work *Diseases That Deprive Man of His Reason*. The ethyl ether derived from vitriol (sulfuric acid salts) distillation had been discovered by others, but its popular use as a general anesthetic would not occur until the 19th C.

Other items include the promotion of opiates for medical use, observation on formation of hydrogen gas (although unaware of its significance), recognition of the importance of human aspects of disease now comprised by Psychiatry, anatomic and surgical observations later acknowledged by the famed surgeon, Ambroise Pare (1510-1590), and the recommendation of iron (as a salt) for “poverty of blood,” although I can’t document its specific use.⁵

Other ingenious inventors and discoverers quickly followed Paracelsus. He, however, would be recognized as the earliest of those “geniuses” that appeared throughout the West in the 16th C. The point to be made in this section, however, is that his spectrum of discoveries, when judged in isolation, were not examples of extraordinary brilliance. They were instead examples of unclouded common sense and human curiosity. As with most ideas, the obvious is repeatedly recognized over the ages. Paracelsus drew his conclusions from personal observation, not ancient tracts, just as many modern clinical discoveries are in fact rediscoveries.⁶ It is notable that in the aggregate his discoveries were careful and obvious, but their importance is that, brazenly asserted, they demoted venerated canonized ideas and presaged modernity.

Paracelsus and the Renaissance

Paracelsus at age 24, at which time Martin Luther had just triggered events leading to the Reformation, had acquired medical knowledge from his physician father and from working around mines and miners. Physical changes observed in the smelting of metals and their compounds provided the environment in which miners’ diseases were acquired. He therefore began developing a theory of human health based on chemistry. That theory had its mystical conclusions, but it was based on his observation of health effects clearly caused by factors external to the miners’ bodies. It was, therefore, objective, even though specifics of chemical reaction and biochemistry were unknown. He based his conclusions on inductive reasoning rather than trying to fit his observations into traditional deductive patterns founded on Galenic concepts that included humoral theory. He instead developed his own concepts, with a mind to more ancient wisdom that included the Kabbalah, from personal observation. To us his theoretical conclusions seem far-fetched, but, by trusting personal observation rather than the venerable canon of ancient writers, he revealed the inconsistency between classical medical theories and real-life practices. He was a hands-on clinician and, despite his demeaning of current medical practices, he was not an early practitioner of, or advocate of, alternative

⁵ Malgaigne, J.-F., *Oeuvres Completes D’Ambroise Pare*, volume 3, p. 345, 1841. And see: Waite, A. E., *The Hermetic and Alchemical Writings*, London, 1894, vol. 1, p. 274, on which Paracelsus advises all physicians to have sulfates of several metals, including iron, noting the doses should be small, but the effects are great, and that “These should convince the physician that God has set a remedy over against every disease.” Iron sulfate is standard oral therapy for iron deficiency.

⁶ See vol. 1 of *The Natural State of Medical Practice*, p. 495ff, for a long list of medical *rediscoveries* that reflect common sense, diligence, and motivation and did not require an unusually high intelligence quotient.

medicine, a nonscientific approach to therapy. He was quite the opposite, as the following will show.

Although Paracelsus has been acclaimed the “Hippocrates of the Renaissance,” his work was in no way emblematic of the Renaissance, which was a “rebirth” or rediscovery of classical antiquity humanism. Dr. Walter Pagel made a clear distinction between the objectivity and religious context of Paracelsus and the moralistic humanism of his near contemporary, the physician and anatomist Andreas Vesalius:⁷

“Religious motives pervade the thought and work of Paracelsus. It is Christian, rather than humanistic, motives which serve him as justification for the physician’s art and craft, prescribe the ends to which it is to be devoted, enter into the very structure of his medical doctrines, and form the background to his empirical and experimental attitude.”⁸

Furthermore, Paracelsus is credited with being the first European of professorial rank to lecture in his native language rather than the Latin of contemporary intellectuals, and it was this and his criticism of Greek and Arabic thinkers such as Aristotle, Celsus, Galen, and Avicenna that made him unpopular in many circles.

Paracelsus’ appreciation of Hippocrates was acknowledged by his analysis of the Hippocratic *Aphorisms*.⁹ But the ancient medical knowledge he particularly appreciated was that which had not been contaminated by many classical Greek and Arabic thinkers. He traced his appreciation of objectivity to original observations of the ancients, including Hebraic.

