Editing Technical Texts. Lessons from Greek and Byzantine Textual Traditions

Fabio Acerbi

Editing Technical Texts.
Lessons from Greek and Byzantine Textual Traditions

FABIO ACERBI
CNRS, UMR8167, "Orient et Méditerranée", équipe "Monde byzantin", Paris

Abstract. Some issues of editorial techniques and stemmatic theory are raised and discussed by using the textual tradition of Greek and Byzantine technical treatises as sources of examples and case-studies.

1. *Basic Stemmatic theory*

The stemmatic method primarily aims at reconstructing the textual tradition of a text that has been transmitted to us through "manuscript witnesses".[1] It is a genealogical method, that is, it is grounded on coincidence in innovation. The idea is that, intentionally or unintentionally, copyists may modify some "readings" of the text they reproduce,[2] and that these "innovations" are transmitted to subsequent copies.[3] It is also assumed that any single copyist uses just one manuscript (the "model", "exemplar", or "antigraph") as his source to realise his own copy (the "apograph"); otherwise, "contamination" has occurred.[4] Tracing the transmission of these innovations back to their first occurrence allows organising the "witnesses"[5] of a text in a genealogical tree, called "stemma".[6] As it was originally devised to

* I am greatly indebted to Richard Goulet, Stefano Martinelli Tempesta, and especially Bernard Vitrac for their critical remarks. Some of the material contained in this study was presented in the workshop *L'albero e le sue radici. I. La questione dell'archetipo* (Milano, December 13, 2021).

[1] In this section, I shall concisely expound my approach to the stemmatic method. The real basics are taken for granted. My approach diverges from the standard view on some crucial points. The attentive reader will easily see that my positions by and large coincide with those expressed in Contini 1992 (which is, however, very difficult to use without a perfect mastery of Italian). The best introductions to the stemmatic method are the brilliant discussion in Paris 1887, 7–27, the founding masterpieces reprinted in Maas 1960 (see also the translations Montanari 2003, Maas 2020, Maas 2021), the collection of studies Reeve 2011, the manuals Chiesa 2012 and Trovato 2017, the handbook Roelli 2020. For the history of the method, also known as "Lachmann's method", see Timpanaro 1985. My examples will be drawn from traditions of technical texts only. By "technical texts" I mean all kinds of literary product that classicists usually spurn as paraliterature; they more or less coincide with the texts treating the disciplines traditionally included in the *Trivium* and in the *Quadrivium*.

[2] There existed professional copyists able to reproduce (usually short) texts without introducing innovations. Some examples are found in Acerbi 2023b, and also see the next section. Such copies do not comply with the base assumption of the stemmatic method, but they can normally be detected by means of special techniques.

[3] The "innovations" used to be called "errors". Read the turning point in Fourquet 1948. The common-error method was already applied by Hipparchus in his commentary on Aratus, see *Comm*. I.2.6 and I.3.1.

[4] On contamination see Martinelli Tempesta 2014. Block contamination—that is, using different models to copy different yet *substantial* portions of a single text—can be treated by stemmatic methods, as all kinds of moderate contamination can. On the notion of "block contamination" ("contaminazione per giustapposizione di esemplari") see Tonello & Trovato 2011; block contamination in the *Elements* is thoroughly studied in Vitrac 2022, sect. 4. Philologists' *Wunderkraut* against contamination is the "variorum archetype". The existence of variorum manuscript witnesses in specific traditions (the *Elements*, Cleomedes) is no warrant for assuming that this has normally been the case.

[5] A "witness" without further qualification can be a manuscript, a part of it, or a formal object like the ones I shall introduce later.

[6] Highly contaminated or overabundant traditions—or just lack of information—have been represented by means of Euler diagrams. See Rossi 1982, 246–247 (Boccaccio's *Decameron*); Barbieri 2001, 23–35 (Hugues de Berzé's lyric poems); and more recently Tonello 2018, 562–563 (a part of the Tradition of Dante's *Commedia*); Acerbi 2020a, 132–133 (Nicomachus' *Introduction to arithmetics*). I thank M. Giani for a stimulating discussion on the use of Euler diagrams in stemmatics.

represent the "descent of manuscripts", the stemma is traditionally depicted root-up and leaves-down. In a stemma, the witnesses are located at the branching points or "nodes", and the genealogical relations between them are represented by oriented line segments; contamination is represented by (usually broken) line segments that converge on a node from above. I shall say that a set of witnesses in a given stemma is "subordinated" to a witness if at least one monotonic path in the stemma from any of the former to the root of the tree passes through the latter.[7] If two witnesses are such that neither of them is subordinated to the other, they are "independent".

The innovations to be used for organising the stemma are qualified "indicative" (*Leitfehler*);[8] they are singled out by two constraints: uniqueness and irreversibility. This means, respectively, that no indicative innovation could be introduced independently in witnesses (partly) penned by particular copyists (otherwise, it is "polygenetic"); and that the reading modified by any indicative innovation should not be recoverable—either intentionally or unintentionally—in any witness (partly) penned by a particular copyist. Indicative innovations fitting the first constraint and that are shared by a number of witnesses are called "conjunctive" (*Bindefehler*); indicative innovations fitting the second constraint and that are exhibited by a witnesses but not by a number of others are called "separative" (*Trennfehler*). Conjunctive innovations are used to group witnesses into stemmatic "families", that is, to subordinate all of them to a common witness, called the "ancestor". Separative innovations are used to locate a witness in the complement to the stemma of the part of the genealogical tree subordinated to another witness, whenever the latter carries a separative innovation with respect to the former (one also says that the former "is separated" from the latter). Conjunctive innovations normally have a separative value. Whenever a witness has all indicative innovations of an extant witness, plus at least one indicative innovation of its own, then we say that the former is a "copy" of the latter, or that it "derives" from it;[9] the former manuscript is thereby "eliminated" as an independent witness.

It is since long known that the relevant innovations need not lie within the text proper.[10] Any piece of information provided by the manuscript witnesses under examination may serve as an indicative innovation:[11] date of copying and type of handwriting;[12] material "accidents" such as moisture stains

[7] I write "at least one path" instead of "the path" because of contamination, which can make paths with given endpoints not unique. For the same reason, using the notion of "subtree" to define subordination and independence would not do. A path in a graph is "monotonic" if the line segments that make up it have the same orientation.
[8] Most of the terminology and of the rules summarised below have been neatly formulated in the reference manual Maas 1960 (whose bulk was first published in 1927, a crucial *addendum* in 1937). The best translation here is "leading".
[9] This is a definition, that is, an if-and-only-if clause that attaches a meaning to a term (for this reason I write "whenever" and "we say that"). It results that, inversely, witnesses that exhibit exactly the same (possibly empty) set of innovations are independent of each other (usually, innovationless copies are detected by special methods). As I am speaking of "witnesses", this does not imply that the "copy" is an "apograph".
[10] This is the reason why I phrased some rules in the previous paragraph by using the cumbersome definite description "witness (partly) penned by a particular copyist" instead of "copyist".
[11] See also the recent synthesis in Martinelli Tempesta 2022.
[12] No textual data will ever overthrow the plain truth that a later manuscript cannot be a copy of an earlier one. The advances of palaeography allow to assign a fairly precise date to any given manuscript witness, specifically, the copyist of most Renaissance manuscripts can be identified.

and damaged or missing folios;[13] quirks of layout and irregularities in the script;[14] paratextual apparatuses like inscriptions, scholia,[15] diagrams;[16] association with other writings within a given manuscript.[17] These material features also give rise to the sole innovations that allow us to upgrade a "copy" of a manuscript witness to an "apograph"—that is, an actual or "direct" copy—of it.

If the manuscript tradition proceeds root-first, the stemmatic method, as is obvious for a *reconstruction* method, can only proceed leaves-first.[18] As the stemmatic method is a *method*, it aims at stating unambiguous rules yielding a unique output. Accordingly, the organisation of the witnesses of a text in the stemma must be constrained by an overall—that is, superordinate to all other operating criteria—principle of parsimony. The range of the principle are the nodes in the stemma, whose number must be kept to the minimum required by a given constellation of indicative innovations. As the stemmatic method has coincidence in innovation as its ordering criterion and as it proceeds leaves-first, it may happen—it very frequently happens—that sets of conjunctive innovations cannot be located in an extant manuscript. Such sets are called "hyparchetypes". If a set of indicative innovations is shared by all

[13] Masterly eliminations grounded on extratextual features were carried out systematically in De Stefani 1902. Clark 1918 explained how to deal with specific kinds of omission. Methodological *loci classici* for eliminations based on "mechanical" accidents are Pasquali 1952, ch. III; Irigoin 1986; Reeve 1989, 151–164 of the reprint. Inversely, Orlandi 1994 shows that mechanical accidents may not be enough to prove that a manuscript is an apograph of a damaged model: the point is that there may exist, as they do exist in some infamous cases, copies that reproduce their model line by line. As we shall see in a moment, however, twin manuscripts are stemmatologically irrelevant, for they can exist only in the "real tree".

[14] Among technical texts, the most conspicuous eliminations carried out on extratextual grounds are those that reduce the traditions of Apollonius' *Conics* and of Pappus' *Collection* to the manuscripts BAV, *Vat*. *gr*. 206 (12th century; *Diktyon* 66837): Heiberg 1891–93, vol. 2, XV (the letter *ny* at the end of the first line of prop. II.33 is included by later witnesses in the diagram associated with II.32: Plate 1), and BAV, *Vat*. *gr*. 218 (10th century; *Diktyon* 66849): Treweek 1957 (water damage on several folios, and correspondingly perturbed stretches of text in all other witnesses: Plate 2), respectively. A nice example can also be found in Acerbi 2023a, sect. 5.2, Famille E, and plate 1. None of these eliminations is invalidated by the phenomenon pointed out by Orlandi (see previous footnote), for no particular case can be upgraded to falsifying the principle of parsimony, which does not operate on the real tree (see repeatedly below).

