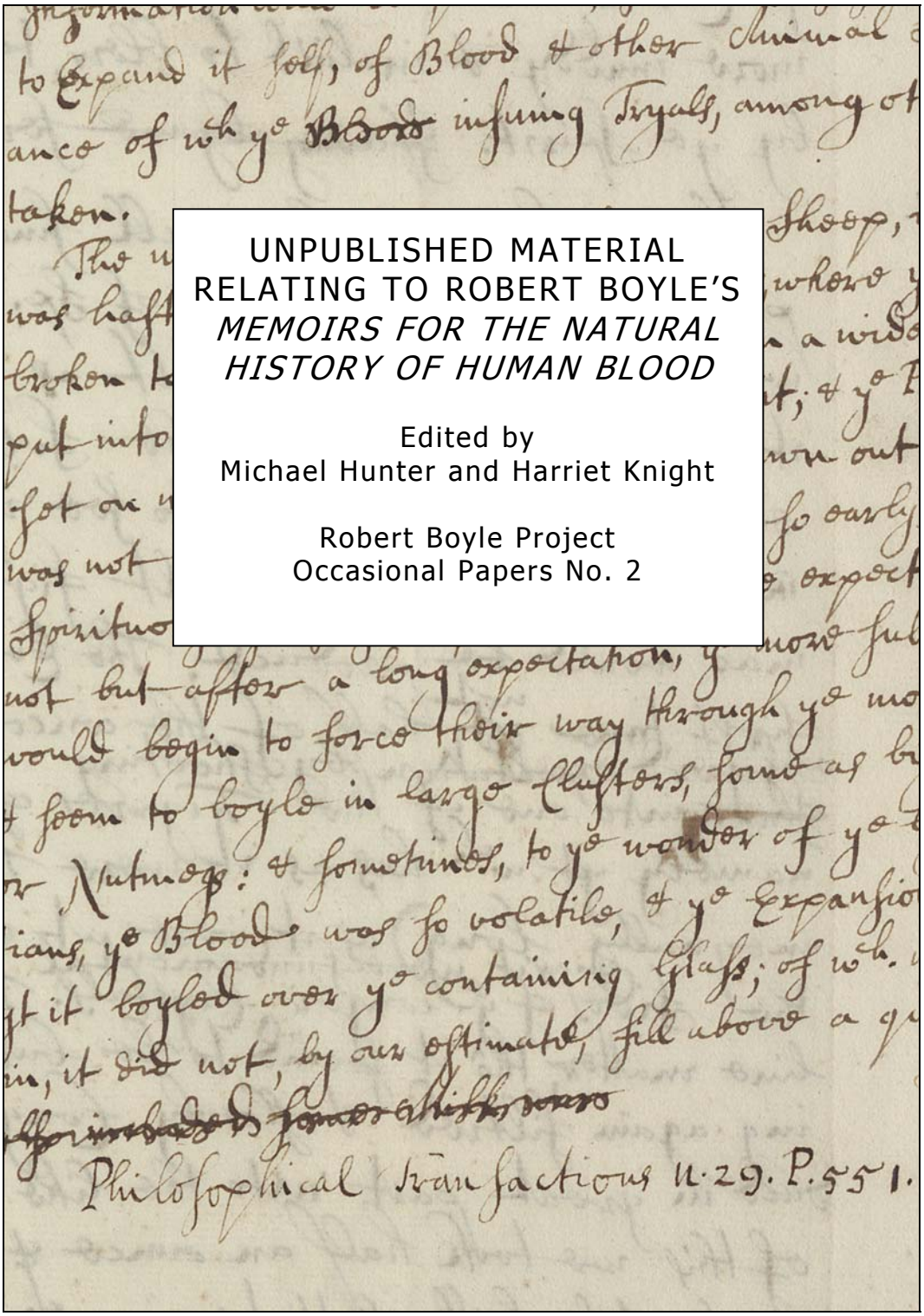


UNPUBLISHED MATERIAL RELATING TO ROBERT BOYLE'S *MEMOIRS FOR THE NATURAL HISTORY OF HUMAN BLOOD*

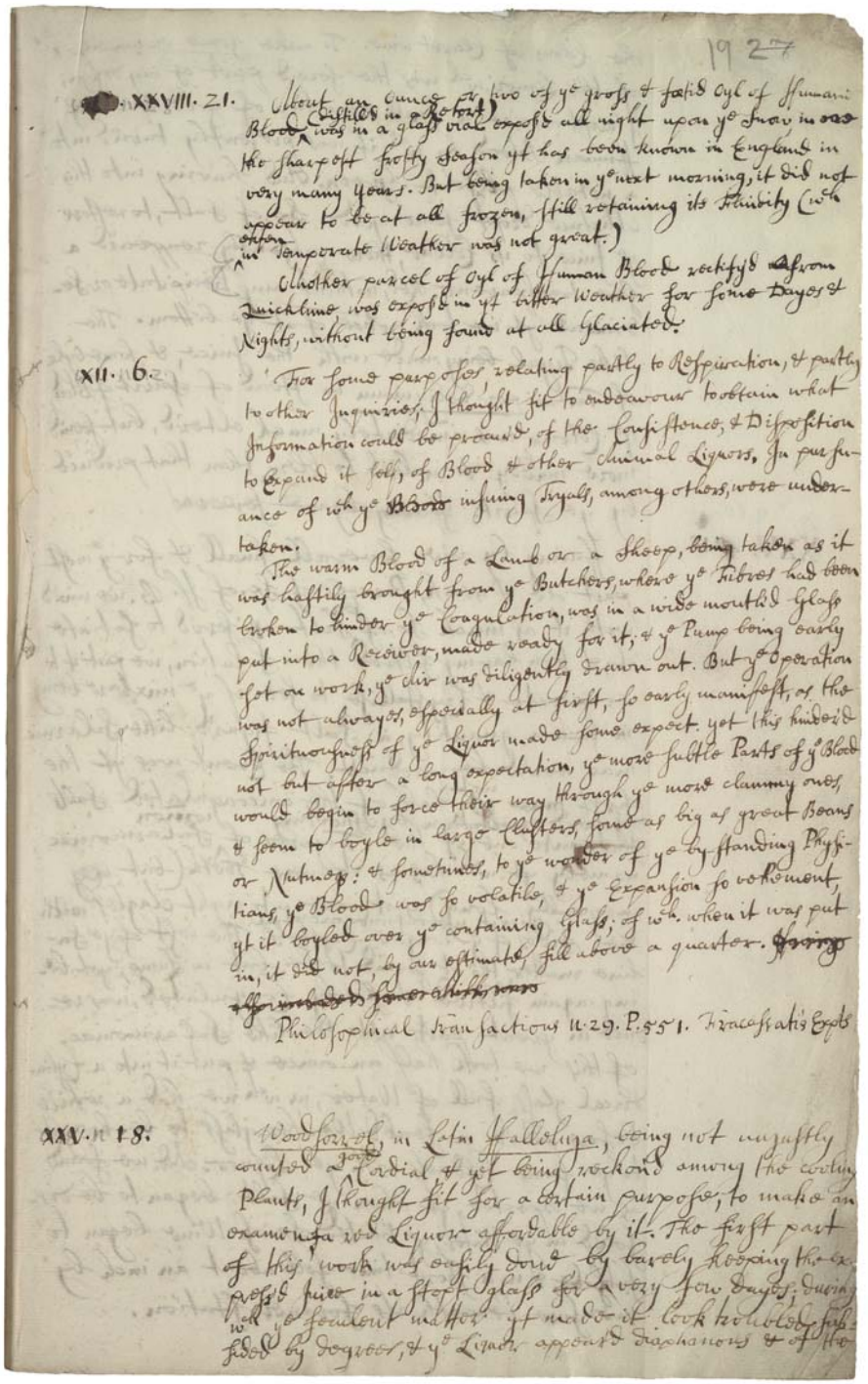
Edited by
Michael Hunter and Harriet Knight

Robert Boyle Project
Occasional Papers No. 2

Unpublished Material relating to Robert Boyle's *Memoirs for the Natural History of Human Blood*

A significant number of manuscripts survive relating to Robert Boyle's *Memoirs for the Natural History of Human Blood* (1684). From them, important conclusions can be drawn about the history of the work and about Boyle's intellectual method more generally. It transpires that, within months of the book's publication, Boyle began work on a revised edition in which he sought to rectify the shortcomings of the published book. The extensive surviving materials relating to this planned but unpublished second edition are presented for the first time here.

The editors are Michael Hunter, Professor of History at Birkbeck, University of London, and Director of the Robert Boyle Project, and Harriet Knight, Postdoctoral Research Fellow at the AHRC Centre for Editing Lives and Letters, Queen Mary, University of London.



1927

XXVIII. 21. About an Ounce & two of ye gross & fatid Oyl of Human Blood (distilled in a Retort) was in a glass vial exposd all night upon ye snow in the sharpest frosty Season yt has been known in England in very many years. But being taken in ye next morning, it did not appear to be at all frozen, still retaining its fluidity (with other in Temperate Weather was not great.)

Another parcel of Oyl of Human Blood rectifyd from Quicklime was exposd in yt bitter Weather for some Dayes & Nights, without being found at all Glaciated.

XII. 6. For some purposes relating partly to Respiration, & partly to other Inquiries, I thought fit to endeavour to obtain what Information could be procurd, of the Consistence, & Disposition to Expand it self, of the Blood & other Animal Liquors. In pursuance of wch ye Ensuing Tryals, among others, were undertaken.

The warm Blood of a Lamb or a Sheep, being taken as it was swiftly brought from ye Butchers, where ye Entrails had been broken to hinder ye Coagulation, was in a wide mouthd Glass put into a Receiver, made ready for it, & ye Pump being easily set at work, ye Air was diligently drawn out. But ye Operation was not always, especially at first, so easily manifest, as the Spirituousness of ye Liquor made some expect. yet this hinderd not but after a long expectation, ye more subtile Parts of ye Blood would begin to force their way through ye more clammy ones, & seem to boyle in large Clusters, some as big as great Beans or Nutmegs: & sometimes, to ye wonder of ye by standing Physitians, ye Blood was so volatile, & ye Expansion so vehement, yt it boyled over ye containing Glass; of wch. when it was put in, it did not, by our estimate, fill above a quarter.

Philosophical Transactions N. 29. P. 551. Tracts of Expts

XXV. 18. Woodsorrel, in Latin Hallelujah, being not unjustly counted a Cordial & yet being reckond among the cooling Plants, I thought fit for a certain purpose, to make an Examen wch Liquor affordable by it. The first part of this work was easily done by barely keeping the expressd juice in a stopt Glass for a very few Dayes; during wch ye feculent matter yt made it look turbid, subsided by degrees, & ye Liquor appeard diaphanous & of the

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Contents

Introduction

This edition presents the principal extant manuscripts relating to Robert Boyle's research into human blood.[1] These are taken from among the Boyle Papers at the Royal Society, with one ancillary item from the Locke Papers in the Bodleian Library. Together they document the extent of Boyle's research into the topic, crucially supplementing the understanding of it which can be gained from considering Boyle's printed *Memoirs for the Natural History of Human Blood* (1684) in isolation. Beyond illuminating his work on blood in particular, these papers also offer general insights into Boyle's research methods and habits of work.

Boyle's one published work on blood, which will hereinafter be referred to as *Human Blood*, has had a mixed reception. It was praised by Boyle's bibliographer John Fulton as 'the most important of Boyle's medical writings' and 'the beginning of physiological chemistry',[2] but its general reception has been less complimentary. A. Rupert Hall showed that many of Boyle's findings had been published by others before the book appeared in 1684, and criticised Boyle for failing to present a systematic treatise and to draw out the conclusions from his results.[3] The most recent, and most sustained, study of Boyle's work on blood, by Johannes Büttner, also presents it as an untimely publication, outdated at the moment of its publication, isolated from contemporary research and not worked into a systematic framework.[4]

The editors of this Occasional Paper have recently provided a detailed narrative of the pre- and post-publication history of Boyle's research into blood, arguing that the printed record must be supplemented by the extensive surviving archival materials if this work is to be fully understood.[5] Boyle carried out the research which he published in 1684 decades earlier; moreover, he began work to improve the printed text within months of its publication. Rather than being regarded by Boyle as his definitive statement on the topic, his printed work on blood appears to have stimulated him to further research. The Boyle Papers contain prefatory matter and collected materials for an extended second edition of *Human Blood*. As well as altering understanding of Boyle's research into blood, these documents provide crucial evidence of Boyle's working methods and attitudes to print. This Occasional Paper supplements the article by Knight and Hunter by providing a text of the archival materials on which it is based.

The materials presented here illustrate the long period over which Boyle worked on blood. Boyle alludes to the first phase of his interest in the preface to the printed work, where he claimed that 'many years ago' he 'did particularly draw up a set of Enquiries,

[1] We have ignored material relating directly to the text of Boyle's published *Human Blood*. This is tabulated in full in *Works*, vol. 10, pp. xii-xv, and variant readings are noted in the text of the book in ibid., pp. 3-101.

[2] John F. Fulton, *A Bibliography of the Honourable Robert Boyle*, 2nd edn. (Oxford, 1961), p. 99.

[3] A. Rupert Hall, 'Medicine and the Royal Society', in A. G. Debus (ed.), *Medicine in Seventeenth-century England* (Berkeley and Los Angeles, 1974), pp. 421-51 (pp. 447-50).

[4] Johannes Büttner, 'Die Physikalische und Chemische Untersuchung von Blut im 17 und 18 Jahrhundert: Zur Beteutung von Robert Boyle's "Memoirs for the Natural History of Human Blood" (1684)', *Medizin Historisches Journal,* 22 (1987), 185-96.

[5] See Harriet Knight and Michael Hunter, 'Robert Boyle's *Memoirs for the Natural History of Human Blood* (1684): Print, Manuscript and the Impact of Baconianism in Seventeenth-century Medical Science', *Medical History*, forthcoming.

and make divers Experiments in reference to the Blood'.[6] In the 1660s Boyle is known to have collaborated in the Oxford research programme of Willis, Lower, Needham, Locke and others,[7] and, while no copy of the 1660s list of heads survives in the Boyle Papers, a notebook used by John Locke in the mid 1660s contains a list which relates to the version Boyle printed and to later versions found in the Boyle Papers. Material also survives from the early 1680s, when it was presumably produced as part of Boyle's preparation for the printed edition. Perhaps most interestingly, copious materials which post-date the printed work also survive: these date from within months of the publication to 1691, the year of Boyle's death.

There are various types of surviving material, each of which offers insights into Boyle's intellectual methods. A preface designed for the second edition provides a context for the revisions, claiming that Boyle had been stimulated to them by the positive reception the work printed 'about 2 years ago' had received in general, and in particular by the response of the Italian physician Marcello Malpighi. It also describes the dual form which Boyle's revisions have taken: he is said to have both 'enlarge[d] the Sett of titles', and used these to categorise additional experimental accounts which he found 'disperst here & there in a *Chaos* of my own Experiments' (below, pp. 1–2). Further documents give details of the type of experiments which Boyle intended to include in the new edition (p. 3), and offer a rationale for expanding the list of heads (p. 2).

Boyle's account of his revisions to his printed work is verified by the surviving documents. One key component of these comprises accounts of experiments and observations made on blood, together with extracts copied from printed books on the topic, supplementing those in the 1684 edition. Boyle's attempt to classify these according to his titles is evident in the marginal endorsements which key these entries to particular heads.[8] A substantial subset of these bear a double endorsement to the list of heads as printed (using arabic numerals), and to the later extended list (using roman numerals), illustrating the complexities which revision to the heads entailed. There is also evidence of Boyle recopying experiments collected in miscellaneous workdiaries into sequences relating exclusively to blood.

Lists of 'heads' constitute the other type of surviving document; Boyle presented the dissemination of such heads as a crucial function ('perhaps... the usefullest part') of the printed work.[9] The earliest dates from the 1660s (doc. c, pp. 19–20), and two further surviving versions relate to but predate the printed edition (docs d–e, pp. 20–3). There are various manuscript copies of the list as printed which are not included here: BP 18, fols 42 and 54 are copies of the primary heads in Bacon and Emes' hands respectively; there are copies of the secondary heads at BP 18, fol. 41, in Bacon's hand, and fol. 55v in Emes' hand; BP 18, fols 58–9, comprise copies of the heads concerning urine as

[6] *Works*, vol. 10, pp. 5-6.

[7] On research into blood in this period see esp. Robert G. Frank Jr., *Harvey and the Oxford Physiologists: Scientific Ideas and Social Interaction* (Berkeley and Los Angeles, 1980).

[8] For more information on Boyle's attempts to classify his papers, see Harriet Knight, 'Organising Natural Knowledge in the Seventeenth Century: the Works of Robert Boyle', University of London Ph.D. thesis, 2004, chapter 2.

[9] *Works*, vol. 10, p. 6. For the printed lists see ibid. pp. 12-13, 40-1. On Boyle's use of 'heads' more generally see Michael Hunter, 'Robert Boyle and the Early Royal Society: a Reciprocal Exchange in the Making of Baconian Science', *British Journal for the History of Science*, forthcoming. For further context, see Michael Hunter (ed.), *Robert Boyle's 'Heads' and 'Inquiries',* Robert Boyle Project Occasional Papers No. 1 (2005).

printed. BP 18, fol. 53, in Bacon's hand, gives the list of primary heads as printed but with one addition: 'the motion of Human Blood especially that call'd circulation'.

Revising and extending the heads was evidently a central aspect of the improvements Boyle made to *Human Blood* after 1684; indeed he had called for such revisions within the published work.[10] The printed edition had presented thirty heads for investigation; after 1684 Boyle extended this list to a version with three preliminary and forty-two other titles. One document (doc. g, pp. 25–8) shows the process of this expansion. An analysis of those heads which are added in the fuller 'second edition' list reveals Boyle responding to research carried out by others in the 1670s which he had omitted from *Human Blood*, and to the demands of readers like Malpighi, as well as to the direction of his own research agenda.[11] In order to help readers to trace the development of these heads, we have appended to the transcriptions a table collating the main versions. We have also included a transcription of the text of Boyle's 'heads' concerning the Gall (doc. j, p. 32).

