A pragmatic aspect of polymathy

A Pragmatic Aspect of Polymathy: The Alliance of Mathematics and Medicine in Liddel's Time

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In a world where academic study is highly specialized, and high achievement seems to be possible only to those, like Melville's Captain Ahab, whose "fixed purpose is laid with iron rails",[1] and who pursue the discipline which is their obsessive quarry in a single-minded way, it is easy to regard polymathy as a desirable alternative. Even the very designation "discipline" smacks of self-denial and a punishing schedule; while polymathy seems to suggest the ranging of a free spirit, ignoring disciplinary boundaries and alighting wherever the fancy takes it. But historical evidence can usually be relied upon to dispel romantic visions of the past. What I want to suggest in this chapter is that polymathy may have seemed the best course to pursue in order to try to make a decent living. Certainly, as I shall try to show, this seems to have been the case among those who might have wanted to pursue a career in the mathematical sciences. Evidence suggests that the mathematical sciences, like crime, did not pay, and those who wished to pursue them, even those who were high achievers in mathematics, had to turn elsewhere to earn an honest living.

Because our principle focus here is Duncan Liddel, I will use him as an illustrative example as much as possible. What I want to do in this paper, is to suggest that Liddel wanted to make a career in mathematics, but that, like many others before him, he failed to do so, and turned instead (or, as well) to medicine—which was always, by strong contrast with mathematics, a reliable way to earn a steady, and

[1] Herman Melville, *Moby Dick, or the Whale* (1851), Ch. 37.

often lucrative, income. Liddel's polymathy, in short, can be seen as the result of necessity rather than as the untrammelled ranging of an ambitious free spirit. I see Liddel as a mathematician first and foremost, and I'm going to point to some indications of this in the admittedly scant biographical material we have on him. But because there is so little we can say here, I am also going to consider what I take to be comparable near contemporary cases. I believe we can use the experience of these other would-be mathematicians, to throw light upon the similar situation of Liddel, and thereby gain circumstantial evidence about him, in the absence of direct evidence. I will consider here the cases of Oronce Fine (1494–1555), Jean Fernel (1497–1558), and Girolamo Cardano (1501–1576). Fine was a mathematician who stuck to his guns, and never did stray into other areas of learning. Fernel, by contrast, tried to make a career in mathematics, and only turned to medicine after he had failed to do so—he then went on to become famous as one of the leading medical practitioners of his day. Girolamo Cardano, unlike Fine, Fernel or Liddel, is still recognised in the history of mathematics as one of its leading contributors, and he was recognised in his own time as one of the leading mathematicians in Europe, but he never made a living as a mathematician. What's more, unlike Fine and Fernel, he never even tried to do so. When it came to earning money for himself and his family, Cardano never seems to have been in any doubt that he should pursue medicine as his career. It seems to me that Liddel was most like Fernel, beginning his careers in mathematics, but turning eventually (after a much longer time in mathematics than Fernel managed) to medicine. Accordingly, in what follows, I will concentrate most on the comparison between Liddel and Fernel.

Let us begin by looking at what we know of Liddel's career trajectory. Our best source is the *Sketch of the Life of Dr Duncan Liddel* published in his native

Aberdeen in 1790, and written by John Stuart, Professor of Greek at Marischal College and a keen antiquarian.[2] We are first told that Liddel, in 1579, aged about 18, and "doubtful what course to pursue, and despairing of his future fortune," happened to meet a fellow Scot, John Craig (*d*. 1620?), who was then professor of mathematics at Frankfurt an der Oder.[3] Now, by the way, Craig himself had matriculated at Frankfurt in 1573 and started teaching mathematics there at some point before his meeting with Liddel, but less than three years after their meeting, in 1582, he returned to Edinburgh and set himself up in medical practice. Craig was not a great mathematician, but he knew enough to copy down a technique he learned from the German mathematician Paul Wittich (*c*. 1546–1586), and on his return to Edinburgh, he showed this technique to John Napier (1550–1617). Craig wrote it down inside the back cover of his copy of Copernicus's *De revolutionibus*, which is now in Edinburgh University Library, and Napier was able to extend and refine this technique into the system of logarithms. Meanwhile, Craig himself rose to be chief among the personal physicians to James VI.[4]

Returning to Liddel, his biographer tells us that, under Craig, Liddel "applied himself very diligently to mathematics and philosophy… and also entered upon the study of physic." Now, when Craig left Frankfurt it is said that he "sent his young countryman to prosecute his studies at Wratislaw or Breslaw in Silesia." Liddel's

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[2] John Stuart, *A Sketch of the Life of Dr Duncan Liddel of Aberdeen, Professor of Mathematics and of Medicine in the University of Helmstadt* (Aberdeen: J. Chalmers & Co., 1790). Hereafter cited as *Sketch*. See also, George Molland, "Scottish-Continental Intellectual Relations as Mirrored in the Career of Duncan Liddel (1561–1613)", in *The Universities of Aberdeen and Europe: The First Three Centuries*, ed. Paul Dukes (Aberdeen: Aberdeen University Press, 1995), 79–101; and A. G. Molland, "Duncan Liddell, 1561–1613: An Early Benefactor of Marischal College Library", *Aberdeen University Review* 51 (1985–6): 485–99.

[3] *Sketch*, p. 1. Stuart dates this to 1579.

[4] John Henry, "Craig, John (*d.* 1620?)", *Oxford Dictionary of National Biography*, Oxford University Press, 2004; online edn, Jan 2007 [http://www.oxforddnb.com/view/article/6575, accessed 8 April 2014] Owen Gingerich and R. S. Westman, *The Wittich Connection: Conflict and Priority in Late Sixteenth-Century Cosmology* (Philadelphia: American Philosophical Society, 1988); Owen Gingerich, *An Annotated Census of Copernicus'* De revolutionibus (Leiden: Brill, 2001). Nicolaus Copernicus, *De revolutionibus orbium coelestium* (Basel, 1566), Edinburgh University Library, Special Collections, Dd. 3. 44.

name is linked now to the "big name" in Breslaw at this time, the humanist scholar Andreas Dudith (1533–1589).[5] Stuart, in his biographical *Sketch* implies that Craig sent him to Breslaw because Dudith was there, but the very next sentence in the *Sketch* seems to offer a much more likely reason for Craig to send Liddel to Breslaw. That sentence reads: "During his residence in this university, Liddel is said to have made uncommon progress in his favourite study of mathematics, under the direction of a very eminent professor, Paulus Wittichius."[6] Craig, as we've just seen, knew Wittich well, and evidently respected him as a superior mathematician. Given that Liddel's favourite study was mathematics, it seems likely that Craig would suggest that the young Scot should go to study with Wittich. It is perhaps worth noting also that John Stuart, Liddel's eighteenth-century biographer is unlikely to have heard of Wittich (note that he refers to him as "a very distinguished professor"), but as a scholar of Greek he would be aware of Dudith's connection to Breslaw, and might have simply wanted (without historical warrant) to associate his Scottish subject with such a famous humanist.[7]

