

Considerations about the Section En-
titul'd Natural History in generall.

THE TEXT OF
ROBERT BOYLE'S
'DESIGNE ABOUT
NATURAL HISTORY'

Edited by
Michael Hunter
and Peter Anstey

Robert Boyle Project
Occasional Papers No. 3

1. That the Subject is so vast & multifarious that as it may be diversely consider'd, it may be very differing and almost infinite. I scarce any Division to
2. There is the most com- that which is
3. That I to exclude exact, or a some one effects & might be thought to be pendices, & notices
4. That I conceive not subordinate distributions and particular Topics of Natural History, can be at present complete & consequently are not to be stable & fix'd. If I may call them Probationary and so to be alter'd &c. according as further Discoverys or more mature Consideration shall enable and invite to change & enlarge y^e particular Topics.
5. For I conceive, that according to the Theorys, men may have for the present of many Subjects, they do not know so much as what is fit to be inquir'd after & observ'd - but must omit any important Quærys, Circumstances, and applications, as Those must do about the falling of Comets, &c. in water & Air, and the Phenomena of Comets

The Text of Robert Boyle's 'Designe about Natural History'

This publication presents a new text of Robert Boyle's prescriptions for the writing of natural history, compiled in 1666 and partially divulged in 1684, but unpublished till modern times. The current edition restores the text to its correct order for the first time, and adds various cognate documents, including certain sections of the 'Designe' which survive elsewhere among the Boyle Papers at the Royal Society and are here first published. The result is to supply a significant document for understanding the evolution of Baconian method during the formative years of the Royal Society.

The editors are Michael Hunter, Professor of History at Birkbeck, University of London, and Peter Anstey, Professor of Early Modern Philosophy at the University of Otago.

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Considerations about the Section En-
-titul'd Natural History in generall.

1. That the Subject is so vast & multifarious that -
as it may be diversely consider'd, it may be very differently
and almost arbitrarily divided, and there is scarce any
Division that will be adequate.
2. Therefore the best Division seems to be that which is
the most comprehensible and easy.
3. That I do not so adhere to the Division I propose as -
to exclude all others, or prefer it to them, or to think it -
exact, or any more than tolerable; but I chuse it because
some One or other I must pitch upon, and I count its de-
fects & incompleatnes may be in some measure, and
ought to be supply'd by Preliminary Tracts, and by Ap-
pendices, Indices &c.
4. That I conceive not subordinate Distributions and
particular Topicks of Natural History, can be at present com-
-pleat & consequently are not to be stable & fix'd ^{but} if I may
call them Probationary and so to be alter'd &c. according
as further Discoverys or more mature Consideration shall
enable and invite to change & enlarge y^e particular -
Topicks.
5. For I conceive, that according to the Theorys, men may
have for the present of many Subjects, they do not know
so much as what is fit to be inquir'd after & observ'd -
but must omit any important Quærys, Circumstances,
and applications, as those must do about the falling of
heavy bodys in water & Air, and the Phenomena of Comets
who know not, the Doctrines of Progressions & Proportions -
Duplicate &c. and what a Paradox is, or how to be observ'd
and who are unacquaint'd with the Hydrostaticks.
6. That many things must be taken upon trust in the
History of nature, as matters of fact extraordinary (as Mon-
-sters Prodiges &c. or long since expir'd, or else such -
as are not to be examin'd but in remote Countryes, or
places we cannot come to. The bounds and manner of
inserting such things into the Natural History.
7. That many things cannot be warily enough deliver'd
without employing more words then many men are -
willing to allow.

Part of the text of Boyle's 'Designe about Natural History' in the hand of
his amanuensis, Robin Bacon. Royal Society Boyle Papers 25, p. 13.
(Dimensions of original: 305 x 195mm)

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Robert Boyle Project
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Introduction

This edition presents the text of Boyle's prescriptions for writing a natural history in a more complete and coherent form than hitherto. The principal component is a document taking the form of a letter addressed to Henry Oldenburg dated 13 June 1666. Although Boyle divulged the existence of this text in his *Memoirs for the Natural History of Human Blood* (1684), in which certain of its themes were summarised, it was not published in full until 1966, when it was included by A. Rupert and Marie Boas Hall in vol. 3 of their edition of *The Correspondence of Henry Oldenburg*. It was then republished in vol. 3 of *The Correspondence of Robert Boyle* in 2001.¹ In both cases, the document was published in the order in which the sole extant manuscript of it is currently bound in volume 25 of the Boyle Papers at the Royal Society. However, careful scrutiny of the text reveals that the order in which it was bound when the Boyle Papers were given their current ordering in the 1850s was almost certainly incorrect.² It therefore seems desirable to present a fresh edition of the text in the order which Boyle intended. In addition, it is evident that the document is incomplete, since not all of the components which it states that it comprises are now present. While some of these may never have been written and some appear to be irrevocably lost, others survive separately elsewhere in the Boyle Papers, and these and other papers on related topics are therefore presented here to complement the reordered version of the main document.

The investigations which have led to these conclusions have also resulted in the publication of a complete analysis of Boyle's 'Designe about Natural History' (as he himself describes it at one point in the text).³ It is unnecessary to repeat the details of that paper here, but suffice it to point out that Boyle's text represents a significant reflection on the proper method for natural history, and the proper relationship between natural history and natural philosophy. Boyle compiled this in the mid-1660s, just at the time when he was becoming more overtly Baconian in his method than had earlier been the case. As the paper argues, Boyle's 'Designe' is enormously important in giving a clear statement of the precise contours of his Baconian methodology and providing a key to understanding the rationale, composition, format and literary style for many of his published histories. Works such as *New Experiments and Considerations Touching Cold* (1665), *Human Blood* and even his more speculative writings such as 'An Introduction to the History of Particular Qualities', published as part of *Cosmical Qualities* (1670), are best understood in terms of Boyle's overall method as articulated in his 'Designe about Natural History'.

Here, we present the principal texts discussed in that paper, first the reordered version of Boyle's letter to Oldenburg. Then, we include two sections in matching format which survive in vol. 9 of the Boyle Papers among papers devoted to 'Sense, Reason and Authority in Natural Philosophy', the subject of a planned treatise by Boyle which he appears never to have completed, of which a synopsis survives.⁴ The titles of these so closely echo Boyle's description of the relevant components of his 'Designe'

¹ *Works*, vol. 10, pp. 9–12; *Oldenburg*, vol. 3, pp. 160–6; *Correspondence*, vol. 3, pp. 170–5.

² For the history of the Boyle Papers and the date at which they were bound in their present form, see *Boyle Papers*, ch. 1.

³ Peter Anstey and Michael Hunter, 'Robert Boyle's "Designe about Natural History"', *Early Science and Medicine*, 13 (2008), 83–126. For the quotation, see below, p. 1.

⁴ BP 9, fols. 1–128; BP 18, fol. 48v. It is also referred to in *Works*, vol. 14, p. 338.

