

The Excellence of Theology, compared with Natural Philosophy

Discoursed of in a letter to a friend

Robert Boyle

1674

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[Brackets] enclose editorial explanations. Small ·dots· enclose material that has been added, but can be read as though it were part of the original text. occasional •bullets, and also indenting of passages that are not quotations, are meant as aids to grasping the structure of a sentence or a thought. Every four-point ellipsis indicates the omission of a brief passage that seems to present more difficulty than it is worth. Longer omissions are reported between brackets in normal-sized type. Unnumbered subsection-headings are not in the original. —This version rather radically alters much of Boyle's wording. **See *The Excellencies of Robert Boyle*, edited by J.J.MacIntosh (Broadview Press, 2008), for a *much* more lightly edited version and for a superb apparatus of explanatory notes, including all the biblical references that are omitted here.** —Boyle has a Latin epigraph to the work, meaning: 'Philosophers search for happiness, theologians find it, but only the sincerely religious possess it.'

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Glossary

adore, adorable: Worship, worthy of being worshipped.

agenda: Things requiring to be done.

antiperistasis: Resistance or reaction aroused—according to Aristotelian physics—by the action of an opposite force or quality.

arbitrary: In early modern uses, this means ‘chosen’, resulting from someone’s decision, or the like. There’s no implication that there weren’t good reasons for the choice.

canonical: The ‘single volume of canonical Scripture’ is the officially recognised Bible.

compare: On page 22 comparing prophecies with the natural world is just aligning them in one’s mind to see how they relate; there may be no question of their being alike.

couched: For something to be ‘couched’ in a biblical text is for it to be somewhat hidden or buried there, not so thoroughly that it cannot be discovered.

credenda: Things requiring to be believed.

curious, curiosity: In the present work these words are used wholly favourably. They refer to the spirit of scientific or theological inquiry, the desire to *know more*.

featureless matter: This replaces Boyle’s ‘adiaphorous matter’. It means: ‘matter that has no qualities except size, shape and motion’.

gross: On page 20, ‘gross’ bodies are lumpy visible ones like pebbles and human bodies, ‘spirituous’ bodies are very finely divided, like air.

intellectual: On page 21 the ‘three intellectual communities’ are the three kinds of creatures—humans, good angels, bad angels—that can think.

justification: The justification of humans towards God is their being freed from the penalty of sin and accounted righteous by God.

moral certainty: A degree of certainty that is high enough for practical purposes, high enough to make practical doubt unreasonable. (In this phrase ‘moral’ is being used in its old sense of ‘having to do with human behaviour’.

naturalist: Natural scientist, suggesting physics and chemistry rather than (as in today’s sense of the word) biology.

patience: On page 33 and perhaps a few other places it means ‘ability to put up with hardship without losing one’s equanimity’.

pathetic: This is used on page 16 in its old sense of ‘producing an effect on the emotions’.

philosophy: In early modern times this was standardly used to cover natural science as well as what counts as philosophy these days; similarly ‘philosopher’; sometimes with the adjective ‘natural’.

Physeophilus: It means ‘lover of nature’. Boyle uses it once in the Preface as a general term, then on page 36 and in Part II chapter 5 as a *name* for the person otherwise referred to as ‘your friend’ or ‘Mr N.’.

physiology: The study of nature, especially physics.

Satisfaction: On page 16 this refers to Christ’s atonement for the world’s sins by his suffering.

supralapsarian: Someone who holds that God’s decision to choose only some for everlasting life was made before the creation and the fall.

virtuoso: In the present work a virtuoso is someone who is intelligently dedicated to practical and theoretical work in the natural sciences.

vulgar: Commonplace, run-of-the-mill, drearily ordinary.

wit: High intelligence; a person possessed of high intelligence.

Publisher's notice

When I tell you that the following work was written in 1665, while the author (like many others) was avoiding the great plague that was then raging in London by going into the country, often having to go from place to place without most of his books, you presumably will not think it strange that in the mention of passages from other writers—as his memory suggested them—he did not provide exact references. And for the same reason it ought not to seem strange that he has not mentioned some recent discoveries and books that might have been relevantly taken notice of, and would fit well with some parts of the work; because things that may seem to have been omitted are of too recent a date to have been known to him when he wrote. But if you ask ‘Then why was a work finished so long ago not published much sooner?’ I must tell you that the main reason why he kept these papers to himself was his real concern for the welfare of the study—namely physical science—that he seems to depreciate in them. He suppressed this work for several years, resisting the desires of persons who have much influence on him, for as long as he was afraid that it might be misapplied by some enemies to experimental philosophy [see Glossary] who were then making a noise against it. But now the attempts of these envious or misinformed persons seem likely to fail: the Royal Society’s reputation can hardly be in danger after so many foreign virtuosi [see Glossary] have written to it, praised it, and wanted to join it. And to this reason must be added the author’s reluctance to go public with a work of an unusual nature, which is one of his reasons for refusing to have his name prefixed to it; though now that the book is printed he finds reason to fear that his name will not be concealed for long, because the book includes references to some of his other writings; he

originally included them for his own private use and then, all these years later, did not remove them because he had forgotten that they were there. [The publisher seems not to have known that Boyle’s Preface assumes that the attempt at anonymity has failed.]

Preface

I am well enough acquainted with the spirit of this age, and of the persons who are most likely to read the following work, to see that probably some will ask why a work of this nature was written at all, and others will be displeased that it has been written by me.

Those who would like to know what induced me to write on this subject may be in great part informed by the work itself. In several places, especially near the beginning and at the close, my motives for putting pen to paper are sufficiently expressed. And though several of those things are directly aimed at the person the letter is addressed to, the attitude I want to dissuade him from—namely the undervaluation of the study of sacred things—is not confined to him but has become so common among many otherwise able persons, especially ones who study physics, that the present work is quite seasonable; I wish it were less so.

But I suspect that some readers who would not think a work of this nature needless or useless may still not be pleased at its being written by me. I am talking about people who think that the physical sciences may well deserve to be ranked above all other sorts of learning, and who object to this ranking’s being opposed in a work written by someone who has had a good reception of his own endeavours in those sciences, a reception that gives him—they think—an *obligation* to spend his whole time promoting them.

I am aware of the favourable reception that the philosophical papers I have so far published have had the happiness to receive from the curious [see Glossary]; but I hope they will not be displeased if I proclaim that I am no lecturer or professor of physics, and have never made any promise to the public to confine myself to writing on any other subject; nor is it reasonable that what I did or may write to gratify other men's curiosity should deprive me of my own liberty and confine me to one subject; especially since several persons for whom I have great esteem and kindness think •they have as much right to solicit me for works like this one. . . .as •the virtuosi have to demand of me my physiological [see Glossary] pieces. And though I realise that the following work, which seems to depreciate the study of nature, may at first sight appear somewhat improper for a person who has written specifically to show the excellence and usefulness of it, I confess that on a more attentive consideration of the matter I cannot reject—or resist!—the reasons of those who are of a quite differing judgment.

One of the reasons is this. My being a member of the nobility and my not being a clergyman are regarded as possible advantages for an author who is to write on such a subject as this. As regards religious books in general it has been widely noticed that those penned by laymen, and especially by gentlemen, have *caeteris paribus* been better received and more effective than those of ecclesiastics. It is no great wonder that exhortations to piety, and dissuasions from vice and from the lusts and vanities of the world, should be more effective when they are pressed by those who *have*, but *decline*, the opportunities to luxuriate in the pleasures they dissuade others from. And (to come yet closer to our present purpose) though I will not venture to say, as an excellent divine did, that whatever comes out of the pulpit counts with many people as nothing but 'the foolishness

of preaching' [1 Corinthians 1:21], it really cannot be denied that if all other circumstances are equal the fittest person to commend divinity is one whose profession it is not; and that it will somewhat add to the reputation of almost any study, and consequently to that of things divine, if it is praised and preferred by those whose condition and course of life exempts them from having any particular calling in the commonwealth of learning, which frees them from the usual temptations to partiality to this or that sort of study that others may magnify because it is their trade or their interest or because it is expected from them; whereas these gentlemen are obliged to commend it only because they really love and value it.

There is another thing that seems to make it even more appropriate that a treatise on such a subject should be written by the author of this one. Professed divines are supposed to be engaged in studies that are of another nature—indeed a higher one—than those that deal with physical things. Now, our modern natural scientists (who are conscious of the excellence of the science they cultivate) are *very* apt to undervalue those who are trained only in other parts of knowledge; so it is much to be feared that what would be said about divinity's ranking above physiology by preachers. . . .would be looked on as the decision of a judge who was incompetent as well as self-interested; and their undervaluing of the advantages of the study of created things would be thought to come—as their depreciating the enjoyment of created things too often does come—merely from their not having had sufficient opportunities to taste the pleasures of them. But these prejudices will not hold against a person who

- has made the investigation of nature something more than a secondary work (as it is thought to be for clerics who know anything about it),

- has shown by long energetic work how much he loves and can enjoy the delight it provides, and
- has had the good fortune to make some discoveries in it, and the honour to have them publicly (and with too many compliments!) taken notice of by the virtuosi.

