On Anecdote and Antidotes: Poison Trials in Sixteenth-Century Europe

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SUMMARY: This article describes the use of poison trials, in which an animal or a condemned criminal was poisoned, to test antidotes in sixteenth-century Europe. In contrast to most drug testing in medieval and early modern Europe, which was gathered in the normal course of therapeutic experience, the poison trial was a contrived, deliberate event. I argue that poison trials had an important function in both medical testing and medical writing in the period between 1524–1580. While poison trials dated back to antiquity, they tended to be described in medieval texts as theoretical possibilities rather than empirical tests that had already occurred. In contrast, early modern physicians conducted poison trials and described them as anecdotes in medical texts. Although physicians did not explicitly separate poison trials from evidence gathered in the course of regular therapeutic experience, they did imbue the outcome of poison trials with considerable epistemological weight.

KEYWORDS: experiment, poison, early modern, trials, experience
In 1563, a royal surgeon to Holy Roman Emperor Ferdinand I named Claudius Ricardus penned a missive extolling the marvelous virtues of bezoar stone. Not a mineral at all but rather a calcified secretion found in the stomachs of animals, bezoar had long been touted as a poison antidote and panacea in Arabic texts, but it had become attainable to wealthy Europeans by the mid-sixteenth century. In his letter, written to Archbishop Nicolaus Olahus of Gran, Hungary, Richardus recounted a series of tests he had conducted on bezoar at the emperor’s behest and alongside his physicians: two in which patients received bezoar in the midst of a serious illness and two in which bezoar was tested in deliberate trials on condemned criminals. In the two former cases, Richardus recorded careful details on the illnesses and the patients’ progression after they were given a dose of bezoar. In the latter cases, the criminals were given deadly poisons and carefully observed. In all four cases, the men survived. On the basis of these tests, Richardus proclaimed, “it is easy to see what a precious stone the bezoar is—as I must claim and avow, it is a kingly medicine.”¹

Richardus’s letter made an argument about the efficacy of a medicine based on tests he and the physicians had conducted in person. These tests used information gathered in two different ways: first, in the usual course of clinical experience, that is, a healer’s ministrations to a sick patient, and second, through contrived trials using poison on test subjects. Richardus described all four tests in extensive anecdotes, accounts that clearly were intended to reinforce and substantiate the arguments he made in favor of the bezoar stone. Just as importantly, his letter communicated these anecdotes, in writing, to a learned audience. Although couched as a private missive to the Archbishop Olahus and written by a surgeon, it took the form of a learned treatise on bezoar, drawing on Galenic medical principles and citing established texts. It almost certainly
circulated among the physicians at Emperor Ferdinand’s court and beyond: we know about the letter because it appeared in print as an appendix to a Latin treatise on the plague by physician Thomas Jordan, a friend of Emperor Ferdinand’s longtime personal physician Johannes Crato von Craftheim. Another physician, Johann Wittich, later translated Richardus’s missive into German.²

The tests Richardus described—and their afterlife in physicians’ texts—provide important evidence of the growing interest in experiential knowledge in learned medical spheres, as has been the topic of much historical scholarship in the past few decades. The practice of recording and sharing medical experiences became an important part of the learned interest in natural particulars, or specific pieces of knowledge about nature and natural processes.³ A number of different genres that communicated the particulars of experiential knowledge gained ground among learned physicians in the sixteenth century, including both the ancient genres of historia and experimenta or recipes, as well as the Renaissance genres of observationes or case studies and, as in this case, medical epistles.⁴ In that sense, Richardus’s bezoar anecdotes both informed and echoed his learned medical peers.⁵

Particularly striking in Richardus’s missive was the detailed description of two trials using poison on condemned criminals, contrived tests that appeared to give a definitive result. These poison trials, as I am calling such tests, dated back to antiquity. The legendary king Mithridates VI of Pontus (135–63 BC) allegedly conducted numerous trials on condemned criminals (and himself) in order to develop his own special antidote, mithridatium.⁶ The use of human subjects to test poison was taboo in the late Roman Empire, but Galen described poison trials on animals to demonstrate the virtues of the antidote and cure-all theriac. Medieval Arabic and European
physicians mentioned theriac trials following the Galenic example. In nearly all cases, however, ancient and medieval accounts described poison trials not as anecdotes—as events that had happened—but rather as theoretical tests that one might conduct. They were guidelines to practice rather than experiential reports.

In the sixteenth century, poison trials became an empirical reality. Poison demonstrations are already well known in the case of empirical healers such as snake handlers and charlatans, who performed dazzling marketplace shows by poisoning and then curing animals—or themselves. Yet learned healers also turned their attention to poison trials, especially after tests on condemned criminals were revived in Italy in the 1520s and 1530s. In 1544, the physician Pietro Andrea Mattioli included an anecdote about a poison trial he had witnessed in his best-selling commentary on Dioscorides’ first-century herbal. From the 1560s, reports describing poison trials became more frequent, with occasional examples through the end of the sixteenth century. Most of these reports were composed by physicians, although in two instances they came from trusted royal surgeons: Richardus and the French surgeon Ambroise Paré. Although trials varied in the poisons used, the antidotes tested, and the ultimate outcome, they had several elements in common. They were all prompted by powerful princes and directed by high-status court healers, often gathering the court physicians, surgeons, and apothecaries together in one room. All of the poison trial reports described the test as a contrived, active event, something that one “made” or “did.” Finally, we know about all of these poison trials through anecdotes in texts shared to a wider medical community.

This essay argues that the poison trial had an important function in both medical testing and medical writing in sixteenth-century Europe. Poison was unusual in early modern medical
theory, because it functioned differently than most ailments. Rather than cause an imbalance in the four humors, it was increasingly assumed to function through direct action of its “total substance,” as Frederick Gibbs has shown. Poison was also seen as the root cause of many diseases, most notably plague. Poison trials thus had the potential to produce results that would be more widely applicable than most tests—both because poison worked similarly on most people, and because poison antidotes were useful for more than just poisoning. The contrived nature of the poison trial, moreover, had the advantage of producing a seemingly clear result: the test subject either lived or died. Although physicians and their peers did not explicitly separate poison trials from evidence gathered in the course of regular therapeutic experience, they did imbue the outcome of poison trials with considerable epistemic weight.

In the period between 1524 and 1580, the way poison trials were reported and shared also expanded. By adding extensive detail and, in some cases, taking active steps to make sure the poison would work more effectively, court healers turned poison trial anecdotes into informative reports for their peers. Peter Dear has argued that “an account of an experiment is an essential part of its performance,” and he has specifically shown how the anecdote was a crucial tool in cementing experimental practices in the seventeenth-century mathematical sciences. While sixteenth-century ideas of “experiment” were still very much in flux, learned healers used anecdotes to communicate their knowledge of natural processes. Poison trials represent one particularly interesting use of anecdote because their contrived nature provided more flexibility than information taken from usual clinical practice. Unlike observations taken in illness, physicians could choose the time of the experience and the specific parameters (such as type of poison or antidote) to be tested.
As much recent scholarship has shown, medicine was one of the first learned disciplines to rely on evidence built on experience. Michael McVaugh has emphasized that experience and empiricism played an important role in medieval medicine.\(^\text{12}\) As the status of experience rose more generally in the later Middle Ages, physicians, alongside the laypeople they served, stood at the forefront of empirical traditions. Harold Cook has pointed to the prevalence of physicians in the early Royal Society and to their focus on particulars such as herbs and other naturalia, and Katharine Park has shown that this focus on particulars was already common among town and court physicians in fifteenth-century Italy.\(^\text{13}\) A number of scholars have also demonstrated the way particulars began to be used to build a catalogue of knowledge.\(^\text{14}\) There appears to be an overwhelming consensus that early modern physicians engaged enthusiastically in investigations of nature and communicated their results with each other—and their wide network of peers and correspondents, which included surgeons, apothecaries, noblewomen, princes, and many others.