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that they almost certainly originally formed part of it. Subsequently, however, either Boyle himself or one of his posthumous editors placed them in their present location on the grounds that they seemed germane to the theme of the treatise in question. Indeed, in his later years Boyle may have seen 'Sense, Reason and Authority' as subsuming the 'Designe', though it has a broader remit in terms of assessing the role of reason in evaluating arguments from experience or authority.

Lastly, we present certain other papers, mostly also from Boyle Papers 9, though one survives only in Latin translation in Boyle Papers 29: the latter (like one of the further papers from BP 9) deals with a topic highly germane to Boyle's discussion in the 'Designe', namely the imperfections of natural history as practiced in his time. The remainder of this introduction will go through the documents one by one giving more technical and bibliographical details about each.

a. Boyle's letter to Oldenburg, 13 June 1666.

Boyle Papers 25, pp. 1–17. Hand: Bacon. Previously published in A.R. and M.B. Hall (eds.), *The Correspondence of Henry Oldenburg* (13 vols., Madison, Milwaukee and London, 1965–86), vol. 3, pp. 160–6, and in Michael Hunter, Antonio Clericuzio and Lawrence M. Principe (eds.), *The Correspondence of Robert Boyle* (6 vols., London, 2001), vol. 3, pp. 170–5.

This text is in the hand of Robin Bacon, who acted as amanuensis to Boyle from the 1670s until Boyle's death.⁵ It is clearly a fair copy of an earlier text which does not survive. Though the whole document is written by Bacon, the handwriting changes on the second page as if a second sitting was begun, and at this point a piece of rewriting occurs, in that the words 'but only to suggest hints for conjectures & Experiments' are deleted and the text instead continued 'or designedly tend to præpossesse the Readers mind', thus concluding a paragraph which is followed by a series of further points. Hence it is possible that the text was modified at the time it was recopied, and that, even if it substantively dates from 1666, it may have been adapted later, perhaps in conjunction with the work on *Human Blood* in the early 1680s in connection with which Boyle referred to it (see above).

As already noted, this document was almost certainly misordered when it was bound in the 1850s, and this incorrect order has been followed in the edition of the text published in *The Correspondence of Henry Oldenburg*, and, following that, *The Correspondence of Robert Boyle*. As currently bound, the Preliminaries are placed first; then follows the section of text describing the content of the 'Appendix'. This is followed by the section entitled 'Considerations about the Section Entitul'd Natural History in generall' and finally the 'Division of Natural History'. However, if we follow the order of the four parts of the 'Designe' and their subsections as listed by Boyle we can retain pp. 1–7 as comprising the Introduction and five Preliminaries, but it would be more logical if the 'Division of Natural History', pp. 15–17, followed the five Preliminaries. This is because the fifth Preliminary is to contain a 'general Scheme or Delineation' of the natural history and this is what pp. 15–17 provide. Furthermore, the 'Division of Natural History', which fills out the fifth preliminary, ends with a reference to certain considerations, a reference which is, in effect, a catchword for the section entitled 'Considerations about the Section Entitul'd Natural History in generall', pp. 13–15 and naturally follows the 'Division of Natural History'. The last section then, is the 'Appendix' on pp. 9–11, which, as we have argued elsewhere, corresponds to the third

⁵ *Boyle Papers*, pp. 47–8, plates 12, 14 and passim.

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part of the 'Designe'.⁶ We have therefore moved these various sections of the 'Designe' to their correct position in this edition.

The original manuscript mainly comprises a series of pairs of conjugate leaves (pp. 1–3, 5–7, 9–11 and 15–17; p. 13 is a separate sheet). Catchwords link the text on the first and second of each of these pairs of leaves and in one case (p. 5) the text of one pair of leaves with the next. There is no link between p. 9 and what goes before it, or between pp. 13 and 15. It is therefore far from unlikely that the pages were misplaced prior to the time when the volume was bound. It is also worth noting a difference of format within the document in that, whereas pp. 1–13 are written on rectos only, with the versos (i.e., 2, 4, 6, 8, 10, 12 and 14) blank, p. 16 (a verso) as well as pp. 15 and 17 (the adjacent rectos) has text on it.

b. Section on 'the History of Bodys'.

BP 9, fol. 71. Verso blank. Hand: Bacon, corrected by Hugh Greg.

This item, like the next, comprises a self-contained section of text which almost certainly belongs to the 'Designe', although it is now to be found in Boyle Papers, vol. 9. They are similar in terms of format to the text of the Oldenburg letter in BP 25, both being in Bacon's hand, and written on paper that matches that used for the text in BP 25: fol. 71 is a single leaf, which displays chain lines which match those in BP 25. The text comprises a single paragraph which sets out the proper method for studying the history of bodies, including a series of six '*Monita*'. In this connection it reflects Bacon's influence in invoking the use of '*Topica particularis* [sic], or Articles of Inquiry'.⁷

c. Section on 'loose Experiments'

BP 9, fols. 72–3. Versos blank. Hand: Bacon.

This shares many characteristics with BP 9, fol. 71. Like that, it is written in Bacon's hand. On the other hand, whereas fol. 71 is a single leaf, fols. 72–3 are a pair, with the text continuing from the first to the second, linked by a catchword. Fols. 72–3 have a distinctive watermark which is identical to that of various pages in the letter to Oldenburg in BP 25, pp. 1–17: the mark in question shows a decorative urn with the initials 'HC'.⁸

The text argues for the value of experiments derived from craft practices, and it again sets out a series of detailed '*Monita*', this time to the number of seven. It concludes with two 'NB's, the first immediately following the text that precedes it, the second separated from the first by a gap of approximately ten lines. Whereas the second reiterates the need for the experiments to be conducive to the end proposed, the first expounds the concept of 'a Philosophical or Physical Algebra', very similar to the better known and overlapping concept of Boyle's protégé and colleague, Robert

⁶ See Anstey and Hunter, art. cit., pp. 88ff. for detailed treatment of the letter and the correct order of its components.

⁷ 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*, 40 (2007), 1–23.

⁸ See BP 25, pp. 7, 13, 15. It should be noted, however, that no systematic study has been made of watermarks in the Boyle archive. Other items in BP 9 have watermarks that are identical to those on other leaves in BP 25, pp. 1–17, probably because they were recopied by Bacon at a similar time.

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Hooke. Indeed, this hitherto unknown passage provides an important piece of evidence concerning the links between the intellectual concerns of the two men.⁹

d. 'De Imperfectione Historiæ Naturalis'

BP 29, fols. 215–16. Fol. 216v blank. Hand: L. Published in *Works*, vol. 13, 358–61.

This item forms part of a group of texts in Boyle Papers 29, fols. 207–18, which are clearly Latin translations of English originals which are partly or wholly lost. On the basis of their handwriting, they may be dated to the 1680s.¹⁰ The first item is a translation of Essay XIII of *The Usefulness of Natural Philosophy*, overlapping with fragmentary English versions of the same text. The others comprise a miscellaneous group of Latin translations: the section printed here, along with a section 'Of the philosopher's leisure' and a further, apparently equally integral, passage dealing with petrification, which is a translation of a section of text of which an English version survives elsewhere in the archive.¹¹ Hence, though published in connection with *Usefulness* in the *Works of Boyle*, it seems appropriate to reprint it here, since it clearly relates more or less closely to the 'Designe'.