And it may be relevant to add that those who make natural philosophy their mistress will probably be less offended to find her represented here if not as a handmaid to divinity yet as a lady of a lower rank, given that the lower status of the study of nature is maintained by a person who, even while he asserts it, continues to court nature assiduously (if not passionately). So that his example can show that just as on the one side

a man can be acquainted with and able to enjoy the lessons taught us in •the book of created things while still thinking them less excellent than those that can be learned in •the book of the Scriptures,

so on the other side

a preference for the latter book is very consistent with a high esteem for, and assiduous study of, the former.

If anyone here objects that there are some passages (I hope only a few) that seem a little too unfavourable to the study of natural things, I might excuse myself on the grounds of **(i)** the great difficulty there must be, in comparing two sorts of studies both of which one much esteems, to conduct oneself so as to split a hair between them and never offend either of them. But I will defend myself differently. **(ii)** In works like the present one it may justly be hoped that fair-minded readers will consider not only what is said but why it is said and on what occasion. Now it is plain by the way the argument goes in this work that the Physeophilus [see Glossary] to whom it most relates is looked on by me as being •very partial to the study of nature *and* •somewhat prejudiced against that of the Scripture; so that I was not

always to deal with him as though he had no bias, but was. . . (to use Aristotle's expression) to bend the crooked stick the opposite way so as to make it straight, depreciating the study of nature somewhat beneath its true value so as to reduce a great over-valuer to a just estimate of it. And to gain the more upon him I allowed myself now and then to make use of his contempt for the Aristotelian and common philosophy, and in some passages to speak of it more slightly than my usual attitude permits, and than I would do on another occasion; so that by going along with his opinions I could argue with him from them.

But to return to the motives that induced me to publish this work: I have not named them all, but all of them together would hardly have been effective if they had not been made more powerful by my indignation at the sight of men—even ones devoted to inquiry—depreciating the kind of knowledge that does the most to elevate mankind as well as the most to bless it, and looking on the noblest and wisest employments of the understanding as signs of weakness in it.

I do not expect that what I say in this work (or indeed anything that *can* be said) will make converts of those who are resolved against being made so and would rather deny themselves the most excellent kinds of knowledge than allow that there can be any more excellent than the kind they think they are masters of. But I have some hope that what I say here may serve to fortify in a high esteem for divine truths people who already have a just veneration for them, and preserve others from being seduced—by insulting though sometimes 'clever' insinuations—into undervaluing the kind of knowledge that is the most excellent in itself as well as the most conducive to man's happiness. This makes me less displeased to see that the work has swollen to a size far greater than its being a mere *letter* promises, and than I first intended. For I confess that when the event occurred

that made me put pen to paper I happened to be in a very unsettled condition (which I fear has had too much influence on what I have written), so I did not plan to go on with my subject anywhere near as long as I have done; but new things kept springing up under my pen (so to speak), and I was content to allow them room on my pages because—writing for my own satisfaction as well as for my friend’s—I thought it might be useful to lay before my own eyes as well as his the considerations that seemed to justify my preference for divine truths over physiological ones and to confirm me in the esteem I had for them. And though I freely confess that the work does not consist of nothing but reasonings, and consequently is not of an altogether uniform texture, I hope that will be thought fitting in a work that is designed not only to convince but to persuade. If it has the good fortune to do so, I hope the reader will have no cause to regret the trouble of reading it, as I shall not regret the trouble of writing it.

Introduction

Sir, I hoped you knew me better than to seriously wonder how I liked the discourse your learned friend entertained us with last night. And I am the more troubled by your question because your way of asking how much I approved of your friend’s discourse gives me cause to fear that you give it more of your approval than I could wish. But before I can safely answer your question about my sense of your friend’s works I must remind you that they were not all on one subject or of the same nature; and I am enough his servant to acknowledge without the least reluctance that he is apt to show a great deal of intelligence when he speaks only about purely physical things; and when he is in the right he seldom wrongs a good cause by his way of managing it. But as for the episodes where he gave himself the liberty

of disparaging the learned Dr N. only because that doctor cultivates theological as well as physical studies and often reads books of devotion and sometimes writes them—I am not so much a courtier as to pretend that I liked them. It is true that he did not deny the doctor to be a learned and a clever man. Some men would be easily tempted to imagine, and more easily to proclaim, that none are philosophers except those who (like themselves) desire to be nothing else; but the wise providence of God has arranged to stop their bold mouths. Our nation is happy in having several men who are as eminent for human learning as they are studious of divine learning, and who—great as their veneration is for Moses and St. Paul—are as well versed in the doctrines of Aristotle and Euclid, indeed of Epicurus and Descartes too, as those who choose not to study anything else. But though for this reason your friend Mr N. did not have the impudence to despise the doctor and some of his like whom he chose to mention, he too plainly showed himself to be one of those who, though they will not deny that some who value theology are able men, talk as if such persons were gifted *in spite of* their religious commitment, which they regard as such a blemish that a man must have very great abilities to make up for the disadvantage of valuing sacred studies. . . . So: since this disdainful attitude begins to spread much more than I wish it did among differing sorts of men, among whom I would be glad not to find any naturalists [see Glossary]; and since the question you asked me—and your esteem for your friend—makes me fear that you may look on it with very favourable eyes; I shall not decline the opportunity you put into my hands of giving you along with a statement of my dislike of this attitude some of my reasons for that dislike. And I am encouraged in this because I can do it without too much exceeding the limits of a letter or the limits set by the haste with which I must write this. For your friend does not

oppose theology but only undervalues it, and professes to believe the Scriptures (which I credit to the extent of thinking that he believes himself when he says it), so that I am not to dispute with him as against an atheist who *denies the author* of nature but only against a naturalist who *over-values the study* of it. And the truths of theology are things that I need not bring arguments for, but am allowed to draw arguments from them.

But though I plan to be brief, the fruitfulness and im-

portance of my subject may suggest enough things to me to create a risk of confusion unless I follow some little method; so I shall divide the following letter into two Parts: one in which I shall offer you the chief positive reasons for considering the study of divinity as preferable to that of physics, and a second in which I shall consider the claims that I foresee your friend may make in favour of natural philosophy. . . .

Part I

Positive reasons for studying theology

A rational man can hardly have better reasons to engage in any study than that **(1)** the subject is noble, that **(2)** it is his duty to apply himself to it, and **(3)** his proficiency in it will bring him great advantages; so these three inducements combine to provide a very strong case for the study of theological truths. I shall give them a section each.

1. The nobility of theology's object

The excellence and sublimity of the object we are invited to contemplate is such that no-one who truly acknowledges a deity can think there is any speculation whose object is comparable in nobleness to the nature and attributes of God.

The souls of inquiring men are commonly so anxious to learn the nature and condition of spirits that some of them—the over-greedy ones—have wanted to discover that there are spiritual substances other than the souls of men, which has led too many of

them to explore forbidden ways of getting answers: they have preferred •putting themselves within the power of demons to •not knowing whether there are any such beings. I have learned about this from private acknowledgements made me of such unhappy (though not unsuccessful) attempts by various learned men (physicists and others) who had themselves made them, these being men who were neither timorous nor superstitious. (But this only an aside.)

Anyone who thinks he is entitled to despise the investigation of the divine perfections, or even thinks that he is fully equipped for such an investigation, must have a notion of the Deity that is as wrong as it is mean, and must be as inattentive to •the nature and attributes of that infinitely perfect being as to •the nature and infirmities of man. The Scripture tells us that God's greatness is incomprehensible and his wisdom inscrutable, that he humbles himself to look into (or upon) the heavens and the earth, and that not

only this or that man but all the nations of the world are in comparison to him like a drop in a bucket or a smaller speck of dust on a balance; and even the heathen philosopher who wrote that eloquent book *De Mundo* (ascribed to Aristotle in his later years) speaks of God's power, wisdom and amiableness in terms almost as lofty, though necessarily inferior to such an infinitely sublime subject. Those who think they can sufficiently understand it, especially without revelation, have very little understanding of themselves.

But perhaps your friend will object that for the knowledge of God only *natural* theology is needed; and I readily admit—being warranted by an apostle—that the knowledge of God was not unknown to the heathen philosophers; and that some knowledge of God is attainable by the light of nature, properly employed—enough indeed to encourage men to exercise themselves more than most of them do in that noblest of studies, and to make their not being experts in it insulting to themselves as well as to their maker. But despite this, just as God knows himself infinitely better than purblind man knows him, so the information he chooses to give us concerning his own nature and attributes are exceedingly preferable to any account of him that we can give ourselves without his aid. And I think the differing views we can have of the heavens may be a fairly good indication of the differing discoveries we may make of the attributes of their maker. For just as

though a man may with his naked eye see the heavens to be a very glorious object, ennobled with radiant stars of several sorts, when his eye is assisted by a good telescope •he can discover a number of stars and planets that his naked eye would never have shown him and •the planets that he could see before will appear to him much bigger and more distinct,

so also

though bare reason well improved will suffice to make a man behold many glorious attributes in the Deity, when that same reason is assisted by revelation •he can discover far more excellences in God and •the ones he contemplated before will be presented to him much greater and more distinct.

