

Critical Notes on a Study of
Galen's *On Critical Days* in Arabic
or A Study in Need of Critical Repairs^{*}

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Illnesses, and especially fevers—malarial fevers, to be even more precise—were observed to have critical turning points in their development; it was as if the patient was then being judged and the verdict could be recovery, death, or a prolonged illness with additional crises along the way. Moreover, these critical days, much like the paroxysms of the fever, were observed to occur at regular intervals. Hippocrates had already written about this phenomenon and Galen applied himself with his usual gusto, recording and analyzing the data, and sharply rebuffing sceptics and sophists. His investigations are recorded in *On Critical Days*. Toward the end of that book, Galen turns to the most difficult aspect of the topic, namely, the cause for the regularity of crisis. He addresses two explanations that were already in circulation, the arithmological account of the Pythagoreans and the astrological explanation. Neither of these was entirely to his liking but he had no way of entirely refuting any connection to the lunar phases. Galen's treatise underwent a significant revision in the so-called Alexandrian summaries, which circulated (in several versions) in Hebrew and Arabic. The full text as well was translated into Arabic by the prolific Ḥunayn ibn Ishāq.

The subject of this essay is Glenn M. Cooper's edition, translation, and study of that complete version: *Galen, De diebus decretoriis, from Greek into Arabic: A Critical Edition, with Translation and*

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*Commentary, of Ḥunayn ibn Ishāq, Kitāb Ayyām al-Buḥrān.*¹ Cooper promises as well an edition of the Greek text to be accompanied by additional investigations.

Cooper's book is an important contribution to the history of science. I find it necessary to open my review with this statement because, in the following pages, I have many criticisms to make of Cooper's work, most of them serious. The length of this essay notwithstanding, I have not attempted to list all of the miscues or to call attention to all of the inaccuracies. Obviously I cannot propose better translations of all of the passages whose meaning, in my judgement, has been, let us say, blurred in Cooper's rendering. The examples presented in what follows ought to suffice. Nonetheless, I can say with all sincerity that this book, when used with caution, is a significant contribution and that I intend to refer to it over and over again in some work in progress.

The book opens with a detailed introduction followed by the annotated texts, English and Arabic in facing pages, both of which are keyed to page and line numbers in Kühn's text [1825, 769–943]. The first appendix contains the apparatus. There is considerable overlap between the material displayed there and the notes to the translation and Arabic text. I do not, in fact, fathom the method by which Cooper divided his textual comments, placing some as footnotes to his translation and relegating others to the appendix. But this is a minor criticism. In the second appendix, Cooper offers a 'working translation' of a text on critical days by al-Kindī, which is required to support his introduction. This text survives uniquely in a transcription of the Arabic into Hebrew letters and was published with a German translation by Felix Klein-Franke [1975]. Ursula Weisser later offered some constructive criticism of Klein-Franke's work, which she published in Sudhoff's Archiv [1982]. Cooper has taken Weisser's notes into consideration in preparing his English version. The third appendix has the Arabic text and English translation of a short treatise on the same topic by another early Arabic-writing scientist, Qusṭā ibn Lūqā, *Questions about the Critical Days in Acute Illnesses*.

¹ *Galen, De diebus decretoriis, from Greek into Arabic: A Critical Edition, with Translation and Commentary, of Ḥunayn ibn Ishāq, Kitāb Ayyām al-Buḥrān. Medicine in the Medieval Mediterranean.* Farnham, UK/Burlington, VT: Ashgate, 2011. Pp. xx + 615. ISBN 978-0-7546-5634-0. Cloth \$134.95.

Cooper publishes it here for the first time on the basis of the lone manuscript, Tehran 6188 (that is the number given to it in the library of the Iranian Parliament, where it is housed). Following the appendices one finds the bibliography, which is extensive [553–585]. At the end, there is a general index, an index of manuscripts, and an index of ancient sources. It is unfortunate that a book so well furnished with notes, bibliography, and so on, is missing one of the more important tools of this sort of research, i.e., an index of terms or a Greek-Arabic lexicon indicating as well the first occurrence.

In the introduction, Cooper labors to place the translation in its context, in line with the history of transmission presented in the widely cited book of Dimitri Gutas [1998] as well as with the book of his thesis advisor George Saliba [2007]. Moreover, he wisely incorporates into his discussion related texts such as the monographs of Qusṭā and al-Kindi, which, as noted, are conveniently included in appendices.

In my opinion, the level of detail that Cooper aims for is beyond the source material; but this too is a matter that can be left for future research to sort out. My focus in this essay will be on Cooper's handling of the text he presents from the perspective of philology (Cooper's skill in Arabic and, to a lesser extent, his handling of the Greek) and history (his understanding of a variety of topics such as astrology, music, and Pythagoreanism with regard both to the issues and to the published literature). Unfortunately Cooper's book will be found to be wanting in all of the above.