The text is, in fact, only a fragment of a larger whole. It opens by noting that it covers the last of ten themes, the rest evidently have been dealt with in sections of the document (or its English original) which are now lost. Moreover, it is itself merely the prolegomenon to a lengthier discussion, which probably dealt in full with the points briefly summarised in Document e, below. In the extant section, Boyle promises a two-fold consideration of the imperfections of natural history, though in fact it is mainly devoted to a single substantive point, namely of the need for natural historical investigation to be intrusive rather than simply descriptive as hitherto.

e. 'Of the insufficiency of Natural History'

BP 9, fol. 56. Hand: Bacon. Verso blank. Conjugate with fol. 57, which is blank except for the endorsement on its verso by William Wotton: '23. Of the insufficiency of N[atural] Hist[ory]'.

This hitherto unpublished fragment in English, entitled 'Of the Imperfections and Insufficiency of Natural History, as we yet have it, Especially <as> to the following Particulars', comprises twelve numbered points. In the Latin text published as Document d, Boyle refers to the 'chief headings, or subjects, of the discourse that follows' and this is apparently a list of these.

f. Miscellaneous papers (BP 9, fols. 19-20, 105(b); BP 10, fol. 138)

(i) BP 9, fols. 19-20. Versos blank. Hand: Bacon

This is a self-contained section of text in Bacon's hand which comprises a series of injunctions concerning the pursuit of the 'Natural History' which is dealt with in the other documents here. It is written on a conjugate pair of leaves, with a catchword linking the two. Its presentation, with each paragraph beginning 'That', bears some

⁹ For a discussion, see Anstey and Hunter, art. cit., pp. 117–18.

¹⁰ See *Boyle Papers*, p. 55.

¹¹ Fols. 217-18. See *Works*, vol. 13, pp. lv, lxi.

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resemblance to that of the section, 'Considerations about the Section Entitul'd Natural History in generall' in Document a. Whereas the first paragraph deals with the potential contribution of individuals, and the third advocates 'a Judicious & Eloquent Treatise' in favour of such an enterprise, the second and fourth deal with the role of institutions both in this connection and more generally. The last gives an interesting, hitherto unpublished, view by Boyle of the Royal Society and its role, including the *Philosophical Transactions* and its publisher: Boyle may here have been thinking of Henry Oldenburg. Not least of interest is the closing passage, which alludes to the role of the Royal Society as a depository of unpublished material of which Boyle was to avail himself on more than one occasion.¹² It should be noted that though fol. 21 is similar in format, it deals with a quite different topic, the uses that men could make of celestial phenomena over which they had no control.

(ii) BP 9, fol. 105(b). Hand: Bacon

This text comprises a further paragraph in Bacon's hand pasted onto a sheet with another section of text on a topic that is wholly unrelated to it. It forms part of a section of BP 9 which is made up of longer or shorter sections of text pasted onto leaves of paper in this way; this probably occurred in the 1850s when the archive was bound in its present form. The text advocates the compilation of 'Scheams for Natural Histories', and expatiates upon their value, not least through an elaborate analogy with the role of divining rods in mineralogy.

(iii) BP 10, fol. 138. Verso blank. Hand: uncertain. Published in Michael Hunter et al., *The Boyle Papers* (Aldershot, 2007), p. 184.

This document in an unfamiliar hand¹³ is a fragment of the preface to a collection of material. It has already been published as part of the account of Boyle's *Paralipomena* in *The Boyle Papers* because of its similarity to documents compiled in relation to that work at a later date. It is not known what the 'Title' was to which Boyle alludes at the start, though it may have been 'Chaos', as in the next sentence.¹⁴ The text is incomplete, comprising only the first of '3. or 4. advertisements', though the lower part of the page is blank; the fact that it is of relatively early date is suggested by the fact that it is addressed to 'Pyrophilus'.

It seems appropriate to include it here for various reasons. First, the miscellaneous material to which Boyle initially alludes seems to bear some relationship to the concept of 'loose Experiments' in Document c: in this connection, he here invokes Bacon's concepts of 'Experiments Solitary' and of uncomplicated 'Experiments in Consort'.¹⁵ In addition to this miscellaneous material, Boyle also adumbrated plans to create natural histories of key topics, and the aspects of nature selected for this bear some relationship to those itemised in Document a. Particularly interesting is the reference to fermentation, linking to Boyle's interest in this as documented elsewhere.¹⁶ As in

¹² See Michael Hunter, *Robert Boyle (1627-91): Scrupulosity and Science* (Woodbridge, 2000), pp. 137, 219-20.

¹³ For its similarity to the hand used in one of the copies of Boyle's 'Order of My Severall Treatises', see *Boyle Papers*, pp. 183-4.

¹⁴ For the usage of 'Chaos' in titles in Boyle's inventories see *Works*, vol. 14, pp. 338, 340, 351-2.

¹⁵ See Francis Bacon, *Sylva Sylvarum, or a Natural History* (1627), *passim*, and Boyle's discussion of the distinction in *Experimenta et Observationes Physicae*, *Works*, vol. 11, p. 373.

¹⁶ See Anstey and Hunter, art. cit., p. 116. See also Document a; BP 28, pp. 403-4; and *Works*, 10, p. 11.

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Document b, the Baconian genre of '*Topica particularis* [sic] or Articles of Enquiry' is invoked as an organising principle in this connection, while also interesting is Boyle's reference to the 'casuall order' in which it was legitimate initially to group things, which echoes his later comments on such matters in *Human Blood*, as also those of John Locke in his 'Advertisement' to *The General History of the Air*.¹⁷

¹⁷ *Works*, vol. 10, pp. 9-10; vol. 12, p. 6.

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Acknowledgments

The following have assisted in the preparation of this edition. The library staff at the Royal Society have been unfailingly helpful during our work on the Boyle archive. The translation of the text from BP 29, which first appeared in *Works*, is the work of Clive Cheesman, revised by Malcolm de Mowbray.

Abbreviations

BP	Boyle Papers
Bacon, <i>Novum organum</i>	Graham Rees and Maria Wakely (eds.) <i>The Instauration magna Part II: Novum organum and Associated Texts, The Oxford Francis Bacon</i> , vol. 11 (Oxford, 2004)
<i>Boyle Papers</i>	Michael Hunter, with contributions by Edward B. Davis, Harriet Knight, Charles Littleton and Lawrence M. Principe, <i>The Boyle Papers: Understanding the Manuscripts of Robert Boyle</i> (Aldershot, 2007)
<i>Correspondence</i>	Michael Hunter, Antonio Clericuzio and Lawrence M. Principe (eds.), <i>The Correspondence of Robert Boyle</i> , 6 vols. (London, 2001)
<i>Oldenburg</i>	A.R. and M.B.Hall (eds.), <i>The Correspondence of Henry Oldenburg</i> , 13 vols. (Madison, Milwaukee and London, 1965–86)
<i>Works</i>	Michael Hunter and Edward B. Davis (eds.), <i>The Works of Robert Boyle</i> , 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 or pagination 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 'p. 133' where each page begins). Words or phrases inserted above the line in the original have been denoted <thus>. Editorial insertions have been denoted by square brackets. All deletions are recorded in footnotes on the page. For details of the various handwritings found in the documents, see *Works*, vol. 1, pp. c–cii, and *Boyle Papers*, ch. 1. For facsimiles of the texts from vols. 9, 10 and 25 of the Boyle Papers included here, see the section 'View Boyle manuscripts online' on the Boyle website, www.bbk.ac.uk/boyle.