And to show how much **(i)** a dim eye illuminated by the scriptures can discover of the divine perfections, and how unobvious they are to **(ii)** the most piercing philosophical eyes that are helped only by the dim light of nature, we need only consider how much more suitable conceptions and expressions concerning God are to be found in the writings of **(i)** the fishermen and others who penned the New Testament and the illiterate Christians who received it than among **(ii)** the most civilised nations of the world (such as the ancient Greeks and Romans, and the present Chinese and East-Indians) and among the most eminent of the wise men and philosophers themselves (such as Aristotle, Homer, Hesiod, Epicurus, and others).

It is not just that the book of Scripture discloses to us much more of God's attributes than the book of nature does; there is also another object of our study for which we must rely entirely on theology—i.e. to revealed rather than natural religion. For although we may know something of the nature of God by the light of reason, we must owe the knowledge of his will, i.e. of the laws he has laid down, to his own revelation. And on the basis of •the frequent travels of the ancient sages and philosophers into foreign countries to observe their laws and government and to bring home their learning, and of •the enormous expense that the great and learned monarch Ptolomeus Philadelphus thought worthwhile to procure an authentic copy of the law of Moses, whom he regarded only as an eminent legislator, we can guess how anxious great princes and wise men have been to

inform themselves of the constitutions established by wise and eminent legislators. But certainly Moses' laws and other laws recorded in the Bible must appear more noble and worthy objects of curiosity to us Christians, who know them to come from an omniscient deity who—being the author of mankind, as well as of the rest of the universe—must have a much more complete knowledge of the nature of man than can be conceived to have been had by any other of the law-givers, or by all of them put together.

There is a further discovery of divine matters in which we are also gratified by theology. As well as what it teaches us about the nature and the will of God, the Scripture contains *historical* accounts (if I may so call them) of his thoughts and actions. Alexander the Great thought himself nobly employed when he read about the Greek actions in Homer's verses; the Queen of Sheba has been more praised than wondered at for coming from the remoter parts of the earth to hear the wisdom of Solomon, which is a sign of how laudable—and how and worthy of an inquisitive soul—is the desire to know the sentiments of great and wise persons on particular occasions. Well, the Scripture does in many places give our curiosity a nobler employment, and thus a higher satisfaction, than could be enjoyed by the King of Macedon or the Queen of Sheba; for in many places it gives us, with great clearness and intelligence, accounts of what God himself has declared of his own thoughts about various particular persons and things, and relates what he who knows and commands all things was pleased to say and do on particular occasions. Examples of this include the things recorded to have been said by God to Noah about the sinful world's ruin and that just man's preservation, and to Moses about the case of the daughters of Zelophehad; and in the conversations said to have taken place

- between God and Abimelech concerning Abraham's wife,
- between God and Abraham regarding the destruction of Sodom,
- between God and Solomon about that king's happy choice, and
- between God and Jonah about the fate of the greatest city of the world.

And above all these, two strange and matchless passages,

- one in the first book of Kings concerning the seducing spirit that undertook to seduce Ahab's prophets [1 Kings 22:19–24] and
- the still more wonderful account of what passed between God and Satan, in which the Deity condescends not only to praise a mortal but also (if I may so speak with reverence) to glory in him [Job 1:6–7, 2:3].

Being admitted to the knowledge of these transactions of another world (if I may so call them) in which God has been pleased to disclose himself so very much is an advantage that the Scripture gives us. . . .

I must not neglect another advantage that we have from some discourses made for us in the Bible; because it concerns us too highly not to be a very great advantage. It is that the scripture declares to us the judgment God is pleased to make of some particular men on the strength of their life and conduct. For

although reason alone—and the grounds of religion in general—may somewhat satisfy us that God is good and merciful, and therefore *likely* to pardon the sins and frailties of men and accept their imperfect services, **nevertheless** we do not know whether he *will* pardon unless we have his promise that he will;

and

although by virtue of general revelation such as

is claimed in various religions we may be assured that God will accept, forgive, and reward those who sincerely obey him and fulfill the conditions of the covenant, whether explicit or implicit, that he condescends to make with them, **nevertheless** a concerned conscience may rationally wonder whether in God's estimate any particular man was sincere enough to be accepted, because he is the judge of whether the conditions were fulfilled and whether the person was sincere, and because he is omniscient and a 'knower of hearts' and so may know more that is bad in us than even we know of ourselves.

But when he himself is pleased to give eulogies (if I may with due respect so style them) to David, Job, Noah, Daniel etc. while they were alive, and to others after they were dead (and thus, having finished their course, had passed into an irreversible state), we may learn with comfort •that the performance of an obedience such as God will accept is something men really can achieve, and •that even great sins and misdemeanours are not (if repented of early enough) certain evidence that a man will never be happy in the future life. And it seems that the lapses of holy persons are so frequently recorded in the scriptures to offer this kind of consolation to frail men and not at all to encourage licentious ones. And setting aside those divine writings, I know of no books in the world that can—even with all of them taken together—give to a considering Christian who is properly aware of the inexpressible happiness or misery of an immortal state in heaven or in hell such a great and well-grounded consolation as can be derived from three or four lines in St. John's Apocalypse, where he says that he saw in heaven [the bracketed insertion is Boyle's]

a great multitude, not to be numbered, of all nations and tribes and people and tongues, standing before

the throne and before the Lamb, clothed in white Robes, with Palms [the ensigns of victory] in their hands; and the praises of God and of the Lamb in their mouths.

From this we may learn that heaven is not reserved only for prophets, apostles, martyrs and such extraordinary persons, whose sanctity the Church admires, but that through God's goodness multitudes of his more imperfect servants also have access to it.

Though the infinite perfections and prerogatives of the Deity are such that theology itself cannot—any more than philosophy can—provide us with any other object for our studies anywhere near as sublime and excellent as what it discloses to us concerning God, theology does favour us with some other discoveries—namely, about angels, the universe, and our own souls—which though they are of course inferior to the knowledge of God himself are, for the nobleness of their objects or for their importance, highly preferable to any that natural philosophy has been able to provide its devotees.

But before I proceed to name any more particulars disclosed to us by revelation, I should remark—to prevent or remove a prejudice—that we should not estimate the worth of the things we owe to revelation on the basis of the impressions they now make on us Christians who learned various of them in our catechisms, and perhaps have several times met with most of the rest in sermons or theological books. For it is not surprising that we should not be strongly affected at the mention of truths which (however valuable in themselves) were for the most part taught to us when we were children or too young to discern and prize their excellence and importance, so that when they were later presented to our adult understanding they still did not make any vigorous impressions on us because by that time they had become

familiar and we did not remember that once we did not know them. Whereas if the same things had been revealed (along with circumstances testifying to their truth) to some heathen philosopher or other virtuous and inquiring man who valued important truths and had nothing but his own reason to attain them with, he would doubtless have received them with wonder and joy. We have several examples of this in the records of the primitive times and in the recent accounts of the conversion of men to Christianity among the people of China, Japan, and other literate nations. For though bare reason cannot reveal these truths, when revelation has once sufficiently proposed them to her she can readily embrace and highly value many of them. Having made this point here, once for all, I now proceed to name some of the revelations themselves.

Angels

I will not now question whether bare reason can even assure us that there are such beings as angels in the natural world. Reason may assure us that their existence is not impossible—perhaps even that it is not improbable—but I question whether those heathen philosophers who believed that there were separate spirits other than human owed that conviction to mere reasoning or clear experience, or to anything but *revelation*, conveyed to them by imperfect tradition. Especially with regard to good angels: I question whether those ancient sages had any strong reasons, any convincing historical proofs—in short, any one unquestionable evidence of any kind—to satisfy an intellectually cautious person of the existence of those excellent spirits, much less to give a further account of them. Whereas theology is enabled by the Scripture to inform us that

- there are such spirits, and indeed a vast multitude of them;
- that they were made by God and Christ, and are immortal, and do not propagate their species;
- that they have their chief residence in heaven, and enjoy the vision of God, whom they constantly praise and precisely obey, without having sinned against him;
- that they are very intelligent beings, and have such power that one of them was able in a night to destroy a vast army;
- that they have ranks among themselves, are enemies to the devils, and fight against them;
- that they can assume bodies shaped like ours, and yet disappear in a trice;
- that they are sometimes employed about human affairs, not only for the welfare of empires and kingdoms, but also to protect and rescue single good men.

And though they customarily appear in dazzling splendour and astonishing majesty, they are all ministering spirits [= *servant*] spirits, employed for the good of the designated heirs of salvation. And they not only refuse men's adoration [see Glossary], and admonish them to pay it to God, but because they are in a sense made by Jesus Christ, who was true man as well as God, they not only worship him and call him 'the Lord' as his own followers did but describe themselves as fellow-servants to his disciples [meaning 'servants who are fellows of, on a par with, his disciples'].

