

THE FALL OF MAN AND THE FOUNDATIONS OF SCIENCE

PETER HARRISON

University of Oxford

For Grace

*We desire truth, and find within ourselves only uncertainty....
This desire is left to us, partly to punish us, partly to make us perceive from whence we
have fallen.*

Blaise Pascal, *Pensées*, §401

Contents

ACKNOWLEDGEMENTS

ABBREVIATIONS

INTRODUCTION	1
1. THE FIRST PHILOSOPHER	18
Adam's Encyclopaedia	
Falling into Ignorance	
Inheriting Error	
Carnal Knowledge & the Divine Light	
Baptising Aristotle	
2. AUGUSTINE REVIVED	55
Luther & the Putrid Philosopher	
Depravity & Doubt	
<i>Augustinus</i>	
The Sceptical Hypothesis	
3. SEEKING CERTAINTY IN A FALLEN WORLD	96
Vestiges of Heavenly Light	
Mathematical Certainties?	
Adam, Moses, Hermes, Solomon	
Inspiration, Experience & Experiment	
4. DETHRONING THE IDOLS	148
Science and Self-Knowledge	
The Dominion of Mind	
The Fallen Body	
Idols of the Mind	
5. THE INSTAURATION OF LEARNING	197
'Knowledge shall be Increased'	
Reversing Babel	
Solomon's House	
The Limits of Reason	
Anthropology Abandoned	
CONCLUSION	258
REFERENCES	271

Abbreviations

ANF	<i>The Ante-Nicene Fathers</i> , 9 vols. (Edinburgh, 1990)
AT	<i>Oeuvres de Descartes</i> , 13 vols., ed. Charles Adam and Paul Tannery (Paris, 1897-1913)
BJHS	<i>British Journal for the History of Science</i>
CHMP	<i>The Cambridge History of Later Greek and Early Medieval Philosophy</i> , ed. A. H. Armstrong (Cambridge, 1970)
CHLMP	<i>The Cambridge History of Later Medieval Philosophy</i> , ed. Norman Kretzmann, Anthony Kenny, and Jan Pinborg (Cambridge, 1982).
CHRP	<i>The Cambridge History of Renaissance Philosophy</i> , ed. Charles B. Schmitt and Quentin Skinner (Cambridge, 1988)
CSM	<i>The Philosophical Writings of Descartes</i> , 2 vols., tr. John Cottingham, Robert Stoothoff, and Dugald Murdoch (Cambridge, 1985)
FaCh	Fathers of the Church, Washington DC., 1932-
JHI	<i>Journal of the History of Ideas</i>
LW	<i>Luther's Works</i> , 55 vols., ed. Jaroslav Pelikan and Helmut Lehmann (Philadelphia, 1957)
NPNF I	<i>Nicene and Post-Nicene Fathers, Series I</i> , 14 vols., ed. Philip Schaff and Henry Wace (Peabody, MA, 1994)
NPNF II	<i>Nicene and Post-Nicene Fathers, Series II</i> , 14 vols., ed. Philip Schaff and Henry Wace (Peabody, MA, 1994)
PG	<i>Patrologiae cursus completus</i> , Series Graeca, 162 vols., ed. Jacques-Paul Migne (Paris, 1857-1912)
PL	<i>Patrologiae cursus completus</i> , Series Latina, 217 vols., ed. Jacques-Paul Migne (Paris, 1844-1905)
SCG	Thomas Aquinas, <i>Summa contra gentiles</i> , tr. English Dominican Fathers (New York, 1924)
ST	Thomas Aquinas, <i>Summa theologiae</i> , Blackfriars edn., (London, 1964-76)

INTRODUCTION

He came into the World a Philosopher, which sufficiently appeared by his writing the Nature of things upon their Names: he could view Essences in themselves, and read Forms with the comment of their respective Properties; he could see Consequents yet dormant in their principles, and effects yet unborn in the Womb of their Causes; his understanding could almost pierce into future contingents, his conjectures improving even to Prophecy, or the certainties of Prediction; till his fall it was ignorant of nothing but of Sin, or at least rested in the notion without the smart of Experiment.... I confess 'tis difficult for us who date our ignorance from our first Being, & were still bred up with the same infirmities about us, with which we were born, to raise our thoughts, and imaginations to those intellectual perfections that attended our nature in its time of Innocence....¹

These effusive estimates of Adam's abilities were delivered by Robert South in a sermon to worshippers at St Paul's Cathedral, London on a Sunday morning in November 1662. While this description of Adam's philosophical acumen was notable for its eloquence—South was widely acknowledged as the most gifted preacher of his generation—there was nothing unusual in its substance. From quite early in the Christian era, patristic writers had commented on the unique intellectual capacities of our first father, on the vast extent of his knowledge, and on the magnitude of his losses at the Fall. These ideas were further elaborated during the Middle Ages and were commonplace in the Early Modern period. For many champions of the new learning in the seventeenth century the encyclopaedic knowledge of Adam was the benchmark against which their own aspirations were gauged. Francis Bacon's project to reform philosophy was motivated by an attempt to determine whether the human mind 'might

by any means be restored to its perfect and original condition, or if that may not be, yet reduced to a better condition than that in which it now is.’² In 1662, the year in which South delivered his sermon, Bacon’s intellectual heirs formed the Royal Society, the goals of which were also expressed by the apologist for the Society, Thomas Sprat, in terms of a regaining of the knowledge that Adam had once possessed.³

Such sanguine expectations, it must be said, were not shared by all. Robert South himself, while clearly impressed by the scope of Adam’s original knowledge, entertained serious doubts about the prospects for its contemporary recovery, and he could be scathing of those who cherished such proud ambitions. In his capacity as the Public Orator at Oxford, he had presided at the opening of the Sheldonian theatre in 1669. In a long speech on that occasion he had observed that Fellows of the fledgling Royal Society ‘can admire nothing except fleas, lice, and themselves’, no doubt causing acute embarrassment to the Fellows present, including Christopher Wren, architect of the theatre. South’s reservations about the programme of the Royal Society were owing to his scepticism about the extent to which Adamic knowledge could be re-established in the modern age and to his concerns about the links between such projects and a discredited puritan utopianism. Indeed one of the major themes of South’s sermon was the vast disparity between the ease with which Adam had acquired knowledge and the difficulties encountered by his latter-day progeny: ‘Study was not then a Duty, night-watchings were needless; the light of Reason wanted not the assistance of a Candle.’ For Adam’s fallen issue, however, it was a very different matter: ‘This is the doom of fallen man to labour in the fire, to seek truth in *profundo*, to exhaust his time and impair his health, and perhaps to spin out his dayes, and himself into one pittiful, controverted, Conclusion.’⁴ Adam’s knowledge, on this more sober account, would not be easily reacquired. Yet, whatever the differences between South and the Fellows of the Royal Society, it was agreed on all sides that those seeking to determine the rightful course for the advancement of knowledge needed to reckon with Adam and what befell him as a consequence of his sin.

¹ Robert South, ‘Man was made in God’s Image’, *Sermons Preached upon Several Occasions* (Oxford, 1679), pp. 127, 128.

² Francis Bacon, *The Great Instauration*, in *The Works of Francis Bacon*, ed. James Spedding, Robert Ellis, and Douglas Heath, 14 vols., (London, 1857-74), IV, 7.

³ Thomas Sprat, *History of the Royal Society of London* (London, 1667), pp. 349f. The Society had met informally from 1660, but was officially incorporated on 15 July 1662.

⁴ South, *Sermons*, pp. 127f.

The narrative of the Fall has always exercised a particular fascination over Western minds. It has been described in recent times as ‘the anthropological myth *par excellence*’, ‘the most elemental of myths’, and ‘the central myth of Western culture’.⁵ During the seventeenth century, this myth assumed a particular importance. At this time, the bible came to occupy a position of unparalleled authority, informing discussions about the nature of the state, the rights of the individual, private property, education, international sovereignty, the status of indigenous peoples, work and leisure, agriculture and gardening, anthropology and moral psychology. In each of these spheres, the story of Adam had a significant place. According to historian Christopher Hill: ‘The Fall then was central to seventeenth-century debates about the nature of the state and its laws, as well as about the justification of private property, social inequality and the subordination of women.’⁶ This was particularly so in England, where Calvinist understandings of the doctrine of original sin predominated. It is no exaggeration to say that this dogma dominated the theological agenda and became a crucial point of reference in broader social and intellectual discussions.⁷

The central concern of this book is to illustrate the ways in which the myth of the Fall informed discussions about the foundations of knowledge and influenced methodological developments in the nascent natural sciences. While the first half of the book will be devoted to making this general case, the second half will focus on the more specific example of experimental science in seventeenth-century England. What should become apparent from the more general discussion is that the differences between competing strategies for the advancement of knowledge put forward during the sixteenth and seventeenth centuries can be accounted for largely in terms of different assessments of the Fall and of its impact on the human mind. The renewed focus on the Fall and original sin that is characteristic of the early modern period was occasioned by the religious upheavals of the sixteenth century. These events not only precipitated a crisis of confidence in the traditional sources of knowledge, but also coincided with a revival of an Augustinian anthropology that emphasized the corruption of human nature and the limitations of the intellect. Four aspects of this development will be examined.

⁵ Paul Ricoeur, *The Symbolism of Evil* (Boston, 1967), p. 281; T. Otten, *After Innocence: Visions of the Fall in Modern Literature* (Pittsburg, 1982); Philip Almond, *Adam and Eve in Seventeenth-Century Thought* (Cambridge, 1999), p. 1.

⁶ Christopher Hill, ‘Sin and Society’, *The Collected Essays of Christopher Hill*, 3 vols. (Amherst, 1986), II, 117-140 (125).

⁷ *Ibid.*, p. 132; W. M. Spellman, *John Locke and the Problem of Depravity* (Oxford, 1988), pp. 8, 9; William Poole, *Milton and the Idea of the Fall* (Cambridge, 2005), pp. 4f., 21-39.

First, the early modern preoccupation with sin meant that in the realm of epistemology error was often equated with sin, and the human propensity to invest false claims with the character of truth was attributed to Adam's fall. Considerations such as these explain why philosophers of the seventeenth century tend to be preoccupied with error and its prevention, and commonly assume that avoidance of error is not merely a necessary condition for knowledge, but that it is sufficient.⁸ The tradition according to which Adam was in possession of the perfect philosophy implies that human minds had originally been designed to know the truth, and that if those impediments that arose as a consequence of the Fall could be identified and neutralized, the mind would once again, of its own nature, arrive at truth or at least be better equipped to do so. Francis Bacon, as is well known, saw in the sciences the prospect of restoring, or at least repairing, the losses to knowledge that had resulted from the Fall.⁹ His emphasis lay in purging the mind of those flaws introduced by Adam's defection. Describing his goal as 'the true end and termination of error', he suggested that this could only be accomplished if knowledge was 'discharged of that venom which the serpent infused into it'.¹⁰ Later in the century a number of those involved in the establishment and running of the Royal Society set out a similar strategy. Joseph Glanvill, an early and influential fellow of the Society, explained that knowledge could not be set on a sure foundation until a full account had been given of the causes of ignorance: 'And therefore besides the general reason I gave of our intellectual disabilities, The *Fall*; it will be worth our labor to descend to a more particular account: since it is a good degree of *Knowledge* to be acquainted with the *causes* of our *Ignorance*.'¹¹ Even opponents of the experimental method of the Royal Society adopted this approach. John Sergeant, a champion of Aristotelianism who opposed both English experimentalism and Cartesianism, observed in his *Method to Science* (1696) that even the greatest minds 'still miss of Reasoning rightly, and so fall short of True Knowledge, which is their Natural Perfection.' Once again, the proposed solution involved an analysis of the primordial cause of error: 'Whence, our First Enquiry ought to be, how Man's Nature come to be so Disabled from performing its Primary Operation, or from Reasoning rightly.'¹²

⁸ On the avoidance of error as sufficient for truth, see Thomas Lennon's introduction to Nicolas Malebranche, *The Search after Truth*, tr. and ed. Thomas Lennon and Paul Olscamp (Cambridge, 1997), p. xii.

⁹ Bacon, *Novum Organum*, II.iii, *Works*, IV, 247-48. Cf. *Valerius Terminus*, *Works* III, 222.

¹⁰ Bacon, *Great Instauration*, *Works*, IV, 20-21.

¹¹ Joseph Glanvill, *The Vanity of Dogmatizing. or, Confidence in opinions manifested in a discourse of the shortness and uncertainty of our knowledge, and its causes: with some reflexions on peripateticism, and an apology for philosophy*, (London, 1661), p. 63; cf. *Scepsis Scientifica, or, Confest ignorance, the way to science* (London, 1665), p. 48.

¹² John Sergeant, *The Method to Science* (London, 1696), Preface, Sig. av-a2r.

This preoccupation with error and its causes was by no means the sole preserve of English philosophers, although admittedly it was they who most enthusiastically focused their attentions on the history of Adam. An important feature of Descartes' programme to establish new foundations for knowledge was 'to investigate the origin and causes of our errors and to learn to guard against them.'¹³ While Descartes makes no mention of the Fall in this context—indeed he is typically silent on matters relating to sacred history—his compatriots were less reticent. The subtitle of Nicolas Malebranche's *Search after Truth* (1674-5) reads: 'Wherein are treated the nature of mans' mind and the use he must make of it to avoid error in the sciences.' Malebranche went on to explain that this approach called for a specific investigation into 'how we might conceive the order found in the faculties and passions of our first father in his original state, as well as the changes and disorder that befell him after his sin.'¹⁴ Blaise Pascal went further, castigating Descartes for not having taken the Fall seriously enough. Had he done so he might not have spoken so confidently about attaining certain knowledge. Pascal allowed that 'if man had never been corrupted, he would, in his innocence, confidently enjoy both truth and felicity.' The present situation, however, was rather different: 'We perceive an image of truth and possess nothing but falsehood, being equally incapable of absolute ignorance and certain knowledge; so obvious is it that we once enjoyed a degree of perfection from which we have unhappily fallen.'¹⁵

For all the attention directed towards sin and error, the ultimate aim was to determine the conditions under which knowledge would be possible and, more particularly, what kinds of things could be known and by what methods. Writing in the Preface of *Micrographia* (1665) Robert Hooke, curator of experiments at the Royal Society, declared that 'every man, both from a deriv'd corruption, innate and born with him, and from his breeding and converse with men, is very subject to slip into all sorts of errors.... These being the dangers in the process of humane Reason, the remedies of them all can only proceed from the real, the mechanical, the experimental Philosophy.'¹⁶ Hooke's statement neatly encapsulates the positive aspect of proposals to advance

¹³ Descartes, *Principles of Philosophy* 1, §31, CSM I, 203-4. It is also significant that one of Spinoza's chief criticisms of both Descartes and Bacon, was that 'they never grasped the true cause of error.' Letter to Henry Oldenburg, September 1661, *The Collected Works of Spinoza*, ed. and tr. Edwin Curley (Princeton, 1985) I, 167.

¹⁴ Malebranche, *Search after Truth*, I.5 (p. 19).

¹⁵ Blaise Pascal, *Pensées*, L 131, tr. A. J. Krailsheimer (London, 1966), p. 65. This edition uses the Lafuma (L) numbering. Cf. L 45, L 199, L 401.

knowledge in the seventeenth century. Having identified the specific privations suffered by the mind on account of Adam's lapse, an argument could be made as to how they could be most successfully redressed by the suggested procedures. The 'mechanical and experimental philosophy', while it will be a major focus of this book, was not the only solution proposed to overcome the inherent incapacity of fallen minds. Despite a general consensus about the limitations of the intellect and the need to overcome its deficiencies, projects to overcome these shortcomings varied considerably. The priority accorded to proposed sources of knowledge—be it reason and innate principles; the senses, observation, and experimentation; or divine revelation through the scriptures or personal inspiration—were intimately related to analyses of the specific effects of original sin. Similar considerations apply to the certitude with which various forms of knowledge could be held.

The second aspect of the thesis of this book, then, is that the various solutions offered to the problem of knowledge in the early modern period are closely related to assessments of exactly what physical and cognitive deprivations were suffered by the human race as a consequence of Adam's original infraction. If, for example, the Fall were understood as having resulted in the triumph of the passions over reason, the restoration of Adamic knowledge would be accomplished through re-establishing control of the passions, thus enabling reason once again to discharge its proper function. If the Fall had dulled Adam's senses, this deficiency might be overcome through the use of artificial instruments capable of restoring to weakened human senses some of their original acuity. If the Fall had altered nature itself, rendering its operations less obvious and less intelligible, intrusive investigative techniques would be required to make manifest what had once been plain. Varying estimates of the severity of the Fall, moreover, gave rise to different assessments of the prospects of a full recovery of Adam's knowledge. Those who regarded the Fall as a relatively minor event were generally far more optimistic about the possibility of constructing a complete and certain science than were those for whom the Fall was an unmitigated catastrophe. As will become apparent, the contrasting experimental, speculative, and illuminative solutions to the early modern problem of knowledge were informed by varying conceptions of the nature and severity of the Fall. To express it in more familiar (but historically more problematic) terms, advocates of 'rationalism' and 'empiricism' largely fall out along lines related to an underlying theological anthropology. Descartes' confident assertion that the 'natural light' of reason could provide the basis of complete and certain science presupposed the

¹⁶ Robert Hooke, *Micrographia* (London, 1665), Preface.

persistence of the natural light and the divine image even in fallen human beings. This was strongly contested by those who believed that the Fall had effaced the divine image and all but extinguished the natural light. On this latter view, if knowledge were possible at all, it would be painstakingly accumulated through much labour, through trials and the testing of nature, and would give rise to a modest knowledge that did not penetrate to the essences of things and was at best probable rather than certain. Such mitigated scepticism characterised the experimental approach commonly associated with such figures as Francis Bacon and Robert Boyle.

The third element of this argument concerns the religious background of these early modern discussions of the Fall and its impact on knowledge. One event that led to a renewed interest in the human condition and its inherent fallibility was the Protestant reformation and the resurgence of Augustinian thought that accompanied it. The reformers' focus on human depravity, originally articulated in the context of a particular view of justification, was also to set the agenda for the epistemological debates of the following two centuries. In general, those influenced by the anthropology of Luther and Calvin were to adopt the position of mitigated scepticism characteristic of empiricism and the experimental philosophy. Those who took a more positive view of human nature were more inclined to assert the reliability of the human reason, the possibility of *a priori* knowledge, and the perfectibility of the sciences. To a degree, then, the methodological prescriptions offered by philosophers in the seventeenth century mirror their confessional allegiances. Hence, the Catholic Descartes held fast to a relatively optimistic Thomist account of human nature and aspired to attain, in his own words, a 'perfect knowledge of all things that mankind is capable of knowing'.¹⁷ By way of contrast, Francis Bacon, raised as he was in a Calvinist environment, thought that knowledge would be accumulated gradually and only with meticulous care. The work of many unexceptional minds, science would ultimately amount to 'judgment and opinion, not knowledge and certainty', as John Locke would later express it.¹⁸ These confessional correlations are, admittedly, far from perfect, partly because of the emergence of a Protestant scholasticism that reverted to the optimistic Thomist/Aristotelian view of knowledge and human nature, and partly because early modern Catholicism witnessed its own Augustinian revival, most conspicuously in the Jansenist movement that exercised such a profound influence over Blaise Pascal and Antoine Arnauld. Nevertheless, it is possible to establish significant links between

¹⁷ Descartes, *Principles*, CSM I, 179.

particular thinkers' commitments in the sphere of theological anthropology and their methodological prescriptions in the realm of the sciences.

Finally, and following directly from the previous point, the trajectories of the major philosophical projects of the seventeenth centuries can be understood to some extent as developments of different aspects of Augustinianism. While Augustine's influence on early modern philosophy has long been taken for granted by French authors, Anglophone writers are now increasingly aware of the significance of aspects of Augustine's thought for this period.¹⁹ In keeping with the received version of the history of philosophy, according to which the chief concern of modern philosophy is epistemology, Augustine's theories of knowledge have been the primary focus of attention. Accordingly, Augustine is seen to have had most impact in the rationalist epistemologies of Descartes and Malebranche. While not wishing to deny the significance of this line of investigation, I shall trace an alternative avenue of Augustinian influence in the early modern period, namely, his views on human nature and his doctrine of original sin. While these are not unrelated to his epistemological views, Augustine's understanding of the Fall and original sin, as already indicated, was to play a vital role in traditions of investigation rather different from that of the Cartesians. The experimental approach, I shall argue, was deeply indebted to Augustinian views about the limitations of human knowledge in the wake of the Fall, and thus inductive experimentalism can also lay claim to a filial relationship with the tradition of Augustinianism. In much the same way that both Protestantism and early modern Catholicism can quite legitimately be regarded as heirs of Augustine, so too, can both of the chief sects of seventeenth-century philosophy.

The claims set out in this book represent a significant challenge to some common assumptions about the origins of modern philosophy and science, and about the onset of modernity generally. At this point it is worth giving a preliminary indication of where

¹⁸ John Locke, *Essay concerning Human Understanding* IV.xii.10, 2 vols., ed. A. C. Fraser (New York, 1959), II, 349.

¹⁹ See, e.g., Etienne Gilson, 'The Future of Augustinian Metaphysics' in *A Monument to St. Augustine* (London, 1934); Jean Laporte, *Le coeur et al raison selon Pascal* (Paris, 1950); Jean Delumeau, *Le Péché et al peur: La culpabilisation en Occident XIIIe-XVIIIe siècles* (Paris, 1983); G. B. Matthews, *Thought's Ego in Augustine and Descartes* (Ithaca, 1992); 'Post-medieval Augustinianism', in *The Cambridge Companion to Augustine*, ed. Eleonore Stump and Norman Kretzmann (Cambridge, 2001), pp. 267-79; Stephen Menn, *Descartes and Augustine* (Cambridge, 1998); Zbigniew Janowski, *Cartesian Theodicy* (Dordrecht, 2000); Michael Moriarty, *Early Modern French Thought* (Oxford, 2003), pp. 41-9 and passim. See also Louis-Paul Du Vaucel, 'Observations sur la philosophie de Descartes', in *Descartes et el Cartésianisme Hollandais*, ed. E. J. Dijksterhuis (Paris, 1950), pp. 113-30; Michael Hanby,

the thesis stands in relation to a number of standard positions. At the most general level, the book seeks to challenge the idea that early modern philosophy, including natural philosophy, is concerned largely with issues of method and epistemology *per se*. The primary focus, I shall suggest, was rather human nature—‘anthropology’ in its broadest sense—and epistemological concerns, while undoubtedly present, were secondary to this.²⁰ This contrasts with a widespread view that regards the seventeenth century as preoccupied with the foundations of knowledge and which characterizes the transition from the medieval to the modern in terms of a shift from metaphysics to epistemology. On this account, it is Descartes who inaugurates the modern age by issuing a sceptical challenge and then solving it with his own radical foundationalism. The agenda thus set, the British empiricists react against Descartes’ rationalism, leaving it to Immanuel Kant (or possibly Hegel, depending on one’s philosophical predilections) to offer the definitive solution to the problem of knowledge. This version of the history of modern philosophy can be found, for example, in the influential writings of Kuno Fischer (1824-1907).²¹ Fischer secured the place of Descartes’ *Meditations* as the founding document of modernity, and enshrined the view that modern philosophy was characterised by a split between rationalists and empiricists that was healed by the critical philosophy of Immanuel Kant. Many introductions to modern philosophy still follow this line, and undergraduates are typically introduced to the subject through the *Meditations*. Integral to this received view is the assumption that the modern epistemological project is essentially a secular one, representing the ascendancy of reason over faith, and setting up the conditions for the age of Enlightenment to follow. Descartes’ reliance on God as the guarantor for his foundational project is thus often dismissed as window dressing designed to placate potential ecclesiastical critics. Certainly, it is true that Descartes avoids making reference to the revealed truths of Christianity, including the doctrine of original sin, and he is quite forthcoming about his reluctance to engage in ‘theological’ discussions. In this respect, however, he is rather atypical and thus a poor exemplar for seventeenth-century philosophy generally. Very few discussions of knowledge in the seventeenth century are devoid of references to the

Augustine and Modernity (London, 2003), esp. pp. 134-77.

²⁰ Wilhelm Dilthey observed, at the close of the nineteenth century, that the advent of modernity can be characterised as a turn from metaphysics to anthropology. ‘Die Funktion der Anthropologie in der Kultur des 16. und 17. Jahrhunderts’, in *Weltanschauung und Analyse des Menschen Seit Renaissance und Reformation. William Diltheys Gesammelte Schriften II*, (Leipzig, 1914).