In the brief introduction to each document which follows, a standard format has been deployed: the title is followed by information on the source, on handwriting and date, and on the physical characteristics of the document. There is then a more discursive note on the document, including information on previous publication where appropriate. The lists of heads (docs c–h) have been placed in a putative chronological order.

a. Introductory remarks to Boyle's planned second edition of *Memoirs for the Natural History of Human Blood*, pp. 1–3

BP 18, fols 11–14, with ancillary material in BP 19 and MS 185. In the text below, these are presented in an undivided sequence, but they comprise the following components:

(i) BP 18, fol. 11. Hand: Smith. Date: 1680s. Written on a single leaf, with the verso blank. In the left margin, adjacent the first lines, is written in pencil: '[The] Appendix about human blood'. Throughout this text, many words have been capitalised after it was originally written to add emphasis. It has not seemed appropriate to provide a piecemeal record of these alterations in the text.[12] However, other emendations have been recorded in full, including 'since' from 'sence', which was evidently misheard by the amanuensis to whom Boyle was dictating and which possibly provides a clue to Boyle's pronunciation. A draft version, also in Smith's hand, survives in one of Boyle's notebooks, Royal Society MS 185, fols 15–16. This has been collated with the text in BP 18, and substantive differences noted in footnotes.

(ii) BP 18, fol. 12. Hand: Bacon. Date: 1680s. Written on a single leaf, with the verso blank. A further copy of this text, and of that on fols 13–14 as far as

[10] *Works*, vol. 10, p. 10. The archival research undertaken on the papers relating to blood has necessitated revisions to the account published in *Works,* vol. 10, p. xi-xv, in which Hunter and Davis mistakenly presumed that all of the lists of heads predated the printed version.
[11] For a full account of the significance of the new heads see Knight and Hunter, op. cit.
[12] They are as follows: 'Memoires', 'History', 'Humane', 'Abilitys', 'Profession' and 'Sound' in the first sentence; 'Essay' and 'Imperfections' in the second; 'Enlargements' in the third; 'Remarks' and 'Experiments' in the fourth; and 'Experiments', 'Subject', 'Humane', Blood' and 'Additions' in the fifth.

'Margent', appears in BP 19, fol. 194, a quarto bifoliate in Greg's hand, the other leaf of which (fol. 195) has manuscript versions of two passages in *Porosity*.[13] It is endorsed 'Tbd' and crossed through. Verbal differences between the two versions are recorded in the notes.

(iii) BP 18, fol. 13. Hand: Bacon. Date: 1680s. Written on a single leaf, with the verso blank. A duplicate version in the same format appears on fol. 14. Hand: Greg. Endorsed: 'Tbd'.

These texts set out the rationale of the intended second edition, and explain some details about its method. On fol. 11, Malpighi is identified as having stimulated the production of the new edition (see above). The context of the distinction on fol. 13 of '*Direct*' from '*Succedaneous*' experiments is provided in the postscript to the printed book, which had called for the Appendix to be increased by '*Succedaneous Experiments*' to be performed on animal blood 'in such Cases and Circumstances, wherein the Blood of Men, either cannot be had, or ought not be procured'.[14]

b. Boyle's material for his planned second edition of *Memoirs for the Natural History of Human Blood*, pp. 3–18

BP 18, fols 15–40, with ancillary material in MS 198 and Boyle's workdiaries. In the text below, these are presented in a continuous sequence, but within them, the components are as follows:

(i) Fol. 15. Hand: Greg. Date: 1680s. This is a title-page, with the title in the hand of Greg at the top and the remainder of the page (and its verso) blank.

(ii) Fols 16–17. Hand: Bacon, with corrections by Greg. Date: 1680s. This comprises a bifoliate with a list of 'Design'd Experiments for the History of Human Blood' written in the left column of fol. 16r, and then in the right-hand columns of fols 16v–17r, in each case occupying only half the width of the page, the rest of which is blank.

(iii) Fol. 18. Hand: Bacon, with corrections by Greg. Date: 1680s. This comprises two pasted-in slips of paper comprising accounts of experiments. The second is a copy of entry 205 in workdiary 21 (where there are two ancillary entries which do not appear here).[15] 'Blood 2.' is written in pencil in the left margin adjacent to the first extract, and '06', '205' and 'Expt with [spirit] of Blood' is written, also in pencil, in the left margin of the second.

(iv) Fols 19–20. Hand: Greg. Date: 1680s. This comprises two leaves with text on both recto and verso. It contains copies of various experiments, observations and more reflective passages concerning human blood. At this point, the entries start to be annotated with references to the various lists of 'titles' already discussed, often in the margin. We have included these at the start of each entry, noting their location (and any emendations to them) in footnotes.

[13] See *Works*, vol. 10, p. xxi.
[14] *Works,* vol. 10, p. 96.
[15] See www.livesandletters.ac.uk/wd.

(v) Fols 21–40. Hands: Fol. 21: Bacon, with endorsements by Greg. Fol. 22: Greg. Fols 23–30: Bacon. Fols 31–2: Greg. Fols 33–40: Bacon, with corrections by Greg on fols 33–4, 37 and 39, and endorsements by him on fols 34–5. Date: 1680s.

This comprises a series of leaves with text on the recto only. They are linked together by their annotation with references to the 'titles' noted above, and in some cases (fols 24–5, 27–30, 33–4 and 38–9) by catchwords. They comprise transcripts of self-contained passages of text, often occupying only part of the page and leaving the lower part of the page blank. Fols 21–6, 35–7 and 40 are single leaves; fols 27–8, 29–30, 33–4 and 38–9 are bifoliates, and in the case of fols 33–4, one entry actually continues across the page break. From the evidence of catchwords, it is clear that the order in which fols 24–30 are currently bound is incorrect, and that they should appear in the order 25–6, 24, 27–8, 30, 29; they are therefore presented thus below. Endorsements are noted piecemeal.

The extracts describe various experiments and observations on human blood, and there is some overlap between them. For instance the third experiment on fol. 21 is similar to the first on fol. 30. For another, vaguer account of the part of the experiment relating to copper described on fol. 22, see fol. 29 (in both cases numbered '22'). The second of the experiments on fol. 24 is repeated on fol. 27, where it is numbered '38'.

The two entries on fol. 35 also appear in one of Boyle's notebooks, Royal Society MS 198, fols 104v–5. Hand: Greg. Date: c. 1680. Endorsed: 'Tbd'. Verbal differences between the two versions are recorded in the notes.

Boyle's sets of 'Heads'

c. 'Tryall about the bloud espetially humane', pp. 19–20

Bodleian Library, MS Locke f. 19, pp. 272–3, 302–3. Hand: John Locke.
Date: 1665–7.

This list appears in a notebook used by Locke between 1662 and 1669; the entry itself dates either from autumn 1665 or from between March 1666 and March 1667.[16] Page 272 is endorsed 'Sanguis q' to denote that these are queries about blood; p. 273 is endorsed 'Sanguis', and has a note '302' at the base of the page to direct the reader to the further notes on blood on p. 302; as part of the same system, p. 302 is annotated 'Sanguis' and with the page number '273'.[17]

In the 1660s Boyle carried out extensive research into blood with John Locke and others in Oxford; the preface to his *Memoirs for the Natural History of Human Blood* (1684) refers to 'a set of Enquiries' on blood which Boyle had drawn up and circulated in the 1660s.[18] This has not survived in the Boyle Papers, but presumably relates to this list in Locke's hand. Locke and Boyle's collaboration and this notebook are discussed in Kenneth Dewhurst, 'Locke's Contribution to Boyle's Researches on the Air and on Human Blood' *Notes and Records of the Royal Society*, 17 (1962), 198–206 (pp. 201–3), where Dewhurst publishes a plate of pp. 272–3 of the manuscript as plate 12.

[16] We are grateful to John Milton for his advice in this point.
[17] On Locke's systems of annotation see Richard Yeo, 'John Locke's "New Method" of Commonplacing: Managing Memory and Information' *Eighteenth-Century Thought,* 2 (2004), 1-38.
[18] *Works*, vol. 10, p. 6.

d. 'Heads of the History of human blood', pp. 20–21

BP 18, fols 43–4. Hand: Greg. Date: c.1680. Written on the rectos of two conjugate leaves; versos blank. Both pages are divided into two columns with a fold, in each case the text is in the right-hand column only.

The heads listed here are more detailed than those in the printed or second edition lists, and may represent subdivisions, referable to the more general titles.

e. 'Titles of the 1st Order For the Natural History of Human Blood (of healthy men)', 'Appendices', 'Titles of the Subsections concerning the Spirit of Human Blood', pp. 21–3

BP 18, fol. 48. Hand: Bacon. Date: c.1680. Written on the recto of a single leaf; the verso has heads concerning arguments from reason and authority and materials for Boyle's critique of orthodox medicine.[19] The page is divided into two columns with a fold; the 'Titles of the 1st Order' and 'Appendices' appear in the left-hand column, with those of the 'Subsections' on the right.

The first list of 33 items bears a close relation to the list of 'Titles of the First Order' printed in *Human Blood* (1684).[20] The second list of 22 items relates directly to the printed 'List of Secondary Titles concerning The Spirit of Humane Blood'.[21]

f. 'Materials for the Scheme of Titles of the Second Classis of the Natural History of Human Blood', pp. 23–4

BP 18, fols 51–2. Hand: Emes; Greg (title only). Date: early 1680s. Written on two conjugate leaves. On fol. 51, the title is centred, with the rest of the text written in the left hand column. The right hand column is blank, except for 'Several & some of them very distant seasons of the year. (as also ante & post amplexus venerae' deleted; this is rewritten on fol. 51v. On fol. 51v the text is written in the right-hand column; on fol. 52 it is in the left-hand column.

This list is fuller than that printed in 1684. Many of the entries are endorsed with numbers which refer them to the relevant title number in the printed list of heads; on fol. 51 these are in pencil; on fol. 52 these are in pencil overwritten in ink.

g. 'Primary Titles Additional' and 'Secondary Titles or Subtitles For the History of Human Blood', pp. 25–8

BP 18, fols 56–7. Hand: Greg; Emes. Date: early 1680s. Written in two columns on fol. 56, continuing on fols 56v–7. This document consists of: 'A Preliminary Title' and 'Primary Titles Additional for the History of Human Blood' both written in the left-hand column of fol. 56, and 'Secondary Titles or Subtitles For the History of

[19] The synopsis of Boyle's critique of orthodox medicine has been published by Michael Hunter, 'Boyle versus the Galenists', *Medical History*, 47 (1997), 322-61, on p. 332, reprinted in id., *Robert Boyle (1627-91): Scrupulosity and Science* (Woodbridge, 2000), p. 167.
[20] *Works*, vol. 10, pp. 12-13.
[21] *Works*, vol. 10, pp. 40-1.

Human Blood' begun in the right-hand column of fol. 56 and continuing in the right hand column of fols 56v–57. The text on fol. 56 and the section from the second entry on fol. 57 ('Of the Chymical Analysis of Milk') are in Greg's hand. Fol. 56v and the first entry on fol. 57 are in Emes' hand.

This manuscript documents the process whereby Boyle expanded the printed list to reach the version prepared for the proposed second edition of *Human Blood*. The 'Primary Titles Additional' consist of titles not present in the printed list, which do appear in the longer list prepared for the second edition.

At the top of the list of 'Secondary Titles' is the endorsement: 'Refer to Title the'. This refers to a system of marginal endorsement, whereby the secondary titles were originally referred to the relevant numbered title in the printed edition. These endorsements were subsequently altered to correspond to the new numbering established in the longer set of heads prepared for the second edition. Several of the 'Secondary Titles' are bracketed together and referred to single categories.

h. 'Preliminary Titles' and 'Titles of the first Order' for the history of blood, pp. 28–31

BP 18, fols 45v–6. Hand: Greg; Date: 1680s. This list is written across the opening of two conjugate leaves. The recto of fol. 45 and the verso of fol. 46 are blank.

This is a copy of the list of heads prepared for the proposed second edition of *Human Blood*. The items are annotated with a double set of numbers, one of which notes its place in the list as prepared to the second edition, and the other (in red ink) gives the number of the equivalent category in the printed list, where appropriate. There are other copies of this list at BP 18, fols 49–50 and BP 26, fol. 46, both in Bacon's hand. In the latter, the items are unnumbered.

i. 'Tryals to be made on humane blood', p. 31

MS 185, fol. 56. Hand: Smith. Date: c. 1686. The title has been included in the numeration, perhaps accidentally. A further version appears in MS 189, fol. 149. Hand: Greg. Date: 1689–90. This notebook has text at both the front and back; the blood entry appears in the section written from the back. The list is marked 'tbd'. The version in MS 189 lacks the title, and therefore each item has a number one lower than the MS 185 version; other verbal variants between the two versions are noted piecemeal.

The titles in this list are more detailed than those which appear in the 'Titles of the first Order'. They deal with the preservation and putrefaction of blood in particular, and may possibly have been envisaged as subheadings for titles 18 and 34 in the general list. They illustrate Boyle's ongoing work on this topic.

j. Untitled heads concerning the Gall, p. 32

BP 18, fol. 47. Hand: Bacon. Date: c. 1680. Written in two columns on one side of a single leaf; verso blank.

A further version of the text in Greg's hand is to be found in Royal Society MS 199, fol. 129, marked 'Tb'd'; this differs only in that the first title is repeated and deleted. The notebook in question dates from c. 1680, suggesting that this text may date from the time when Boyle was composing *Human Blood*, [22] though it is equally possible that he took up the topic again in relation to the putative second edition.

Note on Table collating the Main Versions of the Heads for the History of Human Blood, pp. 33–50

This table juxtaposes the major extant versions of the lists of heads for the history of human blood that Boyle compiled in the 1660s and 1680s to give a sense of the changes made to them over time (for the convenience of the reader, the list printed in the published book of 1684 is included as well as the MS lists published for the first time below). The order in which they are placed reflects our deductions about how the lists evolved as outlined in the Introduction and in Knight and Hunter, 'Robert Boyle's *Memoirs for the Natural History of Human Blood*' (see above, n. 5). In each case, we have tried to indicate how the content of each heading correlates with the content of headings in other lists, attempting to do justice to subdivisions where appropriate. For clarity of reference, we have in various cases inserted sequential numbers in square brackets at the start of entries to denote their place in the list to which they belong. The text given is throughout a plain text, ignoring the alterations, etc., that are recorded in full in the texts given below.

[22] See *Works*, vol. 10, p. 14, for Boyle's plan to write accounts of this and other fluids.

Acknowledgments

We are indebted to John Milton for help in dating Bodleian MS Locke f. 19, and to Peter Anstey for his advice concerning the Locke manuscripts more generally. Sue Rodmell kindly transcribed most of the manuscripts. We are also indebted to the library staff at the Royal Society for their help.

Abbreviations

BP	Boyle Papers
Works	Michael Hunter and Edward B. Davis (eds.), *The Works of Robert Boyle*, 14 vols. (London, 1999–2000)

Textual note

The documents have been transcribed according to the principles for transcribing manuscript texts deployed in the *Correspondence* and *Works* of Boyle. Briefly, original spelling, capitalisation and punctuation are retained; standard contractions (e.g. the thorn with superscript 'e' for 'the') have been silently expanded. Underlining in the original has been shown by the use of italic. Original foliation has been indicated by the insertion in the text of 'fol. 132' or 'fol. 132v' within soliduses where each recto or verso of the manuscript text begins (or, where a page has more than one column, 'col. 2'). Words or phrases inserted above the line in the original manuscript have been denoted <thus>. Editorial insertions have been denoted by square brackets. All deletions are recorded in footnotes on the page. Chemical and other symbols have been transliterated in square brackets, as have details of quantities expressed in the original in a combination of symbols and roman numerals. The following have been silently expanded throughout: 'H. B.' to 'Human Blood'; 'bl.' to 'blood'; 'G.' to 'Gall' (in document j). For details of the various handwritings found in the documents, see *Works*, vol. 1, pp. c–cii, and Michael Hunter et al., *The Boyle Papers* (Aldershot, forthcoming), ch. 1. For facsimiles of the texts from the Boyle Papers included here, see the section 'View Boyle manuscripts online' on the Boyle website, www.bbk.ac.uk\boyle.