The role of drug testing within these trends, however, remains understudied. Despite early modern complaints about the “uncertainty” of medicine, pharmacy was an area in which there were thoughtful attempts to develop a degree of certainty dating back to antiquity and the Middle Ages.\(^\text{15}\) Recipes for cures were ubiquitous and, as numerous scholars have shown, an area in which there was ample discussion of experience and proof in both learned and lay spheres.\(^\text{16}\) Finding proven cures also tended to be one of the few medical pursuits praised by seventeenth-century natural philosophers, including Francis Bacon.\(^\text{17}\) The other essays in this issue make it abundantly clear that therapeutic medicine was an area of particularly vibrant testing in the early modern period. Here I argue that sixteenth-century poison trials helped
expand the parameters of drug testing described in ancient and medieval texts and set important precedents in both practice-based methodology and medical communication.

Methods of Drug Testing

While there were few systematic attempts to test drugs for efficacy before the later seventeenth century, there was enormous interest in the usefulness of medicaments and other cures. Patients, physicians, and lay healers all shared information on practice-based experiences with various medicaments, whether in writing or by word of mouth. In many cases, healers expressed an overt interest in testing new drugs: the respected noblewoman-healer Dorothea of Mansfeld (1493–1578), for example, explained in 1571 that she wished to try a new version of aqua vitae she had created for erysipelas “on people who suffer from the same illness” before she sent a sample to her patron, the powerful Elector August of Saxony. Medicinal recipes commonly claimed to be “tried” or “proven,” and sixteenth-century medical texts of all sorts—in both print and manuscript—were rife with claims that a particular cure was successful in practice. These claims of efficacy were taken seriously and sometimes even garnered an international audience. Spanish physician Nicolás Monardes (1493–1588), for example, helped spark interest around Europe in drugs from New Spain with his reports of the wonderful successes he had seen in his own practice.

Nearly all information on the success—or failure—of early modern drugs came from the use of the medicament in the regular course of healing. In his tests on bezoar, for example, Richardus tried the drug on two “upstanding men” who had fallen ill while visiting the imperial court. The first of the sick patients, a seventy-five-year-old nobleman named Herr Scander, fell into a
“dangerous illness . . . with the reduction of all strength and the pulse, and a weak and unruly stomach, and . . . pain around the ribs.” On the emperor’s command, Richardus gave him “five grains of this stone bezoar in wine” and carefully recorded the patient’s long recovery. The second patient, a Counter-Reformation scholar named Friedrich Staphylus, had been sick “for seventeen whole days of an acute and deadly fever.” He received seven grains of bezoar, and again Richardus carefully listed every detail of his recovery.\textsuperscript{20} In both of these cases, the drug was tested on patients who had existing, nearly incurable illnesses. In his 1565 treatise on poison antidotes, Monardes similarly related several cases in which bezoar had been successful in curing patients.\textsuperscript{21}

Evidence gathered from experience with patients appeared in diverse kinds of medical texts, including scholarly case studies, which dated back to the Hippocratic corpus; medieval consilia, which described a patient’s illness and cure; as well as the widespread tradition of experimenta, or recipes and other cures that were tried out on patients, popular among both physicians and lay healers.\textsuperscript{22} There were enormous variations in how exactly the experiential information was relayed and how extensive it was, and there was a wide range of the author’s assumptions about how generally applicable these individual experiences were. In all cases, however, determining the supposed efficacy of a remedy—including both drugs and other cures, such as manipulating diet—involved observing its effects on patients.

Richardus’ other two tests on bezoar, in which condemned criminals were given poison before the bezoar was administered, relied on a different method: a deliberate, contrived trial that had a clear outcome. Trials were used in several areas of medieval and early modern medicine—for instance, to determine whether a woman was pregnant.\textsuperscript{23} In the case of drugs, contrived trials
were used primarily to test poison antidotes, since poisoning was the rare sickness that could be created artificially. These poison trials tended to be described using an active verb such as “to make” (fare in Latin and Italian, faire in French). Mattioli, for example, described a case in which Pope Clement VII’s physicians “made an experience” (facesse l’esperienza) using poison on two condemned criminals to test a promising antidote in 1524.24 Physicians did not necessarily draw a sharp distinction between evidence gathered in the course of regular therapeutic experience and evidence gathered through a trial—Richardus wrote merely that the bezoar was “tried on four people,” with no semantic distinction between the tests on criminals using poison and the tests on the “upstanding men” who had fallen ill, except to note that one tested the effectiveness of bezoar in illness and the other on poisoning.25 As contrived experiences, however, poison trials allowed physicians to conduct tests that otherwise would have been hard to come by.

In addition to this difference between regular clinical experience and contrived trials, we also need to distinguish between empirical tests (completed in practice) and theoretical tests (suggested in texts). Until the sixteenth century, most poison trials were described theoretically as recommendations that were not necessarily carried out. For example, the fourteenth-century Montpellier physician Bernard of Gordon suggested a trial to see whether a batch of the ubiquitous poison antidote theriac was still good: “Take two pheasants, cut off their crests, apply a poison to the wounds . . . and wait until they begin to stagger. Then put theriac on the crest wound and in the drink of one of them: if this one lives and the other dies, the theriac is good.”26 Bernard’s test was theoretical because it instructed the reader to act but gave no indication of whether the author had ever tried it (or seen or heard of it tried) in practice.
In contrast, medieval texts are full of descriptions of empirical, practice-based tests. There was a wide variation in how extensive and reliable the so-called “experience” was—it ranged from a vague *probatum est* (“it has been tried”) written at the end of many medicinal recipes to long-winded descriptions of specific cures, with names and dates. Reports of empirical tests could be firsthand, secondhand, or even merely hearsay. But all such reports made a statement about a test that (allegedly) *had* been done, rather than just proposing one *might* be done. In some cases, empirical tests were related as full-blown anecdotes, such as this example from Bernard of Gordon’s colleague in fourteenth-century Montpellier, Arnau de Vilanova:

> When I was in Lyons, it happened that a certain noble lady of the city of Vienne suffered from very severe headache. . . . When she was brought into my presence, she was complaining a good deal and anxious about what would happen to her. And because in other cases the aforementioned infirmity commonly occurs because of vapors rising to the brain, I caused to be gathered a certain herb called chamomile; it is found in the meadows in summer. Having collected a large quantity of the herb, I separated out the flowers, and I caused a water to be made from the flowers in the same way that one makes distilled rose water, and I made her wash her head with this water. Within four days, she felt herself to be completely cured. This water is indeed very good for the brain . . . and vapors can readily be expelled from the brain with it.²⁷

Here Arnau described the woman’s condition, her long quest to find treatment, and how he went about making and administering the remedy himself, and he added a more generalizing point postulating the remedy’s usefulness in other cases. He thus related an anecdote about the patient’s illness and his success in curing her in the course of therapeutic experience. In contrast, Bernard of Gordon described his contrived poison trial as a *suggested* theoretical test, not as an
One major development in the sixteenth century was a new interest in empirical, practice-based poison trials.

