

NANCY G. SIRAI SI

# The Clock and the Mirror

*Girolamo Cardano and  
Renaissance Medicine*



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GIROLAMO CARDANO AND  
RENAISSANCE MEDICINE

*Nancy G. Siraisi*

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PART TWO

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Theory and Practice



## Chapter 3

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### ARGUMENT AND EXPERIENCE

MANY of Cardano's ideas about the nature and sources of medical knowledge and the construction of medical theory, the subject of this chapter, were a product of his early academic training in Aristotelian natural philosophy and Hippocratic-Galenic medicine. But in important respects his response to intellectual assumptions built in to the philosophical and medical system in which he was educated was also subversive. His medicine was in most respects Galenic, but he was strongly critical of particular doctrines of Galen. He worked in standard genres of medical writing but used some of them in idiosyncratic ways. As reader and writer of medical books he was a collector and producer of texts and profoundly respectful of textual authority—but the textual authority was sometimes his own, and he also constantly claimed a privileged role for “experience.” His characteristic attitudes appeared early: “In the year 1526, when I was at Sacco . . . I wrote out for myself a pretty big collection of passages from different authors, which was of almost no use to me”; “I wrote a work on the epidemics that occurred between 1526 and 1533, which begins, ‘On September 24, 1526, which was my birthday, I went to Sacco.’”<sup>1</sup> His practice of periodically sorting through his constant flow of writings, destroying some and incorporating others into different treatises, has ensured that neither of the two works mentioned has survived as an independent publication or recognizable entity. But these reminiscences, written down many years later, of his activities as a young practitioner capture enduring features of his medical science. They show him diligently forming two collections: one of authoritative but also strongly criticized texts; the other of “experiences.”

One project that he began in the Sacco years or even earlier and that occupied him, on and off, for much of the rest of his life was the *Contradicentium medicorum libri*, a collection of citations and arguments about issues on which standard medical authorities differed. As noted in the previous chapter, the first octavo volume of *Contradictiones* appeared in print in 1545; a second edition, doubled in length, appeared in 1548. The dates of publication of the first two editions, both within five years of Cardano's receiving his chair at the University of Pavia, probably reflect his determination to publish a work appropriate to a

professor of medical theory as soon as possible after his appointment. The dedication of the work to the Senate of Milan, which controlled professorial appointments to the University of Pavia, is further evidence that the timing of the publication was not coincidental. The *Contradictiones* is also one of very few medical works of any kind that he actually published during the 1540s and 1550s when, simultaneously, his medical career at Milan and Pavia was at its height and he was at his most productive in disciplines other than medicine.<sup>2</sup> But Cardano continued to enlarge the collection long thereafter. By the end of his life it had grown almost as long as both his encyclopedic works combined.<sup>3</sup> In the amount of effort the author devoted to it, this must be rated one of his major works. And although plenty of controversies are incorporated into his medical writings in other genres (most of them treatises on practice or Hippocratic commentaries), the *Contradictiones* is the only work in which he focused exclusively on the analysis of controversies in medicine.

The *Contradictiones* is at once a key text for Cardano's ideas about medical knowledge and a prime example of the multiple and often confusing strands in his thought. Alfonso Ingegno has rightly drawn attention to the presence in it of essential aspects of Cardano's philosophy of nature and a strongly revisionist approach to medicine.<sup>4</sup> Other features are consonant with traditions in Latin medicine extending back to the thirteenth century. Not all the ambiguities can be resolved; the project was not necessarily in every respect a coherent one. Yet the work casts much light on Cardano's agenda as a medical reader, teacher, and writer. In this chapter, I shall draw on it to explore, first, the process of assembling the collection; then, in turn, his ambivalent relation to Latin scholastic medicine; the functions that he may have envisaged for the *Contradictiones* in aiding reading, memory, and debate; his understanding of the roles of textual authority and experience in the construction of medical theory; and, finally, the extent to which he was prepared to allow his general (and in some instances radical) philosophical ideas to drive his medical theory.

#### COLLECTING TEXTS, COLLECTING EVENTS

As his remarks quoted above indicate, in the same period in which he was beginning to amass the texts for the *Contradictiones* Cardano was also collecting events that he had personally experienced in his capacity as a practitioner. The diseases that occurred at Sacco between 1526 and 1533 were also to be sources of medical knowledge. No doubt his fascination with the analysis of all aspects of his personal experience had already led him to begin what would presumably be a lifelong practice of keeping notes or some form of journal. His accounts of his illnesses, his

year-by-year chronicle of his literary activities, and his lists of those who had written well and ill of him were evidently all, like the record of his dreams, the result of a habit of note taking (see chapter 8).

In principle, the combination of attention to experience and bookish compilation from authors was fully congruent with the existing system of medical knowledge. Medicine was held to include both general and universally applicable theory and innumerable disparate pieces of information about diseases, remedies, and patients. Theory was supposedly arrived at by a combination of reason, reliance on textual authority, and experience but in actuality mostly by arguing about texts; many of the details of recommended practice were allegedly the fruit of "experience" (without distinction between ancient and contemporary or between personal and reported experience). What remained unclear, despite much scholastic discussion, was the relation between the two categories of knowledge.<sup>5</sup> But in thirteenth- to fifteenth-century Latin medicine accounts that claimed to be related to some form of experience had a well-established place and took various forms. They included *experimenta* (in most instances, allegedly proven medicinal recipes), *exempla* (occasional illustrative anecdotes, not necessarily based on the writer's own experience), and *consilia* (advice given to individual patients, often preserved in standardized and edited collections). By the fifteenth century, moreover, a good deal of evidence points to growing interest among medical practitioners in details of practice, in the individual and the particular, and in a few cases in the record of personal experience.<sup>6</sup> Nevertheless, Cardano's desire to record the diseases that afflicted Sacco in the years when he lived there was novel, and indeed radical, because it reflected three concerns peculiarly his own that would remain with him for the rest of his life: endeavors to analyze the significance of contingent events; the autobiographical and astrological commitment that led him to introduce his own birthday into a town's medical record; and pioneering interest in the Hippocratic *Epidemics*.<sup>7</sup>

Thus Cardano's interest in the epistemological status of particulars in medicine and in framing rules for practice on the basis of analysis of experience cannot be divorced, either chronologically or conceptually, from his approach to textual authority. His interest, in medicine as in various other disciplines, in the problem of the relation between particular instances and general theory seldom or never involved repudiation of reliance on texts or ancient authority. Rather, he selected, manipulated, and juxtaposed texts according to his own preferences or substituted one authority for another. Cardano's mathematical ability, interest in technology, and endeavors to restructure knowledge set him apart from most other humanistically educated intellectuals of the period. Nevertheless, he as much as any of them was the product of a bookish

and verbal philosophical, natural scientific, and medical culture in which ancient texts provided much of the currency for intellectual exchange.

The enterprise of collecting points on which authorities disagreed began in a logical or philosophical, not a medical, context during his student years. While he was a student at Padua, he compiled a set of 100 points of difference between the teaching on dialectic of Aristotle and Averroes.<sup>8</sup> About the same time he started to collect differences among medical authorities or between Galenic physicians and Aristotelian philosophers. By 1531, he had accumulated almost 400 such differences, and by 1543 he had in hand the material for a work in twelve books.<sup>9</sup> The volume containing one book of 108 differences published in 1545 therefore comprised only a fraction of what he had amassed by that point. But parts of the published Book 2, added in the edition of 1548, were evidently written, or rewritten, after the publication of Book 1.<sup>10</sup> Eight more books survive in a version that includes additions or revisions made in the 1550s or early 1560s; with the exception of a short excerpt from Book 3, these books were printed for the first and last time as part of Cardano's collected *Opera* long after his death.<sup>11</sup>

In the form in which Cardano published it, the work incorporates elements of several different genres and conveys several different messages. Most strikingly, it presents scholastic and verbal analysis, as exemplified by the *Conciliator differentiarum philosophorum et medicorum* of Pietro d'Abano (d. 1316), and the brand-new tool of Vesalian anatomy as two equally effective and in some sense parallel methods for a critique of authoritative medical texts. Thus the preface to the first edition of 1545 declares, "There is no need for me to list those who came before us, who treated these things lightly and listlessly, except one, the Conciliator, and in dissection Vesalius."<sup>12</sup> At the same time, the format of a collection of discrete short treatments of controversial topics gave Cardano scope to intersperse long essays on his own philosophical views as they related to medicine, or on aspects of medicine of particular interest to him, among many shorter routine summaries.

#### CONTRADICENTES AND CONCILIATOR

Pietro d'Abano was the most celebrated professor of the medieval *studium* of Padua, equally famous for his medical, philosophical, and astrological learning. The *Conciliator*, his principal work, is a collection of scholastic *quaestiones*. Most of them concern debated issues within medicine, many of them of a practical variety ("should one give wine to fever patients?"); some, as the title indicates, concern issues equally pertinent to philosophy and medicine—both specific problems arising from the differences in the physiological teaching of Aristotle and Galen and more

abstract issues concerning, for example, the proper understanding of terms such as “substance,” “accident,” and “form” in relation to the human body. As the title also indicates, the method is the normal scholastic one of laying out views of authorities, with the goal of harmonization. But Pietro also devoted lengthy passages to the exposition of an all-encompassing astrological worldview. He was, for example, one of the most explicit proponents of the idea—which originally reached the West from works of the ninth-century Arabic astrologer Albumasar (Abu ‘Mashar) translated into Latin during the twelfth century—that conjunctions of the planets determined the times in history at which great religious leaders appeared.<sup>13</sup>

In choosing a title emphasizing contradictions, Cardano seems both to allude to the *Conciliator* and to signal an intention to subvert it. Yet his remark about his predecessors suggests that one legitimate reading of the title of the *Contradicentium medicorum libri* is as an homage to, not repudiation of, Pietro d’Abano. The idea of emulating or surpassing Pietro emerges in his statement that the collection of contradictions that he had accumulated by 1531 was “almost as big as the *Conciliator*.”<sup>14</sup> Moreover, since Cardano initiated his project as early as the 1520s, the relation to the *Conciliator* long antedates his acquaintance with the work of Vesalius.

Obviously, Cardano was drawn to the *Conciliator* by its author’s reputation as an astrologer and as an extreme exponent of occult but naturalistic and astrological determinants in human affairs. These were areas of inquiry to which Cardano himself was profoundly committed. Pietro d’Abano was in fact one of his chief predecessors in exploring such potentially hazardous topics as the horoscope of religions. But whereas Pietro had confined himself to general statements about the responsibility of conjunctions of the planets for the rise of religious leaders, Cardano went so far as to cast the horoscope of Christ.<sup>15</sup> More generally, both authors shared an interest in astrological history.

But although Cardano’s own astrological and related interests gave him special reason to appreciate Pietro d’Abano, his familiarity with a major work of scholastic medicine was scarcely unusual among the generation of physicians educated in Italian universities in the 1520s. By that time the advent of, and vogue for, medical Hellenism had led in advanced medical circles to a great deal of loudly expressed contempt for Arabo-Latin scholastic medicine. The printing history of works in the last category tells a different story. Among Arabic authors, Rasis and, especially, Avicenna continued to be read. Scholastic medical commentaries by authors who flourished in the fourteenth- and fifteenth-century Italian faculties of medicine were available in numerous printed editions and frequently reissued until at least about the 1520s.<sup>16</sup> Moreover, as

the most famous—and in some respects notorious—philosopher, astrologer, and physician of the early history of the University of Padua, Pietro d'Abano seems to have held his place in the canon of medical literature for longer than most scholastic authors, since several editions of the *Conciliator* were published after 1540.<sup>17</sup>

But Cardano drew a sharp distinction between Pietro d'Abano and later-fourteenth- and fifteenth-century scholastic medical authors. In part, this distinction was connected with his desire to counter the knee-jerk anti-Arabism that so often accompanied medical Hellenism. He thought that the way to do this was to distinguish the important contributions of the Arabs and Pietro d'Abano from the inanities of later medical scholasticism. In 1548, he wrote: "I have not despised the opinion, reasonings, and *experimenta* of the Arabs. Was it fitting for very learned men and excellent philosophers to be scorned solely on account of roughness in language or poor translators? . . . I admit Jacobus [Giacomo da Forlì] and Ugo [Benzi] and the crowd full of chimerical apparitions that Gentile [da Foligno] stirred up contributed little to medicine. But what do you have in the *Conciliator*, Avicenna, and Rasis besides language—which was the calamity of the region or the age—that is unequal to your own outstanding findings? What can be compared with the subtlety of Averroes, with the judgment of Avicenna, with the gravity of Rasis, with the doctrine of the *Conciliator*?"<sup>18</sup>

One medical topic explored by Pietro d'Abano that was also of great interest to Cardano was that of the perfect temperament (that is, combination of elementary qualities). Ingegno has drawn attention to the central significance of this aspect of the medical concept of temperament for Cardano's understanding of subtlety and the attributes of specially gifted people.<sup>19</sup> Galenic theory held that mankind is the most temperate of all animals. This idea was problematic in itself, since it could be argued that the mixture of qualities most suited for human function was not a perfectly temperate balance among hot and cold, wet and dry. The Aristotelian view was that animals were characterized by heat and moisture and mankind more so than any others. But the question also arose as to whether perfect temperament, however defined, was a purely notional standard from which every individual human being deviated to a greater or lesser extent, or whether an individual with perfect temperament could ever actually exist.<sup>20</sup> The discussion of the issue in the *Conciliator* threads its way through the intricacies of the late medieval theory of temperament (in medieval Latin, *complexio*)—the subject of endless scholastic discussions—to make two striking contributions to the development of the theme of human perfection. Pietro drew attention to Galen's use of the story of the statue of Polykleitos, so well proportioned that it served as a standard, or canon, of human perfection, a pas-

sage of Galen that later interested Vesalius as well as Cardano. In addition Pietro noted that those rare prophets and founders of religions whose occasional appearance was made possible by extremely unusual celestial conditions were also endowed with perfection of temperament, adding that “some people” cited as examples Moses and Christ.<sup>21</sup>

Cardano’s own fascination with the idea of a human being with perfect temperament led him to devote two long *contradictiones* to the subject.<sup>22</sup> In the first of these, he reproached Pietro d’Abano—and Pomponazzi—for discussing Christ in terms of naturalistic physiological theory, a reproach that may seem somewhat odd coming from someone who would later publish a horoscope of Christ.<sup>23</sup> Perhaps his restraint in this instance was due to the link between the publication of the *Contradictiones* and his appointment to a university teaching position. Although Cardano questioned the idea that the proper or ideal human temperament was a perfectly temperate balance of qualities on the grounds that heat and moisture predominate in all animals, he asserted both that it approached such a balance and that certain rare individuals could actually possess it.