Cooper's translation is for the most part written in very good and clear English, close to the text yet not weighed down by literalism. Kühn exclusively is used for comparison between the Arabic and Greek. In the section of the introduction, 'The Textual Tradition', Cooper talks of [γ], Ḥunayn's 'autograph translation' which 'may be assumed to be an accurate (Arabic) representation of its Greek exemplar [Ψ]' [86]. Neither of these 'manuscripts' is extant: they are Cooper's hypothetical constructs and are, therefore, enclosed within square brackets as Cooper explains in note 381. In the critical apparatus [appendix 1, 505–528], Cooper mentions a single extant Greek manuscript, Venice, Marcian. app. gr. V, 8, which he describes as 'occasionally cited'. By my count, he cites this manuscript on only two occasions. With these exceptions, the only Greek text to which

Cooper compares the Arabic is that by Kühn [1825], whose editions are universally considered not to be up to standard.

Cooper finds some important pieces of text in the Arabic that are missing in Kühn's edition, citing them as 'om k': on page 59, he avers that the Arabo-Latin tradition has preserved better readings than 'the supposedly purer Greek tradition'. Who has supposed that the Greek tradition is purer? On page 252, in connection with the 20-day cycle [856.8–15], Cooper finds that the Arabic adds

factual data from the Hippocratic writings not present in the manuscript(s) of the *Critical Days* in front of him.

However, Cooper offers no information about the Greek text other than Kühn's edition and Ḥunayn was not reading this edition. So how do we know that this information was not in the Greek manuscript(s) that Ḥunayn saw? Similar comments are found throughout.² More often than not, Cooper marks these divergences as omissions from the Greek supplied by the Arabic. Occasionally, however [e.g., 152n231], he declares them to be a clarification added by Ḥunayn. In one case [192n411], he asserts that a passage is both omitted from the Greek and a 'very significant addition' on the part of Ḥunayn. Sometimes he goes even further in the presentation of speculation as fact, e.g., that an omission in the Greek is not only an addition by Ḥunayn but also that Ḥunayn put in these comments for the benefit of his patron, Muhammad ibn Musa [437].

Rarely does Cooper confess to any doubt as to the source of the variant. One such case is 202n462, where, after marking an omission, he writes, 'Again, if this is not a genuine omission....'. In this particular case, it seems a safe bet that the cross-reference to the *Crises* is due to Galen but one would like to know for sure. At the end of his commentary to 812.8–17 [426], Cooper is more forthcoming:

If this passage is an addition of Ḥunayn's and not ultimately from Galen, then it shows the translator's thorough understanding of ancient medical theory. Ḥunayn occasionally filled in lacunae based on his knowledge of medicine, but this passage is unusually long, and so is likely to have belonged to the original Greek.

² See, for example, 120nn104 and 107 or 122n108 and 112. Additional examples are discussed in detail below.

This is rather late in the book to begin a discussion of such an important issue: the additional material found in the Arabic ought to have been discussed in a separate section of the introduction. Philological tools—above all, the evidence of the Greek manuscripts—ought to be employed wherever possible in order to determine whether we are faced with an accretion or an omission. I do not see how length alone can be the determining factor, if it is a factor at all in our decision on this question. Only once does Cooper call attention to a lacuna in the Arabic text [431, to 819.12–13].

In sum, it is not clear whether the differences between the texts represent omissions from Kühn's text that are possibly found in manuscripts and hopefully to be corrected in a better edition of the Greek or rather a gloss of Ḥunayn that has insinuated itself into the text, or something else. Towards the end of this essay, when I turn to the vocabulary of the Pythagoreans, I will call attention to some more specific phrases where we would dearly like to know if Ḥunayn's translation has any basis in the Greek manuscript tradition.

Cooper's understanding of the transmission of some passages [Kühn 1825, 818.1–9] is not totally clear. The Arabic text appears to repeat itself. So if one of the two very similar passages is missing from Kühn's edition, must we interpret this as an omission from the original Greek? Is it not more likely that somehow the Arabic—not necessarily the translator, more probably a copyist—is responsible for dittography?