THE TEXT OF ROBERT BOYLE'S 'DESIGNE ABOUT NATURAL HISTORY'

a. Boyle's letter to Oldenburg, 13 June 1666 (BP 25, pp. 1-25)

To my highly esteemed Friend H. O. Esquire

Leeze.¹ June 13. 1666.

Sir

Though I be now in a Place where not intending the Stay I have been oblig'd to make, but only a visit, I am absent from my Books and most of my Papers, and where you will easily beleive that the Sex and Quality of the Persons I converse with, allows me not over much leizure for Philosophical Entertainments; yet the Earnestnesse wherewith you are pleased to write to me for some account of my Designe about Natural History, does little less then compell me, not to refuse you the mention of such of the Particulars that my notes or memory can supply me with as I can get time so much as transiently to set down.

The work then about which I formerly wrote you word that I had accidentally recover'd some Papers was propos'd to consist of foure chief parts.² Præliminarys – The Body of the History it self; Additaments and various Indices.

The Praeliminary or Introduction was design'd to consist of severall parts whereof the chief were these.

- I.³ A Discourse of the Importance & usefulness of the compiling of a Naturall History in Order to Philosophy; wherein was to be shown how much of advantage, both Speculative and Practical, might be reasonably hop'd from such a work, and how little (that is any thing worthy of Mankind) has been hitherto done for want of it, or is hereafter to be expected without it.
- II. Instructions about the wayes & method of Experimenting, containing Directions & Advices, how to procure, æstimate, prepare and in some cases better *Mathematicall Instruments*, as Quadrants, Telescopes, Microscopes, &c. *Mathematical Tooles*, as Ballances, Statera's, Standards for /p. 3/ measure &c. and *Chymical Utensils*, Furnaces, Crucibles, Retorts, Glass-Bells, Cupells &c. together with directions how to perform such manual Operations, as testing of Mettals, weighing Bodies in Water, Hermetical sealing &c. as must *either* be often imploy'd in the History *or* imploy'd about Experiments of great Moment. Care being yet taken that as for such Chymical and other Operations or Practices as are already intelligibly enough describ'd in Books, or of which the Reader may easily enough procure himself living Instructors,

¹ Boyle was staying at Leeze Priory, the home of his sister Mary Rich, Countess of Warwick.

² For references to the recovery of papers written earlier in letters to Oldenburg dated 9 December 1665 and 21 March 1666, see *Correspondence*, vol. 2, p. 598, and vol. 3, p. 118. However, there is no particular reason why these should be related.

³ This and the subsequent paragraph numbers are written in the left margin.

men be refer'd to those helpes [sic] if it be not thought convenient to have a Book or *Directory* compiled to contain at large such Instructions.

- III. A Summary but perspicuous Account of those severall Hypotheses (or at least the chief of them) that are now aday's made use of, in explicating the *Phænomena* of nature, such as are the Peripatetick, the Cartesian and the Epicurean Hypothesis, provided alwayes these be so summarily propos'd as not too much to swell the Præliminarys⁴ or designedly tend to præpossesse the Readers mind.

For I pretend not at all that a whole Body of Physicks, according to any particular Hypothesis should be propos'd as the *Basis* of our Natural History, which ought not to be Confin'd to any particular Theorys, but if need be to amplify & correct them. The reason then why I propose a short survey of the several *Hypotheses* of Philosophers, is, *partly*, because the knowledg of differing Theorys, may admonish a man to observe divers such Circumstances in an Experiment as otherwise 'tis like he would not heed; and sometimes too may prompt him to stretch the Experiment farther then else he would (and so make it produce new *Phænomena*) & *partly* because these additional *Phænomena*, and accuratenes which these Theorys will ingage the Experimenter to imploy about some Circumstances, will conduce to make the History *both* more exact /p. 5/ and compleat in it self, and more ready for use, and more acceptable to those that love to discourse upon *Hypotheses*, because they will find those Circumstances set down, the omission whereof they would reprehend, as thinking the tryal or Observation of such a Circumstance, necessary or sufficient to prove or to invalidate this or that particular Hypothesis or Conjecture.

- IV. In the Fourth Preliminary I mention'd the Names of the chief Authors & other Persons, as Navigators, Travellers &c. from whose writings or Relations the Particulars admitted into the Natural History, have been gather'd or receiv'd. And of most of these Persons in particular, some Character is given *partly* for other Men's Information, that may have occasion to peruse his writings, or make tryal of the Experiments he relates; but *chiefly* to give an account how far, and with what cautions, his Testimony is made use of, in the following History. And because it not unfrequently happens that Authors writing at several times, and in differing Circumstances, some of their Books are more full & more warily & judiciously pen'd than others, in so much that sometimes the latter correct or retract somewhat written in the former, and on the contrary now & then (thō but seldom) do out of fear or Envy suppress it, it was not thought amis, if the Book were considerable or frequently cited, to express what Edition of it 'tis, that is in the History employ'd.
- V. In the 5th and last Preliminary an account is given of the method of the Natural History, rendering a reason of the distribution of it into such a number of Parts, and of the order wherein they are marshal'd. And after a general Scheme or Delineation is thus set /p. 7/ down the rest of the Preliminary is spent in giving an account of the Style and the way of writing that is made use of: under which general name of *Style* are comprehended, *not only* the Language as it is concise or more Diffus'd, Embellish'd, or Unadorn'd, Plain or Figurative; *but also* what Perspicuity, Veracity, Impartiality, Cautiousnes and other such Qualitys, have been aim'd at, and for the most part made use of, in delivering the Particulars, that the Body of the History is made up of. By which means *not only* the attention of Readers may be excited, and

⁴ followed by 'but only to suggest hints for conjectures & Experiments', deleted. The ink changes at this point, as if the remainder of the letter was written at a different sitting.

they may be the better induc'd to give as much credit to the History as the Author judges the design exacts, and his way of writing deserves; *but* occasion will be given to deliver such Observations or Reflections about the manner of compiling a Natural History, as may be very assistant to those that shal hereafter undertake, either to continue this work, or attempt something of the like nature, thô of far less extent.⁵
/p. 15/

The Division of Natural History into that of Generations, Preter-generations and Arts, introduc'd by our illustrious Verulam, I do not disprove,⁶ and indeed the Subject is so vast & comprehends so great a variety as well as Number of Particulars, that as I am not ignorant that there may be several Divisions propos'd without being any of them despicable, so 'tis more difficult than those that have not try'd, would imagine to make a good and adæquate distribution of the Parts of Natural History so as to leave out nothing that it ought to comprize and yet take in nothing more then what properly belongs to it. But thô for this reason I blame not the Verulamian division, and do much less pretend to propose a perfect one; yet I shall venture to substitute another as that which seems to me somewhat more suitable to the Immensity and variety of the Particulars that pertain to Natural History and Expressly & distinctly takes in some general Heads of History which seem either to have been omitted, or seem not hitherto to have been taken notice of according to their dignity and Importance.