He next sought to establish that a temperamentally perfect human body would actually be perfect in all its operations. In order to do so, he disposed—at any rate to his own satisfaction—of some fairly powerful pragmatic and theoretical objections: the superior speed and ability, as compared to human beings, of some animals; the Galenic teaching that a warm and hot, not a perfectly balanced, temperament was most conducive to longevity; and the universal susceptibility of even the best-tempered human bodies to disease. His conclusion, again calling upon Galen’s analogy of the statue of Polykleitos, was that the presence of numerous superior human qualities in one individual were signs of temperamental perfection. These qualities were both physical and intellectual. In a temperamentally perfect person unusual ability to overcome disease, exceptionally acute senses, and longevity would be allied to in-born skill (*ingenium*) exceeding that of Archimedes, oratorical gifts greater than those of Cicero, and the ability to “do many other innumerable things all of which would be taken for miracles.”<sup>24</sup> As Ingegno has pointed out, the Galenic idea of balanced temperament as a mean (according to which mankind was at a midpoint as regards other animals, all of which were supposedly either hotter, wetter, colder, or drier, and the palm of the hand was similarly at a midpoint as compared to the other parts of the human body) has here given way to the idea of perfect temperament as the summit of human perfection. Of course, the image of the canon of Polykleitos—also supplied by Galen—lent itself to the latter interpretation. Perhaps, as Ingegno further suggests, Cardano did after all have the qualities of Christ in mind—and may well also have

seen himself among the rare and exceptionally privileged group of the temperamentally perfect.<sup>25</sup>

In addition to praising Pietro d'Abano in the preface and sharing his astrological and related interests, Cardano also repeatedly cited the *Conciliator* throughout the *Contradictiones*. For all that, the *Conciliator* served him as a model only in a very limited sense. He did not imitate its organization and often had goals other than reconciliation of authorities in mind. A telling example is provided by his positioning and treatment of some of the same questions that open the *Conciliator*. Pietro d'Abano began his work with a series of ten lengthy questions about the nature of medical knowledge and the place of medicine in the scheme of the arts and sciences. The practice, which became standard, of discussing these topics at the beginning of commentaries or general works on medicine reflects their fundamental importance to scholastic medical theory. The issues addressed in such questions included whether or not medicine, or any part of it, could be considered a science (*scientia*) in the Aristotelian sense of offering certain knowledge of universal truths arrived at by rational demonstration from generally accepted premises; whether, instead, medicine or some part of it should be considered an art with a practical goal; whether the subject of medicine was the study of the human body or the achievement of health; what was the relation of medical theory and medical practice; and whether medicine should make use of logic, the tool par excellence of medieval natural philosophy. Thirteenth- to fifteenth-century medical writers often ended up by claiming that medicine was both *ars* and *scientia*, but that medical theory, which overlapped with natural philosophy, was the part closest to *scientia* (Pietro d'Abano thought the latter was true only in a loose sense, and that much in medical theory rested on conjecture).<sup>26</sup> These and similar questions were usually dealt with in highly abstract philosophical terms, but they were not of purely philosophical significance. They had broad implications not only for the epistemological status of the discipline, but also for the social and intellectual status of its practitioners in the academic milieu.

Three of the same questions discussed in the opening pages of the *Conciliator* also appear in the *Contradictiones*, namely, "Whether a physician should know logic"; "Whether medicine is a science"; and "Whether the human body is the subject of medicine."<sup>27</sup> Both authors use some of the same citations on each side of the various issues; moreover, Cardano's citations of the *Conciliator* make it clear that he had attentively studied the corresponding sections. Yet in Cardano's hands, these topics have completely lost their privileged position. They are scattered at random, rather than grouped at the beginning; and, as com-

pared with the treatment in the *Conciliator*, they are greatly abbreviated. Formal exposition of medicine's place among the disciplines was evidently simply not of much interest (it was, after all, a very well worn subject). Instead, Cardano used these brief questions to bring in some of his own concerns. He declared that medicine was a science; he likened it, however, not to natural philosophy but to mathematical disciplines, which were simultaneously sciences directed toward action and arts: "I say therefore that a science directed toward *opus* is really an art whenever logical demonstration is not involved, as is the case with medicine and music [*Dico igitur, quod scientia quae ad opus tendit sublata demonstratione est vere ars, ut medicina et musica*]." He ended the question on the subject of medicine by comparing music, geometry, astrology, and medicine. His remarks reflect both contemporary interest in the question of the certitude of mathematics and his own persistent interest in parallels between the epistemology of astrology and that of medicine.<sup>28</sup> He asserted that practitioners in all these fields were simultaneously experts in a science (*scientes*) and artificers; but the *scientia* of music, geometry, or astrology involved knowledge of an unchanging and essential reality—that is, musical harmonies and mathematical relationships—that remained unaffected by the practitioners' activities or operations. But "since a *medicus* is a man of science and not a pure artificer and [yet] has to have an effect on his subject by his work, and the subject does not stay constant in one condition on account of matter: the *medicus* alone among all experts in a science is compelled to judge from sense, not from the truth of the thing." Something of the same idea emerges from his statement in another *contradictio* that medicine was certain in and of itself, although conjectural in actual practice. Elsewhere, he opined that as far as knowledge obtainable by human beings in this world was concerned, medicine was more certain than natural philosophy, astrology, and theology—in that order.<sup>29</sup>

Again, Pietro d'Abano's handling of the question about the use of logic in medicine turned on the distinction between instrumental logic and logic as a speculative discipline in its own right, and justified the use of the former. In Cardano's version medicine is said to have its own *ratio inquirendi*, which, unlike that of philosophy, is not directed toward universal conclusions. The same question also provided him with the opportunity to counter humanist critics who objected to the continued use of *quaestiones dialecticae*, or disputed questions, in medicine (that is, precisely, the format of the *Contradictiones*), citing Galen's objections to useless dialectic in support of their argument. According to Cardano, Galen's criticism had actually been directed at inquiry based on medical principles but not directed toward medical purposes; such inquiry, while

valid in itself, should indeed be excluded from medicine. With a touch that seems typical of him, he chose as an example of this category Book 3 of the Aristotelian *Problemata*, which is devoted to problems connected with wine drinking and drunkenness.<sup>30</sup>

#### READING, MEMORY, AND DEBATE

Considered as a collection of disputed questions, the *Contradictiones* belongs to a tradition of question literature that extends far beyond the *Conciliator*. Furthermore, many of the individual topics are well-worn favorites discussed by a long series of earlier authors. The presence of *quaestiones* embedded in commentaries, the circulation of independent *quaestiones*, and the compilation of collections all became standard features of Latin medical literature in the fourteenth and fifteenth centuries. The origins of the genre lay in the coming together of the tradition of “natural questions,” with antecedents stretching back to antiquity, and practices of scholastic disputation first developed in other faculties of the thirteenth-century universities.<sup>31</sup> Of course, some *quaestiones* reflected local and particular controversies. But when standard topics were discussed—for example, “Whether the heart is the only principal member?”<sup>32</sup>—they also served the purpose of familiarizing the reader with a specific set of issues considered to be of importance and with the positions of the main authorities (in this case, the different views of Aristotle and Galen on the role of the heart). Cardano described another work of his, which does not appear to survive but which was evidently connected in goals and perhaps content with the *Contradictiones*, as follows: “[In 1536], I wrote two *Libri floridorum*, that is, of medical disputations. . . . The special and very great use of the book is that it teaches very difficult medical questions with simple exposition. We also followed an easy order, as is very necessary if you have regard to the subject matter, as without knowledge of these things it is not possible to be a physician.”<sup>33</sup>

As this remark suggests, the usefulness of *quaestiones* in medicine was in part simply as a device for organizing knowledge. As Cardano put it, referring to the *Contradictiones*, “These books were necessary, indeed useful, so that memory of many authors could be gathered together at once.”<sup>34</sup> The acquisition of medical as of most other learning in the sixteenth century consisted chiefly of gaining control of a large body of reading. Whatever the ambiguities of the *Contradictiones*, one thing the work reveals with striking clarity is the extent of Cardano’s mastery of ancient, medieval, and contemporary medical literature and his continuous and assiduous efforts to update his medical reading. He was, as one

might expect, thoroughly familiar with the Renaissance Latin editions of Galen, Celsus, and other ancient medical writers. He also knew the literature of medieval medicine very well: not only the Arabs and Pietro d'Abano, but such luminaries of the thirteenth- and early-fourteenth-century Bologna school as Taddeo Alderotti, Turisanus, and Dino del Garbo, as well as the more recent scholastics—Gentile da Foligno, Giacomo da Forli, and Ugo Benzi—whom he sometimes professed to despise.<sup>35</sup> Some of his remarks seem to imply that he seized on Fabio Calvo's translation of the Hippocratic corpus, which made a number of important works ascribed to Hippocrates readily available in Latin for the first time, almost immediately after it was published in 1525.<sup>36</sup> Cardano's Greek was acquired in middle age. He began to study the language in 1535 but only took it up intensively in 1541 (when he was warned in a dream to do so); by the time Book 1 of the *Contradictiones* was ready for publication, it showed evidence of his reading of Greek medical texts.<sup>37</sup> The remarkable rapidity with which he absorbed the central message of Vesalius's *Fabrica* within a year of its first publication has already been noted.

His reading in ancient and modern authors on topics other than medicine was dauntingly wide, much wider, no doubt, than that of most of his medical colleagues. Thorough knowledge of Aristotelian philosophy and of Aristotelian commentators from Alexander of Aphrodisias to Pomponazzi was perhaps to be expected from anyone educated at Padua in the 1520s. But Cardano also read on an extensive array of other subjects, ranging from mathematics to dream theory to descriptions of the New World. He prided himself on his ability to read rapidly and seize the essential content of a volume. In pursuit of this goal, he devised his own system of marking "useless" passages that could safely be skipped and obscure ones that could be postponed for later consideration.<sup>38</sup> This confident approach to speed-reading is pure Cardano, but its fundamental motivation—to enable him to isolate and remember key passages that were neither useless nor obscure—was by no means idiosyncratic. Instead, his reading practices, which doubtless also included much excerpting, belong to the world of sixteenth-century erudition. They were part of an intellectual environment in which treatises on the art of memory offered help in controlling vast amounts of reading and the use of commonplace books served to process information into brief, easily manageable, and easily retrievable chunks for use as needed.<sup>39</sup> As far as medicine in particular was concerned, *quaestiones* were only one of several ways of organizing texts and authorities for use in study, teaching, and practice. For this purpose they were not necessarily much less useful than some of the others recommended, such as, for example, the

suggestion of Martin Stainpeis, writing in 1520, that medical neophytes should copy all the chapters on a particular disease from an array of authorities into a single notebook.<sup>40</sup>

But questions functioned specifically as a guide to *debated* issues and the literature on them. Nor were they only a written genre. The “medical disputations” Cardano had in mind included two spheres of activity. The first was formal debate in an academic setting, a practice that traced its origins to the quodlibetal debates of the medieval universities and survived in various university exercises in medicine. Thus, for example, in 1561, Cardano was called upon to defend his views in a debate with his fellow professor of medical theory at Pavia, the philosopher and physician Andrea Camuzio, “on the customary day for disputing.”<sup>41</sup> As will become apparent, Camuzio and Cardano were in vehement disagreement on issues of considerable intellectual significance; moreover, this particular debate was part of an orchestrated and successful campaign to end Cardano’s career at Pavia. However, *quaestiones* could also serve more mundane purposes in the academic setting. The discussion of standard *quaestiones* in lectures on medical theory was at once a form of routine pedagogy and a confirmation of medicine’s claimed links with philosophy and of the intellectual prestige of medical professors.

Second, urban or court medical practice often demanded that physicians be able to marshal textual arguments and authorities in debates about disease, diagnosis, and treatment. Such debates came about as a result of the custom of summoning several medical attendants at once to the bedside of important patients. Practitioners were obliged to discuss and defend their recommendations in consultations that, though nominally collegial, were potentially highly competitive and fraught with professional risks—risks that increased in severity with the social status of the patient. A centuries-old tradition of medical deontology advised practitioners to avoid disputing with one another about the causes and proper treatment of cases of illness in the presence of people outside the medical profession, especially the patient and the patient’s relatives; as the thirteenth-century surgeon Guglielmo da Saliceto put it, “the laity always denigrate the wise.”<sup>42</sup> But in sixteenth-century reality, members of the patient’s household seem often to have been on hand when a group of practitioners discussed a case with one another and made their separate recommendations in each other’s presence. In particular, if the patient was a noble woman or child, the head of the household—the primary patron of its medical attendants—was likely to be present. In such a situation a physician needed ready command of appropriate citations in support of his own recommendations and of countercitations to deflect criticism. The fifty formal consultations, fourteen of them in the presence of King Philip II, held by the physicians and surgeons who at-

tended the head injury of Don Carlos in 1562 were doubtless unusual, evidence of the special care due the heir of the most powerful monarch in Europe. On those occasions, the physicians and surgeons sat in a semicircle in front of the king and were called on in turn to speak: “the physician thus addressed gave his opinion, supporting his statements by authorities and reasons.”<sup>43</sup> At a more modest and probably usual level, when Cardano was summoned to attend the infant son of Francesco Sfondrati—one of his principal noble patrons, as noted in the previous chapter—he was obliged to consult with two colleagues, both of whom he thought regarded him critically and with suspicion, in the presence of the anxious father.<sup>44</sup>

