

HARVEY'S ACCOUNT OF HIS "DISCOVERY"

by

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Considering that it is perhaps the most celebrated passage in the whole history of medical science, it is not surprising that the opening lines of chapter 8 of William Harvey's *De motu cordis*¹ have attracted a good deal of attention from scholars. It is in this passage, after all, that we get Harvey's own account of the sequence of his thoughts as he came upon the idea that the blood might have "a certain movement, as it were, in a circle". What is surprising, though, is how difficult it is to derive, from that scholarship, a clear and unequivocal exposition of his account.

Harvey, himself, must bear some of the blame. In this passage, the one crucial sentence that contains most of what interests us, is long, convoluted and awkward. Then there are the circumstances surrounding the book's production. A preamble to the list of errata, found in some copies of the *De motu cordis*, seems almost calculated to undermine our confidence in the text.

For so many errors in such a short work, dear reader, indulgence is requested because of the novelty of the thing, and the unusual foreign hand of the copy sent to the editors, [the work] having been printed in foreign parts [i.e., Frankfurt], and the author having been absent and separated by so great a stretch of land and sea in these uncertain times [i.e. the Thirty Years War] for corresponding.

Moreover, to supplement the long list of errata, the publishers invite the reader to eliminate any remaining small errors "which impede your understanding and pervert the sense of the author". As we shall see, this was perhaps not an altogether wise suggestion.²

Finally, there is the fact that, after the original text appeared in 1628, there was a remarkable variety of versions that appeared and reappeared, before or very shortly

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Without implying their responsibility for any errors I may have committed, I would like to thank Vivian Nutton and Faith Wallis for their help with some of the difficulties in translation.

¹ The conventional abbreviation for *Exercitatio anatomica de motu cordis et sanguinis in animalibus*, Frankfurt, W. Fitzer, 1628. The passage under consideration is the first two paragraphs on p. 41f.

² For the publishing background, see E. Weil, 'William Fitzer, the publisher of Harvey's *De motu cordis*, 1628', *The Library*, 1944, 24: 142-64. For a complaint about Harvey's bad handwriting by one of his own followers, see Ent's comment, quoted by Gweneth Whitteridge in her Introduction to *An anatomical disputation concerning the movement of the heart and blood in living creatures by William Harvey*, Oxford, Blackwell, 1976, p. 1.

after Harvey's death, under the aegis of various publishers from all over Europe. Any one of them could conceivably reflect a second attempt by Harvey to produce a clearer text.

All of these things have produced an understandable confusion, and, as a result, students of the *De motu cordis* have not, so far, established a fully satisfactory English rendering of this piece of text. On the one hand, up to the present day, formal translations of *De motu cordis* have never given us an English equivalent that will withstand close inspection, and it may well be that no single rendering will ever fulfil that goal to everyone's satisfaction. On the other hand, within their relatively recent analyses of Harvey's thinking, Walter Pagel and Jerome Bylebyl have scattered bits of translation in with their interpretations, translations that seem, to me at least, to have better unpacked the meaning of these heretofore more celebrated than understood lines. Therefore, the present work is largely an updated rather than a new interpretation.

I propose, first, to offer both Latin and English texts, and then to discuss them in connection with a number of topics: just which Latin text or texts ought to be relied upon, and why; what is wrong with the most common English translations; and, finally, how recent scholarship suggests these paragraphs should be understood, and, therefore, why I have translated them as I have.

For reasons which I shall offer later, I believe that the best Latin text is the 1628 original, corrected according to the errata sheet that appeared in some copies.³ The corrections listed there are of varying importance but, in the present context, of no real significance. Nevertheless, I have altered the published text according to these corrections, offering the original in such instances as notes.⁴

CAPUT VIII

De copia sanguinis transeuntis per cor è venis in arterias, et de circulari motu sanguinis.

Hucusque de transfusione sanguinis è venis in arterias, et de viis, per quas pertranseat, et quomodo ex pulsu cordis, transmittatur dispensetur[que] de quibus, forsan sunt aliqui, qui, antea aut Galeni autoritate, aut Columbi, aliorumve rationibus adductis,⁵ assentiri se dicant mihi; nunc vero, de copia et proventu istius pertranseuntis sanguinis, quae restant, (licet valde digna consideratu) cum dixero; adeo nova sunt, et inaudita, ut non solum ex invidia quorundam, metuam malum mihi, sed verear, ne habeam inimicos omnes homines; tantum⁶ consuetudo, aut semel imbibita doctrina, altisque defixa radicibus, quasi altera natura, apud omnes valet, et

³ According to the third edition of Geoffrey Keynes, *A bibliography of Dr. William Harvey, 1578–1657*, rev. by Gweneth Whitteridge and Christine English, Winchester, St Paul's Bibliographies, 1989, there are seventy known copies of the *De motu cordis*, of which only 11 include the original errata sheet that comes after p. 72. The sheet consulted for this work, from the copy in the Osler Library at McGill University, had been removed by Sir William Osler from the copy he gave to The Johns Hopkins University. Thus, I am doubly indebted to that institution because the work reported here takes more than a leaf out of the work done by Jerry Bylebyl of the Johns Hopkins Institute of the History of Medicine.

⁴ All abbreviations have been expanded, "u" replaced with "v" where appropriate, and, of course, the long "s" with the short. The original punctuation has been maintained. Hereafter, this particular version will be referred to as the "emended, 1628 text".

⁵ See below, note 11.

⁶ "homines tantum".

Harvey's account of his "Discovery"

antiquitatis veneranda suspicio cogit. Utcumque iam iacta est alea, spes mea in amore veritatis, et doctorum animorum candore: Sane cum copia quanta fuerat, tam⁷ ex vivorum, experimenti causa, dissectione, et arteriarum apertione, disquisitione multimoda; tum ex ventriculorum cordis, et vasorum ingredientium et egredientium Symmetria, et magnitudine, (cum natura nihil faciens frustra, tantam magnitudinem, proportionabiliter his vasibus frustra non tribuerit) tum ex concinno et diligenti valvularum et fibrarum artificio, reliquaque cordis fabrica, tum ex aliis multis saepius mecum et serio considerassem, et animo diutius evolvissem: quanta scilicet esset copia transmissi sanguinis, quam brevi tempore ea transmissio fieret, nec suppeditare ingesti alimenti succum potuisse animadverterim; quin venas inanitas, omnino exhaustas, et arterias, ex altera parte, nimia sanguinis intrusione, disruptas, haberemus, nisi sanguis aliquo ex arteriis denuo in venas remearet, et ad cordis dextrum ventriculum regrederetur.

Coepi egomet mecum cogitare,⁸ an motionem quandam quasi in circulo haberet, quam postea veram esse reperi, et sanguinem è corde per arterias in habitum corporis, et omnes partes protrudi, et impelli, à sinistri cordis ventriculi pulsu, quemadmodum in pulmones per venam arteriosam à dextri,⁹ et rursus per venas in venam cavam, et usque ad auriculam dextram remeare,¹⁰ quemadmodum ex pulmonibus per arteriam dictam venosam, ad sinistrum ventriculum ut ante dictum est.