We will therefore distribute Natural History as 'tis distinct from the History of Arts, and from that (if there ought to be one) of Physical Principles into these seven principal Parts or general Titles.

1⁷ The History of Bodys.

2 The History of particular Qualitys, as Cold, Heat, Colours, Odours Sounds. &c.

3 The History of the States of matter, as Fluid, Firm, Animate & Inanimate &c.

4 The History of Natural Processes & Actions, wherein there /p. 16/ intervenes a Series of Qualitys. As Generation in Vivaparous Animals, the hatching of Eggs, the Fermentation of Liquors. To which are reducible those shorter Processes, which for distinction sake we call Actions or Operations. As Enlightning the Air, blowing up a Myne, Exciting Electrical Bodys by rubbing. &c.

5 The History of Casualty which may comprehend Sir Francis Bacons History of Præter-generations and perhaps diverse other things which do not soe properly belong to that.

6. The History of loose Experiments that is, such which are not reduc'd to any particular art (at least to any of them that are known) yet do very much serve to illustrate or determine Particulars that belong to the other Titles, where nature is consider'd as acting of her own accord, and not as directed and over-rul'd by man.

7. And lastly the various or miscellaneous History containing such Particulars as are not so conveniently referable to the foregoing Titles, & by their not being so, may be judg'd to be lesse indefinite then their Titles would import, and may in some sort resemble the Novels in the Civil Law and the Extravagants in the Cannon Law.

⁵ Remainder of page blank.

⁶ Boyle refers to Bacon's tripartite division as propounded in his *Parasceve*: see Bacon, *Novum organum*, p. 454/455.

⁷ The first 4 numbers are added in the margin, but the rest precede the text at the start of each paragraph.

Now to handle these⁸ distinctly, it will be convenient both to treat of the manner of writing the History of Nature, and annex to each of the above mention'd Titles particular Instructions fitted for the particular Subject, which thō they might be call'd the *Precepts* of writing a History of Bodys, or of Qualitys &c. yet to make those observations the more free & comprehensive /p. 17/ as wel as the more modest, we will chuse rather to name Considerations.

And because our Excellent Chancellor has already left us some Precepts about the writing of a Natural History in general, which thō but few are for the most part very judicious & useful, we shall, when they occur, retain them (without much variation even from the Expressions) and add our own, in cases by him omitted, and on the New Titles we have thought fit to adde.⁹ /p. 13/

Considerations about the Section Entitul'd Natural History in generall.

- 1.¹⁰ That the Subject is so vast & multifarious that as it may be diversely consider'd, it may be very differingly and almost arbitrarily divided, and there is scarce any Division that wilbe adæquate.
2. Therefore the best Division seems to be that which is the most comprehensive and easy.
3. That I do not so adhere to the division I propose as to exclude all others, or prefer it to them, or to think it Exact, or any more than tolerable, but I chuse it because some one or other I must pitch upon, and I count its defects & incompleatnes may be in some measure, and ought to be supply'd by Præliminary Tracts, and by Appendices, Indices &c.
4. That I conceive not Subordinate distributions and particular Topicks of Natural History, can be at present compleat & consequently are not to be stable & fix'd <but> if I may call them Probationary and so to be alter'd &c. according as further Discoverys or more mature Consideration shall enable and invite to change & enlarge the particular Topicks.
5. For I conceive, that according to the Theorys, men may have for the present of many Subjects, they do not know so much as what is fit to be inquir'd after & observ'd but must omit any important Quærys, Circumstances, and applications, as Those must do about the falling of heavy Bodys in water & Air, and the Phænomena of Comets who know not, the Doctrines of Progressions & Proportions Duplicate &c. and what a Paradox is, or how to be observ'd and who are unacquainted with the Hydrostaticks.
6. That many things must be taken upon trust in the History of Nature, as matters of fact Extraordinary (as Monsters Prodigies¹¹ &c. or long since expir'd, or else such as are not to be examin'd but in remote Countrys, or Places we cannot come to. The bounds and manner of inserting such things into the Natural History.
7. That many things cannot be warily enough deliver'd without employing more words then many men are willing to allow. /p. 9/

⁸ altered from 'those'.

⁹ Boyle again alludes to Bacon's *Parasceve*: see above, n. 6. The remainder of the page is blank.

¹⁰ In this section, the numbers precede the text at the start of each paragraph.

¹¹ altered in composition.

The Appendix <to the History of Nature> is to consist of [...] ¹² parts.

The first is a Review wherein any errors or mistakes committed in the delivery of the foregoing history, either as to matter of fact or of opinion, are candidly taken notice of and faithfully rectified or corrected; for it can scarce be hoped that a frail man should carry on so great & various a work without such humane weaknesses, as upon a revised and second thoughts may be discover'd: and when they are so, ought to be ingeniously confes'd out of loyalty to truth and love to mankind: and this will more recommend it's sincerity and it's worth to judicious men, then it will blemish his reputation; for 'tis the prerogative of God alone to be able to survey all that he had done, in reference to the Universe, and find that behold it is very good. ¹³

The second Appendix is to be a Supplement consisting partly of *Paralipomena* or circumstances or other particulars forgotten to be set down in their proper places in the Body of the History; and partly of additional Experiments, Observations &c. that may have been newly discover'd, or may have otherwise occur'd, since the writing of those particular parts of the History to which they are now refer'd or annex'd.

The third Appendix contains casual and Anomalous experiments, answering in some sort in the History of Arts to the accounts of Pordigies [sic] and Monsters, or perhaps to Bacons *Historia præter generationum* as 'tis subjoin'd or refer'd to the History general of the regular course of nature. ¹⁴ /p. 11/

The fourth Appendix consists of strange or scarce credible relations, such as Aristotle has compil'd in his little tract *de mirabilibus auscultationibus*. ¹⁵

The fifth Appendix consists of practical reflections, inferences, hints, Applications, or whatever other names be thought fit to be given to endeavours of making the Survey of the History of Nature, and the several parts of it compar'd together and with the whole, useful to mankind not only by the improvement of mens knowledg, but by enlarging and increasing their dominion over the works of nature.

