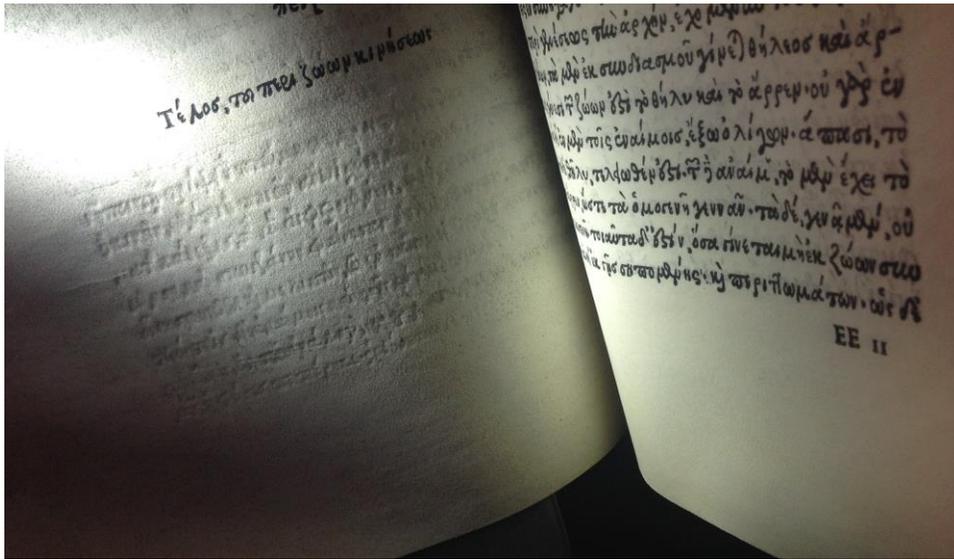


The Invisible Book

for Nelson Adams and Stephen Sword

In Venice in 1495–98, Aldo Manuzio printed the first Greek edition of Aristotle, along with texts by Theophrastus, Alexander of Aphrodisias, Diogenes Laertius, Philo Judaeus, Ammonius, Philoponus, Porphyry, and Pseudo-Galen. The library of New College, Oxford is one of only two in the world to hold all five volumes printed on skin; it was Thomas Linacre’s copy. The Biblioteca Real in the Escorial is the other; Aldo presented its volumes to his Maecenas, Alberto Pio, Prince of Carpi, whom he had addressed in the epistle to each volume. Also in Oxford, in the library of Corpus Christi College, are three volumes on skin that belonged to William Grocyn, Linacre’s friend and a New College graduate. Aldo praised Linacre in the preface to vol. 2 of this edition and published both British scholars in *Scriptores astronomici ueteres* (October, 1499). The prefatory epistle to Alberto in that volume celebrated ‘Thomas Linacre . . . a man of acute judgment’ and ‘William Grocyn, a great expert in Greek, not to mention Latin. . . . Out of admiration for their Latinity and eloquence, I decided to add a learned and stylish letter sent to me by William Grocyn—to make our philosophers ashamed of writing in their barbarous and incompetent way; they should imitate Britons’. Aldo went on to contrast these two humanist scholars with their countrymen of earlier times (presumably Duns Scotus and William of Ockham) who still, the printer regretted, held sway south of the Alps. What with these latter-day Britons, he wrote, Italy’s ‘wound is cured by the same spear that caused it’.¹

In the New College copy, pages appearing blank at top or bottom, may not be completely so.

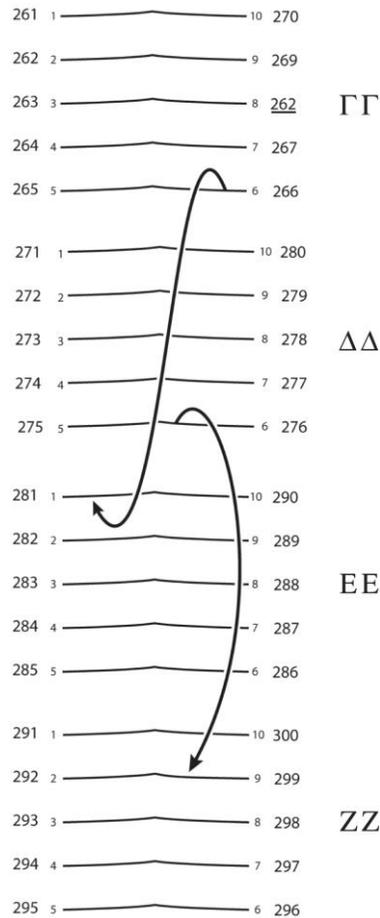


¹ N. G. Wilson, *Aldus Manutius: The Greek Classics* (Cambridge, Mass.: Harvard University Press, 2016), pp. 79–81, 43, and 341 n. 196. See a copy of Aldo’s edition on the website of the Bayerische Staatsbibliothek (search for ‘Praedicamenta: Mit Privileg. [1–5]’). Vatican and Boston Public Library copies are also digitized and available online, the former through the British Library’s Incunabula Short Title Catalogue.

Research for this project was funded by the Social Sciences and Humanities Research Council of Canada, the H. P. Kraus Fellowship in Early Books and Manuscripts (Beinecke Library), the Katharine F. Pantzer Fellowship in Descriptive Bibliography (Houghton Library), and the Carl H. Pforzheimer Endowment Fellowship and Alfred A. and Blanche W. Knopf Fellowship (Humanities Research Center, University of Texas). Thanks to John Grant, Tim Perry, and Ross Petras for help with Greek; to Bill Sherman and Stephen Tabor for help with grant applications; and to Brandon Besharah for artwork. Early versions of this essay were presented at the Canadian Society of Renaissance Studies, Ottawa, May, 2015 and, in a memorial celebration of Conor Fahy, at Università di Udine, February, 2019.

... AA BB ΓΓ ΔΔ EE ZZ HH ΘΘ ΙΙ ΚΚ ...

Eventually, I'll map many of the quires of this volume—on pp. 66–70, 86, and 90, for example. In the meantime, the 'meta-map', below, charts the flow of dead type in the range ΓΓ–ZZ, not only from page to page, but also from forme to forme—and also in the context of whole quires. Below, I stack the formes of quires in what can be regarded (for now, at least) as the order of their printing.



In this my first attempt at such a map, the outer numbers, including the underlined error on f. [268] ('262' was, I suggest, recycled there without updating from ΓΓ2r, three formes prior) are the ones Aldo printed on rectos to count the leaves. (With the inner numbers, I count out the ten leaves of each quire in narrative order.) In the earliest days of printing, each folio page was composed and printed *seriatim* on a one-pull press. By the 1490s, however, it had become normal to print by formes on a two-pull press. One option was to compose to the end of the first page beyond the middle of a quire of folio, eleven pages in this case; impose 5v|6r (pp. 10 and 11); and begin printing the inner forme of the innermost sheet. Later, with the composition of p. 12, that page could be imposed with p. 9, previously composed, and the outer forme of the same sheet (5r|6v) could then go to press. The dead type of the forme just off the press could now be distributed back into the cases.

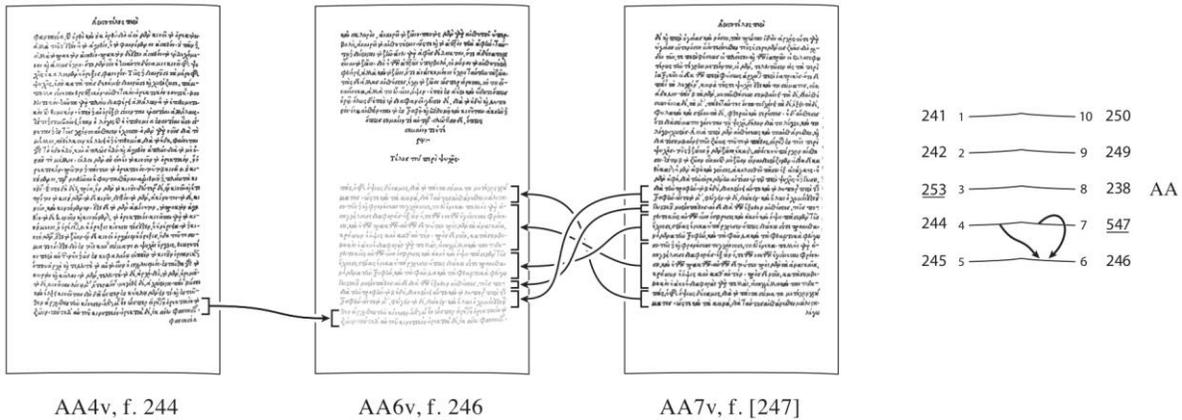
But Aldo's approach was to cast off *all* the pages of a quire, then compose its first and last pages, impose them, and commence printing the outer forme of the outermost sheet. Composition and imposition of the second and penultimate pages followed, to perfect the first sheet. The type of

the first forme, now dead, could be distributed. Composition thus advanced forme by forme toward the middle of the quire: pp. 1|20 & 2|19 on the outermost sheet: then 3|18 & 4|17; 5|16 & 6|15; 7|14 & 8|13; 9|12 and, finally, 10–11 on the innermost. Astonishingly, not all the formes of an Aldine quire existed simultaneously in type for proofreading before printing: there was no overview.

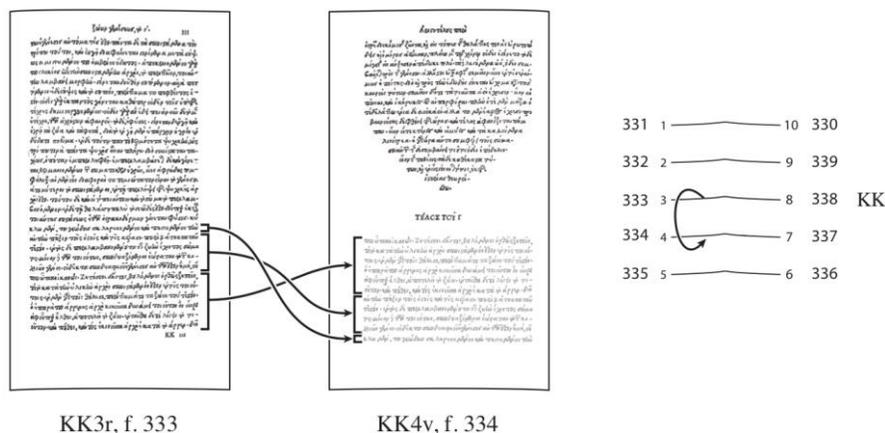
The composition and printing first of the outer forme of each sheet helps explain why the blind impressions in the photograph of EE1v are so clear: they were not disturbed by debossing that originated overleaf, for the outer forme (1r–10v) had been printed first: the typeface (both inked and blind) of the inner forme, where EE1v resides, therefore had the latter say I mean the latter *bite*.

In this meta-map, the first arrow connecting source and destination departs from p. 6v on outer-forme ΓΓ5r–6v and arrives at p. 1v on inner-forme EE1v–10r. The second arrow departs from p. 6v on outer-forme ΔΔ5r–6v and arrives at p. 9v on outer-forme ZZ2r–9v. These sources and destinations lie 13 and 14 formes apart. Such very large numbers might seem to imply that on each occasion over a dozen undistributed formes existed at one time. The simultaneous existence of so many formes would have required an immense supply of type, the very problem that casting-off and composition by formes avoided. Although I am confident that the information about type sources and destinations conveyed by my first meta-map is accurate, these big numbers suggest nevertheless that something is wrong with it. We'll need a better map.

If we look to the examples of blind type immediately before and after the four-quire range ΓΓ–ZZ, we will find more plausible distances between sources and destinations. The first prior example of blind type is on AA6v. (Here the text is from *De anima*.) The meta-map is on the right.



And the first subsequent example is on KK4v. (This text is from *De generatione animalium*.)

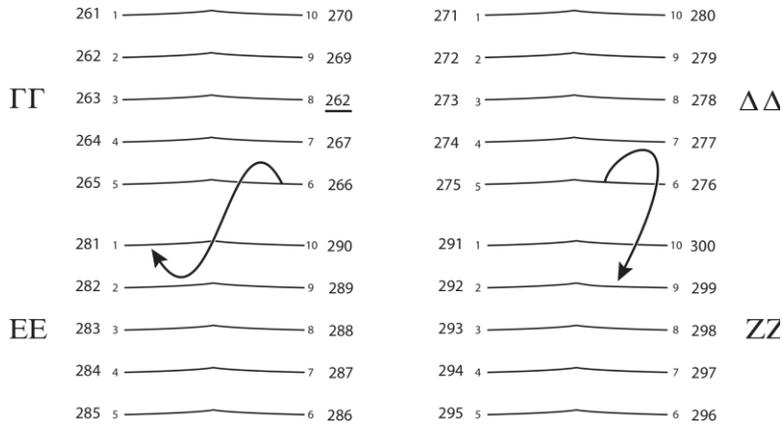


In each of these two maps, the sources and destinations of blind type lie within a single quire, merely 1, 2, or 3 formes apart. Such lower numbers are more to be expected than 13 and 14.²

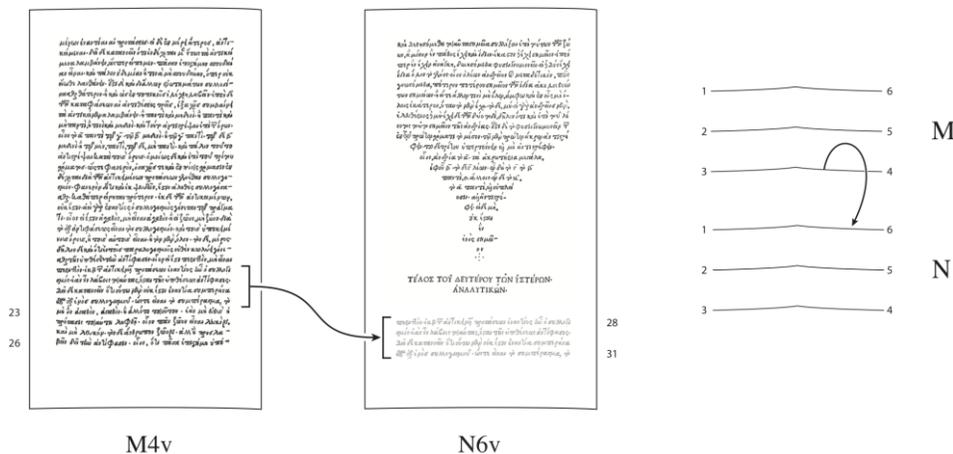


merely 1, 2, or 3 formes apart. Such lower numbers are more to be expected than 13 and 14.²

The vast distances between sources and destinations in the meta-map on p. 3 can be made to look like the shorter ones in the meta-maps on p. 4 if (while waving the bibliographer’s magic wand) we rearrange ΓΓ, ΔΔ, EE, and ZZ for setting of *alternate* quires—ΓΓ & EE by one compositor (or team) and ΔΔ & ZZ by another, presumably working simultaneously, perhaps for a second press.



That rearrangement takes care of the leap-frogging diagrammed on p. 3. The rhythm of blind recycling in this four-quire range now appears over merely 3 or 4 formes, not 13 or 14. Whether quires AA and ΚΚ could also have been composed in runs of alternate quires can be tested by mapping the recycling of their headlines. I’ll turn to that task on pp. 63–70. But first, from *Analytica priora* in vol. 1 (November, 1495), an example of source and destination in alphabetically adjacent quires.

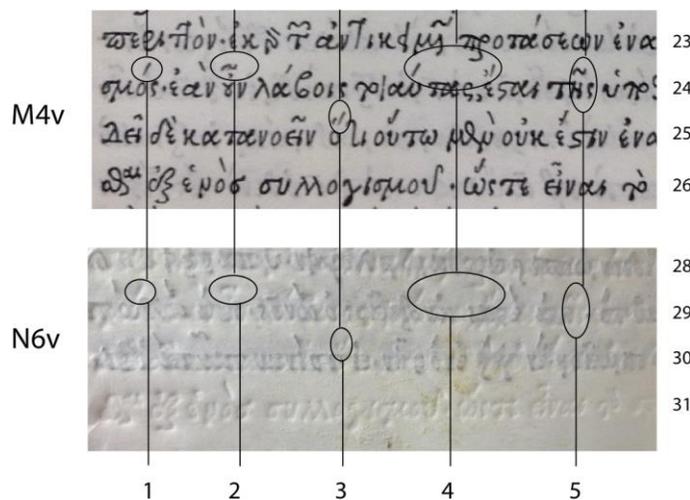


² The migration of type from AA7v to 6v, by the way, is the first evidence to support my claim that composition proceeded by formes from the outside of the quire toward the centre. The other migrations shown so far are open to explanation as proceeding merely from lower-numbered leaves to higher- ones, as if the composition of these pages had proceeded in narrative order. It didn’t.

Here, merely two formes lie between the source of blind type in one quire and its destination in the next. In this range, one supposes, there *may* not have been simultaneous production of alternate quires. (The reason for my caution here will become apparent on p. 68.)

There is, by the way again, a lesson here about quire size. The first section of vol. 1, quires A–N, consists of four-sheet quires, except for L–N, each of which has only three sheets. Aldo must have become aware by the time he had finished quire K that the end of this first section was nigh (it would prove to be 36 pages away) and that he needed to plan for it, as this printer preferred to make units of text coincide with bibliographic units. If he had continued with four-sheet quires, Aldo would have needed three of them, and composition would have ended on N2v (not where it ends now, on N6v)—and the twelve blank pages at the end of his last quire would have wasted much paper. To minimize the number of empty pages, Aldo could have had merely two quires, one with four sheets, and one with five—nine sheets in all—with no waste. But his actual solution was three quires of three leaves each, also for a total of nine sheets and also, therefore, with no empty pages. Aldo’s varying of format certainly saved paper; and it simplified casting-off. In addition (this must have been his aesthetic aim), it gave distinctive structure to the end of this literary unit. (The next unit is signed from the lower case: a, b, c... and it ‘reverts’ to four-sheet quires.)³

The following example of blind type also allows me to enlarge upon a word I used on p. 2 to characterize the appearance of these shadowy texts. I claimed there that if not legible, they are usually at least ‘decipherable’. In the previous detailed map, l. 26 is the last of the four lines transferred from M4v. The inked l. 26 at the bottom of the upper of the following pair of photographs illustrating that map reappears blind as the equivalent of l. 31 on N6v at the bottom of the lower (raking-light) photo.



Although blind, this last line on N6v certainly is legible, at least in the right light. However, the photo does not tell the whole story of the void at the bottom of N6v, for three blind lines (ll. 28–30) are hiding above it. They must now be harder to see and to identify than they were when (outer-forme) N6v was printed on the virgin sheet, for their bite has since not only been obscured by the inked typeface printed overleaf (on N6r, dimly visible, mirror-image, as show-through in this photograph), but also obliterated by its ‘re-morse’ (if you don’t the mind pun), by its ‘back-biting’. Since the

³ My ‘reverts’ naively posits the book as *read* rather than *printed*. That signature N is followed by signature a, rather than signature O, suggests that quires a, b, c ... could have been printed *before, during, or after* quires A, B, C ... N. That the leaves of vol. 1 are not numbered allowed for this option in the order of production.

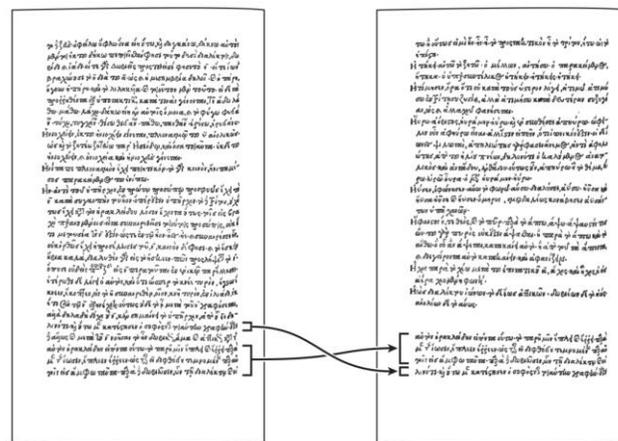
registration on each side of N6 is exact, not much more than a pattern of diacritics of the top three blind lines on N6v is now detectable, as in circled areas 1–5. In circle 4, not only the diacritics, but also the tails of the abbreviation for ‘μένων’ and the ligature ‘πρ’ in the line above (blind l. 28) offer distinctive footprints. All this circled evidence argues that lines 23–26 from M4v printed blind on N6v as ll. 28–31 and in the same order. So, my point, although the top three blind lines on N6v cannot be read, they can be confidently identified and the whole blind text deciphered.

The vertical lines extending to and from the circled areas allow one to monitor alignments. Any lack of co-linearity there might point to typographical alterations in transit. In this case, I suppose, the slight misalignments are mostly to be attributed to different camera angles or to diverse contours of each page as it was photographed. But the more pronounced misalignments in circles 4 and 5 may well have arisen from an alteration to spacing before the period in the last line.

Had the blind lines on N6v been rearranged (as on AA6v, mapped on p. 4), identifying them would have been harder, but not impossible; and harder still had they also come from multiple pages (also as on AA6v); still harder had they come from type already blind and rearranged, as in the example atop p. 90. (But please wait for that one—I want to surprise you.) And hardest of all if from another book altogether, as when type from vol. 4 appears in vol. 2 (see Appendix 1, on p. 114—I *just* solved that puzzle), or when, in Aldo’s octavos, Cicero appears in Ovid, Vergil in Horace, Pope Julius in Petrarch, Lucretius in Petrarch, Sannazaro in Petrarch, or Petrarch in Juvenal—then back again from Juvenal to Petrarch. (Moveable type does move around.)



On p. 2, I suggested that a leaky frisket can hint at the presence of typeface in a seemingly blank part of a page. But when a frisket with windows of proper size had not been fitted until after the print-run had begun, typeface that should have printed blind appeared fully inked and legible in sheets that came off the press first, as on Kk4v of Aldo’s *Thesaurus cornucopiae*, 1496.



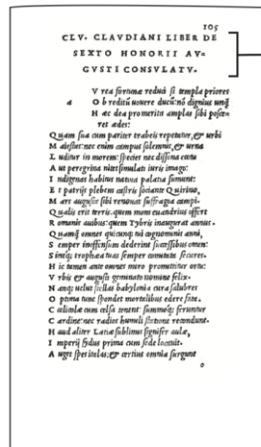
Kk2v, f.74v

Kk4v, f.76v

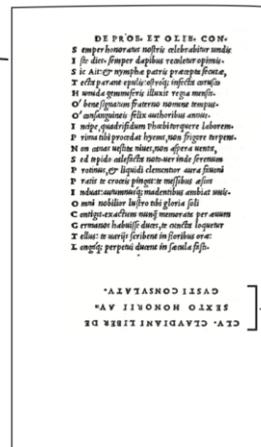
(It was in *Thesaurus*, by the way, that Aldo announced plans for ‘all the works of Aristotle printed in our typeface’).⁴ A more ridiculous example appears upside down on p8v of some copies of Claudian’s

⁴ Wilson, *op. cit.*, p. 29. Thanks to Paul Needham for directing me to this *Thesaurus* example. *The Aldine Press Catalogue of the Ahmanson-Murphy Collection of Books by or Relating to the Press in the Library of the University of California, Los Angeles* (Berkeley,

Opera, 1523, printed after Aldo's death by his father-in-law and partner, Andrea d'Asola. (Both states of *Thesaurus* can be seen at Harvard; both of Claudian's *Opera* at UCLA.)

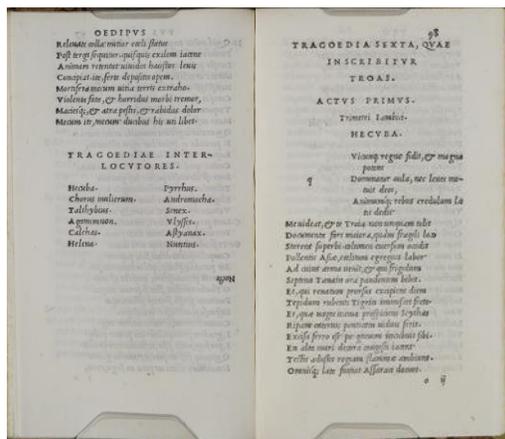


o1r, f.105r



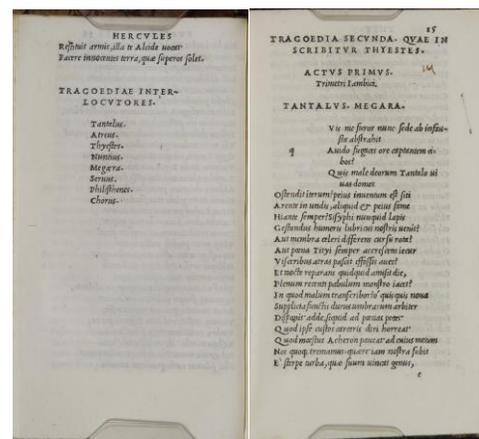
p8v, f.120v

On o1v, the last page of *Oedipus* in Seneca's *Tragedies* (1517), shown on the left, below, appears the list of interlocutors for *Troas*, the next play.



o1v

o2r



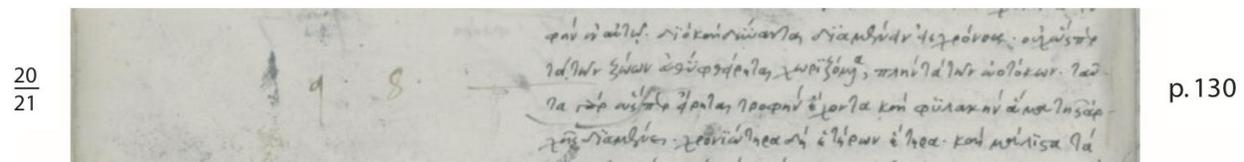
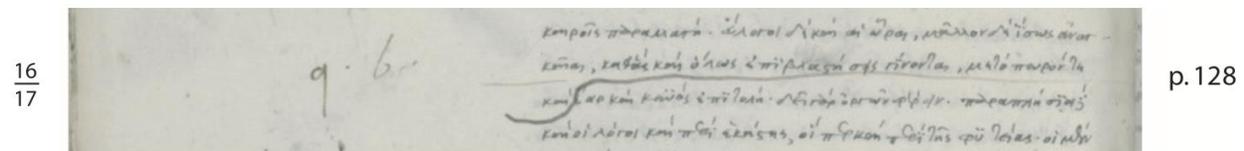
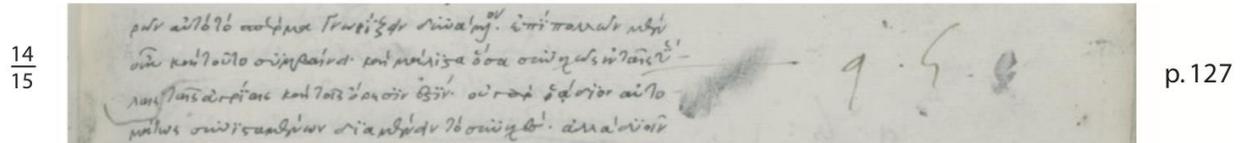
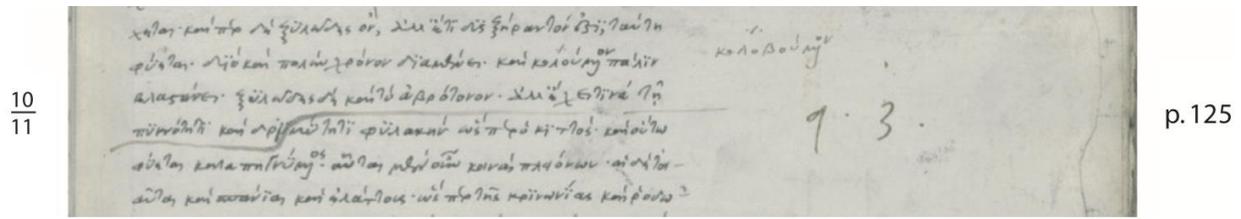
d8v

e1r

Below this list in all copies I have seen appears the word 'Nocte', upside down, looking like a catchword. But, as o2r begins with 'TRAGOEDIA', 'Nocte' is no catchword. (In this edition, catchwords appear only on 8v pages—except once, on d8v, the last page of *Hercules Furens*, shown on the right, above: here is the list of interlocutors for the next play, *Thyestes*—and the expected catchword beneath it does not appear.) Surely there must be blind type below and to the left of 'Nocte'—and the frisket

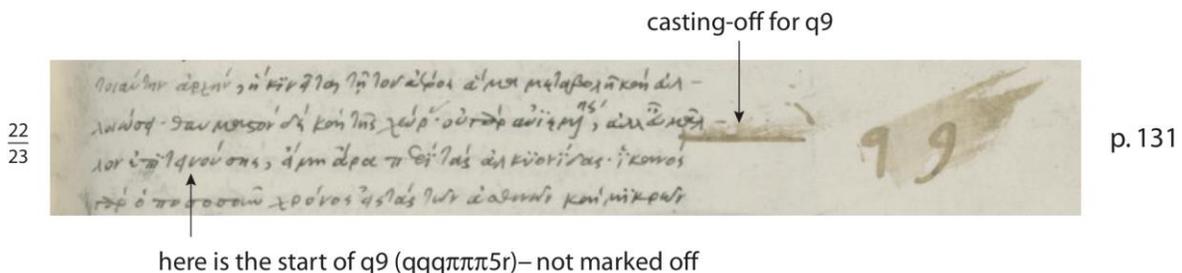
Calif.: University of California Press, 2001), p. 165 says this of its second *Opera* copy: 'Chapter title for VI. Cos. Hon. (o1r) is printed, but inverted, again at bottom of p8v (bearer type, present due to failure to re-cut frisket)'. While all typeface bears pressure from the platen, 'bearer type' is intended merely to support the platen, not to communicate text. It is, nevertheless, full of information—like finger prints at a crime scene. (Many thanks to Special Collections Librarian Jane Carpenter for the gift of a copy of *The Aldine Press Catalogue*, invaluable in the preparation of this essay.)

Discrepancies between locations cast off and marked off abound; they also pertain to q3 in this quire (merely 31 lines later in the body of the page—to account for a line added in the margin), and also to q5, q6, and q8.



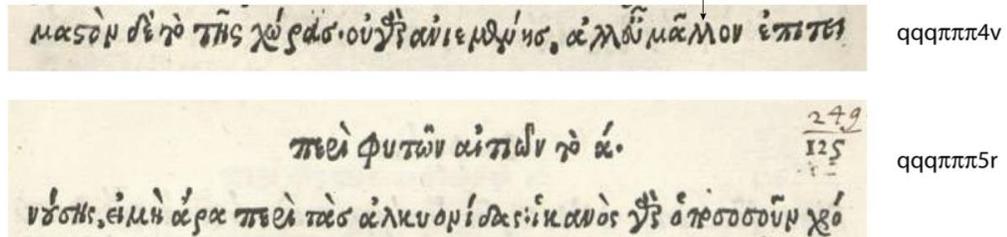
With this last image, we arrive at copy for the middle forme of the printed quire. Such discrepancies are not found hereafter, for composition in the aft-quire had, so my argument goes (for the moment, at least), to respect the locations cast off. When, for example, the penultimate page of the quire, q15, was eventually composed, it had to end exactly where the beginning of q16 had earlier been cast off, for q16 would already have been set from that very point during composition of the first forme, 1r|8v (or q1|q16)—and this forme would presumably have already gone to press. At the end of composition of q15, it was simply too late to kick the can down the road. Similarly, thereafter, when q14 came to be composed, setting had to conclude exactly where q15, already composed, had begun. So it was that most pages in Aldo’s aft-quires had to lie in Procrustes’ bed.

There is, however, one invisible discrepancy—between where the start of q9, the first page of the aft-quire, had been cast off, and where it could have been marked off (for composition of q8 had exceeded the final target), but was not marked off. Here, in the right margin, is where the manuscript was cast off for the start of q9; and a few syllables into the next line is where q9 actually begins.



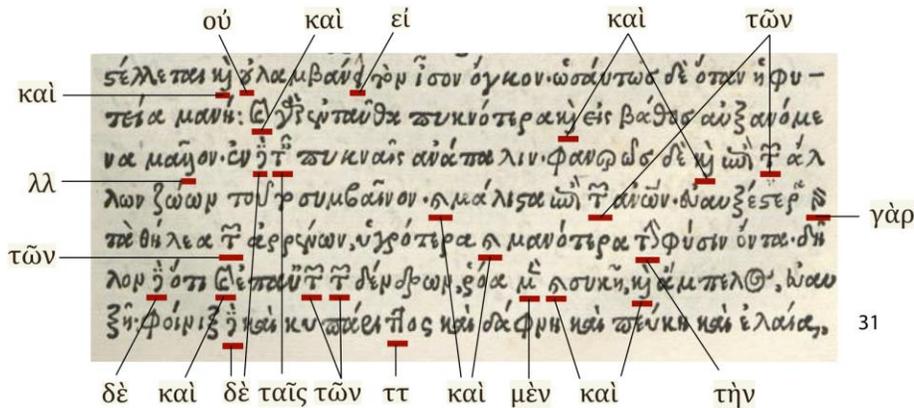
Here are the corresponding areas in the printed book.

q9 (qqqppp5r) was cast off to begin here



Why, this single time in the quire, was the page-break not marked off in the manuscript? Well, in all the formes of this quire but one, its two pages have discontinuous text. The single exception is where we are now, forme q8–q9 (or pp. 4v–5r), in mid-quire. Here, where the fore-and aft-quire pages are continuous for once, there was no need to register the off-target start of q9, because there was no need to interrupt composition at this point—no need later (the next day, let us suppose) to resume composition that had been suspended here, for there simply was no need to suspend composition. Only in this one forme of the quire did a compositor’s stint allow setting straight through the end of one page and into the start of the next. The casting-off of q9 had served its main purpose days before, as a point from which to cast off the remaining pages of the quire, q10–q16. Thereafter, it could be ignored—as in this example it was.

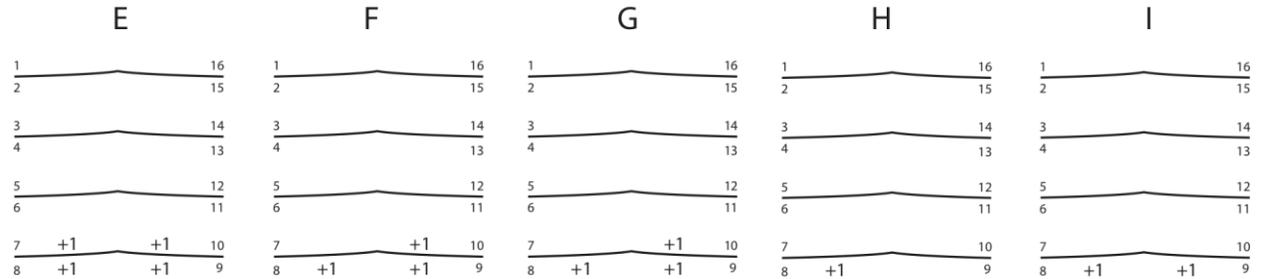
Unlike the composition of q8, however, that of q9 had to be mindful of exactly where it ended, because q10, as I have been arguing, would already have been composed and sent to press in its forme. And so, q9 had to compress or extend itself at the end of its last line in order to reach its target, the start of q10. Actually, in this case, the end of q9 was both compressed and extended, for the last, rather open-spaced, line composed for q9 is extra—it is the 31st line, not the 30th; and the four lines immediately before it are dense with space-saving contractions to help l. 31 exactly fill the measure.



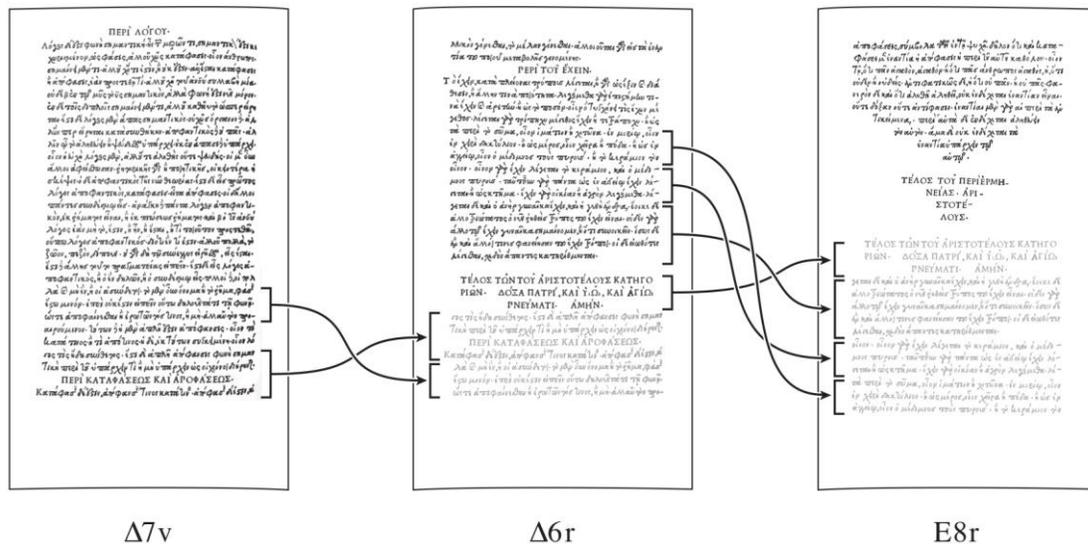
qqqppp5r, composed from q9



The four central pages of a quire often have a different number of lines than pages elsewhere in the quire, as the following run of five quires, E–I, from vol. 1 shows.



In composition by formes from the extremities of a quire to its centre, the buck obviously stops in the innermost sheet of the quire. In addition to extra lines there, sometimes line-lengths are increased: the four pages of the innermost sheet of quire E, for example, are also 5% longer than usual. As Aristotle’s *De interpretatione* concludes on E8r with generous space at the end of the page (as shown here, on the right),

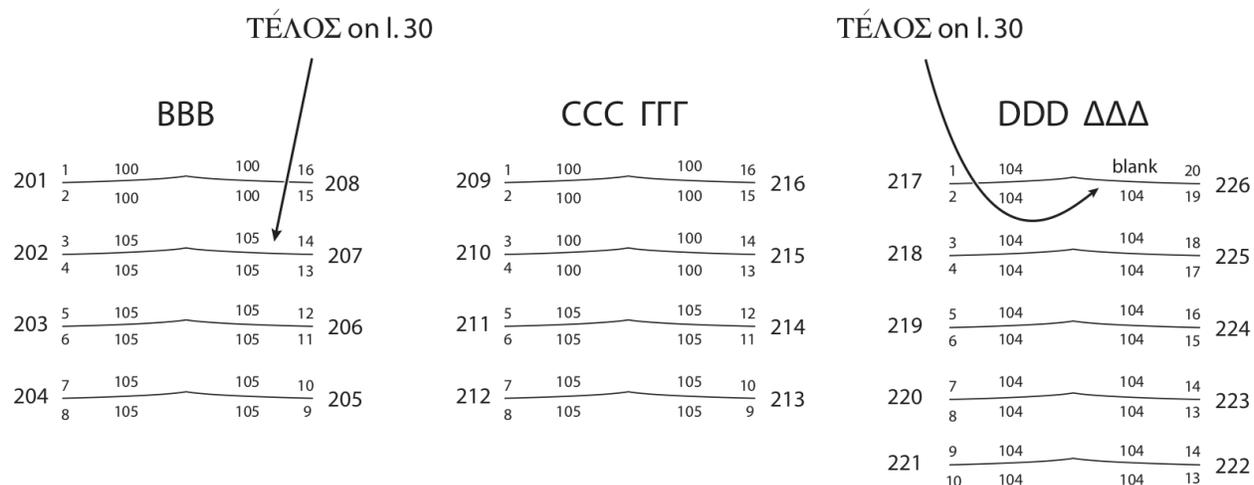


there would have been no reason, had composition been seriatim, for a forward-looking compositor to pack text into the centre of this quire (gaining over ten lines there), for the extra lines gained on that sheet could easily have fit on E8r—and the next text, *Analytica priora*, could still have begun handsomely (this must have been the plan), atop E8v.¹⁰ The expanded capacities at the centres of this and adjacent quires are predictable consequences of composition by formes from the extremities to the centre.

Increased line-lengths also occur in places other than the innermost sheet of a quire—and even programmatically over adjacent quires. In the three consecutive quires from vol. 4, shown in the next map, the penultimate and ultimate sections of Theophrastus’s *De historia plantarum* come to a

¹⁰ The suggestion of this map, that there was only a single site of composition for vol. 1, is supported by the presence of blind type from A3r on B4v (not in quire C), from M4v on N6v (not in a, the next quire—as was mentioned on p. 6), from i4v on κ2r (not in l), and from r3v and r4r (rather than from q) on s5r, the final quire.

close efficiently, each on the last line of a page—on BBB7v and on DDDΔΔΔ10r, the latter followed by a blank leaf. Such elegant effects had to be achieved; they did not come by accident.



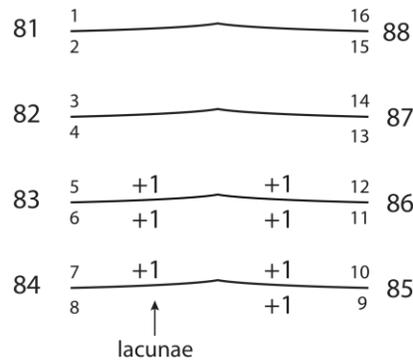
In this map, each page is annotated with a percentage of the normal line-length. In BBB, the 5% expansion of lines on the three innermost sheets kept the end of the penultimate section of *De historia plantarum* from extending a dozen and a half lines down the following page, BBB8r.

But that was not Aldo's only goal: there was also another, some 37 printed pages off. Vol. 4 is so extensive that it is usually bound in two parts, the earlier part closing after quire DDDΔΔΔ. To close the first part here, quire DDDΔΔΔ has an extra sheet, and the line-lengths of all 19 of its printed pages were increased by 4% (the equivalent of 23 normal-length lines overall) and the 8 pages of the two innermost sheets of the previous quire, CCCΓΓΓ, by 5% (the equivalent of 12 normal-length lines). This all points to extensive planning, perhaps as far back as quire BBB, to create a blank verso between Theophrastus's *De historia plantarum* and what usually follows (in the next binding), *Problemata* (supposedly by Aristotle). The 35 normal-length lines saved by expanding column-width in quires CCCΓΓΓ and DDDΔΔΔ could in a pinch have been fitted on DDDΔΔΔ10v. But keeping that page blank must have been the printer's aim. At a supposed rate of two formes a day, the execution of this plan would have taken almost two weeks.

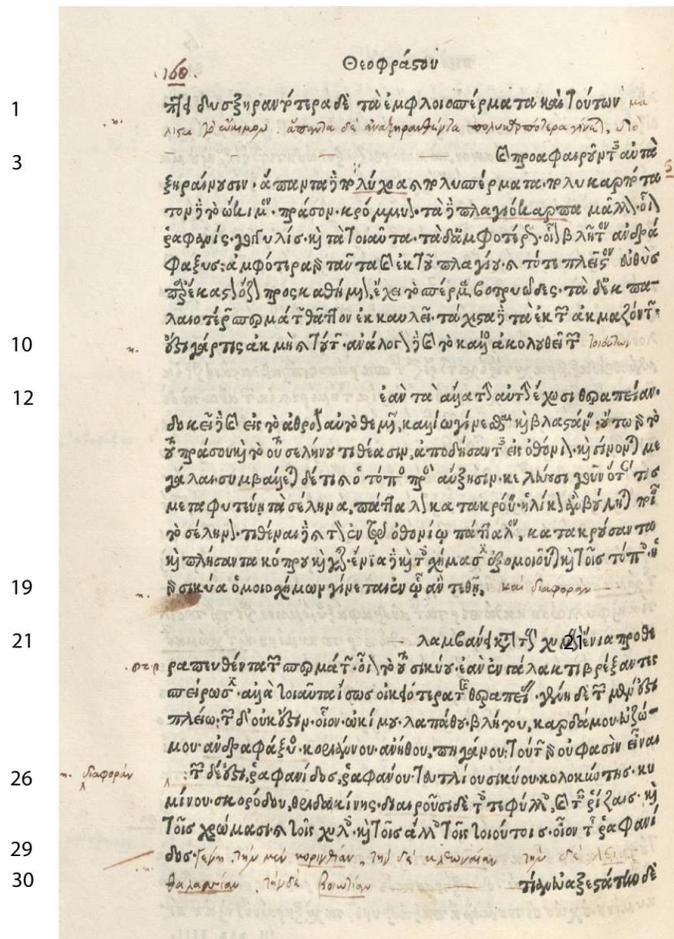
This example of planning for a blank page at the end of a quire (and, here, also the end of a binding unit) is independent of composition by formes, of course, but exactly where in the quire departures from normal line-length occur does nevertheless impinge on composition in that manner: seriatim composition would presumably have expanded line-lengths in the last eight pages of quire CCCΓΓΓ, 5r–8v, rather than in the eight pages in the middle, 3r–6v. (The former would have occasioned the adjustment on all four sheets of the quire; Aldo's adjustment was, compactly, on merely two.)

Shown next, in the same volume, is another example of extended line-lengths, this time in an isolated quire. (The text is still *De historia plantarum* by Theophrastus.) Seven pages in quire ΙΙΙλλλ of vol. 4 have an extra line, the 31st. Six of these pages have the normal width, of 129mm, but the seventh, p. 4r, at 138mm, has an extra 9mm. There seems to have been an awkward last-minute adjustment to plans already underway to increase capacity—to increase it further.

III λλλ



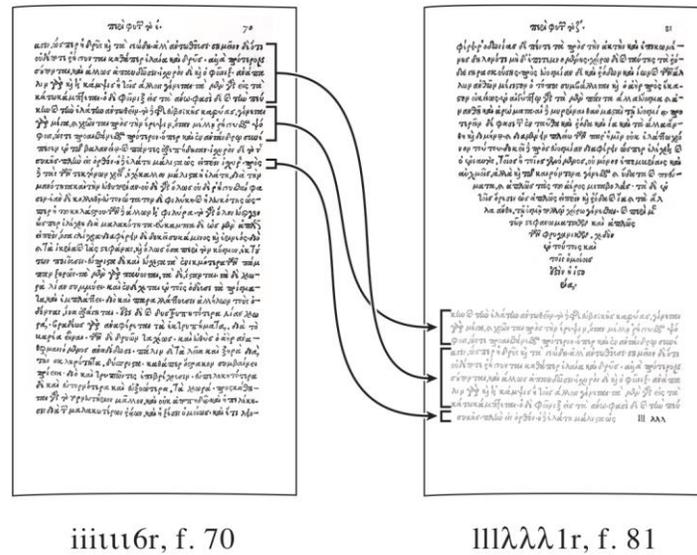
Well into production of the quire, just before the printing of its two innermost sheets, the compositor seems to have decided generously to space the four lacunae (from *De historia plantarum* 7.3.3–7.4.2) that fall on 4v, shown below. They appear in ll. 1–3, 10–12, 19–21, and 29–30—and in l. 26, which, if Aldo deemed it a lacuna, is very short (in *Thesaurus Linguae Graecae* it is merely a space between sentences). This is the page in which, at 138mm, the column is unusually wide. In the Bayerische Staatsbibliothek copy, shown here, a reader has written in some of the missing texts.



vol. 4, IIIλλλ4v

Altogether, the lacunae take up almost seven normal lines. The seven other pages of the quire, each with an extra line, generously cover that amount. But the 4r page, being longer and wider, creates another 4.5 normal lines of capacity. Without printer's copy, one cannot say what so many extra lines were for. But they certainly were not all needed: the compositor could have done with 75% of that amount, so as to bring both pages of the innermost forme to symmetry: but, awkwardly, 4v has 30 lines and 5r has 31.

Blind type on the 1r page of this quire offers another indication of the production of alternate quires of *De historia plantarum* in two sites of composition, for the transfer of type here leaps over quire kkkkkk. Source and destination must have been only 3 formes apart, not 11.