THE TEXT OF THE MATERIAL FOR THE PLANNED SECOND EDITION OF *MEMOIRS FOR THE NATURAL HISTORY OF HUMAN BLOOD*

a. Boyle's introductory remarks (BP 18, fols 11–14)

After I had about 2 years ago[1] publish'd my Memoires about the History of Humane Blood, I thought I might be[2] allowd quite to dismiss that subject, & resign it to persons whose Abilitys & Profession made them more able, as well as more concernd, to promote it; especially, after I had proposd a set of Titles, to which most things, fitt to be remarkt about[3] the blood of Sound men (for I purposely abstaind from treating of that of the Sick) may commodiously enough be referrd. But I have since[4] found that this Essay, notwithstanding its Imperfections, was favourably[5] entertaind by divers learned men, most of them strangers to me. And among these one of the eminentest[6] & famousest Physicians of this Age, hath been pleasd, out of Italy, to sollicite[7] me to make a second edition of that little Tract, with as great Enlargements as I could.[8] And[9] this desire of his being concurrd in by other *Virtuosi* of the same profession, thô I have neither leisure nor health enough to complie with their wishes, yet the respect I have for persons of their merit, has made me consent *both* to enlarge the Sett of titles, *by* the addition of some that were suggested to me, by things occurring after the first Articles of inquiry were printed off, *&* <to>[10] Augment the memoires themselves, by Annexing to several of the Titles such Tryals & Remarks,[11] as I could find disperst here

[1] altered from 'agoe'. Two words later, 'my' is inserted in MS 185.
[2] At this point, MS 185 has 'dispenst with from medling any more with' , deleted and replaced by the text as in BP 18, except that 'quite' is inserted, and 'for' is deleted before '& resign' and 'pro' before 'abilitys'.
[3] followed by 'healthy' deleted in MS 185, where 'blood' was followed by '(for I purpose', also deleted. Five words later, 'men' is altered from 'man' in BP 18.
[4] altered from 'sence'. Two words later, 'when' deleted after 'that' in MS 185.
[5] altered from 'favourabby'.
[6] altered from 'eminenter'. Five words later, 'this' inserted in MS 185, replacing 'our' deleted.
[7] inserted in MS 185, replacing 'press' deleted, as is 'to make' two words later, which replaces 'for'. Later in the sentence, both 'great' and 'could' there follow deleted, misspelt versions of he same words.
[8] This is clearly a reference to Marcello Malpighi; for details of his correspondence with Boyle on the topic see Knight and Hunter, art. cit., Introduction, n. 5.
[9] altered from '&'. Two words later 'desire' is altered from 'motion' in MS 185, where 'I' is followed by an illegible deletion later in the sentence, while 'has' appears as 'as' and 'by' is altered in composition and followed by 'the' deleted.
[10] replacing 'by' deleted. The next word, 'Augment', is altered from 'Augmenting'. In MS 185, 'by' and '-ing' are inserted, and 'memoires' follows 'treatise' deleted
[11] In MS 185, 'tryals' is inserted, replacing 'Experiments' deleted, and 'remarks' is marked for reinstatement after being replaced by 'tryals' inserted.

& there in a *Chaos* of my own Experiments.[12] And thô the unfrequency of the opportunitys I had to procure Healthy blood ([13]to which sort the scope of my memoires confin'd me) kept me from making many of the Experiments I designd, & had drawn up a list of, yet I consented that these scatterd notes, should be bundled up together; both because[14] some of the particulars they consist of may give some not unusefull hints, by the mention of uncommon ways of tryal; & because the Subject (Humane Blood) thô of great importance, is not yet so cultivated, but that a great deal of room is left for usefull Additions. /fol. 12/

I scarce doubt but some will find fault with the Order, in which I have set down the Titles of the first *Classis*; and will object, that I have given the precedency to this or that, before some other to which it should have been postpon'd.[15] But if they do it, I have this to say by way of Apology, that, having more than once drawn up the Catalogue of these Titles, with alterations in their Order, 'tis very possible I may have consider'd most of the things that the Censurers will object, and yet did not think they ought to hinder me, from[16] making choice of the *Series* of Titles I have pitch'd upon; in which I thought it less inconvenient, to decline such a Logical Method, as some Ramist or other Dichotomiser[17] would exact, than to bring[18] two or three barren Subjects under one Title; because separately treated of, there would have been too great & undecent a disproportion, betwixt the Matters referable to those distinct Heads. I might also represent, that the Order wherein[19] I laid some Titles together, was chosen, because I thought it more likely, than one perhaps more nicely[20] Logical would have been, to make the Subjects be the more easily and clearly understood. And[21] I could give a further account of the Method of our Titles, but that I think it not worth while to contend about it. And therefore shall not dispute the validity of the Objections; because in my Opinion, provided the Titles be pertinent & comprehensive enough, 'tis of no great importance, whether this or that be rank'd in the[22] 3d the 4th or, if you will,[23] the 10th place. /fol. 13/

[12] followed by the following deleted sentence in MS 185: 'This new Appendix would have been more copious if in the places where I had been better furnisht with healthy blood to which the scope of my attempt confind me'. Within this, 'Appendix' is followed by 'the' [?] deleted; 'copious' is followed by 'if he I had' deleted; 'where' is followed by 'I wrote it' deleted; 'to which' is followed by 'I was confind' deleted; and 'scope' is inserted, replacing 'nature' deleted. At the end of the sentence, two capital letters, 'B' and 'P', are deleted; at the top of fol. 16 (in the middle of this sentence) 'And thô' is written at the start of the line and deleted. In the rewritten version that there follows, 'I had' is deleted after 'unfrequency', and 'sort' inserted; there is also an illegible deletion after 'yet;'.
[13] altered from comma.
[14] followed by 'some of the things may be of more use' deleted in MS 185. Later in the sentence, 'hints' is there preceded by two attempts to spell the word, and 'of' is deleted both before and after it. Subsequently, 'thô' is inserted, replacing 'is of so' deleted; after 'importance', '& yet little re' is deleted and replaced by 'or' inserted; after 'but that' 'there' is deleted; and after 'room' 'that' replaces 'of' [?] deleted.
[15] The passage from 'and will' is added in the margin in BP 19, where 'to' is inserted, replacing 'of' deleted.
[16] followed by 'pitching' deleted in BP 19.
[17] rewritten in BP 19 from 'some dichotomising Ramist'.
[18] inserted in BP 19, replacing 'joyne' deleted. Three words later, 'barren' is inserted in BP 19.
[19] 'the Order wherein' inserted in BP 19.
[20] inserted in BP 19.
[21] inserted in BP 19. Two words later, 'could' followed by 'add' deleted in BP 19.
[22] followed by 'six and' deleted in BP 19.
[23] the words, 'if you will', inserted in BP 19.

Design'd Experiments For the Second Edition.
Of the Natural History of Human Blood.[24]

Advertisements.

Of these Experiments there are two sorts, the One *Direct* and *Immediate*, which may wel be try'd upon a Human Body or Blood itself;[25] and the Other *Succedaneous*, (if I may apply to my purpose that Medical Term) wherein are[26] substituted Bodys or Bloods of Brutes, in[27] case wherein 'twere either unlawful, or inhuman, or too difficult to make Tryals upon those of Men. The former sort of Experiments need no peculiar Badge, but the latter have for distinctions sake *Succed.* or *Vicar.* to denote *Succedaneous* or *Vicarious* plac'd in[28] their Margent.

The Numbers of the Titles of the first order, are hereafter to be reckon'd not according to the Printed Series of Primary Titles, but according to that new & more numerous List[29] that is prepar'd for the 2d. Edition.

b. The text of Boyle's material for the second edition of *Human Blood* (BP 18, fols 15–40)

Loose Notes For the Second Edition of
The Memoirs for the History of Human Blood. /fol. 16/

Design'd Experiments for
the History of Human Blood.

To get some Body that can procure the prickled Pear, to try whether it will tinge the Urine of a Dog, as red as that of a Man; and, in case it will, to open a dog alive at a convenient time after his having been fed with it, and try whether the *Serum Sanguinis* will prove ting'd[30] like the Urine.

To give Rhubarb, Tobacco,[31] Turpentine, and some other Purges[32] as strong as shall be thought convenient, to a pregnant Bitch, or other female whose whelps are considerably grown; and opening the womb whilst[33] it is working, observe whether

[24] last word inserted in BP 18, fol. 14. The whole title lacking in BP 19.
[25] rewritten in BP 19 from 'Human Blood it selfe'.
[26] inserted in BP 19, replacing 'I' deleted.
[27] followed by 'Insta' [?] deleted in BP 19. The next word, 'case' appears as 'Cases' in BP 18, fol. 14, and BP 19.
[28] duplicated by 'over' deleted in BP 19. Two words later, 'Margent' is followed by 'over against them' deleted in BP 19, at which point the text ends.
[29] inserted in BP 18, fol. 14.
[30] altered from 'tinged' [?].
[31] followed by '&' deleted.
[32] altered from 'purges'. Two words later, 'strong' is altered from 'stronge'.
[33] altered from 'while'.

the *Fœtus* will be thereby purged, and much discomposed, and whether the Urine <or other> Liquors will be sensibly altered as to Colour, Smell &c.

To try whether Opium being given to a pregnant Bitch in quantity sufficient to kill her, the whelps will be thereby destroyed, almost as soon, if not sooner, than the Dam.

Whether any discoverable change will be made in the Blood of a Dog, upon violent Emeticks or Catharticks. /fol. 16v/

Whether a strong[34] Purge being taken, either the Serum or the Urine <would be>[35] purgative.

Whether Rhubarb, Turpentine, Gum-Guajacum, being copiously taken, the mass of Blood or the separated *Serum* of[36] it (a vein being open'd in some part remote from the Stomack & gutts) will have its colour or odour imbued after the same manner, <or>[37] more strongly than the urine.

Whether upon the use of Cantharides severall wayes, the Blood, or the Serum of it, will have any Operation upon the dog it is given to.

Whether there will be any difference betwixt Blood into which Quicksilver, Infusion[38] of *Cantharides* &c. have been a competent time before immediately injected;[39] and Blood of the same Animals, to some of whom the same things have been given at the mouth; and of[40] others to whom they have been outwardly administred.

Whether a Plant being put in well wash'd & well dryed[41] sand, and fed only with the Blood or Serum, will, if it prosper at all, be considerably differing, from what it would be if nourished the ordinary way. /fol. 17/

Whether spirit of Salt injected immediately into the Blood of a live Animal, will coagulate it; and if it doe, whether the spirit of Blood, or Hartshorn, or other volatile Salts, seasonably injected or administred will[42] prove a Remedy.

Whether Animals being kill'd with Orpiment taken at the mouth, or outwardly apply'd, or immediately injected, their Blood will be sensibly affected thereby.

Whether a strong[43] Purge, or a strong vomit being given to a Dog, open'd whilst it is working, the mass of Blood will appear to be sensibly alter'd, and whether more in some vessels than in[44] others. /fol. 18/

[34] altered from 'stronge'.
[35] replacing 'of it is' deleted.
[36] altered from 'if'.
[37] replacing 'and' deleted.
[38] altered from 'infusions' [?].
[39] altered from 'colon'.
[40] altered from 'to'.
[41] followed by a deleted comma.
[42] followed by 'not' deleted.
[43] altered from 'stronge', as is 'strong' four words later.
[44] altered in composition.

[Miscellaneous material]

[45]We put [12 ounces] + 56 grains of *Sanguis humanus* to destill in a Head and Body, the destill'd Phlegm of which when we had weigh'd it, we found to amount to 7½ [ounces] + 51 grains, and the *Caput Mortuum* of it to weigh 4 [ounces] + 3 [drachms].

[46]The Spirit of Blood being put to Spirit of Salt, they made a great hissing and Ebullition, and disarm'd one another, producing a compounded Liquor, not unlike in tast to weak Sal-armoniack: and such a Salt I intended,[47] and little doubted, but to obtain <by> the sublimation of this Mixture, had <not> one, who knew not what it was,[48] thrown it away. The same spirit being mixt with spirit of Niter, or *Aqua fortis*, made the like Ebullition as with spirit of Salt, and produc'd a Liquor of a compounded tast. /fol. 19/

XXVIII. 21.[49] About an ounce or two of the gross & fœtid Oyl of Humane Blood <(distill'd in a Retort)> was in a glass vial expos'd all night upon the Snow, in[50] the sharpest frosty Season that has been known in England in very many years. But being taken in the next morning, it did not appear to be at all frozen, still retaining its Fluidity (which <even> in Temporate Weather was not great.)

Another parcel of Oyl of Human Blood rectify'd[51] from Quicklime, was expos'd in that bitter Weather for some Dayes & Nights, without being found at all Glaciated.

XII. 6.[52] For some purposes, relating partly to Respiration, & partly to other Inquiries; I thought fit to endeavour to obtain what Information could be procur'd, of the Constitence, & Disposition to Expand it self, of Blood & other Animal Liquors. In pursuance of which the[53] insuing Tryals, among others, were undertaken.

The warm Blood of a Lamb or a Sheep, being taken as it was hastily brought from the Butchers, where the Fibres had been broken to hinder the Coagulation, was in a wide mouth'd Glass put into a Receiver, made ready for it; & the Pump being early set on work, the Air was diligently drawn out. But the Operation was not alwayes, especially at first, so early manifest, as the Spirituousness of the Liquor made some expect. yet this hinder'd not but after a long expectation, the more subtle Parts of the Blood would begin to force their way through the more clammy ones, & seem to boyle in large Clusters, some as big as great Beans or Nutmegs: & sometimes, to the wonder of the by-standing Physitians, the Blood was so volatile, & the Expansion so vehement, that it boyled over the containing Glass; of which when it

[45] 'Blood' and '2.' written in pencil in the left margin.
[46] '06', '205' and 'Experiment with [spirit] of Blood' written in pencil in the left margin.
[47] altered from 'intented'. Earlier in the line, 'Sal-armoniack' and 'Salt' have been capitalised, as has 'Mixture' in the next, and 'The' at the start of the next sentence.
[48] followed by 'and likewise had', deleted.
[49] written in the left margin adjacent the first line of text. Written over pencil 'u' ink blot 'n. 28'.
[50] followed by 'one' deleted.
[51] followed by 'm' [?] deleted.
[52] written in the left margin adjacent the first line of text. Written over pencil 'u. 6. n 12' [?].
[53] followed by 'Blood', deleted. In the previous line, 'Expand' has been capitalised.

was put in, it did not, by our estimate, fill above a quarter.[54] Philosophical Transactions N. 29. P. 551. Fracassati's Experiments.[55]

XXV. 18.[56] *Woodsorrel*, in Latin *Halleluja*, being not unjustly counted a <good> Cordial, & yet being reckon'd among the cooling Plants, I thought fit for a certain purpose, to make an examen of a red Liquor affordable by it. The first part of this work was easily done by barely keeping the express'd Juice in a stopt glass for a very few dayes; during which the feculent matter that made it look troubled subsided by degrees, & the Liquor appear'd diaphanous & of /fol. 19v/ the Colour of Claret wine. To make some examen of this Liquor, which was the second part of my design, I dropt into it a small proportion of good Spirit of Human Blood, by which it was presently turn'd into a notable ple<a>sent Green. And having into this Mixture dropt some good Spirit of Salt, to restore the Juice to its Colour, there presently reappear'd a fine transparent Red, without any Precipitate or Sediment that we took notice of at the bottom. The like Tryal being made with the Juice, & some Oyle of Tartar *per deliquium* in stead of Spirit of Blood, the Colour was immediately much alter'd, but seem'd more muddy & inclin'd to blew, than that produc'd by the Spirit.[57]

XXV.[58] 18. Having by me severall small, & for the most part old & weak, Parcels of Spirit of Human Blood we mix'd with it as much Spirit of <Sea> Salt as serv'd to satiate it; & then having filtred the Solution, we put it to evaporate & Crystallise, to see if the mixture being in such a quantity, a Salt figur'd like Salarmoniac would be produc'd. The Event was that the first time <not>[59] half of the uncoagulated Salts <answer'd expectation by Shooting>[60] into one of the Figures of <common> Salarmoniac, namely that which has as it were Teeth (but[61] unequally long) as it were at right Angles with the sides of the longer <& as it were fundamental> Crystals. The rest of the Saline matter, thô it seem'd to be but a Lump, yet being again filtred & slowly Coagulated, was reduc'd in great part into the like Sal armoniac. Of this we took half an ounce & put it into a Cylindrical glass full of Water, in which we had a while before plac'd a seal'd Weather-glass to be brought to the same Coldness with the Liquor. And we found, as we expected, that when the Salt began to be dissolv'd in the Water, the tincted Spirit of Wine began to subside, & in a short time fell about an inch by measure beneath its former station. /fol. 20/

XXXVII. 28[62] Many Chymists, & some Physicians too, have been solicitous to find wayes, of making common Sulphur pass <into their Receivers, together> with the Additaments they had put to it, in a liquid form. This has been wont to be attempted by first dissolving the Sulphur in Oyls, & then forcing over some part of these Solutions, which if the Operation have been well manag'd, will come over red,

[54] followed by 'Having also included some Milk, we' [?] deleted.
[55] A reference to the account of experiments by the Italian doctor Carlo Fracassati (d. 1672) published in *Philosophical Transactions* in 1667: see *Works*, vol. 5, pp. 548-9.
[56] written in the left margin adjacent the first line of text. Written over pencil 'u' [?] 18 n 25'.
[57] followed by 'Having by me several' deleted.
[58] followed by '4' deleted. As previously, the number is written in the left margin adjacent the first line of text, over an illegible pencil reference. 'q 10' [?] written in pencil above.
[59] replacing 'that' deleted.
[60] replacing 'shooting' [?] deleted.
[61] followed by 'very' deleted.
[62] written in the left margin adjacent the first line of text, overwriting 'u 28 n 37' in pencil. 'q. 25' written in pencil above.

but[63] for the most part so very Empyreumatical, that[64] <few> have the confidence to give it, & fewer the resolution to take it. Wherefore the great things that *Paracelsus* & some others speak of the Vertues of Sulphur,[65] & much more the good Effects I have often observ'd of it, when it has been open'd, invited me many years ago, to propose an easy way of bringing <over> a blood red <& very penetrating> Tincture of Sulphur, without the help of oyls; which way, with a little variation, has[66] been since by some learned men apply'd to some other Subjects. These things I premise, as introductory to what I am about to say; namely, that the desire <I had>[67] for <the sake of> some Persons[68] & occasions, to alter the odour of the Spirit of Blood, & to imbue it with the Vertues of volatilis'd Sulphur, induc'd me to make the following Preparation.