[15] An example comes from a manuscript witness of the *Elements*, namely, Paris, Bibliothèque nationale de France, *gr*. 2345 (13th *ex*.; *Diktyon* 51977), ff. 1–4. These two bifolia were part of the original copying plan. They exhibit several gross copying errors, so they were discarded before being completed, they were filled with annotations by later hands, and finally recycled as guard-leafs. One of the errors is a scholium inserted in the text. This scholium can be read in the margin of the manuscript Oxford, Bodleian Library, *Auct*. F.6.23 (11th *ex*. – 12th *in*.; *Diktyon* 47105), f. 167r, and it is located in such a way as exactly to explain the position in which the scholium is inserted in the Paris manuscript. Accordingly, *Par*. *gr*. 2345 can be eliminated as a copy of the Oxford manuscript in its original form; the former can even be used, together with other copies, to reconstruct the letter where this is restored by a later hand (Vitrac 2022, 138–139, 293, 324). An elimination grounded on scholia is also carried out in Martinelli Tempesta 1997,–119 (Plato, *Lysis*).

[16] In Acerbi 2020b I have applied a strategy of diagrammatic eliminations to the tradition of Nicomachus' *Introduction to arithmetics*. See also Acerbi 2022a, in which most eliminations rest upon extratextual features such as the presence and the form of the diagrams, the form of the numerals, misunderstood abbreviations, quirks in the script, and paratexts of any kind.

[17] Examples from the tradition of Nicomachus' *Introduction to arithmetics* are listed in Acerbi 2020b, sect. 5.2.

[18] The stemmatic method proceeds backwards in point of logic, independently of the order in which the manuscript witnesses are collated. Actually, no editor starts by collating the most recent witnesses. At the end of the collation of a witness, any serious editor knows its exact position in the prospective stemma, as stated in Rome 1936, LXXXVII (on Dom Quentin's method see below): "Le procédé de classement suivi a été la méthode de convergence : en collationnant les manuscrits […] on sait, lorsqu'on achève l'examen d'un manuscrit, à quelle famille il appartient. Somme toute, on réalise inconsciemment ce qui se ferait systématiquement en dressant une statistique complète de toutes les convergences et divergences. Comme contre épreuve, après que notre stemma était déjà établi, nous avons appliqué la méthode de D. Quentin. […] Ce n'est donc pas, comme on l'a laissé entendre, sous l'influence de D. Quentin que nous avons voulu avoir trois groupes". I add that serious editors know the exact position of a witness during or at the end of its collation because in doing so they have long been acquainted with the "real object", or at least with a digital reproduction of it. The "serious" editor is the one who has developed a sensibility to manuscript copies and is able to "see" the model behind the apograph.

witnesses after sifting out minority readings,[19] this set is called "archetype".[20] If such a set of innovations can be located in an extant manuscript, this is not the archetype of the tradition, but its "prototype". Clearly, the set of innovations that define a hyparchetype or the archetype depends on the form of the part of the stemma subordinated to them.[21] It may happen that the set of indicative innovations shared by all witnesses is empty; in this case, there is no archetype and the stemma has no single root.[22] By definition, the complement to the edited text of the set of innovations that define the archetype has no stemmatic value:[23] it is part of the "original", which cannot find a place in a genealogical tree, not even if it contains what we might oxymoronically call "authorial innovations".[24]

The hyparchetypes and the archetype need not be lost manuscripts: they are primarily sets of conjunctive innovations.[25] This means that the stemma and the so-called "real tree"—that is, the tree depicting the actual "descent of manuscripts" through the process of copying—need not coincide. This stems, first, from the plain fact that so many manuscripts have been lost, and, second, from the methodological fact that the stemma is organised leaves-first, whereas the real tree proceeds root-first. In the "lowest part" of the stemma—that is, when our information is maximal and we are usually able to determine that there is an extant manuscript from which any assigned witness derives, or even that the former is the antigraph of the latter—the stemma and the real tree may coincide fairly well. Moving towards the "uppermost part" of the stemma, and especially when hyparchetypes are first needed, we

[19] See below for the meaning of "sifting out minority readings", which I shall henceforth mostly understand. This takes into account the phenomenon of "partial dimming of the archetype", namely, when archetype innovations are amended in minority branches of the tradition (Trovato 2017, 147–155). The set of innovations shared by all witnesses includes those detected by "diffraction", that is, the variant readings that result when all witnesses subordinated to a single hyparchetype restore in different, and equally non-acceptable, ways a perceived patent innovation in the model; this innovation is either present (diffraction "in presence") or absent (diffraction "in absence") among the variant readings exhibited by the relevant witnesses. For the notion of "diffraction" see Contini 1992, *passim*.

[20] I endorse a standard definition of the archetype. For a discussion of this terminological problem see Reeve 1985. For instance, Dain's archetype of the tradition of the first four Books of Apollonius' *Conics* (which admits a prototype and therefore has no archetype, as we have seen) is the text stabilised by Eutocius at the beginning of the 6th century.

[21] The case is blatant when a new witness shifts the archetype one step back. This frequently happens when the indirect tradition is allowed to enter the stemma (see below). For the thorny issue of the Arabic tradition of the *Elements*, see Vitrac 2022, especially sect. 2.I and Annexes 2–6. On the stemma being perturbed by the introduction of new witnesses, see already Bédier 1928, 331–339.

[22] See Cap. II in Pasquali 1952, who, however, identifies the archetype with a manuscript. The most important Greek technical text whose tradition is not rooted in an archetype is Aristotle's *Metaphysics*: see Bernardinello 1970; Harlfinger 1979; Primavesi 2012. Kotwick 2016 posits an archetype on no grounds.

[23] The qualifier "edited" means again that the minority innovations have been sifted out, see below.

[24] See Cap. VII in Pasquali 1952. Of course, in the phrase "authorial innovations", "innovation" simply means "error". On authorial rewritings see Section 2 below.

[25] Happy findings may help provide an (hyp)archetype with material and historical substance, that is, they can make it almost certain that it coincides with a lost witness. Examples are the scholarly material that accompanies the *Almagest* in the branch of the tradition stemming from Ammonius' teaching in Alexandria (Acerbi 2020c, 288–295) and a transposition of folios in a branch of the tradition of Euclid's *Data* (Heiberg & Menge 1883–1916, vol. 6, VII and XXXII; Menge's formulation is misleading: the transposition did not occur in the partial prototype of this family—this manuscript is incomplete, so the overall text witnessed by this branch does not admit a prototype, but a hyparchetype). Suppose also that the prototypes of the traditions of Apollonius' *Conics* and of Pappus' *Collection* were lost. The perturbations induced by the periodic water damage on the text witnessed by the copies of the latter would easily allow reconstructing the manuscript behind the archetype. An imaginative philologist would be required to trace the cause of the spurious presence of the letter *ny* in the diagram of *Conics* II.32 (these prototypes might be called "incipient archetypes"). The reference study for an approach to reconstructing the codicological features of the lost model of an extant apograph, if the former was damaged and the effects of the damage are kept in the text of the latter, is Irigoin 1986.

leave the real tree and enter the "real" stemma, which is a formal object. Disregarding this fact and the principle of parsimony gives rise to the so-called "paradoxes" of the stemmatic method.

The principle of parsimony immediately deconstructs two harmless sophisms: the "paradox of the twin manuscript" (formulation: "For any X and Y, X cannot be said to derive from Y, because there might have existed a lost twin of X, Z, from which Y derives") and the "paradox of the interposed manuscript" (formulation: "For any X and Y, X cannot be said to be an apograph of Y, because there might have existed a lost copy of X, Z, from which Y derives"). The reason why these "paradoxes" are mere sophisms is simply that Z is redundant, so that the principle of parsimony forces us to identify it with X. The fact that twin or interposed manuscript witnesses do have existed in specific cases is a warning, not a proof that they have existed in any instance, and at any rate they are irrelevant to organising the genealogical tree by means of the stemmatic method.[26] A further "paradox", to the effect that more-than-bipartite stemmas cannot be "proved" within stemmatics, has been reiterated in the literature.[27] The paradox is solved by applying again the principle of parsimony, and by recalling that the stemmatic method does not "prove" anything, but sets out rules to be applied. These rules are grounded on definitions, namely, on if-and-only-if clauses.

Keeping the real tree and the stemma distinct deconstructs the celebrated "paradox of bipartite stemmas", which uses the overwhelming abundance of bipartite stemmas associated with actually reconstructed textual traditions to argue that the stemmatic method does not work.[28] The correct reaction to the said overwhelming abundance, very simply, is: "so what?"—we are not reconstructing real trees, indeed: thinking that a (hyp)archetype is a lost manuscript necessarily—and unduly—upgrades the dichotomy "original reading" / "innovation" from sets of readings to witnesses and from witnesses to lost manuscripts, and *this* generates the paradox. Moreover, if we are not reconstructing real trees, we may apply graph theory methods to compute how many rooted trees there are with a given number of leaves and *n* branches stemming from the root. The result confirms that there is nothing wondrous in the abundance of bipartite stemmas.[29] Conversely, using decimation in the actual textual tradition to explain the preponderance of bipartite stemmas is undermined by the fact that the former is a phenomenon occurring in the stemma, the latter is a phenomenon occurring in the real tree.[30] A third deconstruction is less theory-laden and comes from the following remarks.[31]

---

[26] One-leg branchings usually formalise the presence of a recension.
[27] See Fourquet 1948, 86–89; Grier 1988; Chiesa 2020.
[28] This "paradox" was first, and with exceptional effectiveness, put forward in Bédier 1928. The literature on Bedier's paradox is huge; see Greg 1931; Castellani 1954; Alberti 1979; Timpanaro 1985; Appendice C (with a review of previous proposals of "explanation" of the paradox), Reeve 1986; Hoenen & Eger 2017; all with a bibliography.
[29] See Flight 1990; Hoenen & Eger 2017. The latter's computations vindicate the argument in Maas 1937, 290–293, thereafter in Maas 1960, 27–30, spurned in Timpanaro 1985, 127–133. Of course, the fact that we are not reconstructing real trees is crucial. This escaped both Maas and Timpanaro.
[30] See Guidi & Trovato 2004. The term "decimation" is used to signify that the loss rate of (early) manuscript witnesses is very high.
[31] These remarks make what is usually presented under the umbrella of "contamination" more precise (see for instance Timpanaro 1985, 140–150).