If this is the most reliable Latin text, it should be the basis for any English interpretation that focuses on Harvey's meaning (as distinct from his style, or from seventeenth-century usage, generally). Based on that text, then, I offer the following translation.

CHAPTER 8

Concerning the large amount of blood passing through the heart from the veins into the arteries, and concerning the circular motion of the blood.

Up to this point, there are perhaps some who, convinced¹¹ either by the authority of Galen or by the arguments of Columbo or others, would declare themselves in agreement with me about the transfusion of blood from the veins into the arteries, the routes through which it passes, and how it is transmitted [and] distributed by the beat of the heart. But now, when I have finished saying what remains to be said, concerning the large amount and supply of that same blood that is passing through (though most worthy of consideration), it is so new and unheard of that I do not merely fear harm to myself from the envy of some, but am afraid lest I should make all men my enemies, so much does custom or doctrine once imbibed and deeply rooted thrive like second nature among them, and a reverential regard for antiquity captivate them. However, the die is now cast, my hope [is] in the love of truth and in the candour of learned minds.

⁷ Clearly a misprint for "tum", and usually treated as such by those subsequent renditions that edited the text.

⁸ "... coepi egomet mecum . . . cogitare." Terence, *Eunuchus*, Act 4, Scene 2, Lines 1–3. Harvey had quoted from another Terence comedy in Chapter 1. When claiming that he had thought of the circulation in 1622, Helvicus Dieterich also alluded to Terence's *Eunuch*, (E. V. Ferrario, F. N. L. Poynter, and K. J. Franklin, 'William Harvey's debate with Caspar Hofmann on the circulation of the blood', *J. Hist. Med. Allied Sci.*, 1960, 15: 7–21, p. 11).

⁹ "dextris".

¹⁰ "remeari".

¹¹ "adductis". I follow here the many subsequent versions such as K5 and K7 and their respective offspring (these short-hand citations are explained in note 21), which have treated this as a misprint for "adducti".

In truth, when, from a variety of investigations through dissection of the living in order to experiment and through the opening of arteries, from the symmetry and magnitude of the ventricles of the heart and of the vessels entering and leaving (since Nature, who does nothing in vain, would not have needlessly given these vessels such relatively large size), from the skilful and careful craftsmanship of the valves and fibres and the rest of the fabric of the heart, and from many other things, I had very often and seriously thought about, and had long turned over in my mind, how great an amount there was, that is to say how great the amount of transmitted blood would be [and] in how short a time that transmission would be effected, and [when]¹² I [then]¹³ became aware¹⁴ that the juice of the ingested aliment could not have sufficed without our having the veins emptied, utterly drained, and the arteries on the other hand burst asunder by the too great inthrust of blood, unless the blood were somewhere to return again from the arteries into the veins and to go back to the right ventricle of the heart, I began¹⁵ privately to think that it might rather have a certain movement, as it were, in a circle, which I afterwards found to be true, and that the blood is thrust out from the heart through the arteries, and driven forward into the habit of the body and to all parts, by the beat of the left ventricle of the heart, just as [the blood is thrust out] by the [beat of the] right (ventricle) into the lungs through the arterial vein; and returns back again through the veins into the vena cava and up to the right auricle, just as [the blood returns] from the lungs through the so-called venous artery to the left ventricle, as was previously said.¹⁶

Within this passage, the sentence “In truth . . . which I afterwards found to be true” (“Sane . . . reperi”)¹⁷ will be the chief, though not exclusive, focus of our attention.¹⁸ It is difficult to render in sensible English without introducing some adjustments, but I have tried to keep these to a minimum. Bringing the substantive clause “copia quanta fuerat” down close to the verbs for which it is the object, and to the “scilicet” clauses which amplify and are in apposition to it, is one such adjustment that does not require further comment. On the other hand, more will be said later about joining the two

¹² Because “animadverterim” is in the subjunctive, it too must be subordinated to the “cum” near the beginning of the sentence. See discussion of this in the text below.

¹³ Added in order to capture the sequential nature of Harvey’s thought, which is conveyed in the Latin just by the change from the pluperfect to the perfect tense, but hardly at all in the English. Ironically, Zachariah Wood, of whom I am otherwise quite critical (see Appendix), added “tandem” at this point in the Latin text! See note 69, below.

¹⁴ Bylebyl’s “realized” (“The medical side of Harvey’s discovery: the normal and the abnormal”, in *William Harvey and his age: the professional and social context of the discovery of the circulation*, ed. by J. J. Bylebyl, Baltimore, The Johns Hopkins University Press, 1979, pp. 28–102; p. 76) captures the sense, but at the expense of using an epistemologically loaded word that only came into common use somewhat later. I was tempted to use “it dawned on me”, in order to convey the meaning of “animadverterim” here, but rejected it as also a bit too modern and tinged with slang.

¹⁵ For the incorporation of “coepi” into this sentence, and the obliteration of the paragraph break, see the discussion near the end of this paper.

¹⁶ Obviously, this translation has benefited from the labours of virtually all of its predecessors.

¹⁷ Hereafter referred to as the “Sane” passage.

¹⁸ The problems this passage presents have been discussed by Whitteridge, *op. cit.*, note 2, above, pp. xli-li, where she gives her view of what the Latin text should be. Her translation appears on p. 74f. It was this discussion that drew my attention to the problem and to some of its dimensions. However, the present work differs from hers in so many ways, both as to the facts of the matter and as to their interpretation, that it is impractical to take note of every point of disagreement. Her discussion should be consulted. For other problems with Whitteridge’s translation of the *De motu cordis*, in general, see Andrew Wear, ‘William Harvey and the way of the anatomists’, *Hist. Sci.*, 1983, 21: 223–49. One of her errors in translating this passage is mentioned by Wear, without elaboration, *ibid.*, pp. 225 and 242, note 9.

Harvey's account of his "Discovery"

paragraphs and making "coepi" the main verb of the "Sane" passage, and the related problem of "animadverterim". That the English rendering of this sentence may have to be read more than once, in order to understand it, is perhaps even desirable because it more faithfully demonstrates how convoluted the Latin at this point is.

There is one stretch of this passage where the fastidious editor or translator would like to correct a small elision in Harvey's thought. Obviously, the inadequacy of fluid intake would indeed cause the veins to be emptied, as Harvey says, but it would be the great amount of blood being transferred that would cause the arteries to burst, not the shortage of imbibed liquid, as the wording seems to suggest.¹⁹ But, to revise this bit would clearly be a matter of correcting Harvey's error, not that of some puzzled or negligent Frankfurt editor. It is a very subtle mistake, and what Harvey had in mind is perfectly clear. To be as non-intrusive as possible, therefore, I did not make any changes to this passage. However, I have called attention to it because it became the source of considerable editorial interference.