Systematic testing protocols based on therapeutic experience were proposed in several medieval Arabic and Latin texts, as Michael McVaugh shows vividly in his essay in this issue. The Arabic physician Avicenna included seven concrete rules for testing drugs “by experiment” (per experimentum) in book 2 of his influential Canon of Medicine. For example, he specified that a drug should be tested on a simple disease, not a compound one (to make the results clearer), that it should be tested on two diseases of opposite complexions, and that it should be tested on a man rather than an animal. As McVaugh shows, fourteenth-century scholastics in Montpellier thought carefully about Avicenna’s guidelines and altered them. Bernard of Gordon argued that drugs ideally should be tried on patients with neutral complexions, or if such a patient was impossible to find, on a patient with the opposite complexion as the drug. He also implied that a drug needed to be tested multiple times and gave a hierarchy of test subjects from animals to humans. Arnau de Villanova proposed a particularly coherent system of testing drugs using healthy and temperate human subjects. These guidelines were all theoretical. There is no record of whether such protocols were carried out in such a systematic manner, even though Arnau related numerous cases of trying drugs on patients in his Experimenta. Moreover, none of these authors suggested the creation of artificial conditions for the tests they proposed. The ultimate goal for this kind of drug testing was to determine the Galenic complexion of a given drug—its particular balance of hot, cold, wet, and dry—not to figure out whether it worked overall. Because most drugs were seen to work differently on people of different complexions
in the Galenic humoral system, discovering the properties was the salient question. In contrast, poison trials tended to focus on the authenticity or efficacy of an antidote, not the properties.

Poison Trials from Antiquity to the Renaissance

From ancient times, poison antidotes presented a special case—both because they were nearly impossible to test in a doctor’s regular practice and because it was possible to conduct a contrived trial. Galen (or possibly pseudo-Galen) stated as much in his On Theriac to Piso, which helped establish the reputation of theriac as an antidote and cure-all. He noted that it was difficult to find a “record either of someone who immediately drinks the antidote” after being bitten by a poisonous animal, “or of anyone who drinks it in advance and then not long afterwards is bitten and gets a strong enough dose to kill.” In other words, it was nearly impossible to determine the efficacy of poison antidotes through usual therapeutic experience. Instead, he noted, “we take roosters—not those that live with us under the same roof, but rather wild ones, and with a dry constitution, and we put creeping poisonous beasts among them, and those who have not drunk theriac die immediately, but those [roosters] who have drunk it are strong and stay alive after being bitten.” Rather than wait around for happenstance, the author artificially created a situation in which the efficacy of the antidote could be ascertained. Significantly, he portrayed testing a drug through a doctor’s daily experience as the norm, and he suggested that the poison trial was a necessity only because it was too difficult to determine the properties of antidotes by chance occurrences in patients.

This poison trial provided a lasting model for later authors. Versions of it appeared in the writings of a number of Arabic authors, most prominently Avicenna, who called for the theriac
to be administered after the poison took effect rather than prophylactically as in *Theriac to Piso*. Most Latin authors followed Avicenna’s description, with some minor modifications as to type of bird or method of introducing the poison, as in Bernard of Gordon’s trial on pheasants.

Whether they tested the preservative or the restorative properties of the antidotes, poison trials after Galen were usually aimed at assessing whether a given quantity of theriac was poor, fraudulent, or old—presumably because they assumed Galen had already established the efficacy of true theriac. As already mentioned, moreover, theriac trials after Galen were usually described as theoretical possibilities rather than as anecdotes drawn from practice. It is unclear from the surviving textual evidence whether any medieval Arabic or European authors actually carried out the tests they recommended.

Several trends in the Renaissance prompted significant changes to this long-standing textual tradition. First, a stark increase in medical manuscripts and printed works in the vernacular, which were full of medicinal recipes, put a greater focus on both drugs and on the language of experience. This emphasis was only heightened by the flood of new drugs entering Europe from all directions—the New World, lands to the east, and local sources. Cook has argued that this new focus on drugs and cures was met with much discomfort by physicians, whose traditional role was to prescribe a regimen of health for the whole body. Nevertheless, many physicians published vernacular books full of recipes and cures. As Gianna Pomata’s work has shown, they also began to collect and publish anecdotal accounts of their experience with patients in the learned genres *Curationes* and *Observationes*. Similarly, an emphasis on drugs found its way into early modern versions of medical *consilia*, in which drug therapy had traditionally played only a small role. Clearly there had always been an interest in finding
effective remedies. In the sixteenth century, however, learned physicians began to be more comfortable with making broader statements about the efficacy of drugs despite continued concerns about the messiness and individuality of the human body.

Poison antidotes, as well, underwent an epistemological transformation in the fifteenth and sixteenth centuries that influenced the way they were tested. As Gibbs has shown, fifteenth-century Italian physicians developed a more sophisticated theory of poison’s action on the body. To account for the deadly effects of a small amount of poison, Avicenna had theorized that some substances had occult properties that went beyond their Galenic complexions, a phenomenon he called “total substance” or “specific form.” Poisons, he thought, could function either through their primary complexions or through their specific form.\textsuperscript{43} Physicians in the fifteenth century fleshed out this notion of specific form, which provided an explanation that circumvented the Galenic theory of the humors and allowed for a more universalizing approach to curing poison.\textsuperscript{44} Simultaneously, many physicians began to see poison as a source of diseases beyond plague, with which it had long been connected. The exact workings of various poisons—and poisonous diseases—on the body became the subject of extensive discussion and debate.\textsuperscript{45}

This growing emphasis on poison engendered an expansive interest in antidotes, and, in particular, antidote cure-alls. Just as one poison could cause the same effects on people of different complexions, so too could one antidote work to expel poison in differing bodily types and for different types of poison. As Gibbs has noted, physicians’ treatises on poison increasingly tended to recommend cure-alls, since universal antidotes would take care of all poisons without the physician having to figure out specifically which one was responsible for a given case.\textsuperscript{46} Antidotes that had long been considered cure-alls, like theriac, mithridatium,
bezoar, emerald, and “unicorn horn” (narwhal tusk), gained new importance, and new antidotes usually were advertised as cure-alls. These medical theories, combined with the growing interest in investigating medical particulars, set the stage for a major revival and expansion of the poison trial.