The final goal of the stemmatic method is to use the stemma to reconstruct a text that is as innovation-free as possible. This means evaluating the variant readings at a given point of the text. Different variant readings coming from witnesses immediately subordinated to a witness located in a node are selected on the basis of the majority principle, which sifts out the less-recorded readings and thereby rejects them as innovations. As the stemma is organised by using indicative innovations only, the stemmatic method is not circular; among other things, it may assign to the hyparchetypes and to the archetype innovations that are not indicative innovations.[32] Of course, there are cases in which the majority principle fails. This happens either when only two branches stem from a node and the two associated variant readings are different, or when more than two branches stem from a node and the associated variant readings are all different (the second disjunct already contributes to weakening the "paradox of bipartite stemmas").[33] In these cases the choice is left to the editor. Likewise, editors are authorised to derogate from the majority principle whenever they see it fit to apply the principle of the *lectio difficilior* or the principle of the *usus scribendi*. The judgement of the editor also determines what readings are innovations and what are not (for the "original" is not at hand for a check), and—crucially—what readings are indicative innovations, for the constraints of uniqueness and irreversibility formulate an *evaluation* of the *likelihood* of an innovation.[34] If *lectio difficilior* and *usus scribendi* can be turned off by the editor, setting the threshold for the indicative innovations cannot. The stemmatic method, then, is not "mechanical" at all,[35] not even in absence of contamination, and not even if the stemma is nowhere bipartite.[36] Conversely, speaking of "closed" or "open recension" is simply nonsense.[37]

---

[32] The stemmatic method is not even circular when we sift out indicative innovations, which are a subset of the variant readings, for no witness "knows" the *varia lectio* of the other witnesses subordinated to the same witness.

[33] The paradox is weakened because its aim was to show that the stemmatic method is not "mechanical", but in most cases—that is, when the stemma is bipartite at its root—it may require a choice on the side of the editor, see below. If stemmas with *any* number of branches may require a similar choice, the paradox is thereby weakened. My formulation as a disjunction also makes it clear that singling out only two-branch stemmas as undermining automatism in the selection of variant readings is tendentious.

[34] In my formulation of the two constraints, the judgement of the editor and its probabilistic character are both borne out by the two modal verb forms "could" and "should". Actually, the judgement of the editor determines what readings are innovations *tout court*. This is crucial when the hyparchetypes and the archetype are reconstructed.

[35] Modifications of the stemmatic method are the taxonomic method proposed by Dom Quentin (1926), applied by J. Mogenet and his school in the edition of technical texts (founding text Mogenet 1950, who, against the overwhelming *varia lectio* he himself had set out, programmatically refused to "close" the stemma with an archetype: "[…] le stemma, tel qu'il s'impose au terme des collations méthodiques, est satisfaisant. Il n'a pas la raideur préconçue et facile de beaucoup d'arbres généalogiques. Il n'est pas bifide, et échappe ainsi aux reproches adressés volontiers aux tenants du système de Lachmann" he self-deluding commented on his own stemma—which is not an "arbre généalogique" at all, since it is made of six disjoined trees—depicted on p. 156; to see what Autolycus' stemma should have looked like had Mogenet not refused to draw its uppermost part, see the one established for the very similar tradition of Aristarchus, in Noack 1992, 339), and whose present-day evolution is computer-aided cladistic stemmatics. A critical summary, with a bibliography, of Dom Quentin's fallacious method and its avatars (Contini 1992, 26, included it among the "artifizî non razionali") can be found in Trovato 2017, sections 2, 4 and 6; note that most of Bédier 1928 is a refutation of Dom Quentin's method. Statistical methods to treat variant readings were advocated in Froger 1968 and recently applied, for example, by H. Weidemann in his edition of Aristotle's *De interpretatione*: Weidemann 2014 (edition; a look at the stemma suggests that something does not work in this approach) and 2019 (an article in which the author explains his method more thoroughly), and in Vitrac 2022, sects. 4.VI–IX. An application of statistical methods to the tradition of Dante's *Commedia* is in Inglese 2007.

[36] We mainly owe the myth that the stemmatic method is something "mechanical" (and, by implication, bad) to the legacy, actively voiced by S. Timpanaro, of the masterpiece Pasquali 1952 (first published in 1934, and stemming from a review of Maas' *Textkritik*).

[37] "Recension" is here a synonym of "tradition". The distinction was introduced in Pasquali 1952, 126: an open recension occurs "ogniqualvolta la lezione dell'archetipo non si può fissare meccanicamente, mediante la constatazione di coincidenze di lezioni in certi apografi". If this applies to at least one reading, any tradition is "open"; if this applies to all readings, no

As the judgement of the editor has a constitutive role in organising and using the stemma, no surprise that they will tend to introduce as many nodes as possible. It is enough to reset the threshold for indicative innovations to get more (by lowering the threshold) or less (by raising it) nodes. Apparently, setting a low threshold is difficult to resist. This psychological mechanism, and the resulting bipartite stemmas, are well described by Mario Roques' celebrated apophthegm: "la force dichotomique, une fois déchaînée, agit jusqu'au bout".[38]

However, a method which is applied incorrectly is not thereby a method that does not work. Lack of information often requires lowering the threshold for indicative innovations;[39] this tends to multiply nodes, and hence bipartite stemmas. This lack of information normally originates in incomplete collation,[40] which may be a constitutive feature of the tradition of the text to be edited.[41] Technical texts also give prominence to phenomena that increase the number of traditions which are bipartite just below the archetype. For, first, there is no mathematical, astronomical, or philosophical text that has not been handed down to us—at least partially, but quite often uniquely—through recensions.[42] As the number of higher-education institutions dealing with technical matters in late antiquity was very low (for the kinds of text just mentioned, only Athens and Alexandria hosted such institutions), and as any recension stemming from the scholarly activities of any of these schools naturally sets itself as a reference, recensions tend to polarise the textual traditions of technical texts. Second, in Byzantine times, rewriting by copyists-scholars typically breaks the monogenesis constraint, generating fake conjunctive innovations.[43] In this case, the editor must use extra-textual criteria, set the threshold for indicative innovations as high as possible, and possibly give up drawing a stemma. Likewise, and third, taking the indirect

tradition is. Pasquali's definition assumes that a stemma can be organised, as his terminology shows. Read the criticisms in Alberti 1979, 1–18.

[38] Bédier 1928, 176.

[39] In principle, lack of information reduces the number of nodes: for an example coming from the tradition of Diophantus' *De polygonis numeris* see Acerbi 2011, 132–133. In this case, the textual data make it impossible to choose between a number of stemmas.

[40] Incomplete information and a consequent low threshold for indicative innovations appears to be the cause of the proliferation of nodes in the stemma of Aristotle's *Metaphysics* set out in Harlfinger 1979, 27.

[41] Euclid's *Elements* contains about 165,000 words and is witnessed by about 100 manuscripts, only one-third of which, however, are almost complete. This is much less than Dante's *Commedia* (*ca*. 102,000 words but 600 complete witnesses) and is negligible if compared with the *New Testament* (*ca*. 185,000 words and 5,800 witnesses). It goes without saying that all these overabundant traditions are affected by contamination; in particular, the *Elements* is affected by a wild contamination ranging over textual macro-units.

[42] A list of Byzantine recensions of Greek mathematical and astronomical works is in Acerbi 2016, 164–181. As for late antique recensions (a list is *ibid*., 143–149), the textual traditions of all Euclidean main works are bipartite from the root, and at least one of the two branches is a recension. One of the three main branches of the textual tradition of Ptolemy's *Almagest* is a recension intended to support the teaching of Ammonius, the leader of the Neoplatonic school of Alexandria in the early 6th century. Apollonius and Archimedes can be read only in recensions (for Eutocius' recension of Apollonius, see in particular Acerbi 2012). And so on. When this has not been the case, the transmitted text is a disaster; examples are Diophantus' *Arithmetics* and *De polygonis numeris*, and the *Sectio Canonis* ascribed to Euclid. See Acerbi 2020b, sect. 2, for a synthesis. As for Aristotle's treatises being transmitted by two distinct recensions, see for instance Moraux 1965 (*De Caelo*), Kassel 1971 (*Rhetorica*), Nussbaum 1976 and Isépy 2016 (*De motu animalium*), Rashed 2004 (*De generatione et corruptione*), Berger 2005 (*Historia animalium*), Primavesi 2012 (*Metaphysics*).

[43] The all-bipartite stemma of Cleomedes' treatise in Todd 1990, XIII, shows that the editor was unable to cope with the problem, possibly because he did not collate all witnesses.

tradition into account—mainly Arabic or Latin translations—almost invariably results in polarising the uppermost part of the stemma of a textual tradition.[44]

The phenomenon of recensions gets rid of the myth of the "scribe" as the sole source of textual innovations.[45] This phenomenon also exposes the main problem underlying the application of the stemmatic method to technical texts.[46] The point is that philologists are interested in reconstructing "the original", and use the stemmatic method to do that. This is something the stemmatic method is not devised to do, for it is designed to organise the archetype, not to reconstruct the original.[47] Philologists pretend to evaluate innovations, but in fact they look for the "best reading", which is presumed to be close to the original reading. Moreover, modern philologists working with Greek texts are educated with a curriculum that privileges the same kind of texts as were privileged by the Byzantine scholars, who strived to conform all and any received prose text to this model. No surprise that such philologists, prone as they are to get trapped by the myth of the "best text",[48] may end in editing a recension.[49] As for the "original", there is plenty of evidence that the authors of technical texts constantly rewrote their works, contributing to the phenomenon of recensions.[50]

So much for abstract nonsense. It is time to see how actual textual traditions of Greek and Byzantine technical texts substantiate some of my statements.

2. *Lessons from textual traditions of Greek and Byzantine technical texts*

THE ARCHETYPE

A striking fact surfaces in comparing textual traditions of technical texts that admit an archetype:[51] the number of innovations shared by all witnesses after sifting out minority readings is frequently very low,

---

[44] A very good example are the cascade hyparchetypes in the tradition of Aristotle's *Poetics* as reconstructed in Tarán & Gutas 2012. The indirect tradition has a more limited impact on the stemma organised in Rashed 2004 (*De generatione et corruptione*) and on the prospective stemma of the *Metaphysics*, see for instance Rashed 2019 (the author's main argument in this paper shows that an ancestor of the Greek model of the translation into Arabic—and not the model itself, as Rashed has it—was damaged and had such-and-such codicological features).

[45] We have also seen above that the textual innovations are not the only relevant innovations.