²¹ Kuno Fischer, *Metaphysik oder Wissenschaftslehre* (Stuttgart, 1852); *Geschichte der neueren Philosophie*, 6 vols. (Mannheim, 1860). See Knud Haakonssen, ‘The History of Early Modern Philosophy: The Construction of a Useful Past’, in C. Condren, S. Gaukroger and I. Hunter (eds.), *The Philosopher in Early Modern Europe: The Nature of a Contested Identity*

problem of sin in relation to knowledge. Indeed, surprising as it may seem, what distinguishes seventeenth-century discussions of knowledge from scholasticism is not their secular character but rather the fact that they tend to be more explicit in their reliance on the resources of revealed theology than their medieval equivalents. Hence, as we shall see, one of the most common seventeenth-century objections to scholastic philosophy was that it was ‘pagan’ in character.

A variation on this thesis, and one closer to that set out in this book, is that the Protestant Reformation precipitated an intellectual crisis by challenging traditional sources of authority. Because this challenge extended to the very criteria for what counted as true belief, the problem of knowledge became particularly acute. The rediscovery of ancient scepticism, which coincided with the Reformation, greatly exacerbated the problem, providing an impressive range of arguments to the effect that nothing could be known with certainty.²² Michel de Montaigne, whose *Apology for Raymond Sebonde* masterfully rehearses the sceptical arguments of Pyrrho of Elis, played a major role in the revival of the ideas of these ancient schools and, along with his disciples, made scepticism a fashionable philosophical option in the seventeenth century. To a degree, sceptical arguments proved useful to the Counter Reformation because they could be deployed against Protestant claims to doctrinal certainty. Moreover, one of the standard sceptical prescriptions—in the face of our ignorance it is best simply to follow the customs and traditions of one’s own country—counselled against the adoption of novel religious views (such as those of the Protestants). Again Descartes is the key figure. The sceptical intellectual atmosphere that flourished in the early seventeenth century provided the point of departure for Descartes’ *Meditations*, which begins with a radical scepticism, but concludes by triumphantly dispelling all doubts with clear and distinct ideas. These provide the indubitable foundations for knowledge. Richard Popkin, who has done most to highlight the role of scepticism in early modern philosophy, thus considers Montaigne’s *Apologie* to be ‘the womb of modern thought, in that it led to the attempt either to refute the new Pyrrhonism, or to find a way of living with it.’²³ Descartes provided just such a refutation, and in doing so inaugurated the era of modern philosophy.

(Cambridge, 2006).

²² L. Floridi, ‘The Diffusion of Sextus Empiricus’s works in the Renaissance’, *JHI* 56 (1995), 63-85; and ‘The Rediscovery of Ancient Scepticism in Modern Times’, in *The Sceptical Tradition*, ed. M. Burnyeat, (Berkeley, 1983), pp. 225-51; Charles B. Schmitt, *Cicero Scepticus: A Study of the Influence of the ‘Academica’ in the Renaissance* (The Hague, 1972).

²³ Richard H. Popkin, *The History of Scepticism from Erasmus to Spinoza* (Berkeley, 1979), p. 54. Cf. Ernst Cassirer, *Das Erkenntnisproblem in der Philosophie und Wissenschaft der neueren*

This is a persuasive argument and one that has been justifiably influential. My own view is that while there is some truth in the idea of a ‘sceptical crisis’, that crisis was precipitated not only by the Reformers’ challenge to traditional authorities and the revival of ancient scepticism, but also by a renewed emphasis on an Augustinian anthropology that stressed the Fall and its epistemic consequences. This was particularly so in England, although varieties of Augustinianism had strong support on the Continent as well. It is true that both scepticism and Augustinian anthropology lead to doubts about the reliability of human knowledge, but they offer quite different prescriptions. For the sceptics, our ignorance is not the consequence of a cosmic catastrophe precipitated by human disobedience; rather it is intrinsic to human nature and is thus to be accepted with equanimity. Accordingly, the appropriate response lies not in attempting to remedy the operations of the mind (which were naturally limited), but in accepting the inevitable, suspending judgement, and cultivating an inner peace.²⁴ For those who attributed our current state of ignorance to the Fall, the figure of Adam had a dual significance. On the one hand, the Fall provided an explanation for human misery and proneness to error; on the other, Adam’s prelapsarian perfections, including his encyclopaedic knowledge, were regarded as a symbol of unfulfilled human potential. It is this hopeful, forward-looking element that is absent from scepticism in either its ancient or modern formulations. The sceptical prescription, moreover, is consistent with the classical ideal of the philosopher as one who adopts a life of contemplation. Those who took seriously the reality of the Fall, by way of contrast, were often motivated to reverse, or partially reverse, its unfortunate effects, and this required a

Zeit, 2 vols. (Berlin, 1906-7) I, 162, 181. Popkin’s work appeared in three successively expanded editions, the earlier work being *The History of Scepticism from Erasmus to Descartes* (Van Gorcum, 1960), the later, *The History of Scepticism from Savonarola to Bayle*, (Oxford, 2003). Also see Popkin’s ‘Scepticism and Modernity’ in T. Sorell (ed.), *The Rise of Modern Philosophy: The Tension between the New and Traditional Philosophies from Machiavelli to Leibniz* (Oxford, 1993), pp. 15-32; ‘Theories of Knowledge’, *Cambridge History of Renaissance Philosophy* [CHRP], ed. C. Schmitt & Q. Skinner (Cambridge, 1988), pp. 668-84. For discussions or developments of this important thesis see *The High Road to Pyrrhonism*, ed. Richard A. Watson and James E. Force (San Diego, 1980); *Scepticism and Irreligion in the Seventeenth and Eighteenth Centuries*, ed. R. Popkin and Arjo Vanderjagt (Leiden, 1993); José Maia Neto, ‘Academic Skepticism in Early Modern Philosophy’, *JHI* 58 (1997), 199-220; Brendan Dooley, *The Social History of Skepticism: Experience and Doubt in Early Modern Culture* (Baltimore, 1999); Petr Lom, *The Limits of Doubt: The Moral and Political Implications of Skepticism* (Albany, N.Y., 2001); *The Return of Scepticism from Hobbes and Descartes to Bayle*, ed. Gianni Paganini (Dordrecht, 2003); *Skepticism in Renaissance and Post-Renaissance Thought: New Interpretations*, ed. Richard Popkin and José Maia Neto (Amherst, N.Y., 2003); Charles Larmore, ‘Scepticism’, in *The Cambridge History of Seventeenth-Century Philosophy*, 2 vols., ed. Daniel Garber and Michael Ayers (Cambridge, 1998), II, 1145-1192; Michael Ayers, ‘Popkin’s Revised Scepticism’, *BJHS* 12 (2004), 319-32.

²⁴ The Pyrrhonic sceptics thus aimed at the suspension of judgment (*epoche*), which to lead to a

commitment to the active life and an energetic engagement with both social and natural realms. There will be further discussion of the Popkin thesis in chapter two.

Turning to more specific theories about religion and the origins of science, and experimental science in particular, there is a long-established thesis that posits a connection between theological voluntarism and the emergence of an empirical approach to the investigation of nature. On most versions of this argument, the late Middle Ages saw the development of a theological voluntarism that asserted the radical freedom of God's will. The Protestant reformers took up this view and served as the agents for its propagation in the modern period. Because, on the voluntarist view, God was not constrained by any prior rational considerations in his creation of the world, the argument goes, human minds cannot know *a priori*, through the exercise of reason alone, what specific order God will instantiate in the world. Instead recourse must be had to empirical investigation.²⁵ While this position is not without merit and provides a plausible account of the origins of the modern conception of laws of nature, it has a number of deficiencies—not least the fact that Descartes was a radical voluntarist.²⁶ If my analysis is correct, it is not so much that God could have ordered nature in any way he chose which is significant for the development of an experimental approach to nature, but rather the fact that the Fall separated human beings from God and corrupted

state of unperturbability (*ataraxia*).

²⁵ M. B. Foster, 'The Christian Doctrine of Creation and the Rise of Modern Natural Science', *Mind* 43 (1934), 446-68; Francis Oakley, 'Christian Theology and the Newtonian Science: The Rise of the Concept of Laws of Nature', *Church History* 30 (1961), 433-57; J. E. McGuire, 'Boyle's Conception of Nature', *JHI* 33 (1972), 523-42; Eugene Klaaren, *Religious Origins of Modern Science* (Grand Rapids, 1977); Peter Heimann, 'Voluntarism and Immanence: Conceptions of Nature in Eighteenth-century Thought', *JHI* 39 (1978), 271-83; Betty Jo Teeter Dobbs, *The Janus Faces of Genius: The Role of Alchemy in Newton's Thought* (Cambridge, 1991); Margaret Osler, *Divine Will and the Mechanical Philosophy: Gassendi and Descartes on Contingency and Necessity in the Created World* (Cambridge, 1994); Henry Guerlac, 'Theological Voluntarism and Biological Analogies in Newton's Physical Thought', *JHI* 44 (1983), 219-29. See also Amos Funkenstein, *Theology and Scientific Imagination* (Princeton, 1986), ch. 3; John Henry, 'Henry More versus Robert Boyle', in *Henry More (1614-87): Tercentenary Essays*, ed. Sarah Hutton (Dordrecht, 1990), pp. 55-76; James E. Force and Richard H. Popkin, *Essays on the Context, Nature, and Influence of Isaac Newton's Theology* (Dordrecht, 1990); Antoni Malet, 'Isaac Barrow on the Mathematization of Nature: Theological Voluntarism and the Rise of Geometrical Optics', *JHI* 58 (1997), 265-287; Margaret Osler, 'Fortune, Fate, and Divination: Gassendi's Voluntarist Theology and the Baptism of Epicureanism', in *Atoms, Pneuma, and Tranquillity: Epicurean and Stoic Themes in European Thought*, ed. Margaret Osler (Cambridge, 1991), 'The Intellectual Sources of Robert Boyle's Philosophy of Nature', in *Philosophy, Science, and Religion, 1640-1700*, ed. Richard Ashcroft, Richard Kroll, and Perez Zagorin (Cambridge, 1991); 'Divine Will and Mathematical Truths: Gassendi and Descartes on the Status of Eternal Truths', in *Descartes and his Contemporaries*, ed. R. Ariew and M. Grene (Chicago, 1995), pp. 145-158.

²⁶ For a broader critique see Peter Harrison, 'Voluntarism and Early Modern Science', *History of Science* 40 (2002), 63-89; 'Was Newton a Voluntarist?', in James E. Force and Sarah Hutton (eds.), *Newton and Newtonianism: New Studies*, (Dordrecht, 2004), pp. 39-64.

their minds. Nature itself had fallen, moreover, deviating from the original divine plan and becoming less intelligible. The empirical and experimental approach was thus not necessitated because of the in-principle unpredictability of the divine will. Rather the inconveniences and limitations of experimental natural philosophy are the inevitable outcome of a realization of the fallen condition of humanity. If the manner of God's direction of the operations of nature is inscrutable to human minds, this is on account of the limitations of the latter, rather than the irrationality of the former.

Another important line argument points to the significance of puritan millenarianism, particularly in the context of seventeenth century English natural philosophy. It is the misfortune of every historian who chooses to address the question of theological influences on the development of experimental science in England to stand in the great shadow cast by Charles Webster's magisterial and encyclopaedic *Great Instauration* (1975, 2002).²⁷ Inasmuch as a significant proportion of the present book deals with Adamic science and the prospects for its recovery, it bears an important relation to this earlier work. Webster has argued that one of the most significant periods in the development of English science took place during the period between 1640 and 1660, when Puritan millenarianism provided the inspiration for a range of revolutionary scientific projects. This millenarianism was inspired in part by the prospect of restoring to humanity the perfections once enjoyed by Adam in Eden, including his vast scientific knowledge, thus establishing a state of affairs that was thought to be a necessary precondition for the onset of the millennium. Following the restoration of the monarchy in 1660, the radical aspects of this vision were viewed with disfavour, but significant elements of it were taken up by the Royal Society and the Royal College of Physicians. My thesis is not a challenge to Webster's, but rather presupposes many of the basic contentions set out there and attempts to place them within a broader context, both temporally and geographically. Rather than emphasizing the discontinuities between revolutionary and Restoration science, and indeed between puritan science and the science associated with other confessional groupings, it seeks to show how their differences are to be understood in terms of varying assessments of the Fall, and of the extent to which prelapsarian conditions might be re-established in the present world. Moreover, while Webster's treatment of the theme of the Fall is primarily in the context of puritan millenarianism, the emphasis of this work is the implications of the Fall for

²⁷ Charles Webster, *The Great Instauration: Science, Medicine, and Reform, 1626-1660* (London, 1975); 2nd edn (Bern, 2002).

theological anthropology.²⁸ There will be further discussion of these issues in chapter four.

Because a major focus of this book is the development of experimentalism in the English context, some of the themes of another classic work in the history of early modern science are also relevant. In *Leviathan and the Air Pump* (1985), Steven Shapin and Simon Schaffer pose fundamental questions about why one does experiments in order to arrive at scientific truth, and why experimentation has come to be regarded as superior to alternative ways of establishing knowledge.²⁹ They rightly argue that such questions are often overlooked by modern historians because the presuppositions of contemporary cultural practices—such as science—are rarely regarded as problematic. This is less true now than when Shapin and Schaffer first wrote, but it remains the case that historians are embedded within a culture in which the virtues of experimentation seem self-evident. From the present perspective, then, it can be difficult to understand the extent to which in the seventeenth century the new experimental approach of such figures as Francis Bacon and Robert Boyle was controversial and counter-intuitive. It is also easy to overlook the strength of the arguments raised against it. Key objections to ‘the experimental philosophy’ were that it did not count as genuine knowledge because it failed to establish the causes of phenomena, and that it fell short of the certainty that characterised genuine science, the goal of which was the kind of demonstration found in logic or geometry. I shall suggest that the new ‘probabilistic and fallibilistic conception of man’s natural knowledge’, that according to Shapin and Schaffer distinguished the approach of the experimentalists, was inspired by a new theological emphasis on the inherent weakness of fallen human minds.³⁰ By the same token, many opponents of the experimental programme who retained elements of a more traditional Aristotelian approach or who emphasised the possibility of mathematical certainties subscribed to a more optimistic view of human capabilities. The role of theological anthropology in these various positions becomes more apparent the more we are able to enter into the cultural milieu of the seventeenth century and recapture something of the strangeness of the prescriptions of the experimental approach.

²⁸ For Webster’s emphasis, see *Great Instauration* (1975), p. xvi.

²⁹ Steven Shapin and Simon Schaffer, *Leviathan and the Air Pump: Hobbes, Boyle, and the Experimental Life* (Princeton, 1985), p. 1

³⁰ *Ibid.*, p. 23. For the new emphasis on probability, see Barbara Shapiro, *Probability and Certainty in Seventeenth Century England* (Princeton, 1983), ch. 2; Ian Hacking, *The Emergence of Probability* (Cambridge, 1975), chs. 3-5.

Another relevant contention of Shapin and Schaffer is that there was a close relation between the problem of knowledge and the problem of social order in the seventeenth century. One of the reasons for this, I shall suggest, is that ignorance and unsociability were numbered together among the more serious consequences of the Fall. As we shall see, those arguing for particular political arrangements typically supported their views by invoking, in various ways, the original sovereignty exercised by Adam. The coercive powers of the state, moreover, were justified as necessary evils designed to curb the aggressive and selfish impulses of sinful subjects. By analogy, the methodological strictures of particular programmes of natural philosophy—experimental method being perhaps the best example—were understood as applying necessary external constraints to fallen minds which, left to their own devices, would simply fail to accumulate any useful knowledge of the natural world.

Finally, the biblical elements of the present work also represent an extension of my own previous book on the bible and the rise of science.³¹ In essence, that work suggested that when in the sixteenth century the book of scripture began to be read in a literal, historical sense, it had a major impact on the way in which the book of nature was interpreted. Medieval allegorical readings of scripture had assumed a natural world in which objects symbolised spiritual truths. The demise of the allegory and its replacement by a literal and historical approach called for a reconfiguring of the natural order, the intelligibility of which was no longer seen to reside in symbolic meanings. While the major focus of that previous work was a consideration of the consequences of the turn to the literal sense of the scripture, the present book looks at one consequence of that literal turn—the way in which the account of Adam’s Fall, now read almost exclusively as an historical narrative rather than an allegory—influenced both theological anthropology and early modern science.

It remains to say something about the structure of the book. The first chapter offers a description of the biblical, patristic and medieval interpretations of the story of Adam’s fall, along with an account of the development of the doctrine of original sin. It is not intended as a history of the ‘unit idea’ of the Fall, but provides background without which it would be difficult to make sense of the arguments advanced by various early modern figures.³² The second chapter deals with the anthropology of the Protestant

³¹ Peter Harrison, *The Bible, Protestantism and the Rise of Natural Science* (Cambridge, 1998).

³² This is not the appropriate place for a discussion of the relative merits of various styles of intellectual history. However it may be a relevant consideration that seventeenth-century thinkers, lacking the sophistication of Cambridge School intellectual historians, assumed that

reformers, their rejection of scholastic Aristotelianism, and their revisiting of the Augustinian position on original sin. Consideration is also given to the re-emergence of scepticism and the Catholic revival of Augustinianism. In the chapter that follows, brief examples are provided of some of the ways in which Reformation anthropology influenced the development of natural philosophy in the sixteenth century—Philipp Melanchthon and his revision of the doctrine of ‘natural light’, subsequently adopted by Johannes Kepler; the attempts of Lambert Daneau and others to ground natural philosophy in the authority of scripture; ‘enthusiastic’ proposals to rely on personal inspiration for knowledge of nature. This chapter does not set out a comprehensive catalogue of those individuals who subscribed to these various positions, but rather provides examples of the possible range of views. The last two chapters bear the main burden of establishing the importance of the Fall in the genealogy of experimental science in the English context. The chief subject of chapter four is ‘anthropological turn’ in seventeenth century England, and the manner in which Francis Bacon’s proposed instauration of natural philosophy was conceived of as a recovery of knowledge lost as a consequence of the Fall. The final chapter continues this story into the middle and later decades of the seventeenth century, giving consideration to how the methodological prescriptions of the English experimentalists, and Fellows of the Royal Society in particular, were shaped by the narrative of the Fall. Here the development of the experimental philosophy is closely linked with a particular understanding of original sin. The last two sections of the chapter deal with Boyle, Locke and Newton, and show how the narrative of the Fall was gradually written out of justifications of scientific practice, leaving the impression that experiment was self-evidently the proper way to pursue scientific investigation. A conclusion and references follow.

theological doctrines did have a chronological history. For a recent discussion of some of these historiographical issues, and for a specific justification of a chronological treatment of the idea of ‘the Fall’, see John Patrick Diggins, ‘Arthur O. Lovejoy and the Challenge of Intellectual History’, *JHI* 67 (2006), 181-209. In any case, readers can decide for themselves whether this chronological approach helpfully contributes to an understanding of later developments and forms part of a coherent historical account.

CHAPTER 5. THE INSTAURATION OF LEARNING

And as at first, mankind fell by tasting of the forbidden Tree of Knowledge, so we, their Posterity, may be in part restor'd by the same way, not only by beholding and contemplating, but by tasting too those fruits of Natural knowledge, there were never yet forbidden.'

Robert Hooke, *Micrographia* (London, 1665), Preface

Whence, our First Enquiry ought to be, how Man's Nature come to be so Disabled from performing its Primary Operation, or from Reasoning rightly.... Divines will tell us that this mischief happens thro' Original Sin.

John Sergeant, *The Method to Science* (London, 1696), Sig. av-a2r.

'... we create tragedy after tragedy for ourselves by a lazy unexamined doctrine of man which is current amongst us and which the study of history does not support.... It is essential not to have faith in human nature.'

Herbert Butterfield, *Christianity and History*, pp. 46f.¹

The striking frontispiece of the 1620 edition of Bacon's *Great Instauration* bears a text from the apocalyptic book of Daniel that reads: '*Multi pertransibunt et augebitur scientia*'—Many shall go to and fro, and knowledge shall be increased.² As Charles Webster has ably demonstrated, the turbulent decades between Bacon's death in 1626 and the restoration of the monarchy in 1660 witnessed a remarkable marriage of Puritan millenarianism and a Baconian promotion of knowledge and learning. While it is true that the scientific writings of this period were remarkably eclectic and drew upon a variety of ancient and modern natural philosophies, it was the millenarian aspects of the Baconian programme that provided inspiration for a whole variety of scientific and technological projects. Whatever Bacon's own religious predilections, his philosophy could have been specifically tailored for puritan purposes.³ Having said this, the Puritan eschatology of the period was characterised by a quite specific chiliastic vision. It was not a matter of complacently awaiting the Day of judgment, or of passively reading the 'signs' that signalled the imminence of the millennium. Godly individuals were to be active participants in history, directing their efforts towards the establishment of those conditions that would usher in the final age of the world. For the puritans, and indeed

¹ Herbert Butterfield, *Christianity and History* (London, 1949), pp. 46f.

² Dan. 12:4 The Vulgate actually reads '*plurimi pertransibunt et multiplex erit scientia*', which Bacon accurately cites in *Advancement*, *Works* III, 340. Whether the change of wording was deliberate is not clear. See Farrington's comment, *Philosophy of Francis Bacon*, p. 132.

³ Webster, *Great Instauration*, pp. 486, 514f.

many Protestants, the reformation of religion in the sixteenth century was the historical event that had triggered the apocalyptic countdown. Since then, revolutions in learning and advances in such diverse spheres as navigation and printing confirmed them in their belief that the end time was quickly approaching. The voyages of discovery not only expanded existing knowledge of the world, but also raised the prospect of the gospel being preached to the whole world for the first time—a signal occurrence that had traditionally had been considered a prerequisite for the culmination of human history. On the negative side of the ledger, the 1620s was not a happy decade for Europe, and for Protestants in particular. The combined effects of economic depression and war brought untold misery to millions, and Catholic forces had begun to make significant gains in the Protestant heartlands of the Palatinate, Bohemia, and Poland. For a time the very existence of Continental Protestantism seemed under threat, and England seemed either unwilling or unable to lend military support to its co-religionists. The spirit of Antichrist seemed to loom larger than at any previous time in history. These events fuelled an upswing of apocalyptic sentiment in Protestant Europe, and refugees fleeing persecution and religious violence brought it with them to the shores of England, where it melded with domestic millenarianism. On those shores, the publication in 1627 of Joseph Mede's enormously influential *Clavis Apocalyptica* showed how biblical prophecy could be directly applied to the interpretation of contemporary historical events, and many were to appropriate its interpretive principles to demonstrate the imminence of the end times.⁴ Along with the book of Revelation, which provided the main subject matter for Mede's *Clavis*, the apocalyptic prophecies of Daniel came to assume great importance for puritan millenarians in the revolutionary period of seventeenth-century England. The verse cited by Bacon assumed particular importance and often appeared in the sermons of puritan preachers, reinforcing the message that the last days would be heralded by an unprecedented increase in knowledge.⁵ The immediate context of the Daniel passage refers to the end times when 'those who are wise will shine like the brightness of the heavens, and those who lead many to righteousness, like the stars for ever and ever' (12.3). Passages such as these served to inspire puritan activists in their efforts to reform society, to rebuild the institutions of learning, to promote arts and sciences, and to usher in a new era of peace and prosperity.

⁴ MacCulloch, *Reformation*, pp. 469-84; Hugh Trevor-Roper, 'Three Foreigners: The Philosophers of the Puritan Revolution', in *The Crisis of the Seventeenth Century* (Indianapolis, 2001), pp. 219-71. For the rise of apocalypticism, prophecy and astrology during this period see Patrick Curry, *Prophecy and Power: Astrology in Early Modern England* (Cambridge, 1989); Christopher Hill, *Antichrist in Seventeenth Century England* (London, 1971); Kinch Hoekstra, 'Disarming the Prophets: Thomas Hobbes and Predictive Power', *Rivista di storia della filosofia* 1 (2004), 97-153.

I. 'KNOWLEDGE SHALL BE INCREASED'

One of the many immigrants to settle in England during these turbulent times was Samuel Hartlib (c. 1600-1662) who, along with fellow émigré Amos Comenius, was to play a vital role in the development of an eschatologically oriented reformation of learning. A native of the Baltic port of Elbing, Hartlib had studied at Emmanuel College, Cambridge in the 1620s. He settled in London in 1628, and soon established himself at the hub of one of the most important networks of correspondence in the seventeenth century. Some sense of his commitment to the task of rebuilding the world in its final days can be gauged from the short utopian work *Macaria* which he published (but did not author) in 1641. The book describes an Edenic world subdued by agriculture and colonization so that the whole land is once again 'like to a fruitfull Garden', thus linking an Edenic past to the coming Kingdom.⁶ *Macaria* provides us with a clear sense of the specifically puritan proactive vision of the future: 'a Reformation shall come before the day of judgment ... therefore with alacrity let us pursue our good intentions and bee good instruments in this worke of Reformation.'⁷ We encounter the same combination of the indicative and the imperative in Comenius who shared many of Hartlib's ideals, and well as his Continental Calvinist background. Comenius announced that there will 'a multiplication of knowledge and light at the very evening of the world Dan. 12.4 Zach. 14.7.' 'Therefore', he concluded, 'let us endeavour that this be promoted.'⁸

Puritan promoters of learning thus appropriated Bacon's incipient apocalypticism. They also took to heart his conception of science as a corporate and cumulative activity as the means to increase knowledge, and thus to hasten the millennium. Communal endeavour, moreover, was thought to secure knowledge against the errors of corrupt individual minds. 'It's in vaine to hope that humane things, prolapsed and faln to decay by the common errors of all can be restored and made entire', Comenius observed,

⁵ Webster, *Great Instauration*, pp. 9-12.