Probably the most successful collection of medical *quaestiones* to be produced in the sixteenth century was the *Controversiae medicae* of Francisco Valles. Originally published in Alcalá, it was subsequently reissued in Germany, France, and Italy (one edition was revised, without the author’s knowledge and much to his annoyance, by two leading German physicians, Crato von Krafftheim and Peter Monau). The work’s contents dealt sequentially with philosophical and physiological issues, pathology, regimen, cures, prognosis, and anatomy. The author’s goal was chiefly to defend the superiority of Galen against medieval Arabo-Latin medicine on the one hand and Galen’s modern critics on the other. He acknowledged Pietro d’Abano as a predecessor, but much less prominently than Cardano had done and in considerably more reserved terms, doubtless because Valles’ commitment to both religious orthodoxy and Galen was considerably more wholehearted than Cardano’s.<sup>45</sup> Valles promised his readers that all traces of scholastic methods of argumentation and “barbarous” discourse had been eliminated from his own questions, which were not only well organized and useful but also a pleasure to read.<sup>46</sup> His readers seem to have found them so, for the substantial volume went into ten editions between its first publication in 1556 and 1625.<sup>47</sup>

Cardano, too, claimed—and may originally have envisaged—the *Contradictiones* as a systematically arranged guide to controversies and debated issues in every area of medicine. The preface to the reader, first included in the 1545 edition of Book 1, explained the design of all twelve books, each supposedly devoted to questions arising from works on a different branch of medicine. The context is unambiguously academic: Books 1–3 are described as pertaining to the rotation of three lectures customarily given in the morning hours, that is, to the courses on medical theory, and Books 4 and 5 to alternating courses on fevers and diseases of the whole body given in the evening hours. Seven other books purportedly cover, respectively, anatomy, surgery, prognosis, regimen, simple and composite medications, and a miscellaneous category.<sup>48</sup>

Thus described, the work seems intended to present a programmatic statement of his approach to medicine considered as an academic discipline and perhaps also an ideal curriculum. Judging by the texts listed in conjunction with each branch of medicine, the idea was to encompass all three categories of current medical debate: long standard *quaestiones*, issues raised by Renaissance Galenist critics of medieval Arabo-Latin medicine, and the Vesalian critique of Galenic anatomy. Thus portions of the *Canon* of Avicenna were to be read in the light of Galen's works on physiology, while for anatomy Vesalius's *Fabrica* was set alongside Galen's *De usu partium*, the survey of physiological anatomy that was at once Vesalius's chief textual source and his main object of criticism. The list of books and topics seems likely to have fitted in fairly well with current interests of the medical faculty at Pavia. There, as at other Italian universities, a traditional medical curriculum of lectures on medical *theoria* and *practica* using Arabo-Latin texts was supplemented by participation in recent trends in medical teaching. Lecturers on simples, medical texts in Greek, and anatomy were appointed in the 1530s and 1540s; in 1552 there was a proposal to build an anatomy theater.<sup>49</sup>

But the pedagogical arrangement promised in the preface is handled in very arbitrary fashion in the text. According to the announced scheme, Books 1 and 2 were supposed to relate to courses in medical theory taught from the Hippocratic *Aphorisms* and Galen's *Ars*. Many of the individual questions bear some relation to the texts named, although that relation is not always easy to discern. However, the sequence of topics neither follows the texts in the manner of *quaestiones* embedded in a commentary nor constitutes a systematic survey of medical theory in the manner of a forerunner of early modern textbooks of the type known as the "institutes of medicine."<sup>50</sup> Instead, the questions move haphazardly and apparently at random from subject to subject and between the highly specific and the general and abstract. "Can there be several definitions of medicine?" follows directly on "Is bread more digestible than meat?"<sup>51</sup> Individual items vary greatly in length, depending on the degree of Cardano's interest in the topic. He devoted twenty folio pages to considering "Whether incantations can have any effect in medical treatment,"<sup>52</sup> but dealt with three questions directly related to the text of the *Ars* in a page and a half.<sup>53</sup> Just as Aristotelian natural philosophy is subverted, but not discarded, in Cardano's *De subtilitate*, so the methods of scholastic medicine survive transformed in his medical *Contradictiones*.<sup>54</sup> It would be hard to imagine a greater contrast to Books 1 and 2 of Valles's *Controversiae*, which plod methodically through a survey of medical theory by way of *quaestiones* of approximately equal length on topics pertaining to the elements, temperaments, humors, parts of the body, faculties, and senses.

The apparently unsystematic character of the *Contradictiones* as Cardano published it cannot, presumably, be attributed either to his haste to issue a medical work after receiving a chair in medicine or to the defects of the publisher of the first edition, since subsequent editions published in his lifetime, although otherwise revised—and issued by publishers in whom he had more confidence—were unchanged in this respect.<sup>55</sup> Rather, the adherence to organization by texts or disciplinary subdivision claimed in the preface dissolves in the body of the work into a medicine of innumerable separate topics, priority among which is determined by the tastes and interests of an individual. The humanistic pleasure in free selection, miscellany, and randomness also evident in some other areas of Renaissance scholarship seems here to have found its way into an academic medical compilation.<sup>56</sup>

#### AUTHORITY, PARTICULARS, AND THE METHOD OF CONTRADICTIONS

Cardano had no hesitation in calling attention to the association of the *Contradictiones* with Pietro d'Abano and to its usefulness as a memory guide to medical literature and debate. But he also claimed it as “almost” belonging to the genre of “scholia and castigations,” that is, as a work of criticism.<sup>57</sup> In his letter of dedication to the Senate of Milan, he set out what amounted to a program for a reformed use of the question method. Redirected toward particulars, it could be used to build up an effective critique of Galen by the method of “the study of contradictions.” Attention to particulars was crucial because of the practical and urgent nature of the task of medicine: “because we are engaged in a serious matter and one in which human lives are exposed to danger, we require not confusions of philosophers or oratorical precepts but more diligent clear reasoning about each single thing [*in singulis*] when the matter [*res*] demands it.”<sup>58</sup> What was necessary was to lay out dubious or self-contradictory statements clearly so that the reader could see where the problem lay: “I have tried to submit things that seem dubious to reasoning. . . . in all I have been led by reason as well as authority, so that if the opinion of both agrees, the judgment will be the firmer: if reason and authority disagree, having given my own opinion, I shall leave to the readers the whole power of choosing what is more pleasing.”<sup>59</sup>

Galen was the appropriate object of such a critique precisely because he was generally regarded as the best representative of the entire ancient medical tradition. The Hippocratic writings were difficult to understand, Celsus was useful only for interpreting vocabulary, the Greek writers who came after Galen were inferior to him, and the Arabs had misinterpreted him on many points, “so that Galen’s judgment was the only

hope left.” But those of Galen’s works that survived contained numerous inconsistencies. Hence “by the study of contradiction it would be possible for me to be a willing judge of every disagreement, even if it had not clearly appeared in dissections that he constantly affirmed that he had seen things which he had not seen at all and which were not true: so that already I, believing not Vesalius but rather my own eyes, have doubts not about his [Galen’s] judgment, as often happens, but about his good faith.”<sup>60</sup> In this formulation, the arguing of *quaestiones* has metamorphosed into “the study of contradiction.” The title of the *Contradictentium medicorum libri* is now to be read simultaneously as homage to the author of *Conciliator differentiarum medicorum et philosophorum* and as a declaration of intent to abandon that work’s goal of reconciliation. Moreover, “the study of contradiction,” which reveals inconsistencies in Galen’s texts, is presented as just as effective as—and indeed as exactly parallel to—the confrontation of Galen’s statements with the dissected human body. The idea of a parallel enterprise emerges again in Cardano’s remark “I certainly have in common with [Vesalius] that for the sake of truth itself I have sometimes set myself against Galen.”<sup>61</sup>

The insistence that close attention to particulars provided the most effective tool for a general critique of Galen is reiterated in a second letter to the reader added at the end of the expanded edition of the *Contradictiones*. Noting that medications unknown to Galen and Hippocrates, such as sugar and rhubarb, were cheap and in common use—even by practitioners who prided themselves on their Galenism—Cardano continued, “But if Galen was ignorant even of these obvious things, why should one not suppose that he was much more ignorant about more hidden things? But you will say that he might have been ignorant about single species of things [*singulares rerum species*], but the art of medicine is established with general principles. . . . [I]f by general reason you mean that rule which teaches contraries are cured by contraries, then indeed I think Galen handed down everything, but [so did] also Hippocrates before him. . . . But if we mean the signs, modes, causes, symptoms, and remedies for particular diseases and the number, site, usefulness, and quality of the parts of the body, then necessarily many things are lacking in Galen’s writings, just as many and extremely necessary things are lacking in his medications.”<sup>62</sup>

There is no doubt that this program represented a genuine set of priorities for Cardano. Exposure of internal inconsistencies within or among Galen’s works is a recurrent theme throughout the *Contradictiones*. The 659 separate questions that make up the ten surviving books of the work, most of them relating to physiology, diseases, remedies, and treatment, can reasonably be regarded as a huge collection of particulars, of “single things,” about which medical authorities were in disagree-

ment. Nevertheless, the actual content of the work fulfills the promised program only very partially. For one thing, scholastic conciliation has by no means disappeared; plenty of questions are resolved by purely verbal reconciliation.<sup>63</sup>

A more fundamental problem, as with many Renaissance calls for attention to particulars or to things, not words, is to determine what the concepts of *singuli*, *singulares*, or *res* meant to Cardano.<sup>64</sup> Clearly, his insistence on the importance of particulars as distinct from speculative philosophizing or broad generalization is a demand for attention to specific, medically useful (“lives are in danger”) details. Furthermore, the parallel that he drew between “the study of contradictions” and Vesalian anatomy evidently rests on the notion that both proceed by close and critical study of detail. In a sense, this is true enough. But whereas the *Fabrica* confronts statements in texts with a mass of directly observed descriptive detail about objects in nature, the *Contradictiones* essentially proceeds by setting details of texts against one another (even when one of the texts is the *Fabrica*). Moreover, although many of the individual *contradictiones* examine statements about limited and specific aspects of Galenic medicine (for example, the attributes ascribed to individual plant remedies), others take up broad aspects of physiological function, such as reproduction. And although Cardano was never committed to medical philology as a method and often expressed his contempt for those who were, yet other *contradictiones* concern the meaning of words. For instance, his inquiry whether *staphyloma* was a disease of the uvea or the cornea traced inconsistencies in the use of this term by Paul of Aegina, Celsus, and Aetius.<sup>65</sup> Such inquiries had value in the period of the re-making of medical vocabulary that was a major consequence of medical Hellenism. But in the *Contradictiones* no real distinctions are made among collecting information about words, collecting views of authors on specific points (“Is ginger humid?” “Is rhubarb hot?” “Is lily bad for the stomach?” “Is pain in the joints always cured by bloodletting?”), and collecting other forms of data.<sup>66</sup>

Of course, Cardano’s insistence on the importance of particulars is connected to the intensive interest in collecting data that marked all his intellectual activities. He referred to his own life as a “collection of events” to some of which his students were witnesses.<sup>67</sup> In medicine, he collected *experimenta* (that is, mostly remedies, not necessarily all his own or even all tried out by him), his own *consilia*, and accounts of cases he had treated.<sup>68</sup> There seems little reason to suppose that he regarded data collected as a result of direct personal experience or observation as essentially different in character from his store of historical anecdote, evidently gathered by diligent excerpting, or from the innumerable descriptions of minerals, plants, and animals that fill long sections of his encyclopedic works, many of which were clearly accumulated in the same

way. Substantial mathematical and technological content, as well as the author's self-expressiveness and his views on subtlety and other matters, distinguish *De subtilitate* and *De rerum varietate*; their sections on natural history have much in common with other sixteenth-century encyclopedic treatments of nature.<sup>69</sup>

In the *Contradictiones*, the importance that he attached to *experimenta* found in texts emerges strongly from his recurrent praise of medieval Arab medical writers, in which their superior knowledge of *experimenta* in medicine is a principal theme. Thus, for example, an exposé, of the inconsistency of the temperaments ascribed to poppy and water lily by Galen and various other authors turns into an attack on medical humanists (especially Giovanni Manardi and Leonhart Fuchs) "who now care not a straw about the opinions of all the Arabs, even in *experimenta*, as they do not wish to attribute anything to them," and who "desert Avicenna, Rasis, Avenzoar, and so many physicians and philosophers of the most outstanding gifts [*ingenium*]. . . . Therefore let the grammarians follow the grammarians, when we will be with the physicians. . . . They certainly want to err with Galen, but it is not given to them to act rightly with Galen. We see every day that those who imitate Galen allow in serious error and are inferior in *experimentum* to the Arabs."<sup>70</sup>

Cardano's own experiences in medical practice, although brought to bear upon the assertions of authorities from time to time, are less prominent in the *Contradictiones* than in some of his other medical works. Almost the only section where *exempla* from his practice or personally known to him appear to be systematically deployed is in a long discussion of poisons.<sup>71</sup> There, a series of such cases illustrate discussion of different types of poisons and their actions. One way of looking at this collection of stories is simply as an attempt to gather at first hand descriptive particulars about cases of poisoning. In some instances, moreover, empirical evidence is used to substantiate conclusions contrary to common assumptions, asserted fact, or learned opinion. Thus Cardano presented two cases known to him that disproved the opinion that powdered steel was poisonous: one of his patients had admitted having fed powder or scrapings of steel to someone (Cardano thought the intended victim was probably the man's adulterous wife) without doing her any harm; and Francesco Todeschini, who ate powdered steel while insane, had also survived unscathed. The story of the crazy nun who, "released from her chains [*vinculis soluta*]," put ground glass in the convent's chickpeas, killing two of the sisters but leaving most of them unhurt, implies that poisonous substances are not always lethal to everyone who ingests them. A realistic appraisal of the difficulty involved in distinguishing symptoms of poisoning from symptoms of disease is suggested by the story of the blood that looked like milk, sent to Cardano from one

of the patients of his friend Tommaso Iseo: this was either the result of poison ingested when the man was already ill or the result of long-standing disease of the liver.<sup>72</sup>

But taken as a whole, this discussion suggests that the selection of examples may have been determined by priorities other than—or in addition to—an intention to test textual authority or common belief by confrontation with empirically collected evidence. The exposition seems both to reflect a generalized social anxiety about poisons and to be specifically connected with the genre of treatises on poison written for princes.<sup>73</sup> One of the main issues addressed is whether there are poisons that, having been administered on a single occasion, act imperceptibly over a series of months, eventually altering the body to produce illness of which the victim dies. (The model for this idea of a type of poisonous action was the bite of a rabid dog.) As an example, Cardano recounted the story of an episode from his time at Gallarate, when a cleric, who wanted to get the parish priest out of the way so that he could succeed to his position, mixed poison in a cake. Nine guests at a dinner died as a result, but not until between one and six months later and from conditions mimicking natural illness (this was a very special poison made by priests at Rome [*Attulerat ex Roma id veneni genus, ubi Christi sacerdotes ei clarissimae industriae operam dant*]).<sup>74</sup> The extent to which anxiety about poisons was focused upon the persons of princes emerges from Cardano's description of how he had seen the chair, table, and even dais that were to be used by Charles V at dinner carefully cleaned so as to remove any poisons that might be absorbed through the imperial skin, clothing, or shoes. As he remarked, citing the example of plague spreaders, "the perfidy of our times invented this great subtlety, which the ancients did not know."<sup>75</sup>

Cardano apparently at one time intended some of the material in this section of the *Contradictiones* for a treatise on poisons for a prince, since it includes the remark, obviously anomalous in a *quaestio*, "And you should know, most illustrious prince, that of ten people who drink poisons scarcely one dies, unless the dose is repeated."<sup>76</sup> The reassuring nature of this remark perhaps suggests that the anecdotes about ingestion of supposed poisons that turned out to be harmless, recovery from attempted poisoning, and the possibility that some supposed cases of poisoning might be disease were also chosen for their reassuring quality. The prince Cardano originally had in mind was presumably a secular one, given the remark about the Roman clergy quoted above. However, the independent treatise on poisons that he finally published is dedicated to Pope Pius IV and contains very little personal or anecdotal material.<sup>77</sup> It appeared in 1564; that, of course, was after the younger Cardano had been executed for murdering his wife with a poisoned cake.