[46] As the tradition of mathematical and astronomical texts can almost always be amended by using semantic criteria (either the mathematics works or it does not, and the rest is negligible), the interest of applying the stemmatic method to these traditions lies in the reconstruction of the tradition itself, which tells us a lot about the diffusion and the appropriation of the intended text.

[47] We often have information about textual layers that precede the archetype. Examples are the text of the first four Books of Apollonius' *Conics* stabilised by Eutocius at the beginning of the 6th century; Pappus' descriptions of the contents of Euclid's *Data* (Heiberg & Menge 1883–1916, vol. 6, L–LII); Pappus' commentary on Book X of the *Elements*; some data in Proclus' commentary on Book I of the *Elements*; the *reclamantes* at the end of some books of Aristotle's *Metaphysics* witnessed by one of the two branches of the tradition (Primavesi 2012, 390–391). Papyri of Greek technical texts are unfortunately so scanty as to convey no useful information.

[48] A remarkable exception is the "decalogue" of the perfect Aristotelian editor set out in Rashed 2004, CCXXIV–CCXXV.

[49] Examples can be found in Acerbi 2016, 137–138.

[50] Apollonius' rewriting his *Conics* is the best-known example from antiquity (see Acerbi 2012, 158–159). For Byzantine authors, see Acerbi & Bianconi 2022 and Acerbi 2023b, and Section 2 below.

[51] Admitting an archetype is by no means the rule. As we have seen, the traditions of Apollonius' *Conics* and Pappus' *Collection* are rooted in a prototype. The same holds for Diophantus' *Arithmetics* and *De polygonis numeris* (Acerbi 2011, 133 option *a*, which I now endorse on the basis of further evidence; Allard 1982–83 is unreliable, for the author used Mogenet's fallacious method, and his way of presenting the textual data is opaque), Serenus' treatises (Heiberg 1896), Theon of Alexandria's "great commentary" on Ptolemy's *Handy Tables* (Mogenet & Tihon 1985–99). The tradition of Archimedes' works as a whole does

in fact implausibly low. As the editor of almost all Greek mathematical and astronomical texts, the supreme J. L. Heiberg, puts it when it comes to the archetype of the tradition of Ptolemy's *Almagest*, these innovations are *paucae et leves*. It is hard to believe that the archetype of a technical monster like the *Almagest*—if this archetype was a manuscript—carried only the trivial innovations listed by Heiberg. As most of the treatises mentioned in the next paragraph admit an archetype that must precede the recensions carried out in late antiquity, the only possible explanation is that prospective archetype innovations are corrected in recensions, which, as we have seen, predominate in the traditions of technical treatises. Accordingly, such corrections are not sifted out as minority readings in the uppermost part of the stemma. This not only confirms that the archetype cannot in general be identified with a manuscript, but shows that doing that is a mistake.

My contention is easy to check. In Heiberg's edition of the *Almagest*, one page is enough to list the (mainly trifling, that is, hardly *indicative* innovations) archetype innovations; half of this page is occupied by innovations in numerals.[52] In Heiberg's edition of the *Elements*,[53] the list of *interpolationes erroresque ante Theonem orti* features: eleven lines of page LXXVI about copying errors; most of page LXXVII about likely mathematical mistakes, almost entirely occupied by whipping previous editors (see below under MATHEMATICAL MISTAKES AS INNOVATIONS); three-quarters of a page, distributed between page LXXVII and the subsequent one, about general conclusions that are not identical to the enunciation, a feature that may well be original (see below, under PARTS OF A TEXT WITHOUT CRITICAL SIGNIFICANCE); a good half of page LXXVIII about the phenomenon of "partial dimming of the archetype"; finally, pages LXXIX–XC about interpolations, which raise thorny problems (see below under INTERPOLATIONS AS INNOVATIONS). If we exclude general conclusions and interpolations, the archetype innovations are few and trifling. Again excluding long interpolations, in his editions of Euclid's *Data* and *Phaenomena*, H. Menge lists one mathematical plus four copying errors and six copying errors plus one short interpolation, respectively, as archetype innovations; in his edition of Euclid's *Optica*, J. L. Heiberg lists three copying errors as archetype innovations. The few and trifling archetype innovations of Aristarchus' treatise are listed in B. Noack's comprehensive study. A. Tihon has shown that the archetype of the tradition of Theon of Alexandria's "little commentary" on Ptolemy's *Handy Tables* is identified by two innovations: a gloss that has found its way into the text and (possibly) the addition of a τουτέστι ("that is"). A partial exception are Theodosius' *Sphaerica*, whose set of archetype innovations is richer even excluding long interpolations.[54]

---

not admit an archetype. Euclid's *Optics* and *Phaenomena* (Heiberg & Menge 1883–1916, vol. 7, XXIX, and vol. 8, XIX, respectively), Aristarchus' treatise (Noack 1992), Theodosius' *Sphaerica* (Czinczenheim 2000), and Theon of Alexandria's "little commentary" on Ptolemy's *Handy Tables* (Tihon 1978) do admit an archetype. The remaining Greek treatises are either too short, or not edited in a satisfactory way, or the edition is unfinished (for instance, Theon of Alexandria's commentary on Ptolemy's *Almagest*).

[52] Heiberg 1898–1907, CXXXVII–CXXXVIII (quotation from the beginning of the paragraph).

[53] The pages are cited from Heiberg & Menge 1883–1916, vol. 5.

[54] See Heiberg & Menge 1883–1916, vol. 6, XVI (but Menge is wrong in including the mathematical mistake); See Heiberg & Menge 1883–1916, vol. 8, XIX; Heiberg & Menge 1883–1916, vol. 7, XXIX; Noack 1992, 88; Tihon 1978, 181–183; Czinczenheim 2000, 183–192, respectively.

As a countercheck, let us see what happens when the tradition admits a prototype. The prototype of Hero's *Metrica*, namely, the manuscript İstanbul, Topkapı Sarayı Müzesi Kütüphanesi G.İ.1 (*ca*. 960; *Diktyon* 33946), penned by such an excellent copyist as Ephrem, contains 391 innovations. Diophantus' *Arithmetica* has been transmitted with about one hundred innovations. The short text of Diophantus' *De polygonis numeris* is affected by 192 innovations. The text of Theon of Alexandria's "great commentary" on Ptolemy's *Handy Tables* witnessed by the prototype "est dans un état désastreux". Heiberg corrects the prototype of Books I–IV of Apollonius' *Conics* and of Serenus' treatises at least three times per page. More corrections are needed for getting the text of the prototype of Pappus' *Collection* right. Finally, to give a measure of the skills of late-antique copyists, the papyrus of Ptolemy's *Psephophoria* (*PL* II/33, late 2nd century), contains three mistakes in 76 characters.[55]

MATHEMATICAL MISTAKES AS INNOVATIONS

It is very difficult to establish whether a mathematical mistake shared by all witnesses of a Greek mathematical or astronomical text is original or traditional.[56] Heiberg warns us about ascribing with certainty mathematical mistakes to the tradition and not to Euclid, and vice versa: *difficillimum est diiudicatu, quid Euclides hoc in genere committere potuerit, quid non potuerit*.[57] As Heiberg's list of the *errores ante Theonem orti* shows, innovations pertaining to the stylistic codes weigh more than any mathematical mistake.[58]

A beautiful example is provided by the first word of *Elem*. I.13.[59] The general enunciation of any Greek theorem enunciated in conditional form begins with the conjunction ἐάν ("if"). The only exception is *Elem*. I.13, whose first word is ὅταν ("whenever") in all witnesses of the recension authored by the middle 4th-century scholar Theon of Alexandria, whereas the earliest (and complete) witness of the non-Theonine family, the manuscript BAV, *Vat*. *gr*. 190 (early 9th century, *Diktyon* 66821), f. 23r, exhibits the reading one sees in Plate 3: ὡς ἂν ("as if", quite absurdly),[60] corrected to ἐάν by a 15th-century hand. Likewise, a later hand corrects ὅταν to ἐάν in the Theonine manuscript Wien, Österreichischen Nationalbibliothek, *phil*. *gr*. 31 (*ca*. 1100; *Diktyon* 71145). The reading of *Vat*. *gr*. 190 is confirmed by the general conclusion of *Elem*. I.13, where ὡς ἂν is unanimously attested to (see below, under PARTS

[55] See Acerbi & Vitrac 2014, 137–138; Allard 1982–83, but my own evaluation is that this tradition admits a prototype, namely, the manuscript Madrid, Biblioteca Nacional de España 4678 (1060–80; *Diktyon* 40155), not an archetype, as Allard has it; Acerbi 2011, 126; Mogenet & Tihon 1985–99, vol. 1, quote from 89; Heiberg 1891–93 and Heiberg 1896; edition of Book VII in Jones 1986, and see also the discussion at 26–30; Acerbi & Del Corso 2014, respectively.

[56] Byzantine mathematicians and astronomers are so prone to mistakes of any kind as to make the supposition of originality more likely *a priori* than the one of innovation. Some examples are gathered in Acerbi 2023b, sect. 5.1.

[57] Heiberg & Menge 1883–1916, vol. 5, LXXVII. The tangled transmission of *Elem*. IX.19, whose proof is flawed even in Heiberg's edition, is reconstructed in Vitrac 2022, sects. 3 and 4.

[58] See Acerbi 2021, sect. 1, on the stylistic codes of Greek mathematics.

[59] See Heiberg & Menge 1883–1916, vol. 1, 36.2 and 36.24 *app*. I thank B. Vitrac for an enlightening discussion on this *locus criticus*.

[60] This innovation can be explained as follows. If the clause ὅπερ ἔδει ποιῆσαι which ends many mathematical problems in the *Elements* is absent, and taking into account the very end of problem *Elem*. I.12 (the denotative letters ΗΓΘ), one gets ΗΓΘΕΑΝ → ΗΓΘΘΕΑΝ → ΕΓΘϢΣΑΝ, by dittography of Θ plus two misreadings of majuscule letters, or one single misreading plus a wrong restoration. If ὅπερ ἔδει ποιῆσαι is present but it is abridged Ο) as sometimes happens in *Vat*. *gr*. 190 and in other early manuscripts, ΕΓΘΟ)ΕΑΝ → ΕΓΘϢΣΑΝ by two misreadings of majuscule letters.