⁶ [Gabriel Plattes], *Macaria* (London, 1641), p. 4. Hartlib himself has usually been credited with authorship, of *Marcaria* but it is probably the work of his colleague Gabriel Plattes. See Charles Webster, 'The Authorship and Significance of *Macaria*', *Past and Present* 56 (1972), 34-48. Similar Edenic images may also be found in Walter Blith, *The English Improver Improved* (London, 1652), sig. d3v; Ralph Austen, *A Treatise of Fruit Trees* (London, 1657), sig. ¶1r; Pettus, *History of Adam and Eve*, p. 43. See also Scott Mandelbrote, 'Représentations bibliques et édéniques du jardin à l'âge classique', *XVIIe siècle* 52 (2000), 645-54.

⁷ Plattes, *Macaria*, p. 13.

‘without the common help and joynt assistance of all.’⁹ In keeping with this principle, Hartlib took it upon himself to coordinate the disparate endeavours of those striving to improve knowledge and human welfare. Soon after his arrival in London he began to cultivate a wide circle of correspondents, drawing heavily upon his contacts in Continental communities of Protestant refugees. One of his key contacts was John Dury (1596-1680), a Calvinist minister originally from Edinburgh, but at that time in Hartlib’s Polish hometown Elbing. Dury shared Hartlib’s heady utopian vision of a universal republic of learning that shared a common Protestant religion. From his London residence, and with the assistance of a secretary and a small group of copyists, Hartlib received manuscripts, reports of experiments and inventions, requests for information, and all manner of proposals for the improvement of agriculture, medicine, commerce and chemistry. These would be copied, summarised if need be, and sent out again to his numerous correspondents. In the late 1640s, in the wake of the victory of the Parliamentary party, Hartlib sought to make his role a more formal one, designated ‘the Office of Address’ with official government support.¹⁰ While his proposal was viewed favourably, it was never formally implemented. Undaunted, Hartlib continued in the role through the 1650s and garnered himself a reputation as one of Europe’s key co-ordinators of scientific information. He was variously dubbed the ‘hub and axeltree of knowledge’, ‘the great intelligencer of Europe’, the ‘conduit pipe’ through which the learning of Europe was channelled.¹¹

Hartlib and Comenius had also sought to reform institutions of learning and to establish new foundations that would embody principles and practises of Solomon’s House. During Comenius’s visit in 1641, the two settled upon Chelsea College—an institution founded in 1610 by James I, but now standing derelict—as the best venue for the realisation of their ambitious strategy. Comenius was to become the Dean of the college, which would reflect the Baconian ideal of a recapture of Edenic wisdom (a goal that was restated in Comenius’s own *Via lucis* (‘The Way of Light’, 1642). The ultimate plan was for Protestant England to become a beacon of learning whose light would illuminate the whole of a benighted Europe. Unfortunately, England was on the brink of its own military crisis, and the onset of civil war in 1642 meant that the Parliament

⁸ Comenius, *A Patterne of Universall Knowledge* (London, 1651), tr. Jeremy Collier, p. 65; Cf. *Reformation of Schooles*, pp. 4, 26.

⁹ Comenius, *Universal Knowledge*, p. 20.

¹⁰ Details of the scheme are provided in *Considerations Tending to the Happy Accomplishment of Englands Reformation in Church and State* (London, 1647).

¹¹ Mark Greengrass, Leslie Taylor and Timothy Raylor (eds.), *Samuel Hartlib and the Universal Reformation: Studies in Intellectual Communication* (Cambridge, 1994), Introduction,

had turned its attention to the more pressing matter of the war in Ireland. But there was still considerable support for educational reform amongst the puritans. John Milton offered a somewhat belated contribution to Hartlib's efforts with his tract *Of Education* (1644). While these two may have differed on issues relating to the content of the curriculum, they shared the view that improvement of the institutions of learning was long overdue. 'To write now of the reforming of education', Milton observed, is 'one of the greatest and noblest designs that can by thought on, and for the want whereof this nation perishes.' Milton, as we have already noted, regarded education as a way of 'repairing the ruins of our first parents'.¹² His brief proposal included recommendations relating not only to the content of the curriculum, but to the kinds of practical matters that Hartlib and Comenius had also given thought to: housing, maximum enrolment, age range of pupils, along with ruminations on diet and exercise. Milton's was one of fifty works written between 1640 and 1660 devoted to the topic of educational reform. The vast majority of these were associated with the Hartlib group.¹³

If hopes for a new bricks and mortar institution that would embody the ideals of Solomons's house were dashed, the 1640s nonetheless witnessed the emergence of a number of important informal groups devoted to the promotion of knowledge, and more specifically to experimental philosophy. One of these was the 'Invisible College', about which very little is known, apart from the fact that Robert Boyle was a participant and that it convened in the two years 1646-7. Another group had begun to coalesce around the mathematician John Wallis (1616-1703) at about the same time. This latter group was devoted to the 'new philosophy' of Galileo and Bacon, and included in its membership John Wilkins, Francis Glisson, George Ent, Seth Ward, and Thomas Willis.¹⁴ Both were important precursors of the Royal Society. In spite of widespread criticism of the hidebound conservatism of the universities, the new philosophy also made inroads at these venues. And while the disruption caused by the onset of civil war may have distracted the Parliament from formal plans to establish a new foundation of godly learning, that body nonetheless resolved to reform the existing universities, seeking specifically to bring an end to the domination of the curriculum by scholasticism. Whatever the intention of the parliamentary party, it cannot be doubted that the middle decades of the century witnessed the introduction of significant aspects

p. 16; Trevor-Roper, 'Three Foreigners'.

¹² Milton, *Of Education*, in *Works*, pp. 225, 226.

¹³ Webster, *Samuel Hartlib and the Advancement of Learning* (Cambridge, 1971), pp. 208-11.

¹⁴ C. J. Scriba, 'The Autobiography of John Wallis', *Notes and Records of the Royal Society*, 25 (1970), 17-46

of the new learning of Galileo, Descartes, and Harvey at the ancient universities. At Cambridge, Henry More introduced students to Descartes' *Principles of Philosophy*, while Isaac Barrow and John Ray promoted experimental philosophy and mathematics.¹⁵ Wallis's 'experimental philosophy club' also began meeting in Oxford in about 1648-9, hosted successively by William Petty, John Wilkins and, following Wilkins' move to Cambridge, Robert Boyle.

II. REVERSING BABEL

While the millenarian motivations of these groups suggest a future-oriented ethos, the history of Adam remained a central preoccupation. John Webster (1611-82), who was introduced in the third chapter, was typical in this regard. A schoolmaster and an active participant in discussions about the restructuring of social and educational institutions during the Commonwealth, Webster had diverse philosophical inspirations. Apart from a deep commitment to Baconian ideals, he approved of the theosophy of Boehme and Fludd, subscribed to the atomism of Digby, and supported elements of van Helmont's iatrochemistry (the use of chemical rather than herbal preparations in medicine). In all of this he was sharply critical of Aristotelian learning which in his view suffered from a misplaced trust in the powers of human reason. The 'much magnified natural reason' of the peripatetic schools, he claimed, was in reality 'the fruit and effect of the forbidden tree, ... a spurious and adventitious faculty which man wanted in his innocency, and was instilled in him by *Satan* in the fall.' Confidence in human reason alone, he insisted, gave rise to knowledge that was 'fleshly, earthly, deadly and destructive.'¹⁶ Aristotle's philosophy, in brief, was the corrupted knowledge of the fallen creature. It did not follow that all forms of natural philosophy were to be shunned however, for if prosecuted properly the study of nature had two vital uses: first, it enabled the philosopher to discern 'characters' or 'hieroglyphics' of the divine power in the things of nature; second, knowledge of the operations of causes and effects would enable the investigator 'to make use of them for the general good and benefit of mankind, especially for the conservation and restauration of the health of man, and of those creatures that are usefull for him.'¹⁷ Adamic science provided the model of this godly natural philosophy.

¹⁵ Webster, *Great Instauration*, pp. 134f., 150-3.

¹⁶ Webster, *The Saints Guide*, pp. 6, 4.

¹⁷ Webster, *Academiarum Examen*, p. 19.

In speaking of the ‘characters’ of the natural world, Webster was not merely alluding to the ubiquitous trope of the ‘book of nature’, for in his conception, nature was literally written in a language that Adam had once been able to read. There was a ‘Paradisical language’ that Adam had used in Eden, and which he had used to bestow names upon the beasts. Unlike the labels of conventional language, these names were not imposed arbitrarily on things. Rather, they uniquely identified them and perfectly expressed their true natures. In Eden, Webster informs us, ‘the imposition of names was adequately agreeing with their natures; otherwise it could not be univocally and truly be said to be their names, whereby he distinguished them.’¹⁸ It followed that Adam knew ‘the internal natures, virtues, effects, operations, and qualities of the creatures’, indeed Adam’s encyclopaedic knowledge was nothing other than facility in the very language of nature. After the entry of sin into the world, this language of things was ‘defaced and forgotten’.¹⁹ However, Webster was encouraged by the possibility that this primitive language might be recovered, and with it Adamic learning. Indeed it was the common belief that the knowledge of the primitive tongue, if reacquired, would confer knowledge of the natures of things. Bacon himself had asserted that ‘the imposition of names’ was one of the summary parts of knowledge and, moreover, that ‘whensoever he shall be able to call the creatures by their true names he shall again command them.’²⁰

Some, like Webster, associated the Adamic language with the Renaissance doctrine of signatures, according to which natural objects (and plants particularly) bore some sign that indicated their use. The shape of the kidney bean, to take a simple example, indicates that it is to be prescribed for ailments of that organ.²¹ God, it was thought, had impressed these signatures on objects to show their interior properties and their uses. The science of signatures was linked to the discipline of physiognomy, which also conveyed the inner workings of things by external signs. Webster described physiognomy as ‘that laudable, excellent, and profitable science ... from which and by certain external signs, signatures and lineaments, doth explicate the internal nature and

¹⁸ *Ibid.*, pp. 27, 29.

¹⁹ *Ibid.*, pp. 30, 27.

²⁰ Bacon, *Advancement*, I.vi.6 (p. 38); *Of the Interpretation of Nature*, Works III, 222. See also Walker, *History of the Creation*, pp. 193, 229; Boehme, *The Second Booke*, Sig A3r; John Pettus, *History of Adam and Eve*, p. 60; Francis Bamfield, *Miqra qadosh, The Holy Scripture* (London, 1684), Title page. Also see discussions in Håkan Håkansson, *Seeing the Word: John Dee and Renaissance Occultism* (Lund, 2001), pp. 100-108; Bono, *Word of God*, ch. 8.

²¹ For representative adherents see Boehme, *Signatura Rerum* (London, 1651); Oswald Croll, *Of Signatures* (London, 1669); Paracelsus, *Die 9 Bücher der Natura Rerum*, in *Sämliche Werke*, ed. Sudhoff, xi, 393. Della Porta, *Natural Magick* (London, 1658), p. 17 and passim; Richard Saunders, *Saunders Physiognomie and Chiromancie, Metoposcopia*, 2nd edn. (London, 1671); Coles, *Adam in Eden*, To the Reader.

quality of natural bodies.²² For Webster, knowledge of these signs had provided the basis of the natural science of Adam although, of course, this had been lost—either because of the corruption of human nature, or because the Fall had erased these once conspicuous ciphers from the surfaces of natural objects.²³ In its present state, then, the science of signatures was fragmented and imperfect, and likely to remain so unless further efforts were devoted to extending and improving it.²⁴

There was also considerable speculation about the possibility that the original Adamic tongue had survived the catastrophes of the Fall and Babel, and was still spoken (or written) somewhere on the globe. Hebrew was the traditional candidate for this role, partly because of some remarks in Augustine's *City of God* suggesting that the language of the ancient Israelites had been spared the confusion of tongues.²⁵ The priority of Hebrew was the fundamental assumption of Cabbalism, a mystical Jewish tradition that sought hidden meanings of the Hebrew characters of Scripture. Christianised versions of Cabbalism flourished during the Renaissance, finding powerful exponents amongst humanist scholars.²⁶ In his *Occult Philosophy* Agrippa von Nettesheim suggested that Adam's original Hebrew names 'contain in them wonderful powers of the things signified.' Because God had used speech to create the world—'And God said ...' (Gen. 1)—letters and words could be said to form the very structure of the cosmos. As Agrippa expressed it: 'there are therefore two and twenty Letters, which are the foundation of the world, and of creatures that are, and are named in it, and every saying, and every creature are of them, and by their revolutions receive their Name, being, and Virtue.'²⁷ Johannes Reuchlin (1455-1522), Great-Uncle to Philipp Melanchthon and

²² Webster, *Academiarum Examen*, p. 76.

²³ *Ibid.*, pp. 27, 29. Cf. Coles, *Adam in Eden*, To the Reader; Saunders, *Saunders Physiognomie*, Preface.

²⁴ See also the suggestions of More, *An Antidote*, pp. 56f., and Coles, *Adam in Eden*, Preface.

²⁵ Augustine, *City of God*, XVI.11. Supporters of this view included Browne, *Pseudodoxia Epidemica* V.xxiii; VI.i (I, 434f., 442); Gulielmus Postellus, *De originibus deu Hebraicae linguae* (Parisiis, 1538), Fols. Aiiiir-Aivv; Agrippa von Nettesheim, *Three Books of Occult Philosophy*, pp. 162f.; J.H. Heidegger, *De historia sacra patriarchum*, 2 tom. (Amstelodami, 1667-71), I, 462f.; Richard Simon, *A Critical History of the Old Testament* (London, 1682), I.xiv (pp. 97-101); John Selden, *De Synedriis ... veterum Ebraeorum*, Prolegomenon, cap. iii; Lightfoot, *The Works of the Learned & Reverend John Lightfoot D. D.* 2 vols., (London, 1684), I, 1012; Thomas Brett, *A Chronological Essay on the Sacred History* (London, 1629), pp. 56-93; Simon Patrick, *A Commentary*, pp. 218f. Also see discussion in H. Pinard de la Boullaye, *L'Etude Comparée des Religions* (Paris, 1922) pp. 158-63. Most of the language projectors of the mid-seventeenth century also believed in the priority of Hebrew. See e.g., George Dalgarno, 'On Double and Triple Consonants' in Cram and Maat (eds.), *George Dalgarno*, p. 335; Wilkins, *Essay*, p. 5.

²⁶ Alison Coudert, *The Impact of the Kabbalah in the Seventeenth Century* (Leiden, 1999); Håkansson, *Seeing the Word*, pp. 170-84.

²⁷ Agrippa, *Occult Philosophy*, p. 162. Pythagorean and Platonic glosses on this position were

pioneer of the teaching of Hebrew in the German universities, attributed Solomon's great wisdom to his ability to discern hidden scientific knowledge 'in the minutiae of grammar [and] in the letters' of the Hebrew bible.²⁸ Recovery of the power of these words was often understood as the means by which Adamic knowledge dominion were to be re-established. Reuchlin believed the whole purpose of Cabbalistic interpretation was to effect a 'universal restoration, after the primordial Fall of the human race'. In an interesting variation on the *topos* of the regaining of Adamic knowledge, Reuchlin held the view that Cabbala was delivered to Adam *after* his expulsion from Eden. In a version of events that shares elements of the *Sepher Raziel* legend, Reuchlin suggested that God, in his compassion, had sent an angel to teach Adam how the divine words might be interpreted so as to repair the ruins of Edenic wisdom.²⁹

Despite its obvious antiquity and its centrality in cabbalistic practices, as a candidate for the original, natural language, Hebrew suffered from the disadvantage that its written form was alphabetical, and it was thus incapable of representing things pictorially. For some, this ruled it out of contention. It was also contended that contemporary Hebrew would in any case have been a much-corrupted form of the original tongue, if for no other reason than that the modern Jews seemed to have no better knowledge of nature than anyone else. As we have seen, Bacon pointed to the fact that Chinese was written 'in characters real, which express neither letter nor words in gross.' Thomas Browne was similarly intrigued by the fact that the 'Chinoys' spoke an ancient language and used a 'common character'. Further evidence for the priority of Chinese lay in the fact that their chronologies were said to trace their ancestry back to a founding father known as 'Poncuus', a figure often identified with the biblical Noah.³⁰ This combination of facts raised the enticing possibility that Noah and his family had preserved the original tongue, that the Ark had landed in China, and that in the form of writing still extant were remnants of the very first forms of writing and speech. Browne was himself doubtful about this chain of events—he had a greater interest in Egyptian hieroglyphics—but the priority of Chinese was strongly championed later in the century

to regard the divine creative act as a numbering of things rather than a naming and hence numbers might be regarded as the basic units of the language of nature. See S. Heniger, Jr., *Touches of Sweet Harmony: Pythagorean Cosmology and Renaissance Poetics* (San Marino, 1974).

²⁸ Johannes Reuchlin, *On the Art of the Kabbalah*, p. 249, qu. in Håkansson, *Seeing the Word*, p. 176.

²⁹ Reuchlin, *Art of Kabbalah*, pp. 62-5, 68f., 158f.; Håkansson, *Seeing the Word*, pp. 179f.; Wilhelm Schmidt-Biggemann, 'Christian Kabbala', in Alison Coudert (ed.), *The Language of Adam / Die Sprache Adams* (Wiesbaden, 1999), pp. 81-121.

by John Webb, in *An Historical Essay, Endeavoring a Probability that the Language of the Empire of China is the Primitive Language* (1669).³¹ While this thesis attracted some enthusiastic adherents, it was eventually acknowledged that Chinese idiograms suffered from the major shortcoming that they were difficult to draw and even more difficult to learn—not characteristics of a supposedly natural and transparent means of representation.³² The other major contender—Egyptian hieroglyphics, which had attracted the attention of Bacon, Browne, and the Jesuit polymath Athanasius Kircher—had the advantage of obvious antiquity but were in other respects inferior to Chinese characters, not least because they were impervious to all efforts to translate them. They remained so until 1822 when, after much concerted effort, Jean-François Champollion finally deciphered them after the discovery of the Rosetta Stone.³³

Both of these options for the recovery of the Adamic language, in the middle decades of the seventeenth century at least, gave a central place to direct divine inspiration.

Webster followed Boehme in his conviction that the key to the secret language of nature would be given through the inspiration of the Spirit. Just as the key to the meaning of scripture was given only by the Spirit of God, so the knowledge of true signatures of nature relied on divine inspiration.³⁴ According to Robert Fludd, Moses and Solomon came into their knowledge only by the assistance of the spirit. The patriarch had ‘conversed with God and obtained the key to both types of understanding (natural and supernatural) by divine assistance and illumination of the most Holy Spirit.’³⁵ The new revelation of the true language of nature was considered to be a reversal of the curse of Babel, calling to mind the words of the Prophet Joel that were repeated by the Apostle Peter on the occasion of the linguistic miracle of Pentecost: ‘I will pour out my Spirit in

³⁰ Thomas Browne, ‘Of Languages, and Particularly of the Saxon Tongue’, *Works*, ed. Geoffrey Keynes (London, 1928) III, 71.

³¹ (London, 1669). Webb relied on Jesuit accounts of Chinese chronology and argued that it was also likely that the Chinese had preserved something of the primitive religion. See Harrison, ‘*Religion and the Religions*’, pp. 151-7.

³² John Wilkins, *Mercury, or, the Secret and Swift Messenger*, in *Mathematical and Philosophical Works*, 2 vols. (London, 1802), pp. 106f.; *Essay*, pp. 10, 451; Cave Beck, *The Universal Character* (London, 1657) Preface; Hale, *Primitive Origination*, p. 163; Robert Hooke, ‘Some Observations, and Conjectures concerning Chinese Characters’, *Philosophical Transactions of the Royal Society*, XVI (1696), 63-78. (65, 73); Wotton, *Reflections upon Ancient and Modern Learning* (London, 1694), p. 154.

³³ Bacon, *Advancement of Learning*, I.vi.9 (p. 39); cf. II.xvi.2 (p. 131); Browne, ‘Of Languages’. Kircher thought that the Chinese language had been derived from the Egyptian. *Of the Various Voyages and Travels undertaken into China*, in Peter de Goyer and Jacob de Keyzer, *An Embassy from the east India Company of the United Provinces to the grand Tartar Cham Emperour of China* (London, 1669), pp. 75f. Cf. Kircher, *Oedipus Aegyptiacus*, pt. II.

³⁴ Webster, *Academiarum Examen*, pp. 7-9.

³⁵ Fludd, *Apologia compendiarum* in Huffman (ed.), *Robert Fludd*, pp. 46, 52. Cf. *Mosaical Philosophy*, pp. 3, 10.

those days, and they will prophesy, I will show wonders in the heaven above and signs on the earth below.’ (Acts 2:18-19, Joel 2:29-30). Jacob Boehme’s English disciple J. Ellistone thus described signatures as ‘the language of Nature, which telleth for what every thing is good and profitable’. But this language was to be understood only through ‘the manifestation of that Spirit, which on the Day of Pentecost gave forth the true sence and meaning of all Languages in one.’³⁶

There remained a third, and less exciting, prospect for the recovery of Adamic or pre-Babel language, and that was the construction of an artificial language that possessed some of the amenity of the original language of nature. To varying degrees the universal language projects of the second half of the seventeenth century, the best known of which are those of John Wilkins and George Dalgarno, represent attempts to explore this third option. As we shall see, however, there was a sharp divergence between the apocalyptically inspired aspirations of John Webster, and the more prosaic and painstaking efforts of John Wilkins. The former sought an inspired, magical language that would provide immediate access to the secrets of nature. The later projects, however, relied upon human ingenuity and labour, and for the most part were essays attempting to lay foundations for a future enterprise. Samuel Hartlib provided an important connection between these two types of projects, because of his involvement with both.³⁷

The sense of urgency that attended all of these endeavours of the interregnum enthusiasts inevitably led to a certain lack of discrimination. Virtually any form of learning, provided that it was not scholastic, could find a place in the proposed reforms. The chief commitment during this period was to eclecticism, and for this reason the disparate ideas of Paracelsus, van Helmont, Jacob Boehme, Fludd, along with the Cabbalists and Rosicrucians all found a place at the table.³⁸ The chief criterion was that of potential utility. This meant that while Bacon’s ideas about the organization of scientific knowledge and his vision of a state-sponsored scientific organization were always in the foreground, the content of his natural philosophy and his emphasis on the importance of an evaluation of the competence of the mind and the senses receded. Indeed Comenius himself had expressed dissatisfaction with the ponderous nature of

³⁶ J. Ellistone in Boehme, *Signatura Rerum*, Sig a4r.

³⁷ See Gerhard Strasser, ‘Closed and open languages: Samuel Hartlib’s involvement with cryptology and universal languages’, in Greengrass et al. (eds.), *Samuel Hartlib*, pp. 151-161

³⁸ Stephen Clucas, ‘In search of “The True Logick”’: Methodological Eclecticism among the “Baconian Reformers”’ in Greengrass et al., (eds.), *Samuel Hartlib*, pp. 51-74; Webster, *Great*

scientific advance under the Baconian regime. Thus Bacon was praised for having established the method of an ‘artificial induction’, which Comenius conceded was ‘the onely way to pierce through into the most abstruse secrets of Nature.’ But the specific method of Bacon took too long, required onerous organization, and delivered results that were uncertain: ‘But because this requireth the continuall industry of many men, and ages, and is not merely laborious, but seemeth also to be uncertaine in the event and successe thereof, hence it come to passé, that thought it be a most excellent invention, yet the most part of men neglect it as unprofitable.’ Accordingly, Comenius looked elsewhere, trusting that God might lend his direct assistance: ‘It will be therefore requisite for us to search out some other more universall Rule, which perhaps God of his great mercy will upon our diligent endeavour vouchsafe to reveal unto us.’³⁹ The many years of labour demanded by the Baconian programme could not be accommodated within the contracted timetable of the puritan millenarians. Voracious consumers of any kind of knowledge that seemed capable of improving the human lot, figures such as Comenius, Hartlib, and Webster were strongly influenced by the utilitarian and millenarian aspects of Bacon’s philosophy. But while they sought to realise the kinds of practical arrangements and social organizations that Bacon had argued for, in their impatience to regain an Edenic state they were less interested in the issue of human nature itself, and in how its defects might have had a bearing on the acquisition of knowledge.