But this is really impossible for him who cares about learning what Hippocrates said about this so that he grasps it before he attends patients, and diligently investigates their conditions. But, if he attends patients without learning *what Hippocrates also said about this discipline* then he is of no benefit at all, and his labor is in vain. *And if he cares about learning what the marvelous Hippocrates also said, so that he grasps it, and he is <not> lazy about tending to patients, and serving them, this will occur by itself.*

The italic text marks passages that are 'omitted' in Kühn's edition [see nn351, 354]. If we strike these passages from the translation of the Arabic, we are left with this:

But this is really impossible for him who cares about learning what Hippocrates said about this so that he grasps it before he

attends patients, and diligently investigates their conditions.
 But, if he attends patients without learning, then he is of no
 benefit at all, and his labor is in vain.

I submit that the ‘omitted’ passages (especially after correcting Cooper’s translation from the Arabic, which I shall do presently) add nothing and, hence, ought to be dismissed as intrusions. The point is simple: a serious physician must absorb Hippocrates’ teachings; then and only then will he be able to make a useful prognosis.³

Cooper’s treatment of the connection between the theory of critical days and ‘astrological medicine’, and his understanding of astrology overall, leave much to be desired. True, his conclusion, which is that

Galen’s use of astrology is actually superficial, of mostly rhetorical value, and does not cohere with the rest of his medical science, except in an almost meaningless general way [69]

is not far off the mark. By ‘rhetorical’ Cooper is pointing to Galen’s effort to make his book, especially ‘his new theories and methods’, appealing to the educated Roman public by packaging it in keeping with their cultural expectations, which would have given an important place to astrology. To my mind, as a committed scientist, Galen felt it necessary to weigh seriously the astrological and arithmological explanations for critical days, even if he felt uneasy about them. The regularity (and occasional irregularity) of crises calls for explanation; and for all of Galen’s doubts about the theories of others, he himself was hard pressed to come up with a better alternative. But to return to the subject of this review: Cooper’s discussion of the issues throughout—introduction, notes, and commentary—is simply not up to standard.

Let us begin with the concept of critical days, which is Hippocratic—the definition from *On Medical Conditions* is cited by Cooper on 396n16 and has by itself no connection at all to the stars. Cooper himself correctly remarks, ‘That the critical days were part of common medical practice seems implied by the fact that Galen expects

³ A small remark on the Arabic regarding 818.7 [182]: ‘bi-’aynihi’, means ‘exactly this’, i.e., ‘this is exactly what will happen’, not ‘by itself’, though the meaning is just about the same.

his readers to possess a certain basic knowledge of them' [403]. Again, near the end of his discussion of the scientific background, Cooper observes accurately, 'Astrology was not central to the scientific medicine of the Galenic tradition (as we have seen in the *Critical Days*)...' [58]. But he forgets these insights time and again when he gets carried away by disquisitions on 'astrology', which often have no grounding at all in the passage under discussion.

One key point must be made before turning to astrology. The importance of critical days for Galen, and Greek medical theory in general, has much to do with the fact that Greek medical theory developed largely in response to one disease, namely, malaria, which is marked by cyclic paroxysms and crises. This critical insight into the significance of malaria was made by the late Mirko Grmek in his *Diseases in the Ancient Greek World* [1989] but it has been largely overlooked, and not just by Cooper. Grmek's book is not listed in Cooper's bibliography. Indeed, the connection to malaria clearly lies at the heart of Galen's decision to take the onset of fever as the crucial factor in determining the beginning of the illness.⁴

Chapter 3 of the introduction, 'The Sciences in the Critical Days', which discusses 'the content rather than the history of the Arabic transmission', 'is included to assist the reader in understanding this treatise'. In fact, it seems to this reader that Cooper could use some assistance. For example, Cooper writes: 'Using basically an Aristotelian model, Galen offers a much more detailed hypothesis about lunar influences on patients' [61]. In n288, he observes that Ptolemy describes some supposed medical effects of the heavenly bodies in *Tetrabiblos* 3.10–14: 'but Galen makes an empirical argument, involving both induction from empirical data, and deduction from general principles'. Is this fair to Ptolemy? In fact, the first sections of the *Tetrabiblos* offer many arguments, not only that the heavenly bodies have effects but that these effects can be known, and that knowledge of them is beneficial. Indeed, the intimate connections between astrology and medicine with regard to issues such as the

⁴ Cf. Cooper's comments on 797.10–16 [416], and especially on 798.7 [417], where he notes Galen's calling on Hippocrates' support 'for this important idea, namely, that, for purposes of calculating the series of critical days, the fever is identical to the illness'.

legitimacy of induction or the value of sciences whose success rate is not very impressive accompany the two arts throughout the ages.

Another slip-up, which in other circumstances could be written off as an oversight, reinforces my judgment that Cooper is not at all expert in the history of astrology. On page 24, Cooper notes that astrologers were consulted to select the propitious moment for the founding of Baghdad. He then adds: 'It would be interesting to know what the star chart of Baghdad looked like for that date...'. The foundational horoscope for Baghdad was published and discussed by David Pingree [see 1970, 104]. This is not the only instance where a desideratum passed on by Cooper for future research has already been discussed in accessible publications by leading scholars in the field.