With the Urinous Spirit of Human Blood (which is not necessary in this work to be dephlegm'd) & Spirit of Salt I made a Sal armoniac, which being filtred & coagulated the second time was well enough figur'd. One part of this, one part of Flowers of Brimstone, & about[69] one part & a half of Quicklime well mix'd together, we drew off in a Retort a high red Spirit, exceedingly volatile & piercing, so that if the[70] vial wherein it was kept were unstopt, it would presently fill the upper part with white Fumes, which would[71] < at > the Orifice, without the help of external heat,[72] ascend like Smoke into the Air. /fol. 20v/

For their sakes that[73] scruple the internal use of any Medicine prepar'd by the help of Quicklime, I shall propose a Tincture of Sulphur, which thô I foresaw it would not be deep as the foregoing, may yet be of some use in Physic. Into melted Sulphur we put by degrees an equal weight of powder'd Salt of Tartar, stirring them together that they might incorporate into a reddish mass. Then powdering it before it had drawn the moisture of the air, we mix'd with it about half its weight of our Sal armoniac made with Spirit of Blood & then distilling these in a <small> Retort, we had a <yellowish> Spirit, that[74] discover'd its being of a Sulphureous nature, by its gilding a piece of clean sylver moistured with it.

But, because the Sulphur of[75] Copper, as the Chymists call a fine substance obtainable from that Metall, is cry'd up by Helmont, Basilius Valentinus, & some other of the chief Chymists, as one of the greatest *Arcana*[76] /fol. 21/

[63] altered from '&'.
[64] followed by 'Chymists' deleted. The next word, 'few', is inserted in margin, and the word after that, 'have', is followed by 'scarce' deleted.
[65] I.e. the sixteenth-century iatrochemist, Paracelsus, though it is not clear which of his writings is referred to.
[66] altered from 'had'.
[67] replacing 'of altering the Odour of the Spirit of Blood' deleted.
[68] altered in composition.
[69] altered in composition.
[70] followed by 'still' [?] deleted.
[71] followed by 'without' deleted.
[72] altered from 'head'.
[73] followed by 'have a' deleted. The next word, 'scruple', is followed by 'at' deleted.
[74] followed by 'was somewhat Tinctur'd' deleted.
[75] followed by 'venereous' deleted.
[76] followed by 'as' deleted. At this point, the text ends, leaving the rest of the page blank. Boyle refers to the Flemish natural philsopher, J. B. van Helmont (1579-1644), and the late 16th-century alchemist, 'Basil Valentine', i.e. Johannes Thölde.

X. 4[77] I sent a Servant with a seal'd and gag'd weather-glass to be present at the killing of a Cow at the Butchers, that I might know with what degree of heat the Blood would issue out at the cutting of the Beasts Throat, as soon as it was knock'd down. He receiv'd the Blood in a Glass Cucurbite, which was deep enough to contain a good quantity of it, and presently, before it could congeal, plung'd into it the Ball, & Part of the Stem, of the Thermoscope, whose tincted spirit of wine was by the Heat of the Blood presently impell'd up above the top of the Cylindrical part of the Stem, and fill'd near, but not quite, half the Pear-like part of the Instrument that reach'd almost to the Hermetic Seal.

XIII. 7. 8.[78] He that brought home the Blood judg'd it to be much heavier than Human Blood; and having left it in the Glass Cucurbite for 6. or 7. hours to settle, we did not perceive that any *Serum* swam[79] at the top; but that which appear'd was well concreted Blood of a florid colour.

Miscell.[80] Of this pulverated Blood we took out two pretty large Clots or Lumps, and laying them separately upon white Paper, we perceiv'd that in that Part of the Surface of each of them that was florid, the Scarlet Colour reach'd but a little way, the rest of the Mass being black as is usual in Human Blood. Upon the dark part of one of these Clots we drop't some good spirit of Urine; but did not perceive that it quickly produc'd a Florid Colour, as 'tis wont to do upon Human Blood. Yet the other Lump being left in the Air had its dark part cover'd with a fine colour, (but not so deep nor so uniform as that part that was at first florid) in about 25. minuts. /fol. 22/

XXII[81] We pour'd off the *Serum* of a parcel of Human Blood, (let out, if I mistake not, at one Phlebotomy) upon a convenient quantity of running Mercury; & another parcel upon Filings of Steel; & also[82] (another time) we pour'd a somewhat greater parcel upon the Filings of Copper. The vials that contain'd those parcels of Liquor were kept carefully stopt, the Design being to try, Whether the Metals would preserve the *Serum*, & to observe Whether the Liquor would have any manifest Operation upon the Metals. The Event was, that within 10 or 12 dayes, the Serum pour'd on the Quicksylver was found to have a bad smell, but not as if the Putrefaction had been very great: nor did it seem much to increase, by being kept a week or 10 dayes longer. The Liquor that was upon the Filings of Steel, did in[83] less than three Weeks acquire a scent that argu'd some degree of Putrefaction, but smelt not <quite> so ill, as that upon the Quicksylver. But the *Serum* that had been pour'd upon the Filings of Copper, at the end of about two Months, viz. March & April, thô standing in a warmer place & divers times open'd to be smelt to, seem'd to be altogether incorrupted, having no bad scent, nor other token of Putrefaction. /fol. 23/

[77] written in the left margin adjacent the first line of text. Written over the pencil reference 'u. 4. n. 10'.
[78] Inked over pencil '13. 8. 7.' 'Miscel' and 'q' above and '2, 7' below in pencil. All this written in the left margin adjacent the first line of text.
[79] altered from 'swim'.
[80] written by Greg in ink over the same word in pencil in the left margin adjacent the first line of text.
[81] written in the left margin adjacent the first line of text, inked over pencil '22'.
[82] followed by 'at (' deleted.
[83] followed by 'a fourtnight' deleted.

IX. 3[84] Simon. Pauli De Febribus malignis. pa. 13. Et sanè si in loco proprio, in venis nempe sanguis putresceret, anne si, verbi gratiâ Petro, vel Paulo, Mariæ, vel Elisabethæ, febre ephemera extensa, et jam putrida laborantibus, venam ferro abrumperemus, necessariò sequeretur, putridum illum sanguinem semper fœtere? cuius rei unicum solum exemplum per tot annos, quot Dei Gratia Praxin exerceo (exerceo autem per viginti & novem) observavi, et quidem Anno MDC LIV. In Cive primariô Hafniensi longè quinquagenario majori, & propemodum sexagesimum visuro annum; qui præservationis causâ assuetus venæ sectioni mense maiô, me, conjuge & famulis illius præsentibus, sibi per chirurgum venam brachii medianam incidendam curabat, nullo modo febricitanti. Ingens enim fœtor & peculiaris, ad nullum v.g. putidi ovi, ulceris sordidi &c. comparandus de improviso, & dum saliebat adhuc ex vena sanguis, universum cænaculum opplebat, qui incensis odoriferis corrigebatur. Si ergó hujus sanguinis insigniter fœtentis sed calidi adhuc, causa exstitisset cacochymia, aut putredo, maximé cum eodem, cum seu M. DC. LIV. pridem ante maium Pestis complures é medio sustulisset, qui non sanguis illius ex venâ prolectus, ulceroso sanici fuisset persimilis? qui tamen frigefactus, neque fœtebat, neque colore dissimilis erat optimæ notæ sanguini, nisi quod impensé veluti rutilans, ad Floris Cardinalitii trachelii illius Indici colorem proximé accedens, imó propemodum superans, perpauco sero esset conspersus; quam sanguinis conditionem vel grassantibus Epidemiis, malignisque Febribus, vel non iisdem grassantibus [dicta hæc et scripta novellis Practicis volo] mortem aliquam multis portendisse observavi aliquoties: astantibus & imperitis, sibi ob roseum hunc, aut potius coccineum sanguinis colorem gaudentibus ægro veró grantulantibus. Ego autem iam pridem condocefactus sum, diffidens semper ejusmodi suspectæ sanguinis bonitati, propinare in ejusmodi casibus ægris alterantia, una cum alexipharmacis et specimen habetis paulo anté seu. §. 2do descriptum decotum casuræ C.C. meæ descriptionis. /fol. 25/

XVI. 11[85] One that was letting Blood being order'd to bleed in a Porringer where there was Spirit [of salt] we found as we expected, that the Blood even whilst it was sensibly warm was by the spirit [of salt] coagulated and turn'd into a curdled substance of a very dirty colour.

XVII. 12 But some of the same Blood issueing out of the same vein into a Porringer with spirit [of ammonia] in it acquir'd a deeper red then before, and continu'd fluid, not only til 'twas cold but long after.

XVII. 12 Another Person having bled into a small vessel with spirit [of ammonia] in it the Blood which was much highten'd in colour was thereby kept from coagulating for 5 dayes: at the end of which time it stil retain'd its fluidity and acquir'd colour not appearing to have any Fibres like other Blood when it is settled, whereupon having put on a little of it some spirit [of acetum destillatum] we found the colour to grow more florid, and less deep, approaching much more then it did before to a Scarlet Colour, which was made again to decline towards a Crimson, by the Effusion of some fresh spirit [of ammonia] but dropping some spirit [of salt] upon a Parcel of the Embalm'd Blood it presently curdled it into a dirty colour'd substance.

[84] 'q. 7' above in pencil. This and the title which follows written in the left margin adjacent the first line of text. The text is taken from Simon Paulli, Παρεκβασις; *seu digressio de vera, unica, & proxima causa, febrium cùm malignarum & petechialium* (Frankfurt, 1660) p. 13. Boyle also quotes from p. 71 of this work in his *Languid Motion*: see *Works*, vol. 10, p. 261n.
[85] These numbers are written in the left margin adjacent the first line of text, inked in over the same text in pencil; the same is true of each of the following three entries.

XVIII. 13. Upon Inducements that need not here be mention'd, we put upon some Ounces of the Serum of a Sound Mans Blood as much clear Oyl of Turpentine as would swim upon it to the height of about 2. Inches or less in a fitly shap'd Crystalline vyal, that the *Phænomena* to be exhibited might be the more easily & distinctly seen. This done we set the Glass well stopt in a South window and left it there for a great while together presuming that the Oyl of Turpentine would as it were embalme the *Serum,* and keep it from Purefaction, without suffering the moisture easily to separate from the rest & acquire a distinct place. After a little while the upper part of the Serum grew white as if a kind of cream swam between the 2. Liquors. This whitenes by slow degrees went deeper & deeper, til at length the whole Serum seem'd to be turn'd into Milk. But having suffer'd the vessel to continue longer in the same window, notwithstanding the season grew very hot, I afterwards observ'd that this Serum seem'd to have lost its Fluidity, and lay beneath the Oyl of Turpentine (which swam over it very clear) in the form almost of Spermaceti, and had a kind of Luster belonging to it, being also white as snow. In which condition it yet continues. /fol. 26/

Miscell.[86] q. 25. 23. There happen'd once to me, in making an Experiment about Human Blood, an Accident, of which thô I could not give either others or my self any satisfactory account, I think fit to take notice, because of its oddness. To make a Tryal, what Heat would be produc'd by the conflict of the Spirit, or Volatile Salt of Human Blood with an Acid Spirit, we put this last nam'd, whether it were drawn from niter or common Salt, (for I remember not which) into a somewhat wide mouth'd but slender vial, into which we also put the Ball of a seal'd weather-glass that was gag'd according to the Standard at Gresham Colledg,[87] that being cover'd with the Acid Liquor, the spirit of wine in the Instrument, might be brought to the same degree of coldness. Then putting to it by degrees some spirit of Blood, there presently ensued a conflict between the two Liquors that was accompany'd with a hissing noise and store of Bubbles, together with a manifest heat, that impell'd up the tincted spirit of wine, to the height of divers Inches in the stem of the Thermoscope. All this was but what we look'd for. But when we expected it, as soon as the tumult and heat of the External Liquors were pas't, the spirit of Wine should descend again, according to the Custom, we were much surpriz'd to find that it continu'd stil at the same height for a long time together, so that being quite weary of waiting, we took it out, to see if there were any Crack in the Ball, at which some of the External Liquor might have got into the Instrument, thô even in that case much of the strangeness of the *Phænomenon*[88] would have remain'd. But having narrowly view'd the Thermoscope, we found it sound & intire, and yet afterwards in the cold Air we observ'd it from day to day, to continue obstinately at a high't that made it unserviceable for further Tryals, thô till then I lik'd it so well, that I usually imploy'd it about nice Experiments preferably to any of my other weather-glasses. /fol. 24/

XXII. March 4. 1684/5.[89] Into a Glass Egg, furnish'd with a Stem somewhat large in proportion to it, we put as much *Serum* of Human Blood emitted that same day, as reach'd to the bottom of the Stem: and, having made a Mark with a Diamond against the Surface of it, we put it into a Frigorific Mixture to congeal. And, thô we

[86] written in Greg's hand in the left margin just above the first line of text; 'q 25', which follows, is in pencil.
[87] I.e., the Royal Society thermometer: see *Works*, vol. 10, p. 180.
[88] altered from 'Phænomena'.
[89] written in the left margin adjacent the first line of text, as are the numbers at the start of the next entry. 'Ex' in pencil at head of page.

did not find it at all easy to be turn'd into Ice, yet at length it was frozen, and lost its Transparency, and appear'd to have been expanded by glaciation, since it reach'd a pretty way above the mark it rested at when unfrozen. Then, to try whether this expansion was not inferiour to that which so much water would have receiv'd, we thaw'd and pour'd out the *Serum*, and filling the Egg with common water to the forementiond mark, we put it into the Frigorific Mixture, and having frozen it, found it to reach much higher into the Stem than the *Serum* had done; for we had set a mark where that rested, in somuch that by our guess, the quantity of place that was gain'd by the second expansion, was at least double to that which had been gain'd by the first.

XXV. 18 We took some Spirit of Human Blood, that had been rectify'd,[90] but long kept, and having put it into a slender Egg of Glass blown at a Lamp-furnace, we kept it in our Frigorific Mixture 8. or 10. hours, without finding that it was at all frozen, but only that it subsided, and that but little, in the stem of the vessel; thô it seem'd probable, in regard of the slendernes & thinnes of the Glass, that common water would have been frozen in a small part of <the>[91] time. /fol. 27/

Miscell.[92] 44. We took a Clot of the fibrous part of Human Blood weighing (after the *Serum* had been drain'd from it) [1½ ounces] + 38 grains and having steep'd it all night in a good deal of fair water, in the morning we carefully drain'd off the water which was ting'd of a deep red, and then weighing the Clot against it amounted to [1 ounce] + [5 drachms] + 11 Grains.

XXV. 18.[93] 38. We took some Spirit of Human Blood, that had been rectifyed, but long kept, and having put it into a slender Egg of Glass blown at a Lamp-furnace, we kept it in our Frigorific Mixture 8. or 10. hours, without finding that it was at all frozen, but only that it subsided, and that but little in the stem of the vessel; thô it seem'd probable in regard of the Slenderness and Thinness of the Glasse that common water would have been frozen in a small part of that time.

XXVIII. 13. [94] Oct: 12. 68. We put [½ ounce] of Sol[ution] of Minium in [acetum destillatum] to [2 ounces] of Serum of Human Blood. Item [2 drachms] of [Mercury] to [1 ounce] of Serum. Item [½ drachm] of Fylings of [Copper] to [1 ounce] of Serum. Item (October 25th) [2 ounces] of Flos [Sulphuris] to [2 ounces] of Serum; (That with Fylings of [Mercury] being kept in an open wide mouth'd Glass was after 9. or 10. dayes time found to stink:) while the other two continued fresh; and 1 [ounce] of [Antimony] to [1 ounce] of Serum, also [1 drachm] of [spirit] of [urine] to [1 ounce] of Serum, and [1 drachm] of Saccharum Saturni to [1 ounce] of Serum: (Nov: the 12th) We found that with [Mercury] that with [Sulphur] and that with [Antimony] stinke, but none of the rest, only that with the [spirit] of [urine] smelled doubtfully. /fol. 28/

X.4. 14. [The French Chirugeon answer'd me, that Yesterday; He open'd a vein of a Man, whose Blood was so hot, not only at the coming out but afterwards that the Person loudly complain'd, that He was as it were scalded by that part of the Blood that fell and run along upon his Arms, in so much that the Chirugeon to comply with his Impatience, was fain to alter the posture of the Bleeding Arm to keep the

[90] altered from 'rectify'.
[91] inserted in Greg's hand.
[92] written in Greg's hand in the left margin just above the first line of text.
[93] written in the left margin adjacent the first line of text, as is the case with the numbers preceding the next two entries.
[94] 'Oct: 12. 68' is written in the margin, beside the entry.

Emitted Blood from touching it. The Liquor as it came fresh out of the vein seem'd to be well condition'd like a Healthy Mans Blood, but quickly degenerated to very much of a corrupted Blood.] [95]

XXII.[96] 9. Two Ounces of Serum of Human Blood being kept over a Chaffing-dish of Coals till it was just coagulated into a Gelly, being weighed again was found to have lost but 7½ grains of its former weight.

Half an Ounce of another parcel of Serum lost but 3 quarters of a Grain by this Coagulation, which was much sooner perform'd than that of the former.

XXII. 16. We took some double colour'd Tincture, and with as little spirit of vinegar as we could deprive it of its Cæruleous colour; and then presently restor'd this colour to it by dropping in a little Serum of well condition'd Human Blood.

XXII. 17. At the same time, with a-nother Portion of the same Serum, we made a white Præcipitate, by dropping some of it into a Solution of common Sublimate.

XXII. 18. We took some Serum of the Blood of a sound Man, and having put it into a round vyal with a wide neck left unstopt we held it in a gentle heat, till it had just lost its Fluidity, and then set the Glass aside, that the Coagulated matter might be surely dry; by which means we observ'd, that after a while it grew somewhat Diaphanous, and throughout by its lovely and changable colour, resembl'd an Opal, and so continu'd during several Dayes. /fol. 30/

XXV.18.[97] 19. A Lump of well condition'd Human Blood, being taken out, and laid upon a Piece of White Paper with part of the blackish portion upwards, a little spirit of Human Blood that was drop't upon this obscure Part, thô it did not give it as good a Colour as the Neighbouring Part, which the durable contact of the Air had made florid, yet it much better'd and heighten'd the colour.

XXV. 18.[98] 20. Upon the Florid part of a little Lump of sound Human Blood, we let fall some Drops of Juice newly squeez'd out of a Lemmon, the Acid Liquor did, as was expected, discolour the Surface of the Blood, which it made to look somewhat dirtily. But a few drops of the Spirit of Blood being let fall upon the discolour'd place, restor'd it in good measure, and made a Notable change in it towards its former Floridness.