The sense we get from Stuart's *Sketch*, anyway, is that Liddel was keenly interested in mathematics, and that medicine, mentioned here and there, is very much a secondary concern. This theme continues. Liddel left Breslaw for the university at Rostock in 1587. It is not clear why he chose Rostock, but it may have been because of its associations with the astronomer Tycho Brahe (1546–1601), a former student there. Be that as it may, it is clear that Liddell was admired by new friends there as a

[5] *Sketch*, pp. 1–2. Stuart says Craig returned to Scotland in 1582.
[6] *Sketch*, p. 2.
[7] It should be noted, also, that Stuart provides citations for his information about Wittich—"Jo Caselii, Epist. Ded. Ty. Brahe, Epist. Astron. Lib. I. p. 296. Norie, 1601"—referring to Tycho Brahe, *Epistolarum astronomicarum libri* (Nuremberg, 1601). By contrast, he does not provide any source for his claim about Dudith. He does, however, provide an informative footnote about who Dudith was, "as some readers may be ignorant", but he does not provide similar information about Wittich. I surmise this is not because he assumes nobody will be ignorant as to who Wittich was, but because he, Stuart, did not know and did not care (Wittich being merely a mathematician).

mathematician. Johannes Caselius (1533–1613), professor of rhetoric, in a letter to John Craig, said that Liddel instructed Heinrich Brucaeus (1530–1593), professor of medicine but described by Caselius as "an excellent mathematician", in "the more perfect knowledge of the Copernican system, and other astronomical questions." Caselius went on to say :

> Mr Liddel was the first person in Germany, who explained the motions of the heavenly bodies, according to the three different hypotheses of Ptolemy, Copernicus, and Tycho Brahe.[8]

It is assumed that Liddel did indeed meet Tycho during this period in Rostock, and visited him "at least twice" according to George Molland, at his one-man research institute on the nearby Danish island of Hveen (Uraniborg).[9] Certainly Liddel's reputation with Tycho was such that Tycho included him alongside Nicolaus Raimarus Ursus (1551–1600), Paul Wittich, Helisaeus Roeslin (1545–1616), and Christopher Rothmann (*c*. 1555–1600), as dangerous rivals to his own reputation as the leading astronomer in Europe.[10] Historians of mathematics have recently shown the interconnectedness of the community of mathematicians throughout Europe, and their cliquishness.[11] It seems pretty clear from Liddel's association with Paul Wittich, and Tycho Brahe, and Brahe's awareness of him as a rival, that Liddel was very

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[8] *Sketch*, p. 2.
[9] Charles Platts, "Liddel, Duncan (1561–1613)", rev. George Molland, *Oxford Dictionary of National Biography*, Oxford University Press, 2004 [http://www.oxforddnb.com/view/article/16639, accessed 9 April 2014]. See also *Sketch*, pp. 2–3.
[10] Ibid.
[11] Gingerich has shown how marginalia by leading astronomers, such as Wittich, or Erasmus Reinhold (1511–1553), appear in many copies of Copernicus's book, having been copied (either directly or indirectly) from Wittich's or Reinhold's originals. See Owen Gingerich, *The Book Nobody Read: Chasing the Revolutions of Nicolaus Copernicus* (London: William Heinemann, 2004); Gingerich, *An Annotated Census of Copernicus'* De revolutionibus; and Gingerich and Westman, *The Wittich Connection*.

prominent in advanced mathematical circles (even though he is not now remembered for any mathematical innovations).

Liddel's next move, in 1591, was to the University of Helmstadt, the Julian Academy established by Henry Julius (1564–1613), Duke of Brunswick-Lüneburg in 1576, where he taught mathematics for about 12 years. It's only at this phase of his career that medicine begins to emerge as another string to Liddel's bow. He takes the MD in 1596, becomes first physician at the Brunswick court, and develops an extensive practice. But, meanwhile, he continues to teach mathematics, until he becomes pro-rector of the university in 1604. His biographer tells us that

> During this period, he gave repeated courses of lectures on geometry, astronomy, and universal geography; instructing his pupils in the whole circle of mathematical science, and particularly in the new theories of the planetary system, which untill [*sic*] his time were very imperfectly understood or taught in that country.[12]

Liddel left Helmstadt early in 1607 and seems to have returned to Scotland shortly after. Stuart mentions the political instability of the Julian Academy at that time as a reason for Liddel's departure, but he also mentions "the profits of an extensive practice".[13] Although Stuart does not discuss anything so vulgar as Liddel's financial arrangements, the reader receives the impression that it is thanks to his medical practice—not his teaching of mathematics—that Liddel becomes a wealthy man. He was wealthy enough, to make his first bequest to Marischal College in 1612,

[12] *Sketch*, pp. 3–4.
[13] *Sketch*, p. 4.

shortly after his return to Scotland, and in 1613, within days of his death, he provided an endowment to set up a chair of mathematics.[14]

So, it seems to me that the biographical evidence suggests that Liddel wanted to make a career for himself as a mathematician, but that he eventually, later in his career, coupled this with medicine in order to enhance his income, and perhaps even his public reputation. It is well known from Galileo's case, for example, that professors of mathematics were the least valued, and consequently worst paid, professors in the university system.[15] Professors of mathematics were even lower down the academic hierarchies than professors of natural philosophy, who were generally paid much less than professors in the higher faculties. The low status of mathematics in the universities clearly reflected a generally low opinion of mathematics among men of letters. Furthermore, the teaching of mathematics at university was generally of such a low level that it was not even intellectually rewarding. Consequently, those who did teach mathematics in the university system, seldom made it a lifetime's career; it was much more usually undertaken for a few years only by young men biding their time before making their next career move (either into natural philosophy, or medicine, or perhaps something completely different). John Craig, Liddel's early mentor in Frankfurt an der Oder, perfectly fitted this pattern.