Nonetheless, Cooper repeatedly introduces astrology into his comments, when there is no call at all to do so, for instance, with regard to 778.15 [112] where Galen opines that it is difficult, but not impossible, to distinguish the one who speaks the truth about critical days from the one who does not, adding that the matter 'is difficult only because it requires a long time and very thorough investigation'. Not the slightest trace of astrology here! But in his comment on this passage [401–402], Cooper volunteers an example of data that are hard to establish, such as the beginning of the illness (discussed by Galen elsewhere), compares the critical day as starting point to a person's astrological destiny, and spirals off into a disquisition on the parallel between prognosis by critical day and by astrology and between medicine and divination. None of this has the slightest bearing on Galen's text here!

Miscomprehension of astrology and its history are rampant. For example, in contradiction to Cooper's remarks at the top of page 58, mathematical detail in astrological medicine is consistent not just with Renaissance but with the medieval period too. However, the highly technical charts used in astrological medicine have nothing to do with the theory of critical days and, in fact, represent an alternative path to prediction. In his comment on 775.10 [398], Cooper offers an unjustified criticism of Vivian Nutton concerning Galen's dispute with the Methodists, claiming further that his own book 'will dispel future misconceptions regarding Galen's use of scientific method

in connection with astrological prediction’—in a context where no astrology, or astrological prediction, has any relevance whatsoever.

It is not just in astrology, but in astronomy as well, that Cooper’s grasp is insufficient. See, for example, his comment on 809.7–17:

Galen is rather imprecise about what constitutes a day, which is odd, since his mathematical/astronomical exposition in Book III depends on precise values. Does he mean ‘length of daylight’ or does he mean something closer to the familiar twenty-four hour period in common use today?

Really! The *nychthemeron*, which is pretty darn close to ‘the familiar twenty-four hour period’, was in use in antiquity as well. But more to the point: if Galen has in mind the length of daylight or of night, then his computation will be off by a factor of two. Galen speaks of seven days, or 14 ‘lengths of day-or-night’, not seven half-days. Cooper continues:

This carelessness is another argument that Galen did not mean the astrology part of his theory to be taken seriously: astrology requires considering precise times and periods. Galen’s near contemporary Ptolemy was far more precise about what a day is.

Indeed, he was.

On page 479, in commenting on 901.18, Cooper writes,

Aristotle taught that without the motions of the heavenly bodies, whose influence churns the elements, no change, and hence, no life would be possible on Earth, since in the absence of celestial influences, the material elements would tend to seek their natural places—and stay there.

True enough—but does Aristotle speak of the ‘influence’ of the celestial bodies or rather of their motions?⁵

⁵ In the following comment, Cooper writes that ‘the Moon was thought to be closer—in the Aristotelian universe it is the heavenly body closest to the earth’. I cannot resist adding that the Moon is the closest heavenly body in the Ptolemaic universe and so also in the Copernican, Keplerian, Newtonian and contemporary universe. Cooper is not the only one to forget this simple fact.

At K 912.3, Galen mentions a hypothetical horoscope in connection with a patient...He does not linger on details, but merely states that the sign that a patient is born under and the moon are related as follows....

But the value of a horoscope is in the details! If there are no computed values for the positions of the seven planets (at the very least), what kind of horoscope is it? Of course, in the passage in question, there is no horoscope at all but only some remarks of a very general nature concerning the 'sign' under which a person was born. To make matters worth, Cooper has mistranslated the passage that he refers to. Cooper's translation at 912.3 is not grammatical either; it reads:

Suppose a patient was born in and good fortunes occur to him in Aries, and misfortunes in Taurus, then I maintain that when the Moon is in Aries, Cancer, Libra, or Capricorn, this patient's situation will inevitably be good.

But the Arabic conjunction 'wa-' in the phrase 'wulida wa-l-su'ūd fi al-ḥamal' means (as every beginning student of Arabic knows) not 'and' but 'when' or 'at the same time as'. So, a more precise translation would be:

Suppose that a person is born when Aries is in good fortunes and Taurus is in bad fortunes, then, I say, that the situation of this person will doubtlessly be good whenever the Moon is in Aries, Cancer, Libra, or Capricorn.

On page 486, at the end of his comments on 913.6–15, Cooper writes:

This connection between the lunar phases and the courses of illnesses was very important to the medieval physician, who carried charts to help him identify when the key lunar phases would occur.