There are no fewer than nine additional printings of the Latin text between 1628 and 1661.²⁰ The *De motu cordis* first reappeared in Leyden, in 1635 (hereinafter, K2),²¹ which itself reappeared in 1639 (K3) and 1647 (K6),²² while other versions were published in Padua 1643 (K4), Amsterdam 1645 (K5), Rotterdam 1648 (K7), with further versions of K7 appearing in 1654 (K8), and 1660 (K9) and a London version of K8, also in 1660 (K10).²³ The relevant passage was examined closely in each of these for two reasons: first, to see if any of them contained significant revisions to the meaning that could be attributed to Harvey; secondly, to assess their impact on the standard English renditions in common use today.

Such investigations, it turns out, tell us much more about the craft of typesetting and the etiquette of seventeenth-century editing than it does about Harvey's ideas. All of these texts, for example, took great liberties with punctuation, adding and subtracting not only commas but also semi-colons, colons, periods, and even paragraphing. Just in the brief stretch of text we are looking at, there were customarily over thirty such punctuation changes in any given version. Some were clearly the work of an editor, but

¹⁹ Presumably this is what Whitteridge is referring to when she speaks of a "non-sequiter", op. cit., note 2, above, p. xlv.

²⁰ Harvey died in 1657, and no further versions appeared between 1661 and 1671. It seems reasonable to assume that nothing after 1661 could have received his approval.

²¹ Keynes, op. cit., note 3, above, contains a numbered list of all of Harvey's publications, in their various forms. For the sake of convenience and brevity, I shall use "K" and the Keynes number rather than the full reference.

²² I have been able to examine only K3, from 1639. Supposedly, K2 and K6 are more or less the same. See their description in Keynes, op. cit., note 3, above.

²³ I am grateful to Dr Inci Bowman of the Truman G. Blocker, Jr, Collections at The University of Texas Medical Branch, Galveston, Texas, for making copies of K4 and K10 available to me. In addition to this list of Latin texts, there were translations of K7, presumably into Dutch 1650 (K18), and certainly into English 1653 (K19). (An examination of the Dutch volume, limited to the two paragraphs under study and undertaken with the help of Wayne LeBel of the Osler Library, yielded equivocal results as to the Latin version it was based upon because the translation is quite loose. On the basis of external circumstances, though, plus the use of the same illustration on the title page, and one hint of indebtedness in the examined text, it seems almost certain that K7 was the source of the Dutch. In his 'The reception in Holland of Harvey's theory of the circulation of the blood', *Janus*, 46: 183–200, G. A. Lindeboom (p. 199) accepts this attribution without comment.) That K7 was the basis for the English was pointed out by Whitteridge, op. cit., note 2, above, p. x.

occasionally the choice seemed more what came to the typesetter's hand than what came to the editor's mind.²⁴ Changes in wording, though less numerous, were also present in almost all of the texts examined. Most frequently, the motive behind such changes seemed to be nothing more serious than editorial twitch, a condition not unknown among the breed in our own day. Usually such changes are trivial and in no way affect the meaning of the text. Sometimes, though, the editor clearly wanted to improve on Harvey's language or to correct real or imagined errors.²⁵

Editors clearly did not operate under the constraints that prevail today, whereby authors of non-fictional, and especially specialized and technical texts, are usually consulted about any proposed changes that have the slightest possibility of revising the meaning. In striking contrast, one of these early editors even appears to have revised the text according to what he thought Harvey should have said, or would want to have said!²⁶

What all of this tells us is that we cannot, in general, use the mere fact of variations in any particular text as an indication of what Harvey "really" intended, unless we have some other evidence than the changes themselves.

Many of these (to us rather cavalier) practices can be illustrated in the Rotterdam version of 1648 (K7). Moreover, this particular text is worth some time because, of all of the post-1628 Latin versions, it is the only one that has been claimed to bear Harvey's stamp of approval, or to have been called "the second edition".²⁷

Like most of the versions being discussed, the Rotterdam text makes the changes called for in the 1628 errata sheet. And, just as typically, there are well over thirty punctuation changes in this two-paragraph passage alone. Again, like so many of the others, there are changes in wording that are much more than mere corrections and yet have no significant impact on the meaning.²⁸ Knowing that the editor, Zachariah Wood, was a specialist in Latin and a schoolmaster in a Latin School in Rotterdam,²⁹ we need not be surprised that many of his emendations are pedantic.

On the other hand, some changes seem at first to be more serious. Most important is the revision made to the "Sane" passage. On close inspection, however, what we find is

²⁴ For example, where K4 has ";" before "Coepi", K12, a generally sloppy copy of K4, has ":" followed by "Cepi".

²⁵ Even when just reading his own copy, Alexander Read displayed such an editorial twitch, (R. K. French, 'Alexander Read and the circulation of the blood', *Bull. Hist. Med.*, 1978, 50: 478–500; pp. 489 and 494). But then, that is precisely what the Frankfurt editor of the original invited his readers to do!

²⁶ See the version of *De motu cordis* included in the posthumous *Opera* of Spieghel, 1645, (K5). On p. li, to cite one example among several, the editor has changed "et antiquitatis veneranda suspicio cogit" to "et antiquitatis veneranda suspicio plerosque cogit nova velut nulla putare". On the other hand, at least one editor did not even change those errors listed on the errata sheet of the original, (K14). Clearly, editorial twitch, while endemic, was neither universal nor consistent.

²⁷ Whitteridge, op. cit., note 2, above, p. xlii. In speaking of these various texts, I have been deliberately using "rendition" and "version" rather than "edition" because "edition" suggests, today, that any substantive additions or changes reflect the views of either the author or of someone explicitly designated to take the author's place. In that sense, none of the texts under examination deserves to be called a further "edition", not even K7, as we shall see. Hereafter, by the "Rotterdam text" I mean K7.

²⁸ Thus "... spes mea in amantium veritatis et doctorum animorum candore" replaces "... spes mea in amore veritatis, et doctorum animorum candore".

²⁹ M. J. van Lieburg, 'Zacharias Sylvius (1608–1664), author of the *Praefatio* to the first Rotterdam Edition (1648) of Harvey's *De motu cordis*', *Janus*, 1978, 65: 241–57; p. 243.

Harvey's account of his "Discovery"

again not something that looks like a "second edition" revision, but just tinkering.³⁰ After twenty years since the first edition, after so many other reprintings, after the notion of the circulation had received such extensive, Europe-wide attention, and while Harvey was seeing another book on the subject through the press, it is hard to believe that he would have engaged in such trivia.³¹

What about external evidence? Circumstances surrounding the appearance of the Rotterdam text have been cited to suggest that Harvey had something to do with it. But speculations that he may have met the editor, Wood, or at least communicated with him, are admitted by their author to be "open questions and assumptions without evidence . . .".³² Then there is the question of whether Harvey was doing business directly with the publisher, Arnold Leers. Within a year of bringing out the Rotterdam text, Leers published Harvey's two letters to Riolan, Jr.³³ We now know, however, that the Leers edition of the 1649 book was not directly done from Harvey's manuscript, but copied from the Cambridge edition, published earlier in that same year.³⁴

Finally, there is the claim that, in that 1649 book, Harvey's second letter to Riolan reflects the ideas of De Back, the contributor of an additional treatise on the heart to the Rotterdam text of the year before.³⁵ Because of this, the argument goes, Harvey must have seen the 1648 text before he had finished writing his 1649 book.³⁶ But Frank has argued that that particular letter to Riolan had been written by 1646.³⁷ Even if we accepted the possibility that Harvey had seen the 1648 text shortly after it appeared, that would tell us nothing of what he thought of it.