This pattern remained in force in spite of some notable attempts to reform the university curricula in the sixteenth century. Jesuit colleges elevated mathematics to a much more important position in their curricula, but generally mathematics remained

[14] *Sketch*, pp. 5–6.
[15] Mario Biagioli, *Galileo, Courtier: The Practice of Science in the Culture of Absolutism* (Chicago: University of Chicago Press, 1993). For a general survey of the social standing of mathematicians see idem, "The Social Status of Italian Mathematicians", *History of Science* 27 (1989): 41–95.

a minor, propaedeutic study in the arts faculties.[16] But Liddel did not conform to the usual career pattern. He continued to teach mathematics in the university system from 1587 to 1603 (16 years following on 8 years of learning). He only properly taught medicine from 1596 to 1604, and as far as we can tell, he only put his medicine into lucrative practice during this same late stage of his career.

Given the low status of mathematicians within the university system, it might be supposed that an aspiring mathematician would forge his career outside the universities. But that simply wasn't possible, for the simple reason that there was no such thing as a career in mathematics. As Kirsti Anderson and Henk Bos have recently pointed out, "mathematicians did not come from a well-defined group that earned their living from mathematics". Moreover, as Michael Mahoney has insisted, "one is hard pressed to find even a single, unified discipline of mathematics."[17] Mahoney himself has discerned "six broad categories" of mathematician: classical geometers, cossist algebraists, applied mathematicians, those artists or artisans concerned with geometrical perspective and other aspects of projective geometry, mathematical magicians, and a group he calls "the analysts" who emerged a bit later in the early modern period, and who combined geometry and algebraic techniques in problem solving, and shared with the applied mathematicians a concern for pragmatism.[18]

Those who did spend their lives working as mathematicians outside the university system, either had private means, or were lucky enough to attract the

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[16] Michael S. Mahoney, *The Mathematical Career of Pierre de Fermat* (Princeton: Princeton University Press, 1994), 12. On mathematics in the Jesuit curriculum, see James M. Lattis, *Between Copernicus and Galileo: Christoph Clavius and the Collapse of Ptolemaic Cosmology* (Chicago: University of Chicago Press, 1994).

[17] Karen Andersen, and Henk Bos, "Pure Mathematics", in *The Cambridge History of Science, Volume 3: Early Modern Science*, ed. K. Park and L. Daston (Cambridge: Cambridge University Press, 2006), 696–707, p. 697; Mahoney, *The Mathematical Career of Pierre de Fermat*, 2.

[18] Mahoney, *The Mathematical Career of Pierre de Fermat*, 2.–14.

commitment of a wealthy patron. In England, for example, Thomas Harriot (*c*. 1560–1621) and Thomas Digges (*c*. 1546–1595) were able to make life-long careers as mathematicians thanks to steady patronage.[19] John Dee (1527–1609), by contrast, sought the patronage of his Queen, but never succeeded in winning reliable support and had to leave England for patronage abroad.[20] Galileo (1564–1642), managed to escape a poorly paid position as a professor of mathematics at Pisa and subsequently Padua, when he attracted the patronage of Cosimo II de Medici, while René Descartes (1596–1650) expressed his gratitude that he never had to earn a living, being sufficiently financially secure that he could always pursue his own ambitions.[21]

Liddel, whose father was described as "a respectable citizen of Aberdeen" presumably had no private means, and was never able to win patronage.[22] His only recourse, therefore, was to teach mathematics at a university. If it hadn't been for his medical practice, he would have had to resign himself to being poorly paid throughout his life. It is surely significant that Liddel should provide an endowment for a chair of mathematics at Aberdeen, and he perhaps hoped that the endowment would be sufficient to pay a decent salary to the incumbent. Certainly, Stuart tells us that Liddel's bequest was providing "a very considerable salary to that professor" in 1790.[23]

But, it might seem surprising to us that a professor of mathematics like John Craig, or Duncan Liddel, should turn so easily to medicine. For us, these are hardly companion disciplines, indeed, far from it. But, the fact is, in Liddel's day these were

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[19] Frances Dawbarn, and Stephen Pumfrey, "Science and Patronage in England, 1570–1625: A Preliminary Study", *History of Science* 42 (2004): 137–188; Stephen Pumfrey, "Was Harriot the English Galileo? An Answer from Patronage Studies", *Bulletin of the Society for Renaissance Studies* 21 (2003): 11–22.
[20] Stephen Pumfrey, "John Dee: The Patronage of a Natural Philosopher in Tudor England", *Studies in History and Philosophy of Science* 43 (2012): 449–59.
[21] Biagioli, *Galileo, Courtier*; Stephen Gaukroger, *Descartes: An Intellectual Biography* (Oxford: Clarendon Press, 1995).
[22] *Sketch*, p.1.
[23] *Sketch*, p. 6.

much more closely associated with one another. Although the mathematical *quadrivium* was regarded as propaedeutic to the studies in each of the higher faculties (theology, law and medicine), geometry and astronomy, in conjunction with astrology, continued to be taught at more advanced levels in the faculty of medicine. It was not unusual, therefore, to find the most advanced mathematicians working not in the Arts Faculties but in the Medical Schools. Furthermore, many leading physicians at this time also published works in mathematics. Consider, for example, Alessandro Achillini's *De orbibus* (Bologna, 1498), Girolamo Fracastoro's *Homocentrica* (Venice, 1538), and even Nicolaus Copernicus was training to be a physician as he began to formulate his reformed cosmology. As Charles Webster has pointed out, "Leading astronomers and cosmologers of the renaissance were educated as physicians; the two avocations were compatible and partly interchangeable". [24]

So, there is nothing surprising in the fact that Liddel combined mathematics and medicine in his own career. Indeed, it would have been surprising if a high achieving university professor had been content to confine himself to the lowly status and lowly pay of a mathematician. This in itself seems hard for us to understand because, in our post-Newtonian world, mathematicians are seen as the elite, the epitome, if not the apotheosis, of the scientific thinker. If we look at the historical evidence, however, it is easy to see just how difficult it was to make a purely mathematical living in the period before Newton successfully revealed to everyone that there were indeed mathematical principles underlying natural philosophy. The difficulty of making a mathematical living went hand-in-hand also with a general assumption among the learned that mathematical knowledge simply wasn't very useful, much less important.

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[24] Charles Webster, *From Paracelsus to Newton: Magic and the Making of Modern Science* (Cambridge: Cambridge University Press, 1982), 4.

We can see this if we look at the careers of two French mathematicians, Oronce Fine and Jean Fernel. In both cases, these men tried to create a mathematical career where no such thing existed—and both ultimately failed. Let us begin with Fine, who was the pioneer, and arguably inspired Fernel in his own efforts to become a mathematician. We need to begin by asking why Fine thought that such a career was possible.