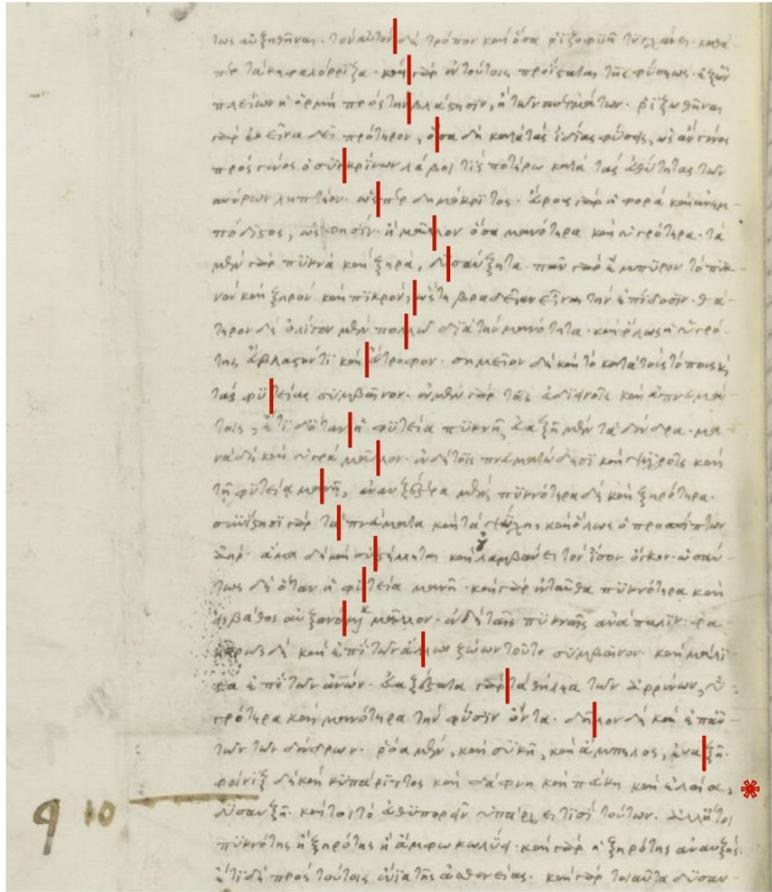
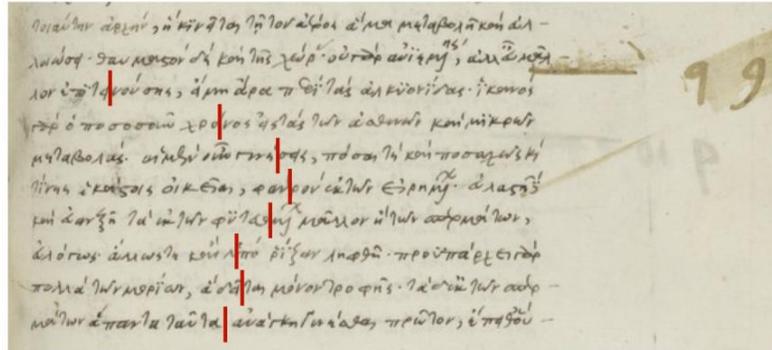
Usually, the stripping of a page of type to impose groups of its lines elsewhere proceeds from low to high. Each transfer of a block of type from a source page to a destination page goes first from low on the former to high on the latter, then from the new low on the source (it is now higher on the page) to the new high (now lower) on the destination—and so on. In this exceptional case, however, the lowest transfer from the source was merely the first 70% of a line, and it served as blind filler for the *composition* of the direction line on the destination page.¹¹ Usually, a catchword is preceded just by spaces in the direction line (as in the example of AA7v on p. 4, above). The two multi-line blocks from the same source page were then imposed in the usual order to the usual places higher on the destination page, after which, below, the previously composed direction line completed the imposition (unless it had been added to the bottom of the latter block before it was transferred).



Now to map onto q9 the line endings of Aldo's setting of type. In this and the following maps, I shall mark with an asterisk any line of manuscript that does not have an annotation of a line-break. The more of such in a cast-off page-length, the denser the composition overall.

¹¹ The catchword at the end of this line printed through a small window in the frisket, as 'Nocte' did (see pp. 8–9). This example suggests that the composition of this catchword occurred during imposition, rather than during the prior composition of the body of the page. See p. 49, n. 33 for more on when catchwords were composed.

$\frac{22}{23}$
p. 131

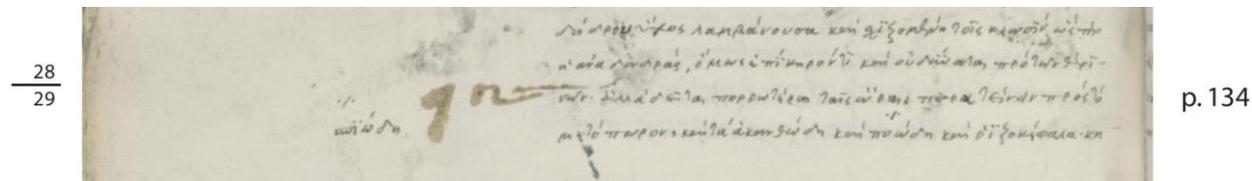


p. 132

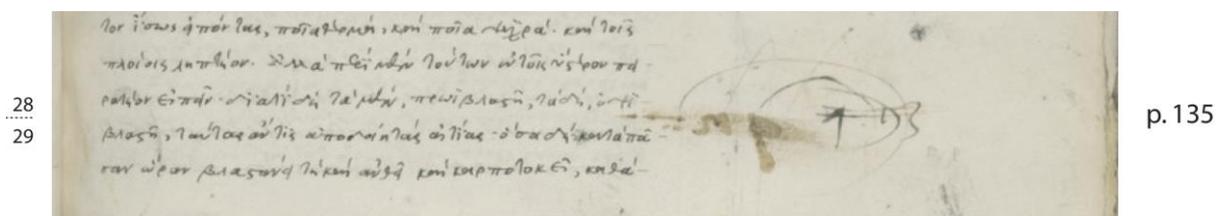
$\frac{24}{25}$

In the middle of the q9 range of manuscript, shown above, the ratio of lines of manuscript to lines of print falls to approximately 1:1; but in the four lines before the end, where an attentive compositor would have realized that he had too much text for the small amount of allotted space that remained if he continued as he had, the ratio increases by 20%. Departures either up or down from a mid-page ratio are to be expected whenever composition approached the end of a page in an aft-quire—though not in a fore-quire, where Aldo’s compositors were free to disregard targets, and did so.

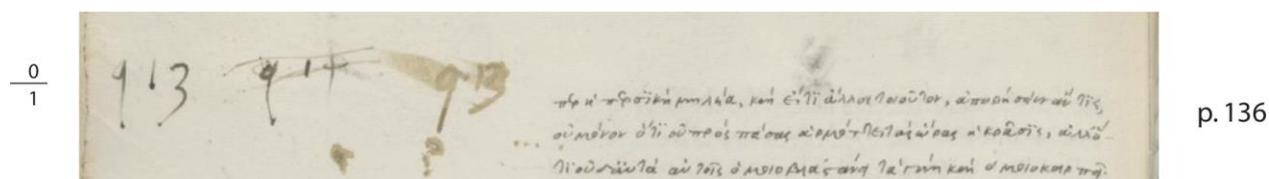
From q9, casting-off was continued to q16 by a second compositor, recognizable by his broad pen strokes and red ink, as here, again, two lines above the bottom of q12.



His work was reviewed by another compositor (perhaps the first?), who, with thin nib and black ink, wrote ‘q 13’, at the base of the next page. (Here is where we first encounter the reviewer’s hand.)

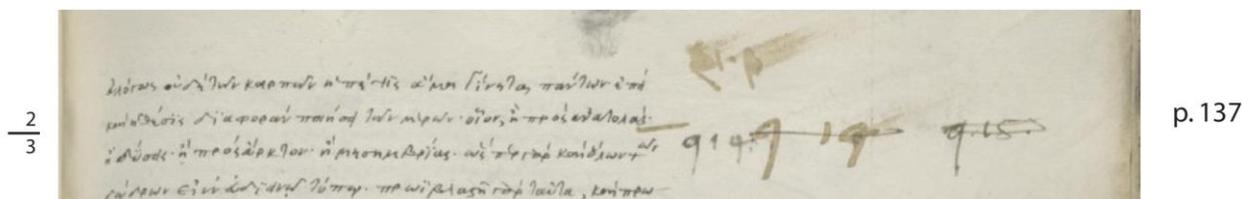


This, like all of his marks in the aft-quire, was subsequently deleted, for this compositor had come on the scene with a wrong assumption. At the bottom of recto p. 135 in the manuscript, the reviewer seems to have mistaken the mere offset of red ink ‘q 12’ from the verso opposite as the appropriate place to write ‘q 13’. But, as marks of casting-off successive pages move down the manuscript page two lines at a time, the actual casting-off of this page should have been at the very bottom of p. 135 or—the equivalent—not in this opening at all, but atop the page overleaf, as shown next, where the second compositor indeed had already written ‘q.13’ (now smeared).



The reviewing compositor wrote ‘q 14’ here, but later deleted it and wrote ‘q 13’, in belated confirmation of the earlier casting-off in red ink.

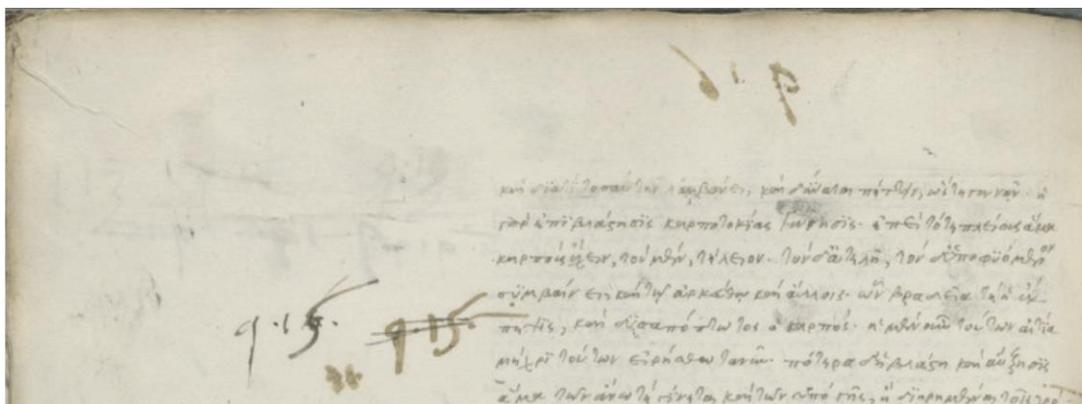
Atop the recto opposite appears offset from this smeared red ‘q.13.’ And, in the same red ink, ‘q 14’ was written in the appropriate place, two lines lower,



which the revising compositor deleted, and wrote ‘q.15.’ instead in his black ink, which he eventually deleted and inscribed ‘q 14.’ instead, confirming, as usual, the message in red ink.

Overleaf, four lines down the page, the second compositor had written ‘q.15.’ in red ink. It was deleted in black ink and ‘q.16.’ written instead, the ‘6’ eventually overwritten with ‘5’.

4
5



p. 138

Also, atop this verso, 'q16' in red ink has set off from the recto, opposite. And, a few lines lower, there is another '16' set off from the recto. Shown next is that recto, p. 139.

6
7

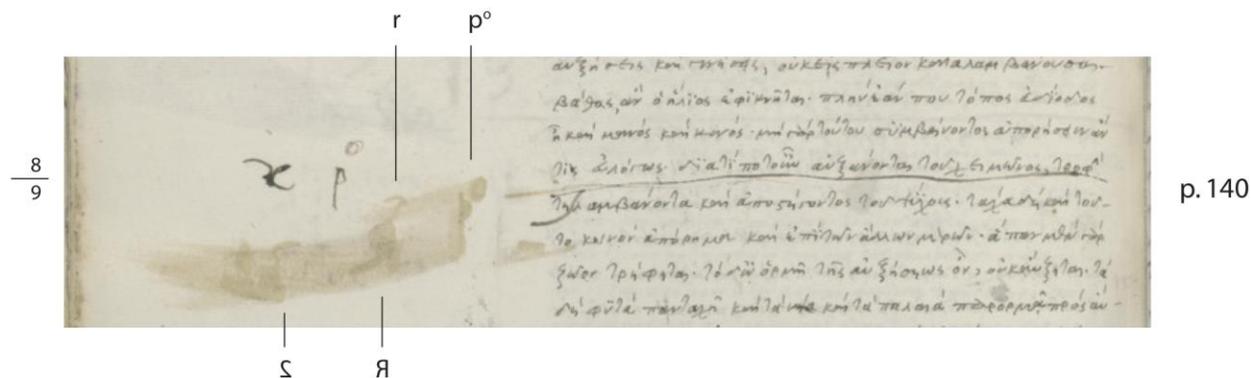


p. 139

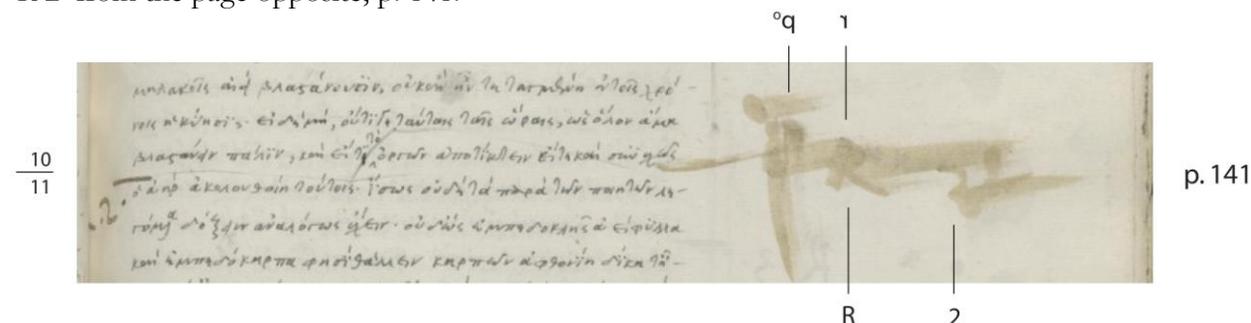
The second compositor's 'q16' (six lines down) is crossed out in black ink, with no revision added this time. It may be that the second compositor's redundant numbering and also the solid underlining of the whole of the sixth line (presumably previously inscribed to represent the end of the quire) was what finally alerted the reviewer to his miscounting.

We have come to this page last in our progress through the sixteen pages cast off for quire q, but the compositor or compositors would soon, of course, have been occupied with this last page along with the first, in order to set the first forme of the quire. We read the manuscript from front to back, and so did those compositors when they cast off and reviewed the casting-off. But in setting type, they would have taken pages a pair at a time from the extremities to the centre. All the controversy over the numbering of the castings-off of the page-breaks must have occurred prior to composition of this quire. The presence of two hands in the annotations of the manuscript suggests (without actually proving) that workers who struggled over the casting-off of this quire may also have shared the composition, perhaps one page each per forme. (Such a work pattern would have contrasted with that of two compositors, or two teams of compositors, working simultaneously on separate quires—the pattern that came to mind on p. 5.)

Unlike the start of quire q, where composition began on target, that of rrrppp, the next quire—or ‘r p^o’, as it is labelled in smeared red ink—is a few letters away from the place cast off.



That fact implies that although the casting-off of the start of quire r had taken place early, the actual composition of the first page of R—that letter is now a capital in black ink—did not begin until after q16 had been composed: the first forme of q and the first of r/R could not, surely, have been in simultaneous composition, though other pairs of quires of vol. 4 certainly were composed at the same time (as I shall lay out now in a footnote).¹² Across this page, there runs a line of black ink, beginning with an /-shape to indicate the actual page-break. The page-break had earlier been cast off in red and ‘r p^o’ written at the top of the area now smeared. Lower down in that area, also smeared, is offset of ‘R 2’ from the page opposite, p. 141.



Hiding in the gutter (an unusual place) is another casting-off for the second page of quire r (or, more likely in this case, of quire R), this time written in red ink and small characters, perhaps by yet another hand; it reconfirms the smeared casting-off. Since we are now in a fore-quire again, it should be no surprise that composition could have missed the target here.

(This example of marking-off, in black ink, happens to be the first example of compositorial freedom that we have seen that falls *short* of the place cast off.)



¹² The supporting evidence for simultaneous composition of alternate quires in vol. 4 is the leap-frogging of type from one quire over the next to print blind in the quire after that. Type from 3a3α jumps over 3b3β to print blind in 3c3γ. This pattern suggests that 3a3α and 3b3β were in production at the same time. Similarly, 3i3i jumps over 3k3κ to 3l3λ; 3M3m over 3N3n to 3Ξ3o; 3B3β over 3C3γ to 3D3δ; 3D3δ over 3E3ε to 3F3ζ; 3H3θ over 3I3ι to 3K3κ; and 3L3λ over 3M3μ to 3N3ν. But where blocks of type recycle for blind printing within a quire, as in 3f3ζ, 3h3θ, 3&3ω, 3H3g, δ'd, 3F3ζ, 3H3θ, and 3P3o, they move merely 1, 2, or 3 formes away. (Recycling from one quire to the very next in this volume is found only in the short inserts of the *Problems* of Alexander of Aphrodisias and of Aristotle's *Mechanics*: α~a to β~b and a'α to β'b. (Such strange signatures suggest that these quires were not routine parts of the printing schedule of this volume, where concurrent composition of pairs of quires was, as the blind type shows, the norm.)

earlier I. 26

χρη πρότερον ὡσεὶ γὰρ αἰεὶ ἐσαμνηθῆς· αὐτὴ γάρ ὄσιν ἢ αὐ

χρη καὶ πρότερον· ὡσεὶ γὰρ αἰεὶ ἐσαμνηθῆς· αὐτὴ γάρ ὄσιν ἢ αὐ

Λ Λ Λ Λ Λ Λ Λ Λ Λ Λ Λ Λ

|— start of later I. 27

earlier I. 27

τις φερόμενη ὁμοίως ἢ εἰ ὅς ἄλλης συστολῆς λαμβάνοιτο τὸ

τις φερόμενη· ὁμοίως δὲ καὶ εἰ ὅς ἄλλης συστολῆς λαμβάνοιτο τὸ

Λ Λ Λ Λ Λ Λ Λ

|— start of later I. 28

earlier I. 28

μέσον, ὡς περ ἐλέχη ἢ ἐπὶ τῆς σεσητηκῆς ἀπάτης, ἀνάγκη

μέσον, ὡς περ ἐλέχη καὶ ἐπὶ τῆς σεσητηκῆς ἀπάτης, ἀνάγκη

Λ Λ Λ Λ Λ

|— start of later I. 29

earlier I. 29

ἢ τὴν μὲν δὲ αὐτὴν ἀντιθέσθαι φερόμενη ἢ ἀπό

γὰρ τὴν μὲν δὲ αὐτὴν ἀντιθέσθαι φερόμενη ἢ ἀπό

Λ Λ Λ Λ Λ Λ Λ Λ Λ

|— start of later I. 30

earlier I. 30

τῆς αὐτῆς πρότερον ἐλάττων, αἰεὶ ἀληθῆς ὄσιν ἢ δὲ μείζων

↑ correction ↓

τῆς αὐτῆς πρότερον· ← revised punctuation

Λ

Here now is Tim Perry's account.



The text that fills out the bottom line of b5r in the Beinecke Library's copy of volume one of the Aldine edition of Aristotle's *Analytica Posteriora* is extraneous but not irrelevant, and we may readily explain both its initial inclusion and the factors that led an early reader of this copy (and also Aldus's proofreader) to mark it for deletion.

The passage from the *Analytica Posteriora* to which the extraneous text has been appended contains Aristotle's discussion of the 'Inferred dispositional ignorance of [affirmative] derivative facts',¹⁴ which gives some idea of the technical nature of the material; the extraneous text itself is from *In Aristotelis Analytica Posteriora*, a commentary on the *Analytica Posteriora* by the Byzantine philosopher and theologian John Philoponus.¹⁵ The complexities of Aristotle's argument need not delay us; we need establish only the general context. Aristotle's analysis at this point (*APo.* 81a15–34) concerns situations in which a positive conclusion to a syllogism has been reached, but that conclusion is nevertheless false. In such cases, Aristotle argues, if the middle term of a syllogism—i.e. the term that occurs in both premises but not in the conclusion, B in the example given below—is appropriate, then it is impossible for both premises of the syllogism to be false.¹⁶ (Conversely, he goes on to argue, if the middle term is inappropriate, then it *is* possible for both premises to be false.) Philoponus expands upon Aristotle's discussion of appropriate middle terms by explaining that in such cases the minor premise is always true and the major premise always false (211,1–14, *in* 81a16). It is this explanation, or at least part of it, that has made its way into the early state of Aldus's text of b5r.

The phrase from Philoponus is relevant to the context and is included in exactly the right place: after Aristotle's discussion of appropriate middle terms, which it explains, and before his discussion of inappropriate ones. Nevertheless, at least one reader of the early-state copy of b5r at the Beinecke Library noticed the intrusion, as evidenced by the addition of subpunction (a standard means of indicating text to be deleted or ignored). And there are at least two factors that may have led the reader to question the text at this point. First, despite its relevance, the phrase from Philoponus is incomplete. Philoponus's comment, as found in the Aldine edition, reads: ἐλάττων, ἀεὶ ἀληθῆς ἐστίν· ἡ δὲ μείζων ('minor [premise] is always true; but the major'); Philoponus's comment, as found in his commentary reads: ὥστε ἡ μὲν ἐλάττων ἀεὶ ἀληθῆς ἐστίν, ἡ δὲ μείζων ψευδῆς ('so that the minor [premise] is always true, but the major false'). Greek is a language that tolerates a great deal in the way of ellipsis, with omitted words to be understood from context. The ellipsis, therefore, of the word πρότασις ('premise') in both Philoponus's commentary and the fragment of it that made its way into the Aldine text presents no problem; in fact, this word is very frequently omitted by both Aristotle and Philoponus. The omission of ὥστε ('so that') from the Aldine text is similarly unproblematic, though one might have expected some sort of conjunction to provide a link to what has preceded. The omission of ψευδῆς ('false'), however, asks rather more of the reader—it could be inferred from the ἀληθῆς ('true') that precedes it, but the sense is much clearer with ψευδῆς present, which is, of

¹⁴ Barnes (1994), p. 166.

¹⁵ Philoponus' commentary on this work is the earliest to have survived, but it was far from the first—Theophrastus, Aristotle's pupil and successor as head of the Lyceum, wrote one, and Galen claims to have written as many as eleven. For Theophrastus, D.L. 5.42; for Galen, *Libr. Propr.* 14; see further McKirahan (2012), p. 1.

¹⁶ Truth or falsity here relates to the knowledge that can be derived from a syllogism rather than its formal validity, the formal characteristics of syllogisms having been discussed in the *Analytica Priora*; see further Halper (2018) 36–38, whose discussion covers in particular the middle term and how it functions in a syllogism.

course, why Philoponus included it.¹⁷ Second, the phrase from Philoponus’s commentary makes use of post-Aristotelian vocabulary in describing the parts of a syllogism. Aristotle generally uses letters of the alphabet to refer to the terms of a syllogism, and then refers to the propositions (i.e. the premises and conclusion of the syllogism) by means of the terms they contain. So, for example, an Aristotelian syllogism might take the form:

	All B is C
	All A is B
<i>therefore</i>	All A is C

A, B, and C are the terms, and having identified them as such Aristotle may refer to the premises as BC and AB and the conclusion as AC. Philoponus, on the other hand, uses the post-Aristotelian terms *μείζων* (‘major’) and *ἐλάττων* (‘minor’) to refer to the first (BC) and second (AB) premises respectively.¹⁸ The extent to which a Renaissance reader would have been sensitive to developments in philosophical vocabulary over the course of the ancient and medieval periods, and able therefore to distinguish Aristotelian from post-Aristotelian usage, is difficult to gauge, especially as there are forerunners of post-Aristotelian vocabulary already in Aristotle—Aristotle may not speak of the ‘major’ premise, but at *APo.* 18b20, for example, he does speak of *τὴν πρὸς τῷ μείζονι ἄκρῳ* (‘the [premise] on the major extremity’).

In addition to these two internal factors—incompleteness and post-Aristotelian vocabulary—external evidence may have led the reader of the Beinecke copy to condemn the extraneous text. That is to say, the reader may simply have compared Aldus’s text as it appears in this Beinecke copy with either: 1) another text of the *Analytica Posteriora*, whether a manuscript copy, an Aldine copy that does not contain the phrase from Philoponus, or a later printed edition; or 2) the text of Philoponus’s commentary—manuscripts of Philoponus’s work were no doubt rare, but an Aldine edition appeared in 1504.

All that remains is to explain how the phrase from Philoponus’s commentary made its way into the Aldine text of the *Analytica Posteriora* in the first place. The simplest explanation, of course, is that it was in the copytext used by Aldus’s compositor. This is merely to postpone the problem, however, for it does not account for the presence of the phrase in the copytext, and so on backwards through the tradition to whenever the extraneous text first appeared. What is certain is that at some point Philoponus’s text found its way into Aristotle’s, and the most likely source is interpolation from a marginal note or gloss. At some point, that is, a reader of Aristotle who was familiar with Philoponus decided to quote the latter’s commentary in the margin of a copy of the *Analytica Posteriora*. A later copyist, or perhaps even the Aldine compositor, misinterpreted this marginal note as part of the main

¹⁷ The punctuation of the extraneous text, with a comma following *ἐλάττων*, may seem unnatural to a modern reader, but is unlikely to have caused any difficulties to our early reader; the inclusion of a comma in such contexts—i.e. after both *μείζων* and *ἐλάττων*—is the standard Aldine convention, as can be seen by referring to Aldus’s 1504 edition of Philoponus’s commentary, *passim*. The standard modern edition, Wallies (1909), prints without a comma, as reproduced above. Likewise, Aldus’s use of a semi-colon following *ἔστιν* poses no problem; it suggests a slightly greater syntactical break than the comma that Wallies opts for, but the sense is identical.

¹⁸ The use of *μείζων* and *ἐλάττων* in this way did not originate with Philoponus and can be traced back at least as far as Alexander of Aphrodisias’ commentary on the *Analytica Priora*; see, for example, Alexander’s discussion of major and minor premises at *in APr.* 47.29–48.10. For further discussion, albeit in a Latin context, see Thomsen Thörnqvist (2008), p. 172.

text and incorporated it as such.¹⁹ The process of interpolating a marginal note in this way was facilitated by the fact that text that had been accidentally omitted in the copying of a manuscript was frequently added in the margin, usually with some sort of symbol, or *signe-de-renvoi*, indicating the point at which the omission had occurred; for examples, see below, pp. 44 and 46. It was therefore easy for a later scribe to confuse a marginal note with text added to supply an omission, and thereby interpolate a note into the main body of the text.²⁰ The highly technical nature of the *Analytica Posteriora*, which may well have made the sense obscure to a copyist or compositor, could also have aided in the process of interpolation by making more difficult any judgement as to what belonged in Aristotle's text and what was merely a gloss. Quite when the phrase from Philoponus's commentary was interpolated is impossible to tell, but its incompleteness makes it unlikely that it survived through multiple recopyings in the manuscript tradition—it was certainly caught by both the reader of the early-state Beinecke copy and Aldus's proof-reader. It is more likely, therefore, to have been a recent addition.

Timothy Perry

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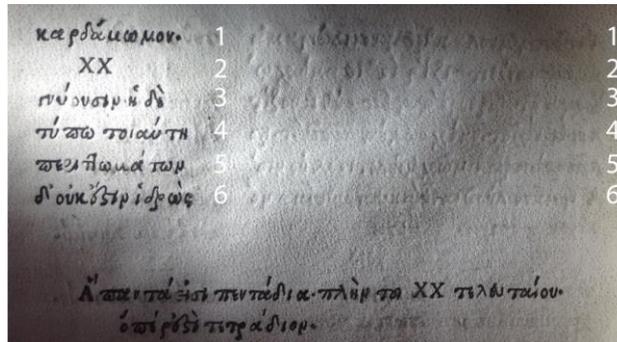
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¹⁹ Unfortunately, the manuscript used as a copytext for the Aldine edition has not been identified, making it impossible to determine whether Aldus's compositor reproduced or introduced the error. For the manuscripts of Aristotle used by Aldus, see Sichterl (1976), who, however, has little to say about Aristotle's *Organon*, of which the *Analytica Posteriora* forms a part.

²⁰ For scribal practice in the manuscript tradition of Aristotle's works, especially as it relates to commentaries, see Kotzabassi (2002) 52; for glossing and interpolation more generally, see Clemens and Graham (2007) 39.

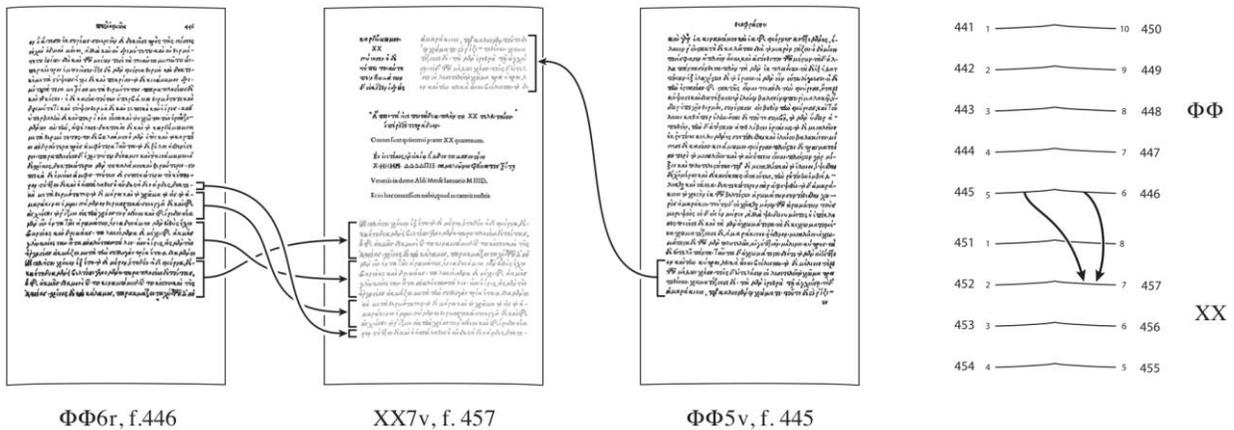


Consider the eighth and final leaf of quire XX in vol. 3. It is blank on both sides. By ‘blank’, I do mean it this time: there is no blind type there. In the two open areas of XX7v, however, the page before, we are not disappointed. At the bottom of this page and in the following raking-light photograph of the top right, there are legible examples of blind type. This upper area affords an intimate view of how, from a dead composition, a compositor built up lines to print blind elsewhere.



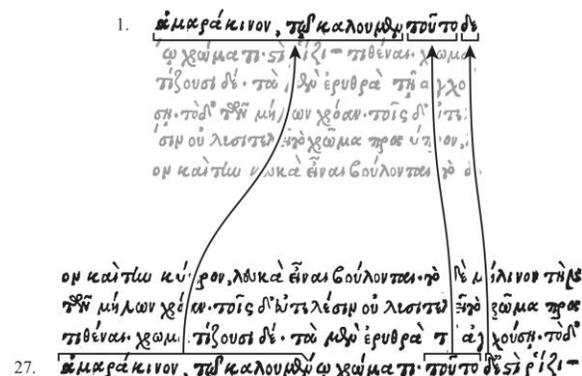
XX7v

In this photo from New College, the bite of blind type is legible in the first half of each of the six blind lines, perhaps because Aldo’s platen or packing of the tympan exerted extra pressure there.²¹ The dark letter-shapes at the right end of these lines are merely show-through (from the recto side of the leaf) and the blind type there cannot be made out. But the initial characters are deeply debossed and easy to read: α in l. 1; $\omega\chi$ in l. 2; $\tau\zeta$ in l. 3; $\sigma\eta$ in l. 4; $\sigma\nu$ in 5; and $\omicron\nu$ in l. 6. These six lines constitute the more interesting example of blind type on this page, as they could not have been filled with whole lines, as at the bottom of the present page and also in previous maps.

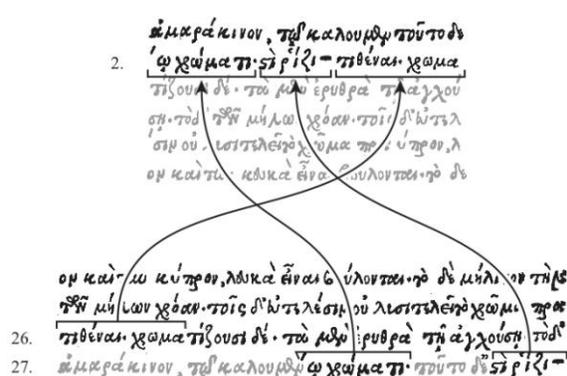


²¹ A most vivid example of such uneven platen pressure appears on u5v of the 1514 Aldine Petrarch. There, skin copies reveal blind type imported from an admonition by Pope Julius II previously on B3r of the 1513 Caesar. It is legible only on the left side of the page. For a raking-light image of this page and for maps of the rest of the blind type in this edition, see Dr Alba Page’s uncut octavo-sheet insert, ‘Les égouts de Paris: The sewers of’, *Chicago Review* 59 (1) (Fall 2014).

The following six maps will document how these lines of blind type atop XX7v were built up one at a time by shoe-horning line segments of varying sizes quarried from the final four lines of ΦΦ5v. In what follows, the blind lines on XX7v are numbered from 1 to 6 and those on ΦΦ5v from 24 to 27. Higher-numbered lines from the bottom of the source were quarried first (27, then 26, 25, and 24) to create the lower-numbered lines at the top of the destination (1, then 2, 3, 4, 5, and 6).

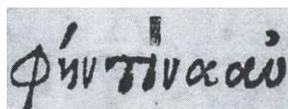


Map 1



Map 2

1. In the first map, three segments of type from l. 27 on ΦΦ5v feed the first line atop XX7v. A very subtle detail: the first and third segments do not take with them the diacritic that pertains to the last word in each phrase—´ above the *mu-epsilon-nu* ligature in the middle of the line and ¨ above ligature *delta-epsilon* near the end. These diacritics must be stand-alone sorts; and the vowels in the ligatures they modify may kern over them or *vice versa*, or both.²² Or, as the following image suggests (it shows a spacing type above the *tau-iota* ligature in hh0010r.29, which has risen in some copies and taken ink),



the apparent point size of Aldo's type may sometimes be made up, above, of diacritics or spaces that occupy only a third of a line and, below, x-height letters whose bodies fill the remaining two-thirds. It is hard to be sure of the typographical details when all we see are inked impressions of typeface and not the whole types. (The following descriptions will be in terms of kerning.)

Between the second and third segment in l. 1 of this first map, some spacing seems to have been altered in order to achieve justification. Routine alterations of spacing are to be expected in the construction of every blind line of this re-composition. The blind impressions were usually not clear enough, however, to make them obvious to me as I constructed these maps.

2. In the second map, two segments of type from l. 26 and one from l. 27 feed l. 2. The first of them begins with the acute accent left behind in the first map; that accent thus certainly seems to be a full-height character, and the *mu-epsilon-nu* ligature that preceded it must, I suppose, have kerned some of the face of the *nu* portion over the body of the accent type. If so, we would have to understand this about the first map: that following the first segment in l. 1, a shoulder-high space must also have

²² An example of such kerning is illustrated in Philip Gaskell, *A New Introduction to Bibliography* (Oxford: Clarendon Press, 1972), fig. 18, p. 32: there, the face of *alpha* kerns onto the shoulder of a mark of smooth breathing, and, as it extends even beyond the far edge of the face of this smooth-breathing type, composition of an additional space might well be required to protect the kern from damage by the face of whatever letter might be composed next.

been composed next to *-nu* to support its kern. The *second* segment takes all the remaining types from l. 27 except the second diacritic, ”. If the *delta-epsilon* ligature that stood before it, and which now ends l. 1, also had a kerned letter, the *epsilon*, a shoulder-high space must have been added at the end of the line to support it. (Most spaces do not need to be shoulder high, but ones exactly that height are required at the start or end of a line—or even at the start or end of a word anywhere in the line—when there is an outward-facing kern, in order to keep it from bending or snapping off when pressed by the platen.) The *third* segment comes from the start of l. 26.

3. In the third map, l. 3 is made up of a single segment of the next available part of l. 26. The diacritic ” in l. 27 is the only part of that line not conveyed to XX7v. (It therefore remains dark.)

3. ἔμμεράκινον, τῆς καλουμένης τούτου δὲ
ἢ χρώματι· σὲ ρίξι· πέναι, χρώμα
πίσουσι δὲ· τῶ μὲν ἔρυθρά τῆ ἀγχοῦ
 ση· τὸ δὲ τῶν μύλων χόσπ· τοῖς δὲ βίτι λ
 σμ οὐ λισιτελεῖτὸ χρώμα πρὸς ὑπρην, λ
 ομ καί τῳ κούκᾳ ἔναι βούλονται· γὰρ δὲ

4. ἔμμεράκινον, τῆς καλουμένης τούτου δὲ
ἢ χρώματι· σὲ ρίξι· πέναι, χρώμα
πίσουσι δὲ· τῶ μὲν ἔρυθρά τῆ ἀγχοῦ
 ση· τὸ δὲ τῶν μύλων χόσπ· τοῖς δὲ βίτι λ
 σμ οὐ λισιτελεῖτὸ χρώμα πρὸς ὑπρην, λ
 ομ καί τῳ κούκᾳ ἔναι βούλονται· γὰρ δὲ

26. ομ καί τῳ κούκᾳ ἔναι βούλονται· γὰρ δὲ μύλων τῆς
 τῶν μύλων χόσπ· τοῖς δὲ βίτι λ σμ οὐ λισιτελεῖτὸ χρώμα πρὸς
 πέναι, χρώμα πίσουσι δὲ· τῶ μὲν ἔρυθρά τῆ ἀγχοῦ ση· τὸ δὲ
 ἔμμεράκινον, τῆς καλουμένης ἢ χρώματι· τούτου δὲ σὲ ρίξι·

25. ομ καί τῳ κούκᾳ ἔναι βούλονται· γὰρ δὲ μύλων τῆς
 τῶν μύλων χόσπ· τοῖς δὲ βίτι λ σμ οὐ λισιτελεῖτὸ χρώμα πρὸς
 26. πέναι, χρώμα πίσουσι δὲ· τῶ μὲν ἔρυθρά τῆ ἀγχοῦ ση· τὸ δὲ
 ἔμμεράκινον, τῆς καλουμένης ἢ χρώματι· τούτου δὲ σὲ ρίξι·

Map 3

Map 4

4. In Map 4, l. 4 consists of two segments: first is the remainder of l. 26; second is the start of l. 25. A space lies between them. Where might it have come from? It could have come from the invisible end of l. 26, for a common practice (nowadays, at least) is to begin and end composition of a line of type in the composing stick with a uniformly wide space. When it is shoulder-high, it protects outward-facing kerns. (Of course, the space could simply have been composed from the case.)

5. ἔμμεράκινον, τῆς καλουμένης τούτου δὲ
ἢ χρώματι· σὲ ρίξι· πέναι, χρώμα
πίσουσι δὲ· τῶ μὲν ἔρυθρά τῆ ἀγχοῦ
 ση· τὸ δὲ τῶν μύλων χόσπ· τοῖς δὲ βίτι λ
 σμ οὐ λισιτελεῖτὸ χρώμα πρὸς ὑπρην, λ
 ομ καί τῳ κούκᾳ ἔναι βούλονται· γὰρ δὲ

6. ἔμμεράκινον, τῆς καλουμένης τούτου δὲ
ἢ χρώματι· σὲ ρίξι· πέναι, χρώμα
πίσουσι δὲ· τῶ μὲν ἔρυθρά τῆ ἀγχοῦ
 ση· τὸ δὲ τῶν μύλων χόσπ· τοῖς δὲ βίτι λ
 σμ οὐ λισιτελεῖτὸ χρώμα πρὸς ὑπρην, λ
 ομ καί τῳ κούκᾳ ἔναι βούλονται· γὰρ δὲ

24. ομ καί τῳ κούκᾳ ἔναι βούλονται· γὰρ δὲ μύλων τῆς
 25. τῶν μύλων χόσπ· τοῖς δὲ βίτι λ σμ οὐ λισιτελεῖτὸ χρώμα πρὸς
 πέναι, χρώμα πίσουσι δὲ· τῶ μὲν ἔρυθρά τῆ ἀγχοῦ ση· τὸ δὲ
 ἔμμεράκινον, τῆς καλουμένης ἢ χρώματι· τούτου δὲ σὲ ρίξι·

24. ομ καί τῳ κούκᾳ ἔναι βούλονται· γὰρ δὲ μύλων τῆς
 τῶν μύλων χόσπ· τοῖς δὲ βίτι λ σμ οὐ λισιτελεῖτὸ χρώμα πρὸς
 πέναι, χρώμα πίσουσι δὲ· τῶ μὲν ἔρυθρά τῆ ἀγχοῦ ση· τὸ δὲ
 ἔμμεράκινον, τῆς καλουμένης ἢ χρώματι· τούτου δὲ σὲ ρίξι·

Map 5

Map 6

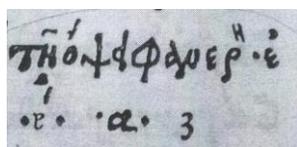
5. In Map 5, the remainder of l. 25, including the acute accent on *epsilon* at the start, but not the letter itself, migrates to the start of the l. 5. That line is filled out, curiously, with a few types from *inside* l. 24. Why? The same length of type taken from the start of that line would have ended unsatisfactorily

in the midst of a *tau-eta-nu* ligature. Obviously, the compositor built up this line from the start, and so it was the end of the line that required precise fitting.

6. In the last map, two phrases that flanked the mid-line sequence of l. 24 that migrated to l. 5 in map 5 go to fill up l. 6. As in l. 1, the last type, a *delta-epsilon* ligature, arrived without its diacritic and was, I imagine, supported by a shoulder-high space under the supposed kern of the *epsilon*.²³

Of the typeface in the four quarried lines on ΦΦ5v, what was not put to use as blind type in the six lines on XX7v amounts only to the diacritic in l. 27, the *epsilon* in l. 25, and a little over a dozen characters at the end of l. 24. As the length of one of the lines of blind type on XX5v is about two thirds the length of a line of inked type on ΦΦ5v, four full lines almost fill six of these shorter ones. It was neat work.

A startling take-away from these minutest observations of the compositor's actions concerns the diacritics. Everywhere one looks now, their independent faces will loom out, as in this signature in vol. 4,

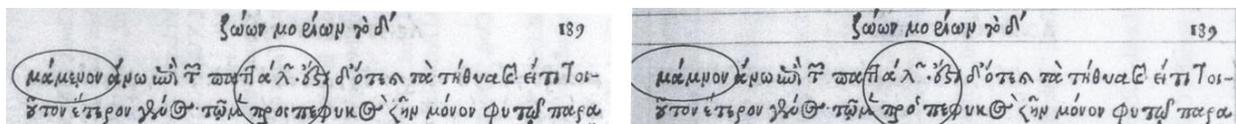


or as in these italic circumflex accents in l. 40 on p. □ 6v of Vala's *De expetendis* (1501).



Two delicious errors here. In what must be the earlier state (on the left), the *a* plus its circumflex were together composed upside down and followed with a redundant circumflex right-side up. The *alpha* was later turned right-way round, but the wrong accent was removed.

On τττ9r.1 of *De motu animalium* in vol. 3: the removal of *epsilon* from the first word

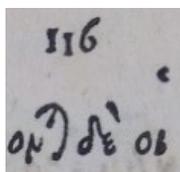


occasioned the sliding left of the rest of the sentence, except for the circumflex above *lambda* (circled), which remained in place. Also, below the circumflex, a space must have opened, into which rose at least the *sigma* of 'προς' in the line below. It is hard to know exactly the body shapes of these accent sorts. Some may kern horizontally; but others, as previously noted, may sit on small bodies that are composed above letters or spaces, which are also on proportionally reduced bodies.²⁴

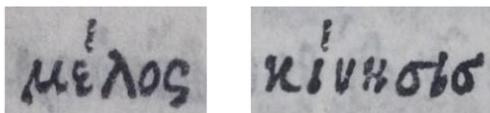
On mmμ5r.1 of vol. 3, the rough breathing at the end of the line exhibits a very free spirit.

²³ P.S. I observe that the last line of Map 6 is slightly too long. As I suggested in commenting on the first map, the compositor would often have had to alter interior spacing to make a quarried segment fit. When this plague is past and libraries reopen, I'll check how the compositor made this line fit and I'll tighten my representation accordingly.

²⁴ Aldo's note on diacritics on γ2v–3v of his 1501 Vergil (the first book printed entirely with italic type) has examples of what seem to be cut-down bodies stacked vertically, so that some diacritics print above, and some below the letter.

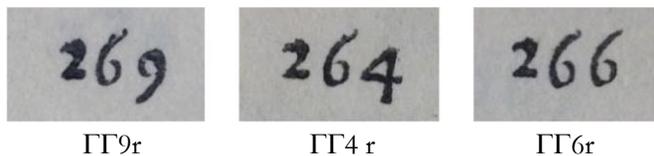


On &&ω10v.4 and 2r.30 in vol. 3, the same damaged acute accent appears over different vowels.



In this range of vol. 3 (as a later section of this essay will explain at length), three headline settings recycle regularly in a quire: A, B, C, A, B, C This distinctively damaged accent appears first above *epsilon* on a page with an A headline and then, faster than the rhythm of recycling returns that headline to the press (three formes later), this accent reappears (two formes later) above *iota* on a page with a C headline. And so, we come by the humblest of means to detect various rhythms of recycling in type from different areas of a forme.

The folio numbers in recto headlines also have their own lives. Observe the three appearances of a damaged ‘6’ in quire ΓΓ, three formes apart between pp. 269 and 264 in vol. 3 and three more between pp. 264 and 266. Whenever the headline reappears (headline no. 2 in this case), its damaged page number can also reappear (though in fact the verbal part of this headline is typically suppressed on p. 264, because that page begins with an ornament followed by a new title).



One might suppose that a signature might also recycle along with a headline as part of a single skeleton.



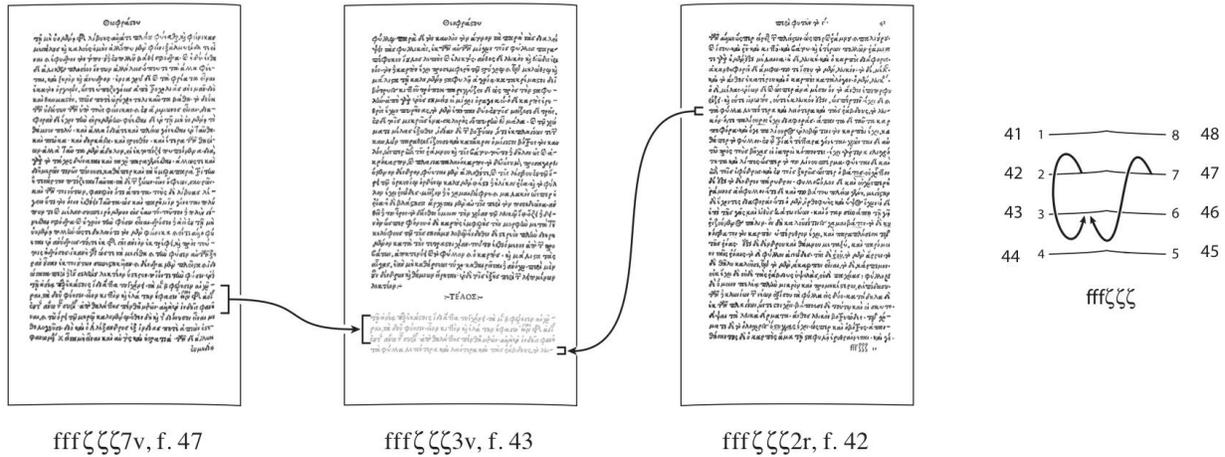
But in these two signatures the damaged ‘I’ is recycled four formes later, whereas the headline titles (A, B, and C) above these pages recycle every three formes: above ‘BB III’ is a C headline, above ‘BB IIIII’ is an A (but not the A immediately following that C). Printing folio with three formes in sequence, a skeleton must recycle over an *even* number of consecutive formes to be able to reuse part of the setting of its signature in another signature. (That’s because an odd number would have brought the signature to the aft quire, where signatures are not used.) That the damaged sort reappears in A, four formes away (rather than in B, only two away) implies that that forme, though printed, had not yet been stripped. Here is another indication of the rate of recycling. (There will be more on skeletons below, on pp. 63–70.)

Back now to printer’s copy and to further thoughts on whether a quire was produced from the extremities to the centre or *vice versa*.



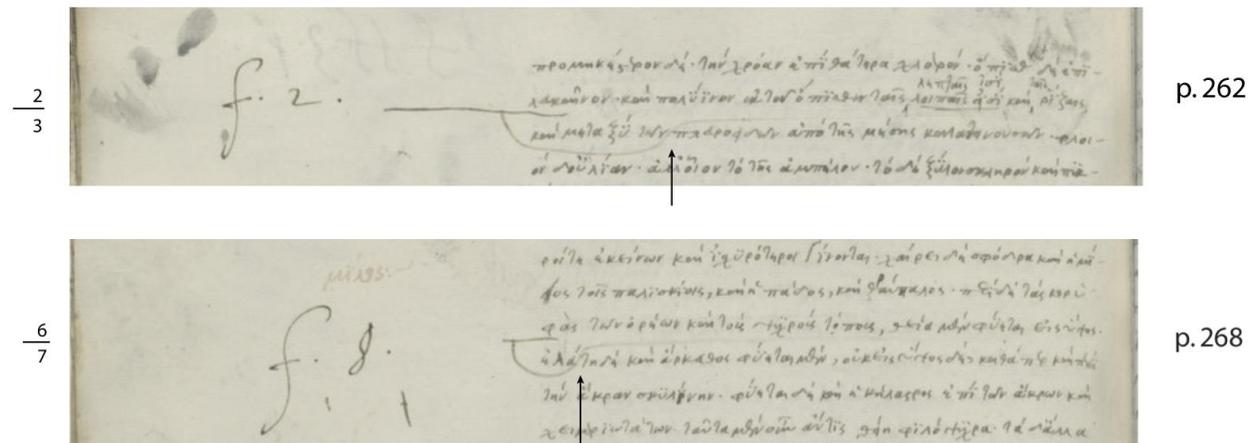
A discrepancy between where a page-break is cast off in the manuscript and where the printed page actually breaks does sometimes occur in the aft-quire, despite my claims on p. 11 that confined this discrepancy to the fore-quire. As it could be evidence of composition from the center of a quire to the extremities, aft-quire discrepancies present a challenge that must be addressed.