OF A TEXT WITHOUT CRITICAL SIGNIFICANCE).[61] We may safely assume that the reading ὡς ἂν in the enunciation is an archetype innovation,[62] wrongly corrected by Theon, and restored again to the standard reading in *Vat*. *gr*. 190 and in *Vindob*. *phil*. *gr*. 31. Had we a corrected copy of *Vat*. *gr*. 190 as our sole witness of the non-Theonine family, we would downgrade the innovation to the hyparchetype of the Theonine family. In all cases, corrected copies of *Vindob*. *phil*. *gr*. 31 exemplify the phenomenon of "partial dimming of the (hyp)archetype".

INTERPOLATIONS AS INNOVATIONS

Interpolations characterise technical texts. Can interpolations be made to count as archetype innovations? There is very much at stake: 12% of the text of Euclid's *Elements* transmitted by the entire tradition is certainly spurious; 20% of the text of Euclid's *Data* transmitted by the entire tradition is certainly spurious; the lists of the chapter headings that precede all Books of the *Almagest* are certainly spurious.[63] And so on.

As the following example shows,[64] only the sheer bulk of interpolations makes it certain that they—that is, most or some of them, but we are unable to tell which—must be taken as archetype innovations. In the tradition of Nichomachus' *Introduction to arithmetics*, the very short section I.23.15 is an interpolation inserted after Iamblichus' (b. *ca*. 250) rewriting but before Ammonius' lecture notes that gave rise to Philoponus and Asclepius' commentaries.[65] In the same tradition, a sentence (the "Adjunct" henceforth) with the same contents as section I.23.15 was added at the end of Book I at a pre-traditional stage and in a large family of the tradition. Well, the Adjunct shows what "contamination" might have meant in the case of interpolations. For in the manuscript BAV, *Vat*. *gr*. 2297 + Roma, Archivio Storico dell'Abbazia di S. Paolo fuori le mura, 24C (*Diktyon* 68928 + 55907), an important witness of the late 13th century, the Adjunct lies in the margin of Philoponus' commentary, which in its turn lies in the margins of the *Introduction to arithmetics*. In the manuscript Göttingen, Niedersächsische Staats- und Universitätsbibliothek, *philol*. 66 (end 13th century; *Diktyon* 17413), f. 141r, an apograph of the previously-mentioned witness, the Adjunct is relocated at the end of Book I of Philoponus' commentary, but a later hand copies it again, preceded by κείμενον, in a blank space in the same page and in the subsequent, blank, page (Plate 4). In the manuscript Paris, Bibliothèque nationale de France, *gr*. 2480 (*ca*. 1733; *Diktyon* 52112), a slavish copy of the *Gottingensis*, we read the Adjunct both at the end of Philoponus' commentary and at the end of the *Introduction to arithmetics*, whereas in another copy of it, namely, the manuscript Bucuresti, Biblioteca Academiei Române, *gr*. 620 (Litzica 183; 18th century;

[61] This further confirms that the general conclusions are later additions.
[62] The alternative is that some reviser changed *all* liminal ὡς ἂν of the theorems in the *Elements* to ἐάν, with the sole exception of prop. I.13.
[63] See Heiberg & Menge 1883–1916, vol. 5, LXXIX–XC, and Vitrac 2022, sect. 2.II.a; Heiberg & Menge 1883–1916, vol. 6, XLIX–LII; Heiberg 1898–1907, CXLI, respectively.
[64] See Acerbi 2020a, 122 and 132–133. Compare also the case of Theon's addition to *Elem*. VI.33 and of the contamination occurring in *Elem*. IX.19, see Vitrac 2022, sects. 3.II and 3.III–X.
[65] On these commentaries see Tarán 1969; Acerbi 2023a.

Diktyon 10693), the Adjunct can be read only as a last sentence of Nicomachus' treatise. On the other hand, in manuscripts such as Paris, Bibliothèque nationale de France, *gr*. 2107 (14th century; *Diktyon* 51736), the Adjunct is marked for deletion by a later hand, and might well have been deleted in later copies. Therefore, the Adjunct may have (or actually has) entered or left the text of the *Introduction to arithmetics* by contamination with the exegetical apparatus and by collation initiatives of copyists or scholars. Of course, the same might well have happened in the case of *Ar*. I.23.15: we can imagine two, or even more, "real" but lost witnesses that served as roots of the tradition, and such that only some of them have section I.23.15 in the text, whereas the others either have it in the margin or do not have it at all, but in all of their copies section I.23.15 has been included in the *Introduction to arithmetics*, possibly by contamination with the exegetic apparatus or with the witnesses that do have section I.23.15.

On these grounds, shall we deem interpolations unfitting to count as archetype innovations? We shall not. The reason is that *any* kind of innovation can be supposed to be transmitted by contamination in a suitably wild scenario. Yet, that *some* wild scenarios actually occurred does not mean that *any* wild scenario has. This entails that, if 12% of the text of Euclid's *Elements* transmitted by the entire tradition is certainly spurious, most of this material—even if, let me repeat, we are unable to tell how much—must count as archetype innovations.

Parts of a text without critical significance

A part of the text of any mathematical treatise has no critical significance. This is the general conclusion of every theorem, for it is identical to the enunciation of the same theorem.[66] No copyist can be assumed to be unaware of this general feature of Greek mathematical texts, or, more simply, no copyist can be assumed to have overlooked this specific feature of the text he is copying. Some general conclusions are found abridged in the manuscripts,[67] but any portion of any of them can be immediately restored by looking at the corresponding enunciation.

Sectional texts

Byzantine mathematics mainly comprises "sectional" texts, that is, writings that do not display a tight deductive structure: these texts can easily be, or actually are, partitioned into independent sections, or can easily be assembled to generate sectional texts. Take the example of Easter Computi. Such collections comprise algorithms, usually illustrated by examples, devised to calculate specific chronological items; moreover, any computistical algorithm or worked-out example is likely to undergo (major) modifications in the process of transmission. For this reason, Computi elude standard philological methods for establishing filiations among witnesses. Accordingly, hypotheses of filiation between versions of specific algorithms in different manuscripts can seldom be corroborated by uncontroversial textual evidence. The only sensible attitude is to edit every Computus separately, even when there are—as there

[66] See Acerbi 2021, sect. 1.1.
[67] For the *Elements*, see the discussion at Heiberg & Menge 1883–1916, vol. 5, LXXVII–LXXVIII.

frequently are—overlaps with other Computi. These observations apply to most sectional writings, such as geometric metrological collections, *Rechenbücher*, and grammatical compendia.[68]

Sauts du même au même

It is a commonplace of textual criticism that the *sauts du même au même* have a partial critical significance: insofar as they are (possibly long) omissions, they count as separative innovations;[69] insofar as they are potentially polygenetic, they cannot count as conjunctive innovations.[70] This argument does not apply to Greek mathematical texts. For the determiner "polygenetic" formulates an evaluation of the likelihood of an innovation. The reader will immediately realise that, in a highly formulaic text as exhibited by any Greek mathematical proposition, it is *very unlikely* that no copyist commits an omission by *homoioteleuton* within an assigned, even reasonably short, stretch of text, but it is also *very unlikely* that two or more copyists omit *the same* textual sequence by *homoioteleuton*, as there are many sequences conducive to such an omission in any assigned stretch of text, and all of them are equiprobable.

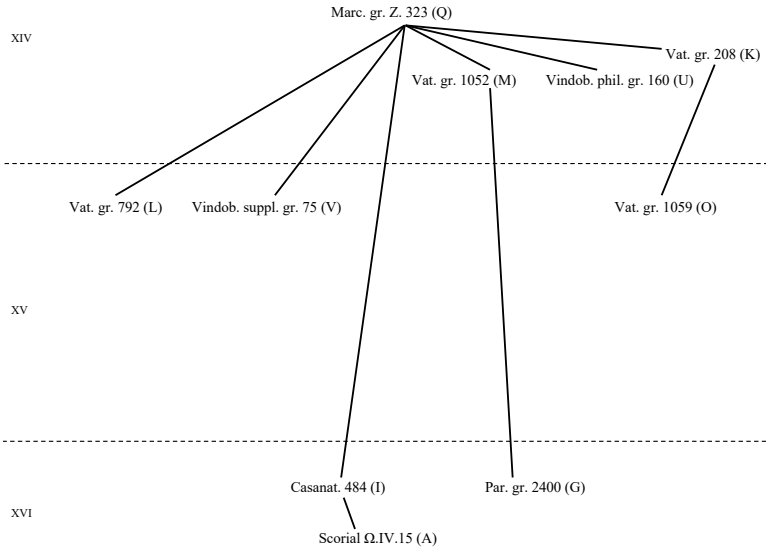
Authorial rewritings (the myth of the autograph)

Byzantine authors were fond of rewriting their own works. Cases in point are the two versions of Nicephoros Gregoras' (d. *ca*. 1358–61; *PLP* 4443) astrolabe, Barlaam's (d. 1348; *PLP* 2284) tract on computing the circumstances of a solar eclipse in 1333, reiterated in 1337, Isaak Argyros' (d. *ca*. 1380; *PLP* 1285) short texts in which he explains how he adapted some of Ptolemy's tables to Julian years and to the longitude of Constantinople, Michael Chrysokokkes' (d. shortly after 1439; *PLP* 31144–5) *Hexapterygon*, of which we read at least two authorial versions, and the same for Marcus Eugenicus' (d. 23/6/1445; *PLP* 6193) *On the Cycles of Bonjorn*.[71] I shall outline the tradition of Argyros' texts, whose most interesting feature in our present perspective lies in the fact that they are partly autograph, parly penned by a collaborator, partly in a later hand, whose copy was obviously used to replace the autograph.

Isaak Argyros adapted two sets of tables, contained in Ptolemy's *Handy Tables* and in the *Almagest*, respectively, to the longitude of Constantinople and to Julian years. The first set are the tables of the mean motions of the Sun and the Moon. Argyros added to these new tables a text (denoted *CAN*) that explains how he carried out the adaptation. Argyros' autograph of *CAN* is in the manuscript Venezia,

[68] See, in the same order, Acerbi & Vitrac 2014; Acerbi 2019; the categorisation and the examples in Ucciardello 2019. In Acerbi 2019 and Acerbi 2022b I disproved the hypothesis that the Greek and Byzantine *Rechenbücher* are simply the repository of an earlier and worldwide network of "recreational mathematics". That lucubrations of this kind are generally unfounded was masterly shown in Bédier 1895 for the case of the *fabliaux*, a likewise highly sectional collection of texts.
[69] Only competent revisers are able to detect and to fill a gap of this kind, but normally they are unable to restore the original text exactly, for Greek mathematical style is formulaic but not formalised.
[70] See first Maas 1937, 292 n. 1, thereafter in Maas 1960, 28 (but note the qualification "Trennfehler ohne bindende Kraft sind viele der sog. Homoioteleuta").
[71] See Jarry 2021; Mogenet & Tihon & Donnet 1977; Acerbi 2023b; and Acerbi & Bianconi 2022, respectively.