It so happened that mathematics had enjoyed something of a revival in Paris during the opening decades of the sixteenth century. In 1495, seeking to reform the Arts curriculum at the University of Paris, the leading French humanist Jacques Lefèvre d'Étaples (*c*. 1455–1536), placed renewed emphasis upon the importance of the mathematical quadrivium. The study of mathematics was subsequently encouraged by his colleagues, Jossé Clichtove (1472–1543), and Charles de Bovelles (1479–1553). Furthermore, these three scholars published between them a considerable number of mathematical works. These included new editions of the arithmetics of Boethius and Jordanus Nemorarius, and of the *Sphaera* of Sacrobosco, as well as treatises on geometry, astronomy, music, squaring the circle, doubling the cube, and so forth.[25]

Furthermore, these three attracted into their circle a student who subsequently went on to become the leading French mathematician of his generation, Oronce Fine.[26] If his three older mentors were more interested in the mystical side of mathematics (they were interested in the theological use of number symbolism),[27] Fine was much more concerned with the pragmatic aspects of mathematics. Although

[25] J. M. Victor, *Charles de Bovelles, 1479–1553: An Intellectual Biography* (Geneva: Droz, 1978), 36–44.
[26] Alexander Marr, ed., *The Worlds of Oronce Fine: Mathematics, Instruments, and Print in Renaissance France* (Donington: Shaun Tyas, 2009).
[27] See, for example, P. M. Sanders, "Charles de Bovelles' Treatise on the Regular Polyhedra (Paris 1511)", *Annals of Science* 41 (1984): 513–66.

he too edited earlier works, including Euclid's *Elements* (1536) and Peurbach's *Theoricae novae planetarum* (1525), he was also an inventor of mathematical instruments, a leading cosmographer, and an influential mathematical teacher (who included Petrus Ramus among his students).[28] Undoubtedly, as one recent commentator has suggested, Fine was "one of the progenitors of a French renaissance of mathematics".[29] Fine became especially active in publishing mathematical works following his release from a short prison sentence (possibly for charges connected with his practice of judicial astrology) in 1525, and in 1531 he was appointed to the newly established chair of mathematics in the Collège Royal, recently founded by François I.[30] Indeed, the king agreed to create a Royal chair of mathematics, alongside the more obviously humanist chairs of Greek and Hebrew, at the urging of Fine himself, who in an *Epistre exhortative* (1530) extolled the practical usefulness of mathematics and claimed that a chair of mathematics would lead to France "surpassing in sciences".[31] It might seem that Fine would now be set for life, but it was not to be. Oronce Fine endured years of financial hardship right up to his death in 1555. As his son later reported, Fine, entirely dependent on courtly patronage, all too often found himself, in spite of his undeniable achievements, "waiting and begging for payment for his efforts and being mocked and put off with courtly pittances."[32]

But Fine was not the only casualty whose initial enthusiasm for mathematics was inspired by the work of Lefèvre d'Étaples, Clichtove, and Bovelles. In view of the new excitement for mathematics stimulated by these thinkers, it is easier to understand why the brilliant young Jean Fernel, whose friends felt he could make a

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[28] Adam Mosley, "The Cosmographer's Role in the Sixteenth Century: A Preliminary Study, *Archives Internationales d'Histoire des Sciences* 59 (2009): 423–439.
[29] Marr, ed., *The Worlds of Oronce Fine*, 5.
[30] Isabelle Pantin, "Oronce Fine's Role as a Royal Lecturer", in *The Worlds of Oronce Fine*, ed. A. Marr, 13–30.
[31] Marr, ed., *The Worlds of Oronce Fine*, 7–8; Pantin, "Oronce Fine's Role as a Royal Lecturer", 17.
[32] Marr, ed., *The Worlds of Oronce Fine*, 9, quoting Fine's son, writing in 1560.

successful career in any of the three traditional professions, divinity, law, or medicine, might instead have harboured ambitions of forging a career in mathematics. Indeed, Fernel's secretary and first biographer, Guillaume Plancy (1514–*c*. 1568) even records that when Fernel "began to talk over with his friends the career he should take up", some of his friends proposed mathematics ("alii mathematicas disciplinas… proponebant").[33] If we can assume that this is an accurate report, and a career in mathematics really was suggested by some of Fernel's friends, it surely counts as testimony to the new respect for mathematics in contemporary Paris, following the reformist educational schemes of Lefèvre d'Étaples and his circle.

Jean Fernel is now remembered as one of the most historically significant medical thinkers of the sixteenth century. At a time when severe cracks were beginning to show in the edifices of both Galenism, and the Aristotelian natural philosophy with which it was so closely linked, Fernel was one of only three thinkers who tried to develop a revised system of medical theory.[34] His new theory moved closer to what historians of medicine, following Owsei Temkin, call an *ontological* concept, rather than a *physiological* concept of disease (in which diseases are regarded as having their own independent existence, as opposed to being merely the result of an imbalance of the four bodily humours).[35] Fernel saw his new theory as additional to, not a replacement for, Galenic theory and accordingly decided to clarify the nature and extent of the standard theory, before publishing his own. The result was the fullest exposition of Renaissance Galenism ever written, the *De naturali parte*

[33] Plancy was Fernel's secretary for the ten final years of Fernel's life, and evidently wrote his biography in 1588. I quote it from the translation provided in Sir Charles Sherrington, *The Endeavour of Jean Fernel* (Cambridge: Cambridge University Press, 1946), 151; but I will also provide a page reference to the original Latin edition, included in Jean Fernel, *Universa medicina… editio sexta* (Frankfurt, 1607), sig. *4*v*.

[34] On Fernel, see John Henry and John M. Forrester, "Jean Fernel and the Importance of His *De abditis rerum causis*", in *Jean Fernel's On the Hidden Causes of Things: Forms, Souls and Occult Diseases in Renaissance Medicine*, ed. John M. Forrester and John Henry (Leiden: Brill, 2005), 3–65.