Thus, his thinking was not at all characteristic of the Renaissance.¹⁰ His thinking was a feature of the Reformation because his many ideas and his reliance on objectivity and inductive reasoning were merely an open expression of a natural response of human curiosity to natural phenomena of particular interest. This revolutionary thinking was considered unnatural because it was unusual in the intellectual environment of the Medieval Period. Thus, the real problem was that entrenched thinking of society was deductive to such a degree that natural curiosity and motivation had virtually ceased to exist among the privileged population. Ancient heroes, such as Aristotle, Galen, Avicenna, and Rhazes had, in their view, already discovered, at least in some of their writings, the road to perfection. As a consequence, adaptation had taken the place of invention. This had warped the intellectual environment in the West for a thousand years. In volume 1 of *The Natural State of Medical Practice* the damning effect of authoritarian canonization of ancient medical knowledge by the “great” civilizations of Mesopotamia, Egypt, India and China is discussed. In medieval Europe, however, autocratic governance was only part of the problem. It was, in addition, a veneration self-imposed by a proud and learned university

⁷ “Medical Renaissance” has been applied to advances in medicine that appeared during the Renaissance (sometimes dated 1400-1600), a span that includes Andreas Vesalius, famed for his anatomical studies (*De Humani Corporis Fabrica Libri Septem*, 1543). Paracelsus is not included among its prominent physicians.

⁸ Pagel, W., and Rattanzi, P., Vesalius and Paracelsus, in *Med. Hist.*, 8:309-328, 1964.

⁹ *Aphorismorum Aliquot Hippocratis genuinus sensus & vera interpretatio*. Augsburg, 1568. This sensitive interpretation of Paracelsus’ writings indicates he took Hippocrates seriously even though he freely provides his own interpretations. For example, in discussing Aphorism 1, he interprets the modern statement “art is long” as the long time it takes for medical progress to evolve rather than implying the volume of knowledge is great. And so he anticipates the time when, through experimentation, the “art” will be “short.”

¹⁰ For a good review of the source and significance of Paracelsus’ thinking, see: Stillman, J. M., The Contributions of Paracelsus to Medical Science and Practice, in *The Monist*, 27:390-402, 1917.

class that emerged from monastic and cathedral schools that had been integrated, formally and informally, into an ecclesiastical mold. The term for this is “scholasticism.”

The Reformation and Scholasticism

Paracelsus was born and raised a Catholic and his childhood was in the village of Einsiedeln, Switzerland, home of a prominent monastery where his father was physician. But Swiss cantons were known for their relative autonomy and civil liberties, and Zwingli, the famed Protestant reformer, briefly lived in Einsiedeln a few years after Paracelsus left. Paracelsus found no religious sect particularly appealing. His writings indicate he had his own opinions on the subject, and some of his personal views were considered heretical by the Roman Church, and some of his theories were ridiculed by the reformers. In a personal sense he was a reformer of both the Roman Church and the Reformation in that he had his own idea of canonical thinking on the role of spirituality in human health and disease. He was imbued from childhood with the normality of observation and open expression of opinion. Although he expressed no admiration for Luther and other reformers, he appreciated their open criticisms of the Church:

“... I know of no other enemies of Luther than those whose kitchen prospects are interfered with by his reforms. Those whom he causes to suffer in their pockets are his enemies. I leave it to Luther to defend what he says, and I shall be responsible for what I say. Whoever is Luther's enemy deserves my contempt.”

A characteristic of scholasticism was its late integration with Canon Law of the Church. The latter was distinct from civil law and traceable to the 325 AD Council of Nicaea. Its effects had been far-reaching, one example being laws that would lead to the prohibition of women from obtaining a university education. In this “ecclesiastical mold” the seemingly fantastical aspects of Paracelsus’ thinking appeared so because there was no one around who was able conceive and then seriously communicate alternative ideas, for from that struggle of ideas more rational conclusions would have been born. He happened to be the first of thousands, if not millions, who could have disclosed a similar broad array of ideas and observations had their interests been similarly aroused and their opportunities unlocked.

His odd interpretations were not popular in an age when Galen and other ancients were virtually unassailable. And when the *Index Librorum Prohibitorum* was released by the Roman Church about twenty years after the death of Paracelsus his early work (*De Gradibus et Compositionibus Receptorum Naturalium*) is reported to have been included because of its magic content.¹¹ Despite their novelty and the disadvantage of his intolerant personality, his observations and significant writings on medical topics, most published posthumously by a former attendant and subsequently gifted publisher (Johannes Oporinus, 1507-1568) from manuscript notes, are remarkably and broadly relevant today.