Meanwhile, contradicting this flimsy evidence is what the editor, Wood, says in his preface to the Rotterdam text.

. . . we have again set forth *Harvey's Anatomical Exercise*, which in the year 1628 was set out at Frankfurt, very carelessly by the fault of the printer which the author often complained vigorously of, finding that the calumnies of his reproachers had their beginning from thence, who not understanding what he said, did take them ill, and endeavoured to traduce him publicly; I say we have set it forth, and have taken a great

³⁰ For details, see the Appendix.

³¹ The new book, published in three places under various titles, came out at Rotterdam as *Exercitationes duae anatomicae de circulatione sanguinis. Ad Joannem Riolanum filium*, 1649. The fact that it also came out under the same publisher (Arnold Leers), who produced the 1648 version of *De motu cordis* (K7), is not evidence of Harvey's direct communication with that publisher; see below. Whether or not one agrees with Whitteridge when she says that "the 1648 emendation makes the meaning of the passage abundantly clear", one wonders why she thinks that supposed clarity has any authority when she admits, on the one hand, that "it is not possible to account for the alterations as being merely corrections of printer's errors", and, on the other, that "in the absence of any evidence to the contrary, we must assume that the 1628 text, printer's errors apart, represents exactly what Harvey wrote in his manuscript", (Whitteridge, op. cit., note 2, above, p. xliii).

³² Lieburg, op. cit., note 29, above, p. 249.

³³ Ibid., p. 248f. See above, note 31.

³⁴ Keynes, op. cit., note 3, above, p. 73.

³⁵ F. M. G. De Feyfer 'Bemerkungen zu Harvey's Exercitatio tertia de circulatione sanguinis ad Joannem Riolanum Filium', *Janus*, 1909, 14: 335–46; p. 345f.

³⁶ Lieburg, op. cit., note 29, above, p. 248.

³⁷ Robert G. Frank Jr, *Harvey and the Oxford physiologists: scientific ideas and social interaction*, Berkeley, University of California Press, 1980, p. 33f.

deal of pains, that so much as was possible all things intricate, confused, or unperfect, being taken away, that same exercise might come forth mended and restored, in this business having had the help of the most learned *De Back* our beloved colleague, whose judgement we do much esteem.³⁸

Besides more or less admitting to, and giving his motive for the fussy changes already noticed, Wood makes clear that he, with the help of *De Back*, was responsible for the text. It is inconceivable that Wood would have failed to mention Harvey here if, in fact, the author had personally made or approved the revisions.

It is unwise, therefore, to claim any special status for this Rotterdam text, to call it the “second edition”, or to say that this “was the first to contain a corrected text”.³⁹ To do so suggests that we know this particular version to carry more authority than any of the others, possibly including the original of 1628, when all the evidence we have suggests the contrary.

None of the other post-1628, Latin versions has been claimed to have Harvey’s imprimatur and I found no internal evidence to suggest otherwise.⁴⁰ To varying degrees, all of them have features similar to those of the Rotterdam text and, therefore, give the same impression that they constitute nothing more than editorial tinkering or occasional efforts to make unauthorized improvements on Harvey’s original.

In conclusion, then, we must look to the original, 1628 edition, with its corrections from the errata sheet, for the most reliable guide to what Harvey wanted to say on the matter.⁴¹

Now let us turn to the English translations. It has already been pointed out that the first English translation of 1653 (K19) was in fact based on the Rotterdam text, not on that of 1628. And the 1673 copy (K20) of the 1653 translation is identical, except for changes in spelling. So both of these English renditions, while undoubtedly giving us the flavour of seventeenth-century language, introduce the modest change made to

³⁸ K7, sig. *, folio [12v] and sig. **, folio 1r. I have only slightly changed the wording of the 1653 English translation (K19, sig. *, folio [8v] and sig. **, folio 1r). Also, in this English version (but not in the Latin), “1628” is incorrectly “1648”.

³⁹ Keynes, op. cit., note 3, above, p. 26.

⁴⁰ Weil, op. cit., note 2, above, p. 146, calls K4 “the second authorized edition . . . , so to speak”. What he means, however, is clear from the context. In K2 and K3, the text of the *De motu cordis* is interspersed with critical comments by Emilio Parisano. Thus, K4 is only the second version to appear complete without commentary. Weil calls every version an “edition”.

⁴¹ These various early versions had their offspring. K2 is claimed to be the basis for K3 and K6 (see note 22, above). K4 is reincarnated in a sloppy version, K12, and in a better copy, K13. K5 was copied in K15. K7, as already noted, was the basis for K8, but with significant changes. K7 was probably used to make the Dutch translation, K18, and certainly for the English, K19. K8, in its turn, was very closely copied in K9 and also used for K10, while K9 was used for K11. (For this last comparison, I am again obliged to Dr Inci Bowman.) K14 is a raw version of the original 1628 edition without even the changes from the errata sheet, and it was reprinted, without even resetting the type, in K46. K16 very closely followed the official Royal College of Physicians version of 1766 (K47) which, itself, is closely similar (but not exactly so), with the emended 1628 text. In none of the cases examined, other than K46, is an “offspring” a true facsimile or even reset copy of the parent text. At the very least, several punctuation changes have been made, restoring, in some places, the punctuation of the 1628 original! All of these comparisons, incidentally, are based solely on the two paragraphs at the beginning of Chapter 8. It is conceivable, if unlikely, that a comparison of a larger stretch of text would bring one to different conclusions.