As for the other angels—the bad ones—though gentile philosophers as well as other gentiles were commonly so far mistaken about them as •to adore them as true gods, and yet (many of them) •to question whether they were immortal, the Scripture informs us

- that they are not self-originated but created beings;
- that however much of mankind worships them, they are wicked and impure spirits, enemies to mankind and seducers of our first parents to their ruin;
- that though they create and promote confusion among men, they have some order among themselves, as having one chief or leader;
- that they are evil spirits not by nature but by choice;
- that their power is very limited, so that a legion of them cannot invade something as negligible as a herd of swine without special permission from God;
- that not only good angels but good *men* can by resisting them put them to flight, and the sincere Christians who defeated them here will be among those who will judge them hereafter;
- that their being immortal will make their misery immortal too;
- that they do themselves believe and tremble at the truths they try to persuade men to reject;

And that they are so far from being able to confer the happiness that their worshippers expect from them that they themselves are wretched creatures, reserved in chains of darkness to the judgment of the great Day at which they will be doomed to suffer everlasting torments, in the company of the wicked men they will have prevailed on.

The universe

As regards the corporeal things that the naturalist tackles as his special theme, we can name particulars—ones of the most comprehensive nature and greatest importance—that the naturalist can know about only from theology. I shall content myself with giving examples of a few of these concerning the

world itself—the universal aggregate of corporeal things—because that is looked on as the noblest and most important object that physics gives us to contemplate.

First, those who admit the truths revealed by theology generally allow that God is not only the *author* but the *creator* of the world. I am not ignorant of what Anaxagoras taught (and Tully mentions) about what he called *nous* [= 'mind'] in the production of the world; and that what many other Greeks later taught about the world's eternity is solely due to Aristotle, who does little less than *brag* that all the philosophers before him were of another opinion. Nor will I here (as I do elsewhere) examine what if anything merely physical arguments can show about the creation of the world. But whether or not mere natural reason *can* reach such a sublime truth, it seems that it *did not* actually do so where it was not prompted by revelation. For though many of the ancient philosophers believed *the world* to have had a beginning, they all took it for granted that *matter* had none; nor does any of them that I know of seem to have so much as *imagined* that any substance could be produced out of nothing. Those who ascribe much more to God than Aristotle does hold him only to have given form, not matter, to the world, and to have merely worked pre-existent matter into this orderly system we call 'the universe'—i.e. to have been the author but not the creator of the world.

Next, whereas many of the philosophers who succeeded Aristotle suppose the world to have been eternal; and those who believed it to have been *not eternal* but *produced* did not have the confidence to claim to know how old it was; except for some extravagant ambitious people such as those fabulous Chaldaeans, whose foolish account reached up to 40,000 or 50,000 years. Theology teaches us that the world is 30 or 40 thousand years short of being as old as they have presumed, and very many ages younger than various

others have thought; and from the Scripture it give us an account of the age of the world that sets us certain limits to how long it can have existed, without mistakes in our calculation. Whereas philosophy leaves us to the vastness of indeterminate duration, without any certain limits at all. [Boyle is presumably relying on Archbishop Ussher's calculation, based on Old Testament figures, that the world began in 4004 BCE.]

Bare reason obviously cannot inform us of particulars that preceded the origin of the first man; so we owe to revelation what we know about the time, the order, and various other facts about the manner in which the fabric of the world was completed. I do not think religion is as much concerned with this as it is thought to be by many who in their opinion and conduct want to deduce particular theorems of natural philosophy from this or that expression in a book that seems designed to instruct us about spiritual rather than corporeal things. But I see no sound reason to embrace some people's opinion that would so turn the first two chapters of Genesis into an allegory as to overthrow their literal and historical sense. And though I take the Scripture to be mainly designed to teach us nobler and better truths than those of philosophy, I do not condemn those who think that the beginning of Genesis contains various details concerning the origin of things which—though not to be brought into physics incautiously or unsupported—may still provide very considerable hints to an attentive and inquiring reader.

As for the duration of the world: the old philosophers held it to be interminable; and the Stoics' opinion (which they held from the Jews) that the world will be destroyed by fire was not soundly based on physics; but theology teaches us expressly from divine revelation that the present course of nature will not last always and that one day this world (or at least this vortex of ours [here = 'our solar system']) will

either •be abolished by annihilation or, much more probably, •be innovated—as it were, *transfigured*—this being done by the intervention of a fire that will dissolve and destroy the present frame of nature; so that either way—•annihilation or transfiguration—•the present state of natural and political things will have an end.

As theology provides us with this information about created things in general, revelation very plainly reveals various important things concerning the most prominent and noblest of visible things, namely men—things about which reason must necessarily be in the dark.

The human body

First, concerning the body of man: •the Epicureans attributed its original (like the origin of everything else) to the random coming-together of atoms, •the Stoics absurdly and insultingly enough (but more pardonably than their follower in this, Mr Hobbes) maintained that men sprang up like mushrooms out of the ground, and •other philosophers maintain concerning it fantasies too wild to be recited here. But the book of Genesis assures us that the body of man was first formed by God in a special way out of terrestrial matter, and it is described there as having been perfected before the soul was united to it. And along with teaching us how the body of man had its first beginning, theology assures us of what will become of the body after death, though bare natural reason will hardly be claimed to reach such an abstruse and difficult doctrine as that of a resurrection, which produced nothing but wonder or laughter among the Athenian philosophers when St. Paul reported it to them.

Not to mention that theology teaches us various other things about the origin and condition of men's bodies:

- that all mankind is the offspring of one man and one woman,
- that the first woman was not made of the same matter as the first man or made in the same way, but was afterwards taken from his side,
- that both Adam and Eve were not (as many Epicureans and other philosophers fancied the first men to be) at first infants, growing by degrees to be mature and complete human persons, but were made so all at once, and
- that hereafter, as all men's bodies will rise again, so will they all (or at least all the bodies of the just) be kept from ever dying a second time.

The human soul

As for the human soul, though I willingly grant that much can be deduced from the light of unaided reason concerning its existence, properties, and duration, still divine revelation teaches us this more clearly—and with greater authority because he that made and upholds our souls can surely best know what they are and how long he will have them last. Along with Scripture's teaching us that the rational soul is distinct from the body because it is not going to be destroyed by the enemies that kill the body, theology addresses the origin of this immortal soul (about which philosophers can give us only broad unsupported conjectures), assuring us that the soul of man did not originate in the same way as the souls of other animals, but was God's own immediate workmanship, and was united to the body already formed; but only united in such a way that when they divorce the soul will survive and pass into a state in which death will have no power over it.

I expect you will here object:

We need not owe to the Scripture our knowledge of the perpetual duration of separate souls, because the immortality of the soul can be sufficiently proved by the sole light of nature, and particularly has been demonstrated by the great Descartes.

But let me tell you two things. **(1)** A matter of that weight and importance to us cannot be too well proved; so we ought to welcome all good kinds of proof. **(2)** I suspect that many Cartesians (and some others) mistake •the difficulty under consideration and •the **scope** of Descartes's work.

I grant that by natural philosophy alone the immortality of the soul can be proved against its usual enemies, atheists and Epicureans. ·Here is how·. The ground on which these men think the soul to be mortal, namely that

it is not a true substance but only a modification ·or state· of body, and must therefore perish with the breakdown of the frame or structure of the body it belongs to;

so if we can point to some intellectual operations of the rational soul that matter (however modified) is incapable of, thereby proving that the soul is a substance distinct from the human body, there is no reason why the dissolution of the body should imply the destruction of the soul, which is a simple substance and as real a substance as matter itself, which the adversaries affirm to be indestructible.

But though by the mental operations of the rational soul and perhaps in other ways it can be proved—against the Epicureans and other mere naturalists who will not allow God to have anything to do with this—that the soul is immortal in the sense newly proposed (·i.e. being simple (= without parts) and therefore proof against destruction by being taken apart·), the same proofs do not show that absolutely it will never cease to exist, if we have on our side

philosophers who admit as the Cartesians and many others do that God is the sole creator and preserver of all things. For how are we sure that the following is not the case:

Though the soul of man could by the continuance of God's ordinary and upholding concourse survive the body, God has ordained that it will be annihilated when it parts with the body, withdrawing at death the supporting influence which alone kept it from relapsing to its first nothing.

(That would be in line with what is generally believed, that the soul is not created until it is on the point of being infused into the body.) We see from this that despite the physical proofs of the spirituality and separableness of the human soul, we owe to divine revelation our assurance that its duration will be endless.

And now to make good what I was intimating above concerning the **scope** of Descartes's demonstration, I appeal to his own words to show that he considered this matter mainly as I have done, and claimed to demonstrate that the soul is a substance distinct from the body, but not that absolutely speaking it is immortal [Boyle gives this quotation in Descartes's Latin]:

'I explained in the Synopsis of my *Meditations* why I wrote nothing about the immortality of the soul. And I *have* adequately proved that the soul is distinct from every body. But there remains your point that the soul's distinctness from the body doesn't imply that it is immortal, because God may have given it a nature such that it goes out of existence at just the moment when the body dies. I admit that I can't refute this. I don't undertake to use the power of *human* reason to settle matters that depend on the free will of *God*. Our natural knowledge tells us... etc. But if it's a question about the absolute power of God—"Might

God have decreed that human souls are to cease to exist precisely when the bodies he has joined to them are destroyed?"—then only God can answer that.'