XXV. 18 21. Since not only many Chymists, but Physicians too, think that there is a great and peculiar affinity betwixt Wine and Blood; I thought fit to try for their sakes, what Operation the Spirit of the last nam'd Liquor would have upon the Other. Wherefore having put some French red wine into a Glass conveniently shap'd for discovering any change of colour, we drop't into it a little rectify'd spirit of Humane Blood, and perceiv'd as we expected, that it presently much highten'd the colour, making it far more deep and inclining to Purple, and having suffer'd the Mixture to stand for a good while, there seem'd to settle at the lower part of it, a substance like a dark, but not ponderous Præcipitate. /fol. 29/

[95] The square brackets surrounding the text of the entry are in the MS. The French surgeon has not been identified.
[96] This, and the roman numerals preceding the next three entries, is written in the left margin adjacent the first line of text.
[97] written in the left margin adjacent the first line of text, as is the case with the comparable numerals preceding the next three entries; 'q. 7' in pencil above.
[98] 'q 7 Misc' in pencil above.

XVIII.13. 22. Having been induc'd, upon certain grounds, that need not be here made out, to think that in copper, there is somwhat very fit to preserve Animal Substances from Corruption; we took some Serum of healthy Blood, and pour'd it into a vyal, whose bottom was cover'd with clean Fylings of Copper [for they should be no wayes rusty nor too gross] [99] and left it in a window, where from time to time coming to visit it, and smell to it, we found that the Liquor was preserv'd from stinking & incorrupted, for a very considerable space of time, which we guess'd to be (for the dates were lost) above 3 months, thô the season of the year were warm and the window wherein the vial stood (for the most part unstop't) were frequently shin'd upon by the Sun in the hottest part of the day which not seldom beat also upon the Glass it self. /fol. 31/

XXXVIII. 29 Pancratii Eunonymi Pyretologia mystica, s. de Febr. Petech. pag. 256.[100] Non abs re erit hic adducere ea quæ Zacat.Lusitan. in Introita ad Praxim pag. 58. & alibi de sanguine Hispanorum et Germanorum tradit cogintor et notatu dignissima. In Corporibus iniurium Hispanorium abundat Sanguis crassus sucelentus [?] ac compactus, ut si febre continua corripiantur in larga sanguinis miscio interveniat, omnes moriantur. Contra Germanorum Corpora conferta sunt sanguine crudo aquoso non bene firmo. Si in febribus sanguis Hispano miscus, fluidus, aquosus non concrescat, indubium Iudicium etiam Idiotis cognitum, omnes mori, quia Fibræ opus sunt corrupta ac dissolutæ. In Germania autem non tantum in morbis malignis, sed et salubrionibus et valetudinariis sanguinem fluidum et aquesum esse expertem omnis periculi. Exin confingit ut Germani largiorem imprimis sanguinis missionem difficulter ferant, quod eorum sanguis minus sit spirituosus, cum, teste Experientiâ, si in sanitatis statu, præservandi tantùm causâ, vena secetur, sæpius sanguine adhuc fluente in graves incidant Lipothymias; multo magis id verendum in Febribus continuis et malignis. Cum et Italorum natura ad Hispanorum constitutione haud multùm distet Gallorum autem Complexio Ignea, ut majori opus per vetus sectionum sit oventilatione.[101] /fol. 32/

VII. 1. [102] We took rectify'd Oyl of Vitriol, clear as Rock-water, & warily let fall a couple of drops of it upon a Lump of Human Blood, whose surface was very florid: & immediately, as we expected, those Parts that were touch'd by the Oyle grew so black as would have surpris'd an ordinary Spectator. Afterwards with a kind of bodkin of glass dipt in this Oyle, we toucht the florid Blood here & there with the like success; making also use of this Experiment to make a conspicuous, thô not full, separation of the Serous Parts harbour'd in the Cavities of consistent Blood (after the supernatant Serum should be first pour'd off.) For we knew that Oyl of vitriol would immediately Coagulate the Seru<m> of Blood pour'd off from the rest; & therefore 'twas proper to put it warily upon the well colour'd lumps or clots of Blood. For we concluded that by this means the *Serum* harbour'd in the Cavities of the Lump, would by its colour manifestly distinguish it self from the former part of the Blood. And accordingly 'twas pretty to behold the lately florid surface of the[103] Lump presently turn'd into a variegated Colour, as if it were a piece of very oddly, & therefore very pleasantly, mingl'd white & black Marble. /fol. 33/

[99] The square brackets are in the MS.
[100] written in left margin, as is 'XXXVIII. 29', written adjacent to the fourth line of text; followed by 'q Misc.' in pencil; 'q 42' above in pencil, crossed through in ink. The source of this quotation is Pancratius Eunonymus, *Pyretologia mystica* (Padua, 1686) p. 256.
[101] followed by 'Parerata' deleted.
[102] written in the left margin adjacent the first line of text, as is the case with the numerals in the next four entries.
[103] followed by 'Blood' deleted.

XXII.[104] Into some *Serum* of Human Blood, put into severall Tasters and other small Glasses, we dropt strong Solution of Sublimate, some strong Solution of Silver in *Aqua fortis*, and of Tin in its proper *Menstruum*. Each of these Liquors presently produc'd with the Serum a white Coagulum.

XXII. We took also a thin Solution of Copper in spirit of Urine or of Sal. armoniac; but did not find that this Ceruleous Liquor made any Coagulation or Curdling with the *Serum*: no more than did a volatile Tincture of Sulphur, made also with the Spirituous parts of [Sal armoniac].

XXII. We took likewise some Solution of Marcasite in Rain or Snow water, such as is to be had at Deptford, before the workmen put in Iron to increase the weight of the Vitriol <to be made,> and having dropt some of it into a Taster with *Serum* in it, it did, as I expected, not only presently coagulate it, but likewise change the Colour of it, making it in divers places almost red. Having also drop't into an ounce of *Serum*, weigh'd out in a small flat [clear cak'd][105] Glass, 40. drops of this Liquor, it brought the whole Serum, abating a very little that remain'd Fluid, into a somewhat stiff Coagulum, that was somewhat reddish, and almost of a flesh colour.

XXII.[106] About the same time into a clear cak'd Glass, half full (by guess) of *Serum*, we pour'd near as much Sea-water, but found not any Coagulation or Curdling to insue, thô we kept the Mixture from night til morning. But the Colour seem'd to be much alter'd towards Rednes.

Having made & filtrated a Solution of Tin glass in Aqua fortis, we put upon it a vinous spirit that would burn all away, and immediately as was expected, it made a copious Precipitation of an exceeding white Calx.[107]

XXII.[108] Having several times made a Tryal of the Solution of highly refin'd Gold, upon *Serum* of Human Blood, I found the Effects generally considerable[109] enough, but very various. And I remember, that in the two last Tryals I made, the *Serum* being put, one part of it into a small clear cak'd Glass, and the other into a Chrystaline Taster very shallow, I let fall 9. or 10. drops of Solution of Gold into the former, and a smaller number into the latter. The Event was, that in the former were produc'd divers parcels of coagulated matter, of an almost Hemispherical shape, which were cover'd with deeply purplish /fol. 34/ skins, and had about most of them divers small Spherical Bubbles, that lookt very prettily, as if each of them were a Globule of finely burnish'd Gold. But the mixture in the shallow Tasting Cup was much more pretty & surprizing: for having, when I had let fall into it, the golden Solution, not suffer'd the Drops to form distinct Concretions (as they did in the other Glass, but stirr'd them to & fro in the *Serum*, with a Glass wire, lest the *Menstruum* should receive some Tincture from it) there was presently produc'd a curdled substance that fell to the bottom, and look'd somewhat brownish. But having suffer'd the mixture to rest all night, I found the next day, that 'twas coagulated into one entire transparent mass, the sides of which in the upper part were[110] here & there adorn'd with a very lovely Purple; and the whole Bottom, together with the contiguous part of the Sides, look'd as gloriously, as if it had been cover'd with a thick Leaf of finely

[104] written over pencil '22', as is the case in the next two entries.
[105] The square brackets are in the MS.
[106] written over pencil '22'.
[107] paragraph crossed through in pencil.
[108] written in the left margin adjacent the first line of text, written over pencil '22'.
[109] altered from 'considerably'.
[110] altered from 'was'.

burnish'd Gold. Which splendid *Phænomena* lasted for several dayes, during which I show'd them to divers curious Persons, and among them to a Couple of ingenious Physicians, who were not a little surpriz'd, as well as delighted, with so odd & pleasant a Spectacle. NB.1. That the *Menstruum* I imploy'd to dissolve the Gold, was made, not with the usual proportion of Sal-armoniac, but only with an 8th part of that salt in reference to the *Aqua fortis*. 2. When the above mention'd *Serum* was grown so dry as to cleave in several places, it appear'd that the lower part was of a whitish Colour; and that the part that look't like leaf Gold, and before seem'd to be spread upon the bottom of the Glass, did indeed lye upon the upper surface of the Serum, and had immediately under it a little *Stratum* or bed of a fine purple Colour.

XX. 17.[111] Upon some powder'd Human Blood we left all night in the Cold, some *Serum* of Human Blood, and the next morning found, as we expected, that it had made a Solution of part of the Powder, and drawn a deep Tincture from it, which thô filtred through Cap-paper, retain'd the fine Colour of good Blood. /fol. 35/

Miscell.[112] A learned Physician and of great Practise lately[113] inform'd me, that he had observ'd in some Persons, that when after Phlebotomy their Blood was settled, it would appear blackish and ill colour'd, and sometimes with little or no *Serum*, but oftner cover'd with greenish or with Blewish stuff, that look'd more greasy than *Serum*; and yet that he would[114] not thence conclude with other Physicians, that the whole Mass of Blood was much corrupted; in regard that he afterwards[115] observ'd no such symptoms as must have been consequent to a far less Depravation; and sometimes in a few dayes the Blood of the same Person would appear florid and well condition'd, thô no such[116] Medicins had been us'd, as so great & quick a change could probably be ascrib'd to. Wherefore his opinion is, that such bad Colorations of the Blood do oftentimes proceed, not from Putrefaction or any great Corruption of the Mass, but from a confusion & temporary[117] unequal mixture of the Parts of the Blood, which render it turbid & discolour'd for a while, but afterwards, especialy being a[118] little assisted by proper Remedies, regains its due *Crasis* and Colour. But as for the[119] Observation it self, about the visible change of Blood, he told me had made it twenty times, and thought it fit to be much taken notice of in his Practise.

VII.1 q. Miscel.[120] A Lady of a midle age and sanguine Complexion, being afraid of a Relapse into an Inflammatory Distemper she had fallen into some months before, resolv'd to[121] let out a considerable quantity of Blood; and the vein being open'd whilst she sat near a window, I had the curiosity, as well as conveniency, to observe

[111] written in lefthand margin adjacent to first line of text over 'u. 17. n. 20' [?] in pencil. 'q. 22' written below in pencil, and above in ink.
[112] written by Greg in the left margin adjacent to start of text. Written over the same word in pencil. Preceded by 'XXXVIII.29. b.', written in ink over pencil 'o. 29 n 38b', and the whole crossed through in ink. 'q. 7' below in pencil.
[113] inserted in MS 198. Seven words later, 'that' inserted, replacing 'that' deleted in MS 198.
[114] inserted, replacing 'did' in MS 198.
[115] these five words inserted in MS 198, replacing 'For that' deleted.
[116] followed by 'persons' deleted in MS 198.
[117] these two words inserted in MS 198, replacing 'the a' deleted.
[118] these two words inserted in MS 198, replacing 'with a' deleted.
[119] these four words inserted in MS 198, replacing 'The' deleted.
[120] written by Greg in the left margin adjacent the first line of text, replacing 'XXXVIII. 29. a' deleted, itself written over pencil '29. 38.b'. 'q. Miscel.' is preceded by '7' in pencil.
[121] followed by 'bleed' deleted in MS 198.

the manner of flowing of the Blood, which came out[122] impetuously enough, and whilst I look'd upon it attentively in that inlightned place, I could easily take notice, that sometimes, there would come a parcel of Blood (which I gues'd might be about a Spoonful) that was of a much other and more florid Colour, than that part of the stream that presently preceded it, and that also[123] which follow'd it. And this not only I perceiv'd more than once, but upon my warning, both one of the By-standers, and the Lady her self, took notice of it. /fol. 36/

q. 7. Miscel.[124] A young Woman of a Sanguine Complexion, that said she had never been let Blood before, had a vein open'd in her Arm, whence flow'd a good quantity of Blood, of so fine a colour that the Chirurgeon look'd upon it as a Rarity, and as such brought it me. But by reason of my absence I knew not of it till night, and then thinking it too late to judge of it, I order'd it to be kept in a cool place till the next morning. When this was come, the servant that had laid it by was much surpriz'd to find the upper part of it turn'd of a white colour. And thô much Company and other Avocations kept me from seeing it till the afternoon, yet still it continu'd, as he assur'd me, of the same Colour. And thô when I sent for it up, the Motion the Porringer had been put into by the way, did somewhat disturb the Liquors it contain'd, yet I saw with pleasure, that the upper part was still almost totally whitish, in so much that finding in it no appearance of a morbid *Serum*, I suspected it was Chyle that had not been assimilated; and having sent for the Chirurgeon, inquir'd of him, at what hour this Blood had been taken, and he telling me, that 'twas yesterday at about two a clock in the afternoon; I further inquir'd, whether she had din'd that day; and he answering that she had, did thereby confirm me in my former Conjecture; and having suffer'd the Porringer to stand quietly again for a good while, that the chylous part of the Blood might be pour'd off from the concreted, which was of a good red; this being look'd on severall hours after, retain'd still a notable whitenes at the top, to the thicknes of a Silver Crown piece, or thereabouts. /fol. 37/

XXXII. 24[125] One pound of dry'd Humane Blood afforded by Destillation [6 ounces] + [5 drachms] of Phlegm, Spirit and Oyl, [3 ounces] + [2 scruples] of Volatile Salt, and [4 ounces] + [7 drachms] of Caput Mortuum, so that there was lost in the Destillation [1 ounce] + [3 drachms] + 20 grain.

XXXII. 24.[126] [6½ ounces] + [½ drachm] of the Fibrous part of Human Blood being dry'd in a moderate heat, till it was pulverable, weigh'd [1 ounce] + [7 drachms] + 17½ grains. So that the Proportion of the Fibrous part to its own Phlegm was as that of

XXII.[127] [4 ounces] + [2 drachms] of Serum of Human Blood dry'd in like manner weigh'd [½ ounce] + 18 grains so that the Proportion of the Serum to its own Phlegm was as that of

[122] followed by 'very' deleted in MS 198.
[123] inserted in MS 198.
[124] written by Greg in the left margin adjacent start of text; 'Miscel' is inked over but 'q. 7' is not. It replaces 'XIX. 15.' in ink, deleted, itself overwriting pencil 'u. 15 n. 19' [?].
[125] written in the left margin adjacent the first line of text, as is the case in the next five entries.
[126] '4' altered from '6'.
[127] followed by '16.' deleted.

XXXII. 24 [8 ounces] + [½ drachm] of entire Human Blood being dry'd with a moderate heat, till it was just pulverable weigh'd [2 ounces] + 15 grains, <so that the Proportion of the entire Blood to its own Phlegm[128] was as that of> /fol. 38/

XXII. 'Tis asserted by some Chymists and Physicians, and upon their authority taken for granted, that when Blood or other Animal Liquors begin to putrefy, they contract an Acidity. But, thô the Authors of this Observation be eminent in their Art, yet since 'tis of no small importance to the Theory, and consequently to the practise of Physick; I think it ought not to be taken for granted or beleiv'd, upon the Authority of a disputable *Hypothesis*, but be examin'd by Observations and Experiments. On this ground we took some *Serum* of sound Human Blood, and kept it in a Vial, which whilst fresh, as we have elsewhere cited, restor'd[129] the blew colour to a [tincture] of *Lignum Nephriticum* or a *Succedaneum*[130] to it. And having put this *Serum* in a Vial, we try'd it from day to day, what effect it would have upon the [tincture] (still taken fresh and fresh;) but did not find that it would destroy the Cæruleous colour, even when its very offensive smell argu'd a notable degree of Putrefaction, thô a single drop or less of vinegar would have done it. This Experiment needs and deserves further tryal, which for want of healthy Blood I have not yet been able to make. /fol. 39/

XXV. 18 To show that the spiritous and Saline Particles of Human Blood, thô reduc'd to the minutenes of invisible exhalations, do[131] yet retain their volatile Urinous nature, and a considerable activity; I took some Spirit of Human Blood that was none of the best rectify'd, and upon the open Orifice of a slender vial about half full of this Liquor, I laid a piece of polish'd Copper, that it might stop the ascending *Effluvia*, and thereby receive their Action. The Event was such as I expected; for the smooth surface of the Copper was almost in a trice manifestly discolour'd and not in all places alike, but in some very prettily. And this, thô no External Fire was imploy'd, to make the volatile Particles ascend more copiously, or act more briskly. This Tryal was more than once repeated. But upon a Body not solid as the mettal was, the Effect of the Spiritous *Effluvia* of the Blood was very quick, and much more notable; for having cover'd the Orifice of the Vial with a Paper, whereon I had well bruis'd 2, or 3, Leaves of a Clove Gilly flower; the Particles that ascended, thô in the cold, presently turn'd that part of the Paper that cover'd the Orifice, from a deep red to as deep a blewish green. And when after the same manner I imploy'd a piece of Paper, which the Juice of black cherries had dy'd of a deep purplish red, the Part that cover'd the Orifice of the Vial was presently turn'd of a fair green. And if I much misremember not, the Experiment succeeded when <we did not> lay downwards that side of the Paper on which the Juice had been rub'd, but that side which was yet unting'd and dry. /fol. 40/

Observatio circa Proportionem partis purpureæ ac Substantiæ seroso-gelatinosæ Sanguinis, intra vasa animalium fluctuantis. Les Ouvrages Des Savans p. 196. 197.[132]

[128] altered from 'Serum' [?]. The text in the insertion is not completed.
[129] altered from 'restore'.
[130] altered in composition.
[131] altered from 'undo'.
[132] The reference is written in the left margin beside the first lines of the following text. It is to *Le Journal des Sçavans* for 28 June 1683: *Journal des Scavans pour l'Anneé MDCLXXXIII* (Paris, 1683), pp. 186-8. The page reference was perhaps accidentally miscopied. This report is paraphrased from the account there, rather than being copied verbatim.