Harvey's account of his "Discovery"

the sequence of Harvey's thoughts which I discuss in the Appendix with regard to the 1648 Latin version.⁴²

Once again, though, claims have been made that Harvey in some way lent his authority to the 1653 translation, the only one to appear in his lifetime. Russell, for example, simply states without proof that it "must have been done with Harvey's knowledge and approval".⁴³ Keynes offers the equally speculative, if contrary claim that "it is unlikely that Harvey himself had any hand in making it, but there is no reason for supposing that he disapproved of that undertaking".⁴⁴ Franklin seems to have got it right by merely stating that "we do not know if it was acceptable to" Harvey.⁴⁵

There is the additional fact that the English version is full of mistakes. The appearance of "1648" for "1628" in Wood's preface has already been noted. But, in the "Sane" passage, itself, there is an error that is so egregious as to be laughable. Instead of "... unless the blood did pass back again by some way out of the *arteries* into the *veins*, and return into the *right ventricle* of the *heart*", the translator has reversed the flow so that the blood must "pass back again . . . out of the *veins* into the *arteries*." This is exactly wrong at the most crucial point in the entire book!⁴⁶

After these seventeenth-century English versions, the next influential translation was that of Willis, in 1847 (K48). Besides being the source of other printings,⁴⁷ it was, itself, reprinted in 1949, 1965⁴⁸ and once again, quite recently.⁴⁹ For his translation, Willis either went back to the original, or, more likely, to the official Royal College of Physicians version of 1766.⁵⁰

Two features of Willis's translation merit our attention. First, he translated "quanta scilicet esset copia transmissi sanguinis", etc., as "what might be the quantity of blood which was transmitted".⁵¹

To appreciate the subtle significance of this interpretation, we need to examine the first part of the "Sane" passage in more detail. Stripped of all subordinate clauses, the essence of everything down to the "nec" clause can be summed up in two words:

⁴² As Whitteridge (op. cit., note 2, above) makes clear in her discussion and translation, she too has incorporated this apparently unauthorized change in the sequence of Harvey's thoughts into her rendition. However, her changes to the text go well beyond this and do not solely depend on the 1648 text, as she makes clear.

⁴³ K. F. Russell, 'The English translations of Harvey's works', *The Aust. and N. Z. J. Surg.*, 1957–58, 27: 70–4; p. 71.

⁴⁴ K25, p. 198.

⁴⁵ K. J. Franklin, 'On translating Harvey', *J. Hist Med*, 1957, 12: 114–19; p. 114.

⁴⁶ K19, p. 45. Italics in the original. This error is repeated in 1673 and again in Keynes' "newly edited" printing of 1928 (K25). In quoting this same 1653 sentence, Whitteridge corrects the mistake without indicating that she has done so (Whitteridge, op. cit., note 2, above, p. xlv).

⁴⁷ Such as K22 (which, according to Keynes, op. cit., note 3, above, was then reprinted in K24a and b), K23, K24c and d, and K48.1.

⁴⁸ Keynes, op. cit., note 3, above, p. 105.

⁴⁹ William Harvey, *The works of William Harvey*, transl. Robert Willis, M.D., introduction by Arthur C. Guyton, M.D., Philadelphia, University of Pennsylvania Press, 1989.

⁵⁰ Although Willis does not explicitly say what he used for his translation, he does tell us that, in the past, "having access to the handsome edition of Harvey's Works in Latin . . . published by the College of Physicians in 1766, I had always referred to that when the course of my studies led me to consult Harvey" (K48, preface). In any event, the choice of text is not particularly critical.

⁵¹ K48, p. 46.

“considerassem . . . quanta”; “I had . . . thought about . . . how great . . .”. At least that is how I have translated it. For Willis, the ambiguity inherent in the Latin led him in a slightly different direction. He wrote “I . . . bethought me . . . what might be the quantity . . .”.

On the strength of Willis’s rendering, we could understand these words in the interrogative and investigative sense of *looking into the question* of how much. My translation, on the other hand, quite clearly implies a contemplative sense of Harvey’s having reflected on *the belief, already formed*, that the amount would indeed be great. I believe the context favours this latter interpretation. First, “considerassem”, particularly when combined with “mecum” and accompanied by “evolvissem”, lends itself best to the idea of contemplation. It is an odd choice of word if Harvey meant to say that he had investigated the matter. Nevertheless, up to this point, it could be argued that my rendering does not depart from that of Willis. But then there is “copia” which conventionally means “abundance” or “richness”. That Harvey had this conventional meaning in mind is strongly supported by the fact that he used “copia” in the title of the chapter and in the opening lines of the first paragraph with the clear intention, it seems to me, of saying that he believed there to be an abundance, a large amount, of blood being transferred from the vena cava to the aorta in the light of what he had come to understand to be the workings of the heart. Once one accepts this interpretation of “copia” it becomes hard to see how “quanta” can be understood in the interrogative sense which Willis had given to it.⁵²

It is a very subtle distinction. Does it matter? Perhaps in 1847, Willis’s rendering of this bit of text was unproblematical. In a twentieth-century context, though, his “what . . . quantity” has lent itself to a doubtful reading of Harvey at this point. Because the use of “quantitative reasoning” or “the quantitative method” has often been celebrated as one of the features of the scientific revolution; because Harvey has been regarded as one of the heroes of this revolution, and because, in the very next chapter of *De motu cordis*, he did go through the motions of a quantitative argument based on measurement, Harvey has been made a leading medical exemplar of the “new” approach.⁵³

⁵² The anonymous, seventeenth-century translator of the 1653 English version invariably rendered “copia” as “abundance” and interpreted this part of the “Sane” passage in the contemplative sense (K19, p. 44f.). For reasons why “copia” should be construed in the sense of “abundance”, see J. J. Bylebyl, *op. cit.*, note 14, above, p. 99, notes 223, 228 and 230. While I am persuaded by Bylebyl’s argument that Harvey clearly means by “copia” to convey more than merely an unqualified “amount” or “quantity”, Vivian Nutton has also convinced me that the term “abundance” sounds slightly overblown to the modern ear as a suitable English rendering of same. Therefore, when “copia” in the Latin text is not qualified, as in the title and the earlier part of the text, I have rendered it as “large amount” on the strength of Bylebyl’s argument. And, when it is modified by “quanta”, I have just used “amount”, but have construed the “quanta” as modifying it in the assertive sense of “how great the amount was” and not in the interrogative sense of “how great was the amount”.

⁵³ For examples, see the citations in F. R. Jevons, ‘Harvey’s quantitative method’, *Bull. Hist. Med.*, 1962, 36: 462–7; p. 462, note 2, and G. K. Plochmann, ‘William Harvey and his methods’, *Studies in the Renaissance*, 1963, 10: 192–210; p. 192, note 1. At the same time, the modernness and presumed novelty of Harvey’s “quantitative method” were being cast into doubt. See F. G. Kilgour, ‘William Harvey’s use of the quantitative method’, *Yale J. Biol. Med.*, 1954, 26: 410–421; Owsei Temkin, ‘A Galenic model for quantitative physiological reasoning’, *Bull. Hist. Med.*, 1961, 35: 470–475, and especially, Jevons, cited above. Also at this time, the notion of quantification as a characteristic of science was undergoing a general critique that applies to Harvey. See Thomas S. Kuhn, ‘The function of measurement in modern physical

Harvey's account of his "Discovery"

Understandably, then, there was a tendency to read the passage under discussion in a manner consistent with his membership among the revolutionary quantifiers. For Chauncey Leake, the phrase became "For a long time I turned over in my mind *such questions as*, how much blood is transmitted . . .".⁵⁴ Franklin took this a step further with "I considered . . . and took correspondingly long *trying to assess* how much blood was transmitted",⁵⁵ while Whitteridge's "when I had for a great while turned over in my mind *these questions*, namely, how great was the abundance of the blood" hovers ambiguously between the interrogative implications of the Leake version and the clearly contemplative sense that I have argued for.⁵⁶

However, right in the "Sane" passage, Harvey gives us a list of experiences which he says gave rise to his contemplation of that abundance. He emphasizes his structural and vivisectional studies, but makes no specific mention of measuring amounts, something he was to bring up only in the following chapter.