[35] Owsei Temkin, *The Double Face of Janus and Other Essays in the History of Medicine* (Baltimore: Johns Hopkins University Press, 1977).

medicina of 1542. For subsequent editions Fernel appropriated the term *physiologia* (which then signified the study of nature in general) as the title of this work, and so gave rise to the modern usage of "physiology" as the study of living systems. In his day Fernel was recognised as one of the most successful medical practitioners in Europe, and inspired a group of followers, "more numerous than soldiers from the Trojan horse" who practised medicine all over Europe. Furthermore, as a would-be reformer of medical theory it seems fair to say that his influence upon his contemporaries was at least as great as Fracastoro's, and even rivalled that of Paracelsus (particularly among more conservative thinkers who found Paracelsianism hard to stomach).[36]

In view of all this, it might seem that Fernel's interest in medicine was bred in the bone, and that his achievement must have been the result of an unwavering commitment to medicine from an early age. In fact, this was very definitely not the case. There can be no denying that Fernel made a determined effort, first of all, to make a career for himself in mathematics, even though, as we have seen, this was a time when there was no such thing as a career in mathematics. As Michael Mahoney has pointed out, in mathematics "There were no positions to be gained or held. There was no ladder of advancement leading into a hierarchical elite", so Fernel's commitment to mathematics shows much more than a passing interest.[37]

His commitment is also demonstrated by the fact that his pursuit of mathematics did not bring in money, but resulted in considerable expenditure. Fernel had recently married and, using money from his wife's dowry, he began to build up a collection of "the writings of all the old mathematicians", as well as a collection of

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[36] Sherrington, *The Endeavour of Jean Fernel*, 155; Fernel, *Universa medicina*, sig. *7*v*. Jean Fernel, *Physiologia 1567*, translated by John M. Forrester. *Transactions of the American Philosophical Society* (Philadelphia: American Philosophical Society, 2003).
[37] Mahoney, *The Mathematical Career of Pierre de Fermat*, 21.

astrolabes and other bronze mathematical instruments, many of which he had devised himself, and all of which were, as Plancy wrote, "costly". What would undoubtedly have added to the cost was the fact that Fernel employed craftsmen and engravers to make these instruments for him, and they lived in the Fernel household. To off-set these expenses he gave lessons in mathematics to a number of "distinguished pupils", and tried to sell home-produced samples (together with an instruction manual) of at least one of the mathematical instruments he invented, the so-called "monalosphaerium" (a variation on the astrolabe).[38]

Fernel also published two significant mathematical books. One of these, the *Cosmotheoria*, has recently been described as "one of the most original contributions to cosmography in the French Renaissance", while the other, *De proportionibus*, was less successful but shows some genuine originality in its approach. [39]

In view of the need to forge a career for himself, Fernel seized the opportunity in his publications to ingratiate himself with potential patrons. He started, in his first publication, with Jacobus Govea, whom Fernel describes as "highly numerate and a renowned doctor of theology", but, more to the point, he had the ear of the King of Portugal. Cutting out the middle man, Fernel addressed the dedicatory epistle of his next book to the King himself, Johannes III. He dedicated his final mathematical treatise, before he committed himself to a medical career, to a Frenchman who acted as a patron to learned men, Martin Dolet. It seems clear that Fernel thought his best chance of a paying career in mathematics was through the newly burgeoning field known as cosmography. Accordingly, he dedicated the first two of his mathematical

[38] Sherrington, *The Endeavour of Jean Fernel*, 153–54; Fernel, *Universa medicina*, sig. *5*v*–*6*r*; Jean Fernel, *Monalosphaerium* (Paris: Simon Colinaeus, 1527).
[39] W. G. L. Randles, "Classical Models of World Geography and Their Transformation following the Discovery of America", in *The Classical Tradition and the Americas*, W. Haase and M. Reinhold (Berlin: Walter de Gruyter, 1993), 67. On *De proportionibus* see Sabine Rommevaux, "A Treatise on Proportion in the Tradition of Thomas Bradwardine: The *De proportionibus libri duo* (1528) of Jean Fernel", *Historia mathematica* 40 (2013): 164–82.

books to likely representatives of the greatest sea-faring nation at the time, Portugal. Martin Dolet is much more obscure and it is possible he acted as a patronage broker. Fernel describes him in the dedication as a "most devoted patron and protector of learned men".[40] The dedication to such an obscure figure shows that Fernel was setting his sights much lower; it seems reasonable to suppose there was some desperation in this.

In view of all this, it could hardly be said that Fernel had merely a dilettante's interest in mathematics, or that his interest in mathematics went no further than that of other physicians. On the contrary, it seems impossible to deny that he was aiming to establish himself as a member of what he perhaps saw, in the period immediately following the revival of mathematics by Lefèvre d'Étaples and his circle, and reinforced subsequently by Oronce Fine, as a growing community of vocational mathematical practitioners. Furthermore, in view of the nature of his publications and his attempts to win patronage for the kind of work detailed in them, it seems likely that he harboured genuine ambitions to establish himself as a leading cosmographer.

Why, then, did Fernel abandon mathematics and turn his attention entirely to medicine? After publishing his *De proportionibus* in 1528, Fernel never again wrote a mathematical work. All his subsequent publications were medical and, unlike his mathematical writings, they immediately established Fernel's reputation as a leader in the medical arts and sciences. Furthermore, by the time his first medical publication appeared, the *De naturali parte medicina*e, in 1542, Fernel had long since sold off his collection of mathematical books and his collection of instruments. He had dismissed the instrument makers and engravers he had employed and housed, and he had

[40] Jean Fernel, *De proportionibus libri duo* (Paris: Simon Colinaeus, 1528), sig. Aiiii*r*.

notified his private mathematical pupils that "they must look elsewhere for a master".[41] What caused this dramatic change of direction?

The answer is very clear in Plancy's account of Fernel's life. It was apparent to Fernel's family, and in particular to his wife and his father-in-law, that Fernel was not making a suitable living out of his pursuit of mathematics. On the contrary, Fernel was "dipping into his wife's marriage portion" to fund his expensive indulgence in mathematics. Plancy hints at a domestic scene in which Fernel's wife became increasingly distressed by the financial hardship into which Fernel seemed to be leading her and their two daughters. Whenever Fernel's father-in-law came to visit,

> he would take occasion to complain to his son-in-law that medicine, which had been his whole devotion formerly, now concerned him too little. He so clung to mathematics that neither love of his wife, nor the endearments of his children, nor the care of his house, could take him off them.[42]

Eventually matters came to a head and Plancy tells us that the father-in-law, "moved by his daughter's tears, lost his temper and scolded his son-in-law." It was as a result of these "entreaties and reproaches" that "Fernel gave way at last" and "renounced his mathematics and began to devote himself to medicine with a greater zeal than ever before."[43]

It is perhaps worth remarking that the family's concern about the comparative earning power of mathematics and medicine was surely vindicated. Long before the

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[41] Sherrington, *The Endeavour of Jean Fernel*, 154; Fernel, *Universa medicina*, sig. *6*v*.
[42] Sherrington, *The Endeavour of Jean Fernel*,153–54; Fernel, *Universa medicina*, sig. *5*v*–*6*r*.
[43] Sherrington, *The Endeavour of Jean Fernel* (note 33), pp. 154; Fernel, *Universa medicina* (note 33), sig. *6*v*. For a more detailed account of Fernel's decision to abandon mathematics, see John Henry, "'Mathematics made no contribution to the public weal': Why Jean Fernel became a Physician", *Centaurus* 53 (2011): 193-220. I have drawn heavily upon this here.

end of his life, Fernel's earnings as a physician turned him into a wealthy man. As Plancy tells us:

> Throughout the time I lived with him (and I lived with him for ten years) his annual income often exceeded twelve thousand French pounds and rarely fell below ten.[44]

There is a marked contrast between Fernel's fortunes ad those of his contemporary, who never abandoned mathematics, Oronce Fine.