In vol. 4, consider the end of Bk 3 of *De historia plantarum* (shown in the middle of the following map)



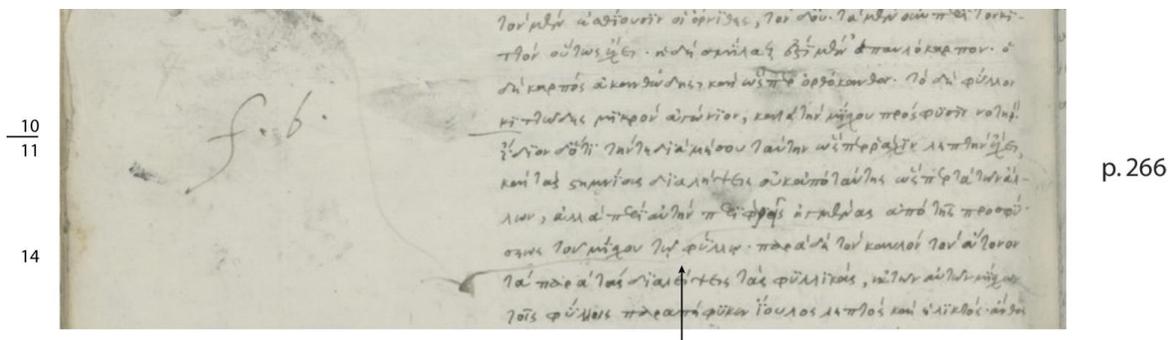
and the start of Bk 4 on 4r (not shown here). The body of p. 3v has 26 inked lines, 4 blind lines, and leading.²⁵ Casting-off allotted 30 lines of manuscript for this final page of Bk 3, and 25 for 4r; there, 7 of the 32 lines normally allotted for a full page are taken up with an ornament, large initial, and leading for the start of the new Book. All the other pages in the quire were cast off at 32 lines each and each page has 30 lines of type. These facts suggest that composition was smooth sailing, but it was not. As the problems could be dealt with routinely, however, they are not apparent in print.

Look now to the meta-map, on the right, above. The sources of blind type on 3v (2r and 7v) point decisively to composition from an outer to an inner forme, just as was documented for quire qqppππ (on pp. 9–12). Further support for this interpretation appears in the fore-quire: on f2 and f8, for example, we find these familiar-looking minor discrepancies—of merely a few syllables.

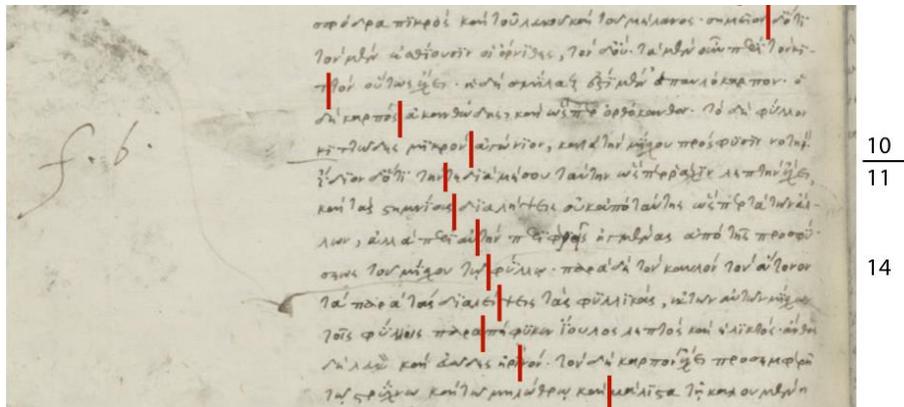


²⁵ Blind type often extends below l. 30, the usual last line in the column: evidently, there was a buffer before the furniture. For evidence of such a buffer, see the map at the base of p. 102.

Also in the fore-quire, however, are unusually large discrepancies on f5 (two and a quarter manuscript lines) and, shown next, on f6 (almost three and a half manuscript lines). These large discrepancies in the fore-quire cry out for explanation even before I come to consider the problematic discrepancies in the aft-quire.

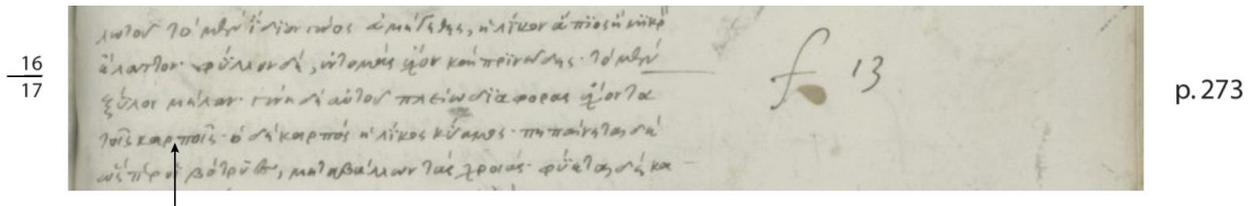
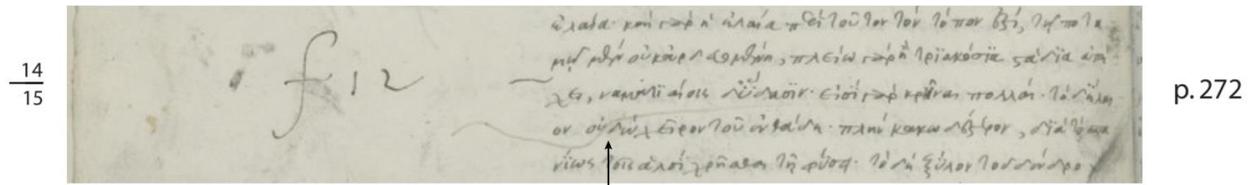


It is no coincidence that f6 is copy for the short 3v page shown in the centre of the previous map. It seems that the compositor, concerned lest the conclusion of Bk 3 spill over from 3v onto 4r, set f5 (for 3r) and f6 (for 3v) more compactly than usual. With hindsight, it is easy to see that he could have relaxed somewhat and more nearly filled 3v with (inked) text before the page-break. But he chose safety and (I'm happy to see) provided room for the use of the blind type—which reveals the overall direction of composition from outside to centre. This conclusion will be reinforced if we map onto this page of manuscript the line-breaks from the printed pages in the vicinity of the places cast off and marked off.

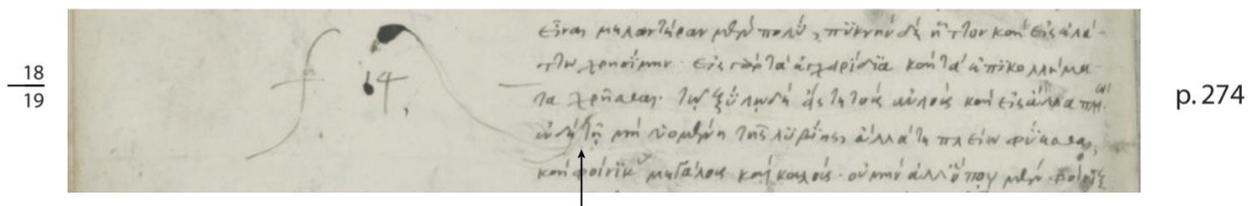


Had he been composing backwards in the fore-quire a page at a time, a compositor would have had to start each composition at the beginning of a line of manuscript. But in the range shown here—a) four lines before the casting-off of the planned start of f6 (at the end of l. 10), and b) four lines between that casting-off and the later marking-off (part way into l. 14), and c) four lines thereafter—not a single line of type starts where a line of manuscript does. A compositor setting from the extremities to the centre, however, as he must have done here, was under no obligation to start or to end on the nose.

Now to the discrepancies in the aft-quire—on f12, f13, and f14, which, like those in the fore-quire are also ‘familiar-looking’—challengingly so.



The discrepancy in f13 is not marked off, but like those in f12 (shown above) and in f14 (shown next), it amounts merely to a few syllables more than a line of manuscript.



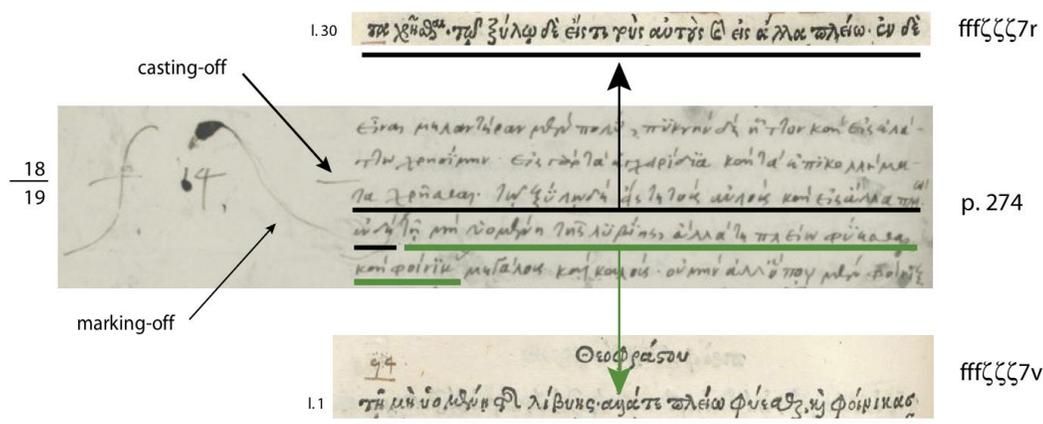
We will do well to quantify all these discrepancies and to understand them in terms of their positions in the structure of the quire. Consider the following comparison, in which the extent of the discrepancies is calculated on two bases—on the left, in terms of the length of a line of manuscript and, on the right, in terms of the length of a line of type. (Zero indicates that a page-break in print accords with the casting-off.)

		Discrepancy			
		by a line of manuscript		by a line of type	
f1	0	0	f16	0	f16
f2	0.37	0	f15	0.19	0
f3	0	1.08	f14	0	1
f4	0.22	1.12	f13	0.19	1
f5	2.20	1.11	f12	1.82	1
f6	3.36	0	f11	3.23	0
f7	0	0	f10	0	0
f8	0.7	0	f9	0.06	0

The precise values of fractions and their differences according to one basis of calculation or the other have little relevance here. What is significant—and astonishing—however, is the ellipse (on the right) containing three integers in a row in the aft-quire; contrast them with the fluctuating values (1.08, 1.12, and 1.11) in the corresponding position on the left. That these various distances in the manuscript should always equal precisely the length of one line of type can hardly be a coincidence. That they occur in a row suggests that they reflect a single kind of problem—as indeed they do. So, these

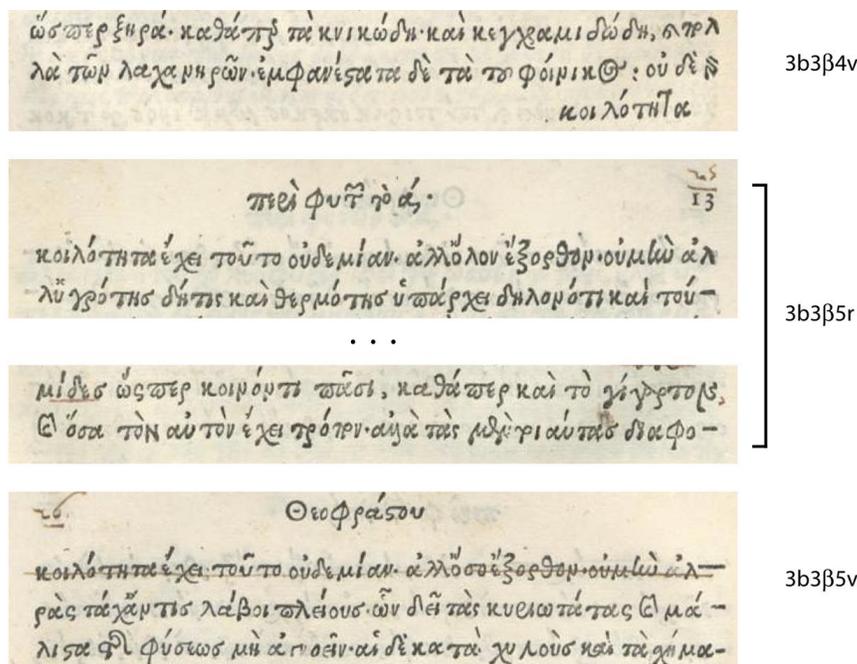
aft-quire discrepancies are not so ‘familiar-looking’ after all. The lesson here will prove to be that *composition* in these aft-quire pages did respect casting-off after all (despite the presence of marking-off), but *imposition* of them did not: marking-off in the fore-quire was routinely dictated by composition, but the occasional occurrences of aft-quire marking-off pertained to imposition.

I shall begin an account of the composition and imposition of these three pages with f14. As composition advanced from the outside of the quire to the centre, this was the first cast-off unit to be composed among f12, f13, and f14. Composition of f14 began, as usual, at the left margin of the first line after the mark of casting-off. Although f14 was all intended for fffζζζ7v, the first line of type composed for it (coloured black in the next diagram) was eventually imposed instead as the last line on 7r, the previous page (narratively speaking), and merely the rest of the composition of f14, beginning with l. 2 (coloured green), was imposed atop 7v. (But, of course, this narratively previous page, 7r, had not yet been composed. The first line of f14 had, therefore, to be set aside for a future rendezvous.)



After he had reached the bottom of his setting of f14, and discovered that he had 31 lines, the compositor returned to where he had begun and marked off there the length of text corresponding to the first line of type he had recently set for the aft-quire page of this forme. Such marking-off in the aft-quire contrasts to marking-off in the fore-quire. In the fore-quire, the compositor marked off exactly where and when he finished setting a page (for the start of the next composition, the next page narratively), not, as he did here in the aft-quire, at a place near where he had begun (for the previous page narratively, not yet composed).

Do you doubt this explanation? A most convincing demonstration of the migration of a line from one page to the top of another occurs when the line lands in the wrong place. Consider the following excerpts from quire bbbβββ—of the same text by Theophrastus: first in this illustration is the bottom of 4v, then the top & bottom of 5r, and, last, the top of 5v. The first line on 5v is struck out in this the Bayerische Staatsbibliothek copy—struck out by a reader, it seems, not by the publisher, because, in other copies (Vatican, Boston Public Library, etc.) it is often not deleted.



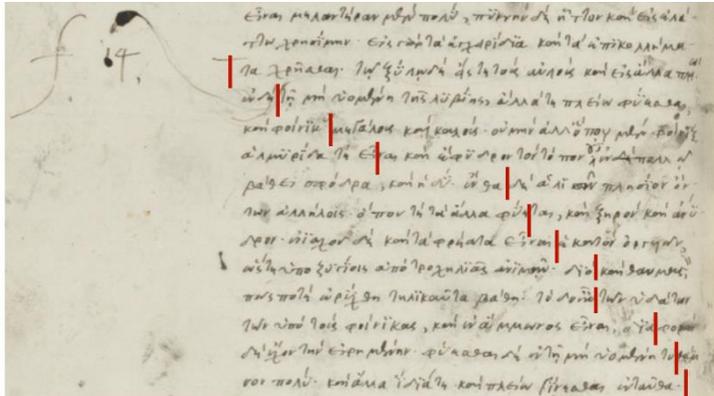
The catchword ‘κοιλότητα’ on 4v correctly links that page to the first line of 5r, the next page. But this first line also appears, inappropriately, atop 5v, the page following. No catchword links 5r to 5v, but, if a proper one did, it would read ‘-ρας’, as in ‘διαφῶρας’—in order to link up the first part of this word with the second part, in the *second* line on 5v. Curiously, the two versions of this ‘κοιλότητα’ line are in the same setting of type, but with slight differences (‘ἀλλ’ ὄλον ... ἀλ’ vs ‘ἀλλ’ ὄλοσο ... ἀλ—’), for this is an example, a most bizarre one, of stop-press revision. (It is bizarre, because the press was stopped for revision between formes, not during one.) The 5r state, Tim tells me, makes better sense. Surely it is in the revised state. However, the 5v state, he adds, is closer to copy (though it does omit the final ‘v’ from ‘ὄλοσον’). On pp. 42–50, I shall attempt to explain how this mistake might have come about; but back now to quire fffζζζ, the matter in hand.

Similarly for f13, cast off for fffζζζ7r: the first line of type in the composition of this stint was imposed (later) as the last line on the narratively previous page, 6v (not yet composed), and the remaining 29 lines were imposed as 7r, concluding with the first line (already composed) brought over from f14 to be the thirtieth line. And similarly also for f12, cast off for fffζζζ6v. The first line of type composed in this stint was imposed (later) as the last line on 6r, the narratively previous page (not yet composed); meanwhile, the remaining 29 lines were imposed as 6v, concluding with the first line left over from f13 as the 30th line. This repeated banishment of the first-born did not end until f11 was imposed, as we shall soon see.

The problem in f14 that provoked this backwards cascade was its 31st line of type, when the page was composed. A little less than half way through his setting of f14, while he passed from p. 275 of the manuscript to p. 276 (as shown on the next page), the compositor (if it was he who continued across this page-break) abruptly reduced the ratio of lines of manuscript to lines of type from about 32:30 to 32:32—or 1:1.

(Note that at l. 18 I have introduced an asterisk to mark a line of copy that has no annotation representing a line-break in the composed page. The usefulness of this mark will soon be apparent.)

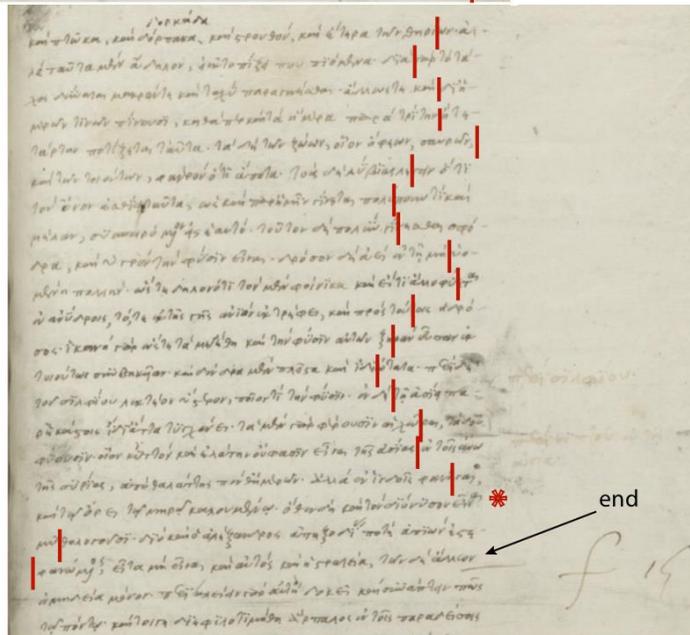
f 14



18
19

p.275

p.276



18

20

21

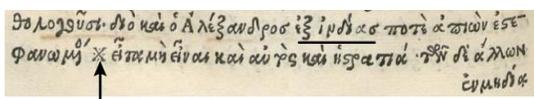
end

f 15

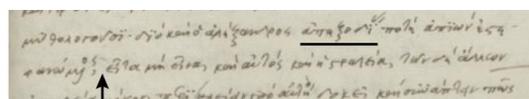
f14, copy intended for fffζζζ7v

Rather than impose all 31 lines of his composition as fffζζζ7v, the compositor set aside the first line for eventual imposition at the bottom of fffζζζ7r, yet to be composed. (At this time, it would no longer be possible to put the last line of his composition over onto the top of 8r, narratively later, for that page, having been composed earlier, would supposedly have already gone to press.) As a new end for 7r, the compositor marked off the manuscript where the first line of type composed for 7v had ended—two syllables into the line below where the start of f14 had been cast off. This place would be the new terminus of f13. Nevertheless, the impending composition of that page would still be obliged to end with a fully justified line in accordance with the original terminus, to be eked out thereafter with the first line of type brought over from f14 (composed long before).²⁶

²⁶ At the end of f14 (the bottom of fffζζζ7v), composition departed from copy. It reads ‘ἄπ’ ἔξοδίας’, but the compositor set ‘ἔξ ινδίας’. Nearby, he set an asterisk (see the arrow on the left), also with no prompting from copy.

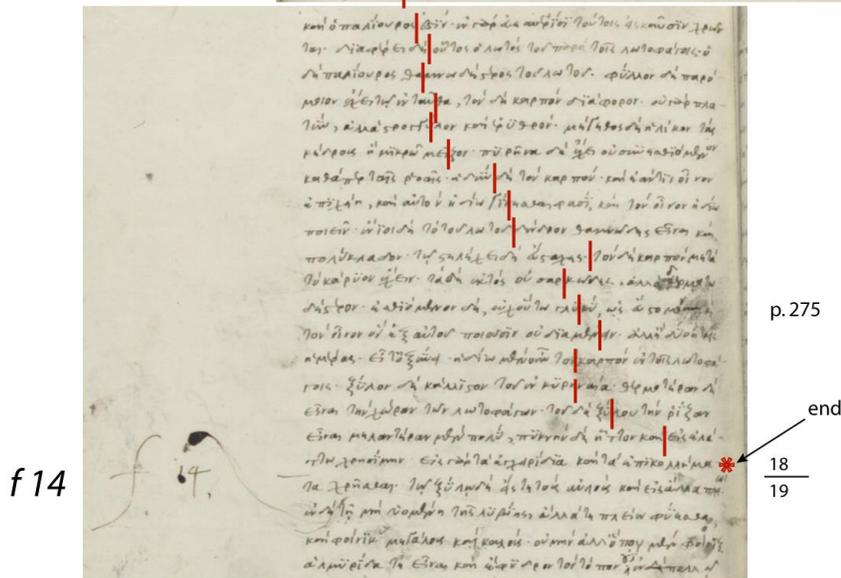
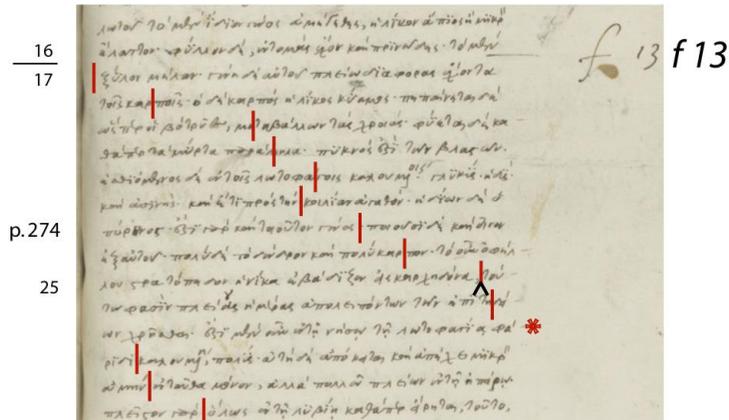


fffζζζ7v, ll. 29–30



p. 276, ll. 19–21

The story continues on Day 2 (let us say). The setting of f13—from the place cast off for its start to the place cast off for the start of f14—now with a ratio more constant, 32:30, produced a full page of type. There are two asterisks now.



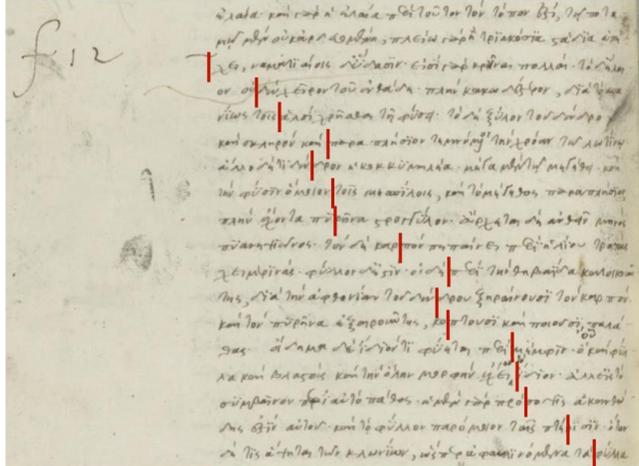
f13, copy intended for fffζζζ7r

When it came time to impose this composition of f13 to print fffζζζ7r with 30 lines, the addition of the former first line from the setting of f14, now brought over to be its 31st line, forced the first line of type for f13 to be set aside in turn, to become the last line of f12 (yet to be composed). (This time, the compositor happens not to have marked off copy after the end of the first line he had set. I have no explanation for why this mark is missing.)²⁷

As the story of f12 on Day 3 is like that just told for f13 on Day 2, it does not need repeating, except to say that this time, after composition, the first line was indeed marked off.

²⁷ At the (black) caret I have added in l. 25, the compositor inserted 'καὶ', without warrant from copy.

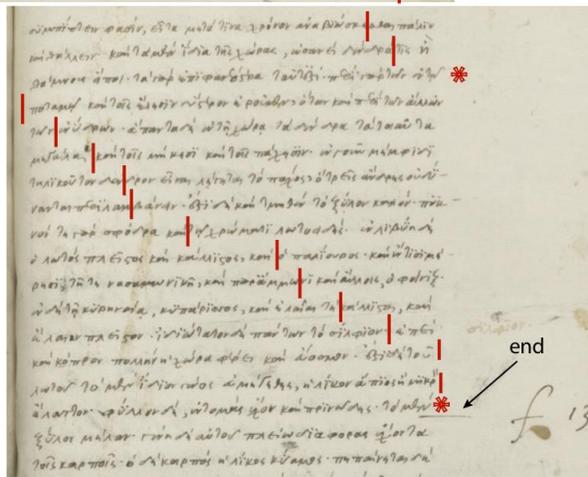
f12



14
15

p.272

p.273



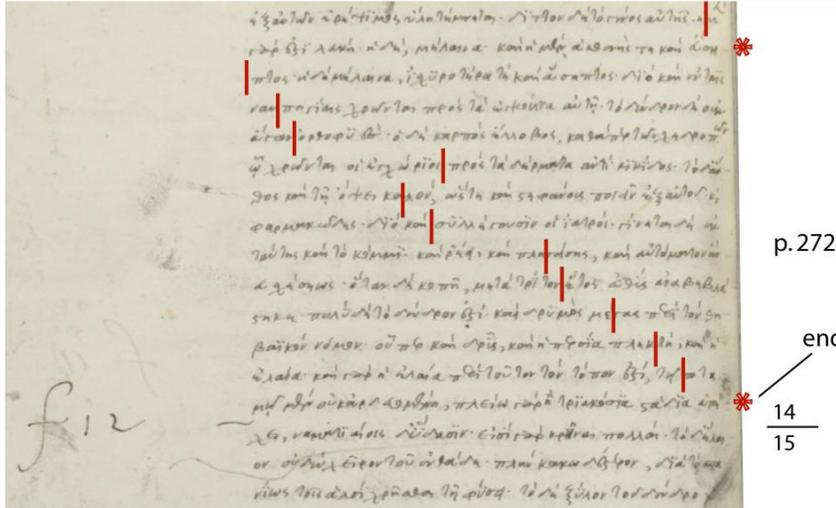
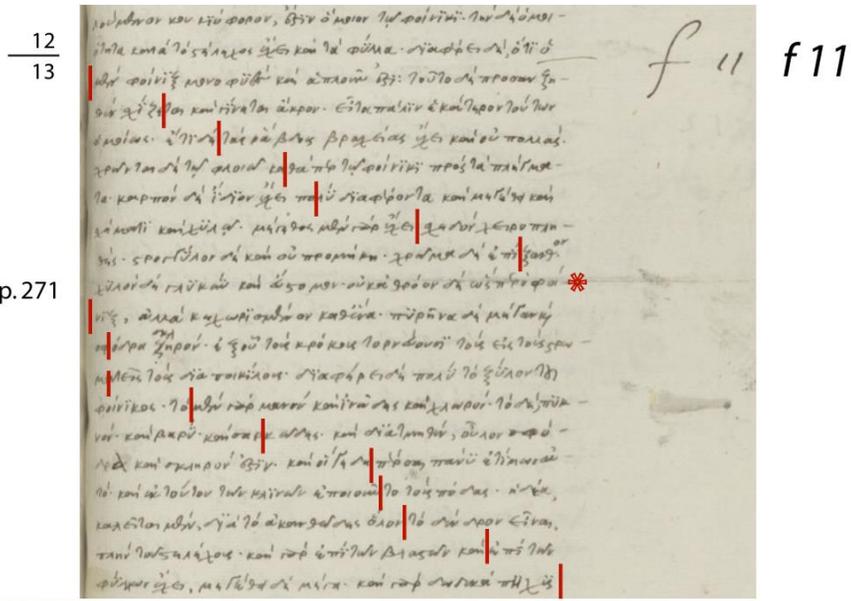
end

f13

f12, copy intended for fffζζζ6v

For those who seek to reconstruct a compositor’s activity when his copy is no longer extant, there is a sobering lesson in these maps from fffζζζ6v and 7r. The printed pages 6v and 7r, each at 30 lines, may strike us as units of composition, but we now know they are not: each starts with the second line originally composed for that page and concludes with the first line of the prior composition, the page that follows narratively. So, when looking to the last lines of a page for evidence of compression or inflation (as I did, for example, on p. 12), one may sometimes need to exclude the last line—as it might once have been a first line). Without access to printer’s copy, how would one know? But even with copy present, there can be doubts. A possible reason why there is no annotation in the second line of f13 is that the composition assigned to Day 2 and Day 3 occurred on the same day, as a single stint running through both pages. The division into these two pages could have taken place in a galley or galleys and so not have left a trace in the manuscript.

On Day 4 (in my original count), composition of f11, shown next, finished at only 29 lines. So, there are three asterisks now.



f11, copy intended for fffζζζ6r

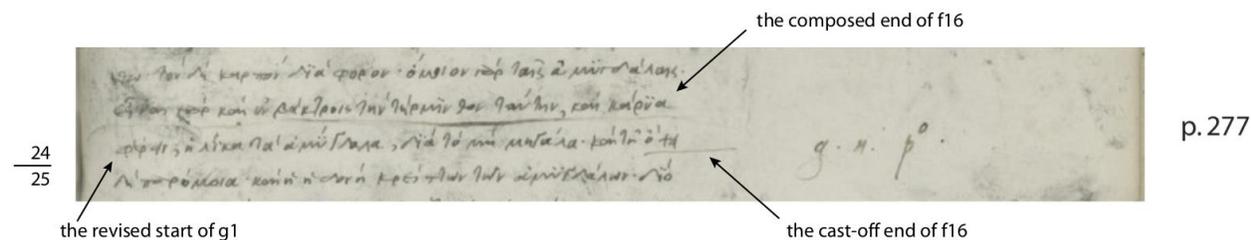
To these 29 lines, what had been composed as the first line for f12, but was set aside, was added at bottom as the 30th line. There was, at last, no more need to kick the can down—or was it up?—the road.

In this last image, for f11, the loci of page-breaks form three transverse slopes. Each slope signals that the number of lines of type set from the amount of text that the slope crosses is one less than the number of those manuscript lines. Thus, as 32 lines were cast off for a 3-slope/3-asterisk composition of f11, only 29 lines of type were composed in all. As the images of f12 and f13 show two such slopes (and two asterisks), 30 lines of type were composed in all. And the image of f14, showing only one slope (that's where the problem began), points to a composition of 31 lines of type.

Recall, by the way, that we have already seen a page with a single transverse slope—q9 (on p. 17). There the compositor imposed all 31 lines on qqppππ5r. As he was then in the last forme of the quire to be composed, there was nowhere to pass the buck. If he had wanted a 30-line page, he should not have changed ratio in mid-page. Or, having already composed a 31-line page, he could have driven out the excess line on that very page. If the example of driving *in* on p. 21 be taken as a guide, he could

have accomplished this amount of shrinkage over the ten last lines. But, as often in this central position in the quire (and even in other locations in it), a longer page was simply tolerated, as we have already seen (on p. 15) in the centre of quire IIIλλλ.

A similar problem arose at the end of the present quire, on f16. Composition of this page, had already produced 30 lines of type from manuscript copy by the time it arrived one line shy of the place cast off for the start of g1.



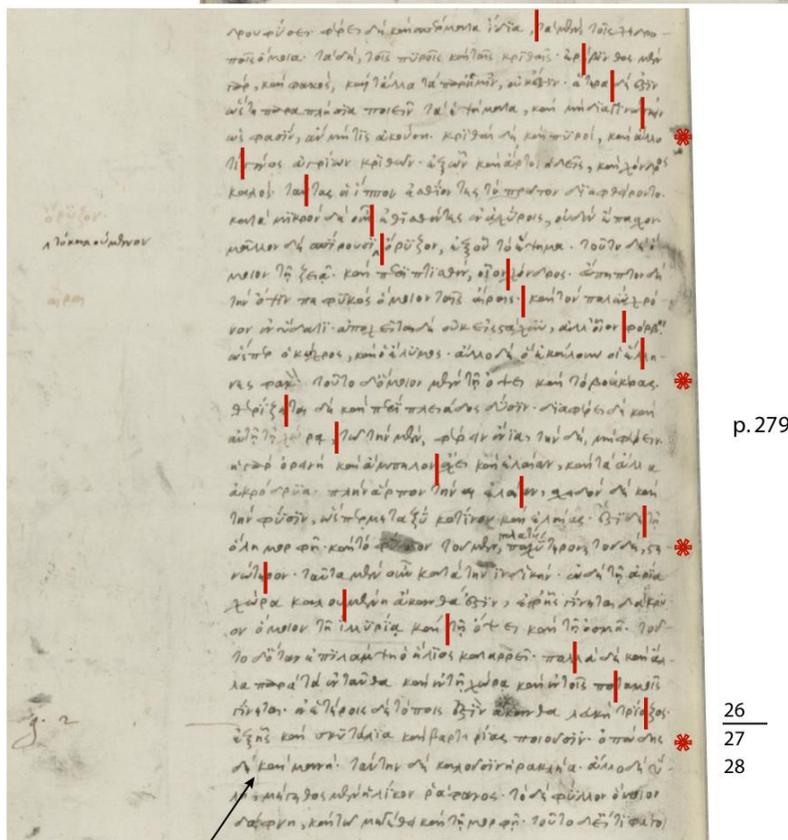
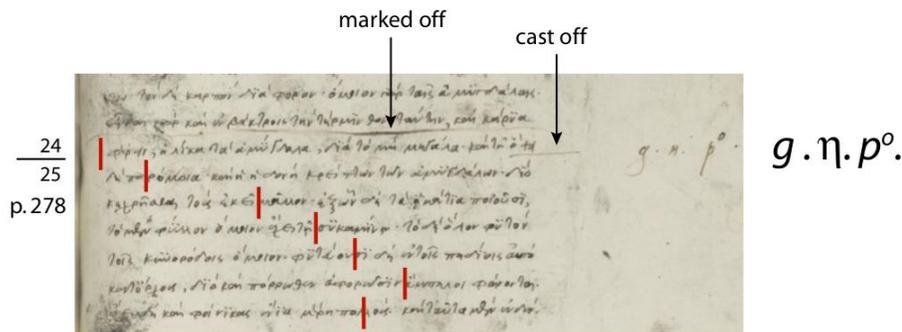
The marking-off by means of a line drawn across the column at this point is reminiscent of that drawn after q16 (see p. 19, the lower image); it suggests that the compositor ceased setting here (at 30 lines of type), and consequently that the start of composition for the next page would have to begin one line of manuscript earlier than the point that had been cast off.

But what if these adjacent quires, fffζζζ and gggηηη, had been in simultaneous production? Would this marking-off have appeared too late for the compositor of g1 to have acted on it when he began work on gggηηη? If he had commenced composition of gggηηη1 at the point cast off, he would eventually have had to add a new first line to his composition when the compositor of fffζζζ, having finished f16 short, alerted him to the problem. However, as the beginning of the second line on the printed page gggηηη1r does not correspond to the place cast off (the start of a manuscript line, as is shown on the next page), but happens to fall several syllables later, the composition of gη1r arguably began earlier, at the revision, marked off with the full underlining. Therefore, it would seem, the start of composition of quire gggηηη followed the composition of f16.²⁸

²⁸ 'arguably'? 'it would seem'? But, of course, a compositor could have set the added line of manuscript (l. 24) a little longer than a single line of type and driven this composition into the start of his pre-existing composition of g1.

If composition of fffζζζ and gggηηη had been shared simultaneously by two compositors, it would have been efficient for one of them to set f16 and g1 and for his mate to set f1 and g16. That way, the junction of one quire to the next would have been smooth, the work of a single compositor.

Mapping of the printed line-endings of g1 onto the manuscript reveals four transverse slopes, for a composition, therefore, of only 28 lines.



g2 starts here

g1, copy intended for gggηη1r

As gggηη1r was imposed with 30 lines, one must account for two lines more. One was composed from the manuscript line just discussed (that lying before the casting-off of the start of g1). The other was poached from the start of g2. For the end of that line, see the arrow at the bottom of this illustration: it shows where the compositor stopped in l. 28 of p. 279: there is very faint marking-off here, a line and a few syllables after the mark of casting-off.



To try to understand how the ‘κοιλότητα’ line came to appear twice, for the next eight pages I shall continue discussion of quire bbbβββ in vol. 4 from where I left off, on p. 35.

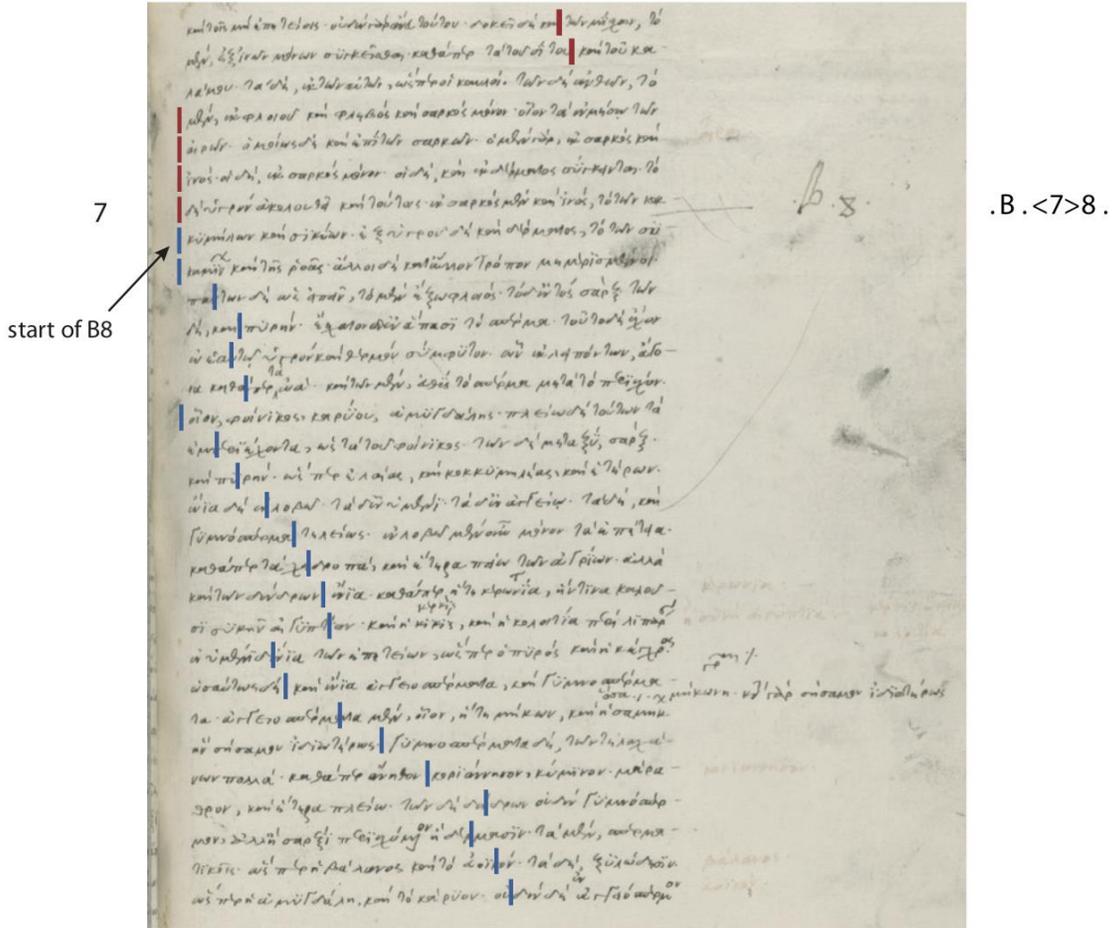
On p. 199 of the Harvard manuscript, copy for the text of this quire in-eights begins near the end of its 1r page and continues thereafter through the end of *De historia* and into the start of *De causis plantarum* (both on bbbβββ8r). The copy for this page employs a *cul de lampe* at the end of *De historia* and was therefore not easy to cast off precisely; and so, it seems, the compositor arbitrarily and expeditiously cast off at the very bottom of the page. He was, confident, I should think, that by also using a *cul de lampe* himself along with leading and an appropriate size of initial, he could satisfactorily shape the layout of that page during composition and not have to calculate its dimensions precisely while he was casting off.

This manuscript seemed the best place to begin my quest, but at crucial moments the evidence of marking-off proved uncertain or lacking just when I thought I needed it most. At first, I deemed that the lack of some of the markings-off was a regrettable accident; but slowly I came to understand why such evidence was thin at the centre of a quire and why it might not hold answers to my questions even if it did exist. Composition was not entirely smooth sailing in bbbβββ, but it was not composition, I eventually concluded, that had corrupted this text. Corruption occurred during imposition—and compositorial adjustments during imposition were unlikely to have left traces in the copy. I shall begin describing composition according to my initial assumptions and question them as I encounter problems, before I move on to an account of imposition—where the action was.

For the first part of this quire, casting-off occurs every 30 lines, not every 32; consequently, the early pages of copy are cast off in the same location on each page—after l. 7. The compositor’s marking-off in most of the fore-quire pages reveals that he usually finished composition shy of the places cast off, but B7 (the extent of it is shown on the next two pages)—which corresponds to bbbβββ4r, the first page of the innermost sheet—was set more open.²⁹ It concludes at the end of l. 7 (atop p. 205 of the manuscript), exactly on target—and so, marking off was not required there. In the line-endings mapped onto the image of this page, the change of colour from red to blue signals the end of B7 (4r), on the outer forme, and the start of the next page, B8 (4v), on the inner forme.³⁰

²⁹ The numbering of cast-off pages in this quire mistakenly repeated ‘6’, and the numbering thereafter was thrown off through B15 (where the casting-off, as already pointed out, was arbitrarily placed at the bottom of the page); but all the mistakes were eventually corrected. The number ‘16’, for the start of the first full page of the next Book of *De historia plantarum*, is inscribed atypically in the inner margin. It was evidently not part of the original mis-numbering and therefore perhaps, not part of the original casting-off.

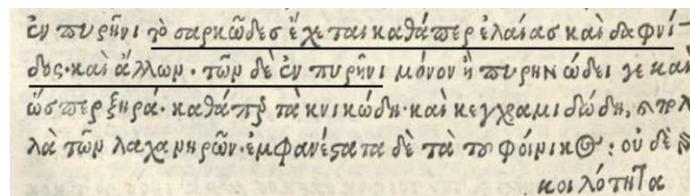
³⁰ Without warrant from copy, the compositor inserted ‘δε’ before the first word of B8.



p. 205, end of B7 & start of B8 (bbbbbβ4v)

Here, on the innermost forme, the compositor had to proceed carefully; he was running out of wiggle room. Composition from the start of the quire would soon have to mesh with composition advancing from the rear. A page from each direction would eventually have to meet somewhere in the middle—exactly where I’m not sure. So far, so good. But trouble lurked on the horizon.³¹

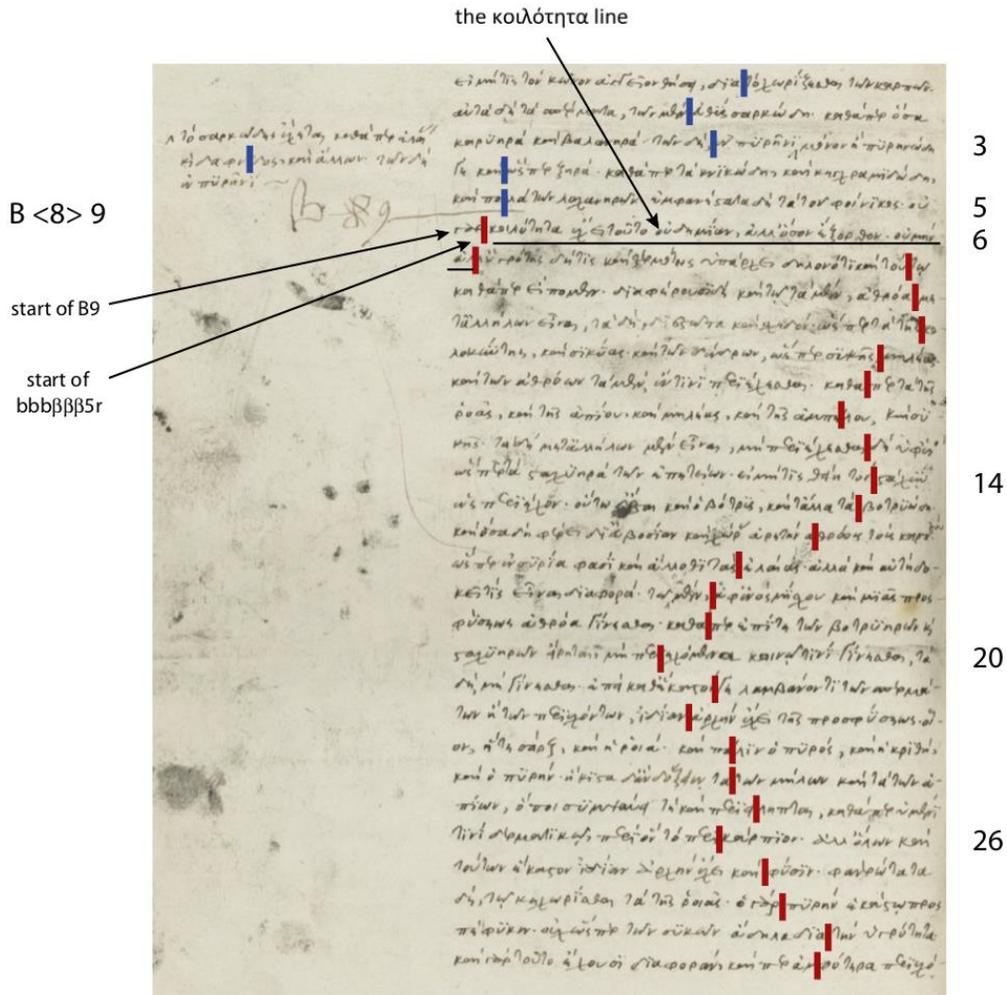
In the margin, seven lines from the base of this page of the manuscript and also overleaf (as shown on the next page of this essay), the scribe had written text in the margin. The first is partly restatement and partly addition; but the second records what must have been a line or two of manuscript text omitted by eye-skip (on ‘*πυρήνι*’) amounting to the underlined one-and-a-third lines of type.



³¹ I have no explanation for the arc connecting the page name (‘.B.8.’) to ten lines below, but such arcs appear from B4 through B15, where Bk 1 of *De historia plantarum* ends. Another arc connects ‘B10’ to a point three lines prior. There are other tentative castings-off, if that is what they are, as after l. 4, for the start of B10. See also p. 111, n. 65.

To allow for these, the compositor cast off two lines. Thus, the casting-off for the start of B9, B10, and B11 now shifted to after l. 5 (instead of after l. 7).

The ratio of lines of manuscript to those of print down to the bottom of B8 on p. 205 was set to deliver 30 lines of type for this page, but once the compositor turned the leaf to p. 206, the ratio abruptly changed, so that by the time he had reached a mere syllable³² after the point cast off for the end of the page, he had set only 29 lines—and that is the length of the page in print. (Hence my (debatable) decision to change from blue to red line-endings in the following photo.) The compositor did not mark off the end of B8, however, and did not begin B9 at the start of a manuscript line. (As remarked on pp. 10–11, the two central pages of a quire can be composed as a single stint.)