With the Restoration of the monarchy in 1660, other features of the proposed Baconian reforms came to the fore. In the middle decades of the century, the emphasis had been utopian and forward-looking, with high expectations of an almost complete recovery of Adamic knowledge. Following the Restoration, Adamic knowledge remained the focus, but the prospects for its full recovery, and the time frame that this was thought to involve were more conservative. To a degree, this development paralleled what had taken place in Continental Europe in the previous century. In the first years of Luther’s initial successes in Germany there had been high hopes that the reformation of religion would usher in a new era with reformed political and educational structures. In their more radical manifestations, these hopes culminated in the Peasants’ War (1524-5), which ended in tragedy and disappointment. In the political sphere, as is well known, Luther threw in his lot with the established political authorities rather than the leaders of the rebellion. In the education realm, the Aristotelian method that had been reviled in

Instauration, p. 513.

³⁹ Comenius, *Reformation of Schooles*, p. 35. Cf. *Naturall Philosophie Reformed*, Preface.

the first heady days of the Reformation, came to be firmly established in the Lutheran universities as a means of imposing order on a curriculum that was in danger of disintegrating under the weight of competing forms of knowledge and the kinds of enthusiastic excesses that were associated with civil disorder.

The Restoration also brought in its wake a renewed sense of the vanity of human aspirations. The events of the civil war, now viewed through a Royalist lens, seemed to confirm the puritans' own views about the inherent limitations of human nature. Now, however, there was no moderating eschatological optimism. Thus while it may seem natural that the Restoration would see some diminution in the emphasis on the depravity on the human condition, if anything, the reverse was the case. The Restoration, writes W. M. Spellman, 'witnessed a resurgence of a view of man which placed sin at the forefront of all theological discussions'. The major theological development of the period witnessed an attempt 'to restore the primitive simplicity of the Christian Fall story.'⁴⁰ By the same token, there was a significant degree of continuity between the scientific impulses of the Commonwealth period and those of the Restoration. For understandable tactical reasons, restoration proponents of experimental philosophy tended to distance themselves from the excesses of the Commonwealth period, typically claiming Bacon as their intellectual progenitor, and silently passing over the various applications of his programme that intervened between Bacon's death and the Restoration.⁴¹ In fact, many of the goals of the 'projectors' of the Commonwealth period would be realised, albeit in a somewhat different form, by the Royal Society.

III. SOLOMON'S HOUSE

The Royal Society of London was officially incorporated on 15 July, 1662. From its earliest days, many of its fellows regarded the Society as an embodiment of the scientific ideals of Bacon's 'House of Salomon'. In his apologetic *History of the Royal Society* (1667), Thomas Sprat declared that Bacon was 'the one great Man, who had the Imagination of the whole extent of the enterprise', and while the early Society was by no means uniform in its philosophical commitments, the figure most frequently invoked as its ideological patron was Francis Bacon.⁴² In November of the year of the Royal Society's incorporation, Robert Hooke (1635-1703) was appointed curator of

⁴⁰ Spellman, *The Latitudinarians*, p. 55. See also Christopher Hill, 'Sin and Society', in *Essays*, II, 117-40.

⁴¹ Webster, *Great Instauration*, pp. 492f. 499. Cf. Gaukroger, *Francis Bacon*, pp. 1f.

⁴² Sprat, *History*, p. 44. On the Baconianism of the Royal Society see Webster, *Great*

experiments for the group, and was charged with the task of preparing several experiments to be performed on each occasion of the Society's meeting. Eventually Hooke's position attracted a salary of £80 per year, making him, in effect, the first professional research scientist.⁴³ While Hooke's status within the Society may not have been as elevated as that of such luminaries as Robert Boyle, his role placed him at the centre of its activities. In his experimental labours, moreover, he clearly sought to put into practice the principles articulated in Bacon's writings, while in his written works he re-enunciated those same principles. His posthumously published essay, bearing the lengthy but informative title—*A General Scheme, or Idea of the Present State of Natural Philosophy, and how its defects may be remedied by a methodical proceeding in the making experiments and collecting observations, whereby to compile a natural history, as the solid basis for the superstructure of true philosophy*—has been aptly described by Patri Pugliese as 'the most compelling rendition of Baconian principles into a solid programme of scientific investigation.'⁴⁴ Sadly, Hooke's difficult personality and his propensity to alienate influential individuals—most notable amongst them Isaac Newton—have meant that only now is Hooke taking his rightful place as one of the founding fathers of experimental science.⁴⁵

In the *Micrographia*, one of the two first publications of the Royal Society, we encounter what is perhaps the most clear and concise account of the Baconian understanding of the relation between experimental natural philosophy and the fallen condition of human beings. Every man, Hooke wrote, 'both from a deriv'd corruption, innate and born with him, and from his breeding and converse with men, is very subject to slip into all sorts of errors.' The path to avoiding these errors lay in identifying the faculties responsible for knowledge and in rectifying their operations: 'The only way which now remains for us to recover some degree of those former perfections, seems to be by rectifying the operations of the Sense, the Memory, and Reason.' These, of course, were the three faculties identified by Bacon. Armed with this proper understanding of the workings of the mind, the inquirer must seek their specific

Instauration, pp. 88-99, 161, 491-6.

⁴³ Lisa Jardine, *The Curious Life of Robert Hooke: The Man who Measured London* (San Francisco: HarperCollins, 2004), pp. 97, 236f. Most fellows of the Royal Society were amateurs, in contrast to the Académie Royale des Sciences which was funded by the crown, and whose members were professional researchers.

⁴⁴ Patri Pugliese, 'Robert Hooke (1635-1703)', *ODNB*.

⁴⁵ Among recent attempts to provide Hooke with a more fittingly prominent place in the history of experimental science, see Jardine, *The Curious Life of Robert Hooke*; Jim Bennett et al., *London's Leonardo: The Life and Works of Robert Hooke* (Oxford, 2003); Stephen Inwood, *The Forgotten Genius* (London, 2004).

deficiencies. Our preliminary task, Hooke wrote, is to ‘recollect their several defects, so that we may better understand how to supply them, and by what assistances we may enlarge their power.’ Taken together, these ‘assistances’ amount to the programme of experimental philosophy: ‘These being the dangers in the process of humane reason, the remedies of them all can only proceed from the real, the mechanical, the experimental philosophy.’⁴⁶ The argument is reiterated in *The Present State of Natural Philosophy*, where Hooke observes that ‘the Intellect is not to be suffer’d to act without its Helps, but is continually to be assisted by some Method or Engine’. Again, the first step in developing such a method involves ‘an examination of the Constitution and Powers of the Soul, or an Attempt of Disclosing the Soul to itself being an Endeavour of Discovering the Perfections and Imperfections of Humane Nature.’⁴⁷

Having surveyed the relevant ‘powers of the soul’ Hooke found himself agreeing with Bacon that the immediate representations made by a fallen nature to human senses are deceptive. Nature seemed ‘to use some kind of art in indeavouring to avoid our discovery’. For this reason nature was to be investigated when ‘she seems to be put to her shifts, to make many doublings and turnings’.⁴⁸ Nature, in short, was to be put to the test under the more stringent conditions of experiment. In addressing the need to reform the senses, Hooke stressed far more than Bacon the importance of instruments. By means of the use of ‘artificial instruments’, Hooke thought, there may be ‘a reparation made for mischiefs, and imperfections which mankind has drawn upon itself.’ Hooke referred specifically to the telescope and the microscope, the successes of the former being better established than in Bacon’s era. As for the latter, Hooke helped secure the place of microscopic observation in the sphere of the natural sciences. Encouraged by pioneering efforts in the application of these artificial instruments to the visual realm, Hooke expressed a firm hope ‘that there may be found many mechanical inventions to improve our other Senses, of hearing, smelling, tasting, touching.’⁴⁹

Hooke also attended closely to the corporate elements of the Baconian programme, seeing in the collective and cumulative industry of the new Society the prospects of

⁴⁶ Hooke, *Micrographia*, Preface (unpaginated). The Fall was considered to be responsible for both ‘innate’ corruption and that owing to ‘converse with men’. The corrupting influences of ‘converse with men’ (which relate to Bacon’s idols of the marketplace and of the theatre) were usually regarded as indirect consequences of the Fall. See, e.g., Ferguson, *Interest of Reason in Religion*.

⁴⁷ Hooke, *The Present State of Natural Philosophy*, p. 7, in *The Posthumous Works of Robert Hooke*, ed. R. Waller, (London, 1705).

⁴⁸ Hooke, *Micrographia*, Preface. Cf. Glanvill, *Scepsis Scientifica*, sig. b2v-b3r.

⁴⁹ *Ibid.* Cf. Power, *Experimental Philosophy*, Sig. C3v.

overcoming the ‘slipperiness and delusion of our memory’. Certainly he viewed his own efforts in this light. The detailed descriptions provided in *Microcosmographia* he regarded as a modest contribution to ‘the foundations whereon others may raise nobler Superstructures’. This long-term success of experimental natural philosophy depended on the co-ordination of many sets of such observations on a variety of topics that were to be specified in advance and compiled under particular headings. Following Bacon’s terminology, Hooke spoke of ‘the ‘compiling of a Naturall and Artificial History’ which involved ‘ranging and registering ... Particulars into Philosophical Tables, as may make them most useful for the raising of Axioms and Theories.’⁵⁰ The unofficial journal of the Society—the *Philosophical Transactions*, launched in 1665 by Henry Oldenburg—also helped fulfil this function, bringing together reports of experiments and observations from fellows and numerous distinguished foreign correspondents. The very first issue contained a contribution by Hooke, and over the next few years virtually every major scientific figure of the period was represented in its pages. It remains the oldest continually published scientific journal in Europe and played a pioneering role in establishing natural science as the communal product of an international community.⁵¹ The idea that an improved natural philosophy necessitated a proper ‘ranking and registering’ of particulars also found concrete realization in the taxonomic tables of the language projects of Dalgarno, Wilkins, and others.⁵²

Another early fellow of the Royal Society and one its most vocal champions, the Anglican Divine Joseph Glanvill (1636-80), also wrote at length on the link between the prescriptions of experimental natural philosophy and the Fall of the human race. His first book, *The Vanity of Dogmatizing* (1661)—a work that was revised and published under various titles throughout his life—was an attack on the Aristotelian scholasticism that he had encountered as a student at Oxford in the 1650s. Certain knowledge of nature, Glanvill insisted, had been possible only in Eden, hence the dogmatism of scholastically inclined natural philosophers was completely unwarranted. While Glanvill is typically associated with the Cambridge Platonists and the Latitudinarians, both of which are generally characterised as having a more positive view of human nature than the puritans, he nonetheless took very seriously the ramifications of sin in the realm of natural philosophy. Thus, the Fall is singled out as the ‘general reason’ for

⁵⁰ *Ibid.* Cf. Hooke, *Present State of Natural Philosophy*, p. 7.

⁵¹ The *Journal des sçavans* (Journal of savants) can lay claim to being the first scientific journal in the world, appearing in January 1665, two months before the *Philosophical Transactions*.

⁵² In keeping with the views of the language projectors, Hooke points out that ‘Words being ill set Marks on very confused Notions; the Reason of a Man is very easily impos’d on by

our ‘intellectual disabilities’. Glanvill also takes it to be virtually self-evident that something is fundamentally wrong with the human mind, the ‘disease of our intellectuals’, as he put it, being ‘too great not to be its own diagnostick’.⁵³ In keeping with the common verdict of the moral philosophers, he asserted that the mind of Adam, in its innocent state, was a model of proper hierarchical relations: ‘Passions kept their place, as servants of the higher powers, and durst not arrogate the Throne, as now.’ With Adam’s revolt against God, the insurrection of the passions destroyed forever the inner harmony that made perfect knowledge possible. ‘Man was never at odds with himself’, Glanvill observed, ‘till he was at odds with the commands of his Maker.’ Thereupon, the mind fell out of tune—‘There was no jarring or disharmony in the faculties, till sin untun’d them.’⁵⁴ The rule of the passions could be represented, as it had been by Philo, by Eve’s persuasion of Adam on their first day in Eden. ‘The *Woman* in us’, Glanvill explained, ‘still prosecutes a deceit, like that begun in the *Garden*.’ While we continue to judge things according to the false witness of the ‘fond Feminine’ we are destined to remain in ignorance.⁵⁵

Much of Glanvill’s attention focused upon Adam’s sensory abilities, and how they had come to be vastly diminished. In Eden, he wrote, ‘the senses, the Soul’s windows, were without any spot or opacity.’ As a consequence, Adam probably knew of the motion of the earth and the true relative dimensions of the heavenly bodies. ‘The acuteness of his natural Opticks’, Glanvill speculated, ‘shew’d him much of the Coelestial magnificence and bravery without a *Galileo’s* tube.’⁵⁶ In his terrestrial environment, Adam was no less capable, and could see ‘the motion of the bloud and spirits through the transparent skin’ and could by sensible perception know the causes of such obscure phenomena as magnetic attraction and the fluxes of the tides.⁵⁷ Glanvill concluded that the first man’s sensory apparatus ‘must needs infinitely more transcend ours.’⁵⁸ From this analysis there followed the now familiar explanation of the need for ‘helps’ to be applied to minimize the limitations of fallen minds and bodies: ‘now our *senses* being scant and

Discourse.’ *Present State of Natural Philosophy*, p. 11.

⁵³ Glanvill, *Vanity of Dognmatizing*, pp. 62f. Cf. *Scepisis Scientifica*, p. 48.

⁵⁴ *Ibid.*, p. 4. Cf. pp. 13, 87, 91, 118; ‘Against Confidence in Philosophy’, p. 30, in *Essays on Several Important Subjects in Philosophy and Religion* (London, 1676).

⁵⁵ *Ibid.*, p. 118. Cf. pp. 125, 135, *Scepisis Scientifica*, pp. 99f.; ‘Against Confidence in Philosophy’, p. 23, in *Essays*. Henry More has a similar view: ‘Now the feminine part in Adam was so tickled with the Doctrine of the old Deceiver, that the Concupiscible began to be so immoderate, as to resolve to do any thing that may promote pleasure and experience in things.’ *Conjectura Cabbalistica*, p. 46; cf. p. 71.

⁵⁶ *Ibid.*, pp. 1, 5.

⁵⁷ *Ibid.*, pp. 6-8.

⁵⁸ *Ibid.*, p. 5. Cf. Philo, *Quaestiones in Genesin*, I. 32.

limited, and Natures operations subtil and various; they must needs transcend and out-run our faculties.’ Our ‘deceitful and fallacious’ senses ‘must be assisted with *Instruments*, that may *strengthen* and *rectifie* their Operations.’⁵⁹ Five instruments in particular were thought by Glanvill to have partially compensated for the loss of Adamic abilities—the telescope, microscope, thermometer, barometer, and air pump.⁶⁰ Thus were the discoveries of Galileo, Hooke, Pascal, and Boyle attributed to their realization of the need to supply the wants of weakened senses.

The frailty of the memory and the problem of gaps in the chain of transmission of knowledge were also taken up by Glanvill in a characteristically Baconian way. These failings were to be redressed by the establishment of organizations capable of coordinating the labours of successive generations of investigators. Not surprisingly, Glanvill believed that the Royal Society would play a leading role in this process. But Glanvill also believed that other modern inventions could make significant contributions on this score. The printing press, for example, had made the recording and distribution of knowledge a far more efficient process, while the compass had improved navigation and hence the geographical range of natural knowledge.⁶¹ Still, the advancement of learning was to be a slow and incremental process, and for Glanvill all that could be expected of the present generation of philosophers was an instituting of the basic structures and methods that would establish the pattern for future centuries. Glanvill’s assessment of the likely achievements of the Royal Society were accordingly modest: ‘and what *one* Age can do in so *immense* an Undertaking as *That*, wherein all the generations of men are concerned, can be little *more* than to remove the *rubbish*, lay in *Materials*, and *put* things in *Order* for the *Building*.’⁶²

Part of the apparent modesty of Glanvill’s ambitions is to be attributed to the fact that he was sensitive to growing criticisms of the record of the Royal Society in the decades immediately following its incorporation. The standard complaint, voiced from the late 1660s, was that this august body had actually produced very little knowledge that was of any use.⁶³ But equally important was the fact that Glanvill was deliberately

⁵⁹ *Ibid.*, p. 67; ‘Modern Improvements of Useful Knowledge’, p. 23, in *Essays*. Cf. *Plus Ultra*, pp. 52f.

⁶⁰ Glanvill, ‘Modern Improvements in Useful Knowledge’, p. 23, in *Essays*.

⁶¹ *Ibid.*, p. 31.

⁶² Glanvill, *Plus Ultra*, p. 91. Locke would later use a similar image to describe his efforts. *Essay*, Epistle to the Reader, I, 14.

⁶³ Prominent critics were Meric Casaubon, *A Letter of Meric Casaubon, D.D. &c. to Peter du Moulin D.D., concerning Natural Experimental Philosophie* (Cambridge, 1669), and Henry Stubbe, *Legends no Histories: or a Specimen of some Animadversions upon the History of the*

distinguishing between an ‘experimental’ philosophy, which in his view was grounded in a realistic estimate of human capabilities, and a ‘dogmatic’ philosophy, identified with the Aristotelian tradition which was presumed to have vastly overestimated the powers of the human mind. Glanvill asserted that ‘the *Free and Real* philosophy makes men deeply sensible of the infirmities of the humane intellect, and out manifold hazards of *mistaking* and so renders them *wary* and *modest, diffident* of the *certainty* of their *Conceptions*, and averse to the *boldness* of *peremptory asserting*.’⁶⁴ By way of contrast, the ‘voluminous Schoolmen, and Peripatetical Dictators’ seemed oblivious to ‘the shortness of our intellectual sight, the deceptibility and imposition of our senses, the tumultuary disorders of our passions’. And with their ‘shallow, unimprov’d intellects’, it was these figures who were ‘confident pretenders to certainty’.⁶⁵ In fact, Aristotle’s philosophy was ‘founded on vulgarities’, dealing only with ‘the unexamin’d prejudices of *Sense*’—all the less reason for modern philosophers to admire him as if he were ‘*Seths Pillars*, on which all knowledge is engraven’.⁶⁶ The failings of the peripatetic philosophy, moreover, were moral as well as epistemological. The same pride that had prompted Adam’s fall had blinded philosophers to their own limitations. Pride had also motivated their dogmatic confidence in their own edicts. ‘Tis *Pride*, and *Presumption* of ones self that causeth such fowardness and assurance’, Glanvill cautioned, ‘and where those *reign*, there is neither *Vertue* nor *Reason*; No *regular Government*, but a miserable *Tyranny* of *Passion* and *Self-Will*.’⁶⁷ In light of these disabilities, known through revelation and confirmed through careful self-examination, what was called for was a philosophy that threaded the narrow path between scepticism and dogmatism. Experimental philosophy had this virtue and was thus fitly described as a philosophy ‘that becomes the sons of *Adam*.’⁶⁸

John Wilkins (1614-72) was a founding fellow of the Royal Society. Indeed, he chaired its first official meeting. Wilkins had been a leading figure in ‘the Invisible College’, a precursor to the Royal Society that met in London and Oxford in the 1640s and 50s.

Royal Society... together with the Plus Ultra reduced to a Non-Plus (London, 1670). For a discussion of these critiques see Harrison, “‘The Fashioned Image or Poetry or the Regular Instruction of Philosophy?’: Truth, Utility, and the Natural Sciences in Early Modern England”, in D. Burchill and J. Cummins (eds.), *Science, Literature, and Rhetoric in Early Modern England* (Aldershot, 2006); Michael Hunter, *Science and Society in Restoration England* (Cambridge, 1981), ch. 4.

⁶⁴ Glanvill, *Plus Ultra*, pp. 146f. Cf. ‘The Usefulness of Real Philosophy to Religion’, p. 26, in *Essays*.

⁶⁵ Glanvill, *Vanity of Dogmatizing*, pp. 13, 14f.

⁶⁶ *Ibid.*, pp. 73, 177, 138.

⁶⁷ Glanvill, ‘Against Confidence in Philosophy’, p. 30, in *Essays*.

⁶⁸ Glanvill, *Vanity of Dogmatizing*, p. 223.

Included in its membership were Robert Boyle, John Wallis, John Evelyn, Christopher Wren, and William Petty—individuals who, like Wilkins, were also destined to play major roles in the early Royal Society.⁶⁹ Much of Wilkins' renown rests upon his *Essay Towards a Real Character and a Philosophical Language* (London, 1668) which was devoted to the development of an artificial language, but his contributions extend well beyond this. He had been an early and influential populariser of the Copernican system and when in 1649 he assumed the position of Warden of Wadham College he succeeded in transforming the Oxford college into an important centre for the new philosophy. Hooke generously observed in this connection that 'whereever he had lived, there had been the chief Seat of generous Knowledge and true Philosophy.'⁷⁰ Wilkins also played a significant role in the composition of Sprat's *History*, a work that was less of a history than an articulation of the basic philosophy of the group, and a defence against the kinds of accusations that Glanvill had been concerned to address.⁷¹

If Hooke and Glanvill had stressed the importance of supplying 'helps' for fallen senses, Wilkins sought to alleviate the effects of the Fall on our ability to retain and communicate knowledge. 'After the fall of Adam', he pointed out, 'there were two general curses inflicted on mankind: the one upon their labours, the other upon their language.'⁷² Wilkins focused his efforts on the 'second curse'. Bacon, as we have seen, spoke of two losses associated with the Fall: the loss of 'innocency' and the loss of 'dominion.' The first was to be repaired by religion, the second by arts and sciences. Wilkins agreed with Bacon that 'arts and professions' were the way to address the loss of human dominion. 'Artificial experiments', he wrote, are 'so many Essays, whereby men doe naturally attempt to restore themselves from the first general curse inflicted upon their labours.'⁷³ Bacon, however, had also spoken of a 'second general curse', for which the best available remedy was the cultivation of the art of grammar.⁷⁴ This was a piecemeal solution, however, and the inherent ambiguities of language were primarily responsible for Bacon's 'the idols of the marketplace'. Wilkins took it upon himself to find a specific 'help' that would moderate the unfortunate consequences of this second

⁶⁹ On the early history of the society see Michael Hunter, *The Royal Society and its fellows 1660-1700* (London, 1982), and R. Lomas, *The Invisible College* (London, 2002).

⁷⁰ Hooke, *Micrographia*, Preface.

⁷¹ Paul Wood, "Methodology and Apologetics: Thomas Sprat's *History of the Royal Society*," *BJHS* 13 (1980), 1-26.

⁷² Wilkins, *Mercury*, p. 53. For a summary of Wilkins' views see his *Discourse concerning the Gift of Prayer*, (London, 1651), pp. 74-80. Here Wilkins notes that the Fall brought about depravity of understandings, consciences, affections, wills, and memories. (p. 77)

⁷³ Wilkins, *Mathematicall Magick. or, The Wonders That may be performed by Mechanical Geometry* (London, 1648), p. 2.

course. Traditionally, the fractured state of human discourse was attributed to the confusion of tongues at Babel. This event provided the historical explanation for the diversity of languages and to a degree also explained their arbitrary nature. Babel was also significant because the loss of the primitive language necessarily brought with it the loss of whatever fragments of Adamic knowledge were not part of the collective memory. The ‘ill conjunction of labours’, which Bacon had identified as a major impediment to learning (along with ‘ill tradition of knowledge’), could also be linked to the Babel event, for the confusion of tongues brought to a premature end the first co-operative technological undertaking in human history. In practice, the curse on human language was often regarded as a later manifestation of the curse placed on Adam and Eve immediately after the Fall. The fourth-century Christian poet Prudentius had long before made the fall of language contemporary with Adam’s sin, rather than postponing it until Babel. The chasm which separates language and truth resulted from original sin, and the polyvalence of language thereafter, is symbolized by the forked tongue of the serpent.⁷⁵ In *Paradise Lost*, Milton was thus to suggest that the Fall had infected Adam’s thoughts, looks, actions, and crucially, his words.⁷⁶ In any event, if the Adamic names and the form of writing that preserved them had persisted after the Fall, these were presumed to have been lost at Babel.⁷⁷ And even if these vestiges of the Adamic language had survived the calamity at Babel—preserved in Hebrew letters, Egyptian hieroglyphs or Chinese ideograms—the forms of these latter-day languages were widely acknowledged to have been significantly corrupted. To simplify matters somewhat, if language can be said to have both representational and communicative capacities, the former were thought to have been damaged by the Fall, the latter by what transpired at Babel.

Some compensation for the confusion of tongues, and hence for the loss of communicative facility of the original tongue, was already provided by Latin, the universal language of the scholarly community of the West. But the prestige of Latin

⁷⁴ Bacon, *Advancement*, II.xvi.4 (p. 132.)

⁷⁵ Martha Malamud, ‘Writing Original Sin’, *Journal of Early Christian Studies* 10 (2002), 329-60; Michael Roberts, *Poetry and the Cult of the Martyrs: The Liber Peristephanon of Prudentius* (Ann Arbor, 1993).

⁷⁶ Milton, *Paradise Lost* X.608. See also John Leonard, ‘Language and Knowledge in Paradise Lost’, *Cambridge Companion to Milton* (Cambridge, 1989), pp. 97-111; William Poole, ‘The Divine and the Grammarian: Theological Disputes in the 17th-Century Universal Language Movement’, *Historiographia Linguistica* 30 (2003), 273-300; Cram and Maat (eds.), *George Dalgarno*, pp. 3f.