And if he would not undertake to demonstrate by unaided natural reason even the *existence* of the soul after death, we may well presume that he would be even further from undertaking to determine what the *condition* of that soul will be after it leaves the body. And to remove any doubts you may have about this I will give it you as it his own confession, as he freely wrote it in a private letter to that admirable lady the Princess Elisabeth (first daughter to Frederick King of Bohemia) who seems to have wanted his opinion on that important question and had cited Kenelm Digby's opinions about it. Here is his answer:

'As for the state of the soul after this life, I am not so well informed as M. Digby! Leaving aside what faith tells us, I agree that unaided natural reason alone can't give us any certainty about this; we can of course make many favourable conjectures and have fine hopes.'

And accordingly in the next clause he explains why according to natural reason we are never to seek death, namely because it is imprudent to quit what is certain for an uncertainty.

Is immortality desirable?

I am not surprised that that is his view. For all that mere reason can demonstrate comes down to these two things:

- (1) Because the rational soul is an incorporeal substance there is no necessity that it should perish with the body; so that it may survive the body and last for ever unless God has otherwise appointed.
- (2) Because (according to Descartes) the nature of the soul consists in its being a substance that thinks,

we can conclude that although death separates it from the body it will nevertheless retain the power of thinking.

I think it may be justly questioned whether either or both of these two things are sufficient to *endear* the state of separation after death to a thoughtful man. Considered in itself, immortality or perseverance in duration is required for felicity rather than being a part of it; and being in itself a neutral thing it takes on the nature of the state or condition to which it is joined; it does not make that state happy or miserable, but makes the possessors of it more happy or more miserable than otherwise they would be. And though some scholastics on airy metaphysical notions maintain that being wretched is preferable to not existing at all, we can oppose to their speculative subtleties the sentiments of mankind and the far more considerable testimony of the Saviour of mankind who says of the disciple that betrayed him that it had been good for that man if he had never been born. Also, eternity is generally conceived to worsen the miseries of hell as much as it heightens the joys of heaven.

And here we may consider two lines of thought. **(1)** Mere reason cannot so much as assure us absolutely that the soul will survive the body. In addition to Descartes's admission, quoted above, we have a probable argument drawn from the nature of the thing, namely:

The body and soul were brought together not by any mere physical agents, and their association and union while they continued together was made on conditions that depended solely on God's free and arbitrary [see Glossary] decision; so for anything reason can tell us to the contrary, the conditions of that association may be that the body and soul should not survive each other.

(2) Supposing that the soul is permitted to outlive the body, mere reason cannot tell us what will become of it in its separate state—whether it will be vitally united to some other kind of body or vehicle and, if it is, what kind of body that will be and what the terms of the union will be. It might be united to an unorganised or very imperfectly organised body in which it cannot exercise the same functions that it did in its human body. We see that even in this life the souls of natural fools are united to bodies in which they cannot speak, or at least cannot philosophise. And it is evident that some souls are introduced into bodies which, by reason of paralytical and other diseases, they cannot move, though that does not always prevent them from being vulnerable to feeling pain. So that for all we naturally know a human soul separated from the body may be united to a portion of matter which it cannot move and from which it does not receive any agreeable intake because the union between the two gives the soul no sense except that of pain.

If I grant ·for purposes of argument· that the soul will not be made miserable by being thus wretchedly matched, let us consider what follows from that. We are supposing then that the soul is left free to enjoy whatever belongs to its own nature, which is only the power of *always thinking*. It may well be doubted whether the exercise of that power will suffice to make it happy. You may easily believe that I love as well as the next man to entertain myself with my own thoughts, and to enjoy them undisturbed by visits and other distractions; I would, accompanied only by a servant and a book, go to dine at roadside inn to enjoy my thoughts more freely for that day. But I think that the most contemplative men would eventually grow weary of thinking if they

- received no supply of objects from outside themselves, by reading, seeing, or conversing;

and if they also lacked the opportunity

- to apply their thoughts by moving the limbs of their bodies, or
- to impart them by discoursing or writing books or making experiments.

I knew a gentleman who was—for a State-crime in Spain, which he thought an heroic action—kept close prisoner for a year in a place where he was not permitted the benefit of any light, either of the day or candles, and was not approached by any human creature except at certain times by the jailer who brought him food and drink. (He was allowed a diet appropriate for a person of note, as he was.) This gentleman appeared by his discourse to be a man of a lively humour, but when I asked him what he could do to pass the time in that sad solitude, he confessed to me that

though he was free to walk to and fro in his prison, and though he tried to give his mind as much variety of employment as he could by often calling to mind all the adventures and other episodes of his former life, and by variously combining and diversifying his thoughts, this would not serve his turn and he was often reduced to drinking large draughts of wine and throwing himself on his bed, trying to drown the melancholy that the lack of new objects cast him into.

And I can easily accept that he found a great deal of difference between the sense he had of thinking when he was at liberty, and that which he had when he was confined to the thinking whose delightfulness, like fire, cannot last long when it is denied both fuel and air, as his was. And, in a word, though I most readily grant that thinking interwoven with conversation and action may be a very pleasant way of passing one's time, because man is by nature a sociable creature, thinking *alone* would be a dry and wearisome activity to spend eternity in.

Other things known only through revelation

Before I proceed to the next section I must not omit to remark that though my desire for brevity keeps me from discussing any theological subjects except those I have touched on concerning the divine attributes and the things I have mentioned concerning the universe in general and the human soul, there are various other things that are knowable with the help of revelation and not without it and are of such a noble and sublime nature that the greatest intelligences may find their best abilities •fully exercised and •highly gratified by making enquiries into them. I shall not mention as evidence of this the adorable [see Glossary] mystery of the Trinity, in which (it is acknowledged) the most soaring speculators find themselves baffled or lost. Instead I shall mention **(i)** the redemption of mankind and **(ii)** God's decrees concerning men. These seem to be *less* out of the reach of our natural faculties. It is into some aspects of **(i)** that the Scripture tells us 'the angels desire to pry'; and it was considering **(ii)** that made someone who had been caught up into the mansion of the angels cry out in bewilderment 'O the depth of the riches both of wisdom and knowledge of God! how unsearchable are his judgments, and his ways past finding out!' [Romans 11:33]

Nor are these the only things that the Scripture itself calls 'mysteries', though for brevity's sake instead of specifying any of the others I shall content myself with putting to you the general point that since God's wisdom is boundless it can surely have more than one way to display itself. And though the material world is full of the productions of •his wisdom, that does not prevent the Scripture from being ennobled with many excellent impresses—signatures, as it were—of •the same attribute. For, as I was beginning to say, it cannot but be highly insulting to the Deity, in whom all

other true perfections as well as omniscience are united and transcendent, to think that

- the only way he can contrive to disclose his perfections is through the ordering of matter and motion, and that
- the only way he can deserve to be the object of men's studies and their admiration is in his capacity as a creator.

And I think I might safely add that besides the grand and mysterious matters I have just mentioned there are many other noble and important things over which unassisted reason leaves us in the dark. They are not so clearly revealed in the Scripture, but they are in an inviting measure uncovered there, and consequently deserve the investigation of a curious and philosophical soul. Shall we not think it worth inquiring whether the satisfaction [see Glossary] of Christ was necessary to appease the God's justice and purchase redemption for mankind? Or whether God, as absolute and supreme governor of the world, might have freely cancelled the penalties of sin? Shall we not think it worth inquiring into how and on what terms the justification [see Glossary] of men towards God is transacted, especially considering how important it is for us to know this, and how confusingly the doctrine about it—not in itself abstruse—is usually presented? Shall we not inquire into whether the souls of men pre-existed in a happier state before being united to their bodies, as many of the ancient and modern Jews and Platonists and (besides Origen) some learned men of our times do believe? And shall we not be curious to know whether when the soul leaves the body it

- immediately passes to heaven or hell (as it is commonly believed), or
- remains asleep (as it were) in an insensible and inactive state until it regains its body at the Resurrection (as many Socinians and others maintain), or

- is conveyed into secret recesses where—though it be in a good or bad condition according to what it did in the body—it is reprieved from the flames of hell and restrained from the Beatific Vision till the day of judgment (which seems to have been the opinion of many if not most of the early Fathers and Christians)?

Shall we not be curious to know whether at the final day of judgment this vast fabric of the world, which all admit must have its structure quite shattered, will •be allowed to relapse into its first Nothing (as several divines assert) or will •be renewed into a better state—transfigured, as it were? And shall we not inquire whether in that future state of things that will never have an end we will know one another (as Adam when he awoke out of his profound sleep knew Eve whom he never saw before)? And whether those personal friendships and affections we had for one another here, and the pathetic [see Glossary] consideration of the relations (e.g. father and son, husband and wife, chaste mistress and virtuous lover, prince and subject) on which many of them were based will continue? Or whether all those things will be treated as antiquated and slight, and be obliterated and (as it were) swallowed up? (In the way the former relation of a cousin a great way off—e.g. second cousin once removed—is hardly considered when the persons come to change their state by being united by the strict bonds of marriage.)