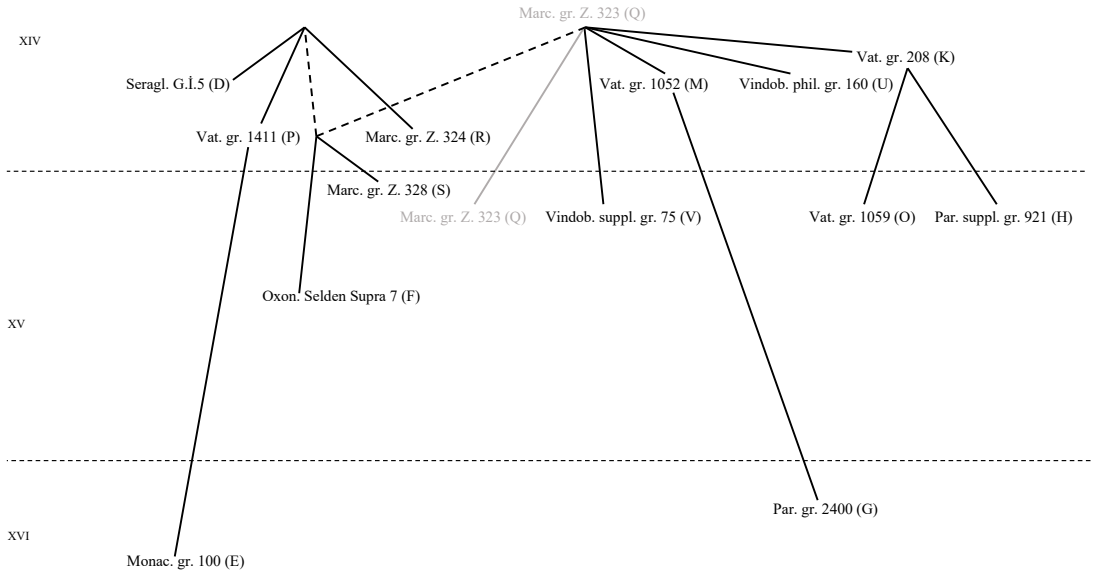
Biblioteca Nazionale Marciana, *gr*. *Z*. 323 (coll. 639; *ca*. 1375 and *ca*. 1428; *Diktyon* 69794), whereas the associated tables are in the hand of one of his collaborators. The stemma of *CAN* is as follows.



The root of the stemma is the prototype. The tables abound with computation mistakes, which must be ascribed to Argyros. These tables are crucial in establishing the stemma, for the manuscripts BAV, *Vat*. *gr*. 792 (here *ca*. 1420; *Diktyon* 67423) and Wien, Österreichischen Nationalbibliothek, *suppl*. *gr*. 75 (1410–30; *Diktyon* 71538) are perfect copies of the text of *CAN*, but not of its tables. Likewise, the manuscript BAV, *Vat*. *gr*. 1059 (1409–15; copyist John Chortasmenos;[72] *Diktyon* 67690) is a copy of BAV, *Vat*. *gr*. 208 (1375–77; copyist Malachias;[73] *Diktyon* 66839) because it reproduces the tables corrected by Malachias (Plates 5 and 6), whereas the variant readings exhibited by the text would not secure the filiation.

The second set of tables adapted by Argyros are the tables of the syzygies in *Alm*. VI.3. Argyros added two texts to these new tables: the first text explains how he carried out the adaptation (denoted *ALM*), the second text (denoted *PROC*) explains how to use the tables. The first text is a rewriting of *Alm*. VI.2, the second is a rewriting of *Alm*. VI.4. In *Marc*. *gr*. *Z*. 323, we read *ALM* and its tables in the hand of the same copyist that penned *Vat*. *gr*. 792 and *Vindob. suppl*. *gr*. 75 (a replacement almost certainly carried out by Bessarion [d. 18/11/1472; *PLP* 2707]), whereas *PROC* is Argyros' autograph. The variable-swing stemma of Argyros' *ALM* + *PROC* (which form a single text) is as follows.

[72] On Chortasmenos (d. 1431; *PLP* 30897), see Hunger 1959; Canart & Prato 1981; Acerbi & Bianconi 2020 for the technical output and a complete bibliography (in particular, see the contributions by M. Cacouros); Acerbi & Bianconi 2022, sect. I.2.2.
[73] On Malachias see most recently Martínez Manzano 2019; Acerbi & Bianconi 2022, sect. I.2.1, both with a bibliography.

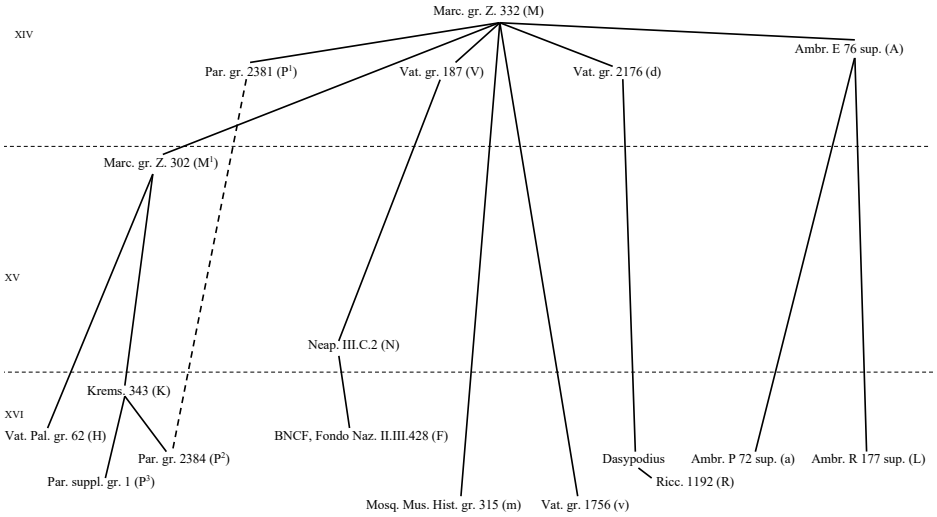


The stemma of *ALM* has *Marc. gr. Z.* 323 as one of the leaves, the stemma of *PROC* has *Marc. gr. Z.* 323 as its root. The substemma on the left side is associated with a version of the text which I assume to be an authorial rewriting. The branching towards which the broken segments converge formalises a further version, which contaminates between the two main versions. It is to be noted that the genealogical reconstruction of the tradition of *ALM* requires hyparchetypes only where the three versions originate, and that the tradition of *PROC* requires that the hyparchetype is replaced by a prototype. There is a hyparchetype in this position for *ALM* because the set of innovations shared by all witnesses after sifting out minority readings is non empty, not because we know with absolute certainty that, before Bessarion's replacement, Argyros' autograph of *ALM* was exactly where we now read the text that replaces it. Note that decimation has not simplified the part of the stemma nearest to the prototype. Finally, the manuscripts İstanbul, Topkapı Sarayı Müzesi Kütüphanesi, G.İ.5 (second half of 14th century; *Diktyon* 33950), BAV, *Vat. gr.* 1411 (last quarter of 14th century; *Diktyon* 68042), and Venezia, Biblioteca Nazionale Marciana, *gr. Z.* 324 (coll. 640; 1365–95; *Diktyon* 69795) are independent copies of an archetype because they do not exhibit *any* variant reading with respect to each other; the associated archetype is identified by the innovations with respect to the text of the other version (and vice versa), otherwise the stemma would remain open. Thus, tripartite is indeed indemonstrable, as everything is in stemmatic theory—it just results from applying its rules.

MINIMA ECDOTICA

Further interesting phenomena are highlighted by Barlaam's rewriting of Euclid, *Elem.* II.1–10.[74] Here is the stemma, whose prototype is the manuscript Venezia, Biblioteca Nazionale Marciana, *gr. Z.* 332 (coll. 643; *ca.* 1340; *Diktyon* 69803), corrected by Barlaam himself.

[74] See Acerbi 2022a.



Some *minima ecdotica* can be deduced from this stemma and from the associated discussion.

(a) As Barlaam's text is short, the independent copies of *Marc. gr. Z.* 332 are identified as such by a handful of indicative innovations each, possibly by just one. But even one indicative innovation is enough.[75]

(b) As in the case of Argyros' treatise seen in the previous subsection, decimation has not simplified the part of the stemma nearest to the prototype.

(c) The genealogical reconstruction of the tradition does not require any hyparchetype.

(d) As far as the "real tree" is concerned, the seven independent copies of *Marc. gr. Z.* 332 must have been apographs of it. This statement is meaningless if applied to the stemma.

(e) Were *Marc. gr. Z.* 332 be lost, there would be no archetype because the seven independent copies of the Venice manuscript do not share innovations.

(f) Were *Marc. gr. Z.* 332 be lost, and as there is no archetype, the seven independent copies of the Venice manuscript could only be traced to an innovation-free witness, which, by definition, is the original. Yet, this original cannot figure in the stemma, for it cannot be reconstructed by means of genealogical methods, which are grounded on innovations.

(g) The tradition of Barlaam's rewriting shows that Paul Maas' rule "[…] ein Zeuge wertlos ist (d.h. als Zeuge wertlos), wenn er ausschließlich von einer erhaltenen oder einer ohne seine Hilfe rekonstruierbaren Vorlage abhängt" contains a methodological mistake (namely, the underlined clause)[76], for according to the rule and to the nature of the variant readings *any* of the seven independent copies of *Marc. gr. Z.* 332 should be eliminated as "wertlos". But if *any* should, nevertheless *all* could not—and this is paradoxical if Maas' rules are to be regarded as a *method*.