⁷⁷ Thus Wilkins: ‘The difference of characters, whereby several languages are expressed, is part of the second general curse in the confusion of tongues; for as before there was but one way of speaking, so also but one way of writing.’ *Mercury*, p. 43.

had been under threat for some time. The interest of the humanist scholars in the original languages of the classics and the new Protestant focus on the biblical text had significantly raised the profiles of Greek and Hebrew. Increasingly, moreover, vernacular languages were becoming important media for the exchange of ideas. The Protestant Reformers had energetically promoted new translations of the bible as alternatives to official authoritative text, the Latin Vulgate. Latin was in any case tainted on account of its association with the rituals and administrative apparatus of the Roman Church.⁷⁸ In the sphere of the sciences, Galileo, Bacon, and Descartes had all written in the vernacular, again, to broaden the appeal of their revolutionary ideas. And of course it served the commercial interests of presses and the apologetic agendas of reformers of both religion and science to reach as wide an audience as possible. These pressures led to a considerable erosion of the dominance of Latin in the realm of print. In any case, Latin had proven itself to be in many respects a most imperfect medium for the expression of ideas, both religious and scientific. In the sixteenth century, humanist philologists and Protestant reformers had discovered that there were major discrepancies between the assumed meanings of central theological terms and the original Greek expressions of which they were supposed to be translations. Some of the most contentious doctrinal debates of the Reformation were to do with the meanings of the words of the Greek New Testament, and such fundamental terms as ‘justification’, ‘repentance’, and ‘ordination’ became linguistic battlefields.⁷⁹ Considerations such as these account for Wilkins’ deep conviction, shared with many of those who invested time in similar projects, that a real character would ‘contribute much to the clearing of some our modern differences in *Religion*.’⁸⁰ The sciences were also confronted with issues of translation, particularly in the discipline of natural history. Compilers of herbals found themselves having to identify plant species from Latin names that were translations of Greek terms taken from the classical references, often with a third language such as Arabic intervening between the Greek original and Latin name.⁸¹ Thus for both theologians and natural historians Latin could be the problem, rather than the solution.

⁷⁸ Introduction, Vivian Salmon (ed.), *The Works of Francis Lodwick: A study of his writings in the intellectual context of the seventeenth century* (London, 1972), pp. 46-8.

⁷⁹ See Harrison, *Bible and the Rise of Science*, pp. 95-9.

⁸⁰ Wilkins, *Essay*, Epistle Dedicatory. Cf. Comenius, for whom religious differences often consist ‘not in fundamentals, only in the manner of expressing them.’ *The Way of Light of Comenius*, tr. E. Campagnac (London, 1938), p. 198. Consider, too, Dalgarno’s lexicon of religious terms in *Ars Signorum*. See also Benjamin DeMott, ‘Comenius and the Real Character’, *PMLA* 70 (1955), 1068-81.

⁸¹ Jerry Stannard, ‘Medieval Herbals and their Development’, *Clio Media* 9 (1974), 23-33.

As we have already seen, some of the radical Baconians of the Commonwealth period had taken up the challenge provided by the ‘second curse’, pursuing the recovery of the primitive language and the wisdom embedded within it through the doctrine of signatures and their investigations of the Cabbala. Wilkins, however, had little time for this project:

And if you will believe the Jews, the holy spirit hath purposely involved in the words of scripture, every secret that belongs to any art or science, under such cabalisms as these. And if a man were but expert in unfolding of them, [sic] it were easy for him to get as much knowledge as Adam had in his innocency, or human nature is capable of.⁸²

On balance, Wilkins seemed not to believe this. He was not so much sceptical of the tradition of Adam’s encyclopaedic knowledge, however, as he was of the cabalists’ claims to be able to recover that knowledge from the words of the Hebrew Bible. There were indeed some particular instances where words of scripture may conceal genuine truths about nature, he conceded, but the general assumption that all scripture could be used for this purpose had given licence to ‘men’s roving and corrupt fancies’ and occasioned ‘many wild and strange absurdities.’⁸³ Wilkins’ rejection of the kinds of linguistic reforms recommended by Webster were consistent with his general position that while there was room for modernization of the curriculum, it was not to be along the lines set out by its more radical critics.

Wilkins’ partner in the defence of the universities was astronomer Seth Ward (1617-89). Indeed, Ward had much in common with Wilkins: they shared an enthusiasm for the new science and Copernican astronomy; they were both founding fellows of the Royal Society, and subsequently Fellows of Wadham College; both, in time, were elevated to the episcopate. In *Vindiciae Academicarum* (1654), written in close collaboration with Wilkins, Ward expressed similar reservations about Webster’s attempts to revive an Adamic language. The schoolmaster was derided as a ‘credulous fanatic Reformer’ given to ‘canting discourse about the language of nature.’ In Ward’s view, Webster’s ‘peevish malcontented humour had brought him into the gang of the vulgar Levellers.’⁸⁴ With the restoration of the monarchy, interest in these more ambitious projects waned as they came to be associated with the radical millenarian politics of the revolutionary era. Ironically, however, both Ward and Wilkins had an abiding interest in natural language schemes and if they did not share the mystical enthusiasms of Webster, Boehme, and

⁸² John Wilkins, *Mercury*, I, 41

⁸³ *Ibid.*, 41f.

⁸⁴ Ward, *Vindiciae Academicarum* (Oxford, 1654), pp. 5-6.

Fludd, they nonetheless saw in natural or philosophical languages prospects for the furthering of knowledge.

Another associate of Wilkins who was a central figure in the natural language movements of the second half of the century was George Dalgarno (c. 1616-1687).⁸⁵ A teacher at a private grammar school in Oxford, Dalgarno was proficient in shorthand and had trialled various ways of improving it. These efforts brought him to the attention of Samuel Hartlib, who suggested that with further modifications Dalgarno's version of brachygraphy could be developed into a real character that might provide the basis of a new form of scientific notation. The young schoolmaster was soon drawn into the orbit of John Wilkins, and with the encouragement of Seth Ward and the mathematician John Wallis, they began work on a collaborative endeavour to develop a philosophical language and a real character. Eventually, Wilkins and Dalgarno fell out over details of the proposed scheme. Concerned to establish a claim for priority, Dalgarno hurried into print with *Ars signorum* ('The Art of Signs', 1661), which lays out his model for a philosophical language. As it turned out, his haste proved to be wasted effort. Whatever the merits of Dalgarno's work, and they were not inconsiderable, it was destined to be almost completely eclipsed by Wilkins' *Essay*, which appeared seven years later in a handsome folio edition and with much fanfare. From that time until very recently Dalgarno's work has been overshadowed by that of Wilkins. In a sad irony, the only recorded use of Dalgarno's language was by Roger Daniel, who ungenerously described its inventor as *nhkpim sufa*—'the greatest ass'.⁸⁶

Wilkins' own scheme was presented as a realization of particular aspects of the Baconian project, the *Essay* being intended to provide 'helps and assistances' to the memory and understanding: 'besides the best way of helping the *Memory* by natural Method, the *Understanding* likewise would be highly improved; and we should, by learning the *Character* and the *Names* of things, be instructed likewise in their *Natures*, the knowledge of both which ought to be conjoined.'⁸⁷ The assistance to the understanding was to be provided by the rational manner in which the various things to be remembered were ordered, for the problem of memory was not simply one of

⁸⁵ For biographical details see Cram and Matt, *George Dalgarno*, pp. 8-31; Rhodri Lewis, 'John Wilkins's *Essay* (1668) and the context of seventeenth-century artificial languages in England', D.Phil. Thesis, Oxford, 2003, ch. 3.

⁸⁶ Jaap Maat, *Philosophical Languages in the Seventeenth Century: Dalgarno, Wilkins, Leibniz* (Dordrecht, 2004), p. 133. Much of the reason that Dalgarno has been ignored lies in the mistaken view that Wilkins' project is the more perfect realisation of what was essentially the same project. See Maat, *Philosophical Languages*, pp. 31-37.

recording information, but of ordering it in such a way that it was accessible. Wilkins ambitiously attempted ‘a regular *enumeration* and *description* of all those things and notions, to which marks or names ought to be assigned according to their respective natures’, his ultimate goal being ‘to reduce all things and notions into such a frame as my express their natural order, dependence, and relations.’⁸⁸ To help him complete the biological classifications of this part of the project, he drew upon the taxonomic expertise of John Ray and Francis Willoughby.

It is important to understand the ways in which Wilkins’ language project differs from the earlier Cabbalistic, Paracelsian, and Boehmenist endeavours. While, broadly speaking, their goals are expressed in terms of the need to recover the features of a pristine ideal language, the earlier efforts sought to emulate Adam himself by seeking out the primitive language and the secrets that supposedly were embedded within it. Wilkins, Dalgarno, Lodwick, and other fellows of the Royal Society with an interest in language schemes had more modest ambitions. As the telescope and the microscope provided assistance to fallen senses, their proposed language sought to provide a ‘help’ for the memory and a means of bringing order to the linguistic confusion that inhibited communication of scientific ideas and promoted religious discord. While the earlier schemes such as Webster’s drew upon Baconian aspirations, ultimately they relied upon supernatural inspiration for their success. Some commentators have suggested that the best way to characterise the difference between the earlier and later language projects of the seventeenth century is in terms of a shift of focus from the Fall to Babel. The more optimistic enterprises of the Commonwealth period are regarded as having focused on recapture of the past glories of a perfect Adamic language; the later projects are concerned with the more modest task of overcoming the practical difficulties caused by the multiplicity of languages.⁸⁹ However, considerations relating to the Fall featured in the later projects too, and in significant ways.

Dalgarno, for example, thought that it was important to have a proper understanding of the Fall and its implications for the creation of a philosophical language. The connections between the design of *Ars signorum* and sacred history are not explicitly

⁸⁷ Wilkins, *Essay*, p. 21.

⁸⁸ *Ibid.*, p. 1.

⁸⁹ See, e.g., Benjamin DeMott, ‘The Sources and Development of John Wilkins’ Philosophical Language’, *Journal and English and Germanic Philology* 57 (1958), 1-13 (2); David Katz, *Philo-Semetism and the Readmission of the Jews to England 1603-1655* (Oxford: Clarendon, 1982), pp. 43-88. Cf. Poole, ‘The Divine and the Grammarian’, pp. 276f.; Lewis, ‘John Wilkins’, pp. 263-81.

addressed in that work, but in a manuscript tract entitled ‘On Interpretation’, Dalgarno helpfully provides them. Here he explores the common ground ‘wherein the Divine and Grammarian seem equally concerned’—the Fall of Adam.⁹⁰ In what is now a predictable pattern, Dalgarno is interested in whether Adam’s mastery of language ‘was a supernaturally inspired gift or a faculty proper to humane nature in its first perfection.’ Dalgarno’s preference is equally predictable: ‘Adam by the strength and excellency of his *natural* faculties did himself invent the Language which he and Eve did then speak *without any supernatural assistance*’.⁹¹ What is interesting about Dalgarno’s position is that while he subscribes to the traditional view of Adamic wisdom—Adam was a ‘great and perfect Philosopher’ and a ‘Master of Language’—the language used, or rather invented, by Adam was in an important sense arbitrary: ‘tho I judge the first Language was rational yet in some sense it might be called arbitrary, that is he had more ways than one of expressing the same thing.’⁹² In this respect then, we are in a similar position to that in which Adam found himself, inasmuch as the tokens we attach to objects are also arbitrary. But there are still ways in which Adam’s language could be regarded as perfect and that the name he used could be said to be expressive of the natures of things. Both Wilkins and Dalgarno (and later, Leibniz), proposed for their language a set of basic terms or ‘radicals’, arbitrarily assigned, to express various simple properties. Things would then be named by compounds of these radicals, the composition of the compound term reflecting the nature of thing. (Think here of how the term ‘philosophy’ captures the nature of the activity it describes—the love of wisdom—because it combines *philia* (love) and *sophia* (wisdom). The elemental terms, however cannot be further analysed in this way. Hence *philia* means ‘love’ and *sophia* means ‘wisdom’ only by convention.) Thus while the radicals were assigned to things arbitrarily, the compound terms were genuinely expressive of the nature of things.⁹³ In following this procedure, Dalgarno thought himself to be emulating the process by which the Adamic language was formulated, for in his view the names Adam gave to the beasts were fitting because they were compound terms that expressed an appropriate combination of properties: ‘Adam as a perfect philosopher following nature and the

⁹⁰ ‘On Interpretation’, *On Universal Language*, pp. 391-408 (p. 398). I am indebted to William Poole for drawing this MS to my attention.

⁹¹ *Ibid.*, p. 396 (my emphasis).

⁹² Dalgarno, ‘The Autobiographical Treatise’, ‘Of Interpretation’, in Cram and Maat (eds.), *George Dalgarno*, pp. 368, 396. Dalgarno reported that Adam in his innocence enjoyed ‘perfection both of soule and body his natural faculties were clear and distinct, not subject to error, but naturally illuminated with such a degree of knowledge that never any of his posterity can arrive at or / so much comprehend what the extent of his knowledge was.’ ‘Of Interpretation’, *Ibid.*, pp. 396f.

⁹³ Maat, *Philosophical Languages*, p. 56. It should also be said that in Dalgarno’s system there

example of his maker gave names to all living creatures, not primitive and independent words ... but words of secondary institution inflected from other words, the primary and proper sense of which contributed to the describing of the nature of the thing.... For unless this be granted, the commone opinion of Adams giving names to all living creatures suited to their natures will be absurd.⁹⁴ While the process of constructing a rational language was the same then as it is now, Adam was presumably better at the business of choosing an appropriate level of generality for his radical terms, and at constructing combinations of these radicals to be expressive of the natures of things. Adam also had the advantage of a photographic memory so that he could immediately command an extensive vocabulary:

... images of things that wee impress upon material objects of sounds or Characters by compact and so carry them in our memories and learn them by Art and industry, all this he did by the natural strength of his faculties without compact or study; all sounds and Characters then were indifferent to him but he was better able then wee to chuse what was in all respects most convenient. The reason of all this because all the knowledge that wee can possibly acquire by labour and paines this and much more was in him naturally without any thing of Labour or paine.⁹⁵

The ‘labours and pains’ now required for the construction of such a language are considerable, as anyone who has read Dalgarno and Wilkins can attest, and it is in these labours and pains that we feel the effects of the curse. Having said this, Adam’s abilities differ from ours only in degree and not kind, and hence a new formulation of an Adamic-like language is to some degree within human capabilities.

It is likely that Dalgarno’s account of Adam’s naming also led to one of the major differences between his scheme and that of Wilkins. In contrast to Wilkins, Dalgarno attempted to minimize the number of radicals or ‘primitives’—a policy which would necessarily maximise the number of compound terms. The reasoning behind this strategy was that it is only the compound terms that are genuinely expressive of the natures of things and that in their naming of things both God and Adam had used compound terms.⁹⁶ Modern Hebrew was thought to have still retained these characteristics, having comparatively few simple and uncompounded roots.⁹⁷ Decisions

were still logical links between related radicals. See Maat, pp. 83-91.

⁹⁴ Dalgarno, ‘Of Interpretation’, in Cram and Maat (eds.), *George Dalgarno*, p. 388.

⁹⁵ *Ibid.*, p. 401.

⁹⁶ Dalgarno, ‘The Art of Signs’, ‘Of Interpretation’, in Cram and Maat (eds.), *George Dalgarno*, pp. 56, 388f.; Maat, *Philosophical Languages*, pp. 56f.

⁹⁷ Wilkins had initially agreed that Hebrew would be a good model for a philosophical language. *Mercury*, p. 57. Cf. Wilkins’ critic Thomas Baker: ‘The first language, the *Hebrew*

about the number of radicals were closely related to the issue of how to determine what things or concepts were truly basic, a task that in principle rested on the division of the whole of reality into its natural categories. This issue also proved to be contentious.

One of the most basic assumptions of the language schemes of the period was that human beings agreed in their fundamental concepts of things, differing only in the linguistic labels they attached to them.⁹⁸ Because individuals share the same senses and mental facilities, when they apprehend a particular object they form a common conception of it. This was in essence the position that Aristotle had set out almost 2,000 years before in the opening lines of *De Interpretatione*: ‘Now spoken sounds are symbols of affections in the soul, and written marks symbols of spoken sounds. And just as written marks are not the same for all men, neither are spoken sounds. But what these are in the first place signs of—affections of the soul—are the same for all; and what these affections are likenesses of—actual things—are also the same.’⁹⁹ In light of this understanding of the relationship between things, concepts, and language, the aim of the language projectors was to align the ‘affections of the soul’ that were common to all with a set of symbols that would also be common to all. Wilkins sets out the plan of the *Essay* in precisely these terms:

As men do generally agree in the same Principle of Reason, so do they likewise agree in the same *Internal Notion* or *Apprehension of things*.... The *Names* given to these in several Languages, are such arbitrary *sounds* or *words*, as Nations of men have agreed upon, either casually or designedly, to express their Mental notions of them. The *Written word* is the figure or picture of that sound. So that if men should generally consent upon the same way or manner of *Expression* as they do agree in the same *Notion*, we should then be freed from that Curse in the Confusion of Tongues, with all the unhappy consequences of it.¹⁰⁰

All this was clear enough. The next logical step, as Wilkins explained, was to arrive at ‘a just *Enumeration* and description of such things or notions as are to have *Marks* or *Names* assigned to them’, and it was here that the problems began.¹⁰¹

was very plain and simple (a good argument of its being an Original) consisting of very few Roots, and those very simple and uncompounded.’ *Reflections on Learning* (London, 1699), pp. 7f.

⁹⁸ Lewis, ‘John Wilkins’, ch. 4; Maat, *Philosophical Languages*, pp. 13-15, 21.

⁹⁹ Aristotle, *De Interpretatione* 16a4-16a9 (*Complete Works*, p. 25)

¹⁰⁰ Wilkins, *Essay*, p. 20.

¹⁰¹ *Ibid.*

The practicality of devising classificatory tables capable of accommodating all things or concepts in a rational order presented Wilkins with difficulties that ultimately proved insuperable. This was because such a scheme seemed to presuppose both that reality could be so divided and, even more problematically, that those divisions were known in advance. Critics of the *Essay* tended to highlight this apparent weakness. In his popular *Reflections upon Learning* (1699) Thomas Baker claimed that the whole project was ‘an impracticable thing’. If we are to have a language based on things rather than words, he pointed out, ‘we must first be agreed about the nature of things, before we can fix Marks and Characters to represent them, and I very much despair of such an agreement.’ Nature, he went on to say, ‘is an inexhaustible mine, where we may always dig and yet never come at the bottom.’¹⁰² The incompleteness of human knowledge rendered impossible the task of setting out its fundamental categories in advance. It must be said that even those involved in the scheme were sympathetic to this general point. In his private correspondence Ray declared himself to be ‘ashamed’ of the botanical taxonomy he had contributed. He complained that in devising the tables he been unable to follow ‘nature’s lead’ being constrained instead by the author’s method. The whole vision of constructing ‘exact Philosophical tables’ of anything was, in his view, highly problematic.¹⁰³

Puzzlingly, there is evidence that Wilkins, too, was aware of at least some of these problems. At the very outset he conceded that the taxonomic scheme he was relying on—in essence a modified table of Aristotelian predicaments—was defective and could not extend to things that were as yet unknown. Indeed the perfection of such a scheme was dependent on the perfection of philosophy itself, it being the task of philosophy, in Wilkins’ view at least, ‘to reduce all things into such a frame, as may express their natural order, dependence and relations.’ He was also in partial agreement with Ray, that the biological taxonomies were artificial.¹⁰⁴ Perhaps the best construction that can be placed on Wilkins’ efforts is that he sought to establish the plausibility of framing a universal language, fully cognizant of the fact that such a project could only be brought to fulfilment with the perfection of philosophy itself—a task that he thought might be

¹⁰² Baker, *Reflections on Learning*, pp. 18, 76; Lewis, ‘John Wilkins’, p. 291. Descartes had similarly thought that a true philosophical language presupposed a ‘true philosophy’, the existence of which presumably would obviate the need for a philosophical language. Maat, *Philosophical Languages*, pp. 27f.

¹⁰³ Ray, *Philosophical letters*, p. 62, cited in Lewis, ‘John Wilkins’, pp. 303f. Cf. Benjamin DeMott, ‘Science versus Mnemonics, Notes on John Ray and on John Wilkins’ *Essay towards a Real Character, and a Philosophical Language*, *Isis* 48 (1957), 3-12.

¹⁰⁴ Wilkins, *Essay*, sig. 1b, pp. 1, 67. See also Lewis, ‘John Wilkins’, pp. 241f.; Maat, *Philosophical Languages*, pp. 156-9, 255-7.

left to his colleagues in the Royal Society. Wilkins' project was, after all, an 'essay': the first rather than the final word. In favour of the scheme was the witness of Aristotle (which for many, admittedly, would count against it). But it was not unreasonable to assume that God had imposed a rational order on the natural world, that it was the task of natural philosophy to discover this order, and that its disclosure would count as evidence of divine wisdom.¹⁰⁵ Adam's naming of the beasts was also a relevant consideration, for if the beasts had been given names according to their natures, and if this had been accomplished by natural means, it could be argued that there did in fact exist such natures in the world.

In the early eighteenth century Wilkins' attempts to frame a philosophical language were savagely satirized in Jonathan Swift's 'Academy of Lagado', where men carry around objects for use instead of words, 'since words are only names for things.' These objects, the reader is informed, 'would serve as an universal language.'¹⁰⁶ While Swift may be the best-known critic of Wilkins' scheme, reservations had been expressed almost from the moment of its publication. Some theologically motivated critics wondered whether repairing the ruins of Babel was such a good idea, given the fate of the original project.¹⁰⁷ It was not difficult to argue that in attempting to reverse the effects of the curse on language, Wilkins was simply rehearsing the proud ambition of the Babel's original architects. Wilkins' latitudinarianism, a view generally associated with which a marginally more generous view of human nature than prevailing versions of Calvinism, may have had something to do with these criticisms.¹⁰⁸ These challenges aside, there was a deep tension between Wilkins' aims and the means by which he attempted to realise them. His basic dilemma was that while his goals were directly linked to Baconian aspirations to reverse those 'curses' that had attended human sin, his proposed remedy seemed to ignore the consequences of those curses, at least as they were typically understood. In certain respects Wilkins' resort to aspects of Aristotelianism was inconsistent with the Baconian analysis of human defects. Arguably, in his invocation of Aristotelian categories he was committing the error of

¹⁰⁵ Lewis plausibly suggests this as a motivation for Hooke's 'philosophical algebra', 'John Wilkins', pp. 225f.

¹⁰⁶ Swift, *Gulliver's Travels*, part III, ch. 4.

¹⁰⁷ Thus Baker: 'The Divisions of Tongues was [sic] inflicted by God as a Curse upon humane Ambition, and may have been continued since for the same reason; and as no Remedy has been yet found, so it is most probable, it is not to be expected, nor are we to hope to unite that which God had divided.' *Reflections on Learning*, p. 19. Cf. Casaubon, *A Letter*, pp. 35f.

¹⁰⁸ Latitudinarians were nonetheless firmly committed to the doctrine of the Fall and can be regarded as 'largely co-extensive with the puritan movement'. Webster, *Great Instauration*, p. 497; Spellman, *The Latitudinarians*, pp. 54-71; Marshall, *John Locke: Resistance, Religion and*

Aquinas in assuming that Aristotelianism was a theologically ‘neutral’ framework that could be deployed unproblematically in a range of different contexts. In fact, the table of Aristotelian predicaments rested on presuppositions that were compatible with neither sacred history nor the new natural philosophy. Proponents of the latter were uncomfortably aware of the impracticalities of identifying and naming the essences of things. Ray, as we have already indicated, had little confidence in his own contribution, and expressed doubts that the natures of things could be known in the kinds of way demanded by Wilkins’ project. Robert Boyle shared this scepticism, suggesting that the book of nature contained only ‘Aegyptian Hieroglyphicks’ and that many of its secrets would remain forever hidden from fallen human minds.¹⁰⁹ The corpuscular philosophy championed by Boyle, moreover, was inconsistent with the idea that natural objects could have genuine essences. The final word may be given to John Locke, who echoed Boyle’s scepticism about the possibility of arriving at a true science of natural bodies. Without naming names, Locke declared in his *Essay concerning Human Understanding* (1690) that no one could attempt the perfect reformation of language ‘without rendring himself ridiculous.’¹¹⁰

IV. THE LIMITS OF REASON

Robert Boyle (1627-1691) and John Locke (1632-1704) had much more in common than a shared sceptical attitude to philosophical language projects. Both have become cherished emblems of human progress in their respective fields, and they enjoy reputations as advocates of the dignity and reliability of human reason. In his ‘Preliminary Discourse’ to the *Encyclopédie*, Jean Le Rond d’Alembert hailed Locke as the founder of ‘scientific philosophy’ while Voltaire referred to him as the ‘Hercules of metaphysics’ who had slain the serpents of scholasticism.¹¹¹ Robert Boyle is a canonical figure in the history of science, ‘the father of modern chemistry’ and, as every science student knows, the author of the eponymous law.¹¹² These reputations have important foundations in fact. Locke’s insistence on the natural liberty of human

Responsibility (Cambridge, 1994), p. 135; Marshall, ‘Locke and Latitudinarianism’.