But it would be tedious to propose all the other things that fall within the scope of the divine and that highly merit an inquiring man's curiosity—things about which all the writings of the old Greek and other heathen philosophers put together will give us far less information than the single volume of canonical [see Glossary] Scripture. I foresee that it may be objected that in some of these inquiries revelation burdens reason by delivering things that reason is then

obliged to make its hypotheses consistent with. But this cannot even be claimed—let alone justified—about all of them. And anyway, if you consider

how much unassisted reason leaves us in the dark about these matters, not being able even to form probable conclusions about them, especially in comparison with the probabilities that reason can deduce from what it finds delivered, in one way or another, in the Scripture,

you will allow me to say, I think, that the revealed truths that reason is obliged to comply with, if they are burdens to it, are like the feathers that 'burden' a hawk! Instead of hindering his flight by their weight, they enable him to soar toward heaven and get a wider view of things than he could possibly do if he did not have feathers.

Criticising the commentators

I owe greater reverence to the Scripture itself than to its expositors; and this leads me to tell you freely that you will not do right to theology or to (the greatest repository of its truths) the Bible, if you imagine that there are no considerable additions to be made to the theological discoveries that have already been made, and no clearer expositions of many texts of Scripture, or better reflections on that matchless book, than are to be met with in the general run of commentators and preachers, without excepting the ancient Fathers themselves. In my opinion two things are required to qualify a commentator to do right to his theme: **(i)** a competency of critical knowledge, and **(ii)** a concern for the honour and interest of Christianity in general, aided by a good judgment to discern and select the things that may most conduce to it. I fear that there are not many so-called expositors of the Scripture who are not deficient in one or

other of these particulars, and I wish there were not so many that are defective in both.

Knowledge of at least Greek and Hebrew is required for anyone who takes on himself to expound writings penned originally in those languages. If this were not obvious from the nature of the case, you might easily be persuaded to believe it by considering what gross mistakes have often blemished the interpretations of the schoolmen and others, and even those of the venerable Fathers of the Church, because of their ignorance of languages. Generally they were worthy men, and highly to be regarded as the grand witnesses of the doctrines and government of the ancient Churches; most of them were very pious, many of them very eloquent, and some of them (especially the two critics Origen and Jerome) very learned; **but** so few of the Greek Fathers were skilled in Hebrew, and so few of the Latin Fathers either in Hebrew or Greek, that many of their homilies and even comments leave difficult texts as obscure as they found them; and sometimes, misled by bad translations, they give the texts senses exceeding wide of the true. The result is that many times in their writings they appear to be far better •divines than •commentators, and in an excellent work on a text you will find only a very poor exposition of it. Many of their eloquent and devout sermons do much better in praising the divine mysteries than of unveiling them. Some modern translations deserve praise for being very useful and less inaccurate than the ones the Latin Fathers used; but when I read the Scriptures (especially some books of the Old Testament) in their originals, I confess that I sometimes cannot help wondering what came into the mind of some even of our modern translators, that they should so greatly mistake—and sometimes insult—certain texts; and I am inclined to think that there is hardly a chapter in the Bible (especially the part of it written in Hebrew) that could not be

better translated and consequently more to the credit of the book itself.

It misses this credit not only through men's lack of **(i)** sufficient skill in critical learning but also through their lack of **(ii)** judgment enough to observe, and concern enough to propose, the things in the Scripture and in theology that tend to the reputation of either. I fear there are too many commentators and other divines who (though otherwise perhaps pious men), having espoused a Church or party and become hostile to all dissenters, are concerned when they read the Scripture to take notice chiefly—if not *only*—of things that may suggest arguments against their adversaries or answers to their objections. I meet with many fewer than I could wish who

make it their business to search the Scriptures for things (such as unheeded prophecies, overlooked mysteries, and strange harmonies) which, being clearly and judiciously proposed, may make the Bible appear worthy of the high origin it lays claim to (and consequently of the veneration of thoughtful men)

and who

are concerned to discern and understand—in the way of governing and of saving men, revealed by God—such an excellent economy, deep contrivances, and wise dispensations as may bring credit to religion, not as Roman, Protestant or Socinian, but as *Christian*.

But (as I indicated earlier) these good affections for the repute of religion in general need to be assisted by deep judgment. Men who lack that, or lack a good stock of critical learning, may easily overlook the best observations (which usually are not obvious) or propose as 'mysteries' things that are either not grounded, or not weighty enough; and so (despite their good intentions) may bring discredit on what they desire to recommend. I am willing to grant that

it is lack of good skill and good judgment, rather than lack of good will, that explains why there are so few who have been careful to do right to the reputation of the Scripture as well as to its sense. When I consider how much more to the advantage of those sacred writings and of Christian theology in general various texts have been explained and discussed in their different ways by the excellent Grotius, Episcopius, Masius, Joseph Mede, Sir Francis Bacon and some other late great wits [see Glossary] (to name now no living ones) than the same texts have been handled by vulgar [see Glossary] expositors and other divines; and when I remember too that *only* one of the *five* worthies I have just named was at once a great philosopher and a great critic—the first three being not so well versed in philosophical learning, and the last being unacquainted with the eastern languages—I can only hope that when it pleases God to stir up persons of philosophical genius, well furnished with critical learning and the principles of true philosophy, and gives them a hearty concern for the advancement of his truths, these men—by exercising on *theological* matters the same inquiringness and sagacity that has in our times made such happy progress in *philosophical* ones—will make explanations and discoveries that will justify more than I have said in praise of the study of our religion and the divine books that contain the articles of it. For these books do not lack excellences but only skilful unveilers. And if I do not tell you that

you should no more *measure* the wisdom of God couched [see Glossary] in the Bible by the glosses or systems of common expositors and preachers than *estimate* the wisdom he has expressed in the structure of the world by *the* discredited Aristotelian physics of Magirus or Eustachius,

I shall boldly tell you that

you should no more •think that there are no mysteries in the books of Scripture except those that the school-divines and vulgar commentators have taken notice of and unfolded than •think that there are no mysteries in the book of nature except those that the same schoolmen (who have taken it on themselves to interpret Aristotle and nature too) have observed and explained.

All the fine things that poets, orators, and even lovers have extravagantly said in praise of the beauty of *eyes* will not recommend them to a philosopher's esteem nearly as much as the sight of one eye skillfully dissected, or the unadorned account given of its structure and the admirable uses of its various parts in Scheiner's *Oculus* and Descartes's excellent *Dioptrics*. And though I do not think myself bound to accept and admire everything that is proposed as mysterious and rare by many interpreters and preachers, I think I may safely compare several things in the books we call the Scripture with several others in the book of nature in (at least) one respect. Although I do not believe all the wonders, that Pliny, Aelian, Porta and other writers of that stamp relate concerning the generation of animals, still by reading

such faithful and accurate accounts as sometimes Galen (*De usu Partium*), sometimes Vesalius, sometimes our Harvey (*de Ovo*) and our more recent anatomists, and sometimes other true naturalists, give of the generation of animals and of the admirable structure of their bodies, especially those of men, and other parts of zoology of which Pliny and the others I named with him could make nothing considerable,

I receive more pleasure and satisfaction, and am induced more to admire the works of nature, than by all the romantic and superficial narratives ·of poets, orators and lovers·. Similarly, applying this to our present subject of theology,

a close and critical account of the more veiled and pregnant parts of Scripture and theological matters, with such thoughts about them as their nature and their interrelations would suggest to a philosophical as well as critical theorist,

would far better please a rational thinker, and give him a higher as well as better-grounded veneration for the things explained than many of those slighter or ill-founded remarks through which the florid and 'clever' expositions and works of superficial writers gain the applause of men of the less discerning sort.

We could use Scripture more than anyone has so far

I venture to add at this point that I have some hope that a further use may be made of the Scripture that neither our divines or our philosophers seem to have thought of. A few theologians have indeed got the name of 'supralapsarians' [see Glossary] for venturing to look back before the fall of Adam for God's decrees of election and reprobation. But their boldness has been disliked by most divines as well as other Christians, and anyway the object of their speculation is much too narrow to be anywhere near the kind of hypothesis I am talking about. For I don't think that the encyclopedias and pansophias [= 'books of all knowledge'] that even men with very high abilities have aimed at cast a wide enough net to take in all that the reason of a man who is improved by philosophy and elevated by the revelations already extant in the Scripture could learn in this life with the help of free reasoning and the hints contained in those pregnant ·scriptural· writings (with the assistances of God's spirit that he is still ready to offer to those who duly seek them). The gospel indeed contains and unfolds as much of the whole mystery of man's redemption as we need to know for our

salvation; and the corpuscularian or mechanical philosophy tries to deduce all the phenomena of nature from featureless [see Glossary] matter and motion in space. But neither •the fundamental doctrine of Christianity nor •the doctrine of the powers and effects of matter and motion seems to be more than an epicycle (if I may so call it) of the great and universal system of God's contrivances, and the two are only a part of the more general theory of things knowable by the light of nature improved by the information of the Scriptures. So both these doctrines, though very general relative to the subordinate parts of theology and philosophy, seem to be merely limbs of the universal hypothesis whose objects I conceive to be the nature, counsels, and works of God, as far as they are discoverable by us (for I do not say *to us*) in this life.