Early Modern Poison Trials

Notably, the first known example of this expansion comes from Rome under Pope Clement VII, an important site of anatomical experimentation. Bodies of condemned criminals were used for anatomical dissection, an established practice that may have opened the door for their use in poison trials. In August 1524, Pope Clement VII directed his medical personnel to test an antidote oil created by the surgeon Gregorio Caravita, which allegedly could drive out all poisons and also cure plague. He granted them two “condemned bodies”—Corsican criminals sentenced to death by beheading—for the trial. Both men were given a strong dose of the deadly herb wolfsbane (aconitum napellus). Soon thereafter, the prisoners started to make frantic gestures, a sign that the poison had taken effect. Caravita then anointed one prisoner with the oil, after which he recovered. The other, a “savage spirit,” was given no antidote and died in much agony. A second successful test was conducted on a Mantuan prisoner given arsenic. Soon thereafter, a pamphlet addressed to “all good mortals” was published in Clement’s name, signed by the physician Paolo Giovio, the apothecary Tomasso Bigliotti, and the senator Pietro Borghese. It described the poison trials and the apparent success of Caravita’s oil as a public service for people affected by poison or plague.
This contrived trial—and the report it generated—represented a new twist on longstanding traditions. It followed Galen’s convention of using two test subjects, but it gruesomely used humans rather than animals, harkening back to the days of King Mithridates VI. Instead of proposing the trial of Caravita’s oil as a theoretical test, as in the medieval trials, the document described an event that had happened. Importantly, it portrayed this anecdote as legitimate medical evidence. The trial’s status was further strengthened when Mattioli included it in his Discorsi (1544), a commentary on the canonical herbal of first-century Greek physician Dioscorides and one of the most influential medical books of the sixteenth century. In a chapter describing the lethal properties of the herb aconitum napellus, Mattioli related the incident as an “experience” and a “historia” he had witnessed as a young man in Rome, when he was studying with Caravita.49 His main point in relating the anecdote was to underscore the poisonous nature of napellus rather than the value of Caravita’s oil, but he made it clear that Clement’s physicians had demonstrated the oil’s efficacy.50

This new kind of poison trial caught on quickly. Following Clement’s trials, other courts began to conduct similar poison trials on condemned criminals. Tests were conducted in Bologna and Modena in 1539–40. The court of Cosimo I de’ Medici and his son Francesco I in Florence appears to have been a site of testing on humans in the 1560s and 1570s. A series of poison trials on criminals took place at the courts of Emperor Ferdinand I in Prague and Vienna in the early 1560s, including the bezoar tests described by Claudius Richardus. In addition to Richardus’s descriptions, later editions of Mattioli’s herbal mention a trial conducted in Prague in 1561, which was also witnessed by Mattioli’s friend and German translator, Bohemian physician Georg Handsch.51 French surgeon Ambroise Paré famously conducted a test at the Parisian court in
1566, and the German Count Wolfgang II of Hohenlohe tested an antidote on a condemned criminal in 1581. There were almost certainly additional trials on top of these. The ethical, legal, and religious implications of conducting poison trials on condemned criminals were complex, and the trials were only held at the courts of powerful princes. Enough descriptions survive, however, to make it clear that physicians were nearly always present (with the potential exception of Paré’s trial), and they took the trials seriously enough to communicate the results thoroughly in writing and, frequently, use them as evidence.

Not all Renaissance poison trials were conducted on humans: dogs were frequently used as test subjects, as were birds such as chickens or pigeons. The trials on humans tended to be more spectacular and more likely to receive extensive descriptions in medical texts, but anecdotes describing animal trials were used as evidence as well, particularly in medical texts tied to the trade in exotic drugs. As global trade networks expanded to the east and west, exotic drugs became increasingly important commodities, and poison trials could provide evidence of the supposedly wondrous nature of antidotes such as bezoar and unicorn horn. For example, Monardes wrote of a Venetian merchant who, in order to show the value of a piece of unicorn horn he was selling, conducted a poison trial using two chickens. The trial was only semi-successful: the chicken given the antidote died after two days, while the chicken given only poison died within 15 minutes. Monardes, with typical optimism, speculated that it would work better on a human. The Portuguese physician Garcia da Orta (1501–68), who spent the latter half of his life in Goa and published a treatise on Indian drugs in 1563, noted that “proven unicorn horn” (unicornó experimentado) always sold for a hefty price in India. Orta also related an anecdote he had heard from a person of “good repute,” in which rhinoceros horn was tested
on two dogs poisoned with arsenic; only the dog given the antidote survived. These trials resembled the medieval trials on theriac in their use of two animal test subjects, but they were described as events that had happened—as anecdotes, not as theoretical possibilities. The main point of including these two poison trials in the authors’ respective texts was to underscore the drug’s efficacy, not its authenticity.

Other poison trials specifically aimed to show authenticity, as Orta’s mention of “proven” unicorn horn suggests. As Valentina Pugliano’s essay in this issue shows, there were great concerns about obtaining authentic drugs, and exotic poison antidotes were particularly open to claims of fraud. Treatises on bezoar stone by German physicians Johann Wittich (1589) and Christoph Hybele or Hieblin (1598) both described tests to determine the authenticity of bezoar, explicitly noting the high incidence of fraud by both Portuguese and Indian traders. Hybele in particular drew heavily on his own personal experience in the Portuguese colonies of Goa and Cochin, where he portrayed testing as the norm. In relating an elaborate fraud allegedly perpetrated by a Jewish merchant, he concluded, “all those who understood and tested it did not buy it.” Wittich warned that the Lisbon merchants “do not want to let people test [bezoars] to see if they are authentic or not,” but he suggested that one nevertheless conduct a trial by passing a needle and thread through the deadly herb balestra (hellebore) and then through the leg of a dog. If the dog survived, “[the bezoar] is authentic. But if the dog dies, it is false.” As in the ancient and medieval trials on theriac, the underlying assumption in these cases was that bezoar worked if one had an authentic exemplar. The inclusion of such anecdotes suggests that they had discursive authority in medical-commercial spheres—and indeed, the commercial context was almost certainly a crucial background to all of the poison trials discussed in this essay. However,
these poison trial anecdotes about testing exotic drugs on animals tended to be brief and not particularly central to the author’s text.

“More Certain of the Trial”