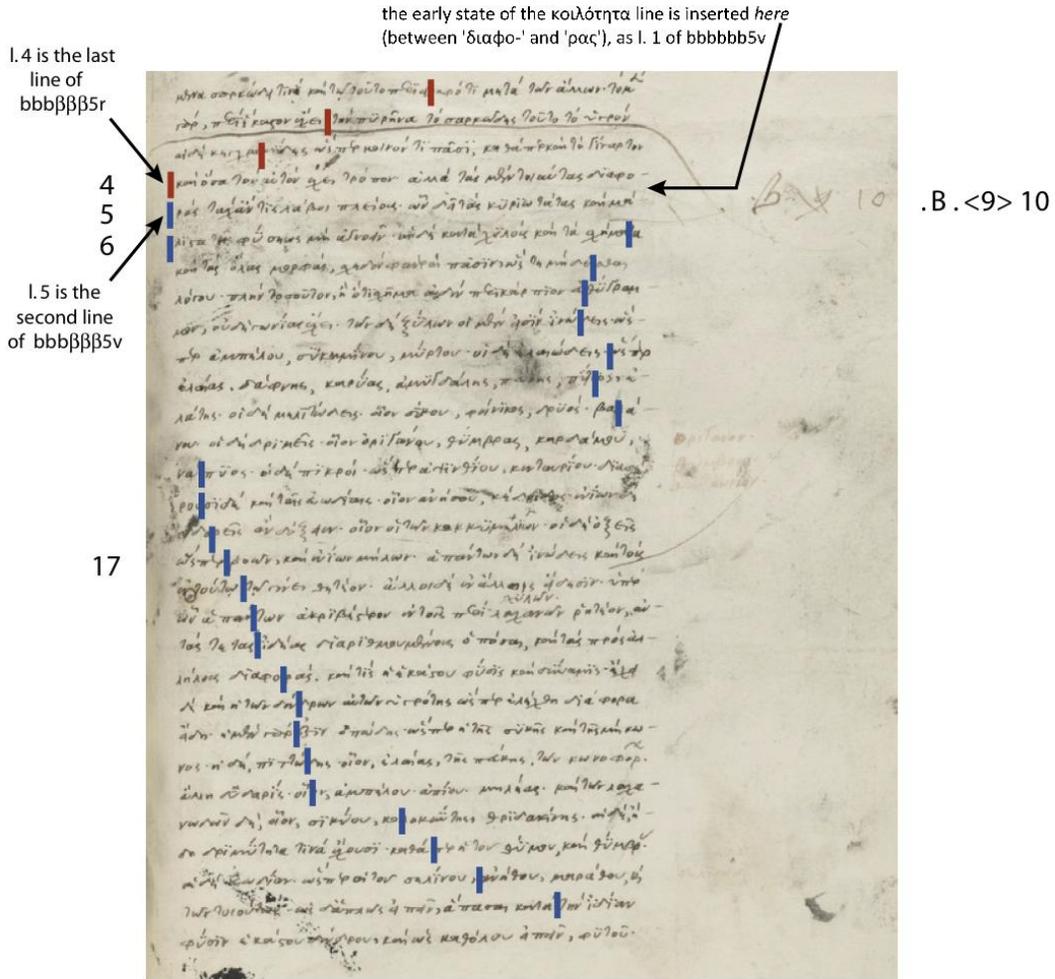


p.206, end of B8 & start of B9 (bbbββ5r)

B9 starts with the ‘κολύπητα’ text—in the correct place; and, in the printed book, this start is confirmed by the catchword on 4v. One supposes that the same compositor who set B8 continued into B9, perhaps deferring the decision of where B9 would end until composition of B10 (the last page of the innermost sheet) had begun.

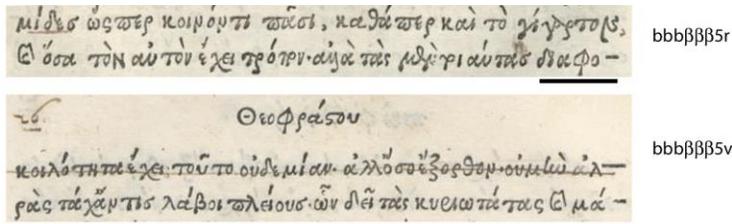
³² This one syllable is ‘γάρ’. The compositor added ‘δέ’ before it, without warrant from copy.

In ll. 4, 5, and 6 of p. 207, the next page of manuscript, where copy for B10 begins, the start of each manuscript line corresponds with the start of a line of type.



p. 207, end of B9 & start of B10 (bbbββ5v)

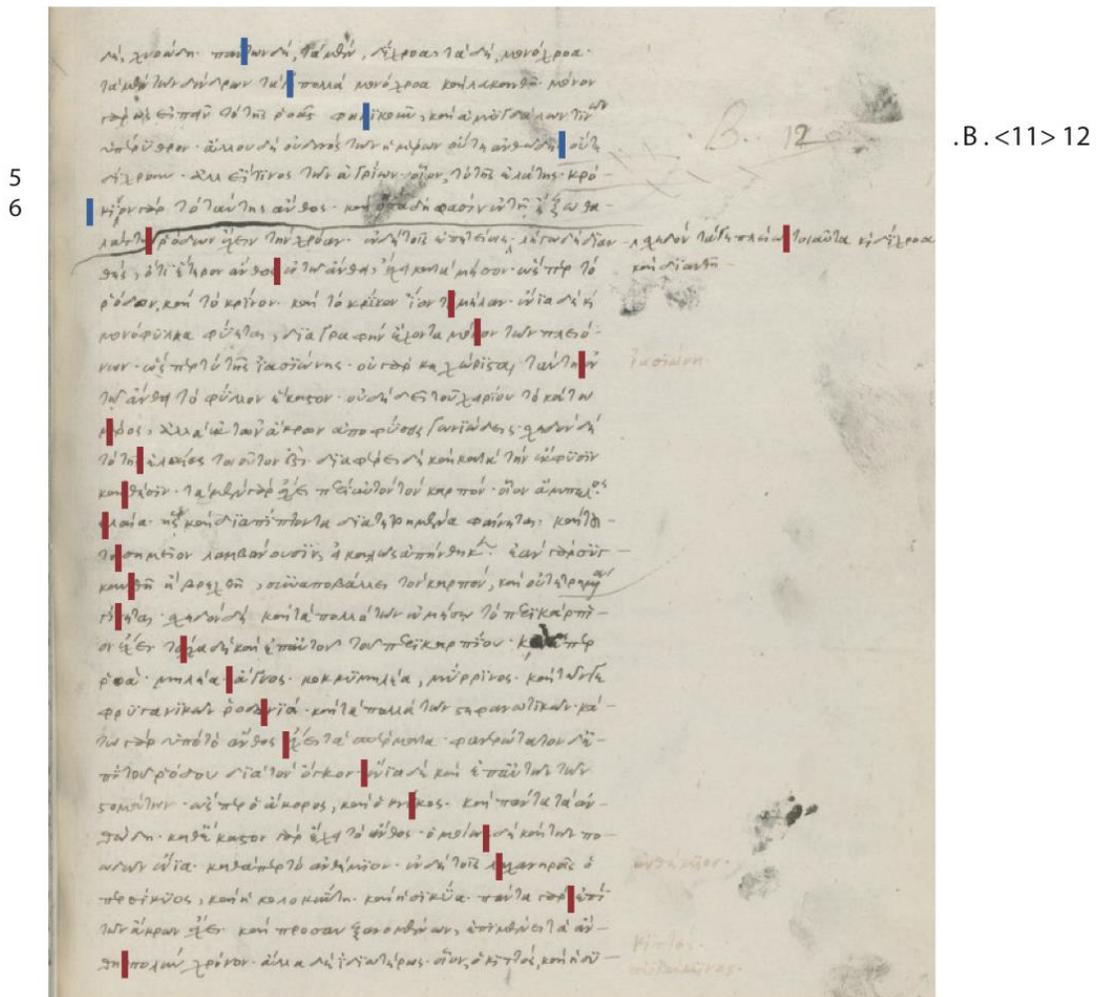
Composition of B10 could have begun at any of these manuscript lines. That none is marked off suggests that B10 may have been part of composition advancing from the front, even though we are now in the aft quire. However it was composed and by whichever compositor, B10 in print starts, ominously, with the early state of the ‘κοιλότητα’ line sandwiched between the two parts of ‘διαφο-|ρας’—‘διαφο-’ ending l. 4 of the manuscript and ‘ρας’ starting l. 5.



Take away this wrongly-placed ‘κοιλότητα’ line from 5v, and that page, like 4v, falls a line short. Composition of the innermost sheet of this quire should have produced 120 lines, not (as it did) 118.

As this shortfall is an even number, it need not have caused an aesthetic problem: for adroit rearrangement of lines of type during imposition could have brought two short pages together in one opening and two full pages in another, and so achieved symmetry in each.

In a moment, I shall come to the *imposition* of 4r|5v and 4v|5r and to their problems. First, however, to increase understanding of B10, I shall trace the composition that approached the centre of the quire from the rear. Where it stopped is uncertain, as we have seen, but the early history is clear enough. We must turn to B11 to understand B10, and to B12 and beyond to understand B11. Copy for B12 begins on p. 209 and composition commenced, despite appearances, at the place cast off—after l. 5: this is the only line of manuscript in the vicinity whose start matches the start of a line of type. As the end of B12 (not shown here) does not match the beginning of a manuscript line, I presume a line or lines from B13 may have been brought over to the bottom of B12.

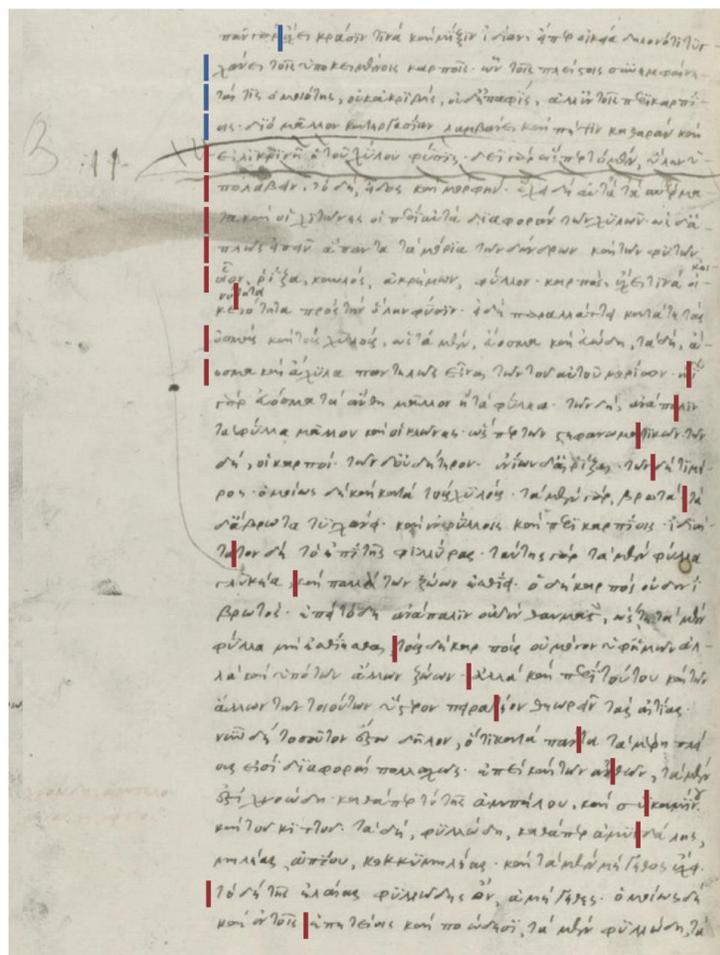


p. 209, end of B11 & start of B12 (bbbβββ6v)

Composition of B12 began at l. 6, and the first line of type corresponds to the text of that line plus two syllables at the start of the next. The compositor's J-shape drawn across the column here reassigned this line of type to B11—for the setting of B12 (perhaps with a line or two added to its base from B13) had yielded 31 lines of type.

Shown next is the start of B11. Feeling pressure from the extra line to be added to what had originally been cast off as copy for this page, the compositor may have over-compensated: starting composition of B11 at l. 6, he set only 28 lines of type from the 30 lines of copy, not the desired 29.

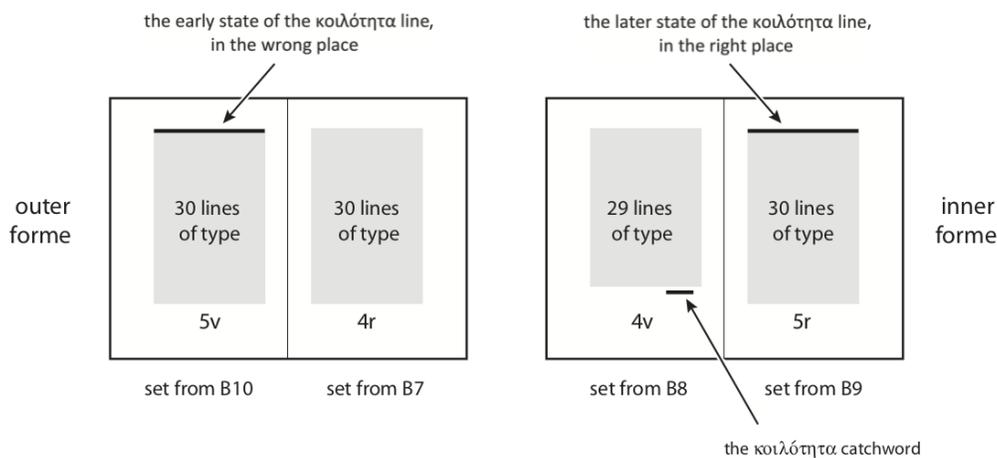
.B.<10> 11. 4
5
6



p. 208, end of B10 & start of B11 (bbbβββ6r)

The surplus line brought over from B12 increased his total to 29. Apparently to bump it up one more, to the desired 30, a new top line, the fifth line of manuscript on p. 208, was poached from what had been cast off for the end of B10. (This line could already have been set, of course, if composition from the front of the quire had assumed responsibility for B10 and had already progressed this far.) The casting-off of B11 after l. 5 of p. 208 was therefore cancelled and copy was marked off after l. 4 instead, by a new stroke crossing the first half of the column. (We have become used to the idea that the *last* line of a page might have been composed long before the rest of it; now we must entertain the idea that the *first* line of a page might have been composed last.) A reduction of resources for B10 from composition advancing from the rear would have put pressure on the composition of that page if it had not yet been composed, which pressure would mirror pressure from the front. In print, B10, this last page of the innermost sheet, does have 30 lines, but only 29 of them are legitimate—as it is the wrong ‘κουλότητα’ line that begins it.

I'll shift now from troubled composition to troubled imposition, where more certainty may be possible in this fog of unclear boundaries. Here, in my first modelling of the imposition of the innermost sheet, is how its two formes appear in print, outer forme first, because printed first.

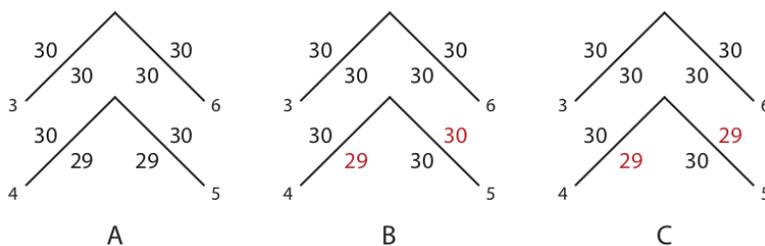


Since the text of the 'κουλότητα' line of type does not correspond to a full manuscript line, it is not a visual unit and is thus not a good candidate for eye-skip, especially from one side of the leaf (in one composition) to the other side (perhaps in another). Also, its first word, 'κουλότητα', and 'γάρ' (abbreviated), the word before that, are not repeated nearby so as to be vulnerable to eye-skip (as we saw, on p. 43, with 'πυρῆνι'). The 'κουλότητα' line of type must have come into existence once only—during the composition of the inner-forme; and it must already have assumed a position at the extremity of a page of type on this forme—either at the top of B9 (bbbββ5r), where it appears in print, or at the bottom of B8—in either of which positions it was in narrative order and (this is important) could easily have been accessible for removal to the top of 5v—on the other forme.

That this line could go from inner to outer forme points to the simultaneous existence of at least both of these outer-forme and inner-forme pages *prior to presswork*. This realization startled me, as I had theorized that, for expediency, the first forme of a given sheet would have been sent to the press before the composition of the second might even have begun. The general idea that the second forme of a given sheet did not come into existence before the composition of the first had ended remains persuasive; but now I know to say, 'except, sometimes, for the innermost sheet'.

My first modelling of the imposition, above, shows that the 'κουλότητα' line, sitting atop 5r, would have been easy to extract. But since this imposition was unsuccessful in both formes—it was textually corrupt on the outer forme and asymmetrical on the inner—it is important not to let this representation distract us from visualizing (as I shall turn to on the next page) what the imposition might have looked like *before* either forme went to press.

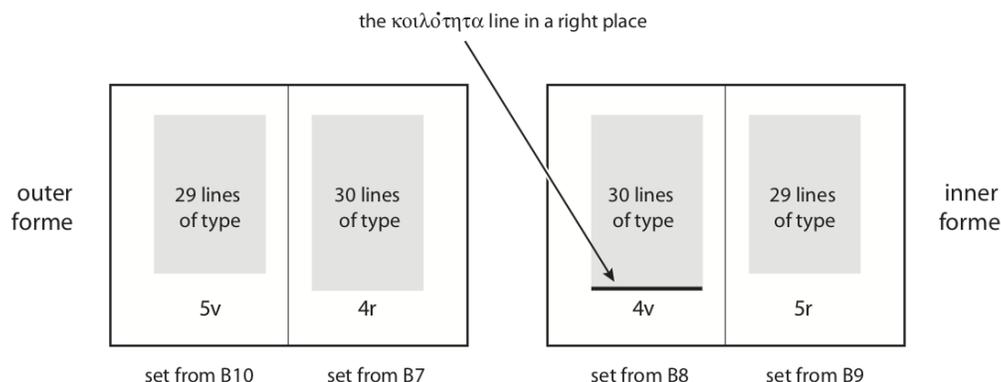
An aesthetically ideal layout of the centre of the quire, as in A,



is symmetrical—an equal number of inked lines (preferably 30, but tolerably 29) on the facing pages of every opening. But the two innermost sheets of quire bbbβββ were published as in B, with asymmetry in the central opening—29 lines on the verso versus 30 on the recto. In this image, I have painted red the ‘30’ on 5v (B9) as a reminder that this page begins with the misplaced ‘κοιλότητα’ line (in its early state, of course, as the outer forme was normally printed first). This 5v page may look unproblematic (the compositor must have thought so as he imposed it), because it has 30 lines to match the 30, already printed, that would eventually oppose it across the gutter of the bound volume. But, for the accuracy of Theophrastus’s account, this first line on the page should simply not be there; it was out of its proper place. Hence diagram C, which aims to model the two aesthetic problems as a compositor might have understood them before attempting a solution: before the ‘κοιλότητα’ line migrated, there were, I suggest, *two* adjacent lopsided openings (not just one, as published). The compositor’s imposition options to solve the problem were limited, for the inner forme of the penultimate sheet, 3v | 6r, having already been printed with 30 lines on each page, the outer forme of the inner sheet (4r | 5v) was obliged also to have as many lines on each page.

The simplest aesthetic adjustment to C would have been to move the bottom line on 5r (B8), a 30-line page, to the top of 5v (B9), a 29-line page, thus uniting ‘διαφο-’ and ‘ρας’, so that the two pages of each opening would have identical lengths—29 & 29 in the central opening, and 30 & 30 in the following one—as in A (in the previous diagram). In other words, A would solve the problem of C. That solution would not have disrupted the narrative. In this account, the compositor’s mistake was to move to p. 5v a line from the wrong extremity of 5r—from its top (where the ‘κοιλότητα’ line *now* sits in print), not from the bottom, where the line ending ‘διαφο-’ sits in print. Such an error is certainly easy to imagine because of the compositor’s frequent experience of setting aside the top line of an over-long aft-quire page to the page composed next (as we recently saw on B12).

But this first modelling of the two formes is not the best way to view the matter: the published book, textually corrupt in one opening and lacking symmetry in the other, impedes our visualization of another possible imposition. Casual viewers of the ‘κοιλότητα’ line sitting corrected atop 5r will be slow to intuit that it had earlier moved from the inner forme to the outer, and that after its sojourn there, and after proof-reading and correction, may not have returned to its original place. I now propose that it earlier stood at the base of 4v, as shown in the following, revised, model, at a time prior to the printing of either forme. (Had proofreading of the outer forme, the first to press, taken place at *this* time, it would not have found the errors in the ‘κοιλότητα’ line or that the line was out of place).³³



³³ I assume that in this early state, neither of the catchwords (which appear only on versos) would have been in place. In *Mechanick Exercises on the Whole Art of Printing* (London, 1683–4), §22, ¶4, Joseph Moxon speaks of the creation of a catchword as the last act of composition of a page; but the composition of the direction line studied on p. 16 seems to have been completed during imposition of blind type on the page, not during composition.

With the ‘κοιλότητα’ line in this bottom place, a fix for these two lopsided openings would have entailed 1) moving the line ending ‘διαφο-’ from the bottom of 5r to the top of 5v, where it would have improved outer-forme aesthetics (30 lines on 5v facing 30 on 6r) without disrupting narrative order, and 2) also moving the ‘κοιλότητα’ line from the bottom of 4v to the top of 5r, where it too would have improved aesthetics (leaving 29 lines on 4v and adding a 29th to 5r), also without disrupting narrative order. Only the first move would have been required to prepare the outer forme for the press. Had both moves been attempted then, the error would more easily have been detected, as it would also have been, had there been proofreading of either forme at this late time. (If the outer forme was proofread, it was likely before the ‘κοιλότητα’ line was moved.)

What makes such a hypothesis attractive (besides the symmetry it would have achieved if it had been carried out fully) is that it explains, why, first, the ‘κοιλότητα’ line (of all 48 wrong lines) would have been the one to move—because it was originally imposed as a *bottom* line; and, second, why p. 5v would have been a fitting place to move a bottom line from 5r to (because it would have created symmetry while preserving the narrative). In this hypothesis, the compositor’s error would have been in the first of the two moves (the only one required to prepare the outer forme for the press)—he relocated to the top of outer-forme 5v the wrong bottom line from the inner forme (that on 4v, rather than that on 5r). This confusion of left and right in the chase is a perennial problem in printing, of course, because the forme of type is the mirror image of the printed forme.

When the disastrous outer forme returned from the press (so my hypothesis concludes), the compositor, having realized his mistake, retrieved the ‘κοιλότητα’ line, proofreading it perhaps for the first time, and restored it, corrected, to the inner forme, where it is narratively appropriate, but now atop 5r, rather than at the base of 4v. In restoring the ‘κοιλότητα’ line not precisely to where it may have originated on the inner forme, the compositor might have been executing Step 2 of the supposed original plan for achieving symmetry, even though it was no longer capable of achieving that goal: without extensive driving in or out, the central opening would be lopsided wherever the ‘κοιλότητα’ returned to in the inner forme. There was no more wiggle room.

Coming belatedly to this hypothesis, I have learned that I need to take with a grain of salt my indication of page-breaks for B9 and B10 in the diagrams on pp. 44 and 45, however accurate they might be. In retrospect, they seem too influenced by the printed book to reflect potential changes to initial impositions within and between the two formes of the innermost sheet. The frequent concentration of additional lines on all four pages of the innermost sheet of many quires, such as I documented on pp. 13–15, lends support to the idea that the imposition of both formes of the innermost sheet of a quire might routinely have been coordinated before either forme went to press. The present example suggests, strangely from our perspective, that this coordination did not imply proofreading of the whole sheet before its outer forme went to press. I commented on p. 4 that printing of one forme before the next was composed meant that there was no overview of the text of a quire through proofreading. Even here, where there was the possibility of proof-reading at least of a single sheet, it seems not to have occurred.

Also, when at l. 21 of p. 206 of the manuscript (see p. 44), there was an abrupt change from an open to a dense setting, which ‘failed’ (so I then thought) to provide an extra line for B8 to bring its count from 29 to 30, I could have been open to the idea that the compositor might have actually set the ‘κοιλότητα’ line as the 30th for that page and that he was simultaneously focused on a bigger horizon—was perhaps striving for an *even-numbered* total of lines for the sheet, rather than merely the *exact number* of lines on specific pages.



Now to enumerate the contents of vol. 3 in order to map them onto quire structures and eventually onto the production schedule, the latter of which topics dates from p. 2 of this essay. *En route*, I'll be on the lookout for inconsistencies, errors, and material deficiencies.

Τῶν ἐν τῇ δευτέρῃ βιβλίῳ περιεχομένων ὀνόματα καὶ ταῖς.			
1	Ἀριστοτέλους περὶ ζώων ἰστορίας.	βιβλία	θ' αααα2r
2	Τῶν αὐτοῦ περὶ ζώων μορίων.	βιβλία	α' ppo06r
3	Τῶν αὐτοῦ περὶ ζώων πνεύματος.	βιβλίου	α' xxξξ5r [sic]
4	Τῶν αὐτοῦ περὶ ψυχῆς.	βιβλία	ε' yyxχ4v
5	Τῶν αὐτοῦ περὶ αἰθήσεως ἐλαίου τοῦ	βιβλίου	α' AA7r
6	Τῶν αὐτοῦ περὶ μνήμης καὶ τοῦ μνημοσύνης.	βιβλίου	α' BB10r
7	Τῶν αὐτοῦ περὶ ὑπνου καὶ ἐγρηγόρευσης.	βιβλίου	α' ΓΓ4r
8	Τῶν αὐτοῦ περὶ ἐπιπνίου.	βιβλίου	α' ΓΓ9r
9	Τῶν αὐτοῦ περὶ φθίσεως καὶ ὑπνομαντικῆς.	βιβλίου	α' ΔΔ3v
10	Τῶν αὐτοῦ περὶ ζώων κινήσεως.	βιβλίου	α' ΔΔ5v
11	Τῶν αὐτοῦ περὶ ζώων ἰστορίας.	βιβλία	ε' EE2r
12	Τῶν αὐτοῦ περὶ μακροβιότητος ἐβραχυβιότητος.	βιβλίου	α' NN2v, NN5v
13	Τῶν αὐτοῦ περὶ ἐνότητος καὶ ἀναπνοῆς.	βιβλία	ε' NN8v
14	Τῶν αὐτοῦ περὶ πνεύματος.	βιβλίου	α' ΞΞ9v
15	Τῶν αὐτοῦ περὶ χρωμάτων.	βιβλίου	α' ΟΟ5v
16	Τῶν αὐτοῦ περὶ φασίγων μινθῶν.	βιβλίου	α' ΠΠ4v
17	Τῶν αὐτοῦ περὶ θανάτου καὶ κοιμήσεως.	βιβλίου	α' ΡΡ4v
18	Τῶν αὐτοῦ περὶ ἐνσφαινοῦ καὶ ζυγίων καὶ	βιβλίου	α' ΣΣ9r, ΤΤ2r, ΤΤ4v
19	Τῶν αὐτοῦ περὶ ἀτόμων γραμμῶν.	βιβλίου	α' ΤΤ6v
20	Θεοφράστου περὶ ζώων.	βιβλίου	α' ΥΥ5v
21	Τῶν αὐτοῦ περὶ ἰλίθων.	βιβλίου	α' ΥΥ7v
22	Τῶν αὐτοῦ περὶ κόπων.	βιβλίου	α' ΥΥ9r
23	Τῶν αὐτοῦ περὶ ὀσμῶν.	βιβλίου	α' ΦΦ1v
24	Τῶν αὐτοῦ περὶ ἰσθίων.	βιβλίου	α' ΧΧ1v

αααα1r

The title page of vol. 3 is a table of contents: its top line translates as ‘The names and arrangement of the contents of this book’. Line 1 (I’ve numbered the lines on the left) begins with Aristotle’s name; and nineteen titles of his works follow. Line 20 begins with Theophrastus’s name; and five of his titles follow. To the right of each title, Aldo totals the number of books in that work. A letter of the Greek alphabet followed by a *keraiá* (literally an ‘insect’s antenna’) functions as a number. After the first title, *De historia animalium*, comes *theta* + *keraiá*—so, it should have eight books. Aldo was mistaken: he had printed nine books by the time he ended this text in the middle of quire pp oo. (And this mistake was not the only miscounting of the books of *De historia animalium*; as we shall see near the end of the

essay: there came to be ten.) Exactly when Bk 10 was printed is certainly a mystery, but one that can be solved, as we shall see, by reading blind type. *De partibus animalium*, the second title, is followed by the number *delta*—so, four books. Most titles consist of a single book: hence ‘á’. Lastly, in the right column, I have indicated the page on which each title begins.

Bibliographic coding of the format and structure of vol. 3 certainly looks arcane. I’ll photo-quote two examples from *The Aldine Press Catalogue of the Abmanson-Murphy Collection* (2001), at UCLA

FORMAT: 2º. aaaa-ii¹⁰ κκ¹⁰ llλλ-uu¹⁰ xx¹⁰ yy¹⁰ zz¹⁰ &&ωω¹⁰ AA-III¹⁰ λPP²⁻¹ PP-ΦΦ¹⁰ XX⁸ X⁸ (rom.)

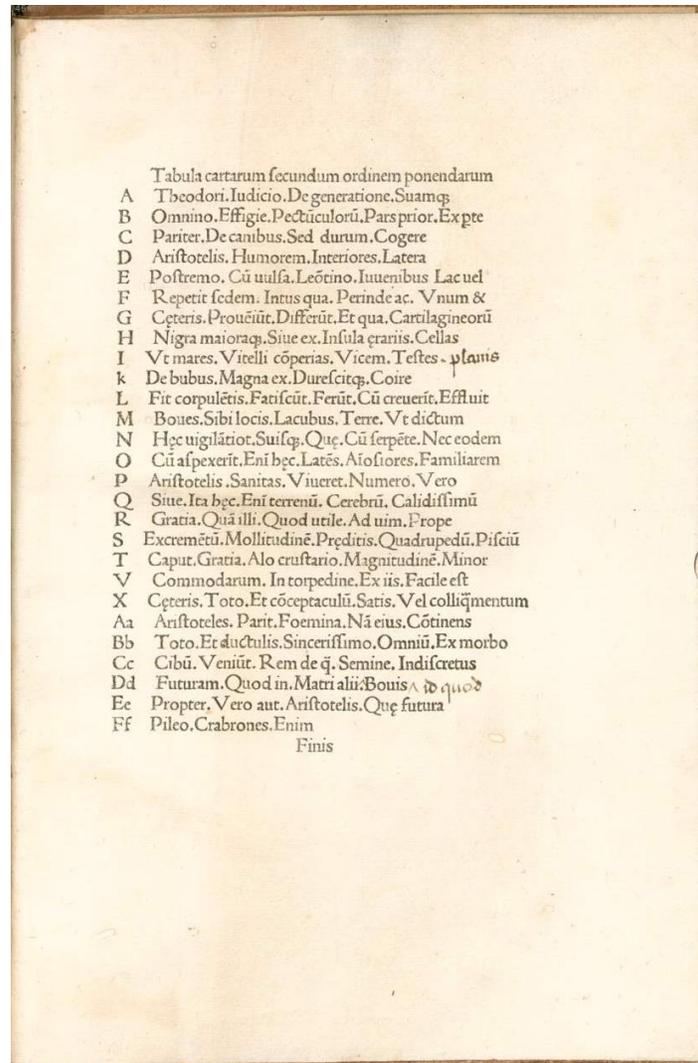
and from the earlier, provisional, edition, 1989, with the same title.

Folio in tens. aa αα-ii u¹⁰ (\$5), κκ¹⁰ (\$5), ll λλ-zz ψψ¹⁰ (\$5), && ωω¹⁰ (\$5), AA-III¹⁰ (\$5), PP¹ (\$), PP¹⁰ (\$5), ΣΣ-ΦΦ¹⁰ (\$5), XX⁸ (\$4), X⁸ (\$4). \$ in upper case Roman. Errors: aa αα 3-5 signed in arabic; üü · ii · for ii u; ii üü 2 for ii u 2; ii u III 2 = ii u 4; ll · λλ · for ll λλ in 2 and 4; variant v in nn vv 2 and 4; && ωω III = && ωω 3; KK 5 signed II III; PP1, first instance, is non-conjugate, but picks up catchword of III¹⁰, verso is blank; ΣΣ 4-5, TT 4-5, TT 4, ΦΦ 4-5, XX 4, X 4 all signed in arabic.

The 2001 catalogue catches several of Aldo’s mistakes or omissions, but also errs on its own, as will become clear on the following tour of the register for this volume.

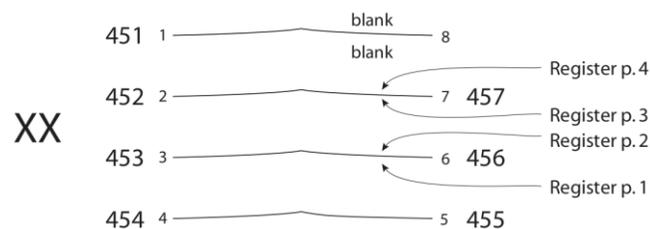
It’s a rare reader who bothers to read collations and registers, but they are essential textual elements of incunables and are rich in details of production. In the cradle days of printing, when texts could be sold as loose sheets, registers provided instructions for binding; but they were often incomplete and unreliable.³⁴ ‘Tabula cartarum’, shown on the next page, is an early example of the genre. It is from Ff5r of the Bayerische Staatsbibliothek copy of Theodore Gaza’s Latin translation of Aristotle’s *De animalibus*, *De partibus animalium*, and *De generatione animalium*, printed in Venice in 1476 by Johann de Colonia and Johannes Manthen. This Tabula too will strike most readers as forbidding territory, as it has no more narrative continuity than a telephone book. On the left, the alphabetical Table does not use Y or Z before it continues the signing with doubled letters (Aa, Bb, Cc ...); also, it lacks upper-case K. To the right are listed the catchwords for the start of text on fore-quire rectos. Two omissions from the Table are supplied by hand in quires I (the last catchword) and Dd (the penultimate); and the printed signature of Dd1 in the body of the book is merely ‘d’, with another ‘d’ added by hand. For quire A, only four catchwords are listed, the first leaf being blank. (See p. 94 for Aldo’s registration of blank pages.) With these omissions considered, the bibliographic formula is A–B¹⁰ C–D⁸ E¹⁰ F⁸ G¹⁰ H⁸ I¹⁰ k⁸ L–T¹⁰ V⁸ X¹⁰ Aa–Dd¹⁰ Ee⁸ Ff⁶.

³⁴ In the case of bilingual texts, Aldo occasionally advised *optional* bindings, as in his editions of Lascaris’s Grammar (1501?), Prudentius (1501), Sedulius (1502), Gregory of Nazianzus (1503), and Aesop (1505). See Randall McLeod, ‘Aldus on How to Assemble Your Own Bilingual Text’, Appendix 10, pp. 305–311, in John N. Grant, ed. and trans., *Aldus Manutius: Humanism and the Latin Classics* (Cambridge, Mass.: Harvard University Press, 2017). See below, p. 96, for more on binding options for the Prudentius volume.

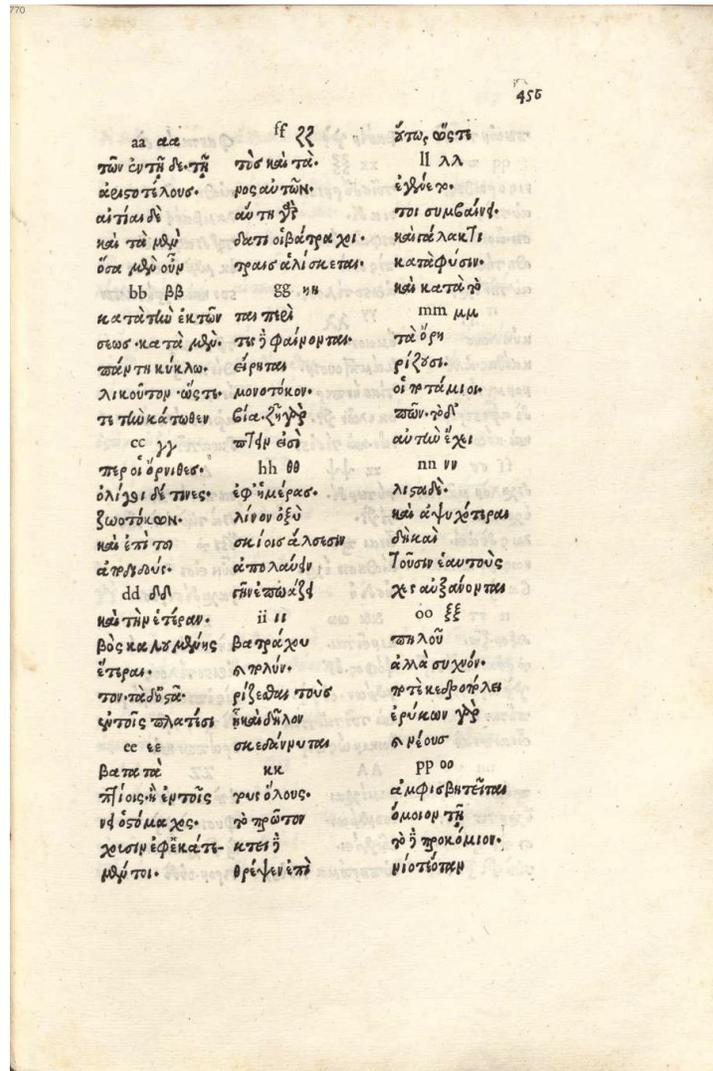


Gaza's edition is generally relevant to vol. 3 of the Aldine Aristotle because it is regarded as the first printed compilation of works on biology in any language. It is especially related because, at the very last moment in his printing of vol. 3, Aldo unexpectedly introduced a reference to it. (More on this too toward the end of this essay.) In 1504 and 1513, Aldo published his own edition of Gaza's Latin translations of selected works by Aristotle and Theophrastus.

The register for vol. 3 of Aldo's edition of Aristotle occupies four pages of the 46th quire, XX. Typically, the register was not indexed on the title page. It seems that, when he drafted it, Aldo planned XX as the last quire of this volume.



Here is the first of Aldo’s four register pages—first narratively, that is, but last printed.



XX6r

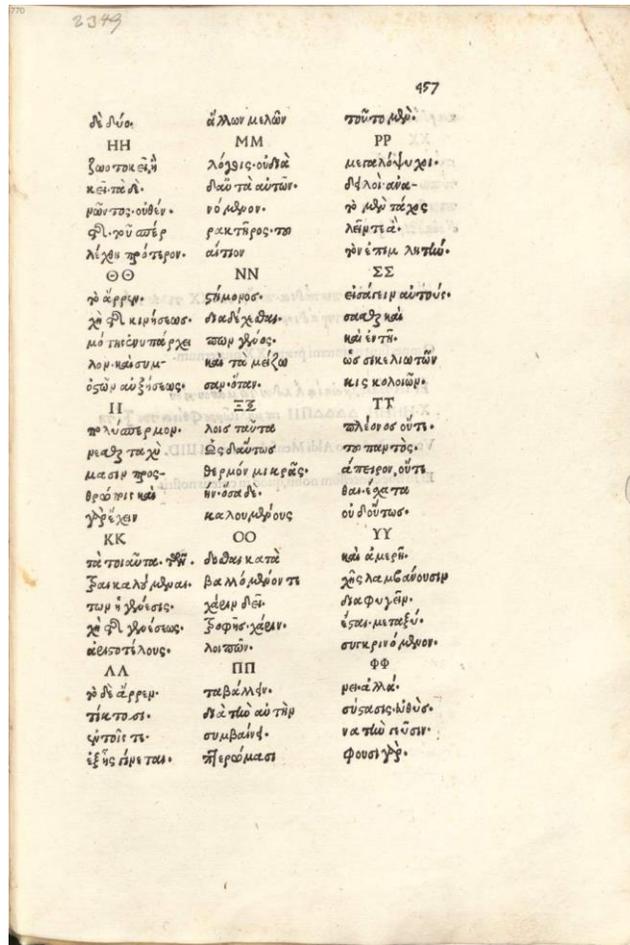
An Aldine register, like the one in the Gaza edition, aims to list each signature of the volume in alphabetical order and, after each, the catchwords of every fore-quire recto. With just them in place, the order of the aft-quire leaves is assured by virtue of conjugacy (barring misimposition). A catchword can be drawn either from the first letters, words, or a phrase (perhaps with punctuation) of the recto itself or, when it exists, from the direction line of the preceding verso. The signatures on this first register page pair two Latin and two Greek letters (‘aa αα’, ‘bb ββ’, ‘cc γγ’...). There seems to have been no Latin ‘kk’ sort, however, to accompany Greek ‘κκ’. The first text of the volume, *De historia animalium*, ends in the middle of the last quire listed on this page, on pp 004v (‘pp’ is Latin, ‘oo’ is Greek.) By chance, this location will prove very important at the conclusion of this essay.³⁵

³⁵ Aldo’s first Latin founts did not have ‘k’ in the lower case; and when it did occur, it may have been in short supply. In the register for Plutarch’s *Moralia* (1509) appears the signature ‘kklz’, where ‘l’ plus ‘z’ suggest the shape of ‘k’. (One sees the same expediency in books by Stephanus printed decades later in Paris.) As use of capital K was rare in Latin (for

aware of this mistake, the 1989 version not so.) This pairing is clearly wrong: the letter *xi* (‘ξ’) had appeared earlier in the register, in the fourteenth signature, ‘οο ξξ’, where it belongs. I suppose the Latin spelling (‘*Xi*’) of the Greek name (‘Ξι’) lies behind the wrong association with the Latin letter *x*. As this misuse of *xi* in the register matches five such wrong signings in the quire itself, it was not a casual mistake.³⁶

The 2001 *Aldine Press Catalogue* makes a mistake in reporting this page that the earlier catalogue did not. The designation of the range ‘λλλ—υυυ’ should have read ‘λλλ—υυυ’. The cataloguer gave *upsilon* (υ) for *nu* (ν), presumably confused by their similar shapes.

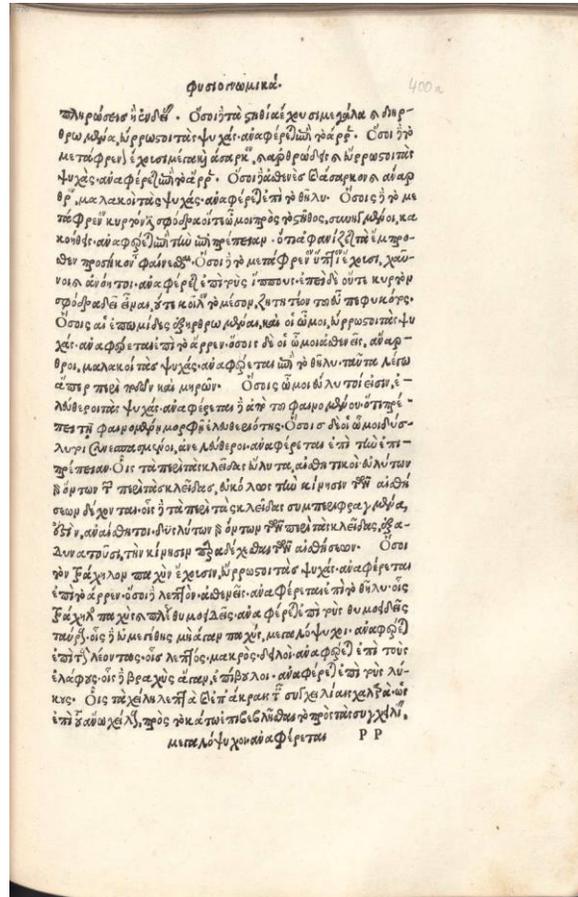
XX7r is the third page of the register.



XX7r

³⁶ This problem with the letter *xi* is found elsewhere in Aldines. The Greek Psalter (c. 1498), for example, is signed in lower-case Greek (up to the letter *upsilon*), but omits the letter *xi* from its expected place after *nu* and before *omicron*. The Aristophanes (1498) signs with this letter in the lower case, but not in the upper. The mistake (if it is one) is easy for someone whose native language employs the Latin alphabet rather than the Greek. A similar explanation seems apt for the mis-signing of quire seven with ‘Θ.G’ (where ‘H.G’ was required), for there are two Greek vowels corresponding to the fifth Latin letter, E: the fifth Greek letter, *epsilon* (Ε), and the seventh, *eta* (Η). Also strange, in *Epistulae diuersorum philosophorum* (1499), a text that uses *xi*, Aldo signs with a *sigma-tau* ligature, ‘*stigma*’ (which has a numerical value of ‘6’), between *epsilon* and *zeta* and with a *tau-tau* ligature after *tau*.

Quire PP (this is Greek—‘RhoRho’) has the usual five catchwords, but in the body of the volume there are, surprisingly, *two* leaves that bear the initial signature, ‘PP’, after which come the expected four signatures, ‘PPII’, ‘PPIII’, ‘PPIII’, and ‘PPIIII’. So—six PP signatures in all; but only the catchwords for only the last five are registered, not that for the first leaf signed ‘PP’, shown here.

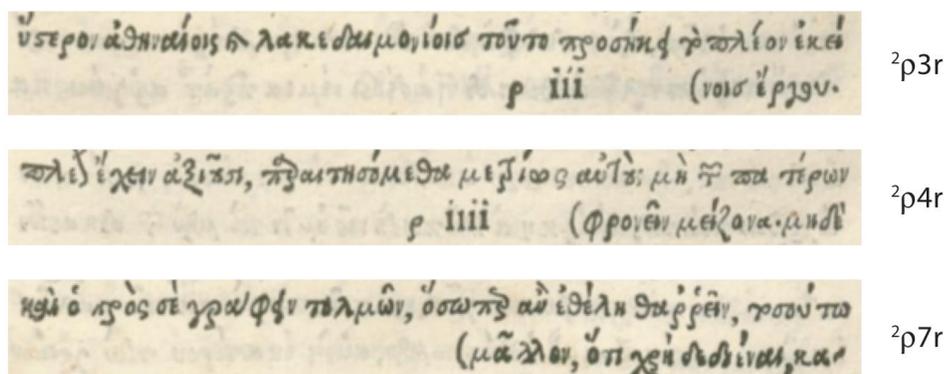


the first PP1r (‘1 PP1r’)

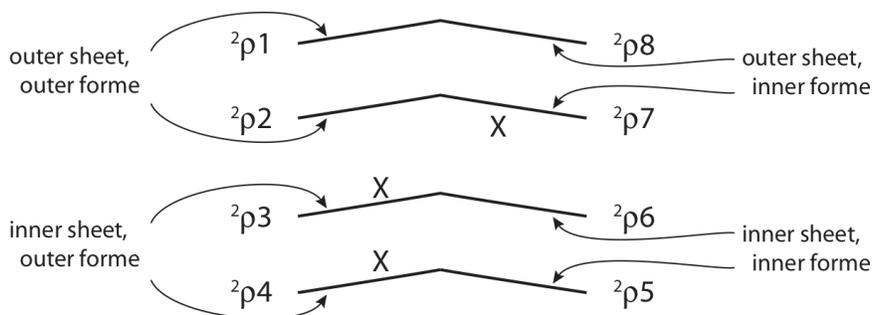
Nor was it even registered in pen and ink, as in the Gaza register, shown on p. 53. Unusually, there is no folio number on this page in quire PP. The previous recto, at the end of quire ΠΠ, is numbered ‘400’, but the second leaf signed ‘PP’ is the one to carry on with ‘401’. However, the *first* leaf signed ‘PP’ (the one shown above) is linked by catchword to the last page of the previous signature—the verso of leaf 400. Tellingly, the headline of the first PP leaf is a unique setting, whereas most of the other *Physionomica* headlines have multiple appearances. All this implies that the first PP leaf was an afterthought. Because the length of its text is that of a single page, it is unlikely to have been a late interpellation into printer’s copy. Likely, a page-worth of text was cast off in the manuscript but accidentally passed over during the original composition. (Recall the mis-numbering in quires q (see pp. 18–19) and bbbβββ (see pp. 42–47). As I am not aware that any copy of vol. 3 lacks this leaf, I presume the missing text was eventually printed and added to vol. 3 before publication, but with no adjustment to the register. (Whether the register had already been printed before this late addition is a nice question—to be raised again prominently at the end of this essay.)

An unconventional feature of this page is the centering of its partial last line, the 31st. It looks too scrawny to have been planned as a *cul de lampe* (they can be very elegant in Aldines), but one expects it only at the end of a Book. To finish the text of the page with a justified line and with the appropriate 30 lines per page, this half line of type could easily have been driven out into the text above it. Perhaps the centering was intended to signal that the blank verso of this leaf was not lacking any text. (A catchword could have cleared up any doubt, of course, but it is not normal for a signed page to have one.)

In *Epistulae diuersorum philosophorum*, 1499, a quarto-in-8s, a part line at the end of a recto sits flush right (in the place where one expects to find—and ignore—a catchword, with an opening parenthesis before it—for which no ‘)’ ever follows). There are three examples in Pt 2, quire ρ.

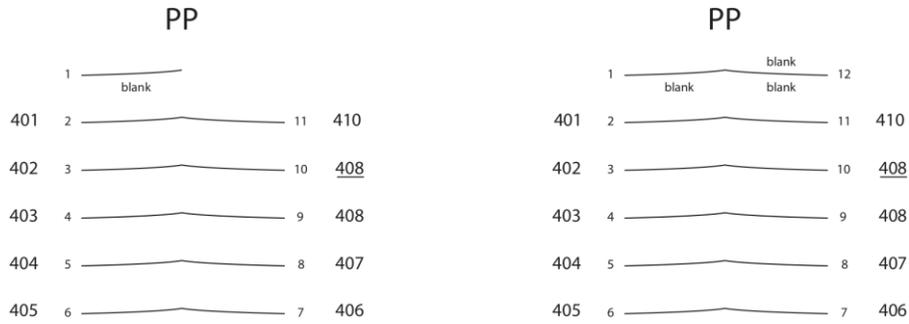


The location of each is marked with an ‘X’ in the following diagram.



The fact that the first two examples fall one on the outer forme and one on the inner of the same sheet suggests that, for at least one of these formes, the page following narratively had not yet been composed when the part-line was composed, so that it could easily have been put over to the beginning of the next page—but wasn't. The implications are that copy was cast off for the whole quire and that the compositor, generally respecting the pre-determined page breaks, finished each page with a full line when convenient. And, instead of either driving out troublesome part-lines at the end of his composition of a page or of passing them forward, sometimes he chose these inelegant short-cuts.

In later centuries, it was common to tip in or sew in a cancel leaf through a hook; hence, the 11-leaf structure shown on the left, below, found in New College and Osler Library copies. Previously in this kind of model, I showed the sequence of production; but here, the model primarily shows physical structure. (The top layer of each of these diagrams was certainly printed last.)