The sixth Appendix consists of design'd tryals or fictitious Experiments, wherein Processes and other wayes of Operating are propos'd to supply the defect of real Experiments, when we want them to determine doubts, to resolve Questions or for other purposes; and these may be so contriv'd that probably which way soever the Event falls out, useful considerations may be rais'd upon it. And to this Appendix may belong the grand transition which is to serve as it were for a Bridge to pass on from what is already perform'd in the foregoing History, to a continuation of it, and a further progress in the discovery of universal Nature. ¹⁶

¹² Ellipsis in square brackets marks where space was left blank for an insertion which was never made.

¹³ Boyle glosses this 'review' with the words of God at the creation of the world; see Genesis chapter 1, verses 4, 10, 12, 18, 21, 25, 31. Followed by a gap of about 6 lines, as is the next paragraph.

¹⁴ Boyle alludes to Francis Bacon's classification of natural history in his *Parasceve*; see Bacon, *Novum organum*, pp. 450/451-484/485.

¹⁵ This work exists in a Greek version and was ascribed to Aristotle by his contemporaries, but modern scholars doubt that it was actually composed by him: see *Works*, vol. 11, p. 429.

¹⁶ At this point the document ends, though there is unused space on the page.

b. Section on 'the History of Bodys' (BP 9, fol. 71)

In the History of Bodys (supposing <the precursors>¹⁷ divisions and Observations) it were not amiss to make for each several History, or at least for those of them, that are, or may be made of greater importance to frame I say a *Topica particularis* [sic], or Articles of Inquiry, for 'tis highly useful for the discovery of the nature of a Body to consider how many wayes it may be examin'd, or (if you will[]), how many distinct *Phænomena* and representations of itself, it may be made to exhibit. And therefore after we have examin'd it as to Colour, Odour, Tast[,] Consistence, Gravity &c. and observ'd what *Phænomena* it exhibits without being alter'd or vex'd by Art, we may then work upon it by wayes artificial & various according to the nature of the subject, especially Statical and Hydrostatical, Chymical & Mechanical. And at the end of each History of a particular kind of Bodys, there should be given diverse *Monita*, as first Cautions or Admonitions to clear up Doubts or prevent mistakes. 2^{ndly} Advertisements of any defect or omission of the Historian. 3^{ly} Any deficiency of the History itself for want of competent observation. 4^{ly} An account of the Reasons and if need be the manner of a report or observation. 5^{ly} Doubts and Qærys for the further clearing or enriching and enlarging the History. 6^{ly} Hints or Intimations of the usefulness of any thing deliver'd in reference to Discovery or Practise.

c. Section on 'loose Experiments' (BP 9, fols. 72-3)

The Title of loose Experiments is not only copious and important of its self, but ought likewise to be complicated with all the other Titles, which by this conjunction will oftentimes be much enrich'd & improv'd, for setting aside those Experiments which are already form'd into Arts, as those of Tanners, Brewers, Dyers &c. there is scarce any part of the History of nature that may not be advanc'd by such as we here call loose or (to borrow a military Phrase) unregimented¹⁸ Experiments for hitherto Men have been for the most part content to receive of Nature those accounts of herself, which in her ordinary course she is wont to give us of her own accord. But when she has Interrogatorys judiciously made by Art, and is skilfully compell'd to give us a farther account of her self, she would then be brought to confess many things that we should never have otherwise learn'd of Her.

At the end of every subtil [sic] of loos Experiments & sometimes at the end of some one Experiment that is noble or important enough to deserve it, 'twilbe very fit to annex *Monita* more copious for the most part, than those of any of the other Titles. These *Monita* may chiefly consist of. 1st A more full account of any omitted, or but lightly touch't Circumstances (I mean weighty ones) of the manner us'd in Experimenting and the Descriptions as full & as clear as is necessary of the Instruments or Engines if any were imploy'd. 2^{ly} Or Intimation of Doubt or Scruples about the Success of the Experiment. 3^{ly} The Deficiencys of the Reporter or the Experiment itself with Proposals for supplying them, or avoiding Inconveniences. 4^{ly} A Suggestion of new

¹⁷ In Greg's hand, replacing 'his' deleted; 'his' was also deleted two words later and replaced by an illegible deletion ('are' [?]) which was then itself deleted.

¹⁸ altered from 'unregemented'.

Experiments for the improvement of the recited Tryal, or any other part of Natural History likely to be meliorated thereby, & a Proposal of the likeliest Instruments or other means to try such Experiments. 5^{ly} Quærys in order to the improvement of the Experiment or the applications of it. 6^{ly} Intimations of the Theoretical Use of the Experiment either Historical or Dioptrical, or Architectonical, if I may so call them, that is either for knowing the Attributes, that *de facto* belong to /fol. 73/ the Subject, more distinctly or for discovering something farther in it or in other natural subjects, or for building up a real & solid Philosophy. 7^{ly} Hints & Intimations of things useful to human Life, to which belong the proposing of Projects that thô rather to be wisht for, then expected, are yet not impossible in their own nature, such as the making perfectly Parabolical & Hyperbolical Glasses, Submarine Navigation[,] the purification of the Air under water, the art of flying, the producing a Gigantick stature in Human Bodys, the making of an artificial Animal. &c.

NB. 1st One of the Noblest & usefulest things that may be reduc'd to the Title of loos Experiments is a Philosophical or Physical Algebra, whereby divers of the practises of Symbolical Arithmetick may be apply'd to Natural & Experimental things as for Example, to resolve a question, or perform an Operation we may reckon up & digest into the best Order, all the Phænomena that we know, and other means that are in our power already, and look upon these as our *Data*, then by considering the nature & tenor of the Proposition, we may find out whether the *Data* we have be sufficient or no, and if insufficient what other *Data* we want. We may also give Symbolical marks to our *Data*, and other Particulars and by adding, subtracting &c. in a way suitable to the nature of this Physical Algebra, we may frame new Propositions, whence will oftentimes result new Truths & which will at least frequently suggest new Inquiry's & Experiments.¹⁹

NB 2. The fitness of Means being to be estimated by their Conduciveness to the End propos'd to be attain'd by them. The principal Thing that we must always have our Eye upon in the compiling the History of Nature is the scope we propose to our selves in undertaking it, which scope being twofold, the discovery & knowledge of Truth & inventing & promoting things useful to human Life, the grand Rule in drawing up a History must be that all the Particulars that compose it be so rang'd & pen'd as may make them most assistant to the attainment of Truth, & may most facilitate the advancement & perfecting the Invention already known, & the finding out of new Ones.

¹⁹ followed by a gap of about ten lines.

d. 'De Imperfectione Historiæ Naturalis' (BP 29, fols. 215-16)

De Imperfectione Historiæ Naturalis

Sic nunc ad ultimum Decumanorum Argumentorum, quæ me in Physiologiâ suspensum tenuere, nimirum duplicem Considerationem Imperfectionis Historiæ Naturalis pervenio: quæ fundamentum Naturalis Scientiæ esse debet, si superstructam Philosophiam satis solidam, ut nomen Scientiæ mereatur, desideremus. Et hanc Imperfectionem Naturalis Historiæ duplicem propono, quippe non solum ea, quâ nunc gaudemus, est imperfecta, verum etiam non apparet, quod brevi adepturi simus Historiam, quæ non similiter tali vitio laboret.