It might be supposed that Fine and Fernel did not succeed in mathematics simply because they were not really top-flight mathematicians. But if we turn to Girolamo Cardano, we can see that even one of the greatest mathematicians of the sixteenth century could not make mathematics pay. If we are fortunate to have a biography of Fernel, written shortly after his death by someone who knew him well, we are equally fortunate to have an autobiography by Cardano, *De propria vita*, which he wrote in the last year of his life, and which is generally agreed to have been written with great candour.[45]

There is no suggestion in Cardano's biography that he ever thought of making a career for himself in mathematics. Although one of his first paid positions, in 1520, was teaching Euclid at the gymnasium in Pavia, his intention was always to qualify in

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[44] Sherrington, *The Endeavour of Jean Fernel*, 170; Fernel, *Universa medicina*, sig. ***2*v*.

[45] Girolamo Cardano, *The Book of My Life*, translated by Jean Stoner (New York: New York Review Books, 2002). Hencefoward cited as *Book of my Life*. A poor quality manuscript of this work came into the possession of the humanist scholar Gabriel Naudé (1600–1653), who saw it through the press: *Hieronymi Cardani Mediolanensis, De propria vita liber* (Paris, 1643). The best studies of Cardano are: Nancy Siraisi, *The Clock and the Mirror: Girolamo Cardano and Renaissance Medicine* (Princeton: Princeton University Press, 1997); Ingo Schütze, *Die Naturphilosophie in Girolamo Cardanos* De subtilitate (Munich: Wilhelm Fink Verlag, 2000); and Anthony Grafton, *Cardano's Cosmos: The Worlds and Works of a Renaissance Astrologer* (Cambridge, Mass.: Harvard University Press, 2001).

medicine.[46] Unfortunately for Cardano, his ability to earn a living in medicine was at first thwarted by enemies, or at any rate by fellow physicians who were ill-disposed towards him. For many years he was refused a licence to practice in Milan by the College of Physicians there, and so had to move to the country to practice medicine. But these were not places where a physician could make a good living—the population being small and the people poor. Of one of these rural sojourns he wrote,

> Gallarate brought me no profit, for in the whole nineteen months I lived there, I did not receive more than twenty five crowns towards the rent of the house I hired... I was forced to pawn all my wife's jewels, and our very bed. If it is a wonder that I found myself thus bereft of all my substance, it is still more wonderful that I did not take to begging on account of my poverty… [47]

Ironically, in view of what I've been saying about the non-paying nature of mathematics, it was mathematics that came to his aid. Thanks to a patron of Cardano's, Filippo Archinto (who had wanted private tuition in astronomy), Cardano was appointed to give the public lectures on geometry and astronomy in Milan, which had been established by a small endowment from one Tommaso Plat.[48] At this time, during the late 1530s, Cardano said he turned his back on medicine and relied on his mathematics. He could always attract a few students, who would pay for tuition, and he also published his first mathematical work, *Practica arithmeticae* (1539), although this only earned him ten crowns.[49]

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[46] *Book of my Life*, 12. See also William George Waters, *Jerome Cardan: A Biographical Study* (London, 1898), 22.
[47] *Book of my Life*, 14, 15.
[48] *Book of My Life*, 15; William George Waters, *Jerome Cardan: A Biographical Study*, 46.
[49] *Book of My Life*, 15; William George Waters, *Jerome Cardan: A Biographical Study*, 54.

One of Cardano's great claims to mathematical acclaim is his early development of the mathematics of probabilities, which grew out of his addiction to gambling on games with dice. Claiming to have written a treatise on this as a young man, he expanded it around 1564 in his *Liber de ludo aleae* (which was subsequently published in his *Opera omnia* of 1663). But Cardano's mathematical expertise was not enough to guarantee that he would always leave the dicing tables with a healthy profit. On the contrary, Cardano insisted that it was poverty, and the lack of other means of earning, which drove him to the gaming tables, and this in turn led him into even greater debts:

> Let him not say that I had any love for gambling, but rather that I loathed the necessities which goaded me to gambling—calumnies, injustices, poverty, the contemptuous behaviour of certain men [he is referring to those who kept him out of the College of Physicians]… It is a proof of the foregoing assertion that once I was privileged to act a respectable part in life, I abandoned those low diversions. Accordingly, it was not a love of gambling, not a taste for riotous living which lured me, but the odium of my estate and a desire to escape, which compelled me.[50]

This early part of Cardano's life, then, was one of poverty in spite of his growing reputation as a mathematician. Things change dramatically, however, when Cardano, thanks to the efforts of some powerful friends, was finally admitted, in 1539, into the Milan College of Physicians. His reputation as a physician now started to grow. He lectured in medicine at the University from 1543 and from 1544 he was

[50] *Book of My Life*, 66.

appointed to lecture at the University of Pavia at a salary of 240 gold crown per annum. It seems his Pavia salary was not paid and so he quickly returned to Milan, but other offers followed. Thanks to his friend Andreas Vesalius (1514–1564), the famous anatomist, Cardano was offered 800 gold crowns a year to attend the King of Denmark. Cardano refused this, but he did agree to visit the Archbishop of St Andrews, John Hamilton (1512–1571) for a single consultation in 1552. This was to prove very lucrative indeed:

> I received before departing 500 gold crowns of France; and upon my return 1200. I was gone 311 days and had I wished to remain in Scotland, I would have received a much larger sum.[51]

Elsewhere, Cardano estimated that his visit must have cost Hamilton four talents of gold, that is to say, 2,000 gold crowns.[52] Furthermore, the nobility of Scotland took the opportunity to consult him while he was there and paid him so lavishly that on one day he made 18 gold crowns. All in all, Cardano said he was paid so generously that he would be ashamed to admit the full amount.[53]

By this time, Cardano had also ensured for himself a Europe-wide reputation as a leading mathematician. His *Artis magnae, sive de regulis algebraicis* (1545) established him as a leading figure in the world of mathematics (and has ensured his continuing historical reputation), but from the financial point of view, this could hardly compete with his medical practice. After all, as Nicolaus Copernicus (1473–

[51] *Book of My Life*, 16. Later, he writes: "The Archbishop paid out for his attendance eighteen hundred crowns of gold, of which fourteen hundred came to me." *Book of My Life*, 156.
[52] Cardano, *Opera omnia* (Lyons, 1663), I, 93.
[53] William George Waters, *Jerome Cardan: A Biographical Study*, 144.