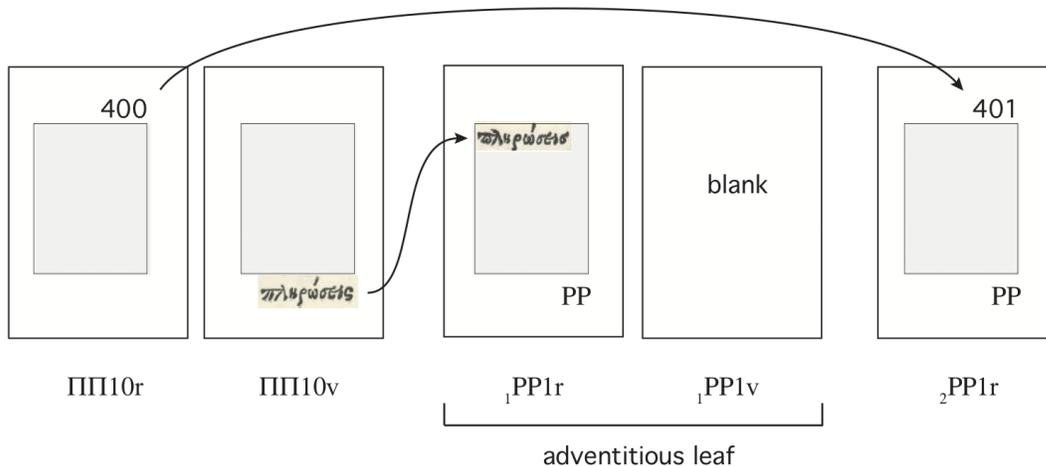


But having been rebound, these copies offer dubious evidence of contemporary practice. Aldo’s habit was to provide a bifolium in such a circumstance, not a single leaf; hence the twelve-leaf quire structure shown on the right, above, as seen in the Vatican online copy and also at Harvard, where a blank twelfth leaf appears at the end of the quire. A third binding is of two sequential PP quires—the first quire of two leaves (its second leaf blank), the second quire of ten leaves,



as in the Berlin Staatsbibliothek paper copy (VB 4489) and one of the copies in the Humanities Research Center in Austin. Here, a blank leaf, conjugate with ${}_1PP1r$, appears between the two leaves signed ‘PP’.

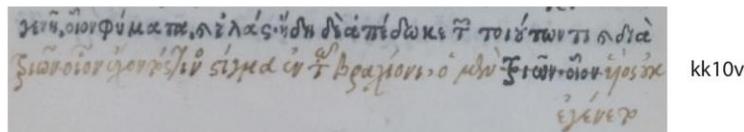
The first two of these three models can be diagrammed like this.



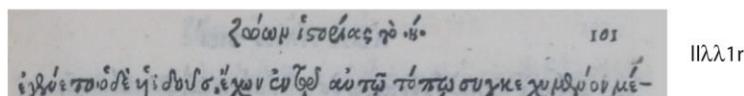
(To adapt this diagram to the third model, insert before ${}_2PP1$ the blank leaf conjugate with ${}_1PP1$.)

Another spectacular omission between quires occurs at the bottom of kk10v (not of KK10v, as claimed in the UCLA catalogue). Shown next is the Osler Library copy, in which a missing line has been penned in, as it also is in copies in the Laurentian Library and the Berlin Staatsbibliothek.

The printed catchword is struck out in the Osler Library copy (and erased in that of the Berlin Staatsbibliothek) and a new catchword, the same as printed in the register, is written in.

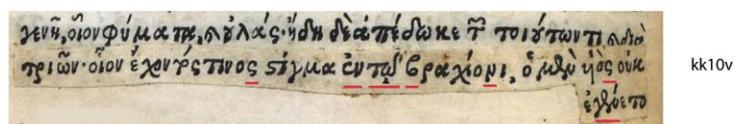


kk10v

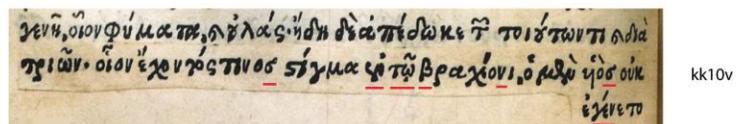


IIλλ1r

In many other copies, the line appears in type in a cancel pasted over the original catchword, as in these two copies from the Harry Ransom Center at the University of Texas. Although these two texts are equivalent, the settings are different. I have underlined the faces of variant sorts.

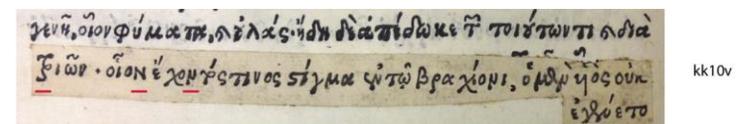


kk10v



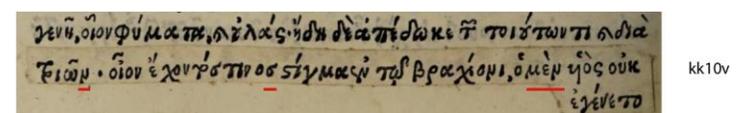
kk10v

One of Yale's two copies is the same as the second of these at the Center, but the other shows a third setting of the cancel, in which I have underlined three characters sufficient to differentiate it from the previous two.



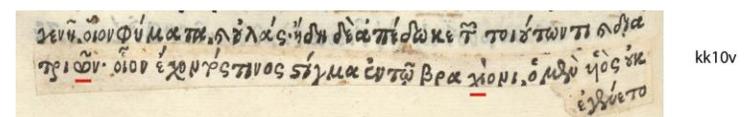
kk10v

The Boston Public Library online copy has a fourth setting, with three new differences.



kk10v

The Bayerische Staatsbibliothek has two new differences, one of which is an accent error. This same state is also found in the Udine skin copy.



kk10v

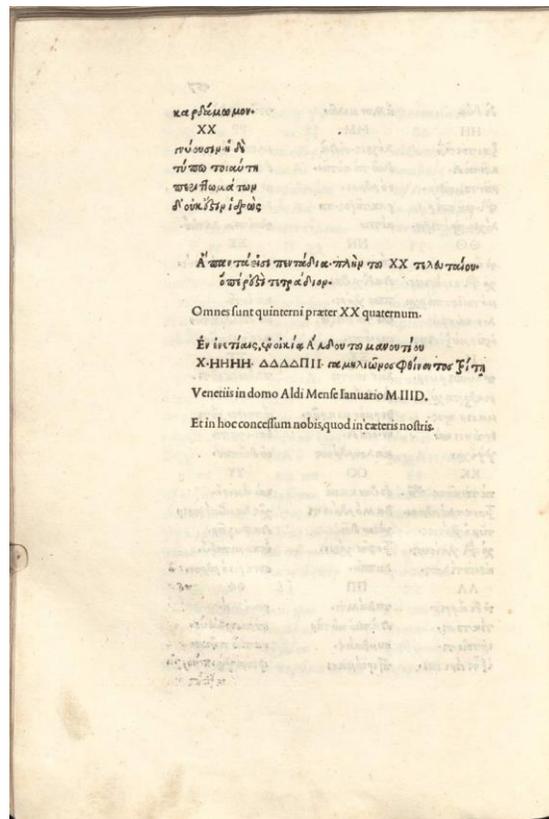
And so on. For efficient printing, this two-line text must have been composed many times and imposed to fill a whole page, from which individual cancels were cut. In the second Texas example (see the arrow) there are traces of the rough breathing and grave accent from the last word of the top line of the adjacent strip-cancel.

It is thought that Aldo's platen size was typically small for that era and that each forme of folio had to be printed with two pulls of the bar, once per page, with a repositioning of the chase beneath the platen for the second pull. Should a survey reveal a total of only fifteen or sixteen different settings

of this cancel, one would suspect that just a single page of cancel settings had been composed; but if the number approached double that, one would suspect a whole forme of them. At question here is the efficient relationship of composition to press-work. For an edition with a small print-run, composition of merely a single page of cancels strips might have made sense. But for a larger print-run, doubling the settings of the cancels would have been more efficient overall.

How did the last line for kk10v go missing? That its first word was recognized in the original catchword link to the next quire suggests that it was not a belated addition to the copy. The bodies of pages kk10v and llλ1r were both printed at the normal length of 30 lines. But composition of the former may already have created a full page, a line short of the casting-off (as was discussed above re fffζζζ on p. 40). Normal ways to deal with such a problem of page length were a) simply to print the page long (as Aldo often did—so we saw with *Epistulae diuersorum philosophorum*, on p. 58), or b) to pass its first line back to the bottom of kk10r (not yet composed, as we saw with f14 on p. 34), or c) to pass its last line forward to the top of llλ1r (perhaps not yet composed). As none of these possible solutions actually occurred, the supposed 31st line may have been mislaid or forgotten after it had been composed and put aside. One wonders whether there was poor communication between compositors (if there was more than one), each employed in a different quire? As the New College copy does not have this cancel and shows no glue stain from a lost cancel, some copies of vol. 3 must have been published before the mistake was caught or were simply not corrected.

Now to the last register page, XX7v, the first composed. (Its blind type has already been mapped on p. 26.) The second catchword under ‘XX’ is, by the way, for XX2r, the conjugate of this page.



XX7v

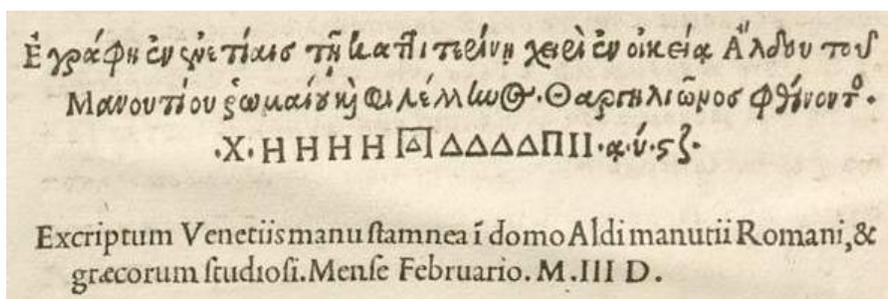
To avoid six final pages with no text, quire XX consists of only eight formes, not the usual ten. The register concludes with a notice in Greek and Latin that the structure of quire XX is a tetradion (or quaternum), not a pentadion (or quinternum). Thus, it has only two final pages without text, not six.

Below the register comes the colophon, with contradictory dating in Greek and Latin. The Latin ‘Mense Ianuario M III D’ looks plausible—‘in the month of January 1497’, but does the Venetian calendar pertain, in which the new year began on March 1, or the calendar in which it began on January 1? The second UCLA catalogue says ‘January 1498’, the first says ‘1497’. They cannot both be right. The dating in Athenian or Attic style,

Χ·ΗΗΗΗ· ΔΔΔΔΠΙΙ·

‘1447’, is plainly wrong, as it predates not only Aldo, but all European printing. Missing from the ‘1447’ date in vol. 3 is a large Π (for ‘Pente’, 5) containing a small Δ (for ‘Deka’, 10), the combination representing 50 (i.e., 5 x 10).

Contrast vol. 2, dated February 1497 in Latin. This time the Greek and Latin years agree,



·Χ· Η Η Η Η Δ Δ Δ Δ Π Ι Ι ·

┆ ┆ ┆ ┆ ┆ ┆
 1000 100 x 4 5 x 10 10 x 4 5 1 x 2

but the Latin month, ‘February’, does not accord with ‘waning Thargelion’, a ‘June’ dating in Greek. (‘Waning Gamelion’ would have better matched ‘February’.) (Blind type from vol. 4 just discovered in vol. 2—see the Appendix—supports the February 1497 date for vol. 2.)

In vol. 4, the alignment of renaissance and Attic calendars is less off than in vols. 2 and 3. The Latin reads ‘Kalends of June’, the Greek ‘new moon of Hekatombaion’ in the first month of the Attic year, which is usually taken as corresponding to July/August rather than to June.³⁷ Fortunately, in his whole career, Aldo used this cumbersome Attic dating in only these three colophons.

Finally, the colophon explains that this volume was ‘written out with a tin hand’ (‘Excriptum ... manu stamnea’). Production took place ‘i~ domo Aldi manutii’, ‘in the house of Aldo Manutius’ (so says the UCLA catalogue), but the first letter of ‘domo’ is actually an inverted ‘p’. So—in *pomo* Aldi manutii? (wherever that may have been). The confusion between calendars is also vexed in what is regarded as Aldo’s first publication, *Erotemata*, a quarto-in-eighths, the work of Greek grammarian Constantine Lascaris. In the second colophon (on C8v), it is dated March 8, 1495.

³⁷ There is an explanation of this system of numbering in Herbert Weir Smyth (rev. edn, G. M. Messing), *Greek Grammar* (Cambridge, Mass.: Harvard University Press, 1956), §348A. For help with Greek dating, thanks again to Tim Perry.

VALETE. VENETIIS. M.
CCCC. LXXXV.
OCTAVO
MARTII.

But the first colophon (on f4v) is in a quire that exists in two completely different settings, and their dates vary: February 28, 1494 (on the left) and February 28, 1495 (on the right).³⁸

Finis Compendii octo orationis partium & aliorum quorundam necessariorum Constantini Lascaris Byzantii uiri doctissimi optimiq;. Impressum est Venetiis summo studio: litteris ac impensis Aldi Manucii Romani Anno ab incarnatione Domini nostri IESV Christi. m. cccc. lxxxviii ultimo Februarii. & DEO gratias.

f4v

Finis Compendii octo orationis partium & aliorum quorundam necessariorum Constantini Lascaris Byzantii uiri doctissimi optimiq;. Impresum est Venetiis summo studio litteris ac impensis Aldi Manucii Romani. Anno ab incarnatione Dñi nri IESV xpi. M. cccc. lxxxv ultimo Februarii. & DEO GRATIAS.

f4v

It is not obvious which of these is the earlier composition. In any case, one suspects that the printing of the five or six sheets between the two colophons in quires f and C may have been the work of merely a week or even a day. A confusion of calendars seems to be the likely explanation for the difference of ‘1494’ and ‘1495’. The dating of Aldines certainly is confusing.

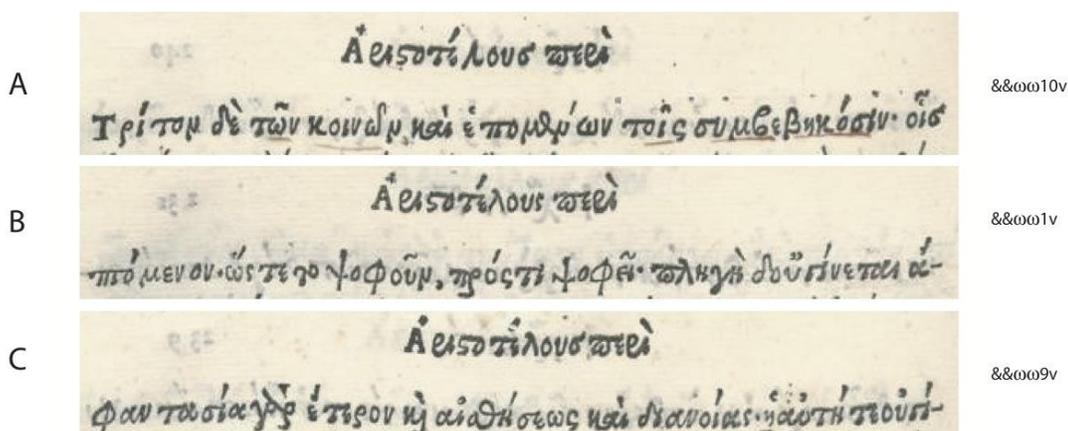


Now to return to the meta-maps, where we left off on p. 30, with a promise to discuss skeletons. Each skeleton of this folio edition of Aristotle usually contains two headlines, one on the verso, one on the recto. To save labour, these skeleton settings—or now we know to say ‘the typographic parts of these skeleton settings’ (headline-titles, folio numbers, and signatures)—could be recycled intact in the printing of one forme after another, hence the abstract literary term, ‘running headline’, and the concrete bibliographic one, ‘headline transfer’. The number of skeletons in use must somehow speak to the schedule of printing and to the number of presses and of compositors, but the exact details are notoriously hard to pin down. Although a pair of headlines was often recycled intact, one or both of them were often suppressed when the pages on which they would have been expected to reappear

³⁸ The online Incunabula Short Title Catalogue (Accessed: 13 September 2020) says, confusedly, ‘Two colophons: the Lascaris has variant colophon dates of 28 Feb. 1494 and 28 Feb. 1495. ... The remaining tracts are dated 8 Mar. 1495.’ This description implies that the two February dates are in the same colophon and could be *stop-press variants*, whereas, in fact, they appear in sheets of completely different settings. Also, the Catalogue does not state that the March date of the remaining tracts appears in the colophon, as opposed, say to in an epistle.

began with new titles atop the body of the page (as on p. 264 of vol. 3, just discussed on p. 30, where only the page-number portion of the headline was recycled). Sometimes a suppressed headline-title would have returned to the skeleton later, but a new headline-title might have been composed instead. Also, when headline pairs extracted from their formes lay close to one another (on the stone, say, or in a galley), they were open to swapping of corresponding parts. As headline transfers leave clear traces of before and after, they help to guide one's reconstruction of the printing schedule, as we shall now see.

The recto headlines of this edition specify title and chapter. On p. 51, my notations of signatures on Aldo's title page make clear that many of Aristotle's works are of short duration; consequently, recto settings often changed too frequently to be of much use in charting headline transfers. But this frequent change of titles is not a problem on versos, which usually repeat the author's name plus a preposition ('Aristotélous perì') with only occasional interruptions. Consider these three verso headlines in quire &&ωω—

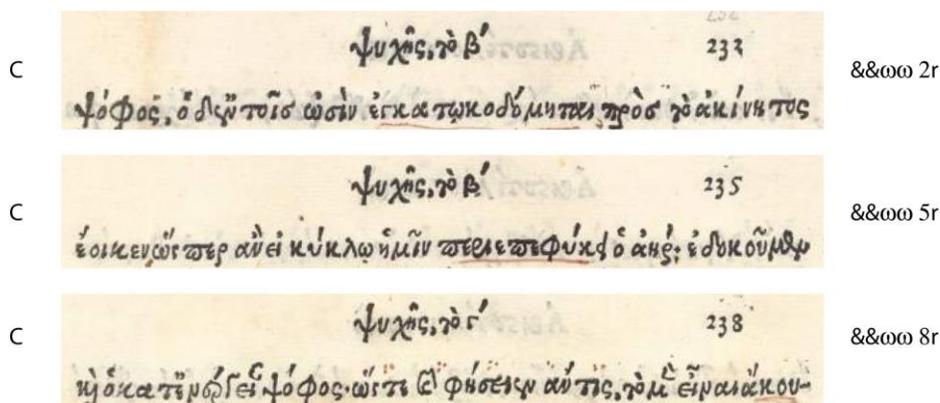


each in a different skeleton, which I have labelled A, B, and C. (I have chosen quire &&ωω, by the way, as it precedes AA, where one of our first examples of blind type appears (see p. 5). Since the distinctive distances from the margins of each headline to the first and last characters are usually conserved from one appearance of these skeletons to the next, empty space before and after can be as important in headline identification as the more obvious variations in internal spacing between, as for example, the *sigma-tau-omicron* ligature in Aristotle's name and the immediately following accented *tau-epsilon* ligature: in C, that space is notably bigger. And note the space between *sigma* at the end of the first word and the *pi-epsilon* ligature at the start of the second: it is smallest in C. Consider too the overall spacing. The printed characters in the headlines of skeletons A and B begin at different depths but conclude at almost the same depth: the composition of characters is more compact in B than in A by virtue of the distinctively narrow *lambda* and *sigma* in Aristotle's name in headline B. And so on. All these particular features are likely to reappear with each use of a headline in a new forme.

Luckily for us, single letters in Aldo's founts were often represented by different sorts (as we see here with *sigma* and as we saw on p. 60 in the multiple settings of the slip-cancel on kk10v). Aldo prized his polymorphic Greek and italic founts for their mimicry of handwriting, which was enhanced by this variety of shapes. In headline B, Aristotle's name ends with an open *sigma*, whereas in A and C the corresponding *sigma* is closed. Headline C shows distinctive damage to the base of the accent above the *tau-epsilon* ligature in Aristotle's name. This damage also appears, I note, in the previous use of headline C, on zzηη5v. After its appearance in &&ωω, however, the accent was soon replaced. Just how many formes this damage appears in would be nice to know, but is hard to say, for its appearance

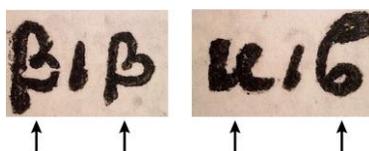
in two locations in the copy in hand does not mean it necessarily appears there in all copies; and non-appearance in other formes in our copy does not mean it necessarily does not appear in those formes in other copies. The hard questions to answer are whether the damage occurred during the press-run of the forme where we first observe it in a given copy (and not earlier, as might be discovered in another copy) or was replaced during the press-run of the first forme in which we note its absence. Collation of many copies might resolve such questions, but only if the necessary evidence has survived. One must be cautious.

In headline identification, caution is also necessary because individual types can be replaced in a recycled headline even when there is no sign of previous damage in the copies to hand. Consider the following group of three recto headlines of skeleton C, also from quire &&ωω



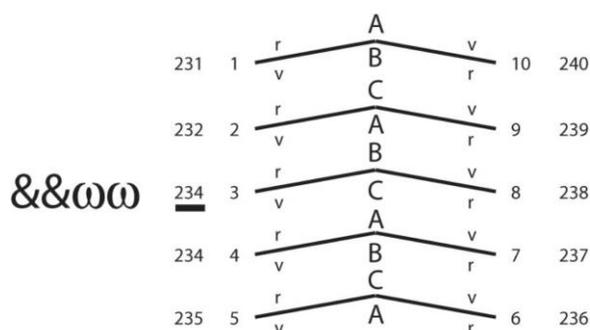
—on pp. 232r (where a lopped ‘3’ serves as the final ‘2’), 235r, and 238r—which report the title of *De anima*, the fourth of Aristotle’s works in this volume. The basic setting is the same, though the last digit of the folio number had, of course, to be updated for each new leaf. As the second book of *De anima* ends on p. 236v, the *beta* at the end of the first two headlines shown above also had to change—to *gamma* in the third (p. 238r). But look more closely: there has also been a change between the *betas* on pp. 232r (it is bigger) and on 235r (it is smaller). The explanation of this difference is straightforward: although I have displayed these three recto headlines in *narrative* order, it is their *printed* order (from the outer formes of the quire to the inner), that counts: and that order is 232r→238r→235r. The large *beta* removed from the headline on p. 238r must have been discarded when it was replaced with *gamma*; and for the subsequent printing of this headline on p. 235r—later in composition, but earlier in the narrative—that *gamma* had in turn to be removed and a new *beta* to be composed instead—the smaller one, it so happened. (There was no possibility, by the way, for either this *beta* or this *gamma* to return to the skeleton until two quires later—but it is useless to hunt for them there because *De anima* had already ended, on AA5v, f. 246.)

These large and small shapes of *beta* raise a nice question about the compositor’s case: What different sorts of *beta* might Aldo have allotted to different compartments, and which were combined in a single compartment? Consider, the many examples of *beta* in the 24 occurrences of the words ‘bibl^{ion}’ or ‘bibl^{ia}’ on the title page of vol. 3 (shown on p. 51). There are four sorts of *beta* there. In title 23, there appears what I assumed to be a mistake, a tailless *mu*,



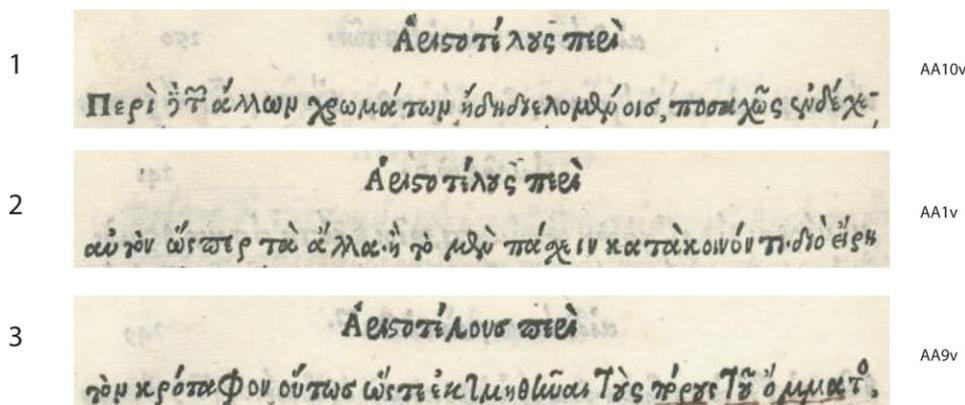
but this rare styling appears elsewhere—as in ‘βασιλεῖ’ in *Psalterion* v4r.6, and as a shape of ‘Vita’, as ‘Beta’ is named, in *Breuisissime Introductio ad Letteras Graecas*, c1497. Did the compositor consciously choose the seemingly random variation of these sorts of *beta* on this page or did it arise merely from his having drawn type uncritically from a single compartment of the case where various *betas* mixed with one another? The is the same question that was posed for the three different substitutes for ligature ‘καὶ’ mentioned on p. 21 and for the open and closed *sigma* just referred to on p. 64.

By such earmarks and fingerprints as these, one traces recurrent settings of headlines (and of the skeletons of which they are parts) both within quires and between them, and thereby begins systematically to deduce the production schedule. In quire &&ωω, the pattern of skeleton recurrence proves regular, from the outermost forme to the innermost: A, B, C, A, B, C, A, B, C, A, as shown in the following enhanced meta-map. (I use each letter A, B, or C generally to represent a pair of headlines, but the verso of the pair is the only one I guarantee to be present.)

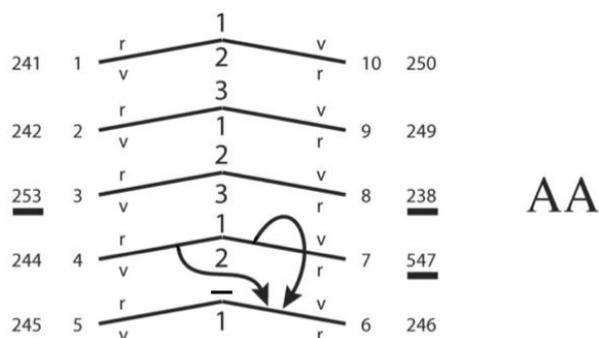


It is very difficult to analyze the recycling of whole skeletons in bound books since a single forme is usually made up of two remote pages. (Only the skeleton pair 5v–6r appears in a single opening of a folio-in-10s.) I was able to construct the following history of skeletons only by laboriously printing out pages from the online Bayerische Staatsbibliothek copy, labelling them so as to establish each conjugate pair and, with tape, reconstituting the formes.

That none of the A, B, and C skeletons of quire &&ωω shown on p. 64 appears in AA, the next quire, increases the difficulty of such analysis. In quire AA, three different skeletons occur.

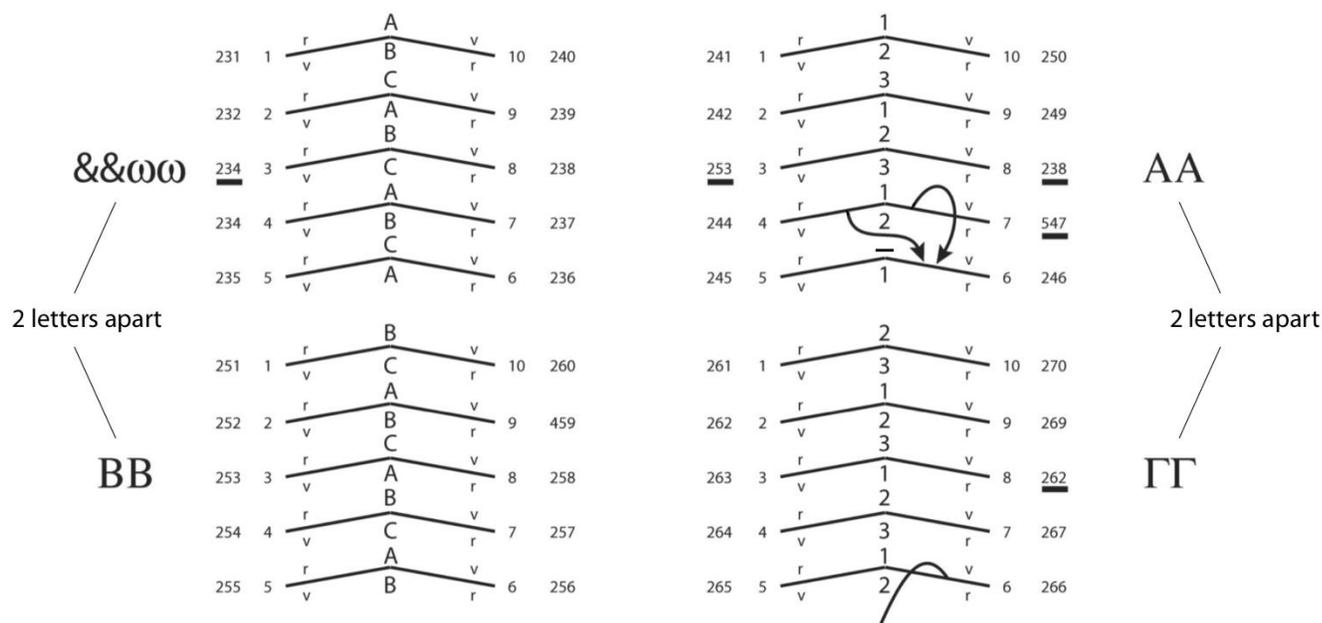


But, helpfully, they too exhibit regular rotation: 1, 2, 3, 1, 2, 3, 1, 2, [nil], 1. (‘[nil]’ appears where the recto was blank and the verso headline was routinely suppressed because a new title appeared atop the body of the verso.)



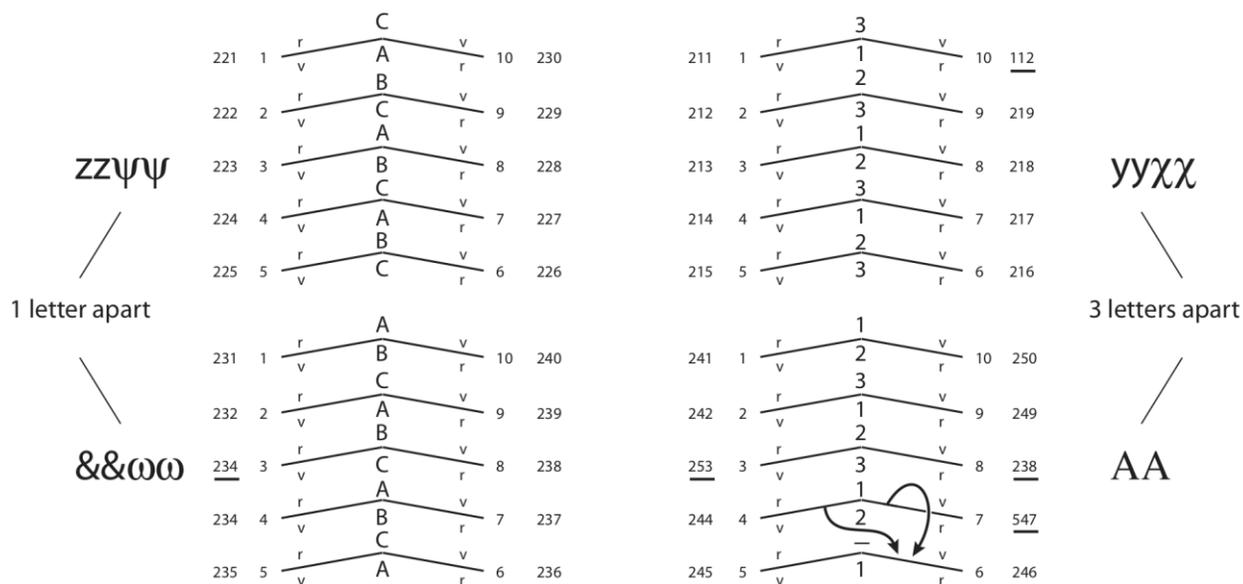
There are more earmarks and fingerprints ripe for comment in this quire. In the verso headlines of skeletons 1 and 2, the *sigmas* at the end of Aristotle’s name are open and look quite—well, look quite Greek, in contrast to the italic shape in headline B. Aldo would soon pioneer the first italic fount, but perhaps not until 1500, when a few italic letters printed within a woodblock on *10v in some copies of *Epistole deuotissime de Sancta Catharina da Siena*. But this italic shape is also found in Aldo’s Greek-2 fount, so identified in the UCLA catalogue, p. 547 and dated 1498. In skeletons 1 and 2, *omicron* and *upsilon* appear in a ligature near the end of Aristotle’s name; also, in these two headlines, the familiar shape of *pi* in the *pi-epsilon* ligature at the start of the second word stands on two legs (π), rather than on an *omega*-shape (ω), as in skeleton 3 (and also in skeletons A, B, and C on p. 64). (Again, one wonders whether these various shapes all reposed in a single compartment of the compositor’s case.) In skeletons 1 and A, the grave accents above the *rho-iota* ligatures at the end of the second word do not have the usual wedge shape; one is slightly convex, the other concave. The point is that such subtleties can be observed in the recycling of these skeletons in successive formes.

With inspection of the verso headlines of the next two quires, BB and $\Gamma\Gamma$, we come to some clarity: regular recycling of skeletons A, B, and C and of skeletons 1, 2, and 3 does occur *between* quires, but, to be precise, in this case, it occurs *between alternate* quires. There were two sites of production, as was supposed to be the case on p. 5. Now we have proof.



Notice, on the left, above, the regular rotation of skeletons A, B, and C out of quire &&ωω and into quire BB (the signatures of these quires being ‘2 letters apart’) and also the regular rotation of skeletons 1, 2, and 3 out of quire AA and into quire ΓΓ (these signatures also being ‘2 letters apart’).³⁹

If, however, we look to the headline transfers of the two preceding quires, yyχχ and zzψψ, we will need to refine this observation slightly, for their horizontal positions in the two columns are the opposite of what we might have expected:



the A, B, and C headlines of **zzψψ** recycle immediately into the next quire in the signing sequence (**&&ωω**), and those of **yyχχ**, headlines 1, 2, and 3, skip over the next two quires in the sequence (to reappear in quire **AA**), like this.⁴⁰



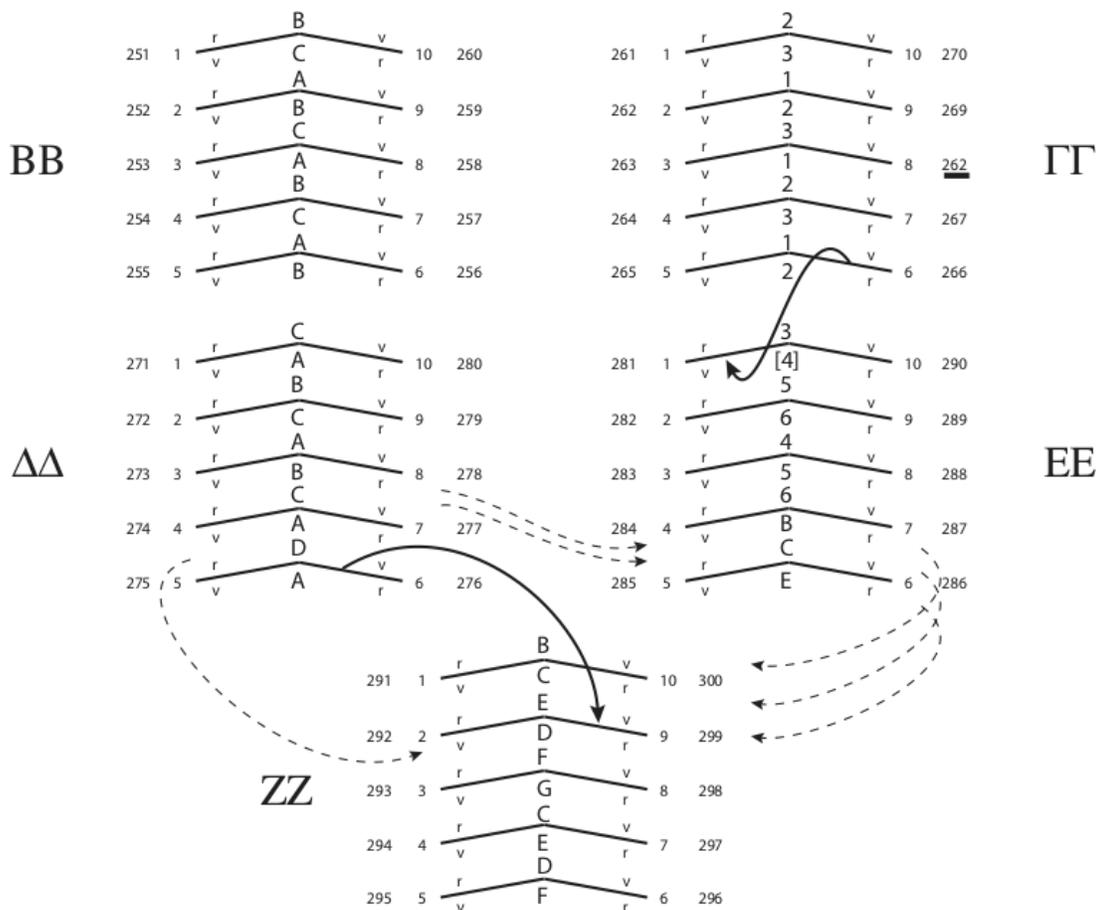
It seems more accurate, therefore, to suppose merely that, as a rule, every two quires were divided between two sites of composition (represented by the two columns), without specifying which quire would have been assigned to which site. If, as they well may, these two columns signify concurrent production of two quires, we can speculate that two quires-worth of pages might normally have been the minimum unit of casting-off of the manuscript.

Analysis of headline transfers shows that divided composition continued into quires **BB** and **ΓΓ** and also into **ΔΔ** and **EE** (where we first suspected it), but in each of the last two (**ΓΓ** and **EE**) the rhythm of recycling broke down and a new rhythm slowly became established. This transition period

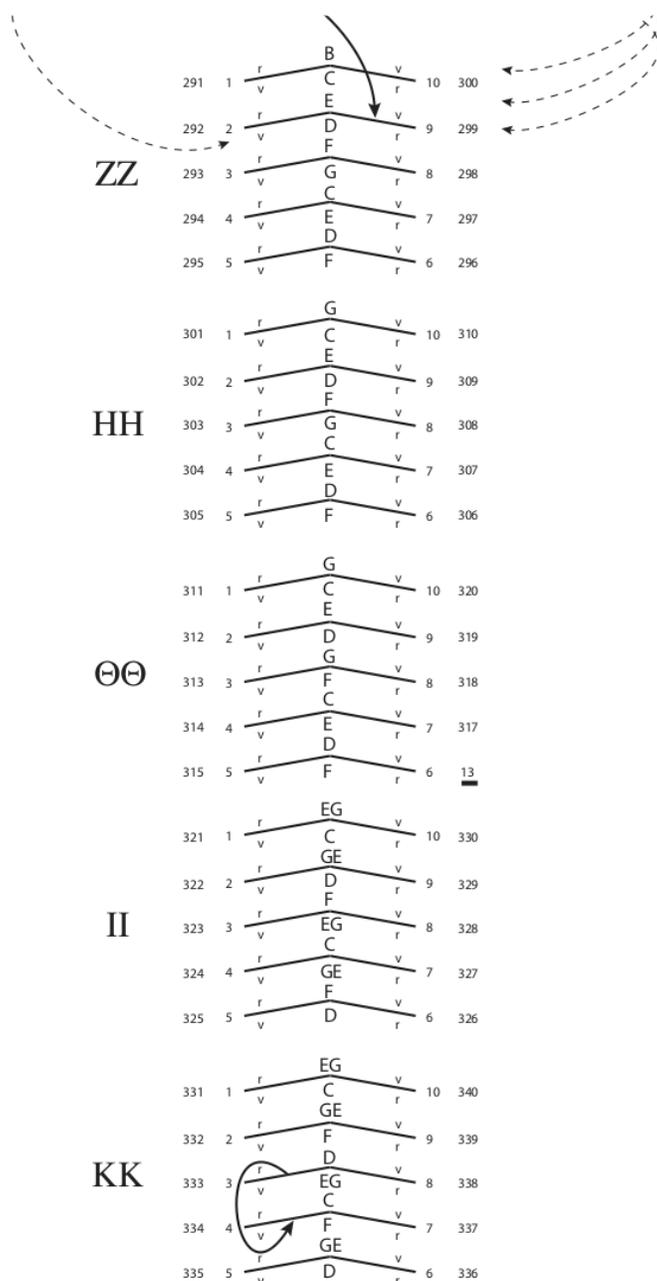
³⁹ On p. 3, I asserted that the underlined setting of the leaf number ‘262’ on ΓΓ8r was recycled from the appearance of that number on ΓΓ2r. Support for that statement now emerges in the fact that *the very types* of headline 1 on ΓΓ8r were recycled immediately to ΓΓ2r. Similarly, in quire **AA**, that ‘5’ mistakenly appears in ‘253’ instead of the desired ‘4’ can be explained by the fact that the previous use of skeleton 2 read ‘250’. When he redeployed this headline, the compositor updated merely its units column, not also its tens column.

⁴⁰ The folio numbers often represent ‘5’ with a look-alike *sigma-tau* ligature (*‘stigma’*), which actually counted as ‘6’ in ancient times (see p. 56, n. 36); and ‘2’ is often represented by a defaced ‘3’, as we have already seen, on p. 65.

is easiest to understand in the meta-maps on this and the following page—but I offer a summary of them in advance: Toward the end of composition of quire $\Delta\Delta$, a new skeleton D appeared (it was to have a long life); and in quire EE, there are, starting early, four new skeletons, 4, 5, and 6 (which all recycled only once), and, later, skeleton E (which reappeared in many quires thereafter). After quires, $\Delta\Delta$ and EE, were completed in their two sites, a single site of composition (evidently the one represented by the right-hand column) came to prevail: by quire ZZ there was one set of mostly new headlines, whose rhythm of recycling was every five headlines—in contrast to every three, the rhythm we encountered in the first quires where headlines were mapped in this essay (on p. 66–67), when two sets of headlines were employed.



The two sites of composition were, it seems, ‘under one roof’, for headlines from Skeletons B and C, in the left-hand column, migrated from quire $\Delta\Delta$ to EE, in the right-, as traced in the two uppermost dotted lines. Furthermore, the slight downward slope of these dotted lines of migration connecting the two columns supports the notion that the two sites of composition were running neck and neck, at least when the migration occurred. At the end of these two columns, new skeletons were created, D in quire $\Delta\Delta$ and E in quire EE. Both skeletons recycled to quire ZZ, where the single site of composition came into effect, along with skeletons B and C (on the move again, as more dotted arrows show), and in this latest quire, they were supplemented with skeletons F and G. Of all the skeletons described so far, only C, E, D, F, and G survived, to recycle in units of five thereafter, with slight changes of order over the next four quires, from HH through KK, where (you will likely be pleased to know) I’ll stop tracing skeletons for now.



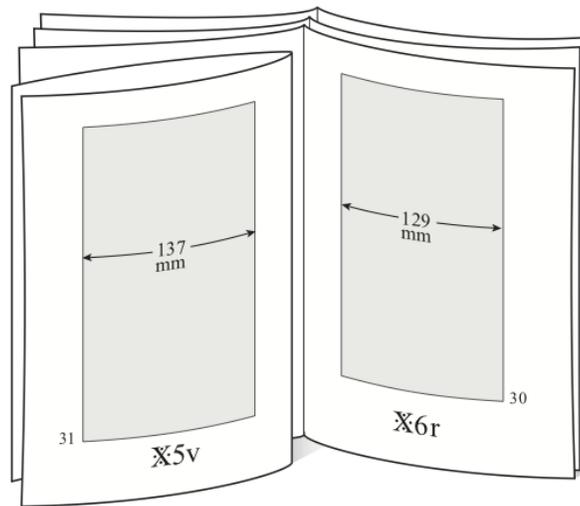
But do note, before we leave this topic, that at the start of quire II, skeletons E and G exchanged one headline each: hence the new hybrid names, ‘EG’ and ‘GE’ thereafter. (Such a possibility has been referred to already, on p. 64.) Between quires ΘΘ and II, the use of skeleton E and then, merely three formes apart, of skeleton EG, its derivative, suggests that a skeleton was ready for recycling during this latest phase of production at the same rate after quire ZZ as before, even though the number of skeletons in rotation had increased, from 3 to 5. Consider that in quire ΘΘ the sequence of skeletons F → G changed to G → F; that in quire II, the sequence of skeletons D → F changed to F → D; and that from quire II to quire KK, the sequence of skeletons C → GE changed to GE → C. It seems that although five skeletons were now in circulation, merely four might have sufficed without compromising the speed of production.



LOSO

Now for two new kinds of calculation of space—linear capacity and textual density. Metal type cannot be compressed, of course. By ‘density’, I refer to how much diction can be expressed in the length of a line or of a page of type. For this topic, I shall consider the four-sheet quire ✕ in vol. 2 (colophon date February, 1498 in the UCLA catalogue, but 1497 in the colophon).⁴¹

Linear capacity: 129mm is the average line-length on the three outer sheets of this quire. But on the fourth and innermost sheet, composed last (or mostly composed last, as we shall soon intuit), line-length grew to 136 or 137mm, an increase of about 5%.

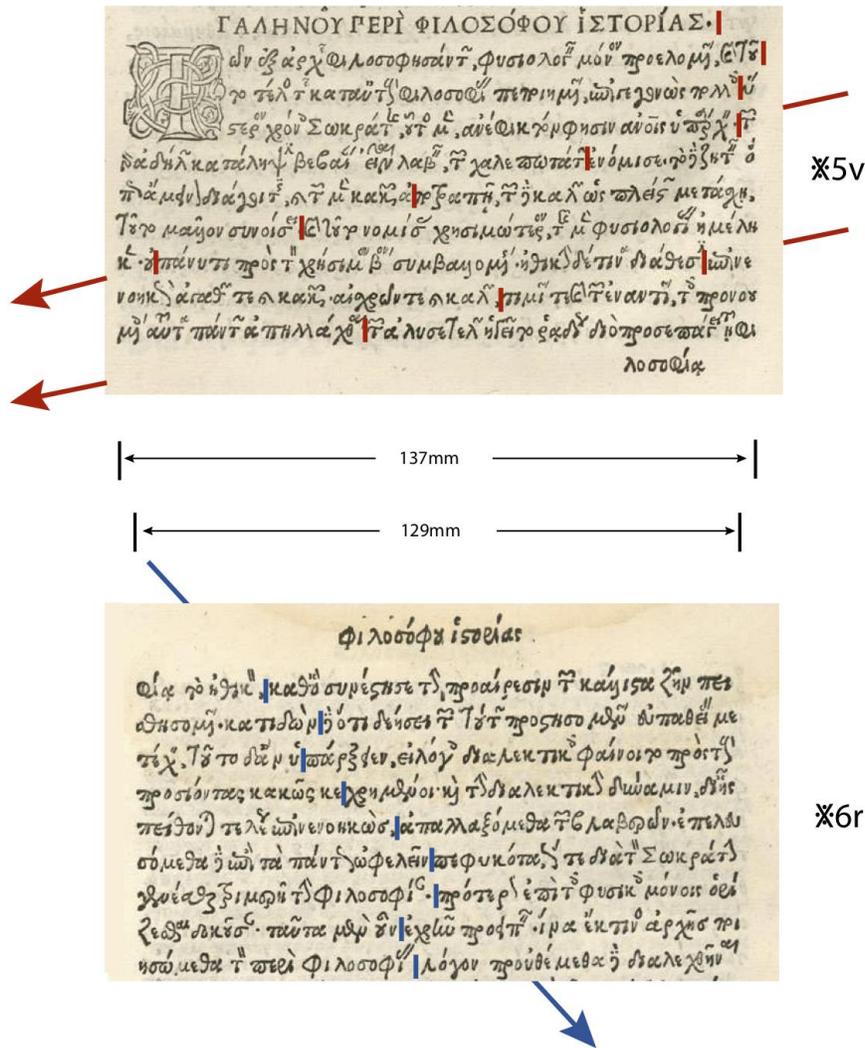


Shown on the next page are the four pages of the innermost sheet. They exhibit a few obvious signs of compression. There is great density, for example, in the last half-dozen lines of ✕4r, which allowed for the stand-alone ‘ΤΕΛΟΣ’ at the very bottom to be leaded and also for a touch of elegance in a *cul de lampe*. Otherwise the concluding line of this text was in danger of extending over-leaf, where it would have been orphaned. The last few lines of ✕4v are also of increased density, as if the compositor had been labouring so as not to exceed a point cast off—when one does not expect such scrupulous behaviour in the fore-quire. Most importantly, the bottom of ✕5v, where *On the History of Philosophy* by pseudo-Galen begins, is extremely dense. Above it, there is no leading and no expected ‘ΤΕΛΟΣ’. I shall focus here on the composition of the start of *On the History of Philosophy*.