Is there any evidence for the medieval physician carrying 'charts' of this sort with him when he made the rounds with his patients? This is another glib observation, thrown out to the reader without bothering to check, and without considering that the readership of this book will be exclusively trained scholars!

One more example should suffice:

The patient's natal sign can be determined by observation, by tables, or, more reliably, by using an astrolabe (after these became available, long after Galen's time). [68]

It is not just the inaccuracy of these remarks—I do not know how the astrologer would 'observe' the natal sign; in any detailed horoscope, it is the ascendant point, not the sign, that signifies. I am annoyed not just by the inaccuracy of these generalizations but also by the way they are tossed off the cuff, as if this book was aimed at the most general audience, who would know no better.

Cooper's knowledge of astronomy as well is significantly lacking; this, combined with an insufficient command of the Arabic language, makes for some rough going. For example, Cooper writes in the introduction, 'Galen states that the relative positions of sun and moon during conjunctions are never the same' [63]. Obviously Galen would never say anything of the sort. In his note, Cooper refers to 906.15–907.5; and when one searches through those passages, one finds this sentence [332]: 'Consequently, the time in which the Moon appears distinctly is never the same'. But this is a mistranslation: the Arabic construction 'fa-laysa...dā'imān' means 'is not always'. So Galen is simply saying that 'the moment in which the Moon is distinctly visible is not always the same'. As he goes on to say, for a period of three days surrounding conjunction, the Moon is either not seen at all or seen. This is a somewhat cumbersome way of saying that the Moon will not be seen for a day or two, maybe three. It suffices for his purpose in the passage, which is to say that during those three days—even if the Moon may be occasionally visible, of course as a slim crescent barely above the horizon—its influence is practically nil.

At 906.11–15 Galen discusses the brief visibility of the Moon at the beginning of the month; just how long it is visible depends on a variety of factors such as the elongation, atmospheric conditions, the Moon's latitude, to name a few. Galen does not go into these details. Cooper writes [n984] in summing up Galen's discussion, 'So, the specific influences depend on whether the Moon is preceding or following the Sun'. But at the beginning of the month, the Moon is always following the Sun (i.e., to the west of the Sun). Moreover, Galen is here only describing the visibility of the Moon on the first

day that it is visible; he is not saying anything at all about ‘influences’, whether specific or general. In the following note [332n985], Cooper again misunderstands the astronomy and adds an irrelevant astrological comment. Cooper notes, ‘The Moon moves faster than the Sun, so its motion is a more significant factor in causing Earthly changes’. This may be true, but it is not what Galen is saying at 907.1–5. Galen is simply saying that the elongation, which depends on the swift and not very smooth motion of the Moon, is the strong variable in determining how long the Moon will be seen on the second day; not a word here about causing Earthly changes.

The following note as well reveals a complete lack of understanding of astronomy. In reviewing the causes for variation in the Moon’s visibility, Galen lists also (citing for convenience Cooper’s translation) the fact that ‘due to the setting of the Zodiacal signs its interval is not equal’, which Cooper glosses:

This means that its path is not parallel to that of the signs. Therefore, reckoning its position along the Zodiac is problematic. [332n986]

Not at all. Galen is referring here to the ‘setting time’ of the Moon, which is determined by the setting of the arc drawn parallel to the celestial equator from the Moon to the horizon; in other words, it is evaluated by converting the altitude of the Moon into time degrees [see [Pedersen 1974](#), 110–115].

More examples could be adduced but I will finish my critique of Cooper’s handling of astronomy by citing just one more sentence from the comment on 905.11–16, this time without adding any countercomment:

This is because the lunar phases are constantly changing, and the fullest full Moon, when the Moon peaks in that phase mathematically speaking, lasts only a moment, and then swiftly begins to wane, like a point in time. [481]

In sum, the kindest thing one can say about Cooper’s understanding of astronomy is that it is insufficient for the task he took upon himself in writing the commentary.

Cooper has something new to say about ‘musical symbolism’ in this treatise. The evidence for this is Galen’s use of the verb «πλημμυλέω», whose meaning Cooper gives as ‘to play a wrong note

in music', which serves to describe nature's going off course. I am not competent to assess just how significant Galen's choice of this word may be. But I am intrigued by Cooper's reference to Galen's 'application of rhythmic principles to his ground-breaking theory of prognosis via pulses', which, he avers, testifies to Galen's having no more than 'a superficial familiarity with some of the basic issues of music' [73]. Galen's statement that the pulse has a musical character was not lost on the Arabic tradition. It is repeated by Ibn Sina and developed in some of the numerous (and lengthy and involved) commentaries on that book.⁶