In contrast, descriptions of the new human poison trials in medical texts became more complex and varied. Nearly all went into far greater detail on the specifics of the tests than their ancient and medieval predecessors. In the course of the 1560s to 1580s, authors developed three new techniques: first, minute observation and accounting of the symptoms the test subject suffered; second, the conditioning of the condemned prisoner’s body ahead of the trial in order to make the result clearer; and third, an expansion of the number of test subjects in animal trials. One can see a clear example of the first development in Mattioli’s account of the trial he had witnessed at the imperial court in Prague in December 1561, which he added in later editions of his Discorsi and which was far more extensive than his brief description of the 1524 trial in Rome. This trial tested the efficacy of a “famous poison powder”—later revealed to be the special antidote of Mattioli’s patron, Archduke Ferdinand of Tyrol.58 The powder had been proven in an earlier trial in which the archduke’s physicians had given a condemned criminal arsenic, followed by the powder, and the man had survived and been set free. The physicians now wanted to see if it also worked against the deadly herb napellus. According to Handsch, who was also present at the trial, the prisoner chosen was “a strong young man who had squandered his life through thievery” and was to be hung the next morning.59 Mattioli noted that the man agreed willingly in the hopes that “we physicians might save his life” as in the case of the previous test subject.60
The trial went awry from the start, as Mattioli described in excruciating detail. A dose of napellus was fetched from the Bohemian mountains, and the prisoner was given a quarter lot (around four grams) of the powdered root mixed with rose sugar, in the presence of “all of the Emperor’s physicians” and “other well known people.” After a half hour sitting in a warm room, the prisoner still felt nothing. The physicians worried that the colder climate made Bohemian napellus weaker than the Mediterranean plant described by Dioscorides and decided it would be wise to give the young man an added dose of the leaves and flowers. After more than two hours, he finally began to complain of “a great heaviness in the heart,” indicating that the poison was working. He was then given the archduke’s powder to drink in wine. As soon as he drank it, his eyes rolled back in his head gruesomely, he made an awful expression with his mouth, thrashed about, grabbed his throat—a sign that the poison and the antidote were fighting with one another. The doctors had a servant splash wine on his face and pull his hair, at which point he came to and defecated. They let him lie down on the straw in his cell, as he complained of being very cold, and then he vomited out “much stinking matter and water that was yellow and leaden-black in color.” After that he claimed to feel a bit better and turned on his side, but then “died quietly with no other movement, as if he were falling asleep.” Mattioli and his fellow physicians thus paid careful attention to each small detail of the trial: the dose, the kind of plant, and every symptom experienced by the poor criminal. The full account of the trial is even longer than the summary recorded here.

Mattioli used this careful accounting both to explain the action of napellus on the body and to provide a theory for the antidote’s ultimate failure to cure the unlucky thief. In this case, he did not believe the failure of the trial meant that the “the most glorious powder of the Serene
Archduke Ferdinand of Austria” was useless. Instead, he noted that the outcome came in part from the strength of the poison and in part from a very old batch of the powder.64 A trial that had started out as an attempt to demonstrate the efficacy of Archduke Ferdinand’s antidote ended with a statement about the toxicity of napellus. The close observation of the prisoner’s every reaction, couched as an epic struggle between poison and antidote, functioned as evidence of the herb’s deadliness. (The cynical observer might note that this narrative would have been far more comfortable for Mattioli than a statement about the failure of his patron’s signature remedy.) Not only did this description add significantly more detail than his account of the 1524 trial, it also reinforced and strengthened the value of such anecdotes. It provided a thorough account of a contrived experience and presented that experience as important evidence. As an aside, Mattioli also mentioned another concurrent and successful trial on napellus using bezoar, but he did not speculate as to why the bezoar succeeded where the archducal powder had failed.

Claudius Richardus, in contrast, provided an extremely thorough account of that successful bezoar trial, the first of his two descriptions of poison trials on condemned criminals. Richardus’s description, on the heels of Mattioli’s account, is particularly significant, because there was a clear attempt to make amends for the problem of the Bohemian napellus not taking effect. A young criminal condemned to be hung was given nothing but bread and water for a few days before the trial and received no food or drink on the evening that he took the poison, “so that from this . . . meager diet his body was very accessible to the poison, for the veins were free, all passageways wide open, and the poison could easily be spread to the most external appendages.”65 The man’s body was thus carefully prepared to better accept the poison. The condemned prisoner then took a quarter lot of the powdered root of napellus—significantly, the
exact same dose that had been given initially in the trial Mattioli described. In contrast to the previous case, the poison worked quickly. Following the dose, “the poor man felt great anxiety about the heart and pains in the stomach, and he felt his eyes were quite dark and everything spun around him.” His pulse slowed and became faint, and he exclaimed, “‘my lords, if you do not come to my aid, I will surely perish!’”66 In the eyes of all present, the poison had taken effect.

Following this plea, the doctors gave the prisoner five grains of bezoar stone dissolved in wine. As this warmed him, he felt better, but soon thereafter he vomited. This made him hope he was getting better, but Ricadus remarked, “I noted that the poison was now gathering in the stomach.” The prisoner soon complained of pain, his body swelled up as if he had dropsy, there was a hardness under his ribs and a pain in his kidneys, he could not urinate, one arm was lame, and he had a faint pulse. He vomited frequently, and when he had stools, he complained of a cold hardness, as if a stone lay in his stomach. Finally, “the poor man said he would rather be dead than live even a little longer and endure such pain,” which, Richardus once again speculated dispassionately, was made worse by the fact that he had a completely empty stomach “so that one could be more certain of the trial.” Nevertheless, the prisoner slept very well during the night, and in the morning he woke up and felt fine. “And he once again became hale and healthy and has also remained healthy. And the Emperor gave him his life, set him free, and gave him an honorarium.”67 Despite the prisoner’s vehement reaction to the poison, the trial was a success.

Once again, the description of symptoms was extensive, and it followed the poison from the heart to the stomach to the kidneys and intestines, before it left the body entirely. This progression was used in part to demonstrate the effects of the poison; the minute description of
the symptoms clearly helped feed the general interest in how poison worked. Richardus also emphasized not only that the decision to withhold food made the prisoner’s body more susceptible to the poison, but also that the prisoner’s empty stomach made his symptoms worse than they otherwise would have been. It also, however, described exactly how the antidote had worked, by driving the poison out through the digestive system (as shown by the vomiting and the cold, hard stools). The man’s intense suffering—and the proclamation that he would rather die than withstand such pain—had the added effect of making the antidote appear even more marvelous than otherwise.

This manipulation of the prisoner’s body continued in the second trial Richardus described, in which the power of bezoar to combat arsenic was tested on a thin, nineteen-year-old man. In the lead-up to this trial, which took place in Vienna on December 10, 1562, the criminal had been given “only a little” food, so that the man was “very meager and gaunt.” Richardus postulated that the prisoner would be particularly susceptible to poison given his “thin and scrawny” nature, a contrast to the “strong young man” mentioned in Mattioli’s trial. The Viennese criminal had also remained awake the entire night before the trial was conducted, although whether out of nerves or per the physicians’ request is not clear. This case proceeded similarly to the other two: the prisoner took a dose of arsenic mixed with ground sugar and soon became dizzy and felt a burning in his stomach and throat, “as is the nature and art of poison.” He then received ten grains of bezoar in bitter orange water, after which he went through various stages of painful cramps, vomiting, and bowel movements, which Richardus saw as essential to expel the poison. He had the prisoner take some meat broth “after the clock struck 12,” which he noted was five hours after the man had taken the poison, “that is at 7 o’clock,” but the prisoner
ate it with difficulty. This fight with the poison continued, but by the following evening the man was able to eat and sleep, and he recovered nicely.\textsuperscript{70} Once again, this anecdote was striking in its detailed accounting of the trial—including the specific hours of the clock and a particularly gruesome description of the patient’s symptoms.

As in Mattioli’s anecdotes about trying antidotes against napellus, these two poison trials used careful observational details to make an epistemological point. In this case, Richardus’s minute description of the patient’s symptoms emphasized the extreme level of suffering and, consequently, the near-miraculous effect of the bezoar. Richardus went one step further, moreover, by introducing the idea of certainty. His claim that the first prisoner was given very little food “so that one could be more certain of the trial” suggested the potential for the outcome to make a meaningful statement about bezoar’s efficacy, and his description of the second prisoner’s thin, scrawny body and his lack of both food and sleep reinforced this point. In his telling, the food deprivation allowed the physicians to be certain that the poison had taken effect—and would have been deadly but for the bezoar. The prisoners’ heightened suffering, however grisly, underscored the “kingly” nature of the antidote.