[75] A single indicative innovation can be sufficient to warrant an elimination, but it is not necessary that there is at least one: about the fact that indifferent variant readings may also acquire a critical significance see Primavesi 2012, 395–396, and most recently Acerbi 2023a, Annexe 1.

[76] See Maas 1960, § 4. This lapse was first exposed as such in Reeve 1989, 148–149 of the reprint.

3. *Conclusion*

I have tried to show that the stemmatic method is both perfectly sound and elastic enough to be able to cope with most textual traditions of technical texts. The method is sound once a few assumptions that underlie it are made explicit and thereby consistently operative: these are the principle of parsimony applied to the number of nodes, realising that the rules of stemmatics are definitions and hence if-and-only-if clauses, the distinction between an (hyp)archetype and a lost manuscript and, accordingly, between the stemma and the real tree. The assumptions also delimit the range within which the method can be applied. The stemmatic method is elastic if it is used with application of thought and with sensibility to the history of the text under examination and to the material features of the extant witnesses. Combining reality and formalism while keeping them separated is the real force of the stemmatic method. My examples are not a Pasqualian list of *de facto* counterexamples; they aim at elucidating specific phenomena that arise in applying the stemmatic method to particular textual traditions. Some examples also appear to corroborate in a decisive way the key points of my view of the method.

Bibliography

Acerbi, Fabio (ed.) (2011): *Diofanto*, *De polygonis numeris*. Pisa – Roma: Fabrizio Serra Editore (Mathematica Graeca Antiqua 1).

Acerbi, Fabio (2012): Commentari, scolii e annotazioni marginali ai trattati matematici greci, in *Segno e Testo* 10, 135–216.

Acerbi, Fabio (2016): Byzantine Recensions of Greek Mathematical and Astronomical Texts: A Survey, in *Estudios bizantinos* 4, 133–213.

Acerbi, Fabio (2019): Byzantine *Rechenbücher*: An Overview with an Edition of *Anonymi* L and J, in *Jahrbuch der Österreichischen Byzantinistik* 69, 1–57.

Acerbi, Fabio (2020a): The Textual Tradition of Nicomachus' *Introductio Arithmetica* and of the Commentaries Thereon: A Thematic Cross-Section, in *Estudios Bizantinos* 8, 83–148.

Acerbi, Fabio (2020b): Eliminazioni diagrammatiche, in *Scripta* 13, 9–37.

Acerbi, Fabio (2021): *The Logical Syntax of Greek Mathematics*. Heidelberg – New York: Springer.

Acerbi, Fabio (2022a): Barlaam's Paraphrase of Euclid, *Elements* II.1–10. A Critical Edition, in *Jahrbuch der Österreichischen Byzantinistik* 72.

Acerbi, Fabio (2022b): A New Logistic Text of Nicholas Rhabdas, in *Byzantion* 92, 17–45.

Acerbi, Fabio (2022c): Topographie du Vat. gr. 1594, in Bianconi, Daniele & Ronconi, Filippo (eds.), *La «collection philosophique» face à l'histoire. Péripéties et tradition*. Spoleto: Centro Italiano di Studi sull'Alto Medioevo, 239–321.

Acerbi, Fabio (2023a): La tradition manuscrite de la « Recension IV » du commentaire à l'*Introductio Arithmetica* de Nicomaque, in *Revue d'Histoire des Textes* 18.

Acerbi, Fabio (2023b): Riscrivere Tolomeo a Bisanzio, in *Bollettino dei Classici* 44.

Acerbi, Fabio & Bianconi, Daniele (2020): L'*Organon* a fisarmonica di Giovanni Cortasmeno, in *Segno e Testo* 18, 223–281.

Acerbi, Fabio & Bianconi, Daniele (2022): *Il* Codex Vaticanus *a Bisanzio. Vicende e Figure di una storia millenaria*. Città del Vaticano: Biblioteca Apostolica Vaticana (Studi e testi 556).

Acerbi, Fabio & Del Corso, Lucio (2014): Tolomeo in Laurenziana: il primo papiro della *Psephophoria* (*PL* II/33), in *Analecta Papyrologica* 26, 37–73.

Acerbi, Fabio & Vitrac, Bernard (2014): *Héron d'Alexandrie*, *Metrica*. Pisa – Roma: Fabrizio Serra Editore (Mathematica Graeca Antiqua 4).

Alberti, Giovan Battista (1979), *Problemi di critica testuale*. Firenze, La Nuova Italia (Paideia 23).

Allard, André (1982–83): La tradition du texte grec des *Arithmétiques* de Diophante d'Alexandrie, in *Revue d'Histoire des Textes* 12–13, 57–138.

Barbieri Luca (2001): *Le liriche di Hugues de Berzé*. Milano: Edizioni C.U.S.L.

Bédier, Joseph (1895): *Les fabliaux. Études de littérature populaire et d'histoire littéraire du Moyen Âge*. Paris: Librairie Émile Bouillon (Bibliothèque de l'École des Hautes Études. Sciences Philologiques et Historiques 98).

Bédier, Joseph (1928): La tradition manuscrite du *Lai de l'Ombre*. Réflexions sur l'art d'éditer les anciens textes, in *Romania* 54, 161–196, 321–356.

Berger, Friederike (2005): *Die Textgeschichte der* Historia Animalium *des Aristoteles*. Wiesbaden: Ludwig Reichert (Serta Graeca 21).

Bernardinello, Silvio (1970): *Eliminatio codicum della Metafisica di Aristotele*. Padova: Antenore.

Canart, Paul & Prato, Giancarlo (1981): Les recueils organisés par Jean Chortasménos et le problème de ses autographes, in Hunger, Herbert (ed.): *Studien zum Patriarchatsregister von Konstantinopel I*. Wien (Österreichische Akademie der Wissenschaften. Philosophisch-historische Klasse. Sitzungsberichte 383), 115–178, repr. P. Canart, *Études de paléographie et de codicologie*, 2 vols. Città del Vaticano: Biblioteca Apostolica Vaticana 2008 (Studi e testi 450–451), 577–675.

Castellani, Arrigo (1954): Bédier avait-il raison? La méthode de Lachmann dans les éditions de textes du Moyen Âge, *Discours Universitaires* 20. Fribourg: Éditions Universitaires 1957, repr. Id., *Saggi di linguistica e filologia italiana e romanza (1946 – 1976)*. Roma: Salerno editrice 1980, vol. 3, 161–200.

Chiesa, Paolo (2012): *Elementi di critica testuale*. Bologna: Pàtron.

Chiesa, Paolo (2020): Tripartito = indimostrabile?, in *Filologia Mediolatina*, 27, 1–42.

Clark, Albert Curtis (1918): *The Descent of Manuscripts*. Oxford: Clarendon Press.

Contini Gianfranco (1992): *Breviario di ecdotica*. Torino: Einaudi.

Czinczenheim, Claire (2000): *Édition, traduction et commentaire des* Sphériques *de Théodose*. PhD Thesis, Université de Paris IV – Sorbonne.

Dain, Alphonse (1949): *Les manuscrits*. Paris: Les Belles Lettres.

De Stefani, Eduardo Luigi (1902): I manoscritti della 'Historia Animalium' di Eliano, in *Studi Italiani di Filologia Classica* 10, 175–222.

Flight, Colin (1990): How many stemmata?, in *Manuscripta* 34, 122–128.

Fourquet, Jean (1948): Fautes communes ou innovations communes?, in *Romania* 70, 85–95.

Froger, Jacques (1968): *La critique des textes et son automatisation.* Paris: Dunod.

Greg, Walter Wilson (1931): *The Calculus of Variants. An Essay on Textual Criticism*. Oxford: Clarendon Press.

Grier, James (1988): Lachmann*,* Bédier and the Bipartite Stemma: Toward a Responsible Application of the Common-Error Method, in *Revue d'Histoire des Textes* 18, 263–277.

Guidi, Vincenzo & Trovato, Paolo (2004): Sugli stemmi bipartiti. Decimazione, asimmetria e calcolo delle probabilità, in *Filologia Italiana* 1, 9–48.

Harlfinger, Dieter (1979): Zur Überlieferungsgeschichte der *Metaphysik*, in Aubenque, Pierre (ed.), *Études sur la Métaphysique d'Aristote. Actes du VI^e^ Symposium Aristotelicum*. Paris: Vrin.

Heiberg, Johann Ludwig (ed.) (1891–93): *Apollonii Pergaei quae Graece exstant cum commentariis antiquis*, 2 vols. Leipzig: B. G. Teubner.

Heiberg, Johann Ludwig (ed.) (1896): *Sereni Antinoensis opuscula*. Leipzig: B. G. Teubner.

Heiberg, Johann Ludwig (ed.) (1898–1907): *Claudii Ptolemaei opera quae exstant omnia*, 2 vols. Leipzig: B. G. Teubner.

Heiberg, Johann Ludwig & Menge, Heinrich (eds.) (1883–1916): *Euclidis Opera Omnia*, 8 vols. Leipzig: B. G. Teubner.

Hoenen, Armin & Eger, Steffen (2017): How Many Stemmata with Root Degree *k*?, in Kanazawa, Makoto & de Groote, Philippe & Sadrzadeh, Mehrnoosh (eds.): *Proceedings of the 15th Meeting on the Mathematics of Language. London, UK, July 13–14 2017*. Association for Computational Linguistics, 11–21. Online: https://aclanthology.org/volumes/W17-34/.

Hunger, Herbert (1959): *Johannes Chortasmenos (ca. 1370 – ca. 1436/37). Briefe, Gedichte und kleine Schriften. Einleitung, Regesten, Prosopographie, Text*. Wien: Hermann Böhlaus (Wiener byzantinistische Studien VII).

Inglese, Giorgio (2007): Per lo 'stemma' della «Commedia» dantesca. Tentativo di statistica degli errori significativi, in *Filologia Italiana* 4, 51–72.

Irigoin, Jean (1986): Accidents matériels et critique des textes, in *Revue d'Histoire des Textes* 16, 1–36.

Isépy, Peter (2016): *Zur mittelalterlichen Überlieferung von Aristoteles'* De motu animalium. Wiesbaden: Ludwig Reichert (Serta Graeca 31).

Jarry, Claude (2021), *Nicéphore Grégoras*, *Isaac Argyros*, *Deux traités byzantins de construction de l'astrolabe*. Paris: Les Belles Lettres.