Music comes up again on pages 409–410 in comments on 789.6, where Galen says, in Cooper's translation from the Arabic, that physicians who investigate medical terms such as 'crisis' from the point of view of language 'understand as much of logic, grammar, and rhetoric as donkeys understand of music'. Cooper wants to make a nice point here: that the association of donkeys and music that is found in classical literature, in a negative sense of course, gets lost in the translation into Arabic. However, it is not clear just what is lost. Cooper says that 'Ḥunayn explains what is meant without the poetry'. It would be helpful here to display the 'poetry' found in Galen so that we can see just what has been left out. Cooper remarks later on the same page, 'Ḥunayn preserves the donkey/music image, which has a similar meaning in classical Arabic'. So has something been lost or has it not? I cannot figure it out. Cooper goes on to discuss some of the musical terminology in Greek and in Arabic. Again, a good thing to do. But for the Arabic 'īqā' he can supply only a few dictionary meanings, adding that 'an investigation of how this word is used, if at all, in the later Arabic musical treatises would be useful'. However, that investigation was carried out over 70 years ago by Henry Farmer [1929], the great pioneer in the history of Arabic music, and a discussion of the term in question can be found on page 49 of his *History of Arabian Music*.

I did not of course check Cooper's translation from beginning to end. I have already said that it generally reads well and appears to present correctly Galen's doctrines, as well as his unique style.

⁶ I have a transcription of a long essay on this from the pen of Shlomo Ibn Ya'ish, the author of a multivolume gloss on the *Qanun* in Judaeo-Arabic, and patiently awaiting its turn in my work schedule.

However, I did stop for a closer look at some passages that caught my attention and in some cases I found some distressing errors.

For example, at the bottom of page 405, in a comment on 783.16 (misprinted as 783.14), Cooper offers some nice insights into Ḥunayn's translational skills but he has mishandled the phrase in question. Ḥunayn expands the Greek «κατόνεος», which has no equivalent in Arabic (though the homonym 'qānūn' would be introduced into the language but with a different meaning) by a four-word phrase. Both my vocalization and translation differ from Cooper's. He reads 'li-yaṣbira bi-hā mā siwāhā' and translates it by 'in order that you might examine the others against those that resemble them'. I read 'li-yuṣbara bi-hā mā siwāhā' and translate it by 'in order that, by their means, other things may be examined'. 'Siwāhā' does not mean 'resemble' but 'other than' or 'different from'; I translate 'bi-hā' as 'by their means', expanding the instrumental suffix 'bi-', ordinarily translated 'by', to 'by...means' for added clarity.

Another example is the difficult passage, 798.1–6, on pages 146–148. Galen is talking about the beginning of the illness here. For him, this means specifically the beginning of the fever rather than the onset of symptoms such as insomnia or loss of appetite. But how precisely can this be determined? The physician must of course generally rely on the patient for this important datum. Galen's point here is that even the most insensitive, boorish, stupid person cannot be off by more than hour and that period of time is insignificant for determining the critical days. Here once again we must recall that by 'illness' and 'fever' Galen has in mind the disease that we call malaria, whose fever cannot be mistaken even by an ignorant brute.

Cooper translates the passage as follows:

Suppose, moreover, that there is someone who fails to notice the fever when it began; then how many a patient is seen that it is possible for his fever to go unnoticed—which I consider to be impossible—and if the fewest people had perceived that an hour passes before it was perceived. Therefore, suppose that he thinks that the fever began in the tenth hour. But let its beginning really be not the tenth, but the ninth hour: then what harm is there for this person in knowing the critical days? Do you see how this is, for the most part, harmful in

medicine, that some patients do not perceive their fever until an hour passes?

Cooper has completely missed the point of the passage and he has mishandled some of the Arabic phrases. His notes expand on his erroneous translation and are thus worthless. The correct translation, in my opinion, is:

But it has happened that a person is unaware of his fever when it begins. How many a patient has been seen to be unaware of his fever as much as I reckon he is able to be, even if he were the least sensitive person, [which is] that an hour would pass before he became aware of it. So it would happen that he thought that the fever began in the tenth hour, whereas in truth it did not begin in the tenth but in the ninth. But what harm does this cause for the knowledge of the critical days? Do you not see that the maximum harm here for medicine is that some patients will not sense their fever until an hour has passed?

Cooper may not always have handled the Greek as well as he should have; his edition of the Greek will surely receive the scrutiny it warrants. But here are examples of some minor mishaps, which may be simple oversights; more serious errors will be discussed below in connection with Pythagoreanism.