The point of all this, of course, is to suggest that we have no right to suppose, on the strength of Harvey's account at this point, that the computations reported in chapter 9 led him to think of the circulation. On the contrary, his appreciation of the large amount of blood being transmitted by the heart in a unit of time seems to have been intuited, at least in part, from his new understanding of the heart's function, from his anatomical investigations of structure, from his eye-witness experience with vivisectioned animals, and, in particular, from his cutting of arteries.⁵⁷

Such an interpretation does not rule out, of course, that, at some point in his ruminations, Harvey looked more closely at the issue of quantity, perhaps looking at the various anatomical features of the heart with precisely the question of cardiac output in mind. And, of course, we know that, sooner or later, he did do his hypothetical calculations. But, all things considered, he does seem to be telling us that his perception of cardiac output, so large as to merit further investigations at this stage (possibly), and contemplation (certainly), *preceded* any kind of measurement or computation.

When we turn from these formal translations to the relatively recent, scholarly analysis of Harvey's work, though, the contemplation of a large amount emerges as the interpretation to be preferred.

science', *Isis*, 1961, 52: 161–93. Kuhn argued that, to have any meaning, the claim of quantification as a feature of science must at least involve measurement and the production of numbers.

⁵⁴ K25b, p. [70], italics added. Leake aimed at "a new translation in the language and spirit of our times . . . [using Willis as a 'pony,' . . .], (K25a, p. [135]). I am inclined to think that Willis served more as a draft horse. Leake goes on, "not possessing a copy of the first [Latin] edition, the basis of my translation was the . . . Longhine edition of 1697" (i.e., K13).

⁵⁵ K25c, p. [58], italics added. Franklin also starts the "Sane" passage, "In attempting to discover how much blood passes from the veins into the arteries I made dissections . . .," (p. [57]), for which there is simply no basis in the Latin. In a recent reprint of Franklin's translation (*William Harvey: the circulation of the blood and other writings*, trans. K. J. Franklin, with introduction by Andrew Wear, London, J. M. Dent, 1990, p. 45f.), Vivian Nutton has revised the "Sane" passage, giving it an interpretation that does not essentially differ from mine on most points.

⁵⁶ K25d, p. 75, italics added.

⁵⁷ In other words, it was quite likely what might be called a "guesstimate", of the sort we all make daily and carrying no special sense of "scientific method". Almost a century before Harvey, Vesalius seems to have had a similarly intuited sense of the large amount of blood flowing through the heart, based on anatomical

Jevons, for instance, argues that we ought not “to force [Harvey] into the mould of a nineteenth-century scientific hero, bent on measurement and calculation”.⁵⁸ The possibility, therefore, that Harvey intuited a great quantity of blood, before he had any serious thoughts of measuring the amount, would have been grist to Jevons’ mill. However, using Willis’s translation,⁵⁹ Jevons never mentions this stretch of chapter 8. As a result, his argument tends to downplay the role of quantity in Harvey’s thinking, altogether, and not just that of calculation, when quantity, measured or unmeasured, was clearly crucial.

On the other hand, Pagel, in 1967,⁶⁰ did take account of the passage in question, citing both the 1628 original and the Willis translation as his guides.⁶¹ Paraphrasing rather than translating, Pagel does not say whether Harvey’s sense of quantity was, at first, based on his anatomical and vivisectional observations or on computation. However, in a more elaborate interpretation in 1969, Pagel does make a non-computational reading almost explicit.⁶² He begins with the complaint that

one can find in translations of Harvey a tendency to help the reader to discover in Harvey’s text a sequence of events which would today be regarded as legitimate in the process of scientific invention and discovery.

and then goes on to say

In the original text matters will be found to look much less straightforward and easy. The discovery would . . . present itself as a “hunch” This *idea* occurred to Harvey through a *meditation on the quantity of blood* ejected by the heart in a unit of time, . . . : it was the point that touched off the idea of the circulation in his mind. (p. 2. Italics in the original.)

Then comes a very detailed analysis of the “Sane” passage. In that “long and involved sentence” Harvey is telling us that his meditation

took the form of a rough estimate of the quantity of blood presumably passing the heart in a unit of time. This estimate was indeed based on anatomical and experimental knowledge relating to the *purpose* of the structures examined,⁶³

investigations, though, of course, without leading him to the same conclusion. See J. J. Bylebyl, “Cardiovascular physiology in the sixteenth and early seventeenth centuries”, Ph.D. Dissertation, Yale University, 1969, pp. 226–30.

⁵⁸ Jevons, *op. cit.*, note 53, above, p. 467.

⁵⁹ *Ibid.*, p. 462, n. 4.

⁶⁰ Walter Pagel, *William Harvey’s biological ideas: selected aspects and historical background*, New York, S. Karger, 1967, p. 53f.

⁶¹ Pagel, in *ibid.*, note 2b, p. 17, says Willis is “in not a few places, inaccurate”, and that, in using him, he did so only “after careful collation with the original Latin text”. Later, in his “William Harvey revisited”, Pt. I, *Hist.Sci.*, 1969, 8: 1–31; pp. 2 & 4, Pagel explicitly criticized Willis’s translation of the passage we are dealing with, though not with respect to the precise point under discussion here.

⁶² *Ibid.*, pp. 2–5.

⁶³ *Ibid.*, p. 3. Italics in the original. Then follows Pagel’s extended criticism of Willis, mentioned above. In his *New light on William Harvey*, Basel, S. Karger, 1976, much of Pagel’s 1969 paper, including the passages discussed here, is repeated, verbatim.

Harvey's account of his "Discovery"

Next we come to Bylebyl's entry on Harvey in the *Dictionary of scientific biography*, where Pagel's new reading appears to be reflected, but ambiguously so. On the one hand, Bylebyl tells us that

one of the consequences of Harvey's new view of the movement of the heart was that the amount of blood transmitted from the vena cava to the aorta at each beat had to be fairly large. It was to be some time before Harvey saw the full implications of so large a rate of transmission, but by 1616 it seems already to have indirectly weakened his adherence to Galen's doctrines on the veins.⁶⁴

But when Bylebyl comes to deal specifically with the stretch of text under discussion, what he says continues to have a whiff of the Willisian.

Harvey's statement in *De motu cordis* indicates that something aroused his interest in the question of how much blood the heart transmits from the veins to the arteries and led him to undertake a searching reexamination of the action of the heart with this specific question in mind.