⁴¹ The collation from the UCLA catalogue is ✕⁸ ✕⁸ ✕⁸ Ⓞ⁸ αα-ττ⁸ στ-ζζ⁸ &ω⁸ Α-Β⁸ ΓΓ⁶ ΔΔ-ΗΗ⁸ Ι⁸ Κ⁶. The initial four quires, signed with non-alphabetic symbols, contain biographies and pseudo-Galen’s *History*. They may have been printed last. There is no register to this volume, but a list of odd-sized quires claims that the first has only six leaves; in fact it has the usual eight. The error may be explained by the fact that preliminary paratexts (the title and an epistle to Alberto Pio) take up two leaves. So, the register may reflect the amount of the first biography cast off for the first quire, without regard for the paratexts that would precede it. Presumably, neither the biography nor the paratexts were printed when copy for the register was drafted or when it was printed. For more on the timing of the register of vol. 2, see pp. 100 through the Appendix. The Appendix offers a last-minute clarification of the conflict of dates, ‘1497’ and ‘1498’.

Having somehow painted himself into a corner as he concluded the setting of this quire, the compositor increased line-length throughout the last two formes. This increase translates to $(7\text{mm} \times 30/129\text{mm} =)$ 1.63 more lines of normal length per page for the final four pages of the quire to be composed. Moreover, on each of them, the compositor added a 31st line; and so, the capacity of each page increased by $(136/129 =)$ 1.05 normal lines, to a total of $(1.63 + 1.09 =)$ 2.72 more lines of normal length per page. The whole sheet therefore increased by 10.88 such lines—which is slightly more than a third of a normal page. But all of this increase—which amounts to more than a meter-and-a-third of type—still proved not quite enough, as we shall soon see.

The following two-part diagram presents text from the opening *5v–6r, where pseudo-Galen’s text begins.



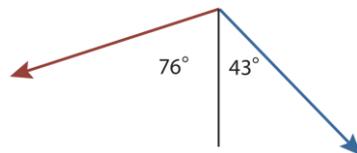
The lower half shows the relaxed composition in the shorter lines atop *6r (composed earlier, on the third sheet from the outside of the quire) and the upper shows the tight corner in the longer lines at the bottom of *5v (on the last page of the fourth sheet of the quire, the innermost). You can easily sense the differences in density by contrasting just the last line of each half of the diagram while trying to locate the spaces between words. Tight as it obviously is, *5v will prove even tighter than I have characterized it thus far when (on pp. 78–81) we come to consult printer’s copy.

Density: Vertical bars in this diagram map the locations of relevant line-endings in the printer's copy (which survives intact for the whole of *On the History of Philosophy*). These annotations allow for the computation of varying densities of text per line, whatever its length may be. Not only was more length given over to the lines of *5v, but also the compositor crammed text into them: and so, the amount of text at the end of the innermost sheet on *5v is even greater than the extra 5% length of each of its lines suggests. On *5v, where the alignment of the bars representing line-endings slopes gently down left (see the two red arrows), the composition of a line of manuscript fills approximately 70mm of a (longer) line of type, whereas on *6r, where their slope is steeply down right (see the single blue arrow), the composition of a line of manuscript fills approximately 88mm of a (shorter) line of type.⁴² The regularity of each slope, that connecting the red bars and of that connecting the blue ones, suggests (without actually proving) that there is uniform textual density throughout the page of printer's copy, while, by contrast, the greatly different but constant slopes in each of the red and blue halves of the diagram argue that the two ranges of text to which they pertain have each a uniform, though different, density.

These figures suggest that the text on *5v—I'll consider just its last six lines (those past the large initial)—is 16% greater in density than the text that continues in the first six lines of *6r. The compositor accomplished the higher density on the former page (composed second) not only by judiciously choosing optional sorts with smaller widths, by abbreviations, and by superscripts (all of which expediences we saw, but in reverse, in the discussion of driving-out on p. 21), but also, at the very last moment—you won't believe this—by injudiciously shunting two syllables of 'philosophía' from the body of the text down to the direction line. (Of all the words for Aldo to screw up in a history of this subject!) Look back now to the page-break in the previous diagram to see what I mean. If one does not attend to the catchword 'λοσοφία' ('losophía'), the word that straddles the page-break reads merely 'φι|φία' ('phi|phía')—not 'φισοο|φία' ('philoso|phía').⁴³

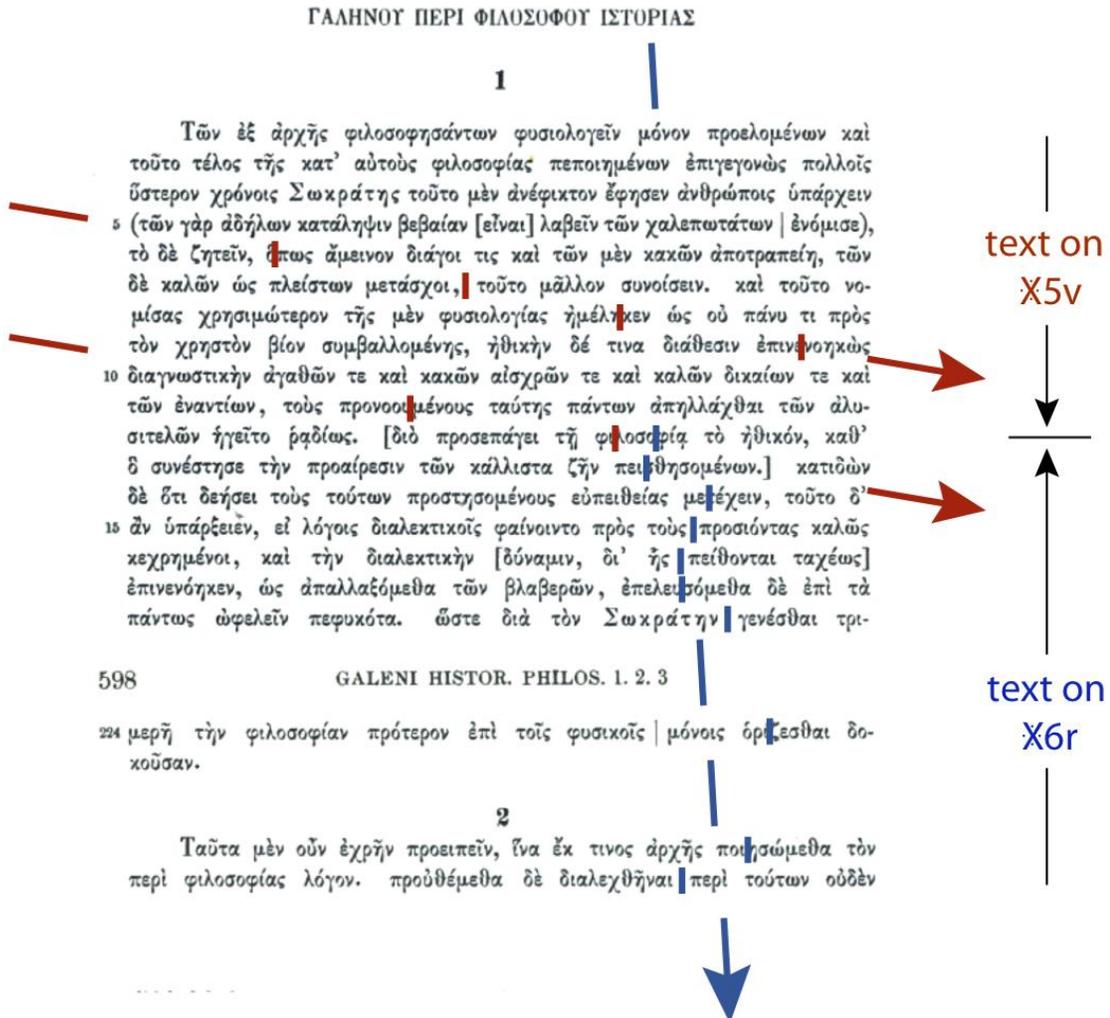
To show that the changes in density across the page-break do not derive from differences in density at this point in the text of the manuscript itself, the following diagram displays the corresponding portions of pseudo-Galen's text in Hermann Diels' *Doxographia Graeci*, first published in Berlin in 1879. His composition has none of the abbreviations, superscripts, and variant shapes that Aldo greatly prized in his founts. Also, in Diels' setting, the differences in density of a tight line (like the one numbered '5') and an open one (like l. 16) are minor. Consequently, this text appears relatively constant in density throughout.

⁴² A telling way to measure these angles is from the vertical.



A vertical arrow (with a slope of 0°) would mean that one line of manuscript corresponds to one line of print. The more an arrow rises in a clockwise direction, the more open is the composition; the more counter-clockwise, the more dense. If we suppose that the 43° angle of the blue arrow represents normal density, then 119° (i.e., 76°+43°) represents the above-normal compression of text at the base of p. *5v.

⁴³ Maybe from now on we should all read catchwords? (Aldo, by the way, did not consistently use a hyphen to unite the two parts of a word broken across a line ending. 'φι|φία' is wrong, but not so for lack of a hyphen.)



The mapping of line-endings from Aldo's setting onto Diels' reveals a change of orientation between the red and blue arrows that mirrors that in the diagram on p. 73. Therefore—*QED*—the abrupt change in density in Aldo's setting does not derive from the manuscript.

On the next two pages, I shall contrast line by line Aldo's compact setting (in the upper channels) with Diels' open setting (in the lower channels); the text is the last nine lines on *5v and the first nine on *6r. In each display, space-saving aspects of Aldo's settings are underlined and linked with the corresponding full settings of Diels'.⁴⁴ Aldo's line-length on the latter page, as we know, is 5% shorter than on the former page, but even when this difference is taken into account, Aldo's space-savers appear twice as dense on *5v as on *6r.⁴⁵ With these two pages, we can closely monitor the shifting pulse of composition.

⁴⁴ The two texts do vary slightly, but not so much as to obscure my point. (See several interlineal examples, signalled by '.....', in ll. 7 and 8 of the first diagram, on p. 76, and in ll. 5 and 8 of the second, on p. 77.)

⁴⁵ Note, in passing, more examples of the independence of accents from the letters to which they pertain, a topic first raised on pp. 27–30. On *5v, the position of superscript 'ov' above 'p' differs in ll. 3 and 6. And the position of the grave accent above 'o' differs in ll. 7 and 9—and in l. 3 of *6r. On this latter page, the position of the acute accent above 'o' differs in ll. 4, 5, 6, and twice in 7.

1



ων εξ αρχης φιλοσοφησαντων φυσιολογοι μονον προελομενων και τουτο

Tōn ex archēs philo-sophēsan-tōn physio-logōi monōn pro-e-lo-mē-nōn kai tou-to

2

το τελος της κατ αυτους φιλοσοφιας πεποιημενων επιγεγονως πολλοις

to-uto tel-os tis kat' au-tous phi-lo-so-phias pe-poi-ē-mē-nōn e-pi-ge-go-nōs pol-lōi-s

3

υστερον χρονις Σωκρατης τουτο μεν ανεφικτον εφρησεν ανθρωποις υπαρχειν (των

h-ster-on chro-nōi-s So-kra-tēs tou-to mēn a-ne-phi-k-ton e-ph-re-sen an-thrō-pōi-s u-pa-r-chē-in (tōn

4

(των γαρ αδηλων καταληψιν βεβαιαν [ειναι] λαβειν των χαλεπωτατων ενομιση, το δε ζητειν, οπως

(tōn gar adē-lōn ka-ta-ly-psi-n be-bai-an [ē-inai] la-be-in tōn cha-le-pō-ta-tōn e-no-mi-se, to de zē-tē-in, o-pōs

5

αμεινον διαγοι τις και των μεν κακων αποτραπειη, των δε καλων ως πλειστων μετασχοι,

h-mē-lōn di-a-go-i tis kai tōn mēn ka-kōn a-po-tra-pe-iē, tōn de ka-lōn ōs ple-i-s-tōn me-ta-scho-i,

6

τουτο μαλλον συνοισειν. και τουτο νομισας χρησιμωτερον της μεν φυσιολογιας ημεληχεν

to-uto ma-lōn sy-no-i-se-in. kai tou-to no-mi-sas ch-re-si-mō-ter-on tis mēn phys-i-o-lo-gi-as h-mē-lē-chēn

7

ημεληχεν ως ου πανυ τι προς τον χρηστον βιον συμβαλομενης, ηθικην δε τινα διαθεσιν επιπνενοηκως

h-mē-lē-chēn ōs ou pa-nū ti pros tōn ch-re-s-tōn bi-on sy-mba-lo-mē-nēs, ē-thi-kh-n de ti-na di-a-thē-sin e-pi-pne-no-ē-ka-s

8

επιπνενοηκως διαγνωστικην αγαθων τε και κακων αισχρων τε και καλων δικαίων τε κατων εναντιων, τους προνοουμενους

e-pi-pne-no-ē-ka-s di-a-gnō-s-ti-kh-n a-ga-thōn te kai ka-kōn ai-sch-rōn te kai ka-lōn di-ka-iōn te ka-tōn e-nan-tiōn, tou-s pro-no-u-mē-nous

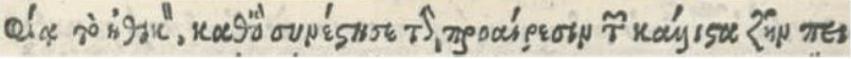
9

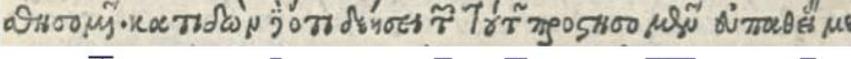
προνοουμενους ταυτης παντων απηλλάχθαι των αλυσιτελων ηγειτο ραδιως. [διό προσεπάγει τη φιλοσοφία

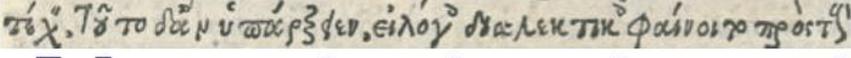
pro-no-u-mē-nous tau-tēs pa-n-tōn a-phē-l-lā-ch-thai tōn a-ly-si-te-lōn h-ge-i-to ra-di-ōs. [diō pro-se-pā-ge-i tē phi-lo-so-phi-a

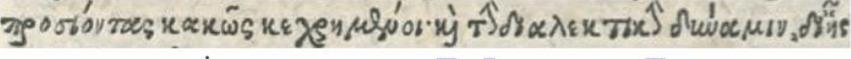
← text cast off for the start of X6r →

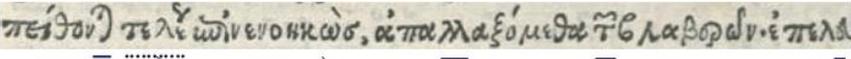
comparison of Aldo's with Diels' text at the bottom of X5v

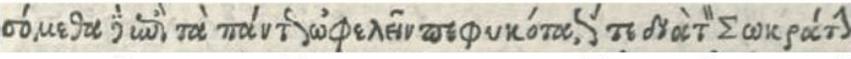
1  1
 φία τὸ ἠθικόν, καθ' ὃ συνέστησε τὴν προαίρεσιν τῶν καλλίστα ζῆν περὶ

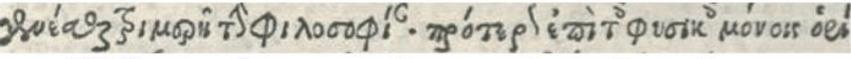
2  2
 ἀθησομένων.] κατιδὼν δὲ ὅτι δεήσει τοὺς τούτων προσηχομένους εὐπειθείας με

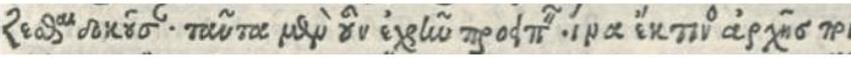
3  3
 τέχνη, τὸ δὲ μὴ ὑπάρξειεν, εἰ λόγῳ διαλεκτικῷ φαίνοιτο πρὸς τοὺς

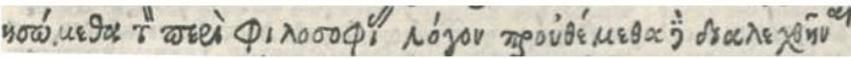
4  4
 προσιόντας κακῶς κεχημένοι, καὶ τὴν διαλεκτικὴν [δυνάμιν, δι' ἧς

5  5
 πείθονται ταχέως] ἐπινοήθηκεν, ὡς ἀπαλλάξόμεθα τῶν βλαβερῶν, ἐπελευ

6  6
 σόμεθα δὲ ἐπὶ τὰ πάντως ὠφελεῖν πεφυκότα. ὥστε διὰ τὸν Σωκράτην

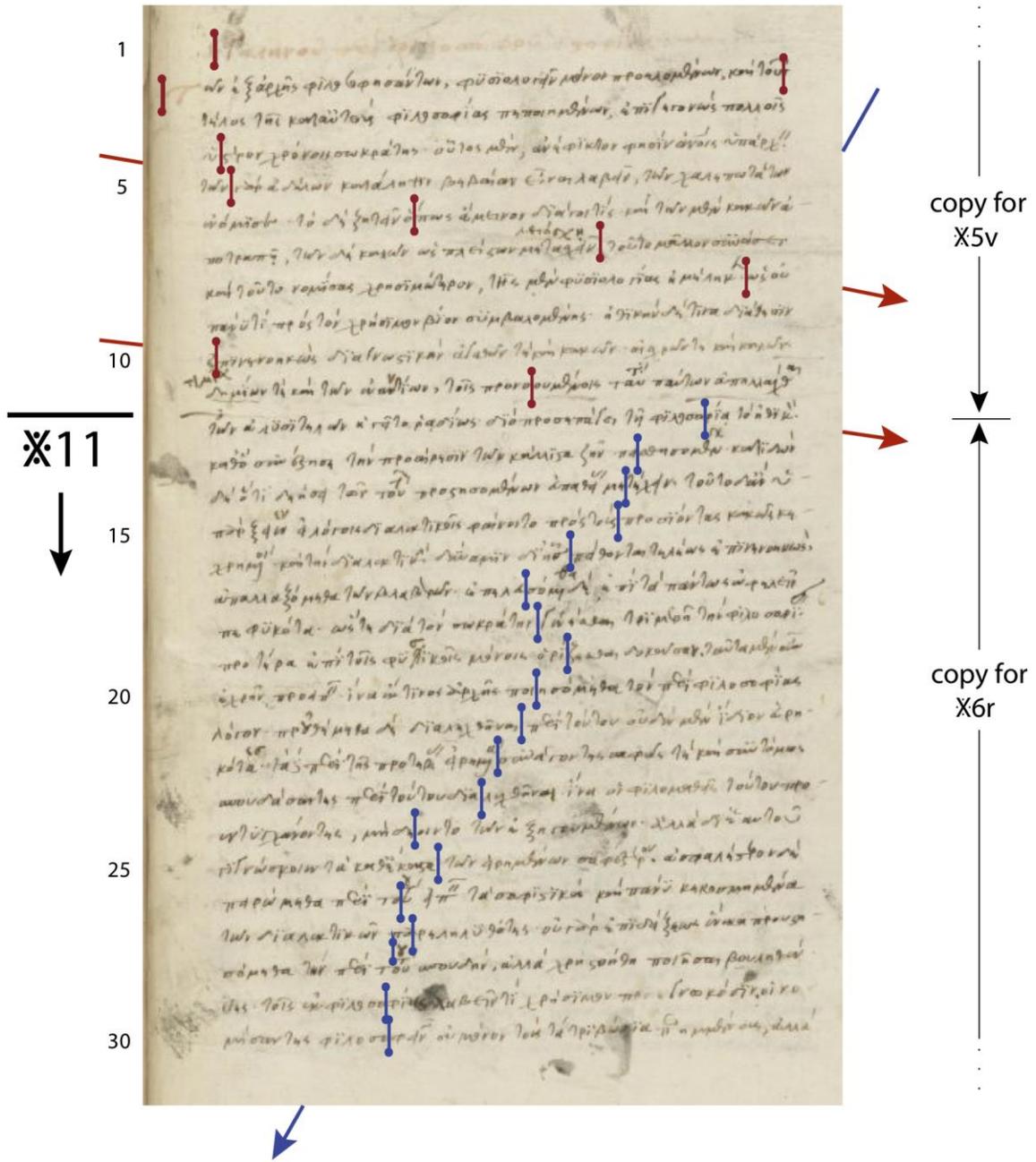
7  7
 γενέσθαι τριμερῆ τὴν φιλοσοφίαν πρότερον ἐπὶ τοῖς φυσικοῖς | μόνους ὁρί

8  8
 ζεσθακοῦσαν. Ταῦτα μὲν οὖν ἐχρήν προειπεῖν, ἵνα ἕκ τινος ἀρχῆς ποι

9  9
 ἡρώμεθα τὸν περὶ φιλοσοφίας λόγον. προϋθέμεθα δὲ διαλεχθῆναι

comparison of Aldo's with Diels' text at the start of §6r

Here at last is p. 313 of the printer's copy, beginning with the title of Galen's work in red ink (now much faded). Like pages of the printed book, this manuscript page has 30 lines. (My cropping omits the compositor's page reference, '✱11', on the right, which I have transcribed on the left.)



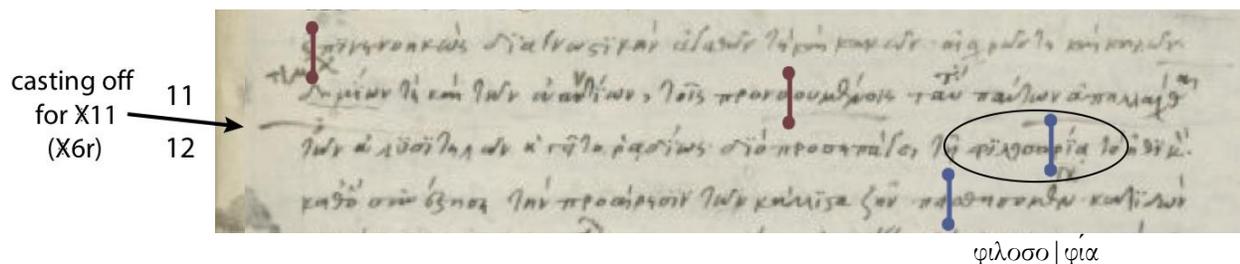
MS Gr 17, p. 313

With research assistance from Chaya Litvak (who helped me relate the scribal hand to Aldo's compositions), I have marked off locations in the manuscript that correspond to the line-endings in Aldo's edition. The slopes of the arrows mirror those on the printed pages of ✱5v–6r as diagrammed on p. 73. Whereas the runs of these annotations on p. ✱5v slope gently down left, the corresponding

ones in the manuscript slope gently down right; whereas that on the printed page *6r slopes steeply down right, that in the manuscript slopes steeply down left.

After the title atop p. 313 of the manuscript, 11.8 lines correspond to 10 lines of print; thereafter, 17.5 lines of manuscript correspond to 18 lines of print. The difference in density between these consecutive portions of text in print—approximately 21%—is more than abstract math. Readers struggling with the crush of abbreviations, superscripts, the variety of ligatures at the base of p. *5v, and also the minimal spacing between words there, experience the abrupt change of density viscerally as they move phi|phically from that page—with a sigh of relief—to the next.

In the following excerpt from the image of p. 313 on the previous page of this essay, the casting-off of the start of p. *6r appears in the left margin, above l. 12.



Composition of p. *6r must have begun at the start of l. 12 (though I do not have a blue annotation there) and it advanced (with no more compression than usual) through the ante-penultimate syllable ‘σο’ of ‘φιλοσοφία’. The length of this first line of type would have been 129mm, the length of all the other lines of type on this page. This first-composed line does not now appear atop p. *6r, however; and its *text* appears at the base of the previous page narratively, *5v, where it is compressed into merely the last 84mm. We are familiar with the notion that a page in the fore-quire can routinely begin a few syllables away from the place cast off and on rare occasions even several lines and parts of lines away (as was first discussed on p. 10). But in the aft quire, we suspect the migration of exactly a *whole line* from the top of one page to the bottom of the page composed next, if the page composed first was 31 lines long. If, when this *6r page came to be imposed, it was that length, its first line was liable to have been set aside for eventual use at the base of p. *5v, yet to be composed. (Such a scenario is already familiar from examples on pp. 34–41.) When *5v was eventually composed, however, there must have been insufficient room in its last line to accommodate the *whole* line set aside from the prior composition of *6r, and so it had to be shrunk for inclusion on *5v —shrunk to 65% of the line-length there (the *expanded* line-length there) or, if not shrunk, composed more compactly from scratch. (This text, in its length reduced from 129mm to 84mm, is indicated at the base of the diagram on p. 76.)

The warning above, on p. 38, deserves repeating here: a page imposed and printed need not have been a unit of composition progressing from beginning to end: its present first line might originally have been its second, and its last might once have been the first of the page that follows narratively—or, we can now add, might once have been a revision or re-composition of the first line of such a page.

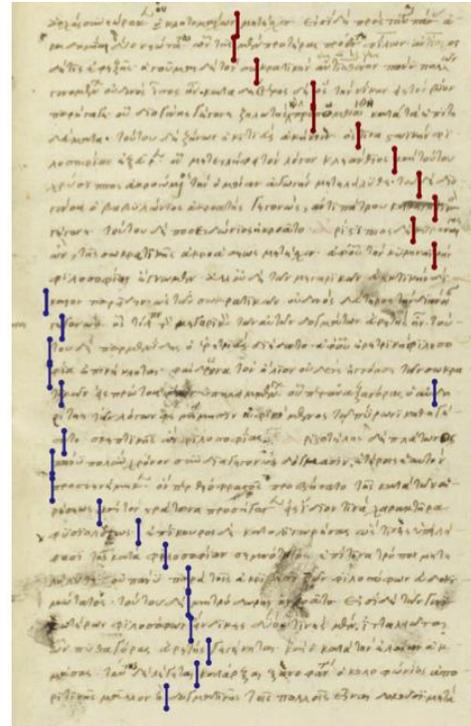
If we look to the next four manuscript pages, we shall see where some of the pressure on *5v from *6r originated.



X12



p.314



X13



p.315



X14



p.316



X15



p.317

To follow the compositor as he rather irregularly cast off the manuscript for setting these aft-quire pages, one takes them in narrative order: 11, 12, 13, 14, 15, 16.

- ✱11 was cast off at 29 lines for composition of p. ✱6r.
- ✱12 was cast off at 32 lines for composition of p. ✱6v.
- ✱13 was cast off at 31 lines for composition of p. ✱7r.
- ✱14 was cast off at 30 lines for composition of p. ✱7v.
- ✱15 was cast off at 31 lines for composition of p. ✱8r.
- ✱16 was cast off at 29 lines for composition of p. ✱8v.

But to follow his schedule of composition, one must take these cast-off pages in the opposite direction: 16, 15, 14, 13, 12, 11. I'll begin discussion of composition at ✱14 and work forward.

✱14 (starting on p. 316): Having cast off 30 lines of manuscript to demarcate ✱14, the compositor set 30 lines of type. (On p. 80, I have marked the start of each line with a bar.) He was able to commence a second line of type in the first line of his copy. An arrow (you'll have to imagine it) beginning at that second bar, near the right margin, and aligning with the subsequent red bars on this manuscript page, slopes down-left to the bottom. But, as the text continues atop p. 317, the arrow bends right, returning to the right margin where it started. What with the last line with no bar at all and the first with two, the overall ratio of lines of manuscript to lines of type is 1:1. (We have seen before similar abrupt changes of density when the compositor changed pages in his copy—on p. 36, above, and on pp. 43–47.)

✱13 (starting on p. 315): Having cast off 31 lines to demarcate ✱13, the compositor set 30 lines of type. Initially, our imaginary arrow connecting the bars (now blue) essentially has zero slope (two bars in l. 5 are balanced by none in the line following), but with the change to the next page, p. 316, it soon turns to the right, with the happy result that the penultimate line is without a bar. The composition has one less line than if the bars had continued their march straight down both pages.

✱12 (starting on p. 314): To demarcate ✱12, the compositor cast off 32 lines, perhaps by mistake. The shape of the imagined arrow connecting the bars (red again) is like that of the arrow connecting the blue bars on ✱13. Consequently, the composition is only one line shorter than copy, not two (only the last line is without a bar). 31 lines on a page of type create a problem, as it is one line too long. To deal with this surplus, the compositor must have set aside the first line of this page for eventual redeployment to the bottom of the next page to be composed, ✱11. (Note that the first bar in the ✱12 range would be blue if I were representing the *printed* text; but I have coloured it red here to represent the page *as composed*. The export of this line to blue territory contributes, of course, to the trouble that soon will surface in 'ϕι|ϕια'. At this point, it seems unlikely that the compositor was aware of the looming shortage of space in the center of the quire. If he had been, he could have helped relieve pressure there by allowing 31 lines on the current page, and on the next one to).

✱11 (starting on p. 313—see its representations on p. 78 and p. 79): Having cast off 29 lines to demarcate ✱11, the compositor set 30 lines.⁴⁶ That quantity would also prove unfortunate, for when ✱11 eventually imported the surplus line from ✱12 for its final line, its total swelled to 31 lines. In order to keep the length of the present page at 30 lines (the compositor must still have been unaware of the problem), its top line was set aside in turn, for eventual deployment to ✱10, on the next and last sheet, where, in fact, the text of the migrating line would prove too big to fit as composed, even

⁴⁶ The 29 blue bars on this page suggests a page of type 29 lines long. But recall that what should have been the first line had its *text* (and perhaps some of its original *composition*) absorbed into the end of last line of the next page to be composed, ✱10 (a narratively previous page), and it therefore is not marked blue here.

though the column width on the new host page was wider. It also swelled to 31 lines—and allowing 31 lines on the facing recto would, in hindsight have been a good idea.

When the compositor expanded the measure of his stick for composition of the four pages of the innermost sheet, he would surely already have known that room needed to be found on *10 for the line to be exported to it from *11. But a single exported line hardly justifies the 5% increase in the measure of his stick for the entirety of the last two formes. So, he must finally have woken up to the enormity of his problem. As the manuscripts for more than the first half of the quire is not extant, we cannot see what problems in the copy might have influenced his decision to increase capacity. Certainly, as the cast-off page-breaks in the surviving portion of copy for *On the History of Philosophy* (I can report) correspond to what was printed, the problem did not originate in them. And so, we'll have to turn to the printed text of this quire for clues.

The biography of Theophrastus ends on l. 29 of *4r (see it on p. 72, along with the other three pages on this sheet) and it is followed by one blank line, so that the page concludes in the 31st line, with 'ΤΕΛΟΣ'. Without the 5% increase in line length on this page and without the conspicuous increase in contractions and superscripts in its last five lines, this text could have ended awkwardly, as an orphan, a line or two down the next page, *4v. By finishing on the recto, Aldo ensured that the next text, *The Life of Aristotle*, beginning overleaf, required no space-consuming leading before it.

On the title page of vol. 4, the Contents' 'nomina & ordo' (as the Latin has it) lists two Aristotle biographies, by 1) Diogenes Laertius, and 2) Philoponus; then 3) a biography of Theophrastus by Diogenes Laertius. There follows 4), pseudo-Galen's history.

	Τῶν ἐν τῇ αὐτῇ βίβλῳ περιεχομένων ὀνόματα καὶ τάξις.	
1	Ἀριστοτέλους βίος ἐκ τῆς λαορτίου.	*3r-★8v
2	Τοῦ αὐτοῦ βίος κατὰ φιλόπονον.	✕4v-✕5v
3	Θεοφράστου βίος ἐκ τῶν λαορτίου.	*8v-✕4r
4	Γαλιῶν πρὸ φιλοσόφου ἰστορίας.	✕5v-⊙8v

	Eorum quæ hoc uolumine continentur nomina & ordo.	
1	Aristotelis uita ex laertio.	*3r-★8v
2	Eiusdem uita per ioannem philoponum.	✕4v-✕5v
3	Theophrasti uita ex laertio.	*8v-✕4r
4	Galenī de philosopho historia	✕5v-⊙8v

In the body of the volume, however, the biography of Theophrastus intervenes between the two biographies of Aristotle: the title page groups by subject (Aristotle then Theophrastus). But, in the body of the book, the sequence is by author (Diogenes Laertius then Philoponus). (Was the Philoponus biography a late addition?) Aldo's was not an age of accurate quotation, but the Contents—like Registers, usually printed last—may preserve an ideal order or an earlier plan.

The published order puts the short text by Philoponus (less than three pages long) before that by Pseudo-Galen. Consequently, quire * contains portions of three texts—1) the end of Diogenes on Theophrastus (on *4r), 2) all of Philoponus on Aristotle, and the start of 3) pseudo-Galen's history (on *5v). Copy potentially consisted of three separate manuscripts⁴⁷—and the co-ordination and casting-off of separate documents in this short space could easily have been prone to error. That the

⁴⁷ The only surviving copy of these three texts, that for Galen's, certainly looks like an independent document. It starts at the top of a recto.

problem in this quire seems to have surfaced just before production of the innermost sheet (where all of Philoponus's text occurs) suggests that something internal to it was the problem. Late in the production of the quire, could a shorter text have been replaced with the present one, longer by a third of a page? (That's the extent of the extra capacity created on this sheet.)

A more fruitful question, I suggest, is whether the count might have been off not by a mere third of a page, but by a much greater amount! We can look to the innermost sheet not only for what is crammed into it, but for what might have been eliminated to secure the present cramped fit of everything that remains. Consider, with this idea in mind, the conventional beginnings of the first two biographies in the previous quire, on ★3r and ★8v, seemingly before the problem was detected.

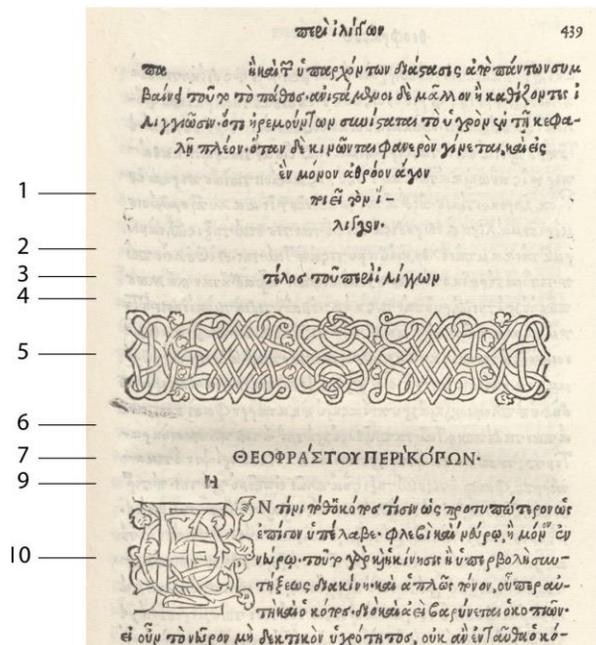


★3r



★8v

When a compositor was not in a tight corner, his layout for a new title might (as it does on YY11r of vol. 4 at the end of Theophrastus's *On diarrhesis* and start of *On fatigue*)



entail 1) a *cul de lampe*, 2) leading, 3) a *telos*, 4) more leading, 5) a woodblock ornament, 6) more leading, 7) an all-caps title, 8) more leading or a line with a diacritic above 9) a large woodblock initial. In a

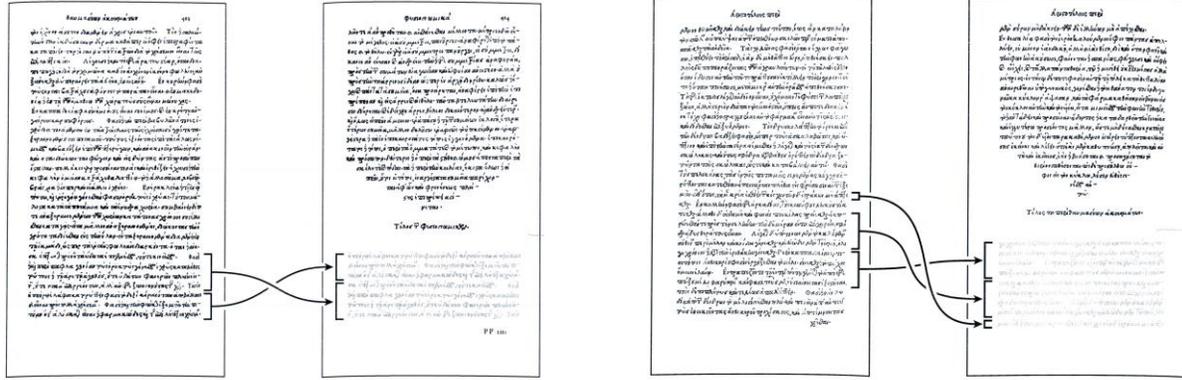
tight corner, dispensing with the *cul de lampe* would save two lines, with the telos, two more. And there are more economies. Aldine woodblock initials (#9 in this itemization) vary in size: the *Alpha* on ★3r takes up 2.6 lines in the size of type and the normal column-width of this edition, and the Omicron on ★8v takes up about 86% of a line (but because it is indented in this case, it effectively takes up 96%). On ★3r, this introductory layout is the equivalent of 9.4 normal lines; on ★8v, the equivalent of 7 lines. My point is that, except for the title, these conventional features to set off and adorn the start of a text are not found on the innermost sheet of quire ✕ either in the biography by Philoponus on ✕4v, or in the history by pseudo-Galen on ✕5v (as you can see in the illustrations of those pages on p. 72). Nor do we see beforehand a *cul de lampe* or a ‘ΤΕΛΟΣ’, which are optional layouts for the end of a text, as on ✕4r. In the Philoponus biography, note the diminutive initial *Alpha* (it takes up only 13% of a normal-sized line). And especially note the all-caps headline spanning the ✕4v–5r opening. As one expects no headline at all on a page atop which a new text begins (as on ★3r) and also expects a *lower*-case setting to appear in subsequent headlines (as on ✕4r—see p. 72 again) and also examples of the many headlines using the lower-case presented on pp. 64–66). It looks as if these two strangely placed and strangely styled *headlines* to Philoponus’s text were composed as a single *title*; but, having split in two, its parts ascended out of the body of the page to save space—as ‘λοσο’ saved space when it descended from the body to the direction line. The two halves of the title thus used up, nothing was left for a headline on 5v, the third page of this text, where the expected headline is lacking. These were desperate strategies to save the text by compromising format.

Earlier, I computed that the longer line-lengths and extra line per page gave the innermost sheet of this quire the equivalent of a third more of a normal page. If we imagine adding enough lines for conventional formatting of the openings of the two texts in the innermost sheet that do not have such formatting (perhaps adding a ‘ΤΕΛΟΣ’ after one or the other or both, we arrive at the equivalent of an entire page of type. We can now think of room for 30 lines, not just 11—and that is an amount that is much easier to explain than a mere third of a page, for the omission of precisely this much text could be the result of a casting-off error that skipped over one number in the count somewhere in the range ‘✕7’–‘✕10’, just before the beginning of the surviving portion of the manuscript (recall that the compositor, repeated his page number ‘B.6.’—see above, p. 42, n. 29), or that a compositor wrongly paired pp. 1 and 15, say, rather than 1 and 16 when he imposed the first forme. Have we not already witnessed a compositor miscounting, on pp. 18–20? And wasn’t a whole page omitted by accident during production of quire PP in vol. 3? In such a scenario, the compositor’s notation ‘✕11’ on p. 313, should have been ‘✕12’, and so on, cascading through to the end of the manuscript. In the case of the adventitious bifolium inserting text before 2PP (the quire in-10s discussed on pp. 58–59), the accidental omission of a page must have been discovered only after the printing of at least the first sheet of the quire was well under way, so that it was too costly to reject what had been printed thus far, and the only viable solution was to print a page (on a bifolium) to fill the gap. In the present case of quire ✕, however (so this hypothesis concludes), the omission must have been discovered late, shortly before the printing of the innermost sheet of this quire was to begin, when the cost of reprinting the three sheets already produced was especially prohibitive. With various alterations to format, Aldo was able (if my hunch is right) to shoe-horn five pages-worth of text into the space of four.

That the compositor miscalculated by a page is a more plausible explanation than my earlier suggestions—a last-minute change of copy for the biography of Philoponus or a change in the sequence of the biographies.



Traced in the following five maps are sources and destinations of blind type in six late quires of vol. 3—PP, ΣΣ, ΤΤ, ΥΥ, ΦΦ, and ΧΧ, this last containing the register (as we already know from discussion on pp. 26 and 53–62). The fourth of these maps is incomplete; nevertheless, it conveys essential information in the column of corresponding meta-maps, which follows on p. 86.



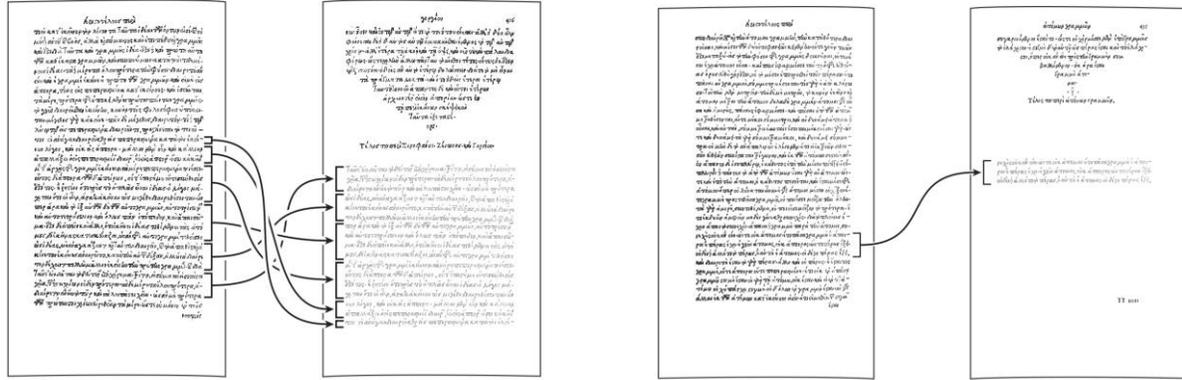
PP8r, f. 408

PP4r, f. 404



PP5v, f. 405

ΣΣ8v, f. [418]



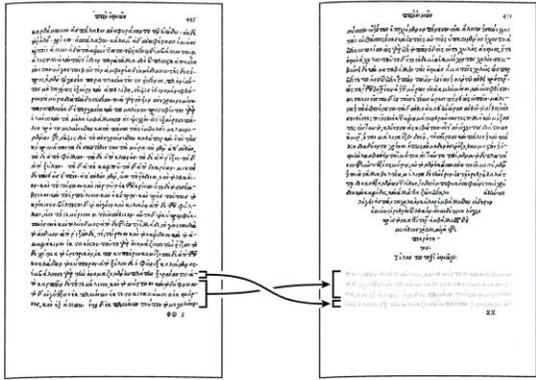
TT7v, f. 427

TT6r, f. 426



YY3v, f. 433

YY5r, f. 435

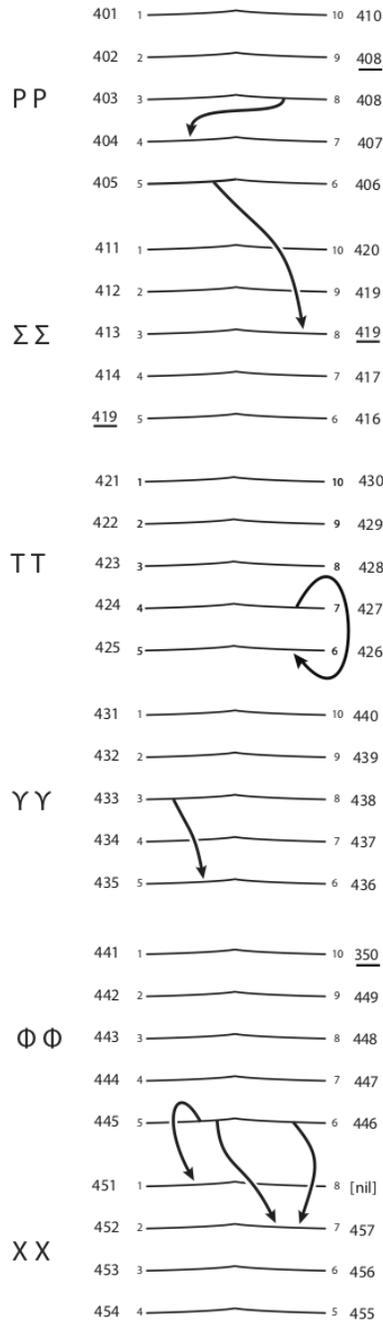


ΦΦ5r, f. 445

ΧΧ1r, f. 451

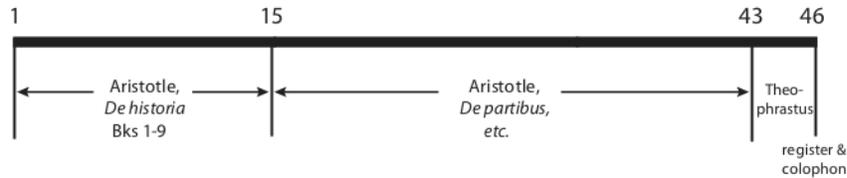
The two examples of blind transfers, from PP to ΣΣ (in the second of these maps) and from ΦΦ to ΧΧ (in the fifth map) strongly suggest that these later quires were composed in alphabetical order in a single site. Headline transfers reinforce that suggestion. Not surprisingly, then, these maps show that

the dead type recycled between quires PP and ΣΣ and between ΦΦ and XX traversed only small numbers of formes—2, 3, or 5, numbers that are not very different from the numbers traversed within quires PP, TT, and YY—1, 2, or 3 formes. (The arrows to XX7v are mapped on p. 26.)

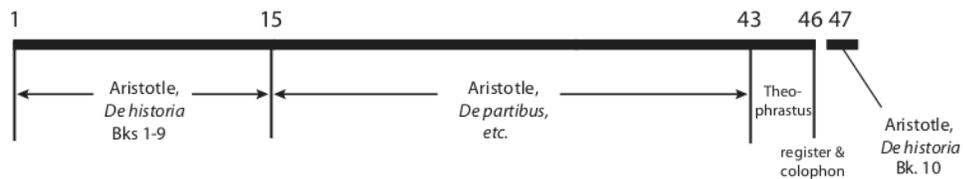


When, on p. 53, I said of the register that ‘It seems that, when he drafted it, Aldo planned XX as the last quire of this volume’, I was anticipating what now needs to be spelled out: not all went according to plan. Nine books of *De historia animalium* (not eight, as the title page claims) run from the start of the volume to the middle of quire 15 (where they end on pp oo5v), whereupon *De partibus*

animalium and other Aristotelian texts follow and continue into quire 43, YY. In the end of YY and in the next two quires, ΦΦ and XX, are texts by Theophrastus, in the last of which, quire 46, appear the register and colophon, already discussed, which conclude on XX7v, f. 457.

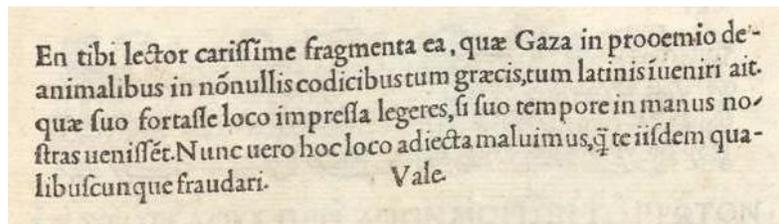


And that should be the end of it, you'd think. But after quire 46 in most copies, there is found, in fact, one quire more.



As this 47th quire has no leaf numbers, does not begin with '458' or '459' (to continue the numerical sequence of leaves from quire XX), nor is signed with 'ΨΨ' (to continue the alphabetical sequence of signatures)—it is signed, rather, with an asterisk, '※'—no binder could or can be certain where it should be sewn.⁴⁸

The first page of this adventitious quire, ※1r, begins with a title announcing Bk K' (that is, Bk 10)—of *De historia animalium*. And its last printed page, ※8r, apologizes for the late arrival of 'these fragments'.



Behold these fragments, dear Reader. In his introduction to *De animalibus*, Gaza said they were to be found in some manuscripts, both Greek and Latin. Had they come into our hands at the right time, you might have read them in their proper place. But now we'd rather add them here than deprive you of the same, such as they are. Farewell

The Gaza passage referred to is found on a4r–4v of his introduction to *De animalibus* in the edition I referred to on pp. 52–53.

⁴⁸ When I adduced the collation formulas of the two UCLA catalogues on p. 52, I did not draw attention to this odd signature. The later catalogue does accurately report it, but the earlier mistakes it for 'X' (UCLA p. 16). In that earlier catalogue, Greek diacritics, etc. for which no typographical sign was available were added roughly by hand to the master to be reproduced, I presume, by photo-offset. The 'X' in this collation and also in the one for vol. 2 (on UCLA p. 14) must, negligently, not have been annotated.

dinis historię habeatur: Sunt etiam exemplaria tum gręca tū
uero latina quę habeant fragmentum quoddam historiis ad
ditum: sed id causas quasdam materiales agentefq; generatio
nis humanę exponit: non historiam complectitur. Itaq; non
a 4^o
inter historię libros hoc ego ponendum duxi: sed si colloca
dum uspiam est: libris de generatione: meo quidem iudicio
coniungendum est: inspicere singulos hos libros: ac legere ue

There are both Greek and Latin exemplars that add a fragment to *Historia*, but it explains some properties and efficient causes of human procreation and does not apply to *Historia*. And so, I did not think this fragment should be placed among its books. If it has to be put somewhere, however, in my opinion it should be joined to the books on procreation.⁴⁹

Since Aldo's register and title page make no mention of Bk 10, its inclusion looks like an afterthought—and hence the question: 'How long after?' Answering this question—it *can* be answered—will occupy us for the next five pages.