- 190 regarding 821.7 ‘a bad mistake’: ‘mistake’ here is ‘āri’, the very same word that Cooper translated correctly in the preceding passages as ‘accident’. It refers to an unforeseen event, one which can affect the natural course of events. For example, if the patient receives a piece of disturbing news or his attendants do not execute their duties properly, the patient’s constitution will be affected and this in turn will put the development of the illness out of kilter. It is not a ‘mistake’, meaning an error of judgement or treatment on the part of the physician but an event that adversely affects the patient. This is indeed a difficult passage to translate and perhaps different English terms will be needed for the same Arabic term.
- 346 regarding 916.11: Cooper translates the Arabic as

Therefore, in the strength of the weekly periods there is a marvelous thing, when so many factors cut up their illnesses and hinder them.

In n1039, Cooper explains that the many factors or reasons involved ‘confuse the issue by presenting a complex situation’. I think that Galen intends here something very different: the fact that the weekly periods are so strong a factor—that is, that the ‘week’ remains the strongest variable despite the errors on the part of the physician, the patient, and others that foul up the natural process—is ‘wondrous’ and indicates that the temporal period is truly a potent cause.

- 398.3 in the comment on 776.6 regarding the Greek «τέλειαν», which is correctly translated into Arabic as ‘tāmm’: it means, however, ‘complete’, not ‘incomplete’ as Cooper has it.
- 404–406 ‘they have no rational principle (ἄλόγως)’: to my taste, this should rather be presented as ‘their theory is irrational (ἄλόγως)’ or ‘they have no rational principle (λόγως)’, so that the Greek term in parentheses has a precise equivalent in the English.
- 422: in commenting on 806.6–16, Cooper calls attention to an important methodological choice made by Galen. Confronted with a number of possible causes for a phenomenon, Galen, in a thought experiment, fixes all but one and allows that one to vary in order to assess its effect on the entire system. This procedure was not unknown in medieval times. Levi ben Gerson used a similar method in order to determine whether a planet’s influence varies with its altitude or its longitude. To do this, he compares their influence when at the two equinoxes, that is, when the longitude would be different but the altitude the same. On this basis, Levi decides that longitude is the strong variable. Moreover, he maintains that this can be determined empirically, and not just by a thought experiment [see [Langermann 1999](#), 509–510].
- 427 regarding 813.11–18: ‘mursalan’ means ‘without qualification’, that is, ‘not qualified in any way’, in other words, ‘in the most general sense’. It does not mean, as Cooper claims it does, ‘absolute, unquestionable’.
- 431 regarding 819.14–820.11, where Cooper writes that Galen ‘humorously’ refers to death as a bad crisis: perhaps Cooper

means by ‘humorously’, in line with his theory of humours? I do not find this funny and doubt that Galen did either.

- 445 regarding 842.17: in fact the practice of consulting more than one physician continued in Islamic civilization. Maimonides complains of this [see [Langermann 2004](#), 291–292].
- 452–453 regarding 853.7–11: the difference in opinion between Galen and al-Kindī is no evidence at all that al-Kindī did not see Galen’s book; it simply means that he chose his own path, as he did in all of the many fields within which he worked. Thinkers like al-Kindī are not the exclusive products of the books that they read and not every book that they read will exhibit its ‘influence’ in their writings. Al-Kindī is much more likely to have rejected Galen’s arguments and opted for Pythagoreanism.
- 480 regarding 903.11:
 - ...since the situation that was beginning to develop in the Islamic world in Ḥunayn’s time was for there to be a caliph, who had nominal authority, and a sultan, who had the real power and did the actual ruling.

The most generous appraisal I can offer of this comment is that it is a tremendous oversimplification. In truth, it betrays a complete lack not just of understanding but of sensitivity to history. This is a minor point with regard to Galen but a major one concerning Cooper’s way of doing things. As in the case of music or the foundational horoscope for Baghdad, as we saw above, Cooper has made no effort at all to see what scholarship already exists on the subject. He would have done well, at the very least, to read the lengthy and learned entry in the *Encyclopedia of Islam s.v.* ‘sulṭān’, where he can learn that the first rulers to bear the title of sultan were the Seljuks.

- 498 regarding 934.12: Cooper once again betrays a fundamental unfamiliarity with the topic, here Pythagorean arithmology—and that is the correct term, not ‘the numerological approach to nature (‘numb-skull argument’)’, as Cooper writes in his commentary. Pythagorean arithmology has been studied intensively for some time, beginning at least with the investigations of Armand Delatte; but Cooper knows nothing of this. To be more precise, he evinces no knowledge of this

in his discussion of the Arabic Galen. The correct term ‘arithmological’ is found in appendix 2 [530] but there is no further reference to the literature on the subject. Galen relates here some of the names that have been given to the numbers and Cooper misses the significance of just about all of them.