Obviously, we should not take these results or interpretations at face value. Bezoars were highly prized, exotic, and expensive, and Richardus was likely eager to “prove” the worth of a remedy in which Emperor Ferdinand was highly invested (both financially and figuratively).\textsuperscript{71} Conversely, Mattioli clearly wanted to avoid diminishing Archduke Ferdinand’s poison powder in his failed test. Poison trials were embedded in the commercial and political complexities of the craze for poison antidotes, and the anecdotes describing them show a certain amount of creative interpretation. Mattioli gave the failure of his trial little weight in determining the efficacy of
Archduke Ferdinand’s powder, instead placing his emphasis on the deadliness of napellus, while Richardus cited the success of the bezoar trials as near-certain evidence of its efficacy. Nevertheless, the extent of detail in the reports of the trials points to an interest in these tests that went beyond the context of patronage. After all, Mattioli did not have to include the failed trial of the archduke’s powder in his Discorsi. The detailed anecdotes suggest that there was a genuine interest in observing and communicating how poisons and antidotes worked on the body—a significant development from fifteenth-century texts on poisons, which only theorized such effects.

One final expansion of the poison trial model, in a test not on humans but on dogs, underscores this emphasis on observation and communication. This trial took place on the command of Landgrave Wilhelm of Hesse-Kassel, one of the great “prince-practitioners” of sixteenth-century Germany. It tested a new drug called Silesian terra sigillata, an astringent clay touted to be similar to the ancient terra sigillata from the island of Lemnos. The antidote came to general attention thanks to a jack-of-all-trades named Andreas Berthold, who began selling the drug in the western Holy Roman Empire in 1580. Berthold heralded the Silesian terra sigillata as a remedy for thirteen broad categories of illness, and he demonstrated its efficacy in a small trial on dogs in the city of Jülich, in a manner that closely resembled the Galenic trials. Two dogs were used, both were fed poison, and one was fed the antidote. The first dog died; the dog receiving the poison and the antidote lived. The test was conducted in the town square and could easily have been dismissed as a mere spectacle in the tradition of theriac sellers and charlatans. However, Berthold obtained an official certificate attesting to the trial’s success, signed and sealed by the town mayor and aldermen. He later appended this certificate to
his book on the drug, published in Latin 1583, as the first of three certified poison trials that built a case using the trial as testimony.\textsuperscript{76}

Berthold then moved on to Hesse, which was in the throes of a plague epidemic. In correspondence with Hessian town authorities, Landgrave Wilhelm was very active in directing the response to plague and in seeking effective remedies for the illness.\textsuperscript{77} Unsurprisingly, then, the landgrave was intrigued by the antidote, which Berthold claimed to be very useful against plague and other pestilential fevers as well as poison. He asked his physicians, Maritius Thaurus and Laurentius Hyperius, to “make a trial” (\textit{facerent periculum}) before he purchased any of it, “not trusting [Berthold] on his bare words.”\textsuperscript{78} The ensuing trial, using dogs, was far more extensive than any of the previous trials we have seen. Like the Galenic trials, it divided the animals into two groups—a group that received the antidote, and a group that received only poison. Rather than just testing the antidote’s effects against one kind of poison, however, eight dogs of different breeds and colors were chosen to test four different poisons: mercury sublimate, napellus, nerium (oleander), and apocynum (dogbane). In pairs, two dogs with roughly similar external features were given a lethal dose of poison—one the poison alone, and the other the poison plus a scruple of terra sigillata.\textsuperscript{79}

Wilhelm’s physicians expanded the Galenic trials not only in purview, but also in the manner in which the results were recorded and disseminated. His physicians produced a detailed report on the trial, which they termed an \textit{observatio}, a genre that, as Pomata and Park have noted, had once been used to refer to careful observations of the heavens.\textsuperscript{80} The physicians carefully noted the color, breed, and markings of each dog, the time of day of each instance of vomit, defecation, or cramping, and the ultimate outcome. In the case of the first pair, for example, “a
yellow-grey male dog was given a scruple of mercury sublimate and a scruple of terra sigillata between eight and nine *hora* in the morning, the same time as the other dogs were given [the poison and antidote]. Within half an hour after the second hour he vomited copiously. In the third hour he once again vomited bilious material, the same in the fourth hour, and he escaped (death) with no other serious harm.” The second dog, who received no antidote, was not so lucky, and his case received an even more thorough treatment:

A yellow and white cur was given a scruple of mercury sublimate and nothing else. Within half an hour he urinated and shortly thereafter defecated; after [another] half hour he fell to the ground with spasms; after they ceased he stood up panting and grinning for awhile, and soon there after again was taken with a convulsion and swelling in the belly. At one o’clock he suffered a violent convulsion and lay as though dead for a quarter of an hour. Half an hour after two, he began to move, and for half an hour he stood with deathly still feet. Between four and five he once again convulsed violently, and he died in the night.  

The other cases progressed similarly: all of the dogs who received poison and antidote survived; all of the dogs who received only poison died—save for one. A shaggy brown dog with a white tail given napellus and no antidote suffered for so long with such terrible paroxysms that the “most merciful” landgrave commanded he be given a half dose of terra sigillata. He too survived, building a seemingly overwhelming case for the efficacy of the antidote.  

The physicians’ *observatio* of the Hessian trial is striking in its thoroughness and in the careful attention to the timing of each specific event, including consistent reference to specific hours of the clock. Even more than in the case of Richardus’s letter, moreover, the report was
written to be shared with the broader medical community. Pomata describes the *observatio* as a genre that was “fundamentally geared to the goal of exchanging and circulating information within communities” in the sixteenth century.\(^{83}\) This *observatio* functioned partially as a testimonial regarding the success of the Silesian terra sigillata, and Berthold published it in his 1583 book.\(^{84}\) However, it also circulated to other German courts in handwritten copies. One scribal fair copy can be found in a recipe collection in Heidelberg, which belonged to Countess Palatinate Elizabeth of Saxony (1552–90).\(^{85}\) Letters from contemporary princes suggest that they, too, had read the report.\(^{86}\) Rather than an anecdote provided within a larger work, the Hessian *observatio* was a report unto itself. It represents one of the first detailed accounts of a contrived experience circulated expressly for the purpose of providing information and evidence.