Ut igitur à priori harum exordiar, non putem, vos ita sentire, quasi obliviscerer, quam multi libri, quorum diversi mole satis conspicui deprehenduntur, scripti sunt à Botanicis, Zoologis, Metallicis, Chymistis, et de Plantis, et Animalibus, sed ejusmodi Libri, quanquam speciosi satis appareant, et perutiles, atque laudabiles in suo genere sint, tamen rerum naturalium causas nimis superficiales nobis reddunt, quam quod aliquid ad talem Historiam, de quali nunc loquimur, conferre possent.

Hoc nullo negotio demonstratum dari possit, si hic locus esset attentè, considerandi Naturam & Scopum talis Historiæ, qualis desideratur, cujus partes non tam in eo consistunt,²⁰ ut nobis exhibeat varietatem rerum Naturalium sponte suâ provenientium, quam exactam rationem reddat, ut de Phænomenis magis informantibus Naturæ sibi ipsi relictæ, ita potissimum de illis aliis, quæ producere cogitur per Hominis peritiam atque industriam extra usitatum suum Ordinem constituta: Ejuscemodi Phænomena ad duplicem finem Philosophicæ Historiæ Naturalis maximè conducunt, quorum

On the Imperfection of Natural History

So now I arrive at the last of the ten themes that have kept me in the realm of natural philosophy, namely a twofold consideration of the imperfection of natural history. This ought to be the foundation of natural knowledge if we desire the philosophy built upon it to be sound enough to merit the name of knowledge. And I propose that the imperfection of natural history is twofold since not only is that which we now enjoy imperfect, but also it does not appear that we shall soon arrive at a history that does not similarly labour under such a defect.

To begin, then, with the first of these, I am sure that you do not suppose me to have forgotten how many books, of which several are observed to be quite conspicuous by their size, have been written by botanists, zoologists, miners, and chemists, about both plants and animals. But books of this sort, although they may look quite impressive, and are most useful and praiseworthy in their way, nevertheless give us an account of the causes of natural things that is too superficial for them to be able to contribute anything to such a history as we are now speaking of.

This could easily be demonstrated, were this the place for a careful consideration of the nature and purpose of such a history as is desired, whose role consists not so much in showing us the variety of natural things arising of their own accord, as in rendering an exact account of the more instructive phenomena of nature left to herself, and especially of those others which, established outside her common order, she is forced to produce by the skill and industry of men. Phenomena of this kind are highly conducive to the two aims of a philosophical natural history,

²⁰ altered from 'consistent'.

/fol. 215v/unus est, nos docendi,²¹ quomodo non solum usitata Phænomena, quæ quasi suâ sponte exhibet Natura, sint explicanda, sed et illa ubi Ars concurrat (et forsân prædominatur) deinde etiam, quomodo Scientia Naturalium Causarum ad Effectus productos, in hac vitâ utiles, applicanda veniat.

Solidam Automatorum cognitionem adepturus, peritiâque ea emendandi, et consimiles machinulas, aliasve in eundem usum fabricandi sibi comparaturus, nunquam ad illam perveniet, nudas Icones, si sint vel exquisitissime delineatæ, permultorum, et diversorum Automatum intuendo, aut illa ipsa argenteis; aureis, vel encaustis thecis inclusa conspiciendo; verum aperta, et nuda thecis remotis, introspiciat, intrinsecamque structuram consideret Numerumque, Symmetriam, Motum, Rotularum, inter se respondentium, Fabricationem, Momentum, Bilancem, aliaque machinulam constituentia observet, necesse est. Applicatio evidentius se sistit, quam ut mentio ejus fiat.

Me non latet rem invidiæ plenam esse, aleam ejusmodi muneris subire, quod me ad notandum (interdum non sine taxatione) Majorum nostrorum, totque Clientum hoc Seculo²² devotorum Physicæ oscitantiam adegerit. Et nihil magis in votis est, quam ut Hominum industria atque præstatio mihi hujus rei gratiam fecissent, quo minus animi sensa super eam proderem, mihi peræque molesta, ac iis, quos tangit, ingrata.

Sed ne repetam, quod hoc in passu alibi fusiùs regestum est, tantummodò responsum habeant, quod, quanquam libenter videremus res in eo, perinde ut debuerunt, Statu constitutas, tamen /fol. 216/ nobis considerandæ sunt, prout reipsâ²³ habentur, nec

of which /fol. 215v/one is to teach us how we are to explain not just the usual phenomena that nature displays as though of her own accord, but also those where art co-operates (and perhaps predominates), and then how a knowledge of natural causes may come to be applied to producing effects of use in this life.

Someone who wishes to acquire a sound understanding of automata, and obtain skill in mending them and in making similar mechanisms or others for the same use, will never arrive there by gazing at mere pictures, be they ever so exquisitely drawn, of a great quantity and diversity of automata, or by examining them within their gold, silver, or enamel cases. Rather, he must inspect them open and uncovered, their cases set aside, and consider their internal structure, and observe the number, symmetry and movement of the wheels in their correspondence to each other, their manufacture, weight and balance, and the other components of the mechanism. The relevance of this presents itself more clearly than to need mentioning.

I am aware that it is to court great unpopularity to venture upon such an undertaking as has compelled me to note (sometimes not without censure) the negligence of our forebears and of so many devoted followers of natural philosophy in this century. And there is nothing more to be wished than that the industry and achievement of men had excused me in this matter from transmitting thoughts on it that are injurious to myself and my pocket, and disagreeable to those they concern.

But, not to repeat what is elsewhere recorded at greater length than in this passage, they can only receive the reply that, although we would willingly see things arranged in just the condition they ought to be, /fol. 216/ we must nevertheless consider them as they exist in reality, and we

²¹ followed by ‘tum’ deleted.

²² Initial letter capitalised after composition.

²³ altered from ‘res’.

oculi nostri occludendi, ut ne videamus Majores nostros fuisse negligentes, aut Physiologos perfunctorios, sicut Verulamius noster scite admodum exprimit *Opinio Copiæ est inter causas inopiæ*;²⁴ nec nostrum esse putabimus, Majores nostros præcedere, si Imperfectiones eorum Actionum, imo conatum maneat opertæ, quo facto, optimum de Humano Geni bene merendi modum hunc esse, ut spero, existimabimus, Antecessorum Negligentiam, & Omissiones in indagatione, quam Naturæ debebant, non velare, multò minùs imitari, sed restaurare. Quod ad illos, comparativè, perpauca, dignos, qui Catalogo Universorum eximantur, eorum Nomina commemorabuntur eo modo, quo non solum absolventur, sed extollentur, digna præstitisse concedendo, cum maxima Pars Hominum ne quidem conati fuerint, & forte fortuna: nequidem unquam in animum sibi id induxerint.