Another kind of use of personal experience to evaluate Galenic theory occurs in a discussion of inherited characteristics, in which Cardano used himself as a test case. If, as Galen claimed, the rule was that if the paternal semen was stronger the offspring would resemble the father, but if the female semen and menstrual blood were stronger it would resemble the mother, how could one explain the characteristics of a person who had his father's nose and his mother's eyes or who, like Cardano himself, was very like his maternal grandfather in inborn skill (*ingenium*) and physique? Really, he thought, just as the soul possessed distinct powers of imagination, reason, and memory, so too in the body there must be many forms, each transmitted from one of the parents, distinct in location as well as nature. In his own case, his heart resembled that of his father, Fazio Cardano, and his paternal grandfather, Antonio Cardano, and his great-grandfather, another Fazio Cardano, and the ancestor of the family, Aldo, and all the intermediate ancestors who had lived since his day 220 years earlier, "for they were all extremely vital [*vivacissimi*] but not, as I have heard, similar in form."<sup>78</sup> Thus when it came to the ruling organ of the body according to Aristotle and the source of heat and vital power (*virtus vitalis*) in Galenic physiology, Cardano insisted on his strictly paternal inheritance. In this way he found physiological and philosophical support for his strong identification with even remote ancestors of his paternal family in preference to a close maternal relative—the grandfather whom he actually resembled.

If the concept of particulars in the *Contradictiones* is in some respects problematic, its anti-Galenism is not nearly as sweeping as Cardano's programmatic statements suggest. The criticisms of particular details of Galen's writings, numerous and frequently cogent though these criticisms are, certainly do not constitute a wholesale rejection of Galenic medicine. Notwithstanding his philosophical eclecticism and intellectual adventurousness, Cardano remained relatively close to academic medical tradition. The strongly Galenist system (to some extent synthesized with Aristotelianism) in which he had been trained provided most of his basic medical ideas. He also expressed admiration for aspects of Galen's character and treated him as an important literary model.<sup>79</sup> One respect in which Cardano did indeed resemble Vesalius was in combining criticisms of Galen on specific issues with an understanding of physiology, pathology, and therapy that remained fundamentally Galenic. Moreover, although Cardano's critique of Galen led him to endorse specific views or achievements of other authors, he by no means always preferred their views to Galen's. Throughout the *Contradictiones* he often demonstrated a preference for Aristotelian over Galenic positions and continually cited Averroes. But he was equally ready to repudiate Aristotle when it suited him; it would be highly misleading to describe the *Contradictiones* simply as an Aristotelian work.<sup>80</sup>

On occasion, too, he was willing to conciliate Aristotle and Galen in traditional scholastic fashion, as he did when handling the two main physiological issues on which Aristotle and Galen disagreed: whether or not the heart was the only ruling organ of the body and the respective roles of the male and female parent in conception. These differences of opinion had long been standard subjects of medical debate.<sup>81</sup> Their treatment in the *Contradictiones* reveals an impressive command of every conceivably relevant passage of both Aristotle and Averroes, as well as of Galen, but in neither case is the main Galenic idea repudiated either on Aristotelian or any other grounds. On the role of the heart, Cardano adopted a conciliation of the Aristotelian and Galenic positions going back to Avicenna: the heart was in some ultimate, philosophically truer, sense the ruling organ, but for medical purposes three principal organs, heart, brain, and liver, had to be taken into account—"and thus the middle way between the philosophers and physicians is embraced, which in my judgment is also the truer."<sup>82</sup> On generation, he favored the Aristotelian position that the male parent alone contributed generative virtue over the Galenic idea of an active female role in conception, but nevertheless conceded that female semen might contribute "some light formative power [*aliquam levem vim ad formationem habeat*]," adding with regard to a cluster of subsidiary problems about generation, "neither Galen, nor Aristotle, nor Hippocrates spoke badly, only imperfectly."<sup>83</sup>

Yet both these lengthy *quaestiones* also include brief appeals to anatomical evidence to correct or amplify Galen on points of detail. In one, the reader is referred to Book 5 of the *Fabrica* for a clearer discussion of the fetal coverings than that provided by Galen. In the other, in the course of considering Galen's belief that the liver provides the "origin" of the blood and the venous system, Cardano cited and endorsed Vesalius's denial that the circumference of the vena cava is greater in the liver than the heart, and described the difference of opinion between Galen and Vesalius as to whether or not the portal and caval systems are joined by capillaries in the liver as "a question of fact, as the jurists say [*Quaestio est de facto ut iurisconsulti dicunt*]."<sup>84</sup>

Even more revealing is his handling of the relation between his version of element theory and the medical theory of temperament. His repudiation of central aspects of Aristotelian teaching on the elements was one of the most notoriously unconventional aspects of his philosophy of nature. Cardano removed fire from the number of the elements. In *De subtilitate* he denied the existence of the elementary sphere of fire and stated that there were only three terrestrial elements. The heavenly bodies were the source of heat in mixed bodies (i.e., all actually existing bodies), and this celestial heat was responsible for their formation from the elements. He further added that coldness and dryness were only absence of heat and moisture, not positive qualities.<sup>85</sup> Moreover, he did not

relegate these ideas to a context remote from medicine. He claimed a Hippocratic source for the idea that there were only three elements and used medical analogies in support of his arguments.<sup>86</sup>

One might expect, therefore, that Cardano's element theory would have equally radical consequences for the theory of temperament, since the four qualities that composed temperament were, according to standard Galenist teaching, elementary qualities. In its various ramifications, the theory of temperament, or *complexio*, constituted an extremely intricate and far-reaching system of explanation that underpinned much of physiology, pathology, and therapy. The ideas about the temperaments of human beings and animals discussed above were only one aspect of a much larger scheme. Pairs of elementary qualities were supposed to inhere in each of the four humors. Each part of the body had its own temperament, and the temperaments of the different parts affected one another (as in the originally Aristotelian idea that the brain cooled the heart). In addition, in human beings temperament was assigned to individuals as well as to the species; each person had his or her individual temperament, linked to psychological as well as physical traits. Temperament was also supposed to differ according to age, sex, region, and condition of health. Furthermore, most internal disease was explained as the result of imbalance of temperament or of humoral qualities. Since medicinal substances were also characterized in terms of elementary qualities and cure was held to be by contraries, "rational" therapy involved finding appropriate simple or composite medicines with qualities to counterbalance those of the disease. Hence a significantly revised theory of temperament would have had serious consequences for the entire system of medical thought.

But Cardano adopted positions that guarded medicine from the extreme consequences of his element theory. In *De subtilitate*, he took care to divorce the number of humors from the number of elements—even though he also toyed with the idea of reducing the number of humors to three: "There are four humors in animals; but what has this to do with the elements? What if I were to say that there were only three, together with Turisanus, the commentator on Galen's *Ars medica*?"<sup>87</sup> In the *Contradictiones*, he made a conscious decision to play down his own views on the number of the elements. His ideas appear briefly and rather obscurely in Book 1 in a passage in which he rejected Galen's analogy between the heat in the human body and the heat of a furnace and cited Aristotle (*Generation of Animals* 2.3.737a1–7) in support of the celestial rather than fiery origin of animal heat.<sup>88</sup>

Further, he preserved every aspect of the medical theory of temperament. At the beginning of Book 2 he took up the much discussed topic of the manner in which the elements or their forms remained in com-

posite bodies. Having rejected the theory that the temperament, or *complexio*, was itself the form of a composite body, Cardano asserted that in animate things the soul was the only form; in inanimate ones the form was that of the predominating element (“*Ut vero declaravimus, unam tantum esse formam animatorum animam, inanimatorum autem elementi praedominantis*”).<sup>89</sup> But he then went on to allow that in animals the “form of the temperament” was inseparable from the soul and to note that Galen had extended this idea to include human beings.<sup>90</sup> He qualified the idea that the properties of medicines were those of their dominant element by explaining how, in the case of simple medicines that seemed to have qualities associated with more than one element (for example, to be of earthy, hence cold, substance and have an astringent, hence hot, power), the temperament supplied by the plant’s vegetative soul when it was alive somehow remained after it was cut and dried.<sup>91</sup> The result of these formulations—a result to which the *Contradictiones* bears abundant witness—was that, despite the genuine radicalism of his view of the elements, Cardano’s understanding of physiology, pathology, and therapy, much like that of his less philosophically adventurous medical colleagues, remained wedded to the theory of temperament. It functioned at too fundamental a level of medical explanation to be critically examined as a whole or subjected to any wholesale modification, much less abandoned.

But on theory of temperament as on so many other aspects of Galenic medicine, he was as usual able bring cogent criticisms to bear on details. One example will suffice. Returning to the Galenic idea that the temperament of mankind is at a midpoint among animal temperaments, he examined Galen’s claim that fish were colder in temperament than man, noting that what led Galen to believe this was their cold skin. But cold skin is no evidence that an animal is cold internally; if fish were completely cold throughout, they would not be alive; moreover, even if some animals do have a colder temperament than man, this is no evidence that man has the mean temperament among all animals (“*non valet dantur animalia frigida in cute, ergo sunt frigida intus. . . . Et concessio quod possent esse frigidiora temperamento, nihil hoc facit ad demonstrandum hominem esse medium temperamento in actu inter omnia animalia*”).<sup>92</sup>

#### PRIORITIES

Notwithstanding the qualifications just indicated, the analysis of particulars and the critique of Galen are substantial themes that run all through the *Contradictiones*. In Book 1, moreover, Cardano more or less kept to his announced intention to avoid philosophical topics of only tangential relevance to medicine. Most questions, it deserves to be emphasized

once again, inquire about particular remedies or particular disease conditions. The longest and most passionately argued segment in Book 1, amounting to a small treatise on the subject and fortified with a dense web of citations, addresses the vehement controversy over the proper method of bleeding for “pain in the side” that divided the medical world in two in the 1520s and 1530s.<sup>93</sup>

The remaining books have a notably higher proportion of material reflecting his other personal and philosophical preoccupations in a medical context. The long question about the usefulness of incantations in medicine addresses his interest in remarkable happenings outside the ordinary course of nature; a cluster of questions on anatomical topics shows him endeavoring to incorporate details of Vesalian anatomy into medical discussion.<sup>94</sup> He also turned the question of whether God knows singulars—meaning in this instance individual human beings and their actions (as distinct from mankind in general)—into an opportunity to discuss his favorite subjects of prophetic or warning dreams and the personal genii or guides who assisted specially favored individuals.<sup>95</sup> But some striking examples of the way in which Cardano’s beliefs and philosophical commitments in areas apparently remote from medicine could sometimes drive his medical exposition are provided by questions on whether the human soul is immortal according to the physicians, and whether there is resurrection of the dead. Neither of these questions was included in the *Contradictiones* published in Cardano’s lifetime; but since in Book 2 he advertised for a patron to support the publication of the remainder, they were presumably not deliberately withheld by him.<sup>96</sup>

In the years in which he was putting the *Contradictiones* into final form, Cardano was much preoccupied with the immortality of the soul. He published a treatise on the subject in 1545, the same year in which Book 1 of the *Contradictiones* appeared.<sup>97</sup> In the late 1550s and early 1560s, when he was working on Books 3–10, he was also engaged by his *Theonoston*, two books of which are dedicated to, respectively, the immortality of the soul and the life and felicity of souls after death.<sup>98</sup> The nature of the human soul was, of course, the subject of a major controversy in Italian academic philosophy in the first half of the sixteenth century; two of the principal participants were Pomponazzi, who in a famous treatise maintained that the authentic Aristotelian view was that the human soul was mortal, and Agostino Nifo, who adopted a syncretistic position and held that the teaching of all ancient philosophers could be reconciled to endorse the immortality and individuality of the human soul.<sup>99</sup> Cardano’s discussions of the subject allied a thorough knowledge of various Aristotelianisms with a syncretizing and Neoplatonic tendency, with religious awareness, and with his own strong interest in dreams, apparitions, and spirit guides. According to Cardano, the

teaching of all ancient philosophers, including the Aristotelians, endorsed the immortality of the soul; but they had understood it imperfectly, since they had not reached knowledge of the Christian doctrines of individual immortality and resurrection of the body, as distinct from reincarnation.<sup>100</sup>

The discussion of immortality of the soul “according to the opinion of the physicians” in the *Contradictiones* brings the subject into a medical setting and endows it with medical consequences. It provided Cardano with the opportunity to insist, pace Galen, both that the soul was something other than temperament and that the nature of the soul was a practical medical concern. Given that the body was the instrument of the soul, it followed that if one of two similar human bodies functioned better than the other, this superior functioning might be due to superiority of soul, “just as we see with barbers, one barber shaves better than another with the same razor, and one copyist writes better than another with the same pen, ink, and paper.” Furthermore, “it would help in many diseases to cure the soul.”<sup>101</sup> The exposition also reveals the intimate connection between a tight cluster of Cardano’s central philosophical ideas and his Hippocratism. The main thrust of the argument was to add the chief medical writers, and especially Hippocrates, to the list of authorities testifying to the immortality of the soul *naturaliter loquentes*. According to Cardano, Hippocrates and Avicenna taught the soul’s immortality; Galen, although undecided on the subject, never definitely asserted that the soul was mortal. Hence the consensus of the physicians could be said to be that the soul was immortal.<sup>102</sup> Cardano demonstrated Hippocratic endorsement for the immortality of the human soul by quoting the same two passages that he also used to provide textual foundation for his element theory and his equally unconventional ideas about generation and corruption. The first of these, in *On Fleashes*, describes the hot as immortal and heat as a component of human beings as of all bodies. The second is the statement in *Regimen* that “No body perishes entirely, nor is anything made that was not before; but mixed and separated things are changed about.”<sup>103</sup>

The appeal to Hippocrates—almost always a figure of irrefutable authority for Cardano—and the significance of the quoted passages for his entire philosophy of nature are fairly unambiguous indications that his own understanding of the immortality of the soul, *loquens naturaliter*, drew on these passages. (On religious grounds, as we have seen, he proclaimed his allegiance to orthodox Christian teaching.) He returned to the same cluster of ideas in the question “Whether generation takes place? And whether there is resurrection of the dead?”<sup>104</sup> There he discussed at length the idea that there is no real generation or corruption, but only a process of mixing and separating and adding and taking away,

once again citing the key passage from *Regimen* and contrasting this view with that of Aristotle. Despite a remark distancing himself from the opinion he ascribed to Hippocrates, Cardano seems to have endorsed something like this naturalistic version of immortality.<sup>105</sup> His medical Hippocratism requires a chapter to itself. But the extent to which Hippocratic sources provided important concepts in his philosophy of nature, which, in turn, underpinned his medical ideas, also deserves to be emphasized.