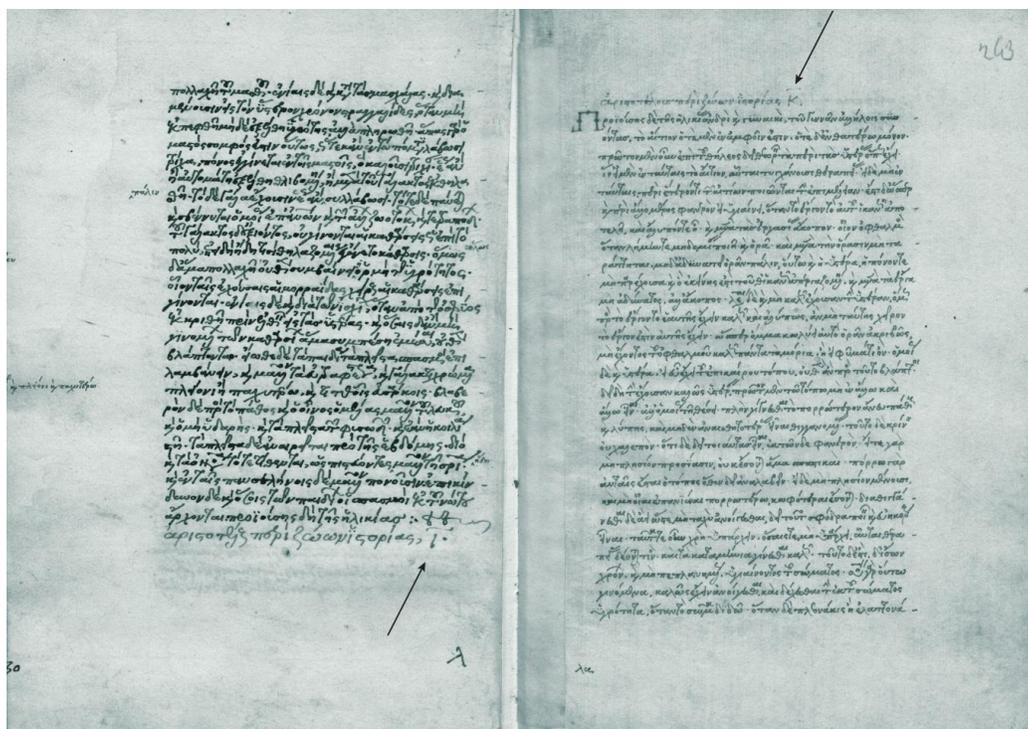
D. M. Balme, the recent editor of the Greek text of *De historia animalium*, holds that Bks 6–9 of the Aldine edition—and also, surprisingly, Bk 10—derive from a mid-fifteenth-century manuscript (I 56 sup) by Andronikos Kallistos (d. 1478), now in the Biblioteca Ambrosiana in Milan.⁵⁰ The structure of this manuscript will inform us about both Aldo's delay in finding copy for Bk 10 and the two transcriptions of the different parts of the manuscript for *De historia animalium* that he would have commissioned for his compositor's use.

The following opening of this manuscript presents a troubled continuity. The last sign on the verso (see the arrow) is the Greek letter *Iota* with a $\kappa\rho\alpha\iota\alpha$ above it; and the last sign in the first line atop the recto is *Kappa* with the same diacritic.⁵¹ This opening thus presents the end of Bk 9 and start of Bk 10.

⁴⁹ Thanks to John Grant for this translation and that on the previous page.

⁵⁰ Aristotle, *De historia animalium*, Vol. 1, Bks I–X, ed. D. M. Balme (Cambridge: Cambridge University Press, 2002), pp. 30–31. The Ambrosian manuscript consists of two Aristotle texts, *De partibus*, then *De historia*. The end of the first falls on 6r of a quire in-8s, of which the last five pages are blank and the last four not even ruled. This quire was definitely styled as the end of a work, though not, perhaps, as the end of a manuscript. *De historia* begins the next quire. (Two apparent marks of casting-off in Bk 10—on 246r.25 and 247r.15—do not, by the way, relate to the Aldine edition.)

⁵¹ The printed *Kappa* + $\kappa\rho\alpha\iota\alpha$ can be seen in the lower-left corner of the photograph on p. 92.

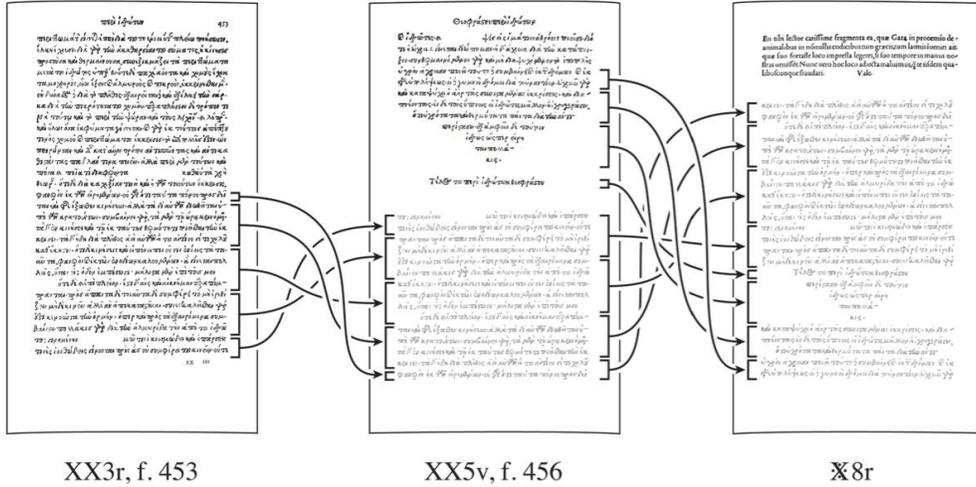


The style of Kallistos’s handwriting extending from this recto to the end of the manuscript is consistent. And his different style, extending from this verso back to the beginning of the manuscript is also consistent, except for some annotations there in his other style (see it on the outer margin of this verso). The contrasting *mises en page*, ruled layouts, and paper stocks visible in this photo are also consistent in each part. The present single manuscript is obviously a fusion of two separate productions. It is generally quired in eights, but the final quire of the left manuscript is uniquely quired in tens. The last and only quire of the right manuscript, consisting of Bk 10, is quired in fours, a format found nowhere else in I 56 sup. The irregular sizes of just these two quires in the present fusion argue that each was understood to be terminal at the time of its creation.⁵²

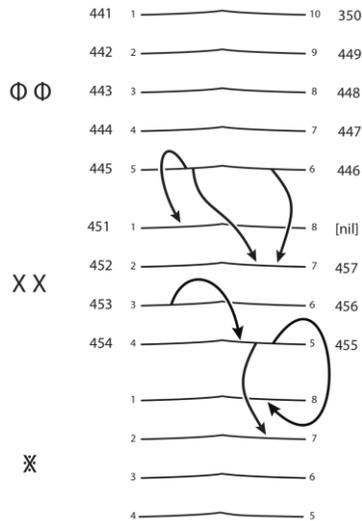
When Aldo first consulted the Ambrosian manuscript, it must have concluded with Bk 9. His subsequent access to the manuscript of Bk 10—whether it then stood alone or had already been grouped with or even bound with the other quires of manuscript I 56 sup, as we see it today, came later. Aldo must not have had the Ambrosian manuscript of Bk 10 copied until after his compositor had moved on from *De historia* to *De partibus*. ‘How much later?’ is again the question. What is at stake here? Do we suppose that Aldo discovered copy for Bk 10 so very late—weeks later, let us suppose—after the register for vol. 3 had already been printed? Or did he know he would print Bk 10 when the register was being drafted, or being composed, or the formes in which it appears were being imposed, or sent to the press—but nevertheless he did not register it? When did Aldo know?

Luckily there are two pages in quire * with only a few inked lines at top and which are therefore blank below. Such blanks are gold for us, now that we can read blind, for they link the production of * intimately to that of XX before it. (Atop p. 90 is the surprise waiting since p. 7.)

⁵² We may say the same of the last quires of Bks 9 and 10 of Aldo’s edition, Bk 9 because of the ‘ΤΕΛΟΣ’ on its last page (in the middle of quire 15), and Bk 10 in the 47th quire (which has no ‘ΤΕΛΟΣ’, by the way), because of the reduced size of this quire (it has only eight leaves), so as not to waste paper for such a short text.



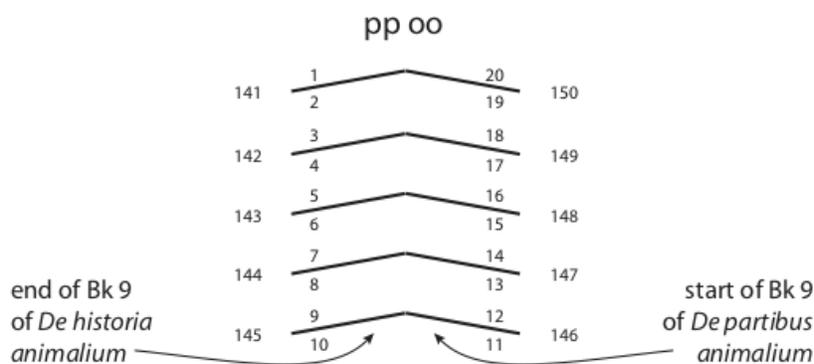
This second map is not yet finished, but it makes its point clearly enough in the following reprise of the bottom of the meta-map on p. 86.



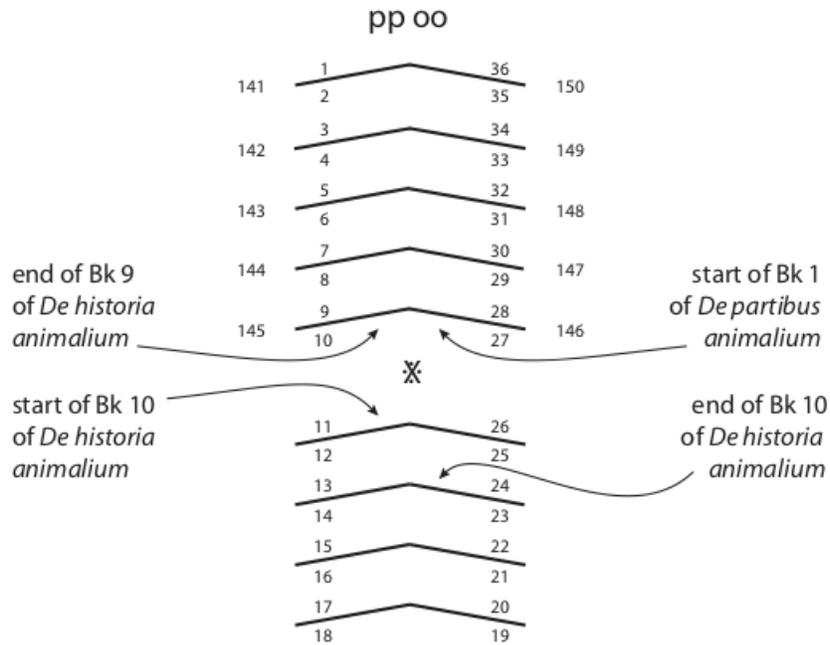
The recycling of headlines from $\Phi\Phi$ to XX argues that there was continuous work-flow in the production of the end of quire $\Phi\Phi$ and the start of quire XX; and the movement of blocks of type (each across merely three formes, from $\Phi\Phi$ to print blind in XX) reinforces this impression. In the absence of recycled headlines between XX and \ast it is only the movement of these blocks of type between the two quires (also across just two and three formes) that suggests that all three of these last quires, $\Phi\Phi$, XX, and \ast were in continuous production one after another. Without the evidence of blind type, we would be in doubt when quire \ast was produced. But now we know. Its printing was belated, but was certainly not an afterthought.

If we allot a day for the printing of a forme, we may suppose that only six days would have passed between the printing of the register page on XX7v, which makes no mention of \ast , and the start of the printing of that very quire. Do we suppose that Aldo had not yet located an authority for Bk 10 when the register was drafted or was composed and printed; that he subsequently found a manuscript of that Book; had it copied; cast it off; then composed the text of its first forme for the press—all within merely five days, so that he could print it on the sixth? A similar question: Do we also suppose that the discovery that $\text{pp}1\text{r}$ had been omitted did not occur in (let us say) the fifty-three days that the last fifty-three formes of this volume were printed before the register was printed, without reference to the added leaf or bifolium? Could Aldo have known about $\text{pp}1$ before he printed the register, but not have registered it? The rest of this essay will show that that is indeed possible and also that we should not be surprised if it be true.

Before additional evidence is brought to bear on this question, consider another question—Where should \ast be bound? On $\ast 1\text{r}$, Aldo’s Apology (quoted on p. 87) says that the Bk 10 fragments are offered ‘here’ (‘hoc loco’)—wherever that is. One may feel more confident that this quire was printed last than that it should be bound last. What if its first recto had been signed not with ‘ \ast ’, but with ‘pp oo vi’? A binder would then have thought to locate this adventitious quire of Bk 10 directly after the end of Bk 9, on pp oo5v—precisely where its title suggests it belongs. Aldo’s having offered an apology for the vague ‘hoc loco’ location of quire \ast implies that he was not aware that Bk 9 had, by great good fortune, ended on the verso at the very centre of a quire, quire 15,



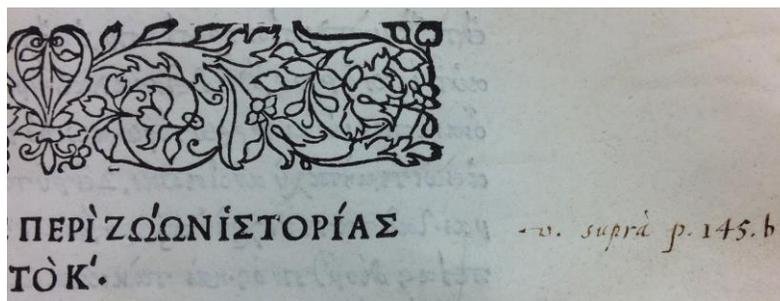
and that in this centre, Bk 10 could have easily been bound—like this:



Such a mega-quire (of 18 leaves) is not without its oddities, of course: it has two signatures; both numbered and unnumbered folia; a premature ‘ΤΕΛΟΣ’ at the end of Bk 9, but no ‘ΤΕΛΟΣ’ at the end of Bk 10—and, on 8r, a totally unnecessary Apology.

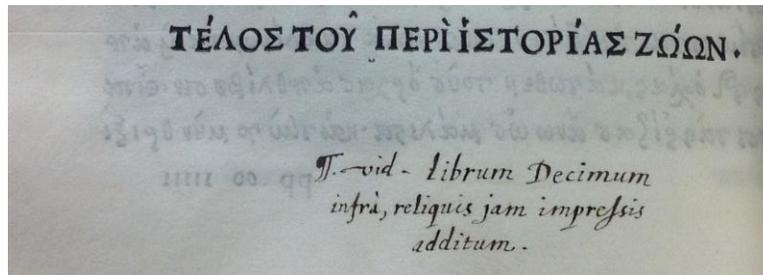
There certainly are other Aldine examples of ungainly quires this large—by (belated) design. The 1505 folio Aesop also has a quire with two signatures (D and d), along with a mix of numbered and unnumbered leaves, a bewildering intermingling and leap-frogging of several texts, plus encouragement, in the printer’s epistle (on o4r), to bind the quire exactly this odd way. Another example is found in the four bilingual quires of the 1501 Prudentius (see below, p. 96)—each also with two signatures.

Whether the few copies of this edition of Aristotle I have observed that do bind ※ in the centre of quire pp oo—those at the Bayerische Staatsbibliothek, Boston Public Library, Princeton University Library, and two at the Library of Corpus Christi College, Oxford—were so structured by Aldo is doubtful. One of the Corpus Christi copies is, of course, that printed on skin that belonged to Aldo’s friend and collaborator, William Grocyn, the New College graduate mentioned at the start of the essay. Quire ※ must originally have been bound inside its back cover (where I have seen this quire in other skin copies—Linacre’s at New College, for example), with this note on its first page, ※1r:



See above, p. 145v.

But, in this Corpus Christi copy, except for its last, Apology, leaf, which is now orphaned at the back of the volume,⁵³ quire ✕ is bound in the middle of quire pp oo, its first page facing the very page this note refers to. And that page, 145v, has at its base this corresponding inscription:



¶. *The remainder having now been printed, see Bk 10, added below.*

—‘below’ having come to mean, by virtue of the volume’s eighteenth-century rebinding (if not some earlier rebinding preserved in that one) ‘opposite’—i.e., ‘across the *present* gutter.’⁵⁴

The question whether Aldus understood that Bk 10 could be bound in proper narrative sequence is ideally put to the skin copy now in the Escorial. Presumably it was bound at Aldo’s request for presentation to his patron. Its binding is intact. Prof. Neil Harris enlisted the aid of Elena Fogolin, who has kindly consulted this copy for me. She reports that quire ✕ is bound at the end of vol. 3 without reference to pp oo5v; nor is there a reference there to a continuation of *De historia animalium* at the end of the volume. This fact is a strong indication that Aldo himself did not grasp by the time his gift to Alberto Pio was being bound (if he ever did grasp it) that no Apology had been necessary. To this evidence can be added the fact that when, in 1498, Aldo printed his Greek list, *Libri Graeci Impressi*, he credited *De historia animalium* with only eight Books. He must simply have copied the title-page of vol. 3, forgetful that he had first printed nine Books—and eventually ten.

Why would clever Aldo not have understood that no apology was required? Short of space, busy printers must promptly warehouse the heaps of paper (and skin) that issue from their presses. Unless for reference, Aldo had compiled and quired sheet by sheet a specimen copy⁵⁵ of vol. 3 at the press from each successive print-run of a sheet, he would not have been able to see what to us, with a copy of the bound volume in hand, is obvious, that quire pp oo could have been—should have been—augmented with quire ✕ at its centre, so that the text of *De historia animalium* would flow without interruption through Bk 9 to its (fragmentary) conclusion in Bk 10. There would have remained only two problems. One was of a kind for which Aldo never apologized: an interruption to the numbering of the leaves. The other was of a kind he rarely cared to resolve—incomplete registers.

⁵³ In each of the Boston Public Library and Bayerische Staatsbibliothek copies, the entire quire sits in the centre of quire pp oo—still with its now-unnecessary Apology.

⁵⁴ The faint dry-point line running horizontally into the ‘T’ of ‘ΤΕΛΟΣ’ is part of the ruling of the whole sheet. Sheets so ruled for scribal use appear here and there in copies printed on skin.

⁵⁵ Such specimen copies, identifiable because they consist of proof-sheets, do exist. Paul Needham reminds me of a copy of Guillemus Durantis’s *Rationale diuinarum officiorum* printed in Mainz by Johann Fust und Peter Schöffer in 1459. It is held by the Bayerische Staatsbibliothek (shelfmark 2.Inc.c.a.2) and a digital scan is available online. Another example is a copy of the second edition of Holinshed’s *Chronicles*, printed in London by Henrie Denham in 1587, held by the Huntington Library (shelfmark 478000). See *The Peaceable and Prosperous Regiment of Blessed Queene Elisabeth: A Facsimile from Holinshed’s Chronicles (1587)*, ed. Cyndia Susan Clegg, with textual commentary by Randall McLeod (San Marino, Calif.: Huntington Library Press, 2005).



incomplete registers

Numbered 'P' in the upper-right corner, the first leaf of vol. 4 of the Aristotle edition offers a list of contents, like the one already seen for vol. 3 (on p. 51); and overleaf lies the expected epistle.⁵⁶ This leaf is signed with a large cross in some copies (UCLA), unsigned in others (Boston Public Library). In some (Boston), this leaf is conjugate with the blank leaf that follows it, to make up the first quire; but it stands alone in others (UCLA). (The UCLA catalogue suggests that the missing conjugate formerly appeared wrapped around what is signed as the following quire.) The next quire is $\alpha\alpha\alpha\alpha\alpha$. Its first leaf is also numbered 'P' in the upper-right corner—as if vol. 4 has two beginnings.

The register for this volume (on PPP00010r) begins with ' $\alpha\alpha\alpha\alpha\alpha$ ', not with the cross, which is nowhere mentioned. Of course, the need for a title page, table of contents, and epistle had certainly been foreseeable parts of vol. 4 from the start. But Aldo apparently began printing with the first quire of **THE TEXT** of Aristotle; and, as he approached the finish, presumably printed his own mere paratexts—on a new sheet, destined for the front. When eventually he did print these paratexts, he must have forgotten that another leaf had already been numbered 'P' (its sheet, printed long before, then being out of sight, I suppose, in the warehouse.) One 'P' is from the end of production; the other, adjacent, 'P' is from the start. There was a long time between I and I.

Compare vol. 5, where the first register entry, for $\alpha\alpha\alpha\alpha 1$, reads 'prima alba'—i.e., 'the first is blank'. But the 1r page of this volume is certainly not blank, as you can see in the photograph of its contents (on p. 99): it is the title page. 'prima alba' is also the first register entry in John Craston's *Greek Dictionary*, 1497, a folio. And that prima is also not alba. In these two cases, the printer must have begun with the first quire of the author's text, but left the first leaf of the outermost sheet of that quire blank for later addition of his own paratexts. (Each forme so affected would have had to go into the press twice.) Whether preliminaries of vol. 5 were printed before or after the register of a volume would not affect the accuracy of the register's collation, even though the record of its first catchword might not have been available to register, as in the *Greek Dictionary* (or was available, but ignored).⁵⁷ We need to understand that an Aldine register is often merely a 'tally-to-date', to mark a milestone in production. Emotionally, it must have represented a triumph, as if the heavy lifting was over and all that remained was tying up loose ends—or perhaps *not* tying them up.

The registers of the *Greek Dictionary* and of vol. 5 of the Aristotle imply that, from the beginning of production, material supports of a specified number of pages already existed for future printing. In these two works, the preliminaries consist simply of text added to the pre-existing supports. In vol. 4, however, the unregistered preliminaries consist of an unlisted support, printed late but bound first. In vol. 3, by contrast, the unregistered support was printed late and bound last.

So it is that Aldine registers commonly give what to a practical binder or to a theoretical bibliographer are incomplete recipes. Each of the twenty-two publications in the following list from throughout Aldo's career has unregistered preliminaries, in each case including at least the title leaf.⁵⁸ (The item-numbers in this list are from *The Aldine Press Catalogue of the Ahmanson-Murphy Collection*.)

⁵⁶ My field notes record that copies in Berlin Staatsbibliothek and Laurentian Library lack this preliminary leaf.

⁵⁷ The register of vol. 4 of the Aristotle, by the way, lists signatures only, not catchwords.

⁵⁸ Some Aldines do register their preliminaries, as, for example:

- | | |
|----|---|
| 4 | Aristotle, vol. 1 (1495) |
| 16 | Craston, <i>Greek Dictionary</i> (1497). As noted above, the first leaf is incorrectly registered as 'blank'. |
| 21 | Aristotle, vol. 3 (1497—revised according to arguments presented in the Appendix) |

- 8 *Thesaurus Cornucopiae* (1496)
- 11 Aristotle, vol. 4 (1497)
- 25 Aristophanes (1498). This register does not list the quire in which it appears.
- 31 Dioscurides (1499)
- 32 Perottus (1499)
- 34 Firmicus (1499)
- 37 Lucretius (1500)
- 38 Prudentius, *Poetae Christiani ueteres*, vol. 1 (1501). This register does not list the quire in which it appears.
- 48 Vala (1501)
- 54 Pollux (1502)
- 57 Thucydides (1502); two initial quires are signed ‘AA’, but only one is registered.
- 58 Sedulius, *Poetae Christiani ueteres*, vol. 2 (1502). This register does not list the quire in which it appears.
- 65 Valerius Maximus (1502).
- 71 Valerius Maximus (1503). A reissue of #65, with quire A expanded from 8 to 12 leaves. (The previous registration of A as a ‘quaternion’, now inaccurate, is unrevised.)
- 72 Origen (1503)⁵⁹
- 98 Erasmus (1508)
- 99 *Rhetores Graeci* (1508)
- 101 Plutarch (1509)
- 114 Plato (1513)
- 121 *Scriptores rei rusticae* (1514)
- 124 Quintilian (1514)

The following five publications have unregistered material in other positions:

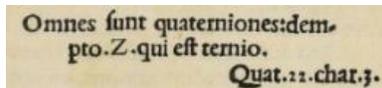
- 22 Bolzanio, *Institutiones* (1498), an unsigned bifolium of corrections is not registered.
- 50 Constantine Lascaris, *De octo partibus* (1501?). This register does not list the quire in which it appears.

-
- 23 Aristotle, vol. 2 (1497—as corrected by the Appendix to this essay)
 - 24 Aristotle, vol. 5 (1498)
 - 36 St Catharine (1500)
 - 87 Demosthenes (1504)
 - 120 *Rhetorica ad Herennium* (1514)

And some have no register, at all, as, for example:

- 35 Colonna (1499)
- 102 Horace (1509)
- 110 Strozzi, (1513). This edition has two A quires. From a literary point of view, either can be bound first.

⁵⁹ Origen collates π⁶ A-Y⁸ Z⁶: one (unsigned) preliminary quire plus 23 quires signed with letters. The register does not list the signatures or catchwords and says merely that all quires consist of four sheets, except Z, which consists of three. It thus ignores the preliminary quire, which also consists of only three sheets. Puzzlingly, the register (on Z6r) concludes with a redundant and incorrect tally, of 22 quaternions plus three sheets, which seems to account for only the quires signed with letters.



- 82 Philostratus, *De uita Apollonii Tyanei* (1504). One register page (h9v) went through the press a second time to add a date, but neither it nor the other register (on i9r) refers to the quire signed ‘Apoll.’
- 84 Gregory of Nazianzus, *Poetae Christiani veteres*, vol. 3 (1504). Two pages of corrections are bound prior to the title in the UCLA copy (as reported in the online catalogue, not the printed one).
- 105 Constantine Lascaris, *De octo partibus* (1512) does not register the last three quires and does not even sign the third of them.



To supplement a register after it had been printed was not difficult: the appropriate forme had merely to be put through the press a second time. In his *Book of Hours* (c. 1497), a 16mo, Aldo printed every forme twice as a matter of course (first with red ink, then with black); and so in his *Greek Psalter* (c. 1498), a quarto-in-8s.

A spectacular early example of Aldo’s updating of a register that had already been printed appears in the first, unregistered, quire of Prudentius (1501), a quarto-in-eights. (Strangely, there are no quires aa–ee.)

REGIMEN LIBRORVM PRVDENTII.			
ff	nn	uu	i i
Senex fidelis	Etpigdis	Se'que	IOANNOY
Chaste graues	Nopra uo	Credere	OU' πΑΛΑΙΩΝ
Legis adhuc	Labi ho	Laurea	ΣΤΡΑΤΗΓΩΝ
Connixa	Mobilitate	Annales	ΣΤΡΑΤΗΓΩΝ
gg	oo	xx	i i
Ductores	Incumbe	Templum	ΚΡΑΤΙΣΤΩΝ
Proflit	Puras gen	Sic zui	ΣΦΥΡΩΝ
Israel	Iam quis	Sichominis	ΚΑΙ ΟΥΚ
Compositis	Leuionum	Enua	ΑΡΜΑΤΩΝ
hh	pp	yy	3 i
AVRELI	A etemitatem	Sydenbus	ΠΡΟΣΕ
Hymnus	Vix iam	Hilce uis	ΚΑΙ ΣΜΑ
Opifex	Ne morte	Aegypti per	ΣΤΡΑΤΩΝ
Nedare	Quae uera	Si itent	ΘΕΩΝ
Odepost	Focundauit		4 i
ii	qq	hh	ε λυ α
Fulmen	Hunc esse	PROSPERI	ΠΡΟΣΕ
Gemmas	Si femor	Multa	ΥΠΕ
Nona sum	Iudza quem	Sicut	
Hymnus ad	Quicquid	Dux sunt	ΤΕΛΟΣ
kk	rr	ii	
Saxum	Vnius ac por	Militit	ΣΤΡΑΤΩΝ ΠΡΟΣΕ
Quas de	Turba	Tunis	ΠΟΔΙΣ ΝΕΗ
Inculro	Quod fixa	Apud	ΣΤΡΑΤΩΝ ΚΟΣ
Filius haud	Sed belze	In quo	ΠΡΟΣΕ ΣΙΔΕΛΙ
ll	ff	kk	i b ε π ω κ
Infelix	Locus ubi	Nunquam	ΚΡΑΤΙΣΤΩΝ ΝΕΤΕ
Iam mater	Et qua	Abique	ΟΛΕΤ
Ipā deum	Hæc dum	Vnde	ΩΝΟΣ
Condens	Non itabu		4. d
mm	tt	nn	νε ρ τ τ
AVRELI	Quam uis	IOANNIS	ΚΑΙ ΟΥΚ
Aduerfus	Argenti &	IOANNOY	ΔΙΟΙΚΗΤΩΝ
Motu	Pendentem	Immata	ΑΝΤΙΣΤΑΣΕΩΝ
Frangere	Omnigeni	Matricem	Ο ΔΙΟΙΚΗΤΩΝ

earlier state

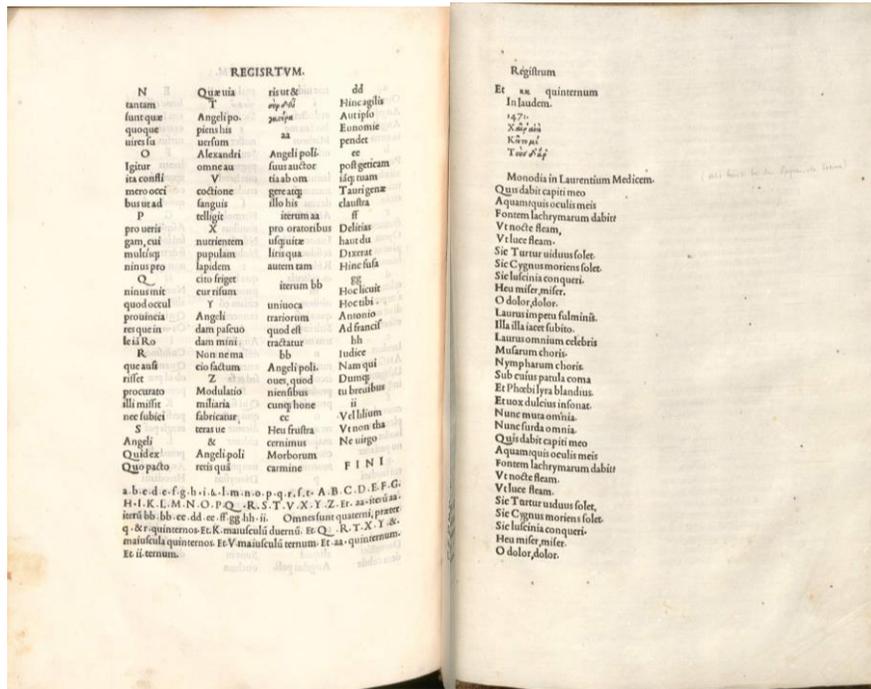
REGIMEN LIBRORVM PRVDENTII.			
ff	nn	uu	i i
Senex fidelis	Etpigdis	Se'que	IOANNOY
Chaste graues	Nopra uo	Credere	OU' πΑΛΑΙΩΝ
Legis adhuc	Labi ho	Laurea	ΣΤΡΑΤΗΓΩΝ
Connixa	Mobilitate	Annales	ΣΤΡΑΤΗΓΩΝ
gg	oo	xx	i i
Ductores	Incumbe	Templum	ΚΡΑΤΙΣΤΩΝ
Proflit	Puras gen	Sic zui	ΣΦΥΡΩΝ
Israel	Iam quis	Sichominis	ΚΑΙ ΟΥΚ
Compositis	Leuionum	Enua	ΑΡΜΑΤΩΝ
hh	pp	yy	3 i
AVRELI	A etemitatem	Sydenbus	ΠΡΟΣΕ
Hymnus	Vix iam	Hilce uis	ΚΑΙ ΣΜΑ
Opifex	Ne morte	Aegypti per	ΣΤΡΑΤΩΝ
Nedare	Quae uera	Si itent	ΘΕΩΝ
Odepost	Focundauit		4 i
ii	qq	hh	ε λυ α
Fulmen	Hunc esse	PROSPERI	ΠΡΟΣΕ
Gemmas	Si femor	Multa	ΥΠΕ
Nona sum	Iudza quem	Sicut	
Hymnus ad	Quicquid	Dux sunt	ΤΕΛΟΣ
kk	rr	ii	
Saxum	Vnius ac por	Militit	ΣΤΡΑΤΩΝ ΠΡΟΣΕ
Quas de	Turba	Tunis	ΠΟΔΙΣ ΝΕΗ
Inculro	Quod fixa	Apud	ΣΤΡΑΤΩΝ ΚΟΣ
Filius haud	Sed belze	In quo	ΠΡΟΣΕ ΣΙΔΕΛΙ
ll	ff	kk	i b ε π ω κ
Infelix	Locus ubi	Nunquam	ΚΡΑΤΙΣΤΩΝ ΝΕΤΕ
Iam mater	Et qua	Abique	ΟΛΕΤ
Ipā deum	Hæc dum	Vnde	ΩΝΟΣ
Condens	Non itabu		4. d
mm	tt	nn	νε ρ τ τ
AVRELI	Quam uis	IOANNIS	ΚΑΙ ΟΥΚ
Aduerfus	Argenti &	IOANNOY	ΔΙΟΙΚΗΤΩΝ
Motu	Pendentem	Immata	ΑΝΤΙΣΤΑΣΕΩΝ
Frangere	Omnigeni	Matricem	Ο ΔΙΟΙΚΗΤΩΝ

later state

Aldo expanded the register in the lower right of the page to add the catchwords of a Latin translation of the four quires of Greek listed in the fourth column. With composite rules, he cancelled that column of Greek (including its ‘Τέλος’) and in three new columns alternated the same Greek catchwords (now reset) with their Latin equivalents under revised, alternating signatures, which signal interbifoliation.

Now out of room, he did not restore ‘τέλος’.⁶⁰ Nor did he add a signature to record the presence of the very quire that contains this supplemented register.

An earlier example of Aldo’s revision of a register (perhaps the earliest) is less obvious. Shown next is opening κκ9v–10r, in the last quire of Politian’s *Omnia Opera* (1498), a folio. These are the final two of the three register pages. Unexpectedly, the recto presents much more than the conclusion of a register: it offers a new poem, Politian’s ‘Monodia in Laurentium Medicem’.



κκ9v

κκ10r

The first two ‘REGISTRVM’ pages appear to have been intended to complete the register, for at the base of the last column of κκ9v occurs ‘F I N I’, spaced off after the entries for quire ii. But now a third page, the recto opposite, belatedly continues the register, under ‘Registrum’ (a mostly lower-case setting of the word), for one more quire, κκ—the very one in which this register appears.

Normally, one would deem that κκ10r was printed before κκ9v, but the inconsistencies just referred to argue that both the texts of κκ10r—the belated extension of the register and the added poem—are afterthoughts and that this page was not printed until κκ1v–10r was run through the press a second time, the first run having printed κκ1v alone and left κκ10r ‘beautifully blank’.

Had Aldo thought to register the details of κκ10r from the start, there was no spatial limitation on κκ9v that would have required extending the register beyond this second page. The body of κκ9v has 38 lines, but show-through at the base of that page makes clear that the first register page, κκ9r, is one line longer; and the recto of the present opening is also that long. If the compositor had also

⁶⁰ It is the two cancelling (composite) rules that show immediately that we are not dealing here with a stop-press revision, but rather with a reintroduction of the forme into the press for subsequent printing. I have discussed this revision more fully in ‘Aldus on How to Assemble Your Own Bilingual Text’ in Appendix X to John N. Grant, ed. and trans., *Aldus Manutius: Humanism and the Latin Classics* (Cambridge, Mass.: Harvard University Press, 2017), pp. 305–11. (The illustration on p. 96 of the present essay also appears on pp. 306–307 of that edition.)

employed a 39th line on κκ9v, to increase the length of each column by one line, and also deleted the four empty lines in cols. 3 and 4, the final column of κκ9v could have accommodated a ‘κκ’ signature plus the five catchwords listed in the register on κκ10r—with two lines left over in the fourth column above ‘F I N I’. Also, the phrase ‘Et κκ quinternum’ listed atop κκ10r, which takes up a whole line there, could have fitted compactly where it pertains (in the end of the prose summary at the bottom of κκ9v) without requiring a line of its own. (Periods, however, would need to have been added on each side of the ‘κκ’ in this line to punctuate it in the styling of its new host.)

In sum, it seems that during the original production of this last quire of the book, Aldo printed, as he often did, a register that ignored the very quire in which the register appeared. The many differences in styling between κκ9v and κκ10r suggest that the texts printed on κκ10r were set much later and/or by a different compositor, or both. The primary motivation for printing κκ10r could well have been not bibliographical—to complete the register—but rather, literary, belatedly to tuck in a forgotten text, Poliziano’s monody on Lorenzo di Medici. This poem is not listed in the index on a2r–2v, though in the middle of 2v appears the title of another poem relevant to the subject, ‘De ira ad Laurentium Medicem’. As this index does not extend to the bottom of a2v, there certainly was room to have listed the title of ‘Monodia in Laurentium Medicem’ there when the Index was made or to have added it belatedly in coordination with the expansion of the register. For good reasons, an index was often printed late, even if, as in this case, it appears early in a bound volume. Because this Index does not refer to the added monody, it seems to have been printed well before the ‘Registrum’ on κκ10r.⁶¹ Anyway, that’s the logic of it. But Aldo, you may have noticed, did not always behave logically.



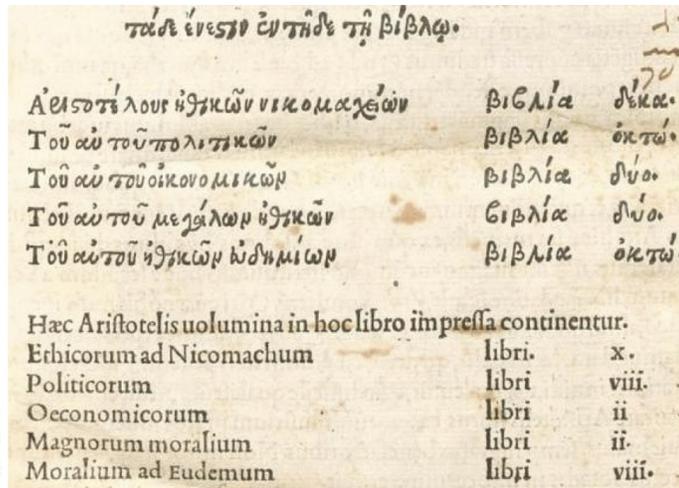
unequal equations

To conclude, the last fifteen pages will offer insights into when and how Aldo fashioned the register for vol. 5 of the Aristotle. According to its colophon, it was published in June 1498.

On the right, the next photo shows the Contents of vol. 5, as printed on the title page; and, on the left, a collation for each of its five parts. (There is stop-press-variant placement of the Contents in the two Yale copies. In one, it sits atop the page, in the other, eight lines lower.)

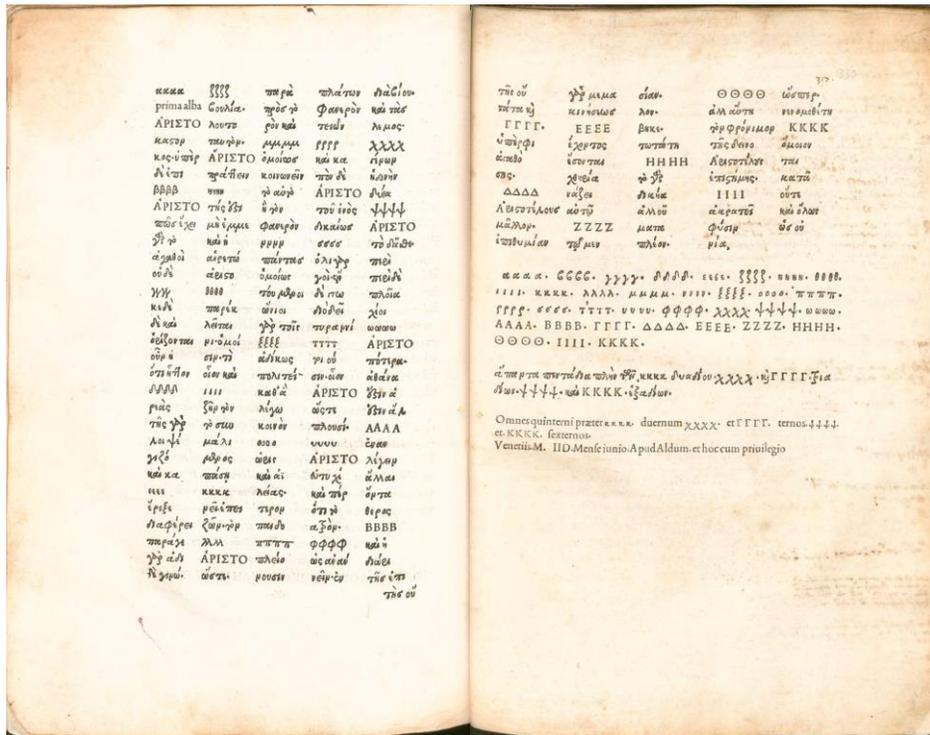
⁶¹ Five more examples of Aldo’s running a forme twice through the press (always for printing again at least with some black ink), come to mind between 1501 and 1504.

- both a(o) and a(i) of the 1501 Vergil (1501), an octavo, to add a title, epistle, and epigram;
- h(i) of Philostratus (1501–04), a folio, to add a colophon date, ‘1501’;
- ²a(i) in vol. 2 of Ovid (1502), a folio, where inked text by Ovid prints spectacularly over blind text from Cicero (1502), also an octavo; and
- α(o) of Sophocles (1502), an octavo, to add a list of plays.



αααα-ιιι¹⁰ κκκκ⁴
 λλλλ-φφφφ¹⁰ χχχχ⁶
 ψψψψ¹²
 ωωωω¹⁰ ΑΑΑΑ-ΒΒΒΒ¹⁰ ΓΓΓΓ⁶
 ΔΔΔΔ-ΙΙΙΙ¹⁰ ΚΚΚΚ¹²

The first part begins with the above title page and an epistle overleaf. The last ends with a register

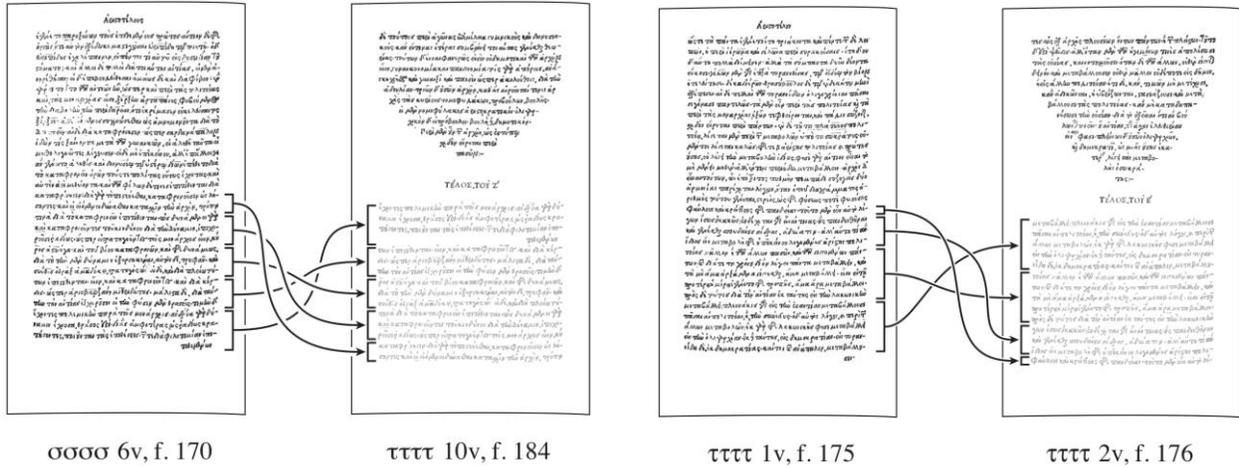


ΚΚΚΚ11v

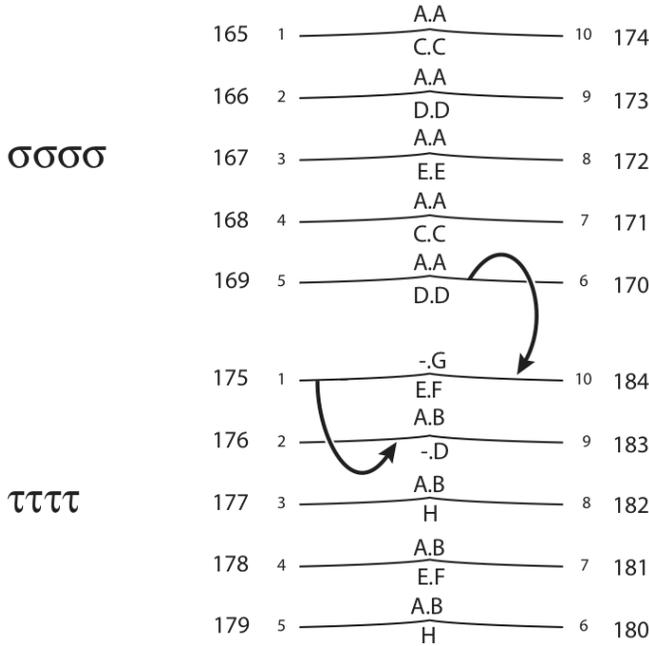
ΚΚΚΚ12r

on ΚΚΚΚ11v-12r followed by a generous space (ripe for blind type) and a blank page (truly blank) overleaf. In fact, all five parts end with a quire of odd size, closing with one or two blank pages.

To sketch the rhythms of production, I shall now quickly explore three sites toward the end of the volume. 1) Blind type in and between quires σσσο¹⁰ and ττττ¹⁰



suggest that they were the products of a single work-site. As shown in the next diagram, a small number of skeletons were quickly recycled every two formes in this range—at the same rate that type was recycled for printing blind. Skeleton A (modulating from A.A to A.B) appears on every other forme but one. More slowly on the inner formes was the rotation of skeletons C, D, and E through two cycles before H replaced C.



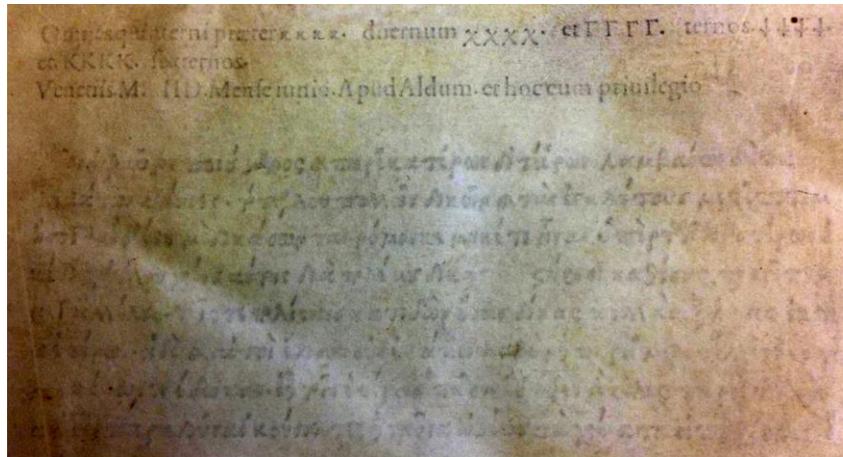
NC Aristotle 4 sigma 4 tau

2) The last two quires of the volume, IIII and KKKK, recycle two skeletons, 2 and 3, at a rapid rate, especially in the last quire, where those two skeletons alone alternate.

III	296	1	A.1	10	314
			2.2		
	297	2	A.1	9	304
			3.3		
	298	3	A.1	8	303
			4		
	299	4	2.2	7	302
			-3		
	300	5	2.2	6	301
			3.3		
	306	1	-2	12	—
			-		
			-2		
KKKK	307	2	3.3	11	316
	308	3	2.2	10	315
			3.3		
	309	4	2.2	9	314
			3.3		
	310	5	2.2	8	313
			3.3		
<u>310/311</u>	6		2.2	7	312
			3.3		

As headline A links this site to the first one (for quires $\sigma\sigma\sigma\sigma$ and $\tau\tau\tau$), we seem to be in the same site of composition.