Plus temporis, & laboris, quam nunc per ocium²⁵ licet, in enumerandas, & seorsim explicandas Imperfectiones illas omnes, quas in Præsenti Historia naturali, in manibus Eruditorum communiter nunc Versante, deprehendi, inumeretur, ideoque Principales (ad quas diversa alia reduci possunt) selegisse, easque præcipua Capita, vel Subjecta sequentis Discursus constituisset, hîc sufficiat, ad quorum singula, ruptâ morâ, illa, eò pertinentia, referenda sunt casuali ordine, quo mihi occurrerunt.

must not close our eyes so as not to see that our forebears were negligent, or careless naturalists. As our Verulam most shrewdly puts it, 'the impression of plenty is one of the causes of poverty'.²⁴ Nor shall we consider it our duty to surpass our predecessors if the imperfections of their deeds, indeed of what they were striving for, remain hidden. When this is allowed, we shall, I hope, esteem this as the best way of serving the human race: not to cover up, and still less to imitate, the oversights and omissions of our forebears in the investigation which they owed to nature, but rather to make them good. As for those, relatively few, worthies who are excepted from the general list, their names will be commemorated in such a manner that they will not only be absolved, but extolled, when we grant that they achieved worthwhile things when the greatest part of mankind did not even attempt, and perhaps did not even imagine, them.

It would take more time and effort than is now at my disposal to enumerate and explain, one by one, all the imperfections I have found in the current natural history that now finds itself in the hands of learned men. Therefore, let it here suffice to have selected the principal ones (to which several others can be referred), and to have made them the chief headings, or subjects, of the discourse that follows, to each one of which, without delay, have been referred those matters pertaining to it in the accidental order in which they occurred to me.

²⁴ Bacon, *Novum organum*, i. 85, pp. 136/137.

²⁵ altered from 'otium'.

e. 'Of the insufficiency of Natural History' (BP 9, fol. 56)

Of the Imperfections and Insufficiency of Natural History, as we yet have it,
Especially <as> to the following Particulars.

1. That of many Things in Nature we have as yet noe History at all.
2. That many Parts of Natural History are falsely deliver'd.
3. That many Parts of Natural History are suspiciously deliver'd
4. That many Parts of Natural History are variously, and some of them contradictiously, deliver'd.
5. That many Things in Natural History are lamely deliver'd.
6. That many Things in Natural History are darkly deliver'd.
7. That many Things in Natural History are partially deliver'd.
8. That many Things in Natural History are unskilfully deliver'd.
9. That very few Things (if any) in natural history are perfectly or sufficiently deliver'd.
10. That divers Relations in Natural History cannot be brought under a severe Test; and therefore must be taken, if at all, upon trust.
11. That divers Things that are faithfully deliver'd, are Contingent.
12. That divers Things in Natural History cannot be wel & certainly related, even by Learned, faithful, & diligent Observers; if they be not acquainted with some Theories which perhaps are yet unknown.

f. Miscellaneous papers (BP 9, fols. 19-20, 105(b); BP 10, fol. 138)

(i) BP 9, fols. 19-20

That those that are not qualify'd or dispos'd or at leisure to undertake any methodical part of the History may be invited to assist those that do, and may be both invited & encourag'd to write Promiscuous Observations, and directed how to write them in the most useful manner.

That the Virtuosi, and especially the Societys of them do keep correspondence One with another, that Men may know both what is done, and what is doing, and what is yet left unattempted, that these Correspondencys be not only amongst those that living near together, may have the conveniencys of Conferences, and more easily associated endeavour, but with those that live in very remote Parts, the great Remoteness of Observers in many Cases, much contributing to the Variety & certainty of Observations.

That a Judicious & Eloquent Treatise be publish'd to show the necessity of Natural History to a solid and useful Natural Philosophy, and the great usefulness of such a

History & Philosophy to the Power, Health and pleasure of Men as well as to the satisfaction of their minds. /fol. 20/

That there be in every Country some Society of Men as in England that of Gresham Colledg or some noted Person, as the Publisher of the Philosophical Transactions to whom accounts, and other Philosophical Papers may be readily address'd, and whereby notice may be given to the Publick at convenient times, and in the fittest manner of what has been already perform'd & observ'd, and what is in agitation, and that for the encouragement of writers whatever Experiment Observation or Philosophical Paper that has been communicated, shalbe thought fit to be publish'd by itself or otherwise shalbe acknowledg'd to the Author by name unless he forbid it, and that Papers may be deposited seal'd up with such a Society <or>²⁶ Persons with a morall certainty of care & faithfulness to prevent all unhandsome and hurtful disputes about the first Authors and Inventors of things.

(ii) BP 9, fol. 105(b)

It seems to me a thing more unhappy than strange, that so very few attempts have been made to draw up Scheams for Natural Histories, and to propose Methods & Notions which at first sight would pass for meerly Luciferous; Since the generality even of learned Men seems not to take any Notice, either of the difficulty or the usefulness of such things, but look upon them as dry & barren Speculations, whereas indeed, if the value of such Instructions were well known & duely consider'd, and if thinking men were encourag'd by a kind of Entertainment of their Endeavours to impart what they have meditated of this sort of things it would quickly make Mens researches of nature more curious & ample, and by that means would probably promote both the extent and the accuratenes of human knowledg. And thõ perhaps few have a greater Love & value for Experiments than I, yet for my part I should think my self more oblig'd to him that discovers to me some pregnant Notion, or usual Method in Natural Philosophy: then if he imparted some fine Experiment or some celebrated Chymical Process: As supposing the truth of the *Virgula Divinitoria*, I should prefer the Discovery made to me of that Simple and in itself despicable Instrument before a whole hundred weight of Lead or Tin Oar, since from the latter I could expect but a moderate quantity of Metal, but the other may lead me to find great veins and whole Mynes of the same, or even of far richer Mettals.

(iii) BP 10, fol. 138

Advertisements

The Title being sufficient to declare the nature of this MS. I shall not need, Pyroph. to give in this place any more then these 3.²⁷ or 4. advertisements about it.

1. There are 2. differing wayes of handling the Subjects treated of in this *Chaos*; for²⁸ some I do not take any solemn notice of, but mention them succinctly, as the *L. Verulam* writes of those things which Hee calls Experiments Solitary, or which if they

²⁶ replacing 'of' deleted.

²⁷ altered from '2'. The next word but one, '4', is altered from '3'.

²⁸ followed by 'of' deleted.

be Experiments in Consort, consist but of few particulars;²⁹ and the Subjects that I thus treat of are to be met with at this end of the book, but there are other subjects which I intended more fully to consider and insist on, such as are Fermentation, Putrefaction[,] water, air, flame &c. and as to these, because they will each of them take up much room, and yet I know not how much, I thought it convenient for distinction sake to place them by themselves at the other end of the book, where there will be more room for so many particulars, which are there set down in order to the Naturall Historys of those subjects; to fit them for which purpose, the particulars that are here huddled together in the casuall order wherein they occur'd to me, are to be rang'd according to the Intimations of the *Topica particularis* [sic] or Articles of Enquiry about each of these Historys, which Topicks are likewise placed at the other end of the Book.

²⁹ See Introduction, n. 15.