La masse du sang est composée de trois choses, du serum aqueux, de la substance fibreuse, et d'une teinture rouge, c'est á dire du sang proprement nommé. Mais parce que dans le sang tiré par la saignée, & coagulé, la partie fibreuse est melée et liée avec le sang, et le rend épais; et qu'il n'y a que le serum qui en soit bien distingue, l'on a cru qu'il n'y avoit que ces deux parties dans le sang. Mais depuis 50. ans l'on a fu fort bien separer la fibreuse, et la distinguer du sang même, sans avoir bien su pourtant observer la proportion de ces trois parties entr'elles. J'ai quelque fois douté qu'il n'y avoit pas beaucoup de cette partie pourprée, je veux dire de celle qui fait le sang proprement nommé, et est le sujet de tant de disputes entre les Anatomistes; puis ayant observé avec le Microscope de petits globules rouges nageant dans une eau claire & limpide, et les ayant compares avec elle, j'ai trouvé qu'il en avoit beaucoup moins que d'elle. Et comme j'etois assuré qu'il y avoit encore beaucoup de ces globules melés et embarasses avec la substance fibreuse, et que je ne pensois pas pourvoir discerner á l'œil combien il y en avoit, j'ai fait diverses experiences, sur divers animaux, sur des hommes memes, et j'ai vu que pour une partie de cette teinture il y en avoit tantôt dix, tantôt douze, quelquefois plus, et jamais moins, de la partie sereuse, et fibreuse. Voici la derniere experience que j'ai faite sur le sang, d'un homme qui se portoit bien. J'ai laissé couler dans une livre d'eau chaude autant de sang qu'il en faloit pour augmenter l'eau du poids de trois onces et une dragme de substance fibreuse. J'ai fait distiller doucement le reste, et il laissoit une livre une once & six dragmes d'eau: deux dragmes et demie de grumeaux rougeatres restant au fonds de sa retorte. Si bien que trois dragmes et demie d'eau s'etoient en partie evaporeés en air, & en partie avoient eté imbibeés par le papier gris. La couleur bizare de ce sang que je remarquois par le Microscope, me convainquant [altered in composition] qu'il y restoit encore quelque partie fibreuse, je macerai dans l'eau tiede cette petite masse, pour en separer toute la gelée: puis l'ayant fait secher il ne restoit plus que deux dragmes et trois grains de cette teinture de sang, c'est á dire une douzieme partie de la masse: tant il est vrai que ce qui fait l'espece du sang, & lui donne ce nom, est tres peu de chose.

BOYLE'S SETS OF 'HEADS'

c. Tryall about the bloud espetially humane (Bodleian Library, MS Locke f. 19, pp. 272–3, 302–3)

Tryall about the bloud espetially humane

Of the Chymicall Analysis of fresh bloud

Of the analysis of long fermented or rather putrified bloud

Of the difference betwixt the serum & the solid part of the bloud

Of the analysis of the serum

Of the seperation of the Chyle from the masse of bloud & the difference betwixt that & the serum sanguinis as also betwixt that & the Chyle in the receptacle or milkie vessells

Of the difference of the bloud from the Lympha & from the Nervous liquor & from the Urin & from Sweat & Spittle /p. 273/

Of the colour tast smell & other obvious qualitys of Bloud.

Of the bloud of the Menstruum

Of the weight of bloud in reference to other liquors

Of the weight & quantity of the parts of bloud in reference one to an other

Of the difference as to weight betwixt humane bloud as betwixt the bloud of a man & woman

The bloud of men of differing nations ages complexions Bulke, as also betwixt the bloud of the same man being taken fasting or otherwise, as in health or in sicknesse, in severall seasons of the year (as also (ante & post coitum) of the difference betwixt arteriall & venall bloud

Of the times wherein different blouds will evaporate out of the same vessells

Of the putrefaction of bloud in close vessells & what insects it will produce

Of severall ways of keeping bloud from putrefaction /p. 302/

Of the relation betwixt acid spirits & bloud

The relation betwixt volatile spirits & bloud

The relation betwixt alcalys & bloud

The relation betwixt [spirit of wine] spirit anomalous & bloud

What change bloud will have if the party have dranke very largely the day before

Whether any discovrable change will be made in the bloud of a Dog upon violent emeticks or Catharticks

Whether a strong purge being taken either the serum or Urine of it is purgative

Whether Rubarb Turpentine Gum Guaiacum being copiously taken the masse of bloud or the separate serum[1] of it, (a veine being opend in some part remote from the Stomach & guts) will haue its colour or odor inbued after the same manner /p. 303/ & more more [*sic*] strongly then the Urin

d. Heads of the History of human blood (BP 18, fols 43–4)

Heads of the History of human blood

Of the <specific> weight of Human blood in comparison of Water.

Of the weight of the consistent part & of the serous part of the same[2] <parcel> of blood.

Of the <specific> weight of the consistent portion of Blood in reference to the serous part, & also to Water.

Of the specific gravity of the serum sanguinis.

Of the specific gravity of moderately dry'd blood.

Of the several similar substances obtainable, upon the Analysis of an entire mass of blood by distillation.[3]

Of the Analysis of the fibrous part of blood by Distillation.

Of the Analysis of the serous part by distillation.

Of burning of blood, crude or dry'd, upon quick coals.

Of the fixt salt of blood, if it have any.

Of the total volatility, or partial fixity of blood.

Whether the Serum of blood will putrefie like urine? and whether, if it will, the spirit will as in putrefy'd urine preceed the phlegm?

Whether the redness can be drawn from Human blood by boyling it in water?

Whether spirit of wine will dissolve, & draw a tincture from dry'd blood.

Whether its own spirit, or that of urine or sal armoniac, will dissolve, or draw a tincture from dry'd blood.

[1] followed by 'or Urin of it is purgative' deleted.
[2] followed by 'portion' deleted.
[3] altered from 'destillation'.

Whether blood flowing out of a vein into spirit of wine, or spirit of sal-armoniac, & immediately shaken to incorporate the Liquors, will be thereby kept from coagulation. /fol. 44/

Whether the vapours or reeks of newly drawn blood will stain a bright copper farthing.

Of the wayes of preserving of blood, & first with spirit of wine; next by spirit of blood, sal armoniac, & other urinous spirits; thirdly by gas; 4. by oyl of turpentine; 5. by oyl of anise-seeds &c. sixthly by a peculiar brine; seventhly by copper, salt-petre, sugar, &c.

Whether human blood hermetically seal'd, will by putrefaction produce[4] any real Insects

What will become of blood left to putrefy in an open bolt-head with a very long neck, & kept till the contained matter be suffer'd to run through all the changs it will admit.

Whether blood will putrefy & breed any insects, in a large vacuum Boylianum.

e. Titles of the 1st Order For the Natural History of Human Blood (of healthy men) (BP 18, fol. 48)

Titles of the 1st Order For the Natural History of Human Blood (of healthy men)

Of the Colours of Human Blood Arterial and Venal.

Of the tast of Human Blood.

Of the Odours of Human Blood.

Of the Specifick Gravity of Human Blood entire.

Of the Specifick Gravity of the serous part of Human Blood.

Of the Specifick Gravity of the red & fibrous part of Human Blood.

Of the Consistence of entire Human Blood.

Of the heat of freshly emitted Human Blood.

Of the inflammability, and some other qualities of Human Blood.

Of the disposition of Human Blood to concretion, and the time wherein it is perform'd.

Of the Aerial particles naturally mix'd with Human Blood and also found in its distinct parts.

Of the Spontaneous or natural Analysis of Human Blood into a serous and fibrous part.

Of the differences between the serous and the red part of Human Blood.

Of the Artificial or Chymical Analysis of Human Blood and first of its Spirit.

Of the volatile salt of Human Blood and it's figures.

[4] altered from 'producd'.

Of the fleghm of distil'd Human Blood.

Of the two Oyles of Human Blood.

Of the fixt salt of Human Blood.

Of the Terra Damnata of Human Blood.

Of the proportion of differing substances Chymically obtain'd from Human Blood.

Of the fermentation & Putrefaction of Human Blood and its Phænomena.

Of the Liquors & Salts that coagulate Human Blood.

Of the Liquors & Salts that impede or dissolve it's Coagulation.

Of the Liquors &c. that preserve Human Blood.

Of the mixtures of Human Blood may admit from minerals.

Of the motions of Human Blood especially that cal'd Circulation.

Of the mechanical uses of as in Husbandry &c.

Of the Chymical uses of Human Blood.

Of the Medicinal uses of Human Blood.

Of the difference between Human Blood as tis found in sound Persons differingly constitut[ed][5] & circumstanced, as men, women, children, Moors, Negroes &c.

Appendices.

Of the Affinity & difference between the Blood of Men, and that of divers other Animals, as Quadrupeds, Birds, Fishes, and Sanguineous Insects.

Promiscuous Observations & Experiments about Human Blood.

Paralipomena relating to the History of Human Blood. /col. 2/

Titles of the Subsections concerning the spirit of Human Blood.

Whether Human Blood will be made to afford any vinous spirit.

Whether Human Blood may may be so order'd by Fermentation or Putrefaction as that in Distillation <a>[6] Spirit <either Urinous or vinous> may ascend before the Phlegm.

Whether spirit of Human Blood be really any thing, but the Volatile Salt and Phlegm well commix'd.

Of the Species of Saline Bodies to which the Spirit of Human Blood is to be refer'd.

Whether spirit of Human Blood be differing from Spirit of Urine, and other spirits that are cal'd Volatil Alcaly's.

Of the Quantity of Spirit contain'd in Human Blood whether accompany'd w/th it's Serum or dry'd.

Of the Odour, taste, Colour, Transparence, & consistence of the Spirit of Human Blood.

[5] letters missing where page is damaged.
[6] replacing 'the' deleted.

Of the Specifick Gravity <subtilty[7] of parts & diffusivenes> of Spirit of Human Blood.

Of the Expansion of Spirit of Human Blood by heat, and its Condensation by Cold.

Of the Dissolutive Power of the spirit of Human Blood.

Of the Tinctures that may be drawn with spirit of Human Blood.

Of the Coagulating Power of the Spirit of Human Blood.

Of the Precipitating Power of the spirit of Human Blood.

Of the Balsamick or preserving Power of Human Blood.

Of the Affinity between spirit of Human Blood and some Chymical Oyls & vinous spirits.

Of the Perfuming of spirit of Human Blood.

Of the Relation between spirit of Human Blood and the Air.

Of the hostility of spirit of Human Blood with Acids whether they be in the form of Liquors, or of Fumes.

Of the spoiling of Spirit of Human Blood by Quicklime.

Of the Medicinal vertues of spirit of Human Blood[8] outwardly <aplyd.>[9]

<Of the Medicinal [virtues] of spirit of Human Blood inwardly us'd in> Pleurisys, Headachs, Coughs, Feavours, Scurvy, Cachexies, Dropsy's, Fits of the Mother &c.

An Appendix containing Promiscuous Experiments & Observations concerning the spirit of Human Blood.

f. Materials for the Scheme of Titles of the Second Classis of the Natural History of Human Blood (BP 18, fols 51–2)

Materials for the Scheme of Titles of the Second Classis
of the Natural History of Human Blood.

18[10] Whether the Chymical analysis of long fermented or putrified humane blood, will[11] give productions considerably differing from that of fresh blood; and if it doe, wherein that difference will consist.

Of the several differences betwixt the serum & the consistent part of Human Blood.[12]

[7] followed by 'such subtilty' [?] deleted.
[8] followed by 'either inwardly or' deleted.
[9] followed by 'us'd in' deleted.
[10] The numbers and other comments (e.g. 'q' and '3rd P') which precede the entries in this list are inserted in the margin.
[11] followed by 'be' deleted
[12] this entry is crossed through.

q Of the difference between the serum sanguinis & the chyle in[13] the receptacle of milkey vessels.

3rd P Of the difference between the serum sanguinis & fresh urine[14] from the Lympha & from sweat & from spittle.

29 Of the peculiar qualitys of the menstruous blood of a healthy women.

29 Of the difference as to weight of the blood of a man and that of a woman.

30 Of the difference as to weight betwen Human Blood & that of other animals (quadrupeds, birds & fishes).

29 Of the differences to be ordinarily[15] found in the blood of persons of differing nations, ages, complections, bulk, stature &c

29 q Of the differences to be found between the blood of the same man, being taken fasting, or <at> several distances from meals, <& after large drinking> [16]before & in, or after long journeys or much ex[er]cise. /fol. 51v/ Several & some of them very distant seasons of the year (as also ante & post[17] Coitum.)

Of the difference between Arterial and venal blood at the first emission & afterward[18]

13 q Of the several ways of keeping blood from putrifaction

q Whether blood putrified in exactly closed vessels, or some that are onely pervious to the fine parts of the aier, at least not to insects, nor probably to their seeds will produce worms or other insects.

14 Whether spirit of salt, or crude salt &c taken at the mouth do[19] materially after many hours remain in the mass of blood, or be discharged[20] by urine, & the consequences of volatilization.

29 Whether the <Menstruous>[21] blood of women <differ from their other Blood> & from it self according to the differing conditions of the person it comes from.

Whether any (or if any) What difference, may be found by chymical analyses (& other wise) betwixt blood, & those other juices of the body, that are supposed to be either Further elaborations[22] milk, sperm[23] <Gall &c.,>

What change hath the blood of animals strangled by suffocation or in the /fol. 52/ Exhausting Engin, or dround in water, or in milk, or in spirit [of] wine, or in chymical oyls, Or suffocated in mercury will have produced in it by their peculiar kinds of death.[24]

[13] altered from 'on'.
[14] followed by '&' deleted.
[15] followed by 'to be' deleted.
[16] preceded by 'a' deleted.
[17] followed by 'ampl. ver.' deleted.
[18] This entry is crossed through.
[19] altered from 'be'.
[20] altered from 'dischard'.
[21] replacing 'lunary' deleted.
[22] followed by 'or else degenerations of it such as are' deleted.
[23] followed by 'the pus of empostumes, the gleeting of ulcers the water to be found in the abdomen of Hydropick persons &c.' deleted.
[24] This entry is crossed through in pencil.

30 Whether by a very nice weather glass, the blood of fishes & frogs be actualy as cold, or colder, than aier, or water, & whether the blood & bodys of those animals when opend alive, be as cold as when they are dead.

30 Whether the blood of those animals that are actualy cold, will apear upon chymical analysis (or other wise) to differ from the blood of hot animals.

30 Whether alimental juice or Liquor of those animals that <have>[25] no blood properly so cald, apeard different from the blood of cold animals otherwise then in poynt of[26] colour.

g. 'Primary Titles Additional' and 'Secondary Titles or Subtitles For the History of Human Blood' (BP 18, fols 56–7)

<A Preliminary Title of the Process of Sanguification, or the Change that the Aliment taken in at the Mouth[27] undergoes to be turn'd into perfect Blood.>

Primary Titles Additional For the History of Human Blood.

Of the order wherein the differing Substances of Human Blood ascend in the first Distillation, & in Rectification.

Of the Analysis of Human Blood by Distillation, according as severall Additaments are mix'd with it.

Of the Constituent Parts of Human Blood as they are discoverable by the Microscope.

Of the Difference between Arterial Blood & Venal, at the first emission & afterwards.

Whether the Blood[28] consist of those differing Substances that Physicians commonly suppose to convene in it, viz. Melancholy, Phlegm, Bile, & Blood strictly so call'd.

Of the Natural & Regular Productions of the Blood such as are suppos'd to be[29] Spirits Naturall Animal & Vital, Milk, or Semen &c.

Whether any, or (if any) what Difference may be found by Chymical Analyses (& otherwise) betwixt Blood & those other Juices of the Body that are suppos'd to be[30] further Elaborations of it, such as are Milk, Sperm, Gall &c.

What Change the Blood of Animals strangled by suffocation or in the Exhausting Engine, or drown'd in Water, or in Milk, or in Spirit of Wine, or in Chymical Oyls, or suffocated in Mercury, will have produc'd in it by their peculiar kinds of Death. /col. 2/

[25] replacing 'are' deleted.
[26] followed by 'co' deleted.
[27] followed by 'ad' deleted.
[28] followed by a deleted stroke.
[29] followed by 'Milk' deleted.
[30] followed by 'other' deleted.

Secondary Titles or Subtitles For the History of Human Blood.

20[31] The Differences between the Serous & Red Parts of Human Blood may be in Gravity, Consistence, Colour, Diaphaneity, Tast, Contents,

34[32] Whether Human Blood or even the Consistent Part of it, <will>[33] by Putrefaction or long Fermentation become Fluid.

7[34] Whether Arterial Blood as soon as ever it settles, thô kept from the Air, would have a florid superficies;

And in case it have, whether the florid Colour be found to extend to the whole mass of the Blood, & if not, how far it reaches.

5[35] What Aliments will impart their Odour or their Colour, <or their Tast,> or some other manifest Quality, to the mass of Blood; or at lest to Liquors that are suppos'd to be deriv'd thence, as Urine, Milk &c.