The manuscript circulation of both Emperor Ferdinand’s and Landgrave Wilhelm’s poison trials—both of which eventually ended up being printed in Latin and translated into at least one vernacular language—underscores their perceived significance.\(^{87}\) The outcome presented in the Hessian physicians’ *observatio* was clearly taken very seriously, as it led to further testing. After reading the document, Countess Anna of Hohenlohe-Neuenstein bought some terra sigillata from Berthold. At her prompting, her son, Count Wolfgang II of Hohenlohe, then tried the antidote on a condemned criminal, to discover “if it works against on a person the same as on animals,” a statement that took at face value the evidence presented in the Hessian trial.\(^{88}\) Wolfgang also provided a testimonial letter for Berthold’s book.\(^{89}\) At the courts of Europe, where concerns about both malicious poisoning and plague were rampant, evidence of potentially effective antidotes was highly sought.\(^{90}\) The detailed accounts of the poison trials must be seen in this context of a search for reliable cures.
Conclusion: Anecdote, Experiment, and Trial

In the period between 1524 and 1580, the ancient genre of the poison trial experienced a makeover in both the way it was conceived and the way it was presented and circulated. Four major developments are worth highlighting: (1) an interest in producing experiential information on a variety of poison antidotes; (2) an increase in the number of recorded trials; (3) an expansion in recording practices; and (4) a new focus on sharing detailed information about the trials. In some cases, previous trials appear to have influenced either the manner in which a trial was conducted, as in Richardus’s trial in Prague, or whether it was conducted at all, as in the Hohenlohe trial. Poison trials thus began to carry more epistemic weight than the brief, theoretical trials included in Galen, Avicenna, and medieval European treatises. We could, potentially, begin to construct an argument about the development of the poison trial as a precursor to seventeenth-century experimental practices. In later Baconian categories, the trials certainly represented not “nature free and at large (when she is left to her own course and does her work her own way)” but rather “nature under constraint and vexed.”

That argument is complicated, however, by the intermixing of evidence drawn from therapeutic experience with poison trials. As already mentioned, Richardus made no sharp distinction between his two ill aristocrats and the trials on criminals that followed. He simply noted that Emperor Ferdinand had the bezoar tried in “four experiments [experimenta],” two in which the antidote “was given after poison” and two in which it was given “in grave illness.” All four “experiments” were related in excruciating detail, including a somewhat irreverent note that the ailing Counter-Reformation scholar Staphylus had produced “six large stools that were choleric and fetid” an hour and a half after taking the bezoar stone. In both the patient cases
and the trials, Richardus aimed to demonstrate how the bezoar purged poison (or poisonous diseases) from the body; in his account, all four cases presented a unified body of evidence.

Monardes’s description of bezoar included no poison trial, but it related a series of dramatic accounts of the antidote’s value in healing sick patients, including the miraculous recovery of a physician who was accidentally poisoned on two different occasions.94

Given the relative scarcity of poison trials, moreover, it is worth questioning the extent of their influence, in comparison to the wealth of anecdotes drawn from therapeutic experience. Much scholarship in the history of medicine in the past two decades has shown how anecdotal accounts of medical cures, recounted as historia, observationes, or experimenta, made a great impact on medical and scientific thought; indeed, Ann Blair has argued that historia should be seen as a precursor to the Baconian fact.95 Gianna Pomata has shown how the categories of observatio and historia merged, grew, and became genres in their own right in the later sixteenth century.96 The poison trial, however spectacular, never really took on a life of its own as an “epistemic genre” of the sort that Pomata describes.97 No texts devoted exclusively to poison trials were published. With the exception of the Hessian physicians’ observatio, trials remained supporting evidence in texts devoted to other purposes, whether herbals, general medical books, or treatises advertising specific drugs. Moreover, following the Hessian and Hohenlohe reports, accounts of poison antidote trials petered out. A century later, the question of how to properly test poison antidotes (and understand the results) remained unsettled—as shown by the famous dispute between physician Francisco Redi and Jesuit Anasthasius Kircher about testing snakestone in the 1660s.98
At the same time, sixteenth-century poison trials posed a number of questions that became ever more important in investigations of nature: the transferability of effects on animals to humans; the need to establish a deliberate, contrived trial in certain situations; the idea that a contrived trial could answer questions about natural phenomena that the ordinary course of nature could not. The peculiar status of poison as a substance that was linked to disease and affected the whole body through its specific form made results of poison antidote tests (both anecdote and trial) potentially more widely applicable than other experimenta. Moreover, the consistent use of the verb “to make” in descriptions of poison trials suggests at least some distinction from the usual process of gathering anecdotes. Mattioli wrote of making an experience (isperienza); Landgrave Wilhelm’s physicians wrote that their lord had commanded them to make an experiment (periculum). Count Wolfgang of Hohenlohe wrote more vaguely of “proving” the terra sigillata, but the 1587 English translation of Berthold’s book on terra sigillata cited both princes as wanting to “make a perfect trial.” Even if early modern physicians did not neatly divide therapeutic experience and trial, there certainly was some sense of the trial as an experience that was contrived or made, an outlook that would fit into the general early modern interest in “making knowledge” that Pamela Smith and others have highlighted.

In the long run, poison trials represented a small part of the wider bulk of evidence drawn from experience in early modern European medicine. Nevertheless, they were unique both in their contrived nature and in the strong knowledge claims presented in the trial accounts, whether they underscored the toxicity of an herb or the efficacy of an antidote. While the concept of testing antidotes faded, the study of poison on test subjects remained an enduring part of medical research and experimentation. Physician Johann Jacob Wepfer conducted extensive animal trials
using poison in the seventeenth century, and A. H. Maehle has found that toxicology was one of the most prominent topics of medical research in eighteenth-century scientific journals. Jutta Schickore’s recent book emphasizes the importance of toxicology to experimental method into the twentieth century. At the very least, then, sixteenth-century poison trials serve as a reminder that many elements of experiment long thought to originate with the mathematical sciences, and more recently attributed to alchemy, had roots in medicine as well.

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My thanks to the individuals who helped me improve this essay, including Elaine Leong, Sharon Strocchia, Katharine Park, and the three very helpful external peer reviewers. An earlier version of this article was presented as a colloquium talk to the Department of the History of Science at Harvard University, and I thank the members of the department for their astute comments and questions.


3 Anthony Grafton and Nancy G. Siraisi, eds., *Natural Particulars: Nature and the Disciplines in Renaissance Europe* (Cambridge, Mass.: MIT Press, 1999); Gianna Pomata and Nancy G.


5 Richardus appears to have had a close working relationship with physicians at Ferdinand’s court. In addition to his own mention of the physicians as part of the group conducting the poison trials, Mattioli mentioned him—and specified him as Ferdinand’s royal surgeon—as part of a group of physicians that dissected a beaver at the imperial court. Pietro Andrea Mattioli, *De i discorsi di m. Pietro Andrea Matthioli* (Venice, 1585), bk. II, chap. 23, p. 353.


Pietro Andrea Mattioli, *Di Pedacio Dioscoride Anazarbeo libri cinque della historia, & materia medicinale* (Venice, 1544). The work was translated into Latin in 1554, French in 1561, Czech in 1562, and German in 1563. Although the book was published under a number of different titles, *I Discorsi* were the first words of the most common Italian title from 1555.


18 Rankin, Panacea’s Daughters (n. 16), 111.
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19 Nicolás Monardes, *Primera y segunda y tercera partes de la historia medicinal de las cosas que se traen de nuestras Indias Occidentales que siruen en medicina* (Seville, 1574).


21 Nicolás Monardes, *Dos libros. El uno trata de todas las cosas que traen de nuestras Indias Occidentales . . . El otro libro, trata de dos medicines maravillosas que son contra todo veneno* (Seville, 1565).


23 Many of these methods now strike us as “folk” remedies, but they were included in many learned treatises with references to the Hippocratic *Aphorisms*. See, e.g., Johann Wittich, *Vade Mecum: Der ander Theil des kuenstlichen Newen Artzney-Buchs* (Leipzig, 1607), 41.