¹⁰⁹ Lewis, ‘John Wilkins’ Essay’, pp. 228, n.62, 247f., 306f.,

¹¹⁰ Locke, *Essay*, III.xi.2 (II, 148). There is some discussion of the extent to which Boyle and Locke shared a common view of the arbitrary nature of classification. See Jan-Erik Jones, ‘Boyle, Classification, and the Workmanship of the Understanding Thesis’, *Journal of the History of Philosophy* 43 (2005), 171-83.

¹¹¹ W. M. Spellman, *John Locke* (New York, 1997), pp. 3f.

¹¹² Some controversy exists over the naming rights to ‘Boyle’s Law’, there being a belated French claimant, Edme Mariotte. Some have also thought that Hooke should have received credit for his contribution to the discovery.

beings, his advocacy of government by the consent of the governed, his defence of toleration, and his irenic and open-minded vision of Christianity, all support this characterization. In the case of Boyle, the reasons are somewhat different, but equally compelling. He was undoubtedly the leading exponent of experimental philosophy in the seventeenth century, and while his religious commitments are well known, they are generally regarded as being of the less extreme kind. Boyle is considered to be one of the chief early modern advocates of the use of reason in the sphere of religion, largely on account of his frequently stated belief that the study of nature provides persuasive evidence of the existence of a wise and all-powerful Deity. Their rejection of Wilkins' language scheme, however, provides us with a hint that their identification as champions of the powers of unaided reason may need some modification. Indeed, in spite of their reputations, both Boyle and Locke are to be located in the tradition of theologically informed scepticism that we have been tracing in this chapter.

As Jan Wojcik has recently shown, the common reading of Boyle as an advocate of the powers of reason in the spheres of religion and natural philosophy is somewhat misleading.¹¹³ This is not the place to rehearse her arguments in detail, but given Boyle's prominence as an advocate of experimental philosophy, some comment on his views about the Fall, human nature, and the limits of our knowledge is in order. Boyle's most direct statements on this topic are to be found in *Some Considerations about the Reconcilableness of Reason and Religion* (1675). Here he sets out the familiar claim that all human race is 'embued with Prejudices, and Errors' and that these typically 'continue undiscern'd and consequently unreform'd.'¹¹⁴ Boyle enlists two modern authors to support his views. The first, surprisingly perhaps, is Descartes, who is cited to the effect that in the realm of philosophy we must always remember that we are finite and God infinite. Boyle also makes reference to Descartes' suggestion that a common source of error are those prejudices acquired in infancy.¹¹⁵ The other modern, as we might expect, was Bacon, whose doctrine of the 'idols' receives brief treatment. Boyle then proceeds, in language reminiscent of Bacon, to explain that the human mind 'is not sincerely dispos'd to receive the light of Truth, but receives an infusion as it were of adventitious Colours (the disguise the light) from the Will and Affections.' Human pride, moreover, prompts us to construct truth as we would want it to be, rather than as it actually is. This takes Boyle back to what transpired in Eden:

¹¹³ Wojcik, *Robert Boyle*, esp. pp. 212-19.

¹¹⁴ Boyle, *Reason and Religion*, p. 28.

¹¹⁵ *Ibid.* p. 26. According to Henri Gouhier, Descartes' account of infancy is a kind of secularised doctrine of original sin. Henri Gouhier, *Pensée métaphysique de Descartes*.

And if we consider the inbred pride of man, which is such, that if we will believe the Sacred story, ev'n *Adam* in Paradise affected to be like God knowing good and evil, we shall not so much marvel, that almost every man in particular makes the Notions he has entertain'd already, and his Senses, his Inclinations and his Interests, the Standards by which he estimates and judges of all other things, whether natural or reveal'd.

'If we admit the fall of our first Parents', Boyle continues, we will not be surprised to discover that 'our Passions and Interests, and oftentimes our Vices should pervert our Intellects.'¹¹⁶

Boyle does admit the Fall, yet he was reluctant to attribute all the limitations of human knowledge to Adam's lapse. It is significant, for example, that he was cautious about endorsing the tradition that accorded encyclopaedic knowledge to Adam. 'I will not urge the received Opinion of Divines', he wrote in *The Excellency of Theology* (1674), 'that before the Fall ... Adam's knowledge was such, that he was able at first sight of them to give each of the Beasts a name expressive of their natures.' Boyle's reservations on this point were owing to the fact that he had closely scrutinized the Hebrew names of animals mentioned in *Genesis* without deriving any clearer insight into nature than that with which he had begun. He concluded that there was some doubt that Adam's knowledge in Paradise was equivalent to that 'of the Saints in Heaven.'¹¹⁷ In fact, earlier in the work he had implied that recent advances in the sciences and arts had well surpassed anything that Adam could have accomplished. 'If *Adam* were now alive, and should survey that great variety of man's productions', he mused, 'he would admire to see what a new world, as it were, or set of things has been added to the primitive creatures by the industry of his posterity.'¹¹⁸ Boyle thus dismissed a common view of the symmetry between the original knowledge of Adam and that of the Saints in heaven. All terrestrial knowledge, including what Adam had known in Paradise, was in his view necessarily limited by finitude. Only with the resurrection would we come into possession of true science. At that time, just as our natures would be completely renovated, so 'our Faculties will be Elevated and Enlarged, and probably made capable or attaining degrees and kinds of knowledge, to which we are here but strangers.' All the more reason, Boyle thought, that we should value the

¹¹⁶ Boyle, *Reason and Religion*, p. 33.

¹¹⁷ Boyle, *The Excellency of Theology compar'd with Natural Philosophy* (London, 1674), pp. 154f.

¹¹⁸ Boyle, *Usefulness of Natural Philosophy, WorksII*, 14.

Christian religion since it provides the only means by which we can come to enjoy a perfect knowledge of natural philosophy.¹¹⁹

For Boyle, then, the root cause of the defects of human knowledge seemed not to be the lapsed condition of humanity *per se*, but rather a prior set of constraints placed on the mind and body that were present even in their first creation. He was to speak of ‘a necessary Imperfection of Humane Nature, that whilst we remain in this mortal condition, the Soul being confin’d to the dark prison of the Body, is capable ... but of a dim knowledge.’¹²⁰ For this reason, our knowledge does not extend to the essences of things, nor even to every object, but only to those ‘as God thought fit to allow our minds in their present (and perchance lapsed) condition.’¹²¹ Although the Fall again receives mention here, the ‘perchance’ is not suggestive of a strong endorsement of the view that the Fall is the primary cause of our epistemic limitations. This is not to say the Boyle entertained any serious doubts about the Fall, but rather that he was uncertain of how it affected our capacity for knowledge. Most likely he regarded the Fall as evidence of our tendency to make poor judgments rather than as the ultimate cause of them. As for the necessity of these limitations, they seem to follow, as implied above, from the kind of creatures we are—souls imprisoned in bodies. It is our relatively modest position in the scale of being that limits our capacity for knowledge, particularly when we compare ourselves to the omniscient God. This comparison means that our knowledge both of natural and supernatural things will be considerably circumscribed: ‘We purblind mortals, that are not of the highest order of God’s creatures, may justly think of ourselves incompetent judges of the extent of the power and knowledge of God ... whose power may justly be supposed to reach farther than our limited intellect can apprehend.’¹²² All of this means that we must entertain only modest expectations of the reach of natural philosophy. Thus Boyle frequently stresses the fact that there is no ‘clearness and certainty’ in physics.¹²³

There has been considerable discussion in the secondary literature about the impact of Boyle’s theological voluntarism on his approach to natural philosophy. According to a widely accepted thesis, ‘voluntarists’ (who emphasize the divine will and believe that God arbitrarily determined the order of the cosmos) tend to be empiricists, while

¹¹⁹ Boyle, *Excellency of Theology*, pp. 154f. Similar remarks may be found in *Seraphic Love*, Works I, 283-90; *Usefulness of Natural Philosophy*, Works II, 33.

¹²⁰ Boyle, *Excellency of Theology*, p. 154.

¹²¹ Boyle, *Things above Reason*, Works IV, 445.

¹²² Boyle, *Appendix to the First Part of The Christian Virtuoso*, Works VI, 676f.

‘intellectualists’ (who stress the divine rationality and goodness, and thus the inherent rationality of the natural order) tend to be rationalists.¹²⁴ Boyle is generally taken to be representative of the former position, Descartes of the latter. There are some deficiencies in this thesis, but for our present purposes it should be sufficient to point out that what ultimately drives experimentalism and its relatively modest vision of what can be achieved in the realm of natural philosophy is not a particular conception of God and how he makes his decisions, but rather a view of human nature.¹²⁵ The experimental approach is justified primarily by appeals to the weakness of our sensory and cognitive capacities. For many seventeenth-century English thinkers these weaknesses were understood as consequences of the Fall. Boyle and Locke, for their part, also place stress on the incapacities that necessarily attend the kind of beings that we are. But in both cases, the more important issue is the nature of human capacities rather than the nature of the Deity. And if the idea of a fall away from an originally perfect knowledge begins to decline in importance towards the end of the seventeenth century, it nonetheless played a crucial role by drawing attention to the question of the capacities of human nature in the present world.

Boyle, incidentally, was by no means the only fellow of the Royal Society to harbour deep misgivings about the prospects of formulating a perfect science. The physician and botanist Henry Power (c. 1626-1668), whose *Experimental Philosophy* (1664) was the first to acquaint the general public with the discoveries of microscopy, wrote that human senses were framed ‘as might best manage this particular engine we call the Body, and best agree with the place of our habitation (the earth and the elements we were to converse with) and not to be critical surveyors, and adequate judges of the immense Universe.’¹²⁶ John Ray, whose ambivalence about Wilkins’ philosophical language we have already noted, expressed a similar sentiment in his classic *Wisdom of*

¹²³ Boyle, *Excellency of Theology*, p. 153.

¹²⁴ See M. B. Foster, “The Christian Doctrine of Creation and the Rise of Modern Natural Science,” *Mind* 43 (1934), pp. 446-68; J. E. McGuire, “Boyle’s Conception of Nature,” *JHI* 33 (1972), pp. 523-42; Francis Oakley, “Christian Theology and the Newtonian Science: The Rise of the Concept of Laws of Nature,” *Church History* 30 (1961), pp. 433-5; John Henry, “Henry More versus Robert Boyle,” in *Henry More (1614-87): Tercentenary Essays*, ed. Sarah Hutton (Dordrecht, 1990), pp. 55-76; James E. Force and Richard H. Popkin, *Essays on the Context, Nature, and Influence of Isaac Newton’s Theology* (Dordrecht, 1990); P. M. Heimann, “Voluntarism and Immanence: Conceptions of Nature in Eighteenth Century Thought,” *JHI* 39 (1978), pp. 271-83; Margaret J. Osler, *Divine Will and the Mechanical Philosophy: Gassendi and Descartes on Contingency and Necessity in the Created World* (Cambridge, 1994); Wojcik, *Robert Boyle*, pp. 189-211.

¹²⁵ For difficulties with this thesis see Harrison, ‘Voluntarism and Early Modern Science’, and ‘Was Newton a Voluntarist?’

¹²⁶ Power, *Experimental Philosophy*, Preface, sig. br.

God Manifested in the Works of Creation (1691), declaring that ‘our Eyes and Senses, however armed or assisted, are too gross to discern the curiosity of the Workmanship of Nature ... and our understanding too dark and infirm to discover and comprehend all Ends and uses to which the infinitely wise Creator did design them.’¹²⁷ The most systematic exposition of this view of the limitations of human knowledge, however, was provided by John Locke.

The work for which Locke is best known, the *Essay concerning Human Understanding* (1690), had its genesis in a casual discussion on the topics of religion and morality that took place among a group of friends in Locke’s London house early in 1671. By any ordinary criterion the occasion was not a success. There was certainly no resolution of the issues under discussion and on parting the participants found themselves in a state of complete puzzlement. But the meeting did plant the seed of an idea in Locke’s mind and, on his own account, he came away the insight that ‘before we set about enquiries of that nature it [is] necessary to examine our own abilities, and see what objects our understanding were or were not fitted to deal with.’¹²⁸ This was the idea that was to give rise to *Essay concerning Human Understanding*. Locke’s basic insight, it need hardly be pointed out, was of a piece with the general trend in seventeenth-century England, to direct attention to the question of human nature before pursuing knowledge claims. Locke’s doubts about the prospects of a robust knowledge of nature are evident to the reader as soon as the book is opened. The title page of the fourth and subsequent editions of the *Essay* bears this epigraph: ‘As thou knowest not what is the way of the Spirit, nor how the bones do grow in the womb of her that is with child: even so thou knowest not the works of God, who maketh all things.’ These words, reputed to be those of Solomon, are taken from *Ecclesiastes* 11:5. While they have often escaped the attention of commentators, they set the tone for the essay and provide an important link to the tradition of ‘Solomonic’ skepticism.¹²⁹ In the Epistle to the Reader, Locke informs the reader that his concern is the analysis of errors and their causes. In order to provide ‘some service to human understanding’, he states, it will prove necessary to

¹²⁷ Ray, *Wisdom of God*, p. 58. Although not published until 1691, this work was composed in the 1650s.

¹²⁸ Locke *Essay*, Epistle to the Reader, I.i.7 (I, 10).

¹²⁹ The original epigraph comes from Cicero, *De natura deorum* I.30 and reads, in rough translation: ‘How much more fitting it would have been, Velleius, for you to have confessed your ignorance of the things of which you were ignorant, than to have spouted the nonsense you did, and aroused your own disgust.’ For a discussion of the epigraphs and their significance see Stephen Buckle, ‘British Sceptical Realism: A Fresh Look at the British Tradition’, *European Journal of Philosophy* 7 (1999), 1-29.

‘break in upon the sanctuary of vanity and ignorance.’¹³⁰ Errors arise in our understanding, he goes on to say, because of overgenerous estimates of the capabilities of the human mind. Accordingly, the *Essay* was intended as an analysis of the powers of the mind, ‘how far they reach, to what things they are in any degree proportionate; and where they fail us....’—all this to the end that ‘we may learn to content ourselves with what is attainable in this state.’¹³¹ The problem of preceding philosophies came from their failure to acknowledge the limits of reason, and their tendency to ‘require demonstration, and demand certainty, where probability only is to be had.’¹³² Thus the philosophies that had sought certain conclusions based on logical demonstration had been nothing more than evidence of human hubris. Locke’s obvious debt to Bacon was acknowledged elsewhere, in the posthumously published *Of the Conduct of the Understanding* (1706). Here Locke repeats Bacon’s observations about the incompetence of logic to address the manifold errors of the mind. ‘There are several weaknesses and defects in the understanding’, he observes, ‘either from the natural temper of the mind or ill habits taken up’. Of these defects, he continues, ‘there are as many possibly to be found, if the mind were thoroughly studied, as there are diseases of the body, each whereof clogs and disables the understanding to some degree, and therefore deserves to be looked after and cured.’¹³³

For a figure typically regarded as a standard bearer for the Enlightenment and the philosopher (along with Bacon) most closely associated with the rise of empirical science, Locke’s vision of the reach of natural philosophy is a rather sober one. Armed with Baconian ‘experiments’ and ‘histories’, Locke thought, the industrious investigator can penetrate further into the natures of things than the scholastic philosophers had ever managed. But this experimental knowledge falls well short of the status of science:

I deny not, but a man, accustomed to rational and regular experiments, shall be able to see farther into the nature of bodies, and guess righter at their yet unknown properties, than one that is a stranger to them: But yet, as I have said, this is but judgment and opinion, not knowledge and certainty. This way of getting and improving our knowledge in substances only by experience and

¹³⁰ Locke, *Essay*, Epistle to the Reader (I, 14). Locke acknowledges his debt to Bacon in *Of the Conduct of the Understanding*, 5th edn. ed. Thomas Fowler (Oxford, 1901), p. 4.

¹³¹ *Ibid.*, Introduction, 4 (I, 28f.)

¹³² *Ibid.*, Introduction, 5, (I, 30).

¹³³ Locke, *Conduct of the Understanding*, p. 4; Cf. p 35. On the disease metaphor in Locke’s *Conduct* see Nicholas Wolterstorff, *John Locke and the Ethics of Belief* (Cambridge, 1996), pp. 94f. For Locke’s often unrecognised indebtedness to Bacon see Peter Anstey, ‘Locke, Bacon and natural history’ *Early Science and Medicine* 7 (2002), 65-92; Neale Wood, ‘The Baconian Character of Locke’s “Essay”’, *Studies in History and Philosophy of Science* 6 (1975), 43-84.

history, which is all that the weakness of our faculties in this state of mediocrity, which we are in this world, can attain to; makes me suspect, that natural philosophy is not capable of being made a science.¹³⁴

This verdict is repeated in Locke's *Thoughts concerning Education* (1693) in which he observes that we shall never be able to make a science out of natural philosophy because the 'Works of Nature are contrived by a Wisdom, and operate by ways too far surpassing our Faculties to discover, or Capacities to conceive, for us ever to be able to reduce them into a Science.'¹³⁵ Because the workmanship of God far surpasses the comprehension of the most ingenious of men, philosophical taxonomies of the kind proposed by Wilkins are sheer fantasies. Locke wrote that it is in vain that we 'pretend to range things into sorts, and dispose them into certain classes, under names, by their real essences.' 'A blind man', he concluded, 'may as soon sort things by their colours.'¹³⁶

For Locke, as for Boyle, however, our current 'state of mediocrity' seems to be less the result of a catastrophic Fall than of the fact that our proper station is quite literally a 'mediocre' or middle state between angelic perfection and the lowers orders of the beasts.¹³⁷ The capacities we do have, however, are well suited to our current state. According to Locke, God had 'fitted our senses, faculties, and organs, to the conveniences of life, and the business we have to do here'—that business not being the quest for a complete knowledge of the operations of nature, but that of learning about God through the creatures, discovering the nature of our moral duties, and providing for the practical necessities of life.¹³⁸ In this respect we are no different from Adam. In contrast to Glanvill, and in keeping with Boyle's view, Locke had little time for an Adam equipped with supersensitive organs of perception, for these he regarded as incompatible with the nature of human beings. While conceding that our present senses were indeed 'dull and weak', he pointed out that any significant improvement in their acuity would be accompanied by a host of inconveniences. Were our hearing more

¹³⁴ Locke, *Essay*, IV.xii.10, (I, 349). Cf.: 'But as to a perfect science of natural bodies (not to mention spiritual beings) we are, I think, so far from being capable of any such thing, that I conclude it lost labour to seek after it.' *Essay*, IV.iii.29 (I, 222). See also *Essay*, III.vi.9 (I, 64). In this context Locke means 'science' in the Aristotelian sense of knowledge that is certain and demonstrable. For Locke's views on the nature of natural philosophy see Peter Anstey, 'Locke on method in natural philosophy', in *The Philosophy of John Locke: New Perspectives*, ed. Peter Anstey, (London, 2003), pp. 26-42.

¹³⁵ Locke, *Some Thoughts Concerning Education* § 190, ed. John Yolton and Jean Yolton (Oxford, 1989), p. 244.

¹³⁶ Locke, *Essay*, III.vi.9 (II, 64).

¹³⁷ For Locke's thoughts on the chain of being see the *Essay*, III.6.12 (II, 68).

¹³⁸ Locke, *Essay*, II.xxiii.12 (I, 402)

sensitive, we would be distracted by a perpetual noise, and would ‘in the quietest retirement be less able to sleep or meditate, than in the middle of a sea fight.’

Microscopic or telescopic vision would also prove to be more a burden than a boon. One possessed of an extraordinary ‘quickness and tenderness of sight’ could not, Locke supposed, ‘endure bright sun-shine, or so much as open day-light; nor take in but a very small part of any object at once.’¹³⁹ As for Adam’s supposed ability to name things according to their natures, this is also treated with scepticism. Adam was merely the first to impose names on things, but his naming would be no different to ours were we in his situation. Indeed, we still possess the same naming capacities as Adam: ‘The same liberty also that Adam had of affixing any new name to any idea, the same has any one still.’¹⁴⁰

The ideal conditions for acquiring knowledge to which our present state was to be compared, then, were not represented by Adam in Paradise, but by the situation of angelic beings—‘spirits’ that might have the ability ‘to frame and shape to themselves organs of sensation or perception, as to suit them to their present design, and the circumstances they would consider’.¹⁴¹ It is a measure of Locke’s commitment to empiricism that in his scheme of things even spiritual beings would rely on sense perceptions for their knowledge of material bodies. Elsewhere, he was to affirm that spirits, ‘of a higher rank than those immersed in flesh’, have knowledge and ideas ‘much more perfect than ours’, and indeed ‘may have as clear ideas of the radical constitution of substances, as we have of a triangle, and so perceive how all their properties and operations flow from thence: But the manner how they come by that knowledge exceeds our conceptions’.¹⁴² It follows from Locke’s adherence to the idea that God placed humans on a specific rung on the ladder of being that had Adam possessed the remarkable intellectual abilities so often attributed to him, he would in fact not have been human at all, but a creature occupying a more elevated rank in the *scala naturae*.

Nonetheless, it seems clear that Locke’s assessment of human nature was shaped to a considerable degree by the Augustinian tradition. This influence is particularly conspicuous in the *Two Tracts upon Government*, written between the years of 1660 and 1662 in the wake of the failure of the puritan experiment. For Locke, while the events

¹³⁹ *Ibid.* Cf. Power, *Experimental Philosophy*, preface.

¹⁴⁰ *Ibid.*, III.vi.51 (II, 470).

¹⁴¹ *Ibid.*, II.xxiii.13 (I, 404).

¹⁴² *Ibid.*, III.xi.23 (II, 160).

of the immediate past had shown the folly of puritan political aspirations, they had paradoxically confirmed one of that movement's most fundamental convictions, namely, the deep corruption of human nature. The puritan project, however laudable in its original conception, had served to demonstrate how the best motives are inevitably diverted towards evil. Instead of establishing a godly commonwealth, they had succeeded only in reducing England to 'chaos' and 'a heady ferment of passions'. Their proud ambition was the consequence of neither reason nor knowledge of the divine will, but was instead a demonstration of 'predatory lust under the guise of Christian liberty and religion.'¹⁴³ Locke thus welcomed the restoration of the monarchy. Without legitimately instituted political power, Locke urged, there would be 'no peace, no security, no enjoyments, enmity with all men and safe possession of nothing, and those stinging swarms of miseries that attend anarchy and rebellion.'¹⁴⁴ The Hobbesian cadences of this statement are unmistakable, as a number of commentators have pointed out.¹⁴⁵ It is not unreasonable to think that the common currency of fallen human nature informed the views of both Locke and Hobbes. Locke himself provides support for this reading. 'Ever since man threw himself into the pollution of sin', he wrote, 'he sullies whatever he takes into his hand, and he that at first could make the best and perfectest nature degenerate cannot fail now to make other things so'. Political anarchy is one result of our 'frail nature' and 'corruption'.¹⁴⁶

This early conviction persisted well beyond the aftermath of the civil wars. If anything, it was reinforced during Locke's three-year sojourn in France in the years 1675-9. Here he encountered the writings of the Jansenist theologian Pierre Nicole. Locke was particularly taken with Nicole's *Essais de Morale* (1671-78), and set himself the task of translating three of them into English. In a journal entry dated 15 August 1676, probably intended as a preface to his translations, he observed:

...when we a little consider what our author says and experience vouches concerning the shortness of our lives and the weakness of our understandings,

¹⁴³ Locke *Two Tracts*, in *Political Essays*, ed. Mark Goldie (Cambridge, 1997), p. 56.

¹⁴⁴ *Ibid.*, p. 37

¹⁴⁵ See, e.g., J. Gough, *John Locke's Political Philosophy*, (Oxford, 1950), p. 180; M. Cranston, *Locke: A Biography* (London, 1957), p. 62. See also Goldie, *Locke, Political Essays*, p. 37, n. 19.