Immediately after these comments, Bylebyl also renders the relevant text ambiguously, "I often and seriously considered, and pondered at great length, how large would be the amount . . .".⁶⁵

Five years later, Bylebyl returned once again to the issue of Harvey and quantification, greatly enlarging our understanding, not only of the context in which Harvey was doing his own thinking, but also that in which his contemporaries and predecessors had had somewhat similar thoughts.⁶⁶ In the course of that discussion, Bylebyl deals only briefly with the passage in question (p. 373).

But it is in an outstanding analysis, two years later, that Bylebyl gives us a really detailed interpretation of the vexing "Sane" passage. His translation does not materially differ from what it was in 1972, but the Willisian-oriented comments are gone, and in their place is a most careful reconstruction of the sequence of Harvey's thought, as Harvey has reported it to us in these opening lines of chapter 8.⁶⁷

It was Bylebyl who pointed out that the "Sane" passage also needs to be understood in the context of the chapter title and the opening sentences that precede it, because they make clear that the issue of the large quantity was uppermost in Harvey's mind. In fact, that is why I included the title and the whole of the first two paragraphs in this discussion.

⁶⁴ J. J. Bylebyl, 'William Harvey', in *Dictionary of scientific biography*, ed. by C. C. Gillespie, New York, Scribners, vol. 6, 1972, pp. 150–62; p. 154.

⁶⁵ *Ibid.*, p. 155.

⁶⁶ J. J. Bylebyl, "Nutrition, quantification, and circulation", *Bull. Hist. Med.*, 1977, 51: 369–85.

⁶⁷ Bylebyl, *op. cit.*, note 14, above, pp. 73–83. The translated passage is on p. 76. The probably non-computational basis for Harvey's impression that there was a large amount of blood being transferred through the heart is spelled out on p. 77f. See also his notes 221 and 230, p. 99; and 241, p. 100. Bylebyl does not claim (as I am not claiming) that we know *for a fact* that Harvey did not perform calculations prior to hitting upon the idea of the circulation. Rather, a close reading of the text, placed in the wider context that Bylebyl has now provided, does not justify those formal translations that imply that Harvey did. Apart from some slight changes, meant to heighten the non-computational interpretation, my translation does not differ essentially from Bylebyl's, and is obviously indebted to both Pagel's and Bylebyl's research, and to their renderings of this difficult stretch of Latin text.

The second feature of the Willis translation to which I want to draw attention highlights a problem that has plagued all translators arising out of an unresolvable difficulty with the Latin original: the lack of a main verb in the “Sane” passage, before the paragraph break and the verb “coepi”.⁶⁸

There are two candidates for the job, each with attendant reasons why it does not qualify. By its placing, context, and semantics, “animadverterim” would seem the most likely. But grammatically, the subjunctive mood subordinates it, as it does “considerassem” and “evolvissem” to “cum” near the very beginning of the sentence. If it were the main verb, it would be “animadverti”, in the indicative mood. It is difficult to argue that this is merely a typographical error or the misreading of Harvey’s difficult hand.

Alternatively, “coepi” is in the indicative mood and can be recruited for this function without creating nonsense. The problem, obviously, is that it is separated from the earlier part of the “Sane” passage by a paragraph break, suggesting, on the face of it at least, that this was not Harvey’s intention.

Different translators have used different solutions. Since Wood had changed “animadverterim” to animadverti” in K7 (see Appendix), the first English translation (K19) treated it as the main verb and maintained the paragraph break at “I began”. Franklin (K25c) also chose this solution to the verb problem, but, because he was likely guided by the 1766 Latin text (K47), followed it in eliminating the paragraph break that follows.⁶⁹

Conversely, Willis (K48), like Leake (K25a) and Whitteridge (K25d) after him, preferred (as I have also preferred), to use “coepi” as the main verb and to eliminate the paragraph break.

One’s decision is unavoidably arbitrary. Did Harvey mean to write “animadverti”? Did he mean “animadverterim” but thought there was a main verb somewhere else in that long, convoluted sentence? Or did he not make a paragraph break at “coepi”, the editor choosing to do so on his own, in order to break up the otherwise horrendously long and tangled opening paragraph of the chapter? In all probability we will never know.

Fortunately, none of these solutions needs to affect our understanding of the sequence of Harvey’s thought. But the grammatically more correct solution, the one that eliminates the paragraph break, the one that I have chosen to use here, does run the risk of obscuring the final step in Harvey’s thinking, simply because we now take the circulation so much for granted.

Without the paragraph break, the idea that the blood flows in a circle follows immediately and directly from Harvey’s conclusion that the blood must go back from the arteries into the veins and back to the right side of the heart. And once the circle metaphor has been used, it is difficult to conceive of the movement of the blood in any

⁶⁸ See also the discussion of this by Whitteridge, *op. cit.*, note 2, above, p. xliii.

⁶⁹ Franklin also chose to ignore the fact that “animadverterim”, in the perfect tense, conveys a time more recent than “considerassem” and “evolvissem” in the pluperfect, presumably because it is just as possible that Harvey mistakenly used the perfect for the pluperfect, as that he used the subjunctive when he meant the indicative. Nutton (see above, note 55) has followed Franklin in this regard.

Harvey's account of his "Discovery"

other way. Like an automatic corollary, the one idea seems irresistibly and immediately to entail the other.

But that is precisely what makes the 1628 text, and its paragraph break at this point, so fascinating. It draws our attention to the fact that Harvey clearly describes the circle metaphor as a step that occurred *after* he had decided that the blood must come back through the veins, and only as a possibility. Listen to him again.

I began privately to think that it *might* rather have a certain movement, *as it were*, in a circle, which I *afterwards* found to be true,⁷⁰

The idea of venous blood returning to the heart did not automatically convert, with compelling logic, into the notion of a circle. That latter idea was at first only tentatively entertained. The obverse is also interesting: Harvey's quantitative hunch led to the idea that the flow of venous blood is towards the heart, independently of the idea of a circular motion.

Bylebyl has captured this very precisely.

It is interesting that Harvey should distinguish two chief moments in the early development of his thought: his initial surmise of return venous flow as a solution to the quantitative problem and the later idea of a quasi-circular movement of the blood. To judge from his statement, it was only when he began to think of the movement of the blood precisely as circular that he was fully aware of having made an important new discovery; in other words, it appears that the metaphor of the circle played a significant role in enabling him to see through the complexity of his observations to a clear and simple conception of the movement of the blood. This is not to suggest that Harvey was looking for a circular pattern before he began thinking of venous return, but that at an early stage thereafter the possibility of a constant circular motion occurred to him and then served as the leading idea in the further clarification of his thought.⁷¹

All of this is not to claim that we can know, with complete confidence, that that was the exact sequence of Harvey's thought. After all, he wrote this account sometime after, maybe long after, the actual events. Even he may not have known with such accuracy the precise sequence of his thoughts and actions. But it is interesting that he has articulated a clear separation between the notion of venous return and the idea of a circle (paragraph break or no), despite an interval between his original thoughts and his report of them, and despite the almost irresistible connection between the blood's movement in the veins and the notion of the circulation, *once it had been thought of*.