Twenty-five years before the first edition of the *Contradictiones* was published, Gianfrancesco Pico had included a chapter reviewing conflicting authoritative statements about human physiology in his *Examen vanitatis doctrinae gentium* (1520). He thereby demonstrated that the study of medical or medical and philosophical contradictions could be turned to skeptical—in his case fideistic—ends. When Cardano's attacks on Galen and his unconventional element theory led his colleague and enemy Camuzio to accuse him of overturning the foundations of the whole of natural philosophy, Camuzio invoked the name of Gianfrancesco Pico.<sup>106</sup> But Cardano's accumulation and study of contradictions cannot be construed as the work of a skeptic. His essentially reformist enterprise proceeded piecemeal within an existing medical system. His moves toward a new epistemology were tentative and frequently ambiguous. Indeed, even Camuzio's rhetorical denunciation recognized that Cardano wanted to change medicine, not destroy it. Using metaphors that were acquiring ever more menacing overtones by the time his attack was published in 1563, Camuzio described his opponent as a heresiarch who had almost founded a new sect in medicine. What especially distressed Camuzio was that not only students but also medical graduates were responsive to Cardano's self-styled "Hippocratic" medicine.<sup>107</sup>

Cardano's eclecticism makes it as difficult to evaluate his medical ideas as to assess his philosophy of nature or his writings on moral or political subjects. The same paradoxical combinations of Aristotelianism and criticisms of Aristotle, of insistence on particulars of experience and dependence on texts, of Neoplatonist or occultist metaphysics and attacks on credulity that have struck interpreters of his output in these fields are also characteristics of his medicine.<sup>108</sup> To them his medicine added other special features of its own: simultaneous dependence on and hostility to Galen; the endeavor to substitute Hippocrates for Galen as the primary medical authority; appreciation of the methodology and results of Vesalian anatomy; and, above all, the technical, social, and personal realities of medical practice. Thus the presentation of medical knowledge in the *Contradictiones* brings together aspects of Renaissance thought that

to a twentieth-century reader are likely to appear opposed, or at any rate distinct: traditional Arabo-Latin medical erudition with Renaissance Galenism; Aristotelian natural philosophy with new eclectic philosophy of nature; Galenism with the critique of Galen; philosophical or philological critique of ancient scientific writers with critique based on empirical data obtained at first hand; scholastic method with self-expression; philosophical abstraction with interest in particulars; Aristotelian rationalism with occultism.

Although Cardano was an extreme example of eclecticism in Renaissance medicine, he was by no means unique. If one novel feature of sixteenth-century scientific culture was intensified attention to describing and collecting, another was the availability of a wider range of methodological and philosophical options. These options were seldom treated as mutually exclusive. The notion of a single correct scientific—or, for that matter, philosophical—method that rigorously excluded other approaches was not part of the sixteenth-century mental universe. Cardano freely selected from and combined a variety of approaches to nature and the art of medicine, just as he selected and combined ancient texts, as the topic, situation, or context demanded. The resulting mixture of genres, content, and ideologies in the *Contradictiones* reveals much conflict, ambivalence, and revisionism in medicine but also suggests the still vast capacity of the traditional system of medical knowledge to absorb new material without wholesale change. But medicine, as the commonplace ran, was distinguished from natural philosophy by its practical goal. Cardano's medical knowledge was intended for use, not only in the classroom and the study, but primarily in practice. It is now time to turn to some of his practical recommendations.

*processo d'eresia* (Bologna, 1992), and Susanna Peyronal Rambaldi, *Speranza e crisi nel Cinquecento modenese: Tensioni religiose e vita cittadina ai tempi di Giovanni Morone* (Milan, 1979). Peyronal Rambaldi notes that Giovanni Morone's father was in the service of Francisco II Sforza (*ibid.*, pp. 69–70). The records of Morone's trial are edited in Massimo Firpo, ed., *Il processo inquisitoriale del cardinale Giovanni Morone*, 6 vols. in 7 (Rome, 1981–95). Whatever the unorthodoxy of his views, Cardano was not in any way involved in Morone's trial, if one may judge by the absence of his name from the indexes of the first six volumes of this set (I have been unable to secure access to the last volume).

77. “. . . sendo gli animi nostri e di tutta questa città molto alieni da esso Cardano, nelle cui mani non ci seria persona nè nobile nè popolare che confidasse mettere la salute et vita sua” (letter of the Quaranta [civic officials], November 29, 1561, edited in Alessandro Simili, “Gerolamo Cardano lettore e medico a Bologna. Nota I: La condotta di G. Cardano,” *Atti e Memorie dell'Accademia di Storia dell'Arte Sanitaria* 39 [1940]: 39); for the condotta of 1563, see Emilio Costa, “Gerolamo Cardano allo Studio di Bologna,” *Archivio storico italiano*, 5th ser., 35 (1905): 425–36, at p. 431; “centeset operam Excellentissimi philosophi et Medici D. Hieronimi Cardani Mediolanensis, qui aliquot iam annos in hac civitate et Academia Bononiense egregi colitur et celebratur, eidi (sic) civitati et scholastico ordine peraeque honorificam et frugiferam fore . . .” (Cardano's condotta of 1570, edited in Alessandro Simili, “Gerolamo Cardano lettore e medico a Bologna. Nota III: Le accuse e la partenza,” *Atti e Memorie dell'Accademia di Storia dell'Arte Sanitaria*, 2d ser., 32 [1966]: 2); “per leggere . . . non riesce ne satisfà al studio, ne anco alla Città nel medicare, et che ciò sia vero, si conosce che non viene scolare alcuno al studio particolarmente tirato dalla fama et nome di Lui, et nelle infirmità anco qui nella Città poco è chiamato, onde si può dire ch'egli sia inutile, et per conseguenza, che sia gettata una spesa tanto grossa” (letter of the Conservatori dello Studio, January 20, 1571, *ibid.*, p. 3). See also n. 10, above.

78. Eckman, *Jerome Cardan*, pp. 67–73, collects a number of examples of the latter approach. See also G. Bellagarda, “Quattro studi su G. Cardano. II. Il ‘De dentibus’ di G. Cardano,” *Minerva stomatologica* 14 (1965): 563–67; *idem*, “G. Cardano e la scoperta dell'infezione focale,” *Minerva stomatologica* 15 (1966): 563–66; *idem*, “Quattro studi su G. Cardano. IV. G. Cardano e l'odontoiatria,” *Minerva stomatologica* 15 (1966): 695–99.

### CHAPTER 3

#### ARGUMENT AND EXPERIENCE

1. “Scripsi enim mihi Collectanea quaedam e diversis auctoribus satis magna, quorum usus nullus mihi prope est” (LP 1562, *Opera* 1:97); “Scripsi et Epidemia, orsus ab anno MDXXXVI usque ad annum MDXXXIII, quorum initium est, Anno MDXXVI die xxiv Septembris, quae mihi natalis fuit, contuli me in Saccense oppidum . . .” (LP 1557, *Opera* 1:62).

2. On the publication history of the *Contradictiones*, see further below. The only other medical works by Cardano published in the 1540s and 1550s were two small volumes on practice, namely, the second edition of *De malo usu*

(1545) and *Quaedam opuscula* (1559). See n. 4 to chap. 2. On the role of the Senate of Milan, put in charge of the university and given the power of nominating professors by the edict of Charles V known as the *Constitutiones domini mediolanensis* of 1541 (1.3), see chap. 1, n. 23.

3. The *Contradictiones* (of which more may have been lost) occupy *Opera* 6:295–923; cf. *De rerum varietate*, *Opera* 3:1–351; *De subtilitate*, *ibid.* 352–672. These are double-columned folio volumes.

4. Ingegno, pp. 209–376, contains a penetrating analysis of aspects of the *Contradictiones* in relation to Cardano's philosophy of nature in a series of long notes in the chapter on natural philosophy.

5. On epistemological problems and discussions in thirteenth- to fifteenth-century medicine, see Jole Agrimi and Chiara Crisciani, *Edocere medicos* (Naples, 1988), *passim*; caedem, "Medicina e logica in maestri bolognesi tra Due e Trecento: Problemi e temi di ricerca," in *L'insegnamento della logica a Bologna nel XIV secolo*, ed. Dino Buzzetti et al. (Bologna, 1992), pp. 187–239; Michael R. McVaugh, "The Nature and Limits of Medical Certitude at Early Fourteenth-Century Montpellier," *Osiris* 6 (1990): 62–84; Per-Gunnar Ottosson, *Scholastic Medicine and Philosophy* (Naples, 1984), pp. 65–126.

6. See Jole Agrimi and Chiara Crisciani, *Les consilia médicaux*, Typologie des sources du Moyen Age Occidental, fasc. 69 (Turnhout, 1994); Danielle Jacquart, "Theory, Everyday Practice, and Three Fifteenth-Century Physicians," *Osiris* 6 (1990): 161–80; Tiziana Pesenti, "Michele Savonarola a Padova: L'ambiente, le opere, la cultura medica," *Quaderni per la storia dell'Università di Padova* 9/10 (1977): 45–101. See further chap. 9, below.

7. LP 1562, *Opera* 1:97, makes it clear that the collection of epidemics made at Sacco was modeled on the Hippocratic *Epidemics*. See further chap. 6, below.

8. LP 1544, *Opera* 1:56; LP 1557, *Opera* 1:61; LP 1562, *Opera* 1:97.

9. According to LP 1557, *Opera* 1:61, Cardano had already begun collecting medical *contradictiones* while still a student at Pavia (that is, before 1523). "Moris autem fuit nobis, ut quoscunque qui in arte aliqua scripsissent, prius legerem, quam in eadem quicquam componerem. Per idem ferme tempus et ad annum usque XXXI duos libros magnos composui: alterum Aetii magnitudine, de medicinae regulis in quatuor distributum. . . . Reliquum in quo medicinae sententias contrarias, quotquot invenire potui, una collegi Graecorum, Arabum, Latinorum; hae autem ferme quadringentae magnitudo libri ut Conciliatoris" (LP 1544, *Opera* 1:56). He transferred to Padua in 1524. For the state of the work in 1543, see LP 1544, *Opera* 1:59.

10. *Contradictentium medicorum liber continens contradictiones centum octo* (Venice, 1545; IA \*132. 052); *Contradictentium medicorum liber primus [-secundus] continens contradictiones centum et octo* (Lyon, 1548; IA \*132. 055). "Nuper hoc Martio mense, anni ut dixi MDXLVI . . ." (*Contradictiones* 2.5.9, *Opera* 6:564). There were three subsequent editions of bks. 1 and 2: Paris, 1564–65 (IA \*132. 096); Paris, 1565 (IA \*132. 097); and Marburg, 1607 (British Library 1169 c. 6). I have not seen the last of these editions.

11. Two books appear to be lost (and may never have existed in more than fragmentary form). In bks. 3–10 there are references to Cardano's *De subtilitate*, first published in 1550 (*Contradictiones* 4.5, *Opera* 6:688), *Theonoston*, begun

under another title in 1555 (LP 1562, *Opera* 1:112; *Contradictiones* 3.6, p. 658), and the critique of Vesalius in Falloppia's *Observationes anatomicae*, first published in 1561 (*Contradictiones* 4.17, p. 696). But bks. 3–10 were presumably complete in something like their present form by 1563, since *Contradictiones* 10.26 is referred to in Cardano's commentary on part of bk. 1 of the *Canon* of Avicenna, which bears a preface dated in that year; see *Opera* 9:458, 490. The single *contradictio* printed in the collection *De balneis omnia quae extant apud Graecos, Latinos, et Arabas, tam medicos quam quoscumque caeterarum artium probatos scriptores . . .* (Venice 1553), fol. 226v, and headed "Ex Hieronymi Gardani [*sic*] Contradictionibus, Contradictione III. Articulari morbo, an balneum competat" is actually *Contradictiones* 1.4.3 (*Opera* 6:366).

12. "Verum qui ante nos fuere, quam leviter atque oscitanter haec tractaverint, praeter unum Conciliatorem, ac in dissectione Vesalium, in paucisque admodum aliis Fuchsium, cum Ferrariensibus, non est cur recitem . . ." (*Contradictiones*, dedicatory letter to the Senate of Milan, *Opera* 6:297).