A break in the hold of scholasticism, of course, is one of the things that the Reformation provided. By intercepting attempts to block new ways of thinking, there were two consequences. One was a questioning of traditional thinking, most prominent in the sphere of politics (see

¹¹ For a full account, see: Lyke de Vries & Leen Spruit (2017): *Paracelsus and Roman censorship* – Johannes Faber’s 1616 report in context, *Intellectual History Review*, DOI: 10.1080/17496977.2017.1361060

Excursus 16, *Naming Our Civilization*). But equally important, new ways of thinking were similarly to be questioned in an attempt to arrive at optimal conclusions. As new civil liberties released the ingenuity and motivation of the unprivileged populations of Europe, not only did old ways of thinking disappear. New ways of thinking appeared in an intellectual environment that increasingly was open to discussion, argument and improvement. This began, of course, with biblical interpretation of scripture (particularly aided by the vernacular Bible and the printing press), but promptly spread to other disciplines. Medicine was a late arrival because the adjustment of the illiterate unprivileged population to the new environment of relative intellectual freedom took time to evolve, as did the acquisition of medical knowledge itself, which requires years of longitudinal observation to accumulate scientifically confirmable knowledge. Importantly, Paracelsus garnered many of his facts from other nonprivileged populations, including midwives, apothecaries, folk healers, and barber-surgeons, those who might have had personal experience with pragmatic aspects of medical care and less likely to have been targets of scholasticism. Many of his ideas, therefore, were based on observations of prior generations rather than bursts of personal brilliance, ideas that come and go throughout all human history and prehistory but have had no opportunity for useful propagation.

Objectivism and inductive reasoning is considered a characteristic of the Scientific Revolution (16th and 17th centuries), and it has been convincingly argued that the Scientific Revolution was itself a consequence of the Reformation. Although the value of both inductive and deductive reasoning is appreciated, the basis for scientific method is inductive. Paracelsus was the forerunner of the Scientific Revolution even though he is but marginally acknowledged. Francis Bacon (1561-1626) is considered prominent in the Scientific Revolution, in addition to being an initiator of the Enlightenment (Excursus 28). Despite disagreements, he appreciated much of the work of Paracelsus and the relative intellectual vacuum in which the latter lived. Inductive reasoning in the sphere of natural sciences was prominent in the work of Bacon, and it was also apparent in the reasoning of Paracelsus almost a century earlier, although not so obvious in his conclusions.

There is, perhaps unsurprisingly, a degree of parallelism between the schism between medieval medicine and nascent scientific medicine on the one hand and the religious schism as manifested by the Reformation on the other. The former relied on an ancient and singular interpretations of human physiology from which Paracelsus dared to differ based on his personal experience. Similarly, the Roman Church was founded on an ancient and undisputed interpretation of the Bible, from which the Reformation, by appealing directly to the vernacular bible, found inconsistencies. Some inconsistencies were so flagrant that they demanded a return to the biblical text itself rather than interpretations of a few scholarly experts.

The difference between the schism in medicine and the schism of the Church was that Paracelsus was virtually alone in his interpretation of chemistry and human physiology, whereas biblical enlightenment was suddenly available to millions. The century following Reformation, particularly across northern Europe and Great Britain, provided an enlightening public that allowed Paracelsus to garner an audience and a reputation. Had those millions not been so advantaged by the Reformation, Paracelsus would still be considered a fool and his works forbidden.¹² For Paracelsus, there was no preexisting text or established scientific process to

¹² The Zurich Paracelsus Project of the University of Zurich states the following (for convenience, I have edited and shortened the opening lines):