The examination of a passage two paragraphs long does not warrant the drawing of conclusions about translations of a whole book, which are always the products of long and arduous labour. All scholars are grateful for the translations we have and will continue to find them helpful, when used alongside the Latin original. However, my story is a cautionary tale. It does suggest that, after more than three and a half

⁷⁰ Italics added. Does the fact that Harvey began this with a tag from Terence (see above, note 8) faintly convey his own sense of the drama of the moment?

⁷¹ Bylebyl, *op. cit.*, note 64, above, p. 156. In *op. cit.*, note 14, above, pp. 73–90, Bylebyl works out the implications of all this in great detail.

centuries, we could still use an improved English translation of what is commonly acknowledged to be the most famous work in the whole history of modern medical science. Such a work would balance an unavoidable reliance on previous efforts at translation with an equal concern for the emended 1628 edition, and the fine scholarship that has characterized Harvey studies in the past two decades or so.

Meanwhile, I can summarize what that scholarship has found out through the careful rendering of these two(?) fascinating if treacherous paragraphs.

During his anatomical and vivisectional investigations, designed to clarify the movement and use of the heart and arteries,⁷² the new answers to these ancient questions that Harvey came to, plus his hands-on experience, impressed upon him that the amount of blood traversing the heart from the vena cava to the aorta, and the rapidity of that transfer, must be very great. As he thought long and hard about this, he realized that the amount must be so great as to create problems: the juice from the ingested food could not keep the veins full, on the one hand, and the arteries could not continue to receive so much blood without rupturing, on the other. The only way he could think to resolve these new problems was to posit the return of the arterial blood, via the veins, to the heart.⁷³

This line of reasoning brought Harvey to the thought that the blood might move in a circle. Having thus come upon a radically new concept, Harvey set about to “demonstrate the truth of it”.⁷⁴ On the basis of some (largely hypothetical) calculations and further, simple experiments, which he tells us about in succeeding chapters, he did indeed find it to be the case that the blood going out from the aorta moves in a systemic loop, as it were, analogous to the pulmonary loop that had already been established by Colombo, and again by Harvey in chapter 7, immediately preceding the passage I have been talking about.

APPENDIX

In the 1648 rendition (following a period instead of a colon), part of the “Sane” passage reads as follows:

Sane cum, copia quanta fuerit, saepius mecum et serio considerassem; tum ex vivorum . . . ; tum ex aliis multis: et cum animo diutius evolvissem, quanta scilicet esset copia transmissi sanguinis; quam brevi tempore ea transmissio fieret; anne suppeditare ingenti alimenti succus eam posset: animadverti tandem, venas inanitas . . . et arterias . . . disruptas fore; nisi sanguis aliqua via . . . (K7, p. 101f. There are also changes in punctuation in the parts omitted here.)

There are several, subtle effects from these changes to be noticed. Separating the “considerassem” phrase from that containing “evolvissem” has no effect on the

⁷² J. J. Bylebyl, ‘The growth of Harvey’s *De Motu Cordis*’, *Bull. Hist. Med.*, 1973, 47: 427–70.

⁷³ The claim that Harvey came to the notion of the circulation through his appreciation of the function of the valves in the veins has been convincingly refuted. See J. J. Bylebyl, Boyle and Harvey on the valves in the veins, *Bull. Hist. Med.*, 1982, 56: 351–67.

⁷⁴ Mindful of the argument about Harvey’s methodology, as advanced by Wear, op. cit., note 18, above, I have used this expression to capture how Harvey seems to have understood what he was doing. I have used quotation marks, though, because it is not how we, today, would likely characterize what he did. Quotation marks around “discovery” in the title of this paper were similarly motivated.

Harvey's account of his "Discovery"

meaning, but is also of doubtful help in making the passage more readily intelligible. Nor can we give too much weight to the changes in punctuation, given the cavalier approach of publishers of the day to punctuation in general. But what is of potential interest is that different clauses have become dependent on different verbs, implying a slight change in the sequence of Harvey's original thoughts.

In 1628, the two, pluperfect verbs, "considerassem" and "evolvissem" governed the early "copia" clause and its later amplifications regarding the amount and rate of flow, as well as the long row of clauses listing the evidential basis for Harvey's thoughts about quantity. "Animadverterim", in turn, governs the "succum" infinitive clause and its subordinate clause with "haberemus".

In the 1648 version, however, mostly by virtue of their placement, "considerassem" is now more closely connected with the first "copia" clause, along with the evidential ones, while "evolvissem" is more connected to the clauses that amplify "copia". But "evolvissem" also now governs the "succus" clause (which has been converted into the subjunctive mood), while "animadverte" (in the indicative rather than subjunctive mood) is now tied more directly to an infinitive (rather than subjunctive) clause about the emptying veins and bursting arteries. And "tandem" has been added.

Thus, the 1648 version was translated in 1653 as follows:

Truly when I had often and seriously considered with myself, what great abundance there was, both . . . and from many other things; and when I had a long time considered with myself how great abundance of blood was passed through, and in how short a time that transmission was done, whether or no the juice of the nourishment which we receive could furnish this or no: at last I perceived that the *veins* should be emptied, . . . and the *arteries* . . . burst with too much intrusion of blood, unless the blood . . . by some way . . . (K19, p. 44f. Italics in the original.)

In the light of all that has been said about it, the conversion of "animadverterim" to "animadverte" is understandable. But why all the other changes? One cannot escape the feeling that they were largely intended to correct that slight elision in Harvey's thought, whereby an inadequate supply of fluid intake was illogically connected to bursting arteries. Conversely, this editorial intervention does not look much like a serious effort to revise the sequence of Harvey's original ideas, even though, in the course of the emendation, that is what happened.

On the other hand, even though far more liberties have been taken with this text than an editor would dare take today, they still exhibit some sense of constraint, an obligation to work within the general framework of the existing text. Had Harvey had anything to do with it, as author he would surely have just rewritten the whole passage.

Moreover, this is not the only example of an alteration to Harvey's thought. In the first paragraph another instance offers us further insight into the editor's practices.

The Rotterdam text changes "... de quibus, forsan sunt aliqui, qui, antea aut Galeni..." (K1 p. 41) to "... quorum forsan aliquibus qui antea sunt aut Galeni..." (K7 p. 80). This awkward revision has the effect of saying that people would agree with Harvey, on the authority of Galen, etc., but that they would agree only about some of what has already been said. In other words, there is a slight

change in meaning. When the Rotterdam text went through two more versions, this phrase was successively revised. In 1654, it reads “quorum forsā aliquis, qui antea sunt Galeni” (K8, p. 80), and in 1660 it becomes “quibus forsā aliqui, qui antea sunt aut Galeni” (K9 p. 80). In other words, it returns essentially to both the meaning and the wording of the 1628 text!

In conclusion, the internal evidence is irresistible that most of these changes are pedantically motivated, and not an indication of Harvey’s desire to bring out a new edition.