13. I used Pietro d'Abano, *Conciliator: Ristampa fotomeccanica dell'edizione Venetiis apud Iuntas 1565*, ed. Ezio Riondato and Luigi Olivieri (Padua, 1985). For the horoscope of religions, see *differentia* 9, fol. 15r. A recent general study of Pietro d'Abano is Eugenia Paschetto, *Pietro d'Abano, medico e filosofo* ([Florence, 1984]). On astrology and the rise of religions, see J. D. North, "Astrology and the Fortunes of Churches," *Centaurus* 24 (1980): 181–211.

14. See n. 9, above.

15. In his comm. *Tetrabiblos*, *Opera* 5:221–22. As Gabriel Naudé pointed out in his life of Cardano prefaced to the collected edition of the latter's works, Cardano was not the first to do this (Naudé, *Vita Cardani*, *Opera* 1:i[4]r–v).

16. Siraisi, *Avicenna* (esp. pp. 64–65 as regards early-sixteenth-century printed editions of scholastic commentaries).

17. In 1548, 1554, and 1565. *Conciliator*, ed. Riondato and Olivieri, includes a "nota bibliografica" by L. Olivieri (pp. ix–xi) giving further details about Renaissance editions of the work.

18. "Arabum sententiam, rationes, experimentaque non sprevi. An decuit eruditissimos viros, optimosque Philosophos, ob solam vel linguae asperitatem, vel rudes interpretes aspernari? Quosdam Graece obgannientes, nec Philosophiae, nec medicinae gnaros, solum nomen Galeni, tamque illud Hebraeorum ineffabile Dei quod septuaginta duobus elementis constare affirmant, iactantes amplecti, tum maxime quod rationes negligere se praeferrunt, vere autem fugiunt. Fateor Iacobum, & Ugonem, turbamque illam quam Gentilis excitat chimericis idolis plenam, parum ad medicinam conferre. Sed in uno Conciliatore, Avicenna, Raseque, quid habes praeter linguam, quae regionis aut aetatis fuit calamitas, quod impar tuis sit egregiis inventis. Quid cum subtilitate Averrois, cum iudicio Avicennae, cum gravitate Rasis, cum doctrina Conciliatoris conferri potest?" (*Contradictiones* [Lyon, 1548], epistle *ad lectorem* at end of bk. 2, pp. 464–65).

19. Ingegno, pp. 257–67; also Alfonso Ingegno, "Il perfetto e il furioso," *Il piccolo Hans: Rivista di analisi materialistica* 75/76 (Autumn–Winter 1992–93): 11–31.

20. Galen, *De temperamentis* 1.5, 1.6, 1.9, Kühn 1:534–51; 559–71; *De op-*

*tima corporis constitutione*, Kühn 4:737–49; Aristotle, *De partibus animalium* 2.2, 653a26–36.

21. *Conciliator, differentia* 18, fols. 27v–29v. Galen mentioned the canon of Polykleitos in *De temperamentis* 1.9, Kühn 1:566; also *De placitis Hippocratis et Platonis* 5.3, ed. and trans. Phillip De Lacy (Berlin, 1981), 1:309, and *De usu partium* 17.1, trans. Margaret T. May (*Galen on the Usefulness of the Parts of the Body*) (Ithaca, 1968), 2:726–7. Only the first of these passages is likely to have been known to Pietro d’Abano. For Vesalius, see Vesalius, *Fabrica* (1543) 5.19, p. 548, and Jackie Pigeaud, “Formes et normes dans le *De fabrica* de Vésale,” in *Le corps à la Renaissance. Actes du XXXe Colloque de Tours 1987*, ed. Jean Céard, Marie Madeleine Fontaine, and Jean-Claude Margolin (Paris, 1990), pp. 399–421, at 413–18, and idem, “Les problèmes de la création chez Galien,” in *Galen und das hellenistische Erbe*, ed. Jutta Kollesch and Diethard Nickel, *Sudhoffs Archiv*, Beiheft 32 (Stuttgart, 1993), pp. 87–103.

22. *Contradictiones* 1.6.9, *Opera* 6:411–13; 2.6.14, pp. 633–37.

23. “Addit vero ibi de Christo multa, non solum impia, sed absurda: et dum Philosophum agit more quorundam, qui optimum argumentum existimant Philosophi impietatem, et in leges [1548; *Opera: legis*] iacta probra: et medici maledicere de Arabibus, cum hi Galenum solo nomine salutaverint, illi vero in lege quidem superstitiosi, in philosophia autem inanes sint et fatui, nam Philosophus non haec acta diceret ut postmodum in causas reduceret naturales, quemadmodum Conciliator, et Pomponatius facere nituntur, fabulosis absurdissimisque imaginationibus” (ibid. 1.6.9, *Opera* 6:412).

24. “ingenio superet Archimedes, eloquentia naturali Ciceronem, multaque alia innumera efficiat, quae singula pro miraculo haberi soleant: his omnibus in unum collectis, palam est eum qui tali temperie [1548; *Opera: temberie*] praeditus sit admirationem maximam populis praebiturum, proque divino homine habendum, ac quasi Deum inter mortales cohabitaturum” (ibid. 2.6.14, *Opera* 6:636).

25. *Ingegno*, pp. 263–66; idem, “Il perfetto e il furioso.” On Cardano’s views on longevity and his own health, see further chaps. 4 and 10, below.

26. *Conciliator, differentia* 3, fol. 7r; see also Nancy G. Siraisi, “Medicine, Physiology, and Anatomy in Early Sixteenth-Century Critiques of the Arts and Sciences,” in *New Perspectives on Renaissance Thought*, ed. John Henry and Sarah Hutton (London, 1990), pp. 214–29, at pp. 219–20, and sources cited in n. 5, above.

27. *Contradictiones* 1.3.1, *Opera* 6:336–37; 1.5.4, pp. 380–81; 1.6.10, pp. 414–15.

28. See Adriano Carugo, “Giuseppe Moletto: Mathematics and the Aristotelian Theory of Science at Padua in the Second Half of the Sixteenth Century,” in *Aristotelismo veneto e scienza moderna* (Padua, 1983), pp. 509–16.

29. “Omnēs enim artifices, qui cum hoc etiam sunt scientes, ut musici, et geometrae, etiam percipiunt rem prout est, et indivisibile, quia tale indivisibile puta diapason, potest esse firmum et non fluens: quia non est in materia generabili, et corruptibili ut sic. Ille etiam astrologus qui considerat luminarium coniunctionem, quae est momentanea, quamvis non maneat, considerat tamen, quia nihil vult operari circa illam. Cum igitur medicus sit sciens, et non purus artifex,

et habeat operari circa subiectum suum, et subiectum non constet unquam sub uno affectu propter materiam: cogitur medicus solus inter omnes scientes diiudicare ex sensu, non ex rei veritate” (*Contradictiones* 1.6.10, *Opera* 6:415). Cf. *Contradictiones* 1.3.10, *Opera* 6:360, and “Verum cum ad nostri intellectus imbecillitatem respicimus non illarum [scientiarum] natura, sed nostra vitio fit ut res pene contrario modo se habeat: Nam relicta mathematica, certissima omnium est medicina, inde philosophia naturalis, post astrologia, ultima omnium est theologia” (comm. *Tétrabiblos* 2.9.51, *Opera* 5:206).

30. *Contradictiones* 1.3.1, pp. 336–37.

31. On the development of scholastic *quaestiones* in medicine and their connections both with procedures developed in scholastic theology and with natural questions and problem literature, see Danielle Jacquart, “La question disputée dans les facultés de médecine,” in Bernardo C. Bâzan, John F. Wippel, Gérard Fransen, and Danielle Jacquart, *Les questions disputées et les questions quodlibétiques dans les facultés de théologie, de droit et de médecine*, Typologie des sources du Moyen Age occidental, fasc. 44–45 (Turnhout, 1983), pp. 281–313; Brian Lawn, *The Salernitan Questions: An Introduction to the History of Medieval and Renaissance Problem Literature* (Oxford, 1963); and idem, *The Rise and Decline of the Scholastic “Quaestio Disputata” with Special Emphasis on Its Use in the Teaching of Medicine and Science* (Leiden, 1993).

32. *Contradictiones* 2.1.4., *Opera* 6:442–46.

33. “Conscripsi igitur revocatus ab eo exercitationis impetu, duos libros Floridorum, id est medicarum disputationum. . . . Proprius usus libri maximaque utilitas est difficillimas medicinae quaestiones simplici oratione edocere. Ordinem quoque et facilitatem secuti sumus, ut si ad subiectam materiam respicias, adeo necessaria sit, ut sine horum cognitione medicus esse non possit: sin ad facilitatem, quemlibet possit invitare ad legendum: si ad ordinem, et facile invenire possis, et inventa memoriae commendare” (LP 1557, *Opera* 1:65–66). In the seventeenth-century *Opera* the title *Floridorum libri* was given (possibly by the editor) to Cardano’s commentary on part of the *Canon* of Avicenna, which is evidently not the work referred to here.

34. “Fuerunt hi libri necessarii, nedum utiles, ut multorum simul autorum memoria coleretur: et ne dubitarem quinam libri fide digni essent, vel qui apocryphi, vel et minus celebris scriptoris: et ut scirem quibus in casibus haec aut illa convenirent” (LP 1562, *Opera* 1:106). But here, although the title, date of publication, and names of the publishers of the first two editions match the *Contradictiones*, Cardano gave a different incipit and said the work was in eight books. Presumably memory failed him at this point.

35. Fourteenth- and fifteenth-century scholastic medical writers are cited fairly often in the *Contradictiones*, by no means always in disagreement; e.g., *Contradictiones* 1.3.17, *Opera* 6:397 (Giacomo da Forlì, Ugo Benzi, Turisanus); 1.6.10, p. 414 (Gentile da Foligno, Dino del Garbo [d. 1327], Taddeo Alderotti [d. 1295]).

36. See chap. 6, below.

37. LP 1544, *Opera* 1:59.

38. “Proprium autem gravis viri est, statim ad rem properare. Et ad hoc, opus est multa lectione, toto triduo ingens volumen devorantes: indicio [*sic*; iudicio]

opus est, pertrita vel parum utilia praetereundo, obscurorum expectare occasionem, obelisco signando” (VP 39, *Opera* 1:31).

39. Frances Yates, *The Art of Memory* (Chicago, 1966); Anthony Grafton, “L’umanista come lettore,” in *Storia della lettura nel mondo occidentale*, ed. Guglielmo Cavallo and Roger Chartier (Rome and Bari, 1995), pp. 199–242; Ann Blair, “Humanist Methods in Natural Philosophy: The Commonplace Book,” *Journal of the History of Ideas* 53 (1992): 541–51.

40. Richard J. Durling, “An Early Manual for the Medical Student and the Newly-Fledged Practitioner: Martin Stainpeis’ *Liber de modo studendi seu legendi in medicina* ([Vienna] 1520),” *Clio Medica* 3 (1970): 5–33, at p. 22.

41. “unus praecipue Gymnasiarcha noster Integerrimus non modo me rogavit, ut statuta mihi iuxta consuetudinem disputandi die, contra tua de elementis paradoxa argumentarer . . .” (*Andreae Camutii disputationes, quibus Hieronymi Cardani magni nominis viri Conclusiones infirmantur, Galenus ab eiusdem iniuria vindicatur, Hippocratis praeterea aliquot loca diligentius multo, quam unquam alias, explicantur* . . . [Pavia, 1563], fol. 72r).

42. According to Guglielmo da Saliceto (d. 1276/80), “inhonestum est et indecens est coram infirmo et laicis de causis infirmitatis et operationibus disputando determinare . . . melius et decentius videtur ut omnis inquisitio cum altero et socio fiat in secreto . . . quia laici semper detrahunt sapientibus” (Guglielmo da Saliceto, *Summa conservationis et curationis* [Venice, 1489], proem, sig. a2r).

43. Daza Chacon, *Practica y teorica de Cirugia*, 2:200; the translation is O’Malley’s (*Andreas Vesalius*, p. 418). It was possible to overdo it; on one of these occasions Philip II asked Daza Chacon not to quote quite so many texts (*ibid.*).

44. VP 40, *Opera* 1:31–32 (Cardano also recounted this story in other contexts—see further chap. 9).

45. “Aponensis, qui ante nos medicas controversias dirimere aggressus” (*Controversiarum medicarum et philosophicarum Francisci Vallesii* [Frankfurt, 1590], p. 240). The preface takes a strongly pro-Galenic stand. On Valles (1524–92) and the *Controversiae*, see José María López Piñero, *Los temas polémicos de la medicina renacentista: Las Controversias (1556), de Francisco Valles* (Madrid, 1988). See also Giancarlo Zanier, *Medicina e filosofia tra ‘500 e ‘600* (Milan, 1983), pp. 20–38.

46. “qui ante nos quaestiones medicas, barbare illi quidem omnes scripserunt. Quoniam vero in quovis opere nihil contingere potest legentibus, aut iocundius, aut utilius ordine: delectationi et memoriae eorum, qui in hunc librum inciderint, consulentes, in decem libros totum opus censuimus distribuendum . . .” (Valles, *Controversiae*, p. 2); similarly, and with more detail about scholastic “barbarism,” *ibid.*, p. 55.

47. López Piñero, *Los temas polémicos*, pp. 10–16, 63–65.

48. *Contradictiones*, preface ad lectorem, *Opera* 6:299.

49. For subjects taught and professors between the 1530s and the 1560s, see *Memorie e documenti per la storia dell’Università di Pavia e degli uomini più illustri che v’insegnavano* (Pavia, 1875), pp. 122–28; regarding the proposal to build an anatomy theater, Giacomo Parodi, *Elenchus privilegiorum, et actuum*

*publice Ticinensis Studii a seculo nono ad nostra tempora* (Pavia, 1753), p. 66. Anna Giulia Cavagna, *Libri e tipografi a Pavia nel Cinquecento: Note per la storia dell'Università e della cultura* (Milan, 1981), throws much light on the sixteenth-century university by tracing the ups and downs of publishing in Pavia during that period.

50. The most famous example of which is Hermann Boerhaave, *Institutiones medicae* (Leiden, 1707). On the development of this genre and its relation to the earlier methods of teaching of medical theory and the emergence of early textbooks of physiology, see Lester S. King, *The Road to Medical Enlightenment, 1650–1695* (London, 1970), pp. 16, 181–83, and Siraisi, *Avicenna*, pp. 101–3.

51. *Contradictiones* 1.5.6–7, *Opera* 6:381–87.

52. *Ibid.* 2.2.7, *Opera* 6:467–86 (see further chap. 7). Pietro d'Abano also discussed this question, but a good deal more concisely.