¹⁴⁶ Locke, *Two Tracts*, in *Political Essays*, p. 36. Thus John Dunn on the *Two Tracts*: 'The cognitive insouciance and the insubordinate disposition of fallen men necessitate an elaborate structure of human authorities'. *Political Thought of John Locke*, p. 15. John Spellman agrees that Locke's *Two Tracts* were premised on 'the irreversible corruption and inherent sinfulness of all men'. *Locke and the Problem of Depravity*, pp. 49-62. Cf. Marshall, *John Locke*, pp. 27, 32, 63; John Colman, *John Locke's Moral Philosophy*, (Edinburgh, 1983), p. 12; Ian Harris, 'The Politics of Christianity', in Rogers (ed.), *John Locke*, pp. 197-216 (p. 207).

what small progress men of the quickest parts make in real knowledge, and how little of useful truth we discover after a long search and infinite labour, we shall find there was reason enough to desire all needless difficulties should be removed out of the way.¹⁴⁷

It is likely, John Marshall writes, that Locke ‘broadly agreed with Nicole’s vision of men’s corrupted nature, the centrality of corrupt self-love among the passions, and the essential role of God’s grace in enlivening and saving men.’¹⁴⁸ Indeed the affinity between Locke’s philosophy and Jansenism was noted at the time by Voltaire who on one occasion described Locke as ‘the Pascal of the English’.¹⁴⁹

Perhaps the chief significance of Locke’s encounter with Nicole was that it provided independent corroboration, as it were, of what in England was the dominant view. Nicole’s position, as restated by Locke, was entirely consistent with the theological consensus in England at the time, where all groups, including the relatively optimistic Latitudinarians, stressed the depravity of the human condition.¹⁵⁰ There is little in the later political writings to suggest that Locke ever abandoned these convictions. While his unpublished ‘Essay on Toleration’ (1667) represents a change of heart on the question of toleration (possibly the result of his experience in Europe of Catholics, Lutherans and Calvinists living together in relative peace), he was still to identify ‘depraved ambitious human nature’ as the reason for men’s desire to have dominion over other men.¹⁵¹ In the *Two Treatises on Government* (1690), Locke writes that ‘Adam was created a perfect man, his body and mind in full possession of their strength and reason’. In the state of innocence he had been able to ‘govern his actions according to the dictates of the law of reason which God had implanted in him.’ For this reason the original grant of government was not given to Adam until after the Fall, when he was ‘much distant in condition’ from his first creation. In theory, the prescriptions of the law of nature would have been sufficient to ensure a ‘great and general community’ were it not for the ‘corruption, and viciousness of degenerate Men.’¹⁵² By implication, civil government was a prerequisite for peace in the post-lapsarian world.¹⁵³ Locke’s rambling and repetitive *Third Letter concerning Toleration* (1692) is peppered with

¹⁴⁷ Locke, *Essays*, pp. 254-7, qu. in Marshall, *John Locke*, p. 134.

¹⁴⁸ Marshall, *John Locke*, pp. 134. Cf. Kim Parker, *The Biblical Politics of John Locke*, (Waterloo, 2004), pp. 53f.

¹⁴⁹ Voltaire, *Eloge et Pensées de Pascal*, in Louis Moland (ed.), *Oeuvres complètes de Voltaire*, 52 vols., (Paris, 1877-85), XXXI, 42.

¹⁵⁰ Spellman, *The Latitudinarians*, p. 55; Marshall, *John Locke*, p. 135.

¹⁵¹ Marshall, *John Locke*, p. 64.

¹⁵² Locke, *Two Treatises of Government*, 12th edn., II.vi.56 (Laslett edn., p. 305); I.iii.16 (p. 152); II.ix.128 (p. 352).

references to ‘depraved’ and ‘corrupt human nature’.¹⁵⁴ Even in the *Essay*, according to John Dunn, Locke only claims that human beings are potentially or intermittently rational, given that all human judgements ‘are clouded by the corrupt passions released by the Fall.’¹⁵⁵

Locke had two further occasions to reflect on the biblical narrative of the Fall and its contemporary significance. His famous refutation of Robert Filmer’s *Patriarcha* entailed a careful exegesis of the narrative of Adam’s creation and Fall. As we have already seen, Filmer’s case for absolutism was grounded in the idea that Adam was the first monarch; that his authority came from a divine grant rather than the consent of those he governed; that this power was conveyed to the patriarchs and from them to all monarchs; and that there had never in all of history been a ‘state of nature’ in which individuals had been free. All of this was buttressed with supporting references from scripture.¹⁵⁶ Locke’s demolition of this argument in his *Two Treatises* involved an alternative reading of Genesis and one which, arguably, was more faithful to the literal account than Filmer’s. Locke upbraided Filmer for having read his personal political views into the text, declaring that ‘our own ill grounded opinions, however by us called “probable,” cannot authorize us to understand scripture contrary to the direct and plain meaning of the words.’¹⁵⁷ A consideration of that ‘plain meaning’ of the relevant texts led Locke to the conclusion that ‘Adam had not, either by natural right of fatherhood, or by positive donation from God, any such authority over his children, or dominion over the world, as is pretended’.¹⁵⁸ The other puzzling feature of Filmer’s account seized upon by Locke concerned the issue of succession. Even if God had granted absolute political power to Adam, Locke pointed out, it was not clear how this power would pass to his offspring.¹⁵⁹ On this issue, Filmer had simply invoked the commonplace principle of Adam as a representative person—‘what was given to Adam, was given in his person to his posterity.’¹⁶⁰ This view was common currency, as we have seen, because it was presupposed in one of the standard explanations of how Adamic guilt came to fall upon succeeding generations. It was by virtue of this principle, then, that both Adam’s monarchical authority and his guilt could be transmitted to his posterity (although the

¹⁵³ Cf. Marshall, *John Locke*, p. 145, n. 38.

¹⁵⁴ See, e.g., Locke, *A Third Letter for Toleration*, in *Works* VI, 351f., 362, 400, 446, 467, 543.

¹⁵⁵ Dunn, *Political Thought of John Locke*, p. 194.

¹⁵⁶ Filmer, *Patriarcha*, p. 13 and *passim*.

¹⁵⁷ Locke, *Two Treatises* I.iv.36 (p. 165).

¹⁵⁸ *Ibid.*, II.i.1 (p. 267). Cf. pp.161, 291.

¹⁵⁹ *Ibid.*, I.ix.95-8 (pp. 211-13).

¹⁶⁰ Robert Filmer, *The Anarchy of a Limited of Mixed Monarchy*, in J. P. Sommerville (ed.), *Filmer: Patriarch and other Writings* (Cambridge, 1991), p. 138.

former, problematically, was conveyed patrilineally to particular persons).¹⁶¹ Locke was to deny that Adam possessed such a representative capacity, and did so again in the rather different context of his account of Christianity.

In the first sentence of *The Reasonableness of Christianity as Delivered in the Scriptures* (1695) Locke announced: ‘It is obvious to any one, who reads the New Testament, that the doctrine of redemption, and consequently of the Gospel, is founded upon the supposition of Adam's fall.’ For Locke, arriving at a proper understanding of the nature of Adam's fall was as fundamental for a right conception of Christianity as it was for political philosophy. What quickly emerges in this work, however, is that while Locke still holds to the idea of the Fall, he has abandoned the Augustinian/ Calvinist understanding of it. This was as a consequence of applying the two criteria cited in his title—reasonableness and the witness of scripture—to the question of what Adam had lost on his expulsion from paradise. Locke argues, plausibly enough, that on a strictly literal reading of Genesis and St Paul, Adam had lost only ‘immortality and bliss’ as a consequence of sin. It was these things, then, that were restored by Christ's redemptive work.¹⁶² Mortality and the loss of bliss might have indirectly made the acquisition of knowledge more difficult, but Locke did not seem to think that the Fall had directly wrought havoc with the mind or the senses. Neither did Locke find any conclusive biblical evidence to support the Augustinian view that moral guilt is inherited by all of the descendents of Adam, ‘whom millions had never heard of, and no one had authorized to transact for him, or to be his Representative.’ According to the New Testament, Locke concludes, ‘every one's sin is charged upon himself only.’¹⁶³ Such a view, happily, also accords with commonsense conceptions of justice and of the goodness of God himself.¹⁶⁴ It is also very similar to a position briefly sketched out

¹⁶¹ Harris, ‘The Politics of Christianity’; Parker, *Biblical Politics of John Locke*, p. 149; Spellman, *John Locke*, pp. 74f.

¹⁶² Locke, *Reasonableness of Christianity, Works*, VII, 10. Also see the MS. ‘*Homo ante et post lapsum*’, reproduced in Victor Nuovo (ed.), *John Locke: Writings on Religion* (Oxford, 2002), p. 231. This is very close to Thomas Hobbes's reading, *Leviathan*, III.38.2/25 (p. 479). Locke returned to this issue in his *Paraphrase and Notes on the Epistles of St Paul* (1705-7). See Parker, *Biblical Politics of John Locke*, pp. 63-5.

¹⁶³ *Ibid.* pp. 7, 10. Locke's contemporary, Bishop Gilbert Burnet, had made a similar point about the Augustinian view which he equated with Federal theology: ‘And since the Foundation of this is a supposed Covenant with *Adam* as the Representative Head of Mankind, it is strange that a thing of that great consequence, should not have been more plainly Reported in the History of the Creation.’ Burnet, *An Exposition*, p. 115.

¹⁶⁴ For Locke's sensitivity to this issue see ‘*Peccatum originale*’, (1661), in Nuovo (ed.), *Writings on Religion*, pp. 229f.; Locke, Journal, 1 August 1680, in Goldie (ed.), *Locke: Political Essays*, p. 277. The notion of Adam as a public person was also inconsistent with Locke's conception of personal identity. See Ian Harris, *The Mind of John Locke, a Study of Political Theory in its Intellectual Setting* (Cambridge, 1994), pp. 301f.

earlier by Locke in his commonplace book, in which the Fall is said to have introduced private possessions and labour, disparities in living conditions, along with ‘coviteousness, pride & ambition which *by fashen & example* spread the corruption which has soe prevailed over man kind.’¹⁶⁵ This follows from the Genesis text in which the necessity of labour is attributed to the Fall (Gen. 3:17-19). In Locke’s well-known doctrine, property only becomes private when mixed with human labour. Thus with private possessions, themselves necessitated by the Fall, came social inequalities and a host of consequent evils. Adam’s lapse did introduce corruption into the world, but it was mostly engendered by social rather than inherited factors. Much of this was also consistent with the views of Locke’s Arminian friend and leader of the Dutch Remonstrants, Philip van Limborch (1633-1712), whom he had met during his voluntary exile in the Netherlands during the mid-1680s.¹⁶⁶ Van Limborch pointed out in his *Theologia Christiana* (1686) that the expression ‘original sin’ was not to be found in scripture, and while he conceded that ‘we are now born less pure than Adam was created’, he described that loss of purity as ‘only a natural Inclination of attaining that which is grateful to the Flesh, which is properly owning the Constitution of the Body, which we derive from our next immediate parents.’¹⁶⁷ This was inherited corruption in only a weak sense, and wholly in accordance with Locke’s view, expressed in the *Essay*, that our cognitive limitations are owing to our status as embodied creatures and the corrupting influences of our upbringing.

Brief comment should be made at this juncture on Locke’s *Some Thoughts concerning Education* (1693), a work that in his day rivalled the *Essay* in popularity. This book is directly relevant to the present discussion because it sets out some of the practical implications of what is the best-known contention of the *Essay*: that at birth the human mind is a blank sheet or *tabula rasa*.¹⁶⁸ If there are, in fact, no innate principles or ideas in the mind, it follows that it is education or training that play the most significant role in determining the nature of the person. Locke’s faith in the efficacy of education and his apparent assertion of the essential innocence of the neonate have sometimes been

¹⁶⁵ Locke, ‘Homo ante et post lapsum’ (1662), in Nuovo (ed.), *Writings on Religion*, p. 231 (my emphasis). See also Dunn, *Political Thought of John Locke*, p. 115; Jacob Viner, “‘Possessive Individualism’ as Original Sin”, *Canadian Journal of Economics and Political Science* 29 (1963), 548-59.

¹⁶⁶ On the Locke-Limborch connection see Spellman, *Locke and the Problem of Depravity*, pp. 130-7; Israel, *Radical Enlightenment*, pp. 464-71.

¹⁶⁷ From the English translation of *Theologia Christiana*, Philip van Limborch, *A Complete System, or Body of Divinity ... founded on Scripture and Reason*, 2 vols., tr. William Jones (London, 1713), I, 190, qu. in Spellman, *Locke and the Problem of Depravity*, p. 132.

¹⁶⁸ ‘Let us then suppose the mind to be, as we say, white paper, void of all characters, without

interpreted as an uncompromising repudiation of the pessimistic Augustinian tradition and a major catalyst for the liberation of humanity from the bleak vision of human nature fostered by early modern Protestants. However, to claim that at birth the mind is a *tabula rasa* is not necessarily to claim that it is innocent or free from bias towards good or evil. Whatever his successors might have made of the doctrine, Locke himself still believed that human beings are constitutionally selfish and wilful.¹⁶⁹ We should also recall that Locke was by no means the first to advance the idea of the mind as a blank slate, and that it had long been regarded as quite compatible with the view of innate corruption. Prominent advocates of original sin were thus happy to affirm the view that the mind was a ‘blank sheet’ at birth. These included Thomas Aquinas, who had cited Aristotle to the effect that the mind is at first ‘like a clean tablet on which nothing is written’. A number of Locke’s contemporaries also saw nothing in this principle that counted against even stronger versions of original sin than Aquinas had been prepared to countenance.¹⁷⁰ It is also possible to conceive of the educational programme set out in *Thoughts concerning Education* as the development of a long-standing puritan emphasis on the value of education as remitting some of the worst effects of the Fall. Huguenot émigré Jean Gailhard exemplifies both of those points. Although a staunch opponent of Locke on a number of issues, he was to agree that the child is ‘a smooth table upon which any thing can be written’. But this was simply one of the premises establishing the importance of education. The other was original sin, thus: ‘Learning doth also afford us help, and rules, how to master our passions.... Now these passions are seated in the heart, wherein reason ought to preside... but this part of man is much sensible of the sad effects of *Adam’s* sin.’¹⁷¹ Education could be regarded, on analogy with the coercive powers of the state and the discipline of the Baconian experimental regimen, as a therapy aimed at remedying the anarchic tendencies of wayward passions. There is clear evidence that this was how Locke’s general position was interpreted into the eighteenth century. If Locke’s epistemology could be appropriated by the forces of Enlightenment it could equally serve to reinforce the more sober assessments of human capacity that originally inspired it. In Isaac Watts’ *Logick*

any ideas.’ Locke, *Essay*, II.i.2 (I, 121).

¹⁶⁹ Locke, *Thoughts concerning Education*, 35, 132, 167 (pp. 104, 193, 223).

¹⁷⁰ Aquinas, ST 1a. 79, 2. On the history of the idea see Neil Wood, ‘Tabula Rasa, Social Environmentalism, and the “English Paradigm”’, *JHI* 53 (1992), 647-68; Spellman, *John Locke*, pp. 84f.

¹⁷¹ Gailhard, *Compleat Gentleman*, 28. Cf. Milton, ‘Of Education’, in *Prose Works of John Milton*, ed. J. A. St John and Charles Sumner (London: Bohn, 1848-64). III, 462f. See also Webster, *Great Instauration*, pp. 100f. On earlier puritan attitudes to education see John Morgan, *Godly Learning: Puritan Attitudes towards Reason, Learning, and Education, 1560-1640* (Cambridge, 1988).

(1725)—a standard logic text based on Lockian principles which appeared in more than twenty editions over the course of the eighteenth century—the author announces that the science of logic is designed ‘to rescue our Reasoning Powers from their unhappy Slavery and Darkness.’ This new form of logic, inspired by Locke and distinguished from the noisy and wordy wrangling of the Schools, was intended to guard us against ‘the foolish and evil Dispositions that are found in fallen Man’ and ‘to raise us in some measure from the Ruins of our Fall.’¹⁷²

All of this seems to confirm W. M. Spellman’s considered verdict that one of the central aims of Locke’s philosophical career was ‘to fully illuminate the nature of Fall.’¹⁷³ It is true that to a degree Locke’s lifelong engagement with the Fall narrative was a function of the intellectual milieu of Restoration England in which so many issues were framed within the limits of a broadly shared theological conception of human nature. It would have been difficult to make a significant contribution to contemporary debates—such as those concerning the philosophical justification for particular forms of government—without coming to terms with this formative myth. But Locke was also committed to the idea of a Fall on his own account. His reading of scripture, his vision of Christianity (minimalist though it might have become), and not least his own experiences, led to an acceptance of the doctrine. There is also the intriguing possibility that he initially formulated his opposition to innatism under the influence of the prevailing understandings of original sin according to which the Fall had obliterated whatever moral notices had originally been stamped on the human soul by God.¹⁷⁴ Undeniably, Locke’s final position on the Fall represents something of a watershed. With Locke, two of the fundamental characteristics of Calvinist and Lutheran versions of Christianity—the principle of *sola scriptura* and a strong commitment to the doctrine of original sin—become disengaged. The plain sense of scripture, Locke discovered, did not seem to support Augustine’s bleak doctrine of inherited guilt. Neither, incidentally, did it seem to support the idea of Adam as a peerless natural philosopher. Locke’s Adam is a figure whose prelapsarian capacities are not much different from ours, and thus in many respects our natural condition is similar to that of Adam in his innocence—with regard to our naming of things, in relation to the formation of our

¹⁷² Isaac Watts, *Logick: Or, the Right Use of Reason in the Enquiry after Truth, with a Variety of Rules to guard against Error* (London, 1725), pp. iii, vi, 4f.

¹⁷³ Spellman, *Locke and the Problem of Depravity*, p. 103. For an alternative reading of Locke see Peter Schouls, *Reasoned Freedom: John Locke and Enlightenment* (Ithaca, 1992), pp. 193-203.

¹⁷⁴ Thus Marshall: ‘Locke would seem to have originally believed in ... a moderate view of the Fall, one that obliterated many but not all innate principles.’ *John Locke*, p. 32. Also see Locke,

political institutions, inasmuch as we bear the burden of guilt for our own transgressions, and in the means by which we must acquire our knowledge. Where we do differ from Adam, however, is in the social matrix into which we are born. The corrupting influences of our human environment place us at a considerable disadvantage, and these influences are themselves the consequence of sin. When Bacon and Hooke had spoken of the deficiencies of human nature, they had distributed blame across innate infirmities and social conditioning.¹⁷⁵ Locke shifted the balance in favour of social factors. We are still inherently limited beings, but this by virtue of our rank in the cosmic hierarchy rather than original sin. We are born into conditions that further compromise our already weak abilities, and these can be regarded as a consequence of the corrupt natures of those who are around us from birth. That said, Locke's estimate of the reach of the human mind is not so different from those who attributed human weaknesses to an inherited disposition. Viewed in this light, the *Essay concerning Human Understanding* was not an epistemological manifesto for a progressive and triumphalist modern science, nor was it (for its author at least) the philosophical harbinger of an Enlightenment that would place its unqualified trust in the powers of reason. Rather it was an attempt to establish the narrow limits of our knowledge of the world, and point the way to a more certain science—the science of morals. Human beings, Locke insisted, can never possess ‘a universal or perfect comprehension of whatsoever is’, yet they ‘have light enough to lead them to knowledge of their Maker, and the sight of their own duties.’¹⁷⁶ Knowledge relating to ‘our conduct’ and ‘our eternal estate’ constituted ‘the proper science’ and the ‘greatest interest’ of the human race.¹⁷⁷ Locke's late views on toleration and government are indeed in tune with the broad spirit of the Enlightenment and no doubt had a significant role in those movements. But these views, like his epistemology, were grounded in a sober assessment of human nature that was entirely consistent with the anthropology of the Protestant reformers. As Victor Nuovo has recently put it, perhaps we should now think of Locke ‘not merely as a progenitor of the Enlightenment, but as one of the last of the Reformers.’¹⁷⁸

Essays on the Law of Nature, ed. W. von Leyden, (Oxford, 1954), p 137.

¹⁷⁵ Bacon, *Novum Organum* §§38-68, *Works* IV, 53-69; Hooke, *Micrographia*, Preface.

¹⁷⁶ Locke, *Essay*, Introduction, 5 (I, 29); Cf. Locke, *Essay*, II.xxiii.13 (I, 404).

¹⁷⁷ *Ibid.*, Introduction, 6 (I, 31); IV.xii.11 (II, 350). For a similar reading of Locke see Spellman, *Locke and the Problem of Depravity*, pp. 5-7, 104-6, and passim. Cf. Richard Ashcroft, ‘Locke wrote the *Essay* ... in order to secure the ends of religion and morality.’ ‘Faith and Knowledge in Locke's Philosophy’, in *John Locke: Problems and Perspectives*, ed. John Yolton (Cambridge, 1969), p. 198.

¹⁷⁸ Nuovo (ed.), *Writings on Religion* (Oxford, 2002), p. lvii. Cf. Spellman, *John Locke*, pp. 4-7;

V ANTHROPOLOGY ABANDONED

Locke met Isaac Newton in the spring of 1689. He had read the *Principia* during his exile in France and while, like most readers, he found its mathematics impenetrable, this had not prevented him from writing a favourable review of the work. In spite of Newton's notoriously difficult personality the two became close friends and they exchanged ideas on a number of topics of common interest. Much of their correspondence concerns the interpretation of Scripture and the slender biblical foundations of the doctrine of the Trinity, but for their immediate posterity their names were linked as dual founders of a new form of knowledge.¹⁷⁹ According to one dominant eighteenth-century French reading of history, and one still remarkably influential, Newton and Locke, with some help from Bacon and Descartes, were inaugurators of the modern, enlightened age. Jean d'Alembert thus suggested that if Locke had created a scientific philosophy suited to the modern era, Newton was the originator of a scientific physics. Both were said to have shared an unwavering commitment to the empirical approach to knowledge.¹⁸⁰ D'Alembert and, before him, Voltaire, had allowed that Descartes been both iconoclast and innovator. But their countryman's speculative methods were judged to have been seriously deficient when compared with a more rigorous English experimentalism, the chief representatives of which were Bacon, Locke, and Newton. As we have already seen, Locke's posthumous enlistment in the cause of Enlightenment is not without its difficulties, and there are other problems with the version of history promoted by the *philosophes*.¹⁸¹ My concern in this final section will be to consider one aspect of this history—the assumption present not only in the propaganda of the French Enlightenment but also in more recent histories of science, according to which Newton may be regarded as the culmination of the tradition of English experimental philosophy that began with Bacon. If this were the case, we would expect to find in Newton's works discussions of the effects of the Fall, or at the very least some systematic account of the limits of knowledge and the way in which experimental philosophy compensates for these. As it turns out, such

¹⁷⁹ Peter Walmsley, *Locke's Essay and the Rhetoric of Science* (Lewisburg, PA, 2003), p. 20; J. R. Milton, 'Locke's Life and Times', in Vere Chappell (ed.), *Cambridge Companion to Locke*, (Cambridge, 1994), pp. 5-25.

¹⁸⁰ Jean Le Rond d'Alembert, 'Discours préliminaire', *Encyclopédie, ou Dictionnaire Raisonné des Sciences, des Arts et des Métiers* vol. I, (Paris, 1751), pp. xxliv-v. Cf. 'Expérimental', vol. 6 (Paris, 1756), 298-301; Voltaire, *Letters Concerning the English Nation*, letters 13-16. See also P. M. Rattansi, 'Voltaire and the Enlightenment Image of Newton', in H. Lloyd-Jones (ed.), *History and Imagination* (London, 1981), 218-31.

¹⁸¹ Israel, *Radical Enlightenment*, pp. 522-6; Brian Young, 'Newtonianism and the Enthusiasm

anthropological concerns are almost completely absent from the Newtonian corpus. In spite of extensive and well-documented interests in the sphere of theology Newton showed little interest in the Fall of Adam or the doctrine of original sin. Neither does he anywhere discuss at any length the issue of the limitations of human knowledge. On the face of it, this is inconvenient for the central thesis of this book, according to which advocacy of a certain kind of experimentalism is closely linked to such considerations. The question that needs further (if necessarily brief) consideration, is whether Newton's methodological prescriptions differ significantly from the pattern of Baconian 'natural and experimental histories', and if so, whether these differences can be related in any way to his silence on the questions of theological anthropology that had so preoccupied his predecessors.

Newton's extra-curricular preoccupations—chronology, alchemy, Church history, biblical prophecy and theology—have been the subject of much scholarly discussion over the past few decades. It has long been known that Newton was passionately opposed to the central tenet of Christian orthodoxy, the doctrine of the Trinity. From his voluminous manuscript writings—Newton wrote several million words on religious topics—we now know that he also cherished other heterodox views, rejecting infant baptism, the natural immortality of the soul, and the existence of the devil.¹⁸² The abandonment of these beliefs was not, as it was for some deistically inclined contemporaries, the consequence of rationalism or religious scepticism. Newton remained fervently committed to what he believed was genuine Christianity, understood as the simple biblical faith practiced by the early Church. According to Newton's carefully reconstructed history of the Church, the minimalist creed of the first Christians had been corrupted by the introduction of doctrines that reflected Greek philosophy rather than biblical truths. Chief amongst these was the idea of a triune God which, according to Newton's somewhat idiosyncratic version of Church history, had been inserted into the Christian creeds at the instigation of the Church Father Athanasius (c.296—373).¹⁸³

On the subject of original sin Newton had little to say even in his private papers. This is

of Enlightenment', *Studies in History and Philosophy of Science* 35 (2004), 645-63.