There is some rich material here for the textual history of *On Critical Days* as well as for the development and transmission of Pythagoreanism. In **Table 1**, I list the Arabic term in Cooper’s edition, the Greek form found in Kühn [1825], Cooper’s translation of the Arabic, and my own suggestion for translating the Arabic.

Arabic	Greek	Cooper	YTL
<i>lā athar lahu</i>	ἀμήτορα	[the One] has no mother	has no effect (Ḥunayn)
<i>ṭalqan</i>	τολμᾶν	[the Two is] unrestrained	unbound
<i>ṣūra</i>	ιδέα	[The One is] a form	form
<i>unṣur ghayr mutanāhin</i>	ἄπειρον ἄπειρον	[The Two is] a boundless essence	unlimited element
<i>unṣur mutanāhin</i>	πεπερασμένην	[The Three is] a bounded essence	limited element
<i>niḏām</i>	ἁρμονίαν	system	cosmos
<i>adad tāmm awal</i>	ἡ τέλειον ἀριθμὸν	first perfect number	first whole (or full) number
<i>mutajassam</i>	ἡ στερεόν	a (compound) body	a solid
<i>basīṭ</i>	ἡ ἐπίπεδον	a simple (substance)	a plane

Table 1

In the first definition or connotation of the monad, it is called ἀμήτορα. Oddly, Cooper chooses the reading of E ('lā athar lahu') for his Arabic text but he translates 'has no mother' in conformity with the reading of L ('lā umm lahu'), which is the correct translation of the Greek (and indeed Kühn's text here is cited in [Liddell, Scott, and Jones 1968](#), s.v. ἀμήτωρ). But Ḥunayn (or perhaps the Syriac *Vorlage*, if there was one) read, or at least understood, the word to be «ἀμετέωρος», even though, as far as I know, no such word exists. 'Āthār' (the plural of 'athar') together with the adjective 'ulwiyya' ('higher up') was used to translate the title of Aristotle's *Meteorologica*: 'athar' means literally 'trace, effect' and in the context of Aristotle's book, refers to the effects produced in our atmosphere by the celestial bodies or the Earth's dynamic processes. This is clearly the meaning that the Arabic phrase has in our text. But where did it come from? Was this variant, or error, already found in any Greek manuscripts?

It is interesting that Ḥunayn chooses to translate «ὕλη» by 'unṣur', a term generally used to refer to 'element', most especially the four Empedoclean elements, rather than the basic material stuff before it is differentiated into elements. However, in Ḥunayn's translations of Galen, it means the simple, undifferentiated element: compare his version of *On the Elements according to Hippocrates* in [Langermann 2009](#), 7. Eventually the Greek word was absorbed into Arabic as 'hayūlā'. In the Greek, «πεπερασμένην» modifies «ἄρμονίαν», so the meaning is 'bounded cosmos' or 'limited harmony' (*scil.* 'harmonious system'). But the Arabic has added here 'unṣur' ('element') and inserted the conjunction 'aw' ('or'), thus dividing the phrase into two alternative connotations. Is there any justification for this in the Greek manuscripts?

With regard to the various connotations of 3, something has gone awry again; and again, I have only Kühn's Greek text to consult, which reads «ἡ τέλειον ἀριθμὸν καὶ ἀ' ἢ στερεὸν ἢ ἐπίπεδον». Apparently Ḥunayn understood correctly that «ἀ'» is shorthand for 'first' (or in his manuscript the adjective «πρῶτος» was written out) but either could not put the sentence together or else—and this seems very unlikely—came up with an Arabic sentence that conveys a different meaning. The Greek says, '[first] whole number, first solid, first plane'; in the Arabic, 'awwal' ('first') modifies only 'first whole number'. 'Basīṭ' can mean either 'simple' (as used in physics and metaphysics to refer to simple substances) or the geometric term

‘plane’, used also for numbers. Had Cooper consulted the Greek, he might have made a better choice for his translation. However, he did consult the Greek, or at least Kühn’s Latin translation, for «τέλειον»: Kühn renders it ‘perfectum’. Indeed, ‘perfect’ is the meaning given by Liddell, Scott, and Jones [1968] but it is inappropriate here. The first perfect number, that is, the number that is also the sum of its factors is 6, as indeed Cooper points out [498n16]. So here ‘tāmm’ clearly means ‘whole’ and signifies that according to this teaching, neither 1 nor 2 are considered to be numbers.

I believe that I have adduced enough examples of passages in this book that require critical repairs; more could be supplied. Clearly, Cooper ought to have done his research more carefully and so also his translation. Nevertheless, as I stated at the beginning of this essay, this a welcome and important addition to the scholar’s bookshelf.

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