Jones, Alexander (ed.) (1986): *Pappus of Alexandria*, *Book VII of the* Collection. New York – Berlin – Heidelberg – Tokyo: Springer.

Kassel, Rudolf (1971): *Der Text der aristotelischen Rhetorik. Prolegomena zu einer kritischen Ausgabe*. Berlin – New York: W. De Gruyter.

Kotwick, Mirjam Engert (2016): *Alexander of Aphrodisias and the Text of Aristotle's* Metaphysics. Berkeley (California Classical Studies 4).

Maas, Paul (1937): Leitfehler und stemmatische Typen, in *Byzantinische Zeitschrift*, 37, 289–294.

Maas, Paul (1960): *Textkritik*, 4. Auflage. Leipzig: B. G. Teubner.

Maas, Paul (2020): *Les dessous de la littérature grecque. Paléographie, histoire et critique des textes*. Textes choisis, présentés et traduits par Laurent Calvié. Toulouse: Anacharsis.

Maas, Paul (2021): *La critica del testo*. Traduzione a cura di Giorgio Ziffer. 2nd ed. Roma: Edizioni di Storia a Letteratura.

Martinelli Tempesta, Stefano (1997): *La tradizione testuale del* Liside *di Platone*. Firenze: La Nuova Italia.

Martinelli Tempesta, Stefano (2014): Contaminazioni nella trasmissione dei testi greci antichi. Qualche riflessione, in *Critica del Testo* 18, 117–159.

Martinelli Tempesta, Stefano (2022): L'interazione fra *Textgeschichte* e *Textkritik* e le sue conseguenze per una buona prassi ecdotica, in Bini, Francesca & Molli, Linda & Poloni, Camilla (eds.): *Convergenze di filologia. Un confronto fra metodi di ricerca*. Pisa: Pisa University Press, 119–146.

Manzano, Teresa (2019), Malaquías mónaco, *alias Anonymus Aristotelicus*: filosofía, ciencias y exégesis bíblica en la Constantinopla de la controversia palamita, in *Aevum* 93, 495–558.

Mogenet, Joseph (ed.) (1950): *Autolycus de Pitane*. *Histoire du texte, suivie de l'édition critique des traités de la sphère en mouvement et des levers et couchers*. Louvain: Publications universitaires de Louvain 1950 (Université de Louvain. Recueil de travaux d'histoire et de philologie, 3e série, 37).

Mogenet, Jean & Tihon, Anne (1985–99), *Le «Grand Commentaire» de Théon d'Alexandrie aux Tables Faciles de Ptolémée*, 3 vols. Città del Vaticano: Biblioteca Apostolica Vaticana (Studi e testi 315, 340, 390).

Mogenet, Joseph & Tihon, Anne & Donnet, Daniel (eds.) (1977): *Barlaam de Seminara*, *Traités sur les éclipses de Soleil de 1333 et 1337*. Louvain: Peeters.

Montanari, Elio (2003): *La critica del testo secondo Paul Maas. Testo e commento*. Firenze: SISMEL – Edizioni del Galluzzo.

Moraux, Paul (1965): *Aristote*, *Du ciel*. Paris: Les Belles Lettres.

Noack, Beate (1992): *Aristarch von Samos. Untersuchungen zur Überlieferungsgeschichte der Schrift Περὶ μεγεθῶν καὶ ἀποστημάτων ἡλίου καὶ σελήνης*). Wiesbaden: Ludwig Reichert (Serta Graeca 1).

Nussbaum, Martha (1976): The Text of Aristotle's *De Motu Animalium*, in *Harvard Studies in Classical Philology* 80, 111–159.

Orlandi, Giovanni (2008): Apografi e pseudoapografi nella «Navigatio sancti Brendani» e altrove, in *Filologia Mediolatina* 1, 1–35, repr. Id., *Scritti di filologia mediolatina*. Firenze: SISMEL – Edizioni del Galluzzo, 63–94.

Paris, Gaston (ed.) (1887): *La vie de Saint Alexis*. Paris: Vieweg (Bibliothèque de l'École des Hautes Études. Sciences Philologiques et Historiques 7).

Pasquali, Giorgio (1952): *Storia della tradizione e critica del testo*. 2nd ed. Firenze: Le Monnier.

PLP = Trapp, Erich (ed.), *Prosopographisches Lexikon der Palaiologenzeit, CD ROM-Version*. Wien 2001. Online https://austriaca.at/plp.

Primavesi, Oliver (2012): Aristotle, *Metaphysics* A. A New Critical Edition with Introduction, in Steel, Carlos (ed.): *Aristotle's* Metaphysics *Alpha. Symposium Aristotelicum*. Oxford: Oxford University Press, 385–516.

Quentin, Henri (1926): *Essais de critique textuelle (Ecdotique)*. Paris: Picard.

Rashed, Marwan (2004): *Aristote*, *De la génération et la corruption*. Paris: Les Belles Lettres.

Rashed, Marwan (2019): Reconstitution d'un archétype grec de la traduction arabe d'Usṭāṯ (IXe s.) de la *Métaphysique* d'Aristote: un codex tardo-antique sur 3 colonnes à 42 lignes de 18 lettres, in *Comptes Rendus de l'Académie des Inscriptions* 4, 1293–1307.

Reeve, Michael David (1985): Archetypes, in *Sileno* 11, 193–201, repr. Reeve 2011, 107–117.

Reeve, Michael David (1986): Stemmatic Method: «qualcosa che non funziona»?, in Ganz, Peter (ed.) *The Role of the Book in Medieval Culture*. Turnhout: Brepols (Bibliologia 3–4), 57–69, repr. Reeve 2011, 27–44.

Reeve, Michael David (1989): *Eliminatio codicum descriptorum*: a Methodological Problem, in Grant, John Neilson (ed.): *Editing Greek and Latin Texts*. New York: AMS Press 1989, 1–35, repr. Reeve 2011, 145–174.

Reeve, Michael David (2011): *Manuscripts and Methods. Essays on Editing and Transmission*. Roma: Edizioni di Storia e Letteratura.

Roelli, Philipp (2020): *Handbook of Stemmatology*. Berlin – New York: W. de Gruyter.

Rome, Adolphe (ed.) (1936): *Les commentaires de Pappus et de Théon d'Alexandrie sur l'Almageste. Tome II. Théon d'Alexandrie, Commentaire sur les livres 1 et 2 de l'Almageste*. Città del Vaticano: Biblioteca Apostolica Vaticana (Studi e testi 72).

Rossi, Aldo (1982): *Il Decameron. Pratiche testuali e interpretative*. Bologna: Cappelli.

Tarán, Leonardo (1969): *Asclepius of Tralles*, *Commentary to Nicomachus' Introduction to Arithmetic.* Philadelphia: American Philosophical Society (Transactions of the American Philosophical Society 59.4).

Tarán, Leonardo & Gutas, Dimitri (eds.) (2012): *Aristotle*, *Poetics*. Leiden – Boston: Brill.

Tihon, Anne (ed.) (1978): *Le "Petit Commentaire" de Théon d'Alexandrie aux Tables Faciles de Ptolémée*, Città del Vaticano: Biblioteca Apostolica Vaticana (Studi e Testi 282).

Timpanaro, Sebastiano (1985): *La genesi del metodo del Lachmann*. Seconda edizione riveduta e ampliata, con alcune aggiunte. Padova: Liviana.

Todd, Robert (ed.) (1990): *Cleomedis Caelestia (ΜΕΤΕΩΡΑ)*. Leipzig: B. G. Teubner.

Tonello, Elisabetta (2018): *Sulla tradizione tosco-fiorentina della Commedia di Dante (secoli XIV-XV)*. Padova: libreriauniversitaria.it.

Tonello, Elisabetta & Trovato, Paolo (2011): Contaminazione di lezioni e contaminazione per giustapposizione di esemplari nella tradizione della «Commedia», in *Filologia Italiana* 8, 17–32.

Treweek, Athanasius Pryor (1957): Pappus of Alexandria. The Manuscript Tradition of the *Collectio Mathematica*, in *Scriptorium* 11, 195–233.

Trovato, Paolo (2017): *Everything You Always Wanted to Know about Lachmann's Method. A Non-Standard Handbook of Genealogical Textual Criticism in the Age of Post-Structuralism, Cladistics, and Copy-Text.* Revised Edition. Padova: libreriauniversitaria.it (Storie e linguaggi 7).

Trovato, Paolo & Marchetti, Federico (2019): *The Study of* codices descripti *as a Neo-Lachmannian Weapon Against the Notions of 'variance' and Textual Fluidity*, in Chegai, Andrea & Rosellini, Michela & Spangenberg Yanes, Elena (eds.), *Textual Philology Facing 'Liquid Modernity': Identifying Objects, Evaluating Methods, Exploiting Media*. Padova: libreriauniversitaria.it (*Storie e linguaggi* 5/1), 147–169.

Ucciardello, Giuseppe (2019): 'Atticismo', excerpta lessicografici e prassi didattiche in età paleologa, in *AION* 41, 208–234.

Varvaro, Alberto (1970): Critica dei testi classica e romanza. Problemi comuni ed esperienze diverse, in *Rendiconti della Accademia di Archeologia, Lettere e Belle Arti di Napoli* 45, 73–117.

Vitrac, Bernard (2022): À propos de l'histoire du texte des *Éléments* d'Euclide : Préalables à une nouvelle édition critique. Online: https://hal.archives-ouvertes.fr/hal-03328161.

Weidemann, Hermann (ed.) (2014): *Aristoteles*, *De interpretatione (Περὶ ἑρμηνείας)*. Berlin – Boston: W. de Gruyter.

Weidemann, Hermann (2019): Zur Stemmatisierung kontaminierter Textüberlieferung. Kann die Textkritik von der Mathematik profitieren?, in *Codices Manuscripti & Impressi* 118, 1–15.

Plates

Plate 1. BAV, *Vat*. *gr*. 206, f. 73v

Plate 2. BAV, *Vat*. *gr*. 218, f. 36v

Plate 3. BAV, *Vat*. *gr*. 190, f. 23r

Plate 4. Göttingen, Niedersächsische Staats- und Universitätsbibliothek, *philol*. 66, f. 141r

Plate 5. BAV, *Vat*. *gr*. 1059, f. 79v

Plate 6. BAV, *Vat*. *gr*. 208, f. 9v