Those to whom God has given the privilege of mature reason seem not to enlarge their thoughts enough if they think that the omniscient and almighty God has limited the operations of his power, wisdom and goodness to the use that could be made of them for some ages in the production and government of •matter and motion and of •the inhabitants of the terrestrial globe, which we know to be a mere physical *point* in comparison of the portion of universal matter that we have already discovered.

For there are (by my count) *four* grand communities of creatures, of which merely corporeal things are only one; the other three, differing from these, are distinct also from one another. Of the first sort are the race of mankind, where thinking beings are vitally associated with gross [see Glossary] and organic bodies. The second are demons, or evil angels; and the third, good angels. In the case of the two kinds of angels, it may be that the rational beings are perfectly free from union with any sort of matter, however finely divided, or they may be united to bodily vehicles that are not gross

but spirituous and ordinarily invisible to us.

We should not think that, because 'angels' and 'devils' are two names quickly uttered, and those spirits are seldom or never seen by us, there are few of them and they are not a considerable topic of speculation. For, just as their excellence is great (as I will show later), so is their number: they are represented in Scripture as a heavenly *host* standing on the right and left hand of the throne of God. And our Saviour speaks of the good angels, saying that he has more than twelve *legions* of them at his command. . . . And the gospel informs us that enough evil angels to call them a 'legion' (which you know is usually conservatively reckoned as consisting of between 6000 and 7000) possessed one single man. For my part, when I consider that matter, however vastly extended and intricately shaped, is

- only a brute thing that is capable of nothing but motion in space and the effects of that on other bodies, or on the brain of man, without being capable of any true (or at least any intellectual) perception or any true love or hatred,

and when I consider the rational soul as

- an immaterial and immortal being that bears the image of its divine maker, being endowed with a capacious intellect and a will that no creature can force,

this contrast disposes me to think the soul of man to be a nobler and more valuable being than the whole corporeal world. I readily acknowledge that world to be admirably contrived, and worthy of its almighty and omniscient author, yet it consists in nothing but of an aggregate of portions of brute matter, variously shaped and connected by motion in space (as dough and rolls and loaves and cakes and vermicelli, wafers, and pie-crust are all diversified *meal*), but without any knowledge of the nature of themselves, or of

their author, or of their fellow-creatures. And as the rational soul is something more noble and wonderful than anything merely corporeal (however big), and is of a more excellent nature than the human body, which is the most intricate piece of mechanism in the world, so to enquire what will become of it—what fate it is like to undergo hereafter—better deserves a man's curiosity than to know what will befall the corporeal universe. . . . And as man is entrusted with a will of his own, whereas all material things *move* only as they *are moved*, and have no self-determining power enabling them to resist the will of God; and as also at least some orders of angels are of a higher quality (if I may so speak) than human souls; so it is very probable that the government of good or bad angels (agents possessing intellect and will) requires greater displays of God's wisdom, power, and goodness than does the guidance of featureless matter; and the method of God's conduct in the government of these is a far nobler topic for men's contemplation than the laws according to which the parts of matter hit against and jostle one another, and the effects or results of such motions.

And accordingly we find in Scripture that whereas

- for the production of the material world and the setting of the frame of nature God employed only a few commanding words, which speedily had their full effects,
- to govern the race of mankind, even for their own happiness, he employed not only laws and commands but revelations, miracles, promises, threats, exhortations, mercies, judgments, and various other methods and means;

and yet often, when he might well say (as he did once by his prophet ·Isaiah·) 'What could I have done more to my vineyard that I have not done it?', he had just cause to exclaim (as he did in the same place) 'Why when I looked that it should bring forth grapes did it bring forth wild grapes?' and to complain of men (as he did through that very prophet complain of Israel) 'I have spread out my hands all the day to a rebellious people'. But not to wander too far in this digression, what I have said about men may make it probable that the grand attributes of God are more notably exercised and made more conspicuous •in the making and governing of each of the three intellectual [see Glossary] communities than •in the framing and upholding of the community of mere bodily things. And since all immaterial substances are for that reason naturally immortal, and universal matter is believed to be so too,¹ possibly those revolutions that will happen after the day of judgment,

in which though probably not •the matter but •the state and constitution of it that makes it constitute *this world* will be destroyed, and make way for quite new frames and sets of corporeal things, and the beings that compose each of these intellectual communities will (in the countless ages they will last) travel through I know not how many successive changes and adventures,

will display and bring glory to the divine attributes just as much as the contrivance of the world and the economy of man's salvation, though these are rightly the objects of the naturalist's and the divine's contemplation.

¹ [He means that immaterial things, just because they are immaterial (and so do not have parts), cannot be destroyed by coming to pieces; and that 'universal matter'—i.e. matter *as such*—is thought not to be 'naturally' destructible because that would be a mere process of dismantling it, and dismantling any portion of matter still leaves its parts, which are also matter.

And some passages in the prophetic part of the Scripture, and especially in the book of the Apocalypse [= Revelation], seem to indicate that as God will perform great and noble things that mechanical philosophy never reached to and that the general run of divines seem not to have thought of, so various of those great things may be to some extent discovered by an attentive searcher into the Scriptures, bringing so much advantage to the devout investigator that St. John, near the beginning of his revelations, says that they are 'happy' who read the matters contained in this prophecy and observe the things written therein. This implies that by carefully comparing [see Glossary] •the indications couched in those prophetic writings with •events and occurrences in the affairs of the world and the church, we may discover much of the admirable economy of Providence in the governing of both. I am inclined to think that the early discoveries of such great and important things are meant by God as considerable favours, not only because the title 'happy' is here given to anyone who attains them, but also because of the two persons to whom such great discoveries were first made

- the first, the prophet Daniel, is said by the angel to be, on that account, a person highly favoured; and
- the other, St. John, is represented in the gospel as our Saviour's beloved disciple.

And you will the more easily think the foreknowledge of the divine dispensations gatherable from Scripture to be highly valuable if you consider that according to St. Paul the very angels that are called 'principalities and powers in heavenly places' learned *from the Church* some abstruse points of the manifold wisdom of God [*Ephesians* 3:10]. But I must no longer indulge speculations that would carry my curiosity beyond the bounds of time itself, and therefore beyond the limits that ought to be placed to this mere letter!

But although on the one side I shall not allow myself the presumption of forming conjectures about those remote dispensations most of which will not have a beginning before this world has an end, on the other side I would not discourage you or any pious inquirer from trying to advance in the knowledge of the attributes of God that can successfully be studied without prying into the secrets of the future.

We could make more discoveries in theology

Let me freely confess to you, Sir, that I am inclined to think that if men cared enough about God's glory and their own satisfaction, far more discoveries of the divine attributes would be made than have been achieved so far. When we consider the most simple or uncompounded essence of God we may easily be convinced that what belongs to any of his attributes (some of which thinking men generally admire) must be an exceedingly noble object of enquiry, and worthy of our knowledge. Yet the abstruseness of this knowledge is not in all respects so invincible as to remove my strong hope that a philosophical eye, illuminated by the revelations extant in the scripture, may pierce a great deal further than has yet been done into those mysterious subjects. Perhaps out of a mistaken reverence, they are too often so poorly handled by divines and schoolmen that what they have taught is not only •not worthy of God (for that is a necessary and therefore excusable deficiency), but too frequently •not worthy of men—I mean of rational creatures who take on themselves to treat of such high points and instruct others about them. And I am sure that your friend will be more inclined to agree with this if he calls to mind the new and handsome notions about some of God's attributes that his master Descartes, though only moderately knowledgeable about the Scriptures, has presented us with. I am also

sure that a much greater progress might be made in the discovery of subjects in which though we can never know all we may still know more than we do, if speculative geniuses [= 'people with high abilities in theory-making'] would propose to themselves particular doubts and enquiries about particular attributes, and form and examine hypotheses, establish theorems, infer corollaries and (in short) apply to this study the same intelligence, assiduity and attention of mind that they often employ in inquiries of a very much inferior nature. Two examples of that:

- Descartes, however profound a geometrician he was, admits in one of his letters that he employed no less than six weeks to find the solution of a problem or question of Pappus.
- Pythagoras was so addicted to and concerned for geometrical speculations that when he had found the famous proposition [now known as Pythagoras's Theorem] that is the 47th proposition in Euclid's Book I he is reported to have offered a great public sacrifice to express his joy and gratitude for the discovery, though it was the discovery of only one property of one sort of triangle.