Whether any observable Difference can be found between the Blood of sucking Children, that feed only upon the Mothers or Nurses Milk, & the Blood of the same persons or others (as near as can be judg'd) in their Circumstances, being grown up to Youth or Manhood.

How far the Occult Qualities, as they are call'd, of things taken at the Mouth may have their Corpuscles discover'd to be in the mass of Blood or in Liquors supposd to be deriv'd thence. To which belongs Hippocrates's Woman fed with Elatorium, & the Nurse I saw which took Opium.

Whether any considerable difference can be discover'd between the Blood of Bramins[36] that never eat any thing that has life, & that of their Countrymen who eat freely what they please.[37] /fol. 56v/

24[38] Whether the Chymical Analysis of long fermented or putrified Human Blood will give productions considerably differing from that of fresh blood & if it doe, wherein the difference will consist.

38[39] Of the peculiar qualitys of the menstruous blood of healthy women.

Of the difference as to weight of the blood of a man & that of a woman.

[31] altered from '17'. This and the numbers which precede the other entries in the list are inserted in the margin.
[32] altered from '25'.
[33] replacing 'be' deleted.
[34] replacing two heavily deleted numbers. This entry is bracketed together with the following item: the marginal number refers to them both.
[35] replacing '14' deleted. This entry is bracketed together with the following three items: the marginal number refers to them all.
[36] altered from 'Bramines'
[37] followed by the following entry, deleted: 'Whether the Blood consist of those differing Substances that Physicians commonly suppose to be conv'.
[38] altered from '18'.
[39] replacing '29' deleted. This entry is bracketed together with the following item: the marginal number refers to them both.

42[40] Of the difference as to weight[41] between Human Blood & that of other animals (quadrupeds, birds & fishes.

38[42] Of the differences to be ordinarily found in the blood of persons of differing nations, ages, complections, bulk stature &c.

5[43] Whether spirit of salt or crude salt &c taken at the mouth materialy after many hours remain in the mas of blood or be discharged by urin &[44] the consequences of volatilization.

38[45] Whether the menstruous blood of women differ from their other blood & from it self according to the differing conditions of the person it comes from.

42[46] Whether by a very nice weatherglas, the blood of fishes & frogs be actualy as cold, or colder, then air, or water, and whether the blood & bodys of those animals[47] when opened alive be as cold as when they <are>[48] dead.

Whether the blood of those animals that are actualy cold will apear upon Chymical analysis (or other wise) to differ from the blood of hot animals. /fol. 57/

42[49] Whether alimental juice or liquor of those animals that have no blood properly so cald, apear different from the blood of cold animals other wise then in poynt of colour.

40[50] Of the Chymical Analysis of Milk, & the proportion of the differing substances obtainable from it.

Of the Odours & Tasts that may be communicated to Milk by certain particular Aliments.

Of the Occult Qualities, Purgative Narcotic &c. that Milk may acquire by Medicines taken at the Mouth.

Of the Specific Gravity of Milk, & its severall Parts.

Whether Milk by Putrefaction will emit a Spirit first, as Urine does.

Of the Constituent Parts of Milk as they are discoverable by the Microscope.

31[51] Let Tryal be made, whether such a substance will be afforded by entire Blood freshly drawn.

[40] altered from an illegible number.
[41] followed by 'as' deleted.
[42] replacing a deleted number.
[43] altered from '14'.
[44] followed by '&' deleted.
[45] altered from '29'.
[46] altered from '30'. This entry is bracketed together with the following item: the marginal number refers to them both.
[47] followed by 'that are actually cold, will appear open' and five 5 illegible words, all deleted.
[48] replacing 'be' deleted.
[49] altered from '30'.
[50] This entry is bracketed together with the five following items: the marginal number refers to them all.
[51] This entry is bracketed together with the four following items: the marginal number refers to them all. '31' also written in pencil at the start of this entry.

Let the same[52] Tryal be also made with the stable part of Blood & with the Serum separately.

Try whether Putrefaction <(for a shorter or a longer time)> will fit Blood to yield[53] a Noctiluca. [I caus'd it to once carefully try'd, but without success.][54]

Try, whether Blood being long expos'd to the open Air (but defended from Fly-blowes) either by it self, or mingl'd with Earth, will become fit to afford a shining Matter.

Endeavour to obtain a Noctiluca by distilling Blood with the <most promising>[55] Additaments.

29[56] Try with Oyl of Vitriol to distill from the Fixt Salt of Blood an Acid Spirit like that of common Salt.

Make the like Tryal with Bole or Clay in stead of Oyl of Vitriol.

Try with Spirit of Nitre to obtain from the Fixt Salt of Blood, an Acid Spirit & a Lixiviate Alcaly.

h. 'Preliminary Titles' and 'Titles of the first Order' for the history of blood (BP 18, fols 45v–6)

Preliminary Titles

1. Of the Process of Sanguification, or the Changes that the Aliment taken in at the Mouth undergoes to be turn'd into perfect Blood.
2. Of the Quality of this Liquor, of its continual Supplyes & Absumtion, & of its Proportion to the rest of the <Human> Body.
3. Of the Motion of the Blood & of its Circulation

<Titles of the first Order>

1. Of the Difference between Arterial Blood & Venal, at the first emission & afterwards. [To which Title belongs an Advertisement, That the following History treats but of Venal Blood.][57]
2. of the Difference between the Blood. of living & that of dead men, whether it be within the Veins or out of them.

[52] altered from 'thesame'.
[53] followed by 'y' deleted.
[54] These square brackets are in the MS.
[55] replacing 'likelyest' deleted.
[56] This entry is bracketed together with the two following items: the marginal number refers to them all.
[57] These square brackets are in the MS.

3. Whether the Blood consist of those differing substances, that Physicians commonly suppose to convene in it, viz. Phlegm, Bile, Melancholy, & Blood strictly so call'd.

4. whether Human Blood consist of or contain, either Chyle separable in its pristine form, or a serum that serves but for a vehicle to the true Blood.

5.[58] of the Mixtures that Human Blood may admit from Aliments.

6. of the Constituent Parts of Human Blood as they are discoverable by the Microscope

7.[59] of the Colours of Human Blood

8.[60] Of the Tasts of Human Blood

9.[61] of the Odours of Human Blood

10.[62] of the Heat & Coldness of Human Blood

11.[63] of the Inflammability, Volatility, & some other Qualities of Human Blood

12.[64] of the Aereal Particles naturally mix'd with Human Blood & also found in its distinct Parts.

13.[65] of the Specific Gravity of entire Human Blood & that of its Consistent Part and of its Serum.

14.[66] Of the Consistence of entire Human Blood & its two most obvious Parts.

15.[67] of the disposition of Human Blood to Concretion & the Time wherein it is perform'd.

16.[68] of the Liquors, Salts, &c. that Coagulate Human Blood.

17.[69] Of the Liquors, Salts &c. that impede or Dissolve its Coagulation.

18.[70] <Of the Liquors &c. that preserve Human Blood or its Parts.>[71]

19.[72] Of the Spontaneous or Natural Analysis of Human Blood into a Serous & a Solid Part.

20. of the Differences between the Serous & Solid Part of Human Blood. /fol. 46/

21.[73] of the respective Quantityes of the Serous & Solid Part of Human Blood.

22. of some other things relating to the Serum of Human Blood.

[58] marked '14.' This and the following marginal numbers (noted in the footnotes below) are all written in red ink. They give the number of the equivalent title in the printed list of titles.
[59] marked '1.'
[60] marked '2.'
[61] marked '3.'
[62] marked '4.'
[63] marked '5.'
[64] marked '6.'
[65] marked '8. 7.'
[66] marked '9.'
[67] marked '10.'
[68] marked '11.'
[69] marked '12.'
[70] marked '13.'
[71] replacing 'of the mixtures that Human Blood may admit from aliments' deleted.
[72] marked with an illegible number.
[73] marked '16.'

23.[74] Of the Chymical Analysis of Human Blood according as severall Additaments are mixed with it.

24.[75] Of the Chymical Analysis of Human Blood made without Additaments, and especially of the Order wherein the differing substances ascend in the first Distillation & in Rectification.

25.[76] of the Spirit of Human Blood.

26.[77] of the Volatile Salt of Human Blood.

27.[78] of the Phlegm of distill'd Human Blood.

28.[79] of the (two) Oyls of Human Blood.

29.[80] Of the Fixt Salt of Human Blood.

30.[81] of the Terra dammata of Human Blood.

31. whether from Human Blood either fresh or putrefy'd, may be obtain'd a Noctilucal substance, that is a Matter shining without the help of External Light.

32.[82] of the Proportion of the differing Substances Chymically obtain'd from Human Blood.

33. what Change <(if any)> the Blood of Animals strangled by suffocation, or in the Exhausting Engine, or drown'd in Water, or in Milk, or in Spirit of Wine, or in Chymical Oyls, or suffocated in Mercury, will have produc'd in it by their peculiar kinds of Death.

34.[83] of the Fermentation or Putrefaction of Human Blood & its Phenomena.

35.[84] of the Mechanical Uses of Human Blood & its Parts, as in Husbandry, the Trade of Dying &c

36.[85] of the Chymical Uses of Human Blood & its parts, in Solutions, Precipitations, Extractions &c

37.[86] of the Medicinal Uses of Human Blood & its Parts.

38.[87] of the Difference between Human Blood & Human Blood as 'tis found in sound Persons differingly constituted & circumstantiated, as Men, Women (when Menstruous & when not) Children, Moors, Negros &c.

39. of the Natural & Regular Usefull Productions of the Blood, such as are suppos'd to be Spirits Animal & Vital, the Gall, the Succus Pancreaticus, the Semen, the Lympha

[74] marked '18.'
[75] marked '18.'
[76] marked '18.'
[77] marked '19.'
[78] marked '20.'
[79] marked '21.'
[80] marked '22.'
[81] marked '23.'
[82] marked '24.'
[83] marked '25.'
[84] marked '26.'
[85] marked '27.'
[86] marked '28.'
[87] marked '29.'

&c. & also of those that are held to be but Excrementitious as Urine, Earwax, Spittle, Tears, &c.

40. whether Milk be produc'd of the Blood as its Material Cause.

41. whether any, or (if any) what Difference may be found by Chymical Analysis (& otherwise) betwixt Blood & those other Juices of the Body that are suppos'd to be further Elaborations of it, such as are Milk, Sperm, Gall &c.

42.[88] of the Affinity & Difference between the Blood of Men, & that of divers other Animals, as Quadrupeds, Birds, Fishes, & Sanguineous Insects.

i. 'Tryals to be made on humane blood' (MS 185, fol. 56)

1 Tryals to be made on humane blood.

2 What proportion of Serum being abstracted will preserve blood.

[3][89] What Proportion of Spirit of blood will preserve Serum.

4 What Proportion of Spirit of vine [sic] wil preserve blood[90] after tis drawen of.

5 What quantity of Air wil be afforded by Blood in such a time.

6 What quantity of Aire wil be afforded by Serum in such a time.

7 What quantity of gall wil preserve blood.

8 In what time blood wil begin to putrify.

9 Of bleeding thrô a Funnel with a long neck.

10 Of preserving Blood with Flower or[91] Balsom of [sulphur].

11 Of preserving blood with Canary wine.

12 Of the mixture of Blood & Milk, & Serum & milk,[92] & their times of putrefaction.

13 Of Covering Blood with Turpentine & colophony.

14 Of Covering Blood with Purifyd Butter[93] & wax.

15 The Tryal of[94] Juice of Scurvy gras &c upon Blood.

[88] marked '30.'
[89] supplied where page is damaged.
[90] MS 189 has 'wyne', and the next word but one, 'tis' is altered in composition.
[91] MS 189 has '&', and '[sulphur]' is there followed by a deleted character.
[92] comma following milk begun as ampersand and altered in composition.
[93] 'Butter' followed by '&' deleted.
[94] followed by 'the' in MS 189.

j. Untitled heads concerning the Gall (BP 18, fol. 47)

Of the Colours of the Gall.

Of the Odour of the Gall.

Of the Tast of the Gall.

Of the Consistence & Viscosity of the Gall.

Of the Specific Gravity of Gall.

Of the Aerial Particles mingled with Gall.

Of the abstersive Quality of the Gall.

Of the Heat & Coldnes of the Gall actual and potential.

Of the disposition & indisposition of the Gall to putrefaction.

Whether Gall may be fermented.

Whether Gall by Putrefaction or Fermentation will yeild a Spirit or Salt ascending before the Phlegm.

Whether Gall will without being impregnated by Flyes or other Insects breed Maggets or Worms &c. and if it produce any, of what kind or kinds they will be.

Whether Gall by reason of its Bitternes will preserve other Body's from Putrefaction. /col. 2/

Whether Gall before it be any way prepar'd do appear to abound with Acid or with Alcaly and if with either with which.

What Separations or Coalition will be made in Gall by putting into it Alcalies, Acids &c.

Of the Combustibility of Gall.

Of some Bodies that will be disolv'd by Gall and some that will not.

Of the Chymical Analysis of Gall by Destillation.

Of the Proportion of the Chymical Principles in Gall.

Of the Chymical Principles of Gall in particular the Spirit [of] Salt, Oyl &c.

Of the affinity of Gall with some Liquors and other Bodies.

Of the Hostility of Gall with some other Bodies.

Of the Mechanical uses of Gall.

Of the Chymical uses of Gall.

Of the Medicinal uses of Gall whether externally, or internally employ'd.

Table Collating the Main Versions of the Heads for the History of Human Blood. (See note on p. xiv.)

c. Bodleian Library, MS Locke f. 19, pp. 272-3, 302-3: 'Tryall about the bloud espetially humane' (above pp. 19–20)	**d. BP 18, fols 43-4: 'Heads of the History of human blood' (above pp.20–1)**	**e. BP 18, fol. 48: 'Titles of the 1st Order' (above pp. 21–3)**	**Printed First Order Heads: *Works*, vol. 10, pp. 12-13**	**f. BP 18, fols 51-2 'Materials for the Scheme of Titles of the Second Classis of The Natural History of Human Blood' (above pp. 23–5)**	**g. BP 18, fols 56-7 'Primary Titles Additional' and 'Secondary Titles or Subtitles For the History of Human Blood' (above pp. 25–8)**	**h. BP 18, fols 45v-46 'Preliminary Titles' and 'Titles of the first Order' for the history of blood (above pp. 28–31)**
[1] Of the Chymicall Analysis of fresh bloud	[6] Of the several similar substances obtainable, upon the Analysis of an entire mass of blood by distillation	[14] Of the Artificial or Chymical Analysis of Human Blood and first of its Spirit.	18. Of the Artificial or Chymical Analysis of Humane Blood, and first of its Spirit.		[2] Of the order wherein the differing Substances of Human Blood ascend in the first Distillation, & in Rectification.	24. Of the Chymical Analysis of Human Blood made without Additaments, and especially of the Order wherein the differing substances ascend in the first Distillation & in Rectification.
	[7] Of the Analysis of the fibrous part of blood by Distillation.				[3] Of the Analysis of Human Blood by Distillation, according as severall Additaments are mix'd with it.	23. Of the Chymical Analysis of Human Blood according as severall Additaments are mixed with it. 25. of the Spirit of Human Blood.
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[2] Of the analysis of long fermented or rather putrified bloud				[1] Whether the Chymical analysis of long fermented or putrified humane blood, will give productions considerably differing from that of fresh blood; and if it doe, wherein that difference will consist.	[18] Whether the Chymical Analysis of long fermented or putrified Human Blood will give productions considerably differing from that of fresh blood & if it doe, wherein the difference will consist.	
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[3] Of the difference betwixt the serum & the solid part of the bloud		[13] Of the differences between the serous and the red part of Human Blood.	17. Of the Differences between the Serous and the Red part of Humane Blood.	[2] Of the several differences betwixt the serum & the consistent part of Human Blood.	[10] The Differences between the Serous & Red Parts of Human Blood may be in Gravity, Consistence, Colour, Diaphaneity, Tast, Contents,	20. of the Differences between the Serous & Solid Part of Human Blood.
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[4] Of the analysis of the serum	[4] Of the specific gravity of the serum sanguinis. [8] Of the Analysis of the serous part by distillation. [12] Whether the Serum of blood will putrefie like urine? and whether, if it will, the spirit will as in putrefy'd urine preceed the phlegm?					
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[5] Of the seperation of the Chyle from the masse of bloud & the difference betwixt that & the serum sanguinis as also betwixt that & the Chyle in the receptacle or milkie vessells				[3] Of the difference between the serum sanguinis & the chyle in the receptacle of milkey vessels.		
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[6] Of the difference of the bloud from the Lympha & from the Nervous liquor & from the Urin & from Sweat & Spittle				[4] Of the difference between the serum sanguinis & fresh urine from the Lympha & from sweat & from spittle.		
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[7] Of the colour tast smell & other obvious qualitys of Bloud.	[13] Whether the redness can be drawn from Human blood by boyling it in water?	[1] Of the Colours of Human Blood Arterial and Venal.	1. Of the Colours of Humane Blood Arterial and Venal.		[12] Whether Arterial Blood as soon as ever it settles, thô kept from the Air, would have a florid superficies; [13] And in case it have, whether the florid Colour be found to extend to the whole mass of the Blood, & if not, how far it reaches.	7. of the Colours of Human Blood.
		[2] Of the tast of Human Blood.	2. Of the Tast of Humane Blood.			8. Of the Tasts of Human Blood.
		[3] Of the Odours of Human Blood	3. Of the Odours of Humane Blood.			9. of the Odours of Human Blood.
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[8] Of the bloud of the Menstruum		[30] Of the difference between Human Blood as tis found in sound Persons differingly constitut[ed] & circumstanced, as men, women, children, Moors, Negroes &c.	29. Of the Difference between Humane Blood as 'tis found in sound Persons differingly constituted and circumstantiated, as men, women, (when menstruous, and when not) Children Moors, Negro's *&c.*	[5] Of the peculiar qualitys of the menstruous blood of a healthy women. [14] Whether the <Menstruous> blood of women <differ from their other Blood> & from it self according to the differing conditions of the person it comes from.	[19] Of the peculiar qualitys of the menstruous blood of healthy women. [24] Whether the menstruous blood of women differ from their other blood & from it self according to the differing conditions of the person it comes from.	38. of the Difference between Human Blood & Human Blood as 'tis found in sound Persons differingly constituted & circumstantiated, as Men, Women (when Menstruous & when not) Children, Moors, Negros &c.
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[9] Of the weight of bloud in reference to other liquors	[1] Of the <specific> weight of Human blood in comparison of Water.					
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[10] Of the weight & quantity of the parts of bloud in reference one to an other	[2] Of the weight of the consistent part & of the serous part of the same <parcel> of blood.	[4] Of the Specifick Gravity of Human Blood entire.	7. Of the Specifick Gravity of Humane Blood entire.			13. of the Specific Gravity of entire Human Blood & that of its Consistent Part and of its Serum.
	[3] Of the <specific> weight of the consistent portion of Blood in reference to the serous part, & also to Water.		16. Of the respective Quantities of the Serous and Fibrous part of Humane Blood.			21. of the respective Quantityes of the Serous & Solid Part of Human Blood.
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[11] Of the difference as to weight betwixt humane bloud as betwixt the bloud of a man & woman [12] The bloud of men of differing nations ages complexions Bulke, as also betwixt the [cont.]			29. Of the Difference between Humane Blood as 'tis found in sound Persons differingly constituted and circumstantiated, as men, women, (when menstruous, and when not) Children Moors, Negro's *&c*.	[6] Of the difference as to weight of the blood of a man and that of a woman. [8] Of the differences to be ordinarily found in the blood of persons of differing nations, ages, complections, bulk, stature &c	[20] Of the difference as to weight of the blood of a man & that of a woman. [22] Of the differences to be ordinarily found in the blood of persons of differing nations, ages, complections, bulk stature &c.	38. of the Difference between Human Blood & Human Blood as 'tis found in sound Persons differingly constituted & circumstantiated, as Men, Women (when Menstruous & when not) Children, Moors, Negros &c.