53. “De signis calidi [1548; *Opera*: calidis] cerebri” (*Contradictiones* 2.1.13, *Opera* 6:457); “An signa posita a Galeno de cerebro, in secundo Artis medicae, sint intelligenda, humoribus aequalibus existentibus” (*ibid.* 2.1.14, p. 457); “An cerebrum expurget superflua per nares, oculos, et aures” (*ibid.* 2.1.15, pp. 457–58).

54. See Massimo Luigi Bianchi, “Scholastische Motive im ersten und zweiten Buch des *De subtilitate* Girolamo Cardanos,” Kessler, pp. 115–30.

55. Cardano complained bitterly about Scotus, comparing him very unfavorably to publishers outside Italy (LP 1562, *Opera* 1:103–4). Bks. 3–10 published in the posthumous *Opera* betray no traces of the arrangement claimed in the preface *ad lectorem*, other than the occasional occurrence of some topical clusters. But there is, of course, no way of knowing whether these books represent Cardano's intended arrangement.

56. See, for example, Anthony Grafton, “On the Scholarship of Politian and Its Context,” *Journal of the Warburg and Courtauld Institutes* 40 (1977): 157–58; also Donald Frame, *Montaigne's Essays: A Study* (Englewood Cliffs, N.J., 1969), pp. 72–85, on Montaigne's self-conscious use of random and miscellaneous topics.

57. “*Contradictiones quoque ad scholia et castigationes quasi pertinent*” (LP 1562, *Opera* 1:145).

58. “*Et quamquam longe facilius, quorundam more, antiquorum opinionibus acquiescendo, hunc, tum caeteros libros absolvisssem: quia tamen seriam nimis rem agimus, et in qua vita hominum periclitatur, non philosophorum nugae aut praecepta oratoria, diligentius in singulis, cum res id postulat, rationem evidentem requirimus*” (*Contradictiones*, dedicatory letter to the Senate of Milan, *Opera* 6:297).

59. “*quae dubia visa sunt, rationibus subijcere tentavimus. . . . in cunctis ratione duce praeter etiam autoritatem usus sum: ut si ea cum illorum sententia consentiret, firmius esset iudicium: si repugnaret, nostra opinione recitata, integram lectoribus eligendi quae magis placeret facultatem relinquerem*” (*ibid.*, p. 298).

60. “*unica igitur in Galeni iudicio spes relinquebatur; sed huius etiam maxima operum pars, antiquitate intercidit: et quae supersunt saepe evariant: et ipse, ut existimo, cum medendo plurimum occuparetur, ac multa scribere vellet, non*

satis sibi constat. . . . Sed vel sic tamen, poterat nobis omnis litis esse voluntarius iudex, si non in dissectionibus liquido apparuisset, constanter illum tanquam visa, contradicendi studio affirmare, quae nec vidisset omnino, nec vera essent: ut iam nos non Vesalio credentes, sed oculis nostris, non de iudicio, quod saepe contigerat, sed de fide dubitaremus” (ibid., p. 297).

61. “. . . laudavi Andream Vesaliam ob virtutem: nam hominem nondum e facie novi: & mihi hoc certe commune est cum illo, ut pro veritate ipsa quandoque Galeno adversatus sim” (*Contradictiones* [Lyon, 1548], epistle *ad lectorem* at the end of bk. 2, p. 463).

62. “Sed, en [*sic*] impium est Galeno adversari? Heu stulte, ac miser, an non ille homo fuit? an non solum omnibus suis praedecessoribus, uno excepto Hippocrate, contradixit? sed etiam eos, per quos profecerat, magistros ignorantiae arguit? En, audi quid dicat, dum medicamenta ad singulos morbos conscribit. At vero Archigenes, ut si quis alius, quae ad medicam speculationem attinent, diligenter ediscere studuit, atque ob id quam plurima scripta memoratu digna reliquit. Non tamen in omnibus sane quae tradidit irreprehensibilis mihi videtur: verum velut & ipse pleraque eorum virorum, a quibus adiutus evasit optimus, reprehendit: sic par est ipsum delinquentem a nobis posteris redargui. Difficile enim est, ut qui homo sit, non in multis peccet: Quaedam videlicet penitus ignorando, quaedam male iudicando, quaedam tandem negligentius scriptis tradendo. Sic nos rationem ac experimentum praeponebant, in reliquis Galeno, ut par est, plusquam caeteris aliis omnibus tribuimus. At qui omnia illa tribuunt, non tam illius esse studiosi videntur, quam reliqua omnia ignorare. Quod si modicae pecuniae causa siliquam Indam, manna, saccharum, rhabarbarumque Galeni medicamentis, et Hippocratis relictis amplectuntur: quaenam, rogo impietas est, ubi error Galeni multorum hominum morte pensatur, ubi experimento ipsi contradicit, illum vel infensis astris tueri velle? Ergo illa ex toto, et reliqua Galeno ignota relinque medicamenta, tuncque prorsus te credam esse Galenicum. Verum, dicis non adeo foeliciter mihi res in medendo succedunt, relinquentque me homines. Itaque non te Galeni amor detinet, sed praiceps inverecundia. Quid enim prohibet si in manifestis multa Galenus ignoravit, in occultioribus longe plure nescivisset? At dices, singulares rerum species ignorare potuit, medica ars praecipis generalibus constat: quae ille non solum scivit sed etiam tradidit. Sed si tradidit, non pervenerunt: qua autem non pervenerant, sunt ac si non tradita nobis fuissent. Cum enim multa, imo plusquam dimidium scriptorum suorum perierint, si non illa repetit ac frustra scripsit, necesse est nos omnibus his indigere. Deinde si per generalem rationem regulam illam intelligis, quae docet, contraria contrariis curari: ego sane fateor omnia tradidisse Galenum: sed et ante eum Hippocratem, nulloque huius causa libro indigemus. Sed si singulorum morborum signa, modos, causas, symptomata, auxilia: tum corporis partium numerus, situm, utilitatem, qualitatemque intelligimus, necesse est etiam in scriptis Galeni multa, velut inter illius medicamenta, ac maxime necessaria deesse. Quamobrem nec his duobus libris tantum, sed decem aliis ista sum prosecutus” (ibid., pp. 463–64).

63. For example, “His ergo intellectis, ad conciliandum haec dicta veniamus . . .” (*Contradictiones* 1.3.8, *Opera* 6:349); “Ad id, quod quaeritur, an [cerebrum] humidius sit quam frigidius, eadem ferme convenit responsio. Nam per se

sumptum frigidius est, cum utroque elemento frigidus participet iuxta Aristotelis sententiam. Galenus vero, arbitratur humidius esse: quam quam si quis velit, illum cum Aristotele possit concordare . . ." (ibid. 2.1.5, *Opera* 6:447). On this point, see also Ingegno, p. 232.

64. On the general problem of the status ascribed to particulars in the sixteenth and seventeenth centuries, see Lorraine Daston, "Marvelous Facts and Miraculous Evidence in Early Modern Europe," *Critical Inquiry* 18 (1991): 93–124.

65. *Contradictiones* 2.2.6, *Opera* 6:467.

66. Ibid. 1.1.12, *Opera* 6:309–10; 1.1.16, p. 311; 1.3.14, p. 355; 1.3.24, p. 362.

67. "... librum de Vita nostra scribere aggredimur. Testati nihil adiectum iactantiae, aut ornandae rei causa. Sed quantum licuit collectis eventibus, quibus interfuerunt discipuli . . . tum a nobis conscriptae historiae partibus, librum conflasse" (VP, proem, *Opera* 1:1). On the narrative aspects of his medicine, see Part 5, below.

68. "Supersunt et duo consilia conscripta pro Archiepiscopo S. Andreae in metropoli Scotiae: multa quoque et sine numero consilia scripta pro Anglis, Scotis, Gallis, Germanis, Italis, Hispanis, Cimbris, Blandis, aliisque non ex harum numero gentium hominibus. . . . Eodem tempore [1545] coepi librum Experimentorum, colligens quae alias scripseram, quem perpetuo auxi" (LP 1562, *Opera* 1:107–8). Cardano's *consilia* survive in some numbers, if not in the profusion this remark suggests; a selection of fifty-seven is printed in *Opera* 9:47–246. At least two manuscripts of Cardano's *experimenta* survive, namely, Rome, Biblioteca Nazionale Centrale, MSS S. Francesca a Ripa 2 and 4, both of which may be partially autograph. The former (MS S. Francesca a Ripa 2, headed on p. 1 in a later hand "Experimenta Cardani," 95 fols.) is a disordered notebook with crossings out. A list of 297 numbered *experimenta* at the beginning does not completely correspond with the actual contents. For MS S. Francesca a Ripa 4, see n. 20 to chap. 2. In both, the *experimenta* are medicinal recipes.

69. See, for example, Ann Blair, *The Theater of Nature: Jean Bodin and Renaissance Science* (Princeton: Princeton University Press, forthcoming, 1997).

70. "Quo fit, ut denuo ad accusandum hos descendam, qui adeo omnium Arabum sententiam, etiam in experimentis floccificiant, ut nihil illis tribuere velint. Nam Fuchsius ipse in suo libro de simplicibus, de ea agit, ac si solum calida vel frigida, sed sicca tamen temperie prorsus sit. Sed vide absurditatem, cum Graecos tantum sequantur, quid attinet Plinium immiscere, quo nemo in rebus medicis, aut inconstantior, aut magis fallax vel rudis. Ergo et istud pene impium, deserere Avicennam, Rasim, Averroem, Avenzoar, totque clarissimi ingenii viros medicos ac philosophos. . . . Ergo grammatici grammaticos sequantur, nos cum medicis erimus. . . . Videmus singulis diebus qui Galenum imitantur non leves errores admittere, experimentisque Arabum inferiores esse" (*Contradictiones* 2.3.15, *Opera* 6:514).

71. Ibid. 2.5.9, *Opera* 6:561–66.

72. Ibid., pp. 562–64.

73. The demand for works on this subject is suggested by the fact that Pietro

d'Abano's *De venenis* was printed at least six times during the sixteenth century; see Durling, *Catalogue*, nos. 7–12, 242. See also Lynn Thorndike, *A History of Magic and Experimental Science*, vol. 5 (New York, 1941), 472–87.

74. *Contradictiones* 2.5.9, *Opera* 6:565.

75. “Dum viderem parari mensam Caesari, detergebant sedem, mensam, et pedum, pluteum sustentaculum, mappa: existimant enim venenum aliquod adeo esse potens, ut vel sub calceis vel ephippiis occidat: quod probe confirmatur, pestiferi experimento: ipsum enim ferro, vestibis, canibus, lapidibus, lignisque contactu haerens persaepe necat. Hanc tamen tantam subtilitatem perfidia nostrorum temporum invenit, quod antiqui ignorabant” (ibid., p. 566). The occasion was presumably Charles V's visit to Milan in 1541 (on his return journey from the Diet of Regensburg), when Cardano, as rector of the College of Physicians, held the emperor's canopy during his entry into the city; see VP 30, *Opera* 1:19, and Karl Brandi, *The Emperor Charles V* (London, 1939), pp. 453–55.

76. “Et scias, Princeps illustrissime, ex decem qui venenum bibunt vix unus, nisi repetatur, moritur” (*Contradictiones* 2.5.9, *Opera* 6:565).

77. Cardano, *De venenorum differentiis, viribus et adversus ea remedium praesidiis ac praesertim De pestis generibus omnibus praeservatione et cura libri III*, printed with his *In septem Aphorismorum Hippocratis particulas commentaria* (Basel, 1564; IA \*132. 093), otherwise *De venenis libri tres*, *Opera* 7:275–355.

78. “Sed aegedum veritas illa sit: quomodo oculis patri assimiletur, naso matri, non explicat? et rursus, cur avo materno, ut ego qui Iacobo Mi[c]herio materno avo moribus, ingenio et corpore sum persimilis? . . . Sicut igitur in anima est vis imaginandi et ratio e memoria, sensus, ita in corpore sunt multae formae, non solum natura sed loco distinctae. Velut cor meum assimilatur in natura patri meo et avo paterno Antonio Cardano et ita proavo Facio alteri et atavo Aldo cum intercesserint ab illius ortu ad hanc usque diem anni CCXX fuerunt enim omnes vivacissimi, non tamen ut audivi forma similes” (*Contradictiones* 2.6.18, *Opera* 6:652–53).

79. See chap. 8, n. 54; chap. 2, n. 2, and discussion in chap. 9.

80. Some examples of Cardano's treatment of Aristotelian ideas in his natural philosophical works are discussed in Jean-Claude Margolin, “Cardan, interprète d'Aristote,” in *Platon et Aristote à la Renaissance. XVIe Colloque International de Tours* (Paris, 1976), 307–33; see also Bianchi, “Scholastische Motive.”

81. For some medieval examples, see Nancy G. Siraisi, *Taddeo Alderotti and His Pupils* (Princeton, 1981), pp. 186–201.

82. “. . . sicque mediam inter philosophos et medicos viam amplexus est, quae et meo iudicio etiam verior existit” (*Contradictiones* 2.1.4, *Opera* 6:445).

83. Ibid. 2.6.18, *Opera* 6:646–47; “non igitur male dixit Galenus aut Philosophus aut Hippocrates, sed solum imperfecte” (ibid., p. 652).

84. Ibid., p. 646; ; see Vesalius, *Fabrica* (1543) 5.17, pp. 541–43. *Contradictiones* 2.1.4, *Opera* 6:443; see Vesalius, *Fabrica* (1543) 3.6, pp. 275[375]–276[376]; *Contradictiones* 2.1.4, *Opera* 6:445.

85. *De subtilitate* 2, *Opera* 3:372–74. On Cardano's element theory, see Ingegno, pp. 223–32. I do not here address the question of resemblances between Cardano's element theory and some Paracelsian ideas. Cardano's ideas about the

elements were roundly denounced in the elder Scaliger's famous attack on *De subtilitate*. I have consulted Julius Caesar Scaliger, *Exotericarum exercitationes libri XV de subtilitate ad Hieronymum Cardanum* (Frankfurt, 1592), in which the attack on Cardano's views on the status of fire as an element occurs on pp. 45–53; the first edition was Paris, 1557. Regarding the wide attention attracted by the dispute between Cardano and Scaliger, see Maclean, "The Interpretation of Natural Signs," at p. 231.