1543) famously pointed out, "Mathematics is written for mathematicians"[54], but everyone takes an interest in health and medicine (although even Cardano's many medical works did not make much money—in his account of "Books written by me", in *De propria vita*, he wrote "my financial returns were next to nothing"[55]). It was medical practice that was lucrative, not medical writing.

I hope I have indicated just how difficult it was to make a living as a mathematical practitioner in the early modern period. But if mathematics did not pay, it was because it was considered to have little value. For us mathematics is a supreme, and a supremely important, intellectual pursuit—even though we have computers to do routine (and not so routine) calculations, we still recognise the importance of the mathematical genius—mathematicians are seen as essential in our techno-scientific world. In the early modern period, however, mathematics was considered at best to be of minor usefulness, and at worst to be treated with extreme caution.

It is usual in the historiography of mathematics, particularly in accounts of its gradual recognition during the Scientific Revolution as a crucially important way of understanding the world, to emphasise its practical utility. In contrast to the contemplative natural philosophy of the pre-modern world, mathematics was always seen to provide practical information which could be put to use for the benefit of all. Or so the story goes.[56] If we look at Plancy's *Life* of Fernel, however, a rather different attitude to mathematics can be seen. It seems that the pragmatic usefulness of mathematics was by no means obvious to everyone. Plancy presents this alternative view of mathematics in a re-imagined quotation from Fernel's father-in-law:

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[54] Nicolaus Copernicus, *On the Revolutions*, translated by Edward Rosen (Baltimore: Johns Hopkins University Press, 1992), Dedicatory Epistle, 5.
[55] *Book of My Life*, 197.
[56] See, for example, Nicholas Jardine, "Epistemology of the Sciences", in *The Cambridge History of Renaissance Philosophy*, ed. Charles B. Schmitt and Qunetin Skinner (Cambridge: Cambridge University Press, 1988), 685–711; and Peter Dear, *Discipline and Experience: The Mathematical Way in the Scientific Revolution* (Chicago: University of Chicago Press, 1995).

> "Now, knowledge of mathematics is in itself as culture well enough, and exercises the wits, if one uses moderation in the time given to it. But it becomes a scandal when an honest man with duties to the public and his family reposes, so to say, to sleep on the quick-sands of the sirens, letting the years go by. Mathematics made no contribution to the public weal. Apart from a modicum of arithmetic and geometry it touched society little or not at all. On the other hand when we turn our gaze and thought to medicine we find it a science occupied either with sublime enquiry into Nature or with deeds of beneficence and utility. It is of right the worthiest of all the arts. Mathematics offers no comparison with it."[57]

It is impossible to tell whether this quotation was reconstructed by Fernel in reminiscence, and told to Plancy while he was gathering information for the *Life*, or whether Plancy himself imagined it as typical of the kind of things any "man of experience" (as Plancy described Fernel's father-in-law) would have said about mathematics. It seems certain, however, that Plancy himself did concur with these views. Immediately after attributing these words to the father-in-law, Plancy says, "he urged on Fernel these *and other good reasons*." Furthermore, at this point in his narrative he depicts Fernel's father-in-law not only as a man of experience but also as "prudent and accomplished".[58] This dismissal of the value of mathematics does not emanate from a critic of no standing, therefore, but from a man of supposed worldly wisdom.

[57] Sherrington, *The Endeavour of Jean Fernel*, 154; Fernel, *Universa medicina*, sig. *6*r*.
[58] Sherrington, *The Endeavour of Jean Fernel*, 153–54; Fernel, *Universa medicina*, sig. *6*r–v*.

There are also echoes of these criticisms of mathematics in Plancy's own comments in the *Life*. Even before recounting Fernel's abandonment of mathematics, Plancy had felt it necessary to apologise to the reader for Fernel's infatuation with the subject: "Contemplation of the stars and heavenly bodies excites such wonder and charm in the human mind that, once fascinated by it, we are caught in the toils of an enduring and delighted slavery, which holds us in bondage and serfdom".[59] This foreshadows the comment about sleeping on the quick-sands of the sirens.

In taking this line, Plancy was conforming to an entirely typical attitude to the intellectual dangers presented by mathematics. Humanist scholars seemed to be highly concerned that, although a knowledge of mathematics could be useful in particular circumstances, it was possible to go too far, and become lost in a world of utter abstraction. Indeed, this belief was expressed by two of the ancient sources for the humanists' admiration of mathematics, Quintilian and Cicero. Quintilian's *Institutio oratoria* (I, 10) and Cicero's *De officiis* (I, 6) both cautioned that too much immersion in mathematics could be a distraction from the *vita activa* required of the good citizen. For Aeneas Sylvius Piccolomini, writing in 1450,

> though these [mathematical] sciences are all delightful and useful to comprehend, still I could not urge too much expenditure of time upon them, because advantageous as they are for the transient student, they can be harmful for a visitor who stays too long.[60]

Similarly, Roger Ascham, in 1563 insisted that,

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[59] Sherrington, *The Endeavour of Jean Fernel*, 153; Fernel, *Universa medicina*, sig. *5*v*–*6*r*.
[60] Aeneas Silvius Piccolomini, *De liberorum educatione*, translated by J. S. Nelson (Washington, D.C.: Catholic University of America Press, 1940), 123.

> Some wittes, moderate enough by nature, be many tymes marde by over much studie and use of some sciences, namelie, Musicke, Arithmetick, and Geometrie. Thies sciences, as they sharpen mens wittes over much, so they change mens maners over sore, if they be not moderatlie mingled, & wiselie applied to some good use of life. Marke all Mathematicall heades, which be onely and wholly bent to those sciences, how solitarie they be themselves, how unfit to live with others, & how unapte to serve in the world.[61]

Ascham even goes so far as to say that such unfortunate cases are "knowen nowe by common experience".[62] If this was so, then it is evident that by the late sixteenth century there were significant numbers of mathematicians who had failed to heed the warnings and had become such solitary figures, unfitted for society. For a Duncan Liddel, therefore, it was possible to be admired by a fellow mathematician or astronomer as one who could clearly expound Copernican theory, while at the same time being considered by other professors in one's own university as "unapte to serve in the world". An obvious way for the university mathematician to avoid these kinds of imputations would be to take up medicine.