24 Mattioli, *Discorsi* (1585) (n. 5), 1153.


26 Quoted in McVaugh, “Experience-Based Medicine” (n. 12), 112.


30 Avicenna, *Liber canonis* (n. 29), 82r–v.

31 McVaugh, “Determining a Drug’s Properties” (n. 28), 7–12; McVaugh, “Experience-Based Medicine” (n. 12), 112, 119.

32 McVaugh, “*Experimenta* of Arnald of Villanova” (n. 22).

33 McVaugh, “Determining a Drug’s Properties” (n. 28).


35 Galen, *De theriaca ad Pisonem* (n. 34), chap. 2, 110.


37 There is a wealth of recent scholarship on medicinal recipes and the use of experience. See, for example, Rankin, *Panacea’s Daughters* (n. 16), esp. chaps. 1–2; Leong and Pennell, “Recipe Collections and the Currency of Medical Knowledge” (n. 16); Elaine Leong and Alisha Rankin, eds., *Secrets and Knowledge in Medicine and Science, 1500–1800* (Farnham, UK: Ashgate,


39 Cook, “New Philosophy and Medicine” (n. 13), 400.

40 Marburg professor Johann Dryander’s *Practicyr Büchlein*, for example, was a book of recipes with a preface justifying physicians’ use of experience. Johann Dryander, *Ein new Artzney und Practicyr Büchlein* (Frankfurt am Main, 1557).


42 In a consilium written for Elector August of Saxony in 1584, a doctor named Johann Goebels emphasized that “as long as I have practiced in my vocation, I have cured many people in the aforementioned illness . . . with the use of drugs.” Sächsische Landes- und Universitätsbibliothek Dresden, Ms. K350, fol. 27r–v.


44 Gibbs, “Poisonous Properties” (n. 9).

46 Gibbs, “Medical Understandings of Poison” (n. 43), 205.


48 *Testimonium de verissima ac admirabili virtute olei compositi contra pestem & omnia venena* (Rome, 1524).

49 Mattioli, *Discorsi* (n. 8), 1152–53. The French translation lists the date as 1524, “in the first year” of Clement’s rule. Pietro Andrea Mattioli, *Commentaires de M. Pierre André Matthiole . . . sur les six livres de Ped. Dioscoride* (Lyon, 1572), 587.

50 Mattioli, *Discorsi* (n. 8), 1152–53.

51 Handsch’s translation of Mattioli, which was published in Prague in 1563, takes some liberties with the original. Pietro Andrea Mattioli and Georg Handsch, *New Kreüterbuch* (Prague, 1563). Michael Stolberg has shown that Handsch recorded several Prague poison trials in his private notebooks. Stolberg, “Empiricism in Sixteenth-Century Medical Practice” (n. 3), 487–516, at 512.

52 A brief account of several poison trials can be found in Alfonso Corradi, “Degli esperimenti tossocologici in anima nobili nel cinquecento,” *Annali universali di medicina e chirurgica* 277 (1886): 73–100.
53 Monardes, *Dos libros* (n. 21), sig. l8r.

54 Garcia da Orta, *Coloquios dos simples, e drogas he cousas mediçinais da India* (Goa, 1563), 128v.

55 Both physicians drew heavily on Monardes and Orta, almost certainly via the Latin translations by Carolus Clusius, but they also added their own embellishments. Wittich, *Bericht* (n. 1), 4; Christoph Hieblin, *Tractat von der aller furtrefflichsten vnd kräftigsten Artzney wider allerley Gifft: welches der Stein Bezaar ist* (Konstanz am Bodensee, 1598), 24–27.


57 Wittich, *Bericht* (n. 1), 5.

58 Mattioli, *Discorsi* (n. 8), 1153.

59 The wording of Handsch’s translation is more elaborate here than Mattioli’s original. Mattioli and Handsch, *New Kreüterbuch* (n. 51), 472–73.

60 Mattioli, *Discorsi* (n. 8), 1153.

61 The information about the “well known people” was provided by Handsch; Mattioli only mentions the physicians. Ibid.; Mattioli and Handsch, *New Kreüterbuch* (n. 51), 473.

62 Mattioli, *Discorsi* (n. 8), 1153.


64 Mattioli, *Discorsi* (n. 8), 1153.

65 Wittich, *Bericht* (n. 1), 17.

66 Ibid., 17–18.

67 Ibid., 18.

68 Gibbs, “Medical Understandings of Poison” (n. 43), chap. 4.
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69 Ibid., 19.

70 Ibid., 19–21.

71 Borschberg, “Euro-Asian Trade in Bezoar Stones” (n. 1), 30; Stark, “Mounted Bezoar Stones” (n. 1).


74 Berthold, Terrae sigillatae (n. 73), C4r–v.

75 Thomas Holste, Der Theriakkrämer: Ein Beitrag zur Frühgeschichte der Arzneimittelwerbung, vol. 5, Würzburger medizinhistorische Forschungen (Pattensen, Germany: Horst Wellm Verlag, 1976); Gentilcore, Medical Charlatanism (n. 7), 176–226.

76 Berthold, Terrae sigillatae (n. 73), B4v.–D4v.

77 Hessisches Staatsarchiv Marburg, Bestand 17, 4750.

78 Berthold, Terrae sigillatae (n. 73), B4v.

79 Ibid., C1v–C2r.
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81 Berthold, *Terrae sigillatae* (n. 73), C2r.

82 Ibid.


84 Berthold, *Terrae sigillatae* (n. 73), C1v–C2r.

85 Cod. pal. germ. 177, fols. 16r–17r.

86 See, for example, a letter from Archbishop Gebhard of Cologne to Landgrave Wilhem’s brother Ludwig from November 1580. HStA Marburg, Bestand 4f Köln 84.

87 Berthold’s text was translated into English in 1587. It also appeared without the trial accounts in Wittich’s German book on wonder drugs, in which Richardus’s treatise can also be found. Andreas Berthold, *The Wonderfull and Strange Effect and Vertues of a New Terra Sigillata Lately Found Out in Germanie* (London, 1587); Wittich, *Bericht* (n. 1).

88 Hohenlohe Zentralarchiv Neuenstein, La5 Bü 400, Nr. 5.

89 Berthold, *Terrae sigillatae* (n. 73), C4r.

90 Rankin, “Empirics, Physicians, and Wonder Drugs” (n. 3); Holste, *Der Theriakkrämer* (n. 75).


93 Ibid., 625.

94 Hieblin, *Tractat* (n. 55), 38v–41r.

95 Blair, “Historia in Zwinger’s *Theatrum Humanae Vitae*” (n. 14), 283–89.
This is a preprint of an accepted article scheduled to appear in the *Bulletin of the History of Medicine*, vol. 91, no. 2 (Summer 2017). It has been copyedited but not paginated. Further edits are possible. Please check back for final article publication details.


97 Ibid., 54–59.


99 Mattioli, *Discorsi* (n. 8), 1152–53; Berthold, *Terrae sigillatae* (n. 73), B4r–v.

100 Berthold, *Wonderfull and Strange Effect* (n. 87), 28–33.