¹⁸² Frank Manuel, *The Religion of Isaac Newton* (Oxford, 1974); James Force and Richard Popkin (eds.), *Essays on the Context, Nature, and Influence of Isaac Newton's Theology* (Dordrecht, 1990); Stephen Snobelen, 'Isaac Newton, Heretic: The Strategies of a Nicodemite', *BJHS* 32 (1999), 381-419; 'Lust, Pride, and Ambition: Isaac Newton and the Devil', in Force and Hutton (eds.), *Newton and Newtonianism*, pp. 155-182.

¹⁸³ Yahuda MS 15, Bodmer MS 'On the Church'

one of the striking features of Newton's theological writings when compared with those of his contemporaries. In none of the manuscript sources listing what Newton considered to be the basic tenets of Christian belief is a significant place accorded to the Fall or original sin.¹⁸⁴ In his 'Theological Notebook' brief reference is made to the classic verse in Romans 5 which speaks of sin entering the world through the transgressions of one man. Newton simply observes in this context that the curse from which we are redeemed is the curse of the Law, rather than the curse of original sin.¹⁸⁵ While Newton's silence on this issue may seem surprising when we consider the prominent place of theological anthropology in wide range of contemporary writings, it is nonetheless consistent with his personal religion with its creedal minimalism and strict Biblicism. It is likely that Newton considered the doctrine of original sin to be a late interpolation into Christian theology and one that, like the notion of a Triune God, rested on rather flimsy biblical foundations. A denial of original sin would also cohere with Newton's rejection of infant baptism (understood within the Catholic tradition as a washing away of original sin), his scepticism about Satan (a central figure in the Fall narrative), and his occasional expression of Pelagian views.¹⁸⁶ But there is a more obvious connection between Newton's rejection of the deity of Christ and his silence on original sin. As Locke rightly declared in *The Reasonableness of Christianity*, the idea of the Fall was the foundation upon which the whole edifice of the doctrine of Christ's redemption was constructed. And as Athanasius himself had long ago pointed out, there was a vital connection between the nature of Christ and the atoning work that he had to perform. Such was extent of our fallen condition that only God himself could repair it. Necessarily, the redeemer must participate in the Godhead.¹⁸⁷ In orthodox theology, then, the doctrines of original sin and of the divinity of Christ were inextricably linked. Newton's vehement rejection of the Trinity was thus entirely consistent with his telling silence on the issue of original sin.

¹⁸⁴ 'Seven Statements on Religion', Keynes MS 6; 'A Short Scheme of the True Religion', Keynes MS 7; 'Twelve Articles on Religion', Keynes MS 8; 'Three Paragraphs on Religion', Keynes MS 9.

¹⁸⁵ Keynes MS 2, part 1, xxii *Christi Satisfactio, & Redemptio vivi*. There is a heading 'xxix *Status Naturæ et Gratia*', but unhelpfully nothing is written there. Insofar as he has any conception equivalent to that of original sin, it would be understood as something like the universal human propensity towards idolatry. Westfall, *Never at Rest*, p. 355; Rob Iliffe, "'The Idols of the Temple": Isaac Newton and the Private Life of Anti-Idolatry', PhD Diss. University of Cambridge, 1989.

¹⁸⁶ Part 2 of the 'Theological Notebook' opens with a statement to the effect that a man sins not through necessity, but through choice. Keynes MS 2, part 2.

¹⁸⁷ Athanasius, *De Incarnatione* §6, §10.

On the thesis being pursued in this volume it would be expected that Newton's agnosticism with regard to theological anthropology, unusual for his period, would have had a bearing on the way in which he formulated his ideas about scientific method. Specifically, he ought to have been less concerned with justifying his methods by appealing to particular theories of human nature and more open to the prospect of a knowledge of nature that was certain and complete. As it turns out, Newton's approach to natural philosophy was quite idiosyncratic. Considered in the context of the seventeenth century, Newton's methodology, according to Peter Dear, makes him 'a curious and novel exception'. Rob Iliffe agrees that the basic methodological principles of Newton's masterwork, the *Principia*, 'went boldly against the grain of most contemporary approaches to natural philosophy.'¹⁸⁸ These judgments are borne out by the confusion and controversy that greeted Newton's first methodological pronouncements in the early 1670s.¹⁸⁹

One of the chief differences between Newton's methods and those of his contemporaries in the Royal Society lies in Newton's confidence that his procedure would yield results that were virtually certain. Where his predecessors and peers had tended to settle for probabilistic conclusions, Newton boldly sought mathematical demonstrability, proceeding, in his own words, 'in imitation of the method by which Mathematicians are wont to prove their doctrines.'¹⁹⁰ Such a method would, in his view, give rise to a new kind of natural science that rejected 'probabilities' and was 'supported by the greatest evidence'.¹⁹¹ At the same time, Newton wished to present himself as an experimentalist, an identification associated with the very probabilism he wished to avoid. This tension is nowhere better expressed than in the opening sentence of the *Opticks*, where Newton announces his intention to 'propose and prove' the

¹⁸⁸ Peter Dear, 'Method and the Study of Nature', *Cambridge History of Seventeenth-Century Philosophy* I, 147-77 (166); Rob Iliffe, 'Abstract considerations: disciplines and the incoherence of Newton's natural philosophy', *Studies in History and Philosophy of Science* 35A (2004), 427-54 (446). Newton's investigations of light, Iliffe adds, 'represented a deliberate and ambitious attempt to transform contemporary natural philosophy, and closer to home, the nature of enquiry at the Royal Society.' (437).

¹⁸⁹ See, e.g., Hooke's complaints, *Isaac Newton's Papers and Letters on Natural Philosophy*, ed. I. Bernard Cohen and Robert E. Scheffler (Cambridge, MA, 1978), p. 111. See also Zev Bechler, 'Newton's 1672 Optical Controversies: A Study in the Grammar of Scientific Dissent', in E. Yahuda (ed.), *The Interaction between Science and Philosophy* (Atlantic Highlands, NJ, 1974), pp. 115-142; Alan Gross, 'On the Shoulders of Giants: Seventeenth-Century Optics as an Argumentative Field', in R. A. Harris (ed.), *Landmark Essays on Rhetoric of Science* (Marwah, NJ, 1997), pp. 19-38.

¹⁹⁰ Newton to Oldenburg, 21 September 1672, *Correspondence*, I, 237.

¹⁹¹ Newton, *The Optical Papers of Isaac Newton, Vol. 1. The optical lectures 1670-1672*, ed. Alan Shapiro (Cambridge, 1984), I, 89.

properties of light ‘by Reason and Experiments’.¹⁹² This stance contrasted with the more modest experimentalism of most of his compatriots. Sprat, for example, had written earlier that the results of experiment must be reported not ‘as *unalterable Demonstrations*, but as *present appearances*’.¹⁹³ The proposed union of reason and experiment suggested a greater faith in our rational capacities than most seventeenth-century experimentalists had been willing to countenance. Indeed Newton’s eighteenth-century legacy tended to split precisely along the lines of reason and experiment. I. Bernard Cohen and George Smith rightly observe that Newton engendered ‘two related but rather different traditions of doing science.’¹⁹⁴ These were those of the experimentalist and the mathematical theoretician.

Much of the apparent oddness of Newton’s approach arises out of his claim to be able to treat the phenomena of light and gravity from both physical and mathematical points of view. This particular combination of approaches, Newton believed, would enable him to argue ‘more securely’ or with ‘certainty’.¹⁹⁵ Historians of science now routinely interpret Newton’s novelty as resulting from the (then) illicit introduction of the methods of mixed mathematics into natural philosophy.¹⁹⁶ Related to this disciplinary transgression was Newton’s apparent assumption that he could practice a demonstrative science while dispensing with the essentialism upon which such a procedure typically

¹⁹² Newton, *Opticks: or, A Treatise of the Reflections, Refractions, Inflections & Colours of Light*, based on the 4th edn., ed. I. Bernard Cohen, et al. (New York, 1979), p. 1.

¹⁹³ Sprat, *History*, p. 108.

¹⁹⁴ I. Bernard Cohen and George E. Smith (eds.), *The Cambridge Companion to Newton* (Cambridge, 2002), Introduction, p. 31. On tensions between the methods of the *Opticks* and the *Principia* see George Smith, ‘The methodology of the *Principia*’, in *Cambridge Companion to Newton*, pp. 138–173; P. Anstey, ‘The Methodological Origins of Newton’s Queries’, *Studies in History and Philosophy of Science* 35A (2004), 247–69; P. Achinstein, ‘Newton’s corpuscular query and experimental philosophy’, in *Philosophical perspectives on Newtonian science*, ed. P. Bricker and R. I. G. Hughes, (Cambridge, MA, 1990), pp. 135–173; I. Bernard Cohen, *The Newtonian Revolution* (Cambridge, 1980); J. E. McGuire, ‘Newton’s ‘Principles of philosophy’: An intended Preface for the 1704 *Opticks* and a related draft fragment’, *BJHS* 5 (1970), 178–186

¹⁹⁵ Newton, *The Principia. Mathematical Principles of Natural Philosophy*, tr. I. Bernard Cohen and Anne Whitman (Berkeley, 1999), Bk. I, Sec. 11, Scholium. (p. 589); Definition 8 (p. 408). Newton to Oldenburg, 6 Feb 1676, *Correspondence* I, 96. On these features of Newton’s method see McMullin, ‘Conceptions of Science in the Scientific Revolution’, in David Lindberg and Robert Westman, *Reappraisals of the Scientific Revolution* (Cambridge, 1990), pp. 27–92, esp. pp. 67–70.

¹⁹⁶ See, e.g., Andrew Cunningham, ‘How the *Principia* got its Name: Or, Taking Natural Philosophy Seriously,’ *History of Science* 28 (1991), 377–92; ‘Getting the Game Right: Some Plain Words on the Identity and Invention of Science’, *Studies in History and Philosophy of Science* 19 (1998), 365–389; Peter Dear, ‘The Mathematical Principles of Natural Philosophy: Toward a Heuristic Narrative for the Scientific Revolution’, *Configurations* 6 (1998), 173–193.

depended.¹⁹⁷ We are now in a position to see a further source of apparent inconsistency: Newton had combined two approaches—‘rationalist/ mathematical’ and ‘experimental’—that had arisen as distinct and arguably mutually inconsistent ways of making knowledge in a fallen world. These approaches had been separated not only on account of lingering Aristotelian prejudices about the separate subject matters of mathematics and natural philosophy, but also because they were based on divergent assessments of our post-lapsarian mental capacities. Small wonder, perhaps, that Newton’s natural philosophy can be characterized as ‘incomprehensible’ and ‘incoherent’.¹⁹⁸

Newton’s general approach to the question of method represents a significant point of departure from what had come before. Rather than seeking foundations for knowledge, as Bacon and Descartes had done, he sought ways of rendering the world intelligible by whatever combination of approaches seemed to work. This meant (in addition to seeking scientific knowledge in ancient texts and arcane alchemical practices) exploiting both experimental and mathematical methods, even though each of these approaches had originally been inspired by a quite different estimates of the capacities of fallen human minds and of the intelligibility of the fallen world. What for others would have amounted to an inconsistent combination of methods was possible for Newton because he was not constrained by any specific theological doctrine of epistemological incapacity. In other words, he had no interest in showing how his method was consistent with a particular theological anthropology. His theological concern lay elsewhere. As he famously wrote in the *Opticks*, by pursuing his method it might be possible to ‘know by natural Philosophy what is the first Cause.’¹⁹⁹ Given that uncovering the designs of God was one of his principal objects, his approach to the natural world could be said to be hermeneutical rather than epistemological. For this reason he elaborated related sets of rules for the interpretation of scripture and the

¹⁹⁷ Dear, ‘Method and the Study of Nature’, pp. 166-70.

¹⁹⁸ Rob Iliffe, ‘Butter for parsnips: Authorship, audience and the incomprehensibility of the *Principia*’, in M. Biagioli and P. Galison (eds.), *Scientific authorship: Credit and intellectual property in science* (London, 2003), pp. 33–65.

¹⁹⁹ Newton, *Opticks*, p. 405. Cf. ‘General Scholium’, *Principia*, p. 943; Keynes MS 7, fol. 1r. For Newton’s commitment to natural theology see I. Bernard Cohen, ‘Isaac Newton’s *Principia*, the Scriptures and the Divine Providence’, in Sidney Morgensbesser et al., (eds.), *Philosophy, Science and Method* (New York, 1969), pp. 523-48; Michael Ben-Chaim, ‘The Discovery of Natural Goods: Newton’s Vocation as an “Experimental Philosopher”’, *BJHS* 34 (2001), 395-416; Stephen Snobelen, ‘To Discourse of God: Isaac Newton’s Heterodox Theology and his Natural Philosophy’, in *Science and Dissent in England, 1688-1945*, ed. Paul Wood (Aldershot, 2004), pp. 39-65. Newton, however, was a more cautious natural theologian than many Newtonians.

interpretation of nature.²⁰⁰ In pursuing these interpretative strategies Newton showed himself to be interested less in re-establishing a lost dominion over nature than in uncovering some underlying uniformity and intelligibility that would in turn point to the power and wisdom of God.

The past few decades have seen a number of attempts to relate Newton's heterodox religious views to his natural philosophy.²⁰¹ Certainly, the general point can be made that Newton's natural philosophical pursuits were at least partly motivated by his religious convictions. This however, would also be true for most of his contemporaries, and falls short of establishing a connection between specific religious convictions and the content of natural philosophy. Some commentators have proposed a connection between Newton's extreme and heterodox monotheism and his apparent theological voluntarism. Newton's God is a God of dominion, who directly controls the creation without the need for the second person of the Trinity mediating between God and his creation.²⁰² But as I have argued elsewhere Newton's voluntarism is questionable and in any case voluntarism is entirely consistent with Trinitarian theology.²⁰³ The considerations set out above hint at a possible alternative way of connecting Newton's heterodoxy to his philosophy. It was Newton's rejection of the deity of Christ that indirectly led to his agnosticism about the fallen state of human nature. This in turn enabled him to combine two methodological principles that arose of conflicting theological anthropologies. The essentially 'optimistic' premises of mathematic natural philosophy are brought together with the 'pessimistic' programme of experimental philosophy in a way possibly only for someone lacking strong commitments to any of the prevailing models of theological anthropology. This lack of interest in anthropology—exceptional for his time—enabled him to construct an equally

²⁰⁰ On parallels between Newton's biblical hermeneutics (his 'Rules of Interpretation') and his natural philosophical method ('rules of reasoning in philosophy' in the *Principia*), see Stephen Snobelen, "'God of gods, and lord of lords": The theology of Isaac Newton's General Scholium to the *Principia*', *Osiris* 16 (2001), 169-208; M. Mamiani, 'The Rhetoric of Certainty: Newton's Method in Science and in the Interpretation of the Apocalypse', in *Persuading Science*, ed. M. Pera and W. R. Shea (Canton, Ohio: Science History, 1991), pp. 157-72. Peter Redpath, *Masquerade of the Dream Walkers: Prophetic Theology from the Cartesians to Hegel* (Amsterdam: 1998), pp. 18f.; Scott Mandelbrote, "'A Duty of the Greatest Moment": Isaac Newton and the Writing of Biblical Criticism', *BJHS* 26 (1993), 281-302.

²⁰¹ Ayval Lesham, *Newton on Mathematics and Spiritual Purity* (Dordrecht, 2003); James E. Force, 'The Nature of Newton's "Holy Alliance" between Science and Religion: From the Scientific Revolution to Newton (and Back Again)', in Osler (ed.), *Rethinking the Scientific Revolution*, pp. 247-70. Snobelen, 'To Discourse of God'.

²⁰² See especially James Force, 'Newton's God of Dominion: The Unity of Newton's Theological, Scientific and Political Thought', in Force and Popkin (eds.), *Essays on Newton's Theology*, pp. 75-102.

²⁰³ Harrison, 'Was Newton a Voluntarist?'

exceptional natural philosophical method. So Newton's theological heterodoxy did inform his natural philosophy insofar as it enabled him to adopt more easily methodologies that were ultimately incompatible with the more conventional theological positions of his contemporaries.

The state of human nature in light of the Fall was important for Boyle and Locke, even though they tended to diminish its role as a significant inhibitor of learning. Ultimately it is not important that Locke diverges from the strong view of inherited incapacity. What is significant is that the prevalence of such a view within his social milieu forced him to reflect critically on the mind and its limitations. And if he was eventually to demur from the common view of the original causes of the debilitation of the mind, he nonetheless affirmed the inherent weakness of the mind and the limited scope of its reach. This is to say that his anthropology was consistent with what had been expressed throughout the century. As he himself put it, what we were able to discover in 'our present condition' with 'dull and weak' faculties, was rather modest: 'We are able, by our senses, to know and distinguish things; and to examine them so far, as to apply them to our uses, and several ways to accommodate the exigencies of this life.... But it appears not, that God intended we should have a perfect, clear, and adequate knowledge.'²⁰⁴ In downplaying the significance of the Fall as an account of how we came to be in this state, Locke was in essence 'naturalizing' our corrupt and weak condition. Michael Losonsky rightly suggests that Locke's strategy 'was to accept the curse as an unavoidable characteristic of human beings.'²⁰⁵ But however it subsequently came to be theorized, this acceptance of the limitations of knowledge was to become a crucial feature of modern experimental science, much of the success of which relies upon the modesty of its ambitions and its capacity to ask the 'small question'. Equally, without the residual influence of the eschatological orientation of the seventeenth-century Protestants, along with Calvinist notions of vocation, the usefulness of earthly work, and the need to work gradually towards the human transformation of the natural and social realms, this account of human nature might have degenerated into a quiescent scepticism.

²⁰⁴ Locke, *Essay*, II.xxiii.12 (I, 402).

²⁰⁵ Michael Losonsky, 'Locke on Meaning and Signification', in G. A. J. Rogers (ed.), *Locke's Philosophy: Content and Context* (Oxford, 1996), pp. 123-142

Newton's approach signals a more significant departure from the original justifications of experimental natural philosophy. But this is not a consequence of any diminution in the significance of theological considerations in the sphere of natural philosophy. Newton's approach, along with that of Boyle, is indicative of gradual move away from theological anthropology towards a more exclusive focus on physico-theology.²⁰⁶ The capacity of both experimental and mathematical natural philosophy to provide evidence of divine providence and design became more important than whether their respective epistemological foundations were in accord with theological conceptions of human nature. This development can be partly explained by the fact that one of the original concerns of those advancing anthropological justifications of their methods had been to critique the putatively naïve and uncritical methods of Aristotelianism, and do so within a context of post-Reformation debates about the extent of the damage wrought by the Fall. With experimental and mathematical methods now more secure, and Aristotelianism less so, attention could be directed away from theological foundations towards theological outcomes. The religious legitimacy of the new forms of knowledge increasingly came to rest on their capacity to deliver a robustly theistic view of natural world, rather than on whether their methods accorded with a quite specific conception of human nature. Regarding the latter issue, it was also the case that the consensus that had once existed amongst English Protestants on the nature and extent of original sin was slowly dissolving. This is evident in the vigorous debates of the second half of the century, in the rise of Socinianism, in Newton's studious ignoring of the whole issue, and in the fact that Boyle and Locke sought to move the problem of intellectual incapacity out of the context of discussions of the Fall and into a more broad metaphysical framework. Equally important is the fact that there is considerable tension between arguments to the effect that divine design can be discerned in the natural world, and claims that the world is fallen and that we have lost the capacity to interpret it. The strong sense of the fallenness of human beings and their world that is characteristic of Calvinism has often been accompanied by an ambivalence about natural theology or even downright hostility towards it.²⁰⁷ The claim that design is evident in the world assumes both the intelligibility of nature and our minds' capacity to detect that intelligibility. Both sit uneasily with a strong view of the Fall and its noetic consequences. Already in Boyle we see that the pendulum has begun to swing away from an emphasis on original sin towards physico-theology. This continues with

²⁰⁶ Israel, *Radical Enlightenment*, pp. 456-63.

²⁰⁷ The locus classicus for this tension is Rom. 1:20.

Newton, although like Boyle, he was content to exploit an experimental method that owed its origins to a theological position to which he no longer subscribed.

It is partly on account of Newton's unparalleled achievements in the sphere of natural philosophy that there has been a tendency for historians to view the theological interactions between science and religion in seventeenth-century England in terms of Newtonianism and subsequent eighteenth-century developments.²⁰⁸ This has meant that the dominant theme in discussions of that relation has been the rise of physico-theology and quest for evidence of design in nature. This vision has been broadened somewhat by the work of Charles Webster and others, who have added the dimension of Protestant eschatology to the picture. My contention has been there a vital third theological component that has been consistently overlooked in these discussions. It is now time to accord theological anthropology a significant place in the articulation and defence of early modern experimental philosophy.

This is not to say that the difference between the two traditions brought into an uneasy partnership by Newton were immediately forgotten. The divide between English experimentalism and the more speculative approach of such Continental figures as Descartes, Spinoza, and Leibniz was deep seated and remained a central feature of the rhetoric of the respective camps. The latter thinkers, whose 'rationalism' is typically contrasted with British 'empiricism', expressed considerable impatience with the mass of observations and experiments demanded by the Baconian regimen, and were disappointed by the modesty of the conclusions drawn from them.²⁰⁹ Leibniz, presuming to speak for them all, complained that the Baconian method, as exemplified by Boyle's practice, was tedious, labour intensive, and ultimately insufficient to provide the kind of certainty that genuine science required. In a lengthy but revealing passage he expresses what he sees to be the essential difference between the respective approaches:

The art of discovering the causes of phenomena, or genuine hypotheses, is like that of deciphering: an inspired guess often provides a generous short-cut. Lord Bacon started putting the art of experimenting into the form of rules, and the Honourable Robert Boyle was a gifted practitioner of it. But unless we add to

²⁰⁸ This is equally true for issues of method which sometimes assume the existence of a univocal Newtonian tradition. See Paul Wood, 'Science, Philosophy and the Mind', in Roy Porter (ed.), *The Cambridge History of Science IV, Eighteenth Century Science*, pp. 800-24, esp. p. 824.

²⁰⁹ Spinoza, Letter to Oldenburg, April 1662, *Collected Works*, I, 178. See also Israel, *Radical Enlightenment*, pp. 253-6; M. B. Hall, *Robert Boyle on Natural Philosophy, an essay with*

that the art of using experiments and of drawing conclusions from them, we can lay out a king's ransom and still achieve less than an acute thinker could discover in a moment. M. Descartes, who certainly fits that description, said something to the same effect in one of his letters, referring to the English Chancellor's method. And Spinoza (whom I am quite prepared to quote when he says something good) offered a similar reflection in one of his letters to the Secretary of the Royal Society of England, the late Mr Oldenburg; it was published among the posthumous works of that discerning Jew. He was commenting on a work of Mr Boyle's, who, it must be said, does spend rather too long on drawing from countless fine experiments no conclusion except one which he could have adopted as a principle, namely that everything in nature takes place mechanically - a principle which can be made certain by reason alone, and never by experiments, however many of them one conducts.²¹⁰

A natural philosophy based on 'inspired guesses', on what 'an acute thinker could discover in a moment', and principles 'made certain by reason alone', as contrasted with 'countless fine experiments' amounts to a significant difference over the powers of the mind, or at the very least, the causes of its propensity for error. This, in turn, may be attributed to a different reading of Adam's incapacity following his Fall—one that insists that fallen human minds still retain something of their access to divine ideas. As we have seen, by the end of the seventeenth century the explicit theological justifications for experimentation were already being written out of accounts of scientific method. Nonetheless, the divide between the methods of inspired guesswork and experimentation persisted. In the middle of the eighteenth century David Hume, who had little time for the doctrines of the Fall and original sin, would still defend English experimentalism against the 'other scientific method' in terms of the former being more in keeping with the imperfections of human nature. In a passage from his *Enquiry into the Principles of Morals* (1751) he nicely sets out the key issues:

... we can only expect success, by following the experimental method, and deducing general maxims for a comparison of particular instances. The other scientific method, where a general abstract principle is first established, and is afterwards branched out into a variety of inferences and conclusions, may be more perfect in itself, but suits less the imperfection of human nature and is a common source of illusion...²¹¹

selections from his writings (Bloomington, 1966), p. 43.

²¹⁰ Leibniz, *New Essays on Human Understanding* IV.12, (p. 454). For Spinoza's letter see *Collected Works* I, 182.

²¹¹ David Hume, *An Enquiry into the Principles of Morals*, ed. L. A. Selby-Bigge, 3rd edition revised by P. H. Nidditch (Oxford, 1975), p. 174.

Notably absent from Hume's remarks is reference to a theological account of human imperfection. In time, even the more general theme of cognitive limitation was to disappear from such methodological reflections, and the last traces of the theological origins of this approach were erased. Henceforth, experimentation will present itself as a central and relatively unproblematic feature of modern science.