Another factor which prevented university-educated men from recognising any usefulness in mathematics derived from the strict separation of mathematics from natural philosophy. Deriving ultimately from Aristotle's views, the prevailing assumption was that natural philosophy was concerned to provide explanations of natural phenomena in terms of physical causes. Mathematics could say nothing about causes, however, but could only give a particular kind of *technical description* of what was going on in a physical system. So, a specific set of deferent and epicycle,

[61] Roger Ascham, *English Works*, edited by W. A. Wright (Cambridge: Cambridge University Press, 1904), 190.
[62] Ibid.

allocated a specific combination of movements, could show us how the observed movement of a particular planet could be accomplished, but this assumed set-up could say nothing about how or why (or even whether!) the planet moved in this way, or what kept it in these motions. Generally speaking, mathematics was regarded as incompetent with regard to natural philosophy.[63]

Given the background that we have been surveying, a background which coloured nearly everyone's perception of mathematics from before Fine's and Fernel's time through to Galileo's and even beyond (many, after all, were still puzzled by the title of Newton's great book when it appeared in 1687—they wondered what it could mean to say there are "mathematical principles" of natural philosophy), it is hardly surprising that Liddel, for all his commitment to mathematics (as shown by his continuing to teach it for so long), should turn also to medicine when he wanted to make a more highly respected living for himself.

I quoted Charles Webster earlier, saying: "Leading astronomers and cosmologers of the renaissance were educated as physicians; the two avocations were compatible and partly interchangeable." This is certainly correct, but that is not to say that it was impossible to be a mathematician without being a physician. Oronce Fine was a mathematician who never trained in medicine, so were Galileo and Descartes; and there were plenty more mathematicians in the early modern period of whom we could say the same. I have suggested here that Fernel and Liddel might well have concentrated on mathematics if their circumstances would have allowed it. But, given that neither Fernel nor Liddel felt that they could single-mindedly pursue mathematics

[63] Dear, *Discipline and Experience*; Paul Mancosu, *Philosophy of Mathematics and Mathematical Practice in the Seventeenth Century* (Oxford: Oxford University Press, 1996); John Henry, "The Origins of the Experimental Method—Mathematics or Magic?" in *Departure for Modern Europe: Philosophy between 1400 and 1700. A Handbook of Early Modern Philosophy*, ed. Hubertus Busche, and Stefan Heßbrüggen-Walter (Hamburg: Felix Meiner, 2011), 702-14; and idem, "Why Thomas Harriot was *not* the English Galileo", in *Thomas Harriot: Mathematics, Exploration, and Natural Philosophy in Early Modern England*, ed. Robert Fox (Aldershot: Ashgate, 2012), 113-37.

(as Oronce Fine struggled to do), the study of medicine would have seemed an obvious alternative, or adjunct, to mathematics; naturally affiliated through astrology, the theory of proportions (for compiling compound medicines), and the concern with pragmatic ends, medicine and mathematics were indeed compatible and interchangeable.[64] We can see Fernel and Liddel, therefore, as polymaths by compulsion. We should not see them as free spirits, seeing the disciplines as unnecessarily constraining to their wide-ranging interests, but as mathematicians who recognised that they would not be able to make an honourable and lucrative living, unless they also branched out into the time-honoured (and conveniently adjacent) profession of medicine.

But what about Girolamo Cardano? He was, by any standards, a polymath's polymath. Cardinal Mazarin's Librarian, Gabriel Naudé (1600–1653), when he published Cardano's *De propria vita* in 1643, said of him:

> Investigation will show us that many excelled him in the humanities or in Theology, some even in Mathematics, some in Medicine and in the knowledge of Philosophy, some in Oriental tongues and in either side of Jurisprudence, but where shall we find any one who had mastered so many sciences by himself, who had plumbed so deeply the abysses of learning and had written such ample commentaries on the subjects he studied? Assuredly in Philosophy, in Metaphysics, in History, in Politics, in Morals, as well as in the

[64] Webster, *From Paracelsus to Newton*, 4. See also, Lynn Thorndike, *History of Magic and Experimental Science*, Vol. V (New York: Columbia University Press, 1941), 547; and Ian Maclean, *Logic, Signs and Nature in the Renaissance: The Case of Learned Medicine* (Cambridge: Cambridge University Press, 2002), 171–190.

> more abstruse fields of learning, nothing that was worth consideration escaped his notice.[65]

There is no denying this, and yet, in the chapter of *De propria vita* where Cardano provides "A brief narrative of my life from the beginning to the present day",[66] the narrative after the period of his childhood, is almost exclusively confined to his transition from a teacher of mathematics to an increasingly successful medical practitioner. Cardano does not present himself in this brief summary of his life as someone seeking to be a polymath, but as someone seeking to make a career in medicine.

If Cardano went beyond the level of polymathy exhibited by Fernel and Liddel, it was not as a means of enhancing his career prospects. It was quite simply to ensure for himself lasting fame. In the chapter of *De propria vita*, "Books Written by Me", he states, "The reason I was induced to take up writing I think you have already learned… I was… urged by a great longing to have my name live."[67] An earlier chapter had offered "A Meditation on the Perpetuation of My Name", and made it clear that Cardano's prolific output was an attempt, against the odds, to come up with at least one book that might continue to be read in future ages: "Will they [any books] endure for even a few years? How many—a hundred, a thousand, ten thousand? Show me a case? Is there one such book among thousands?" Cardano was aware of the fatuousness of his ambition, but could not escape it: "yet my desire is for renown… and it is a desire not so much foolish as stubbornly fixed."[68]

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[65] Quoted from William George Waters, *Jerome Cardan: A Biographical Study*, 254–55.
[66] This is Chapter 4 of the *Book of My Life*, 10–17. Cardano also tells us that by "the present day" he means October 1575, the year before his death.
[67] *Book of My Life*, 196.
[68] *Book of My Life*, 32, 33–4.

We need not try to understand the reasons for Cardano's unquenchable thirst for fame; clearly, in this respect he differed markedly from lesser polymaths like Fernel and Liddel. And yet, we can still see that his polymathy, like theirs, was not simply the result of an unconfined mind, ranging freely and disregarding discipline boundaries, but it was the result of an ambitious drive. For Cardano, fame was the spur; Fernel and Liddel were simply driven to polymathy by careerist ambitions.

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