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bloud of the same man being taken fasting or otherwise, as in health or in sicknesse, in severall seasons of the year (as also (ante & post coitum) of the difference betwixt arteriall & venall bloud				[9] Of the differences to be found between the blood of the same man, being taken fasting, or <at> several distances from meals, <& after large drinking> before & in, or after long journeys or much ex[er]cise. Several & some of them very distant seasons of the year (as also ante & post Coitum.)		
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[13] Of the times wherein different blouds will evaporate out of the same vessells						
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[14] Of the putrefaction of bloud in close vessells & what insects it will produce	[19] Whether human blood hermetically seal'd, will by putrefaction produce any real Insects [20] What will become of blood left to putrefy in an open bolt-head with a very long neck, & kept till the contained matter be suffer'd to run through all the changs it will admit. [21] Whether blood will putrefy & breed any insects, in a large vacuum Boylianum.	[21] Of the fermentation & Putrefaction of Human Blood and its Phænomena.	25. Of the Fermentation or Putrefaction of Humane Blood, and its *Phænomena*.	[12] Whether blood putrified in exactly closed vessels, or some that are onely pervious to the fine parts of the aier, at least not to insects, nor probably to their seeds will produce worms or other insects.	[11] Whether Human Blood or even the Consistent Part of it, <will> by Putrefaction or long Fermentation become Fluid.	34. of the Fermentation or Putrefaction of Human Blood & its Phenomena.
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[15] Of severall ways of keeping bloud from putrefaction	[18] Of the wayes of preserving of blood, & first with spirit of wine; next by spirit of blood, sal armoniac, & other urinous spirits; thirdly by gas; 4. by oyl of turpentine; 5. by oyl of anise-seeds &c. sixthly by a peculiar brine; seventhly by copper, salt-petre, sugar, &c.	[24] Of the Liquors &c. that preserve Human Blood.	13. Of the Liquors, *&c.* that preserve Humane Blood.	[11] Of the several ways of keeping blood from putrifaction		18. <Of the Liquors &c. that preserve Human Blood or its Parts.>
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[16] Of the relation betwixt acid spirits & bloud						
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[17] The relation betwixt volatile spirits & bloud						
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[18] The relation betwixt alcalys & bloud						
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[19] The relation betwixt [spirit of wine] spirit anomalous & bloud						
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[20] What change bloud will have if the party have dranke very largely the day before						
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[21] Whether any discovrable change will be made in the bloud of a Dog upon violent emeticks or Catharticks						
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[22] Whether a strong purge being taken either the serum or Urine of it is purgative						
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[23] Whether Rubarb Turpentine Gum Guaiacum being copiously taken the masse of bloud or the separate serum of it, (a veine being opend in some part remote from the Stomach & guts) will have its colour or odor inbued after the same manner & more more [*sic*] strongly then the Urin						
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	[5] Of the specific gravity of moderately dry'd blood.					
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	[9] Of burning of blood, crude or dry'd, upon quick coals.					
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	[10] Of the fixt salt of blood, if it have any.	[18] Of the fixt salt of Human Blood.	22. Of the Fixt Salt of Humane Blood.		[39] Try with Oyl of Vitriol to distill from the Fixt Salt of Blood an Acid Spirit like that of common Salt. [40] Make the like Tryal with Bole or Clay in stead of Oyl of Vitriol. [41] Try with Spirit of Nitre to obtain from the Fixt Salt of Blood, an Acid Spirit & a Lixiviate Alcaly.	29. Of the Fixt Salt of Human Blood.
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	[11] Of the total volatility, or partial fixity of blood.					
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	[14] Whether spirit of wine will dissolve, & draw a tincture from dry'd blood.					
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	[15] Whether its own spirit, or that of urine or sal armoniac, will dissolve, or draw a tincture from dry'd blood.					
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	[16] Whether blood flowing out of a vein into spirit of wine, or spirit of sal-armoniac, & immediately shaken to incorporate the Liquors, will be thereby kept from coagulation.	[23] Of the Liquors & Salts that impede or dissolve it's Coagulation.	12. Of the Liquors and Salts that impede or dissolve its coagulation.			17. Of the Liquors, Salts &c. that impede or Dissolve its Coagulation.
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	[17] Whether the vapours or reeks of newly drawn blood will stain a bright copper farthing.					
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		[5] Of the Specifick Gravity of the serous part of Human Blood. [6] Of the Specifick Gravity of the red & fibrous part of Human Blood.	8. Of the Specifick Gravity of the two obvious Parts of Humane Blood, the Red (and Fibrous) and the Serous.			13. of the Specific Gravity of entire Human Blood & that of its Consistent Part and of its Serum.
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		[7] Of the Consistence of entire Human Blood	9. Of the Consistence of entire Humane Blood.			14. Of the Consistence of entire Human Blood & its two most obvious Parts.
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		[8] Of the heat of freshly emitted Human Blood.	4. Of the Heat of freshly emitted Humane Blood.			10. of the Heat & Coldness of Human Blood.
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		[9] Of the inflammability, and some other qualities of Human Blood.	5. Of the Inflammability, and some other qualities of Humane Blood.			11. of the Inflammability, Volatility, & some other Qualities of H Human Blood.
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		[10] Of the disposition of Human Blood to concretion, and the time wherein it is perform'd.	10. Of the Disposition of Humane Blood to Concretion, and the Time wherein it is performed.			15. of the disposition of Human Blood to Concretion & the Time wherein it is perform'd.
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		[11] Of the Aerial particles naturally mix'd with Human Blood and also found in its distinct parts.	6. Of the Aerial Particles naturally mix'd with Humane Blood; and also found in its distinct Parts.			12. of the Aereal Particles naturally mix'd with Human Blood & also found in its distinct Parts.
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		[12] Of the Spontaneous or natural Analysis of Human Blood into a serous and fibrous part.	15. Of the Spontaneous or natural Analysis of Humane Blood into a Serous and a Fibrous part.			19. Of the Spontaneous or Natural Analysis of Human Blood into a Serous & a Solid Part.
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		[15] Of the volatile salt of Human Blood and it's figures.	19. Of the Volatile Salt of Humane Blood, and its Figures.			26. of the Volatile Salt of Human Blood.
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		[16] Of the fleghm of distil'd Human Blood.	20. Of the Phlegm of Distill'd Humane Blood.			27. of the Phlegm of distill'd Human Blood.
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		[17] Of the two Oyles of Human Blood.	21. Of the two Oyls of Humane Blood.			28. of the (two) Oyls of Human Blood.
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		[19] Of the Terra Damnata of Human Blood.	23. Of the *Terra Damnata* of Humane Blood.			30. of the Terra dammata of Human Blood.
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		[20] Of the proportion of differing substances Chymically obtain'd from Human Blood.	24. Of the Proportion of the differing Substances chymically obtain'd from Humane Blood.			32. of the Proportion of the differing Substances Chymically obtain'd from Human Blood.
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		[22] Of the Liquors & Salts that coagulate Human Blood.	11. Of the Liquors and Salts that coagulate Humane Blood.			16. of the Liquors, Salts, &c. that Coagulate Human Blood.
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		[25] Of the mixtures of Human Blood may admit from minerals.	14. Of the Mixtures that Humane Blood may admit from Aliments.		[14] What Aliments will impart their Odour or their Colour, <or their Tast,> or some other manifest Quality, to the mass of Blood; or at lest to Liquors that are suppos'd to be deriv'd thence, as Urine, Milk &c. [15] Whether any observable Difference can be found between the Blood of sucking Children, that feed only upon the Mothers or Nurses Milk, & the Blood of the same persons or others (as near as can be judg'd) in their Circumstances, being grown up to Youth or Manhood.	5. of the Mixtures that Human Blood may admit from Aliments.

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					[16] How far the Occult Qualities, as they are call'd, of things taken at the Mouth may have their Corpuscles discover'd to be in the mass of Blood or in Liquors supposd to be deriv'd thence. To which belongs Hippocrates's Woman fed with Elatorium, & the Nurse I saw which took Opium. [17] Whether any considerable difference can be discover'd between the Blood of Bramins that never eat any thing that has life, & that of their Countrymen who eat freely what they please. [23] Whether spirit of salt or crude salt &c taken at the mouth materialy after many hours remain in the mas of blood or be discharged by urin & the consequences of volatilization.	
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		[26] Of the motions of Human Blood especially that cal'd Circulation.				[Preliminary] 3. Of the Motion of the Blood & of its Circulation
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		[27] Of the mechanical uses of Human Blood as in Husbandry &c.	26. Of the Mechanical Uses of Humane Blood, as in Husbandry, *&c.*			35. of the Mechanical Uses of Human Blood & its Parts, as in Husbandry, the Trade of Dying &c
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		[28] Of the Chymical uses of Human Blood.	27. Of the Chymical Uses of Humane Blood.			36. of the Chymical Uses of Human Blood & its parts, in Solutions, Pre-cipitations, Extractions &c
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		[29] Of the Medicinal uses of Human Blood	28. Of the Medicinal Uses of Humane Blood.			37. of the Medicinal Uses of Human Blood & its Parts.
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		[31] Of the Affinity & difference between the Blood of Men, and that of divers other Animals, as Quadrupeds, Birds, Fishes, and Sanguineous Insects.	30. Of the Affinity and Difference between the blood of men, and that of divers other Animals, as Quadrupeds, Birds, Fishes, and Sanguineous Insects.	[7] Of the difference as to weight betwen Human Blood & that of other animals (quad-rupeds, birds & fishes). [17] Whether by a very nice weather glass, the blood of fishes & frogs be actualy as cold, or colder, than aier, or water, & whether the blood & bodys of those animals when opend alive, be as cold as when they are dead. [18] Whether the blood of those animals that are actualy cold, will apear upon chymical analysis (or other wise) to differ from the blood of hot animals. [19] Whether alimental juice or Liquor of those animals that <have> no blood properly so cald, apeard different from the blood of cold animals otherwise then in poynt of colour.	[21] Of the difference as to weight between Human Blood & that of other animals (quad-rupeds, birds & fishes. [25] Whether by a very nice weatherglas, the blood of fishes & frogs be actualy as cold, or colder, then air, or water, and whether the blood & bodys of those animals when opened alive be as cold as when they <are> dead. [26] Whether the blood of those animals that are actualy cold will apear upon Chymical analysis (or other wise) to differ from the blood of hot animals. [27] Whether alimental juice or liquor of those animals that have no blood properly so cald, apear different from the blood of cold animals other wise then in poynt of colour.	42. of the Affinity & Difference between the Blood of Men, & that of divers other Animals, as Quadrupeds, Birds, Fishes, & Sanguineous Insects.
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doc. c	doc. d	doc. e	Printed Heads	doc. f	doc. g	doc. h
		[32] Promiscuous Observations & Expts. about Human Blood	[Appendix] 2. Miscellaneous Observations, Experiments and Enquiries about Humane Blood (to be added to the History of it.)			
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		[33] Paralipomena relating to the History of Human Blood	[Appendix] 1. *Paralipomena* relating to the History of Humane Blood.			
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					[1] <A Preliminary Title of the Process of Sanguification, or the Change that the Aliment taken in at the Mouth undergoes to be turn'd into perfect Blood.>	[Preliminary] 1. Of the Process of Sanguification, or the Changes that the Aliment taken in at the Mouth undergoes to be turn'd into perfect Blood.
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					[4] Of the Constituent Parts of Human Blood as they are discoverable by the Microscope.	6. of the Constituent Parts of Human Blood as they are discoverable by the Microscope
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				[10] Of the difference between Arterial and venal blood at the first emission & afterward	[5] Of the Difference between Arterial Blood & Venal, at the first emission & afterwards.	1. Of the Difference between Arterial Blood & Venal, at the first emission & afterwards. [To which Title belongs an Advertisement, That the following History treats but of Venal Blood.]
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				[13] Whether spirit of salt, or crude salt &c taken at the mouth do materially after many hours remain in the mass of blood, or be discharged by urine, & the consequences of volatilization.		
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				[15] Whether any (or if any) What difference, may be found by chymical analyses (& other wise) betwixt blood, & those other juices of the body, that are supposed to be either Further elaborations milk, sperm <Gall &c.,>	[8] Whether any, or (if any) what Difference may be found by Chymical Analyses (& otherwise) betwixt Blood & those other Juices of the Body that are suppos'd to be further Elaborations of it, such as are Milk, Sperm, Gall &c.	41. whether any, or (if any) what Difference may be found by Chymical Analysis (& otherwise) betwixt Blood & those other Juices of the Body that are suppos'd to be further Elaborations of it, such as are Milk, Sperm, Gall &c.
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				[16] What change hath the blood of animals strangled by suffocation or in the Exhausting Engin, or dround in water, or in milk, or in spirit [of] wine, or in chymical oyls, Or suffocated in mercury will have produced in it by their peculiar kinds of death.	[9] What Change the Blood of Animals strangled by suffocation or in the Exhausting Engine, or drown'd in Water, or in Milk, or in Spirit of Wine, or in Chymical Oyls, or suffocated in Mercury, will have produc'd in it by their peculiar kinds of Death.	33. what Change <(if any)> the Blood of Animals strangled by suffocation, or in the Exhausting Engine, or drown'd in Water, or in Milk, or in Spirit of Wine, or in Chymical Oyls, or suffocated in Mercury, will have produc'd in it by their peculiar kinds of Death.
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					[6] Whether the Blood consist of those differing Substances that Physicians commonly suppose to convene in it, viz. Melancholy, Phlegm, Bile, & Blood strictly so call'd.	3. Whether the Blood consist of those differing substances, that Physicians commonly suppose to convene in it, viz. Phlegm, Bile, Melancholy, & Blood strictly so call'd.
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					[7] Of the Natural & Regular Productions of the Blood such as are suppos'd to be Spirits Naturall Animal & Vital, Milk, or Semen &c.	39. of the Natural & Regular Usefull Productions of the Blood, such as are suppos'd to be Spirits Animal & Vital, the Gall, the Succus Pancreaticus, the Semen, the Lympha &c. & also of those that are held to be but Excrementitious as Urine, Earwax, Spittle, Tears, &c.
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					[28] Of the Chymical Analysis of Milk, & the proportion of the differing substances obtainable from it. [29] Of the Odours & Tasts that may be communicated to Milk by certain particular Aliments. [30] Of the Occult Qualities, Purgative Narcotic &c. that Milk may acquire by Medicines taken at the Mouth. [31] Of the Specific Gravity of Milk, & its severall Parts.	40. whether Milk be produc'd of the Blood as its Material Cause.

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					[32] Whether Milk by Putrefaction will emit a Spirit first, as Urine does. [33] Of the Constituent Parts of Milk as they are discoverable by the Microscope.	
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					[34] Let Tryal be made, whether such a substance will be afforded by entire Blood freshly drawn. [35] Let the same Tryal be also made with the stable part of Blood & with the Serum separately. [36] Try whether Putrefaction <(for a shorter or a longer time)> will fit Blood to yield a Noctiluca. [I caus'd it to once carefully try'd, but without success.] [37] Try, whether Blood being long expos'd to the open Air (but defended from Fly-blowes) either by it self, or mingl'd with Earth, will become fit to afford a shining Matter. [38] Endeavour to obtain a Noctiluca by distilling Blood with the <most promising> Additaments.	31. whether from Human Blood either fresh or putrefy'd, may be obtain'd a Noctilucal substance, that is a Matter shining without the help of External Light.
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						[Preliminary] 2. Of the Quality of this Liquor, of its continual Supplyes & Absumtion, & of its Proportion to the rest of the <Human> Body.
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						2. of the Difference between the Blood of living & that of dead men, whether it be within the Veins or out of them.
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						4. whether Human Blood consist of or contain, either Chyle separable in its pristine form, or a serum that serves but for a vehicle to the true Blood.
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						22. of some other things relating to the Serum of Human Blood