Not surprisingly, blind type is present on this the last recto of KKKK, below the register.⁶²



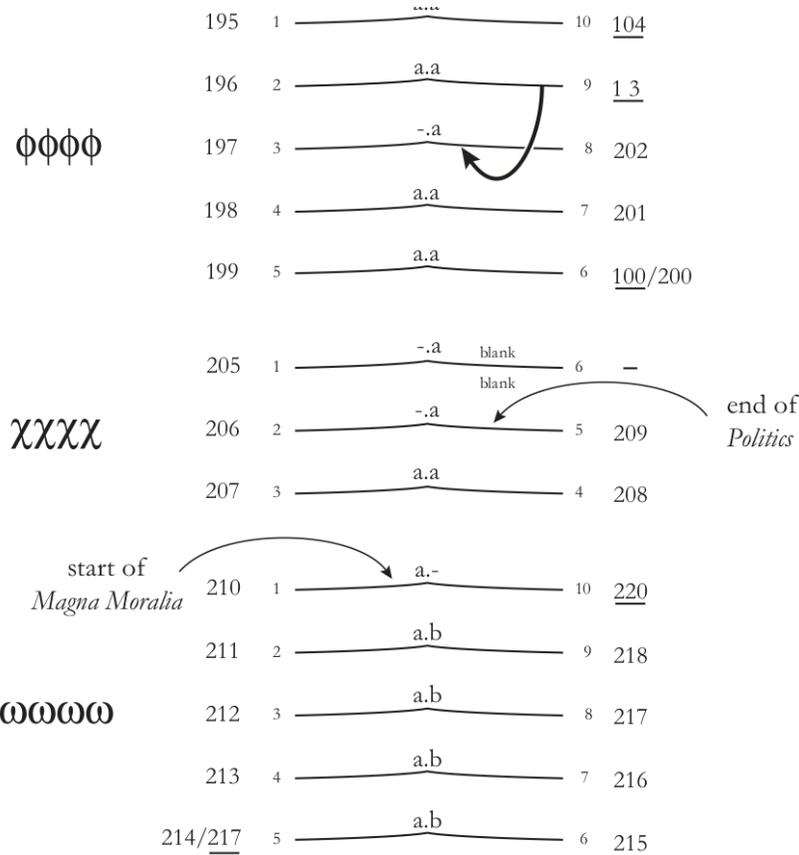
KKKK12r

For years, I could not locate the source of this blind type of KKKK12r, despite the clarity of some of its letters. (But in a moment, I shall reveal its remarkable source and describe its rearrangement.)

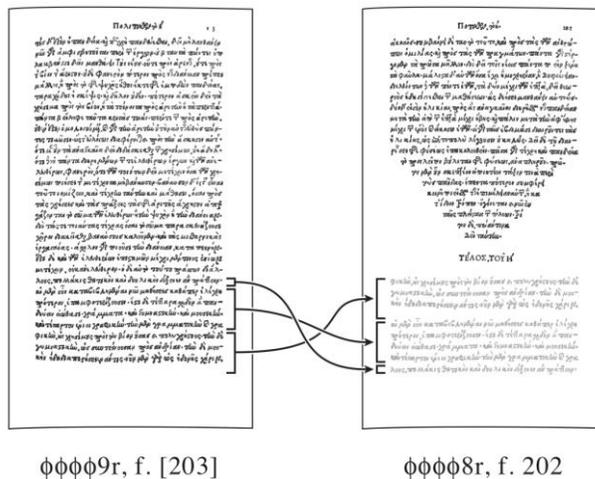
⁶² Shown in this photo is the skin copy of the Biblioteca Arcivescovile in Udine. The leaf, preceded by a sheet of black matt paper, was photographed with reflected light from the (blank) verso side and the resulting image was flipped horizontally, for ease of reading. The bites of individual typesets having made the leaf more translucent at the points of contact, those points appear darker in the photo than the surrounding areas.

There is also blind type on IIII 4r, but I have not yet been able to trace it to its source.

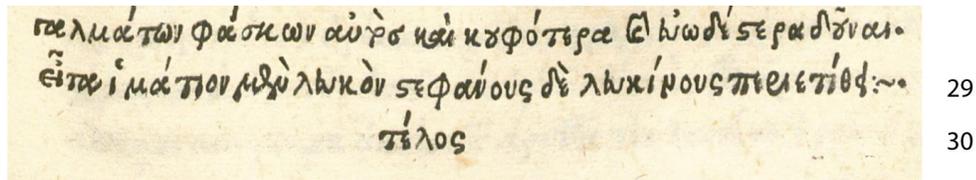
3) Between $\sigma\sigma\sigma\sigma/\tau\tau\tau\tau$ and IIII/KKKK comes the third site. A single skeleton, a.a, was recycled through the outer forms of $\phi\phi\phi\phi$ ¹⁰ and $\chi\chi\chi\chi$ ⁶ at the conclusion of *Politics*, and on into the first quire of *Magna Moralia*, $\omega\omega\omega\omega$ ¹⁰, where, because of the new title, this skeleton, of course, modulated—from a.a to a.b.



The rate of recycling of outer-form skeletons through these three quires and (shown next) the rate of recycling of type that printed blind on $\phi\phi\phi\phi$ 8r



(at the same rate as recently observed in $\sigma\sigma\sigma\sigma$ and $\tau\tau\tau\tau$) are sufficient to argue their continuous production at a single work-site. (Consequently, I shall not take the trouble to trace the movements of inner-forme skeletons, which are more difficult to describe.)⁶³ Omitting the blank leaf at the end of $\chi\chi\chi\chi$ from the count, Aldo's numbering of these folios runs straight on from that quire into $\omega\omega\omega\omega$. Everything in this diagram reflects continuity—except that (and this is big) in the Greek alphabet, *omega* is not the letter that follows *chi*. Between these two quires as the book is usually bound⁶⁴ comes a six-sheet quire containing the complete text of *Economics* (as complete as Aristotle's text survives), signed with ψ , the very letter that intervenes between χ and ω . On the penultimate page of quire $\psi\psi\psi\psi$, the text closes conveniently and elegantly with a terminal flourish at the end of the 29th line and is followed by a centered τέλος on the 30th.



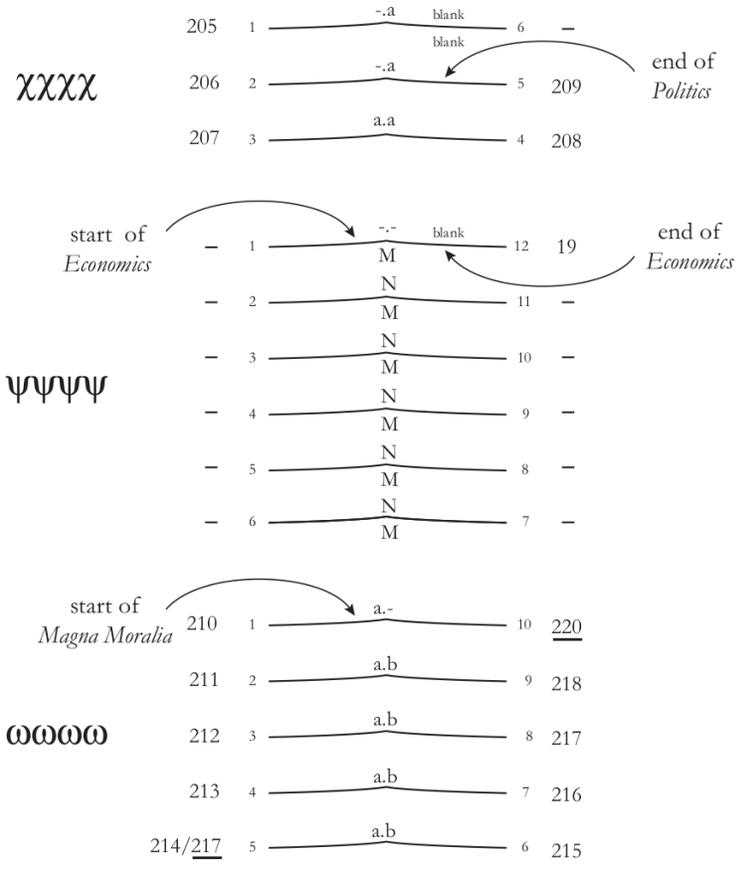
$\psi\psi\psi\psi$ 12r

As we know, ending on the nose like this rarely comes about by chance. One must labour to be beautiful. (*Precisely* how Aldo laboured will be assessed on pp. 109–112.)

In quire $\psi\psi\psi\psi$ too, there is also regular alternation of two skeletons, M and N—but neither of these is a skeleton found in $\chi\chi\chi\chi$, the quire immediately before, or in quire $\phi\phi\phi\phi$, immediately after. Strangely, as the next diagram shows, only one of the leaves in $\psi\psi\psi\psi$ is numbered (and that one wrongly).

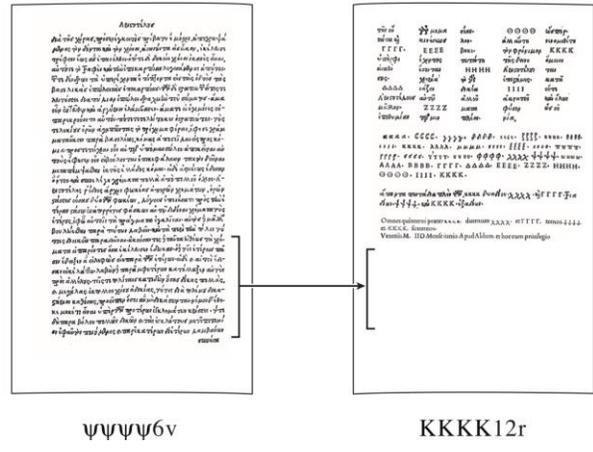
⁶³ In the map at the bottom of the previous page, the presence of a blank line amid the blind type on $\psi\psi\psi\psi$ 8r implies that it corresponds to some spacing material formerly at the bottom of 9r, between the last line of text on the page and the furniture below.

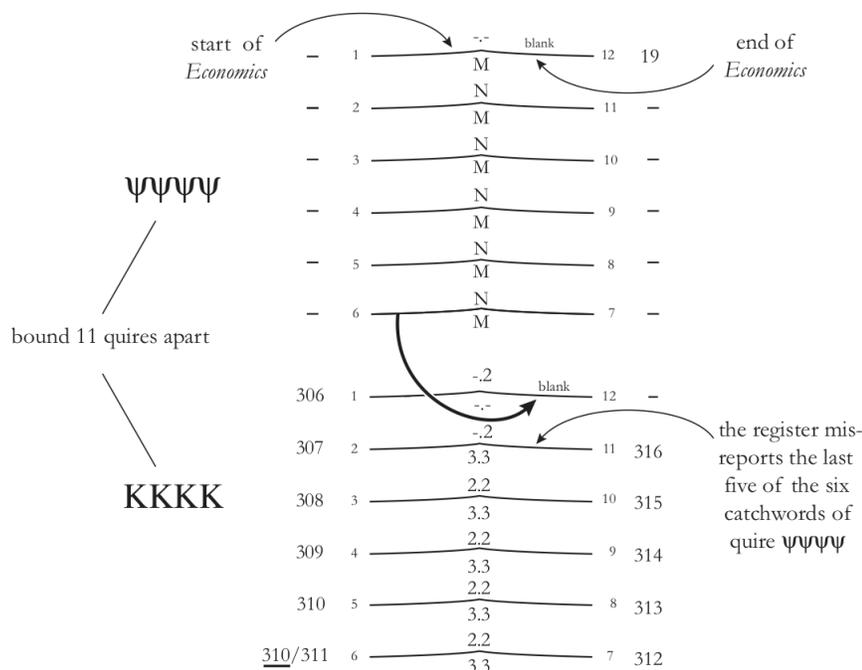
⁶⁴ In the Rylands Library copy, quire $\psi\psi\psi\psi$ is bound after $\kappa\kappa\kappa\kappa$, perhaps in response to its lack of folio numbers.



Quire $\psi\psi\psi\psi$ may look like an interloper; but as it is signed with the letter appropriate to this location rather than with a non-alphabetic symbol, like ‘✳’ in vol. 3, *Economics* must have long been planned for this location, though its production was put off after $\chi\chi\chi\chi$ had been printed.

Put off until when, exactly? In vol. 3, we have determined, quire ✳ was printed just after the register. Here, in vol. 5, quire $\psi\psi\psi\psi$ was printed just before the register. The next map and diagram show that the eight lines of blind type (shown above, on p. 101) came to the second forme of quire KKKK from ten inked lines in the last forme of $\psi\psi\psi\psi$, 6r | 7v—*printed* only two formes away (to judge by previous examples of distances between sources and destinations), though this source is *bound* eleven quires earlier! (No wonder I could not locate the source for years.)





Supposedly, the last three quires produced were $\Psi\Psi\Psi\Psi$, $IIII$, and $ΚΚΚΚ$. $ΚΚΚΚ$ was surely last; the others' sequence is undetermined. (They could have been composed and/or printed simultaneously.)

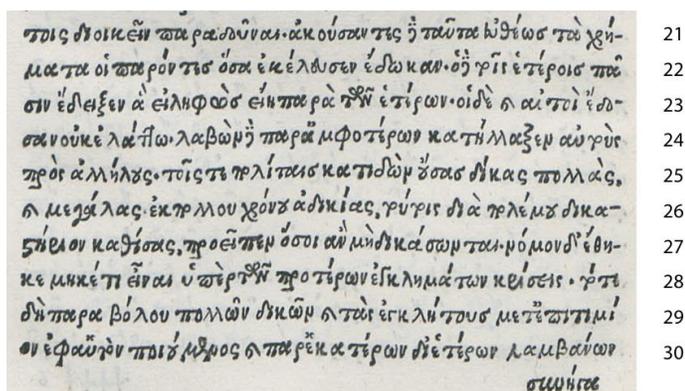
On $ΚΚΚΚ2r-11v$, the third forme of that quire to be printed, appears the first register page (already shown on p. 99). In col. 5 are listed the six catchwords for quire $\Psi\Psi\Psi\Psi$. Very curiously, all but the first of them (for the title of the Book) are wrong. Before I display the evidence for these errors, I'll map the laboured transposition of type from $\Psi\Psi\Psi\Psi\delta v$ to print blind in $ΚΚΚΚ12r$. See the boxes on the next four pages—or skip over them for now, to stay on the topic of the register. . . .

the sources of blind type on $ΚΚΚΚ12$

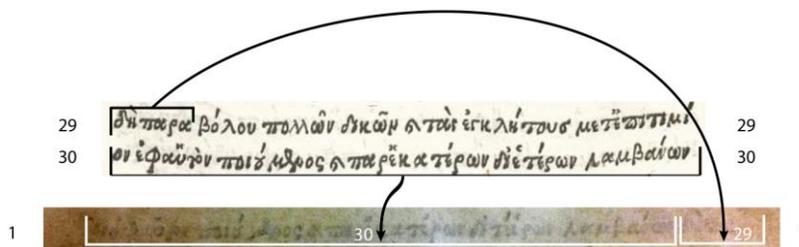
My early quest for the sources of blind type on $ΚΚΚΚ12r$ was unsuccessful. Following my usual practice, I searched first in several previous quires (and eventually, desperately, even in $ΚΚΚΚ$ itself) at the short distance from the right margin where I had found a distinctive blind character. But the quarrying of shorter lines to fill ones unexpectedly (and without good reason) 20% longer, of which I was then unaware, meant that I was searching at the wrong distance.

Two years later, working from the photo on p. 101, I searched *Thesaurus Linguae Graecae* for 'τέρων λαμβάνων', legible at the right end of the first blind line. Initially pleased to learn that that phrase occurs only in Aristotle's *Economics* (one of the texts in vol. 5—though far off (?) as the book is bound), I was soon discouraged, for 'ἀργύριον', occurring shortly before in the *Thesaurus* text, was clearly not present in the blind one. Throwing up my hands, I turned to Tim Perry. He was confident that the search-phrase was indeed from *Economics*, but he regarded what he could read of the text of *Economics* as 'fragmentary'. He also helpfully pointed out that we had not checked whether 'ἀργύριον' was actually present in Aldo's text—and indeed it was not (under the influence, I now gather, of Paris ms 2023 or its family). Soon after, recalling the difference in column widths, I finally realized that my first search had been based on a wrong assumption—whereupon I was on track at last to find the source, the last ten lines of $\Psi\Psi\Psi\Psi\delta v$, shown next.

These ten lines at the bottom of ψψψψδν filled eight longer lines on KKKK12r.

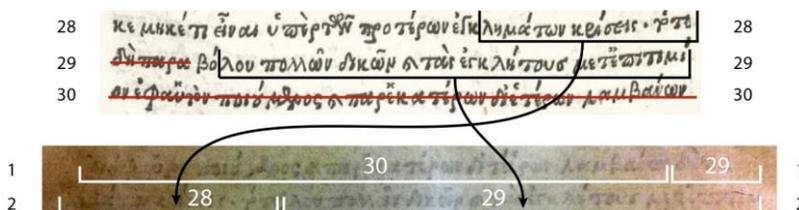


The sources of the blind type in l. 1 on KKKK12r are all of l. 30 and just the start of l. 29.



(If I had measured the location of ‘λαμβάνων’ from the left margin instead of the right, you might think I would have had better luck in my original search. But perhaps not, for the blind line begins with a small amount of spacing not in the source.)

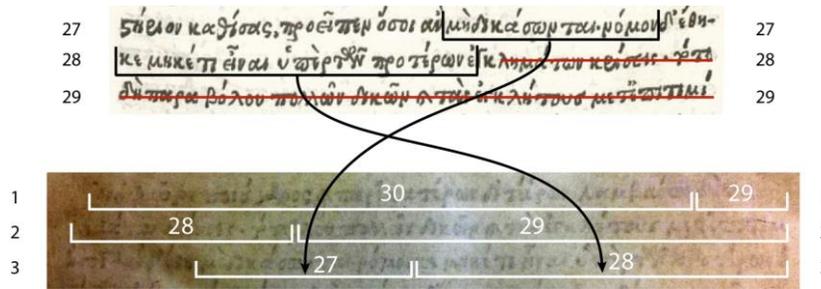
Having placed the whole of source-line 30 to the left, the compositor filled the rest of the first line of blind type with the start of source-line 29. If he had continued like this, the lines of blind type ‘1, 2, 3 ...’ would have wrapped Aristotle’s text in reverse order, line by line down the page, ‘30, 29, 28 ...’ (as in the six Maps on pp. 27–28 that trace the origins of blind type on XX7v of vol. 3). But this pattern does not pertain in the next line—or ever thereafter, in fact,



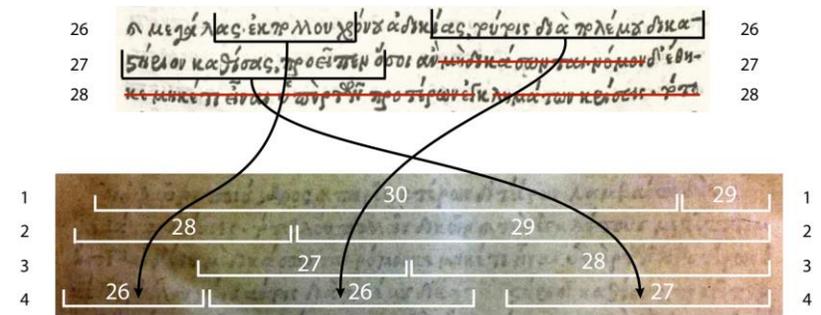
because the remainder of l. 29 went not to the left (to continue the literary sequence), but to the right; and intervening between these two parts of l. 29 (except for two letters, ‘βο’, which were left behind) was the end (not the beginning) of l. 28. The text building down the page therefore does not run ‘30, 29, 28 ...’, but rather ‘all of 30, the start of 29, the end of 28, the end of 29...’.

(In the second map, I have repeated type that was shown transferred in the first, but now it is struck through in red. The arrows from the first map no longer appear, but the line-numbers of the sources remain in the photograph of the relevant lines of blind type, along with indications of the linear extent of the transpositions.)

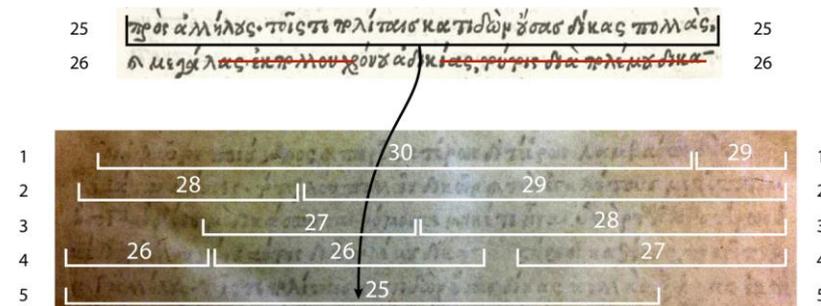
I am not yet able to read the text at the start of l. 3.



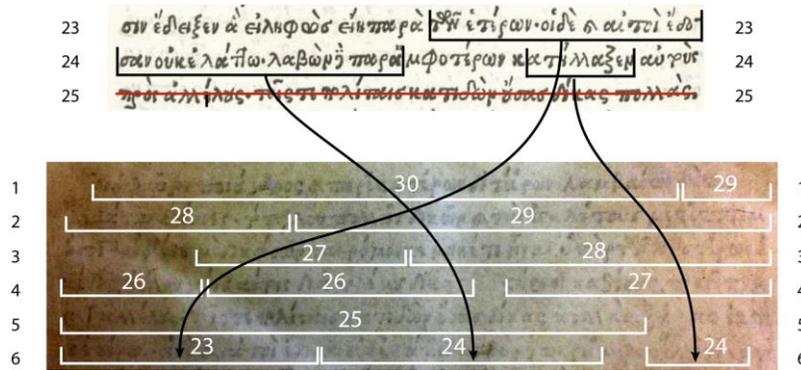
Some of it may come from l. 27 or from one or both of the parts of l. 27 shown as unused in the next map.



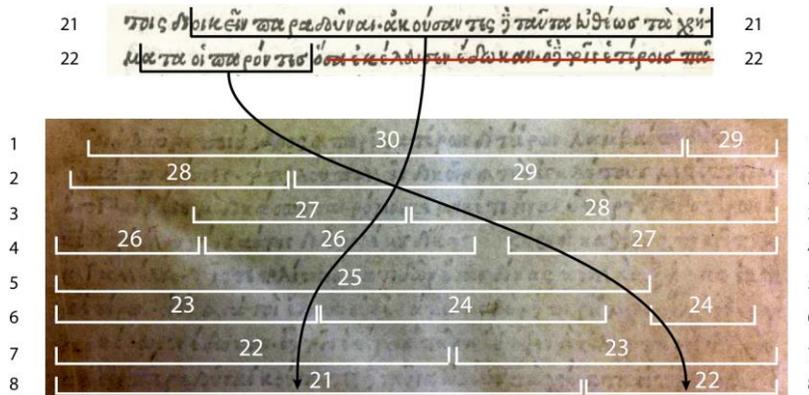
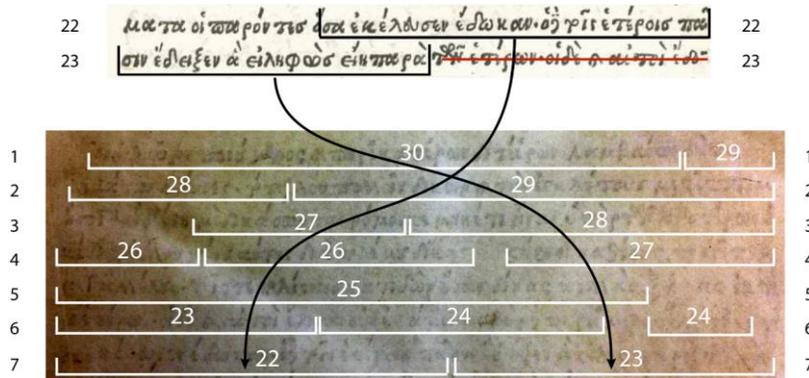
I cannot yet read the right end of l. 5.



Its source may be the unused part of l. 24, shown in the next map.

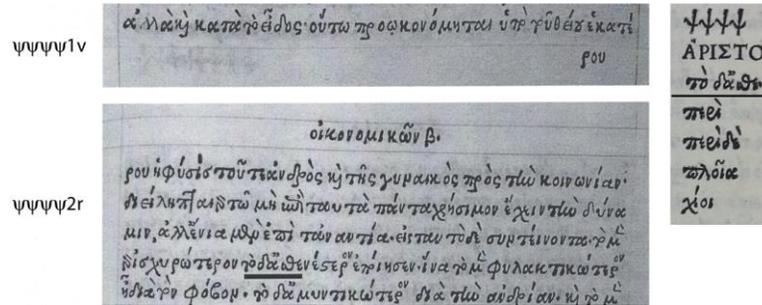


The last two images are unproblematic.

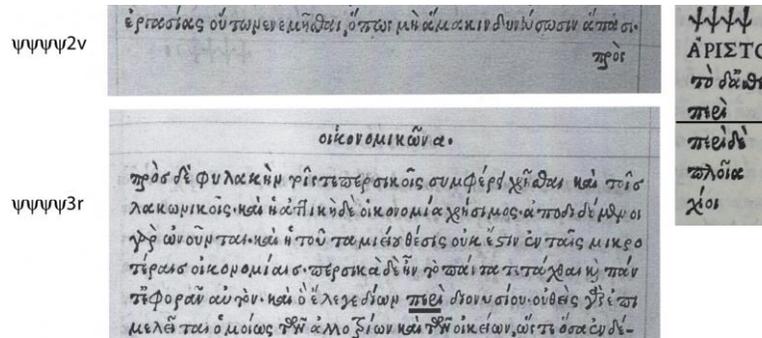


I expect that these maps can be improved upon with re-search into other skin copies

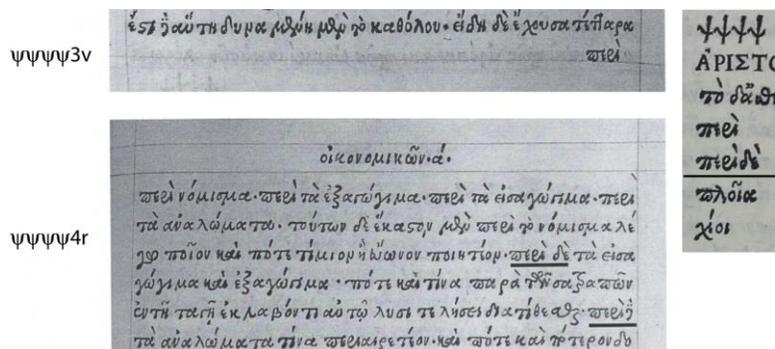
. . . Continuing now from the middle of p. 105: As I said, each of the last five of the six catchwords for quire ψψψψ is wrong, to which I now add that they are *incrementally* so. The second catchword listed in the register (for ψψψψ2r) appears three-and-a-quarter lines late;



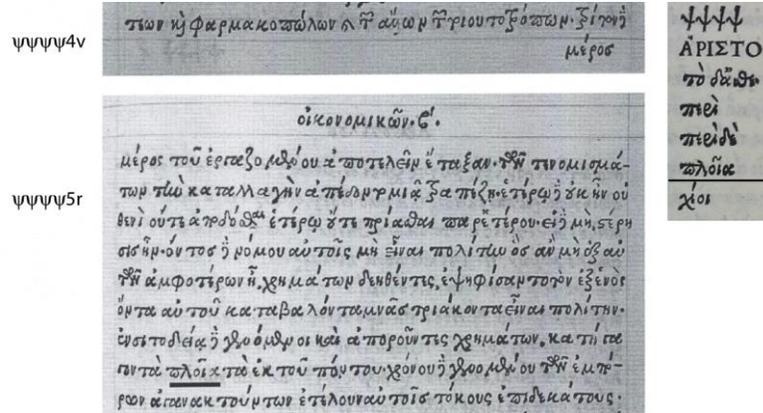
the third (for ψψψψ3r), just over four-and-a-half lines late;



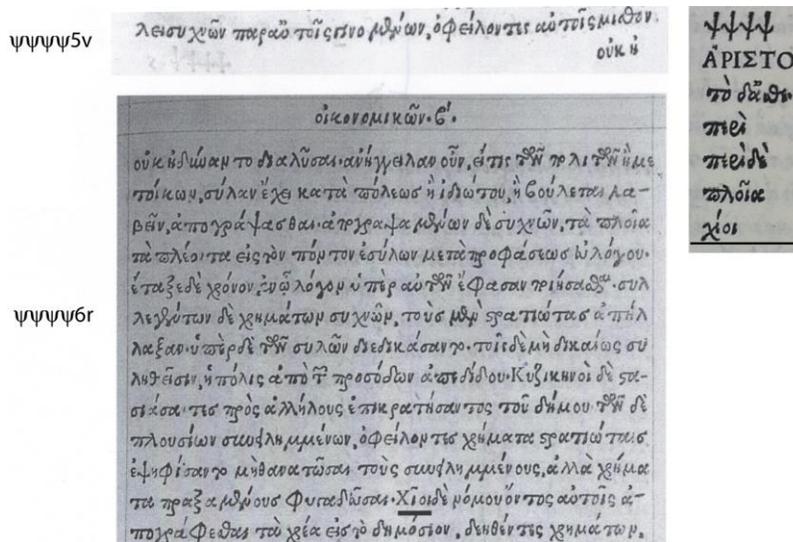
the fourth (for ψψψψ4r), just under five lines late—rather than almost three (to judge by the increments on the four other pages that have catchword errors);



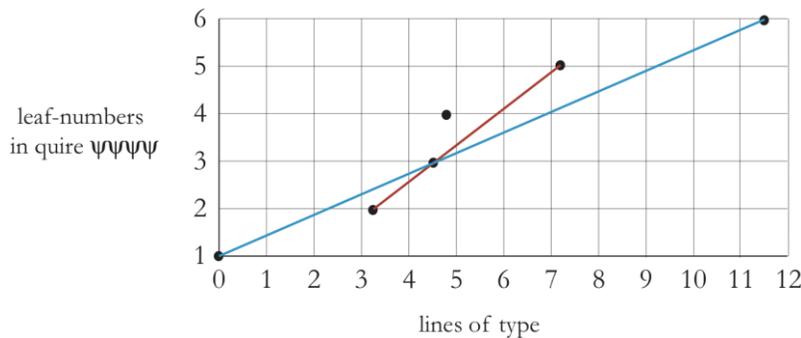
the fifth (for ψψψψ5r), just over seven lines late;



and the sixth (for ψψψψ(6r), eleven-and-a-half lines late.



The following graph offers two tentative representations of the rate of increment. On the vertical, I list the first six leaf numbers of quire ψψψψ; and on the horizontal, I count lines of type. For a given recto page among the first six leaves of the quire, the graph plots the distance (as measured in lines of type) between a) the first word of a given recto in the body of the volume and b) the ‘corresponding’ catchword reported erroneously in the register.



The number of lines of type between a catchword as printed on a given recto in the body and the catchword alleged in the register

The two straight graphed lines tentatively offer different ways to connect some of the dots. The steeper, red, line (linking the second, third, and fifth dots) shows a discrepancy of 3.9 lines over 6 pages. The less steep, blue line (linking the first, third, and sixth) shows a discrepancy of 11.5 lines over 10 pages. As already observed, the present ending of the text of this quire at the very bottom of the penultimate page of quire $\psi\psi\psi\psi$ looks calculated. Had the same text been set at the more compact, red, rate, it would have extended approximately 16 lines onto the next and last page of the quire—and if set at the more diffuse, blue, rate, approximately 28 lines. Either way, casting-off before composition would have revealed that this last page would not exceed 24 pages, the last page of a six-sheet quire (that’s good), but also would not be blank (that’s not so good). Since, time and again, we have seen Aldo manipulate typographical sorts, density, line-length, page-length, and quire structure to favour the creation of a blank page between Books or works, an easy explanation for the wayward catchwords of $\psi\psi\psi\psi$ as registered is, first, that after the copy for *Economics* had been cast-off to end on p. 24, entries for the register were transcribed from printer’s copy into a manuscript list, which eventually served as copy for composition of the register; and, second, the copy for *Economics* was cast off again much later (long enough later that Aldo could forget that copy for the register was now compromised by revision to the casting-off) and composed tighter this time, for cosmetic reasons—by up to as much as one line more per page, so as to leave a blank page at quire’s end. As such a small amount of contraction (about 3%) was a routine matter for compositors, a second casting-off, need not have delayed production by more than a few minutes, since the new casting-off could have piggy-backed on the first.⁶⁵ There must, therefore, have been some other problem with the text of *Economics* that caused this long delay.

One might suppose that a problem had been detected in the scribe’s transcription, one that required further consultation with the (remote) source. Or perhaps, at the eleventh hour, a more authoritative manuscript had been found and new copy had to be prepared. Just such a problem occurred during production of the 1505 Aesop, a folio: After Aldo had printed sheets of the fables by Gabrius/Babrius for this edition from a less-than satisfactory manuscript (‘incorrecte ... exempli’), as the title page explains, and also printed sheets of Latin translation to be interbifoliated with them (some containing new Greek as well as a Latin translation), he found a better exemplar (‘emendatum ... exemplum’) and, using it as copy, reprinted the fables, now with the Greek and Latin translation mixed on each sheet. Then he published the earlier and later versions together!—bafflingly interwoven in a single edition, especially interwoven in composite quire Dd (already referred to on p. 92), which mixed the two productions. The title-page explanation concludes with Aldo’s blithely advising readers: ‘ut ex secundis prima queant corrigi’—‘that the first text might be corrected from the second’.⁶⁶

But we don’t need to speculate. Aldo’s preface to Alberto actually addresses this delay in vol. 5. (I quote here from p. 65 of Wilson’s translation from *Aldus Manutius: The Greek Classics*.) Aldo had hoped in vain for a better manuscript (one that still has not come to light).

⁶⁵ We have an opportunity to observe how this routine function played out in the illustrations to $\text{bbb}\beta\beta\beta$ of vol. 4 on pp. 43–47, above: there, a planned 3% increase in density shows as a tentative (and ultimately unused) casting-off of 10 more lines for ‘B.8.’, 11 for B9, 12 for B10, 13 for B11, and 14 for B12. This is a rate of one extra line per page; but the planned increase actually began on B4, with 3 extra lines for that page, 5 for BB5, 7 for B6, and 9 for B7.

⁶⁶ N. G. Wilson, *Aldus Manutius: The Greek Classics* (Cambridge, Mass.: Harvard University Press, 2016), Appendix VIII, translates ‘curauimus’ as ‘edited’, to have Aldo *editing* ‘it a second time’. But ‘composed’ or ‘printed’ seem more appropriate translations since the edition does include both versions. It is the *reader*, astonishingly, who is offered the chance to edit the first printing on the basis of the second. (I have seen only one exemplar where this advice was acted on.) Why not just have instructed readers to ignore the first? ‘Why publish it at all?’—you ask. Do realize that some parts of the two texts were physically inseparable.

... the *Eudemian Ethics* will in some places offend your ears, and those of other scholars, because we were only able to find a single exemplar; and the *Oeconomica* will look more like fragments than a complete fully preserved text.

I wish I had been able to offer everything [of *Oeconomica*] that was translated by Leonardo Bruni into Latin. ... It is now five months since we put aside this almost finished edition, which was very inconvenient, while we waited for the missing material; it is the second book translated by Bruni, which begins in Latin *Probam mulierem*. Since we could not trace it anywhere, in its place we offer students something else, even if it seems more concerned with politics than economics; we shall provide the small amount that is missing as soon as it can be found.⁶⁷

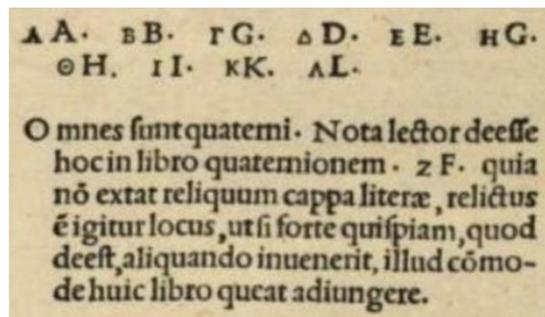
What does it mean to put aside ‘this almost finished edition’ (‘pene abolutos hos libros’)—an interruption during the printing, or a delay in starting it? The regular recycling of the verso headlines from quires BBBB and ΓΓΓΓ, at the end of *Magna Moralia*, into ΔΔΔΔ, at the start of the problematic *Eudemian Ethics* effectively rules out a delay in printing between these two texts. Delay in printing seems to apply only to the other problematic text mentioned, *Economics*, which was printed just short of a dozen quires later than its signature suggests—shortly before the printing of KKKK, the last quire of the volume. The version of ψψψψ that Aldo published must not have been a second printing (as was the case in quire D of the Aesop), but merely the first printing, delayed until Aldo finally abandoned his search for copy of the second Book of *Economics*. Had there been a prior printing of quire ψψψψ (one discarded before publication), would its leaves not have been numbered throughout, commencing with ‘210’, where *Magna Moralia* now begins?⁶⁸

FINI

⁶⁷ Wilson notes that Bruni’s Greek text (from the 1420s) of the second of the three Books was based on a medieval Latin translation, not on a Greek original. The original had consisted of *three* Books; on the title page to vol. 5, Aldo states that his edition of this work has *two*, evidently the first Book and the third.

⁶⁸ Faced with a similar problem in *De Urbibus* by Stephanus Byzantinus (after March 18, 1502), a folio, Aldo left space for the missing text. Here is Wilson’s translation (p. 93) from his introduction to the volume: ‘The end of entries beginning κε is missing, as are those in κη κι κλ and κμ and the first part of those in κο. Therefore, a space has been left, so that if the missing text should be found, it can be inserted conveniently.’

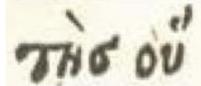
Where exactly did Aldo leave this space? Following the register of signatures is his remarkable answer.



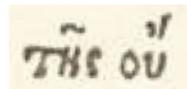
All are quired in four sheets. Reader, note that because the rest of the letter K does not survive, quire ZF is omitted: space has thus been left, so that if by chance the remainder is found someday, it can be added conveniently.



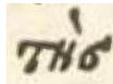
The last unequal equation I shall mention in the register of catchwords for vol. 5 may seem anticlimactic after the Big Questions, but it certainly is symbolic of Aldo’s loose reporting of the microscopic level. The functioning of a catchword depends on redundancy: ‘X’ can be a catchword for ‘X’ alone, never for ‘Z’. The last catchword on the first page of the register, KKKK11v,



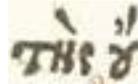
misreports the catchword atop the next page, 12r, already printed on the previous forme through the press:



And this is not the only part of this unequal equation, for neither of these catchwords quotes exactly what it refers to—neither the catchword at the base of BBBB3v, printed long before,



nor the other, printed atop 4r slightly later.



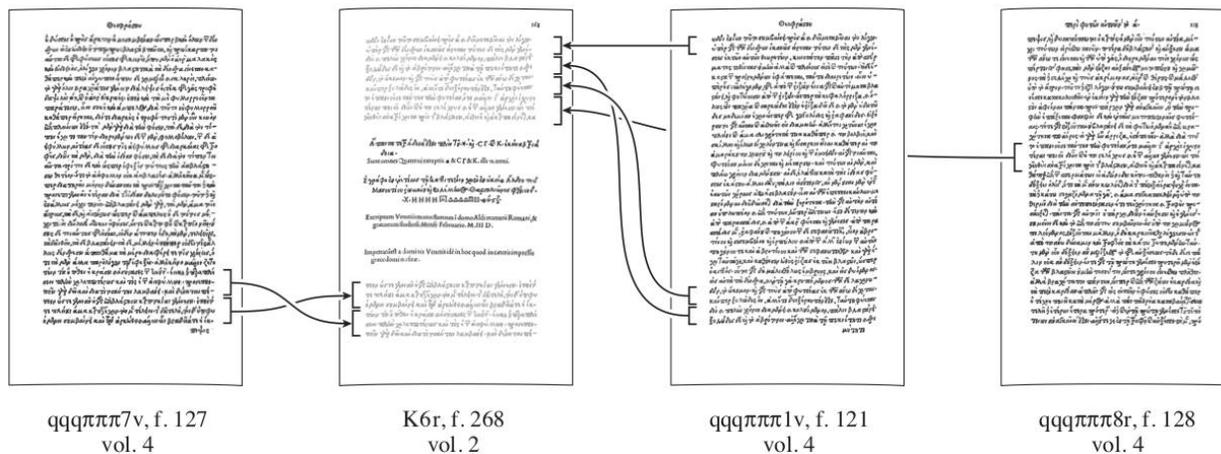
In the body of the volume, the lacuna occurs, as luck has it, on the last page of quire EE almost at the bottom of col. 2, below which one expects a routine catchword—

<p>κ θηλυκῶν, καυλωνιᾶτις, κη καυλωνισ- κ αῶνος, πόλις καρπῖ, ἀρχὴ Καλίνης, οὐ βίβλις κω ἀδελφῆ δὲ ἀδελφῆσιν φιλόντονος ἐκένου • ὁ θεὸς ἢ παρρημία, ο καυλωνισ ἐβρας. ἐστὶ δὲ νο- σώθησ • ὁ θεὸς καὶ σφραγιστὸς ὁ κη θαρσις ἢ σῶν ἀδελφῶν καυλωνισ τῶν καυλωνισ, ἔ-</p>	<p>κ ἑλαίβοι, ἔθνος δεσποτικῶν, προσεχὲς τῆ κ δετῆ αλία. ῥιανὸς. ἀ. λέγονται κη κελθεῖς. κ ελαίθρα, πόλις βοιωτίας, ἀρῆνης πωλησίον, ἀρχὴ κελαιῶρου κ λέπει •</p>	<p>EE8v</p>
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<p>κ ὄρασις πέτρα, ῥόπος ἐν ἰθάκη • ὁ μικρός • ὁ ταυ- κ πτω οἰκῶν, κορακὸς πέδαιος. κ ορακύνιστος, ἀλλέξαντος τῆ τω λιθουκῶς •</p>	<p>κ κορικονοδαιμίτ • κη λίμνη κερικονοδαιμίτις. κ ορομαῖνη, πόλις πρὸς τὸν ποταμὸν κη λαρν • κ μαρικανὸς ἐν πηρίστω ἀυτῆς • ῥ ἐθνικῶν,</p>	<p>HG1r</p>
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but the Greek for ‘it is missing’ that appears there is no more a catchword than inverted ‘Noctē’ was in Seneca’s *Oedipus*, for this expected catchword, like the expected quire zF, is *missing*.

APPENDIX 1



This map documents the recent discovery of lines of type migrating from three pages in qqqppπ in the middle of vol. 4 to print blind on p. K6r, the colophon page of vol. 2. (We already know qqqppπ from discussion of printer’s copy of Theophrastus’s *De causis plantarum* on pp. 10–12.) This vol.-4 text continues beyond this form of qqqppπ for another 104 formes, presumably printed over several more months. (And there are four other texts in vol. 4 *bound* later than *De causis*, which could also have been *printed* later.)⁶⁹ So, as production of vol. 2 ended, printing of vol. 4 was still very much in progress and seems not to have finished until June 1497. ‘Februario. M. III D.’, the Latin date on the colophon page of vol. 2, surrounded as it is by type from a volume finished much later in 1497, cannot be February 1497 *more Veneto*, in which the year began on March 1. It must refer to early in the year that began in January 1497, not early in the year that began in January 1498. (By this logic, the colophon date ‘Ianuario M.IIID’ in vol. 3 is also early in the year beginning in January 1497.)

If we trust the Latin dates, this blind type solves the dating problem in the UCLA catalogues referred to on p. 62: the first UCLA catalogue, which dates that volume ‘1497’, is correct in terms of modern calendar, but the ‘1498’ dating in the revised catalogue is not.⁷⁰

Finally, this revised view of the dating means that the printing of vols. 2, 3, and 4 must have overlapped. The delay in completing vol. 5 referred to on pp. 111–112 suggests that this overlapping might even have included that volume too. The Harvard manuscript may reflect some of this practice. The text of quire K at the end of vol. 2 is *De signis aquarum et ventorum* by Theophrastus. The first leaf of copy for it survives, on leaf 153, following immediately (in mid-page) from the end of Aristotle’s *Physiognomica*, which appears in another Aldine volume: it is the 16th text itemized on the title page of vol. 3 (see p. 51, above). In different ways, manuscripts and printed volumes mixed authors and texts.

Time now for more intertextual searching.

INCIPIIT

⁶⁹ As each has its own foliation, however, any of these four could have been printed before, during, or after production of *De causis*.

⁷⁰ The first UCLA catalogue is wrong, however, to date vol. 3 as June 1497, rather than January of that year.

PHOTO CREDITS

Courtesy of the Warden and Scholars of New College, Oxford, the Aldine Greek Aristotle, 1495–98 (vol. 1, BT1.3.4; vol. 3, BT1.3.6): p. 1 (vol. 3, 2E1v–2r); p. 6 (vol. 1, M4v, N6v); p. 26 (vol. 3, 2X7v).

Courtesy of the President and Fellows of Corpus Christi College, the Aldine Greek Aristotle, 1495–98, vol. 3 (phi.B.5.10): p. 92 (vol. 3, ✱1r—facing 2p205v); p. 93 (vol. 3, 2p205v).

Courtesy of the Biblioteca Arcivescovile di Udine, the Aldine Greek Aristotle, 1495–98 (vol. 5, ARCIVESCOVILE inc. 118 A): p. 101 (vol. 5, 4K12r).

Courtesy of the Biblioteca Ambrosiana, Milan, manuscript I 56 sup of Aristotle's *De partibus animalium* and *De historia animalium*: p. 89 (242v–243r) © Veneranda Biblioteca Ambrosiana.

Beinecke Rare Book & Manuscript Library, Yale University, the Aldine Greek Aristotle, 1495–98 (BEIN Zi +5547): p. 21 (vol. 1, b5r); p. 29 (vol. 3, 2t2τ9r); p. 60 (vol. 3, 2k10v); pp. 109–110 (vol. 5, 4K11v, 4ψ1v–2r, 2v–3r, 3v–4r, 4v–5r, 5v–6r).

Osler Library, McGill University, the Aldine Greek Aristotle, 1495–98 (folio WZ 230 A717 1495–1498): p. 60 (vol. 3, 2k10v–2l2λ1r).

Harry Ransom Center, University of Texas:

1) Constantine Lascaris, *Erotemata*, 1495 (Uzielli 1 and PA 253 L37 1495 Aldine): p. 63 (f4v, the two lower images).

2) the Aldine Greek Aristotle, 1495–98, vol. 3: q/PA/3890/A2/1495/vol.3/HRC/ALDINE & Uzielli 6: p. 60 (vol.3 2k10v).

Bayerische Staatsbibliothek, Munich, from online copies on the website of:

1) Aristotle, *Praedicamenta*, 1495–98 (2 Inc.c.a. 3161 n-1-5 [i.e., vols. 1–5]), in which vol. 4 is bound in two parts: p. 10 (vol. 4, 3q3π1r–1v); p. 12 (vol. 4, 3q3π4v–5r); p. 15 (vol. 4, 3l3λ4v); p. 29 (vol. 4, áα3r); p. 30 (vol. 3, 2m2μ5r); p. 34 (vol. 4, 3f3ζ7r–7v); p. 35 (vol. 4, 3b3β4v–5v); p. 36 (vol. 4, 3f3ζ7v); p. 43 (vol. 4, 3b3β4v); p. 45 (vol. 4, 3b3β5r–5v); p. 51 (vol. 3, 2a2α1r); p. 54 (vol. 3, 2X6r); p. 55 (vol. 3, 2X6v); p. 56 (vol. 3, 2X7r); p. 57 (vol. 3, ₁2P1r); p. 60 (vol. 3, 2k10v); p. 61–62 (vol. 3, 2X7v); p. 62 (vol. 2, K6r); p. 64 (vol. 3, 2&2ω1v, 9v, 10v); p. 65 (vol. 3, 2&2ω2r, 5r, 8r); p. 65 (vol. 3, 2a2α1r); p. 66 (vol. 3, 2A1v, 9v, 10v); p. 72 (vol. 2, ✱4r–5v); p. 73 (vol. 2, ✱5v–6r); p. 82 (vol. 2, ★1r); p. 83 (vol. 2, ★3r, 8v), (vol. 4, YY11r); p. 87 (vol. 3, ✱8r); p. 99 (vol. 5, 4α1r & 4K11v–12r); p. 103 (vol. 5, 4ψ12r); p. 106 (vol. 5, 4ψ6v).

2) Theodore Gaza, *De animalibus, etc.*, 1476 (2 Inc.c.a. 448 m): p. 53 (Ff5r); p. 88 (a4r–v).

3) Constantine Lascaris, *Erotemata*, 1495 (Rar. 302): p. 63 top (C8v).

4) *Epistulae diuersorum philosophorum*, 1499 (4 Inc.c.a. 1612 m-1/2#2): p. 58 (²p3r, 4r 7r).

5) Seneca, *Tragoediae*, 1517 (A.lat.b 1685): p. 8 (d8v–e1r, o1v–2r).

6) Politian, *Omnia Opera*, 1498: p. 97 (xx9v–10r).

7) Stephanus Byzantinus, *De Vrribus*, 1502 (Res/2 A.gr.b 1023): p. 112 (ΛL8r); p. 113 (EE8v–HG1r).

Harvard University Library,

1) the Aldine Origen, 1503 (f MGC.Or163.E503 (A)): p. 95 (Z6r).

2) from the online copy of Ms Gr 17, printer's copy for the Aldine Greek Aristotle: p. 10 (ms pp. 123–24); p. 11 (ms pp. 125, 127–28, 130–31); p. 17 (ms pp. 131–32); p. 18 (ms pp. 134–37); p. 19 (ms pp. 138–39); p. 20 (ms pp. 140–41); p. 31 (ms pp. 262, 268); p. 32 (ms p. 266); p. 33 (ms pp. 272–74); p. 34 (ms p. 274); p. 36 (ms pp. 275–76); p. 37 (ms pp. 274–75); p. 38 (ms pp. 272–73); p. 39 (ms pp. 271–72); p. 40 (ms p. 277); p. 41 (ms p. 278–79); p. 43 (ms p. 205); p. 44 (ms p. 206); p. 45 (ms p. 207); p. 46 (ms p. 209); p. 47 (ms p. 208); pp. 78–79 (ms p. 313); p. 80 (ms p. 314–17).

Boston Public Library, from the online copy of the Aldine Greek Aristotle, 1495–98 (Q.403.89 Folio): p. 60 (vol. 3, 2k10v).

Randall McLeod
Department of English
University of Toronto

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