Paracelsus's life was one of endless writing, his complete works occupying about thirty volumes, not included the probably numerous lost writings. Nevertheless, during his lifetime only a few of them went to press:

which he might appeal and with which the general public had access. The variety and strangeness of his ideas appeared before there was ready access to medical and scientific associations and journals, for the bulk of his writings were published posthumously. Only then was scholarly argumentation and refutation possible. The variety of his ideas would, in varying degrees, have been reflected in the ideas of many individuals, for genius (“great natural ability”; Merriam-Webster) and ingenuity are universal attributes of mankind.¹³ It was, therefore, the restriction of the ingenuity of others that made the ideas of Paracelsus seem particularly odd and authoritarian. But with the posthumous publication of his works and as the 16th C Reformation progressed and natural rights became more generally protected, the marketplace of new ideas blunted old ideas as alternatives became available. It had been the medieval and Renaissance canonization of the writings of ancient thinkers that provided protection over the centuries for their deductive reasoning and prevented emergence of alternative ideas. Deductive reasoning is prone to be authoritarian in nature, for the primary source from which all else is deduced is not debatable. It is top down. In contrast, induction builds from bottom up, and its conclusions remain a target for argument and correction at all levels.

Conclusion

Paracelsus’ writings were extensively infused with Judeo-Christian belief, with the power of God as expressed in His creations underlying his mystical interpretation of nature and its chemistry. But he was not a proselytizer of any religion, and he did not depend on prayer for assuaging or curing human ills. Paracelsus’ association with the Reformation was, therefore, not because it reflected his religious convictions. It was, instead, his freedom and ability to speak out, as did Luther, on matters involving natural rights across northern Europe as scholasticism and Canon Law increasingly lost credibility. He was aware of the criticisms of Luther and considered himself equally burdened. His reliance on objectivity and inductive reasoning was often overshadowed by his fantastic views of nature and ran counter to traditional thinking. But in this age of increasing freedom in the West to argue based on objectivity and natural rights, whether derived from Paracelsus’ direct observation in nature or from personal exegesis of the vernacular bible (*sola scriptura*) by the unprivileged, was key to human progress. He was a child of the Reformation even though he remained a Roman Catholic.¹⁴

some astrological prognostications, two books on syphilis, and his important work, *Grosse Wundarznei* (Great Surgery). The remainder were banned from publication. Only twenty years after his death was there an awakening of interest in Paracelsus's teachings, which resulted in numerous print editions, culminating in the great edition of the collected medical and philosophical works by Johannes Huser in the years from 1589 to 1591.

¹³ As stated in Excursus 11 (*Pressing Implications of the Natural State of Medical Practice*): “And we praise peculiar genius and its beneficences to Western society, but we should be aware that genius abounds in every age and every society, and in some guise and in some degree is present in every person. And that concept of ‘every person’ is unqualified, not imagined or rhetorical. Throughout the existence of humankind, the serfs, the enslaved, the prematurely dying, the enforced infirmities, the ninety percent of the European population purposefully ensnared in medieval bondage, the eighty percent of the Russian 19th C population that were peasants, and the eighty million poor peasants of the 15th C Ming Dynasty, included in their lot not only Newtons, Shakespeares, Bachs, Michelangelos and Einsteins, but also the myriad different expressions of genius that, depending on personal motives, priorities, chance or opportunity, might have appeared in the work of individuals in those populations but were purposefully prevented from emerging.”

¹⁴ In Excursus 27 a proposed alternative world history assumes the Vatican successfully eliminated early Lutheran teaching and avoided the Reformation. That this had been possible was shown by the broad effectiveness of the

Dr. Osler in the opening statement of this excursus recognized the role of independent study and right of private judgment that prompted and permitted Paracelsus to significantly add to human knowledge. And Prof. Neuburger carried the message further:

"We see in Paracelsus.... the most prominent incorporation of that enigmatic, intuitive, anticipative intelligence *of the people*, which drawing upon the unfathomable sources of a rather intuitive than consciously recognized experience, not infrequently puts to shame the dialectically involved reasoning of scholasticism."¹⁵

Neuburger thus indicates the applicability of Dr. Osler's observation to the entirety of a society. That is, in fact, the message of *The Natural State of Medical Practice*. Ingenuity and motivation are universal human attributes, and genius, present in every individual since Creation, awaits its opportunity for expression. Sadly, because of authoritarian dictates across the ages, that genius had rarely been permitted to appear prior to the Reformation.

Counter-reformation in stopping, and even reversing to some degree, Reformation policies and public opinion after they had been instituted. The Holy Roman Empire might than have become the major world power and overlord of the western hemisphere.

¹⁵ See the German text: Neuburger, M., in the Introduction of *Handbuch der Geschichte der Medizin*, Jena, 1903, vol. 2, p. 35, italics added. This translation of Neuburger may be by J. S. Stillman (ref. 10).