86. "Hippocrates quoque in libro de carnibus connumerat terram, aquam, et aerem, aether quod dicit esse immortale, et cuncta cognoscens" (*Contradictiones* 10.26, *Opera* 6:910); "Sed certe sub coelo Lunae nullus est ignis: nam quum [Lyon, 1559: cum] coelum purissima res sit, non decuit sub omnis qualitatis experte re, ardentissimam collocasse. Natura enim semper extrema mediis iungit. Inter carnem enim et os, membranam: inter os et ligamenta, cartilagine: inter os et cerebrum, quod carne cerebrum esset mollius, duplicem membranum, ac duriozem ossi propinquiorem collocavit" (*De subtilitate*, bk. 2, *Opera* 3:372). For the Hippocratic passage, see *Hippocratis Cois medicorum omnium longe principis, opera quae ad nos extant omnia. Per Ianum Cornarium medicum physicum latina lingua conscripta* . . . (Basel, 1546), p. 55, Littré 8:584.

87. "humores in animalibus quatuor sunt: sed quid hoc ad elementa? quid si tantum tria cum Thrusiano expositore artis medicae Galeni esse dicam? Sed tamen sensus ostendit esse quatuor" (*De subtilitate*, bk. 2, *Opera* 3:373). According to Turisanus (Torrighiano de' Torrighiani, fl. early fourteenth century), "Dicemus ergo videri nobis eterogeneitatem illius commixti quod est in venis ex tribus constare manifestis substantiis tantum, scilicet terrestri aquea et spirituali: quarum una proportionatur melancolie: reliqua flegmati, 3a colere ex quibus secundum proportionem commixtis resultat sanguinis temperamentum: propter quod aliquando dicimus sanguinem colericum: aliquando melancolicum: aliquando flegmaticum a dominio unius eorum in commixto: non dicimus autem sanguinem sicut a dominio alicuius quartae substantie preter dictas: sed dicimus eum temperatum a temperantia mixtionis illarum trium secundum decentem proportionem ad opus naturae: et hoc est quod simpliciter dicitur sanguis sine hac additione colericus vel flegmaticus vel melancolicus" (*Turisani monaci plusquam commentum in microtegni Galieni. Cum questione eiusdem de Ypostasi* [Venice, 1512], fol. 54v). On Turisanus, see Siraisi, *Taddeo Alderotti*, pp. 64–66.

88. "Item calor animalium secundum Philosophum est calor non igneus, sed coelestis. . . . Manifestum est autem quod Galenus aliter censet, nam libro de Usu respirationis, vult calorem nostrum igneum, sumpta similitudine, quod non secus ac in fornace ignis prohibita transpiratione extinguitur. Est igitur hic alia inter Galenum et Aristotelem discordia. . . . Verum neque illud concedere cogimur, quod si calor animalis etiam sit igneus, ob id debeat, cum sub forma mixti est, agere in subiectam materiam" (*Contradictiones* 1.1.11, *Opera* 6:308). The decision to muffle his views on the elements in *Contradictiones* was a conscious one; in *De subtilitate* he remarked, "Admirabitur forsitan aliquis, quod in contradicentium libris aliter senserim. Sed ubi opiniones antiquorum sequi propositum fuit, hic vero docere veritatem" (*De subtilitate* 2, *Opera* 3:390). The remark is quoted in Maclean, "The Interpretation of Natural Signs," p. 237. A

much fuller and clearer statement of his position on the elements is found in *Contradictiones* 10.26, *Opera* 6:911 (not printed in his lifetime).

89. *Ibid.* 2.1.1, *Opera* 6:439, with the entire discussion on pp. 437–40. As noted above, when it suited another argument, he was ready to postulate separate forms for different organs of the body.

90. “Formam vero temperamenti dicimus adesse, sed non disiunctam esse ab anima, in belluis: quia vel est ipsa, vel ab ipsa sustentatur. Item dico de homine apud Galenum, et Alexandrum Aphrodiseum. Nobis autem constituentibus animum humanum immortalem, longa nimis esset disputatio, si vellemus hoc declarare: dictum est etiam partim hoc in libro De animi immortalitate” (*ibid.* 2.1.1, *Opera* 6:440). On Galen’s materialism as regards the soul and its Christian critics, see Owsei Temkin, *Galenism* (Ithaca, 1973), pp. 82–92.

91. “Sed adest dubitatio, nam si forma mixti est forma elementi praedominantis, igitur nullum simplex medicamentum habet facultates contrarias: nam non datur forma sine operatione: cum tamen Galenus dicat, quod Balanus Myrepsica [a suppository with myrrh], seu glans unguentaria, calidam habet terreamque substantium simul, astringentemque vim . . . nisi esset quod et in his partes sunt actu invicem distinctae, quoniam viventis fuerunt herbae: et tunc potentia quidem tales, actu vero formam animae plantae consequerentur [1548: . At] postquam eradicatae, ac mortuae fuerint, unaquaque in proprium relabitur temperamentum” (*Contradictiones* 2.1.1, *Opera* 6:440).

92. *Ibid.* 5.44, *Opera* 6:745.

93. *Ibid.* 1.2.8, *Opera* 6:320–334. For the controversy over derivation and revulsion, see Andreas Vesalius, *The Bloodletting Letter of 1539*, trans. J. B. de C. M. Saunders and C. D. O’Malley (New York, n.d.), introduction, pp. 7–19. Although Cardano referred to bk. 3 of the *Fabrica* in the course of this discussion (*Opera* 6:330; ed. 1545, fol. 45v), I have not found any citation of Vesalius’s *Epistola, docens venam axillarem dextri cubiti in dolore laterali secundam* (Basel, 1539) (the so-called bloodletting letter). Essentially, the argument was over whether the object of bleeding should be to direct the blood (and other humors) toward an affected part or to draw them away from it. It involved claims to revive authentic Hippocratic and Galenic procedures, attacks on and defenses of medieval tradition, and extensive differences of opinion about the interpretation of ancient sources.

94. *Contradictiones* 2.2.7, *Opera* 6:467–86; 2.1.4, pp. 442–46, and 4.16–23, pp. 695–704. For discussion of the content of these sections, see chaps. 5 and 7.

95. “Deus an singula quaeque cognoscat” (*Contradictiones* 3.6, *Opera* 6:657–59). For discussion, see chap. 7. The *quaestio* itself was a traditional one and had been discussed by Thomas Aquinas, *Summa Theologiae*, Prima pars, qu. 14, A.11, “Utrum Deus cognoscat singularia.”

96. *Contradictiones* 3.6–7, *Opera* 6:657–61; 6. 10, pp. 764–67. The plea for a Maecenas (Cardano’s own term) is to be found in *Contradictiones*, epistle *ad lectorem* at end of bk. 2 (Lyon, 1548), p. 464.

97. *De immortalitate animorum* (Lyon, 1545; IA \*132. 049); *Opera* 2:456–536.

98. *Theonoston*, bks. 3 and 5, *Opera* 2:403–33 and 448–54. Cardano was at

work on this treatise, which was not published during his lifetime, in 1555 and 1561 (LP 1562, *Opera* 1:112, 118).

99. See Eckhard Kessler, “The Intellective Soul,” in *The Cambridge History of Renaissance Philosophy*, ed. Charles B. Schmitt et al. (Cambridge, 1988), pp. 485–507.

100. Cardano, *De immortalitate animorum*, *Opera* 2:529–30. Cardano’s views on the soul and the related question of the intellect are discussed in Margolin, “Cardan, interprète d’Aristote,” pp. 316–22, and Ingegno, pp. 61–78.

101. “si corpus esset instrumentum animae, aliquae operationes poterunt esse validiores quam pro natura corporis, et ita non erit necessarium temperaturam esse bonam si functio sit bona, quoniam ut videmus in tonsoribus, tonsor unus melius tondet alio cum eadem novacula, et scriptor unus melius scribit alio cum eadem penna, atramento, et papyro, et discrimen hoc est notabile: Et est mirum de Galeno. Et plurimum etiam iuaret in multis morbis curare animam” (*Contradictiones* 6.10, *Opera* 6:765). For the repudiation of Galen’s identification of the soul with the temperament of the body, *ibid.*, p. 767.

102. “At cum ille [Galenus] non omnino affirmet esse mortalem, Hippocrates, et Hasen immortalem est dicant, constat etiam medicorum opinionem ad immortalitatem accedere” (*ibid.*, p. 767).

103. “Hippocrates videtur animam nostram censuisse immortalem cum in libro *De carnibus* haec scripsit. ‘Et videtur sane mihi id quod calidum vocamus, immortale esse, et cuncta intelligere, et videre, et audire, et scire omnia tum praesentia, tum futura. Huius igitur plurima pars, quum turbata essent omnia, in supernam circumferentiam secessit. Et videntur mihi ipsum veteres Aethera nominasse. Altera pars inferna, appellatur Terra, frigidum quid et siccum, et multis motionibus obnoxium, et in hac sane multum calidi inest. Tertia pars aeris, medium locum occupavit, calidum quid ac humidum existens. Quarta vero pars terrae proximum locum coepit, humidissimum quid ac crassissimum.’ Cum ergo censet hominem ex his quatuor constare et animam esse calidum illud, haud dubie animam immortalem esse voluit. Idem in primo *De diaeta* haec habet quae etiam alias a me, sed ad aliud propositum recitata sunt. ‘Et quidem nullum omnino corpus perit, neque sit quod prius non erat; verum permista et discreta permutantur. Homines autem putant hoc quidem ex orco in lucem auctum generari, illud vero ex luce in orcum imminutum perire ac corrumpi’” (*ibid.*, p. 764). The Hippocratic passages are quoted from the translation of *De diaeta sive victus ratione* (= *Regimen*) by Cornarius; see Hippocrates, *Opera*, trans. Cornarius (Basel, 1546), pp. 55, 125. See also Littré 8:54 and *Regimen* 1.4, *Hippocrates* (Loeb) 4:233. Attention is drawn to the significance of *Regimen* 1.4–6 for Cardano in Ingegno, pp. 226–27. Cardano also cited remarks about the weeping and laughter of infants in *On the Seven Month Child* as evidence for Hippocrates’ belief in the immortality of the human soul; see *Contradictiones* 3.7 and 5.10, *Opera* 6:660 and 764, and Hippocrates, *De septimestri partu*, *Opera*, trans. Cornarius (Basel, 1546), p. 64 (Littré 7:450).

104. “Generatio an detur? Et an resurrectio mortuorum” (*Contradictiones* 3.7, *Opera* 6:659–61).

105. “Ne tamen videamur Hippocrati, aut immortalitati animi, vel resurrectioni addicti, respondebimus his quibus ab Aristotele responderi potest” (*ibid.*,

p. 661). See Ingegno, pp. 226–29, pointing out the further discussion of some of these ideas in Cardano’s *Hyperchen*, *Opera* 1:284–92.

106. “. . . contra tua de elementis paradoxa argumentarer (quod sane, ut mihi quidam eruditi retulerunt, prius inventum fuit Ioannis Francisci Mirandulensis)” (Camuzio, *Disputationes*, fol. 72r). Pico’s chapter on physiology is found in Gianfrancesco Pico, *Examen vanitatis doctrinae gentium et veritatis Christianae disciplinae* (Mirandola, 1520), 1.16, fols. 27v–32r; on this chapter, see Nancy G. Siraisi, “Medicine, Physiology, and Anatomy,” pp. 214–29.

107. “ille [Cardanus] ipse velut heresiarcha quidam insignis in arte medica, novam propemodum sectam condiderit, a Galeno quampluribus in locis diversae [sic] penitus, Hippocraticum se medicum adfirmans. . . siquidem in haec Insubria nostra quamplures videas non solum auditores, verumetiam iamdiu promotos ad lauream, quos minime pudeat Cardanum conta Galeni placita veluti Pythiam Apollinem in medium producere” (Camuzio, *Disputationes*, \*iiiiv).

108. For discussion of some of these features of Cardano’s natural philosophy, see, in addition to Ingegno, Margolin, “Cardan, interprète d’Aristote,” idem, “Analogie et causalité chez Jérôme Cardan,” in *Sciences de la Renaissance. VIIIe Congrès International de Tours* (Paris, 1973), pp. 67–81, and Maclean, “The Interpretation of Natural Signs.”

#### CHAPTER 4

#### TIME, BODY, FOOD: THE PARAMETERS OF HEALTH

1. He lectured at Bologna on *Aliment* and *Regimen in Acute Diseases* in 1568 and 1569. See chap. 6.

2. *Opus novum cunctis de sanitate tuenda ac vita producenda studiosis apprime necessarium: in quatuor libros digestum. A Rodulpho Sylvestrio Bononiensi Medico, recens in lucem editum* (Rome, 1580; IA \*132. 118). It was reissued Basel, 1582 (IA \*132. 120), and corresponds to ST, *Opera* 6:8–294.

3. Cardano, *De usu ciborum liber*, *Opera* 7:1–64; *Liber secundus Theonoston seu De vita producenda, atque incolumitate corporis conservanda*, *Opera* 2:372–402. These treatises were not published in Cardano’s lifetime. Book 2 of *Theonoston*, also known as *De optimo vitae genere*, survives as an independent item in two Vatican manuscripts (Vat. lat. 5849 and Fondo Boncompagni J 51); it was published under the title *Theonoston, seu de vita producenda atque incolumitate corporis conservanda dialogus* (Rome, 1617). I have not seen these manuscripts or editions, and cite the edition from Ingegno, p. 26.

4. The main Hippocratic treatises specifically devoted to diet are *Regimen* (known in its Renaissance Latin versions as *De diæta* or *De victus ratione*), *Aliment*, and *Regimen in Acute Diseases*, but the subject is, of course, central to Hippocratic medicine and recurs throughout the corpus. Galen treated the subject as part of general regimen in *De sanitate tuenda*, Kühn 6:1–452, and with respect to individual foodstuffs in *De alimentorum facultatibus*, Kühn 6:453–748. In addition, there was a Renaissance forgery of Galen’s lost commentary on *Aliment*; see n. 110 to chap. 6. Ancient and medieval developments are summarized in Pedro Gil Sotres, “Le regole della salute,” in *Storia del pensiero medico occidentale*, vol. 1, *Antichità e Medioevo*, ed. Mirko D. Grmek