And certainly if Christian philosophers rightly estimated what noble and fertile subjects the divine attributes are, they would find in them materials on which to exercise their best abilities as well as to recompense the employment of them. But the conduct I want to dissuade them from may come not only from laziness but also from the mistake of thinking that there is little to be known of such an incomprehensible object as God, except that in general all his attributes are infinite, as *he* is, and thus cannot be fully known by human understandings because they are finite; so I shall add that although it is true that because of God's infinity we cannot comprehend him—i.e. have a full

and adequate knowledge of him—we can nevertheless know very many things concerning him, and *may make endless progress in that knowledge*. Pythagoras knew very well what a triangle was, and was acquainted with many of its properties before he discovered that famous one. And though since him Euclid, Archimedes, and other geometricians have demonstrated I don't know how many other properties of the triangle, the subject is not yet exhausted, even today. And possibly I (who make no claim to be a mathematician) have now and then, in managing certain equations I had a use for, lighted on some theorems about triangles that had not occurred to any of them. The divine attributes are such fruitful themes, and so worthy of our admiration, that the whole fabric of the universe and all the phenomena exhibited in it are merely imperfect expressions of God's wisdom and a few of his other attributes. And I am not surprised that the angels themselves are represented in Scripture as employed in worshipping God and admiring his perfections. For even they (being merely finite) can form only inadequate conceptions of him, and consequently must try through many conceptions to make amends for the incompleteness of every one of them—which they can never perfectly do. Yet it is very wrong to let God's infinitude discourage us from enquiring into his nature and attributes. (I'll set aside the question of whether infinity, though the word is negative, is really a positive thing in God.) Despite his infinity we may discover as much of him as our nature *can* know. What harm is it to someone drinking in a river that he cannot drink up all the water, if he is free to quench his thirst and take in as much liquid as his stomach can contain? So infinity should not hinder us from a bold ambition to learn as much as we can of an object whose infinitude only makes our knowledge of it more noble and desirable, which indeed it *is* in such a degree that it's no wonder that the

angels are represented as never wearying of their activity of contemplating and praising God. For (I repeat) they can have only inadequate ideas of those boundless perfections, and no number of those ideas can enable them to make amends for their incompleteness; so it need not seem strange that in fresh discoveries of new parts (if I may so call them) of the same object, it being *infinite*, they should find nobler and happier entertainments than variety could provide them with in any other activity.

2. Our obligation to study theology

Having spoken of *some* of the many things that could be cited to show how noble the objects are that theology offers for contemplation, I now proceed to some considerations that may give us a sense of how great an obligation there lies on us to devote ourselves to the study of them.

I shall here name only two of the things on which this obligation may be grounded—they being indeed comprehensive ones—namely obedience and gratitude.

Obedience

Presumably there is no need for me to elaborately prove that it is God's will and command that men should learn the truths that he has been pleased to teach, whether concerning his •nature or attributes or •how he wants to be served and worshipped by man. Even if we did not have injunctions in Scripture to that purpose, your friend is too rational a man to believe that God would so solemnly cause his truths to be published to mankind by preaching and writing without intending to *oblige* people to enquire into some of them—at least people who have the capacity and opportunity to do this. And if it appears to be *his will* that a person so qualified

should search after the most important truths that he has revealed, it must be *their duty* to do so. Even if the nature of the thing itself did not lay any obligation on us, the authority of him who commands it would do so; because he, being the supreme and absolute lord of all his creatures, has as full a

- right to make what laws he thinks fit, and command what service he thinks fit, as a
- power to punish those who violate the laws or refuse the service;

and accordingly it is obvious that before Adam fell and forfeited his happy state by his own transgression he had imposed on him a law whose whole power of obliging came from the mere will and pleasure of the law-giver (because there was no right or wrong about eating or not eating from the tree of life, in itself). From this we learn •that man is subject to the laws of God not as being vulnerable to him but as being a rational creature, and •that something that is not a duty in its own nature may become an indispensable one barely by its being commanded. And indeed if

our first parent, in the state of innocence and happiness in which he tasted of God's bounty without yet standing in need of his mercy, was most strictly obliged out of mere obedience to conform to a law about something that was intrinsically neither good nor bad,

then surely we in our lapsed [= 'sinful'] condition must be under a high obligation to obey the declared will of God, by which we are commanded to study his truths and do something •that has so much intrinsic goodness in it that it would be a duty even if it were not commanded, and •that brings such recompenses that it is as much an advantage as a duty.

Gratitude

But it is not only obedience and self-interest that should draw us to the study of divine things, but also gratitude. And there are so many important reasons for gratitude that even he who said *Ingratum si dixeris, omnia dixeris* [= 'If you call someone ungrateful, you have said everything'] could not think ingratitude to be worse than ordinary vices by as much as neglect of the duty I am pressing would be worse than ordinary ingratitude.

It would not be hard to show here that we are extremely great debtors to God, both as he is the author and the preserver of our very beings and as he (immediately or mediately) fills up the measure of the continual benefits, prerogatives and other favours we receive from him as men, and the higher blessings which (if we don't let ourselves down) we may receive from him as Christians. But to show in how many ways and to how high a degree God is our benefactor would be to launch out into too immense a subject; and anyway I have already discussed those matters in other papers.

So I will single out a reason for gratitude that will be specially pertinent to our present purpose. For whereas your friend takes so much pride in the study of natural philosophy, and despises not only divines but also statesmen and even the most learned men in other parts of philosophy and knowledge because they are not skilled in physics, he owes that very skill of his, among many other favours, to God. For it is God who made man unlike the horse and the mule, who have no understanding, and endowed him with the noble power of reason by the use of which he acquires whatever knowledge he has of natural things above the beasts that perish. For it can fairly be said about our other acquisitions what Moses, by God's appointment, told the Israelites about

the acquisition of riches:

He warns the people to beware that when their herds, and flocks, and other treasures are multiplied their heart be not lifted up and prompt them to say '*My power, and the might of my hand hath gotten me this wealth*'. He tells them. . . .to 'remember the Lord thy God, for it is he that giveth thee power to get wealth'.

But making men rational creatures is not all that God has done towards making them philosophers. For the knowledge of particular things requires *objects* as well as *faculties*; and if we accept the probable opinion of divines who teach that

the angels were created before the material world, this being what is meant by 'the sons of God' and 'morning stars' that 'shouted for joy' when celebrating the foundations of the earth [Job 38:6-7],

we must allow that there were many creatures endowed with at least as much reason as your friend who were not yet acquainted with the mysteries of nature because nature itself had not yet come into existence. Thus, because God made the world and gave man the faculties that enable him to contemplate it, naturalists are as much obliged to God for their knowledge as we are for our information to those who write us secrets in code and teach us the skill of deciphering things so written, or to those who write what would fill a page in the space of a single penny and give us a microscope to enable us to read it. The naturalist not only has special inducements to gratitude for the endowment of knowledge but also his intelligence gives him a special obligation to express his gratitude in the way I have been recommending; it is one of the most acceptable ways it can be expressed in, especially since in this way philosophers can not only exercise their own gratitude towards God but procure him the gratitude of others. How pleasing men's hearty praises are to God is shown among other things by what is said and

done by the royal poet whom God was pleased to declare a man after his own heart; for he introduces God pronouncing 'Whoso offereth praise glorifieth me', where the word our interpreters translate as 'offereth' in the Hebrew signifies to *sacrifice*, which agrees with the fact that elsewhere those who pay God their praises are said to sacrifice 'to him the calves of their lips'. And the excellent person to whom God gave such a particular testimony was so assiduous in this exercise that the book that we (following the Greek) call 'Psalms' is in the original called 'Sepher Tehillim', i.e. *The book of praises*, because praises are what it most abounds with. And to let you see that many of his praises were of a kind that the naturalist may best give, he exclaims in one place:

How manifold are thy works, O Lord! how wisely hast thou made them. . . .

and elsewhere

The heavens declare the glory of God, and the firmament showeth his handiwork etc.

and in another place

I will praise thee, because I am fearfully and wonderfully made. Marvellous are thy works, and that my soul knoweth right well.

And not content with many such expressions he several times, in a devout rapture and poetic strain, invites the heavens and the stars and the earth and the seas and all the other inanimate creatures to join him in celebrating their common maker. This may seem to be merely a poetical figure of speech, but in a way it might be a suitable thing for a naturalist to say. By

- seeing the power, wisdom, and goodness of the creator, and by
- reflecting on the particulars in which those attributes shine

he engages in a devout consideration of created things which may make them (in a sense) join in glorifying their author.

In any other context, I dare say, your friend is well-natured enough to think it an unkind piece of ingratitude if after some great and excellent prince had freely and transcendently obliged him he did not •concern himself to know what manner of man his benefactor is, and •be anxious to inform himself of the details concerning the person and affairs of that obliging monarch that were not only in themselves worthy of any man's curiosity but that the prince had solemnly declared he was very desirous to have men inquire into. And surely it is very wrong-headed to undervalue or neglect •the knowledge of God himself in favour of •a knowledge which we cannot attain without him and by which he designed to bring us to the study we are neglecting for it. This is not only

- not to treat him as a benefactor, but
- to treat him as if we meant to punish him (if I may so speak) for having done good to us, because we so abuse some of his favours as to make them inducements to our ungrateful disregard of his intentions in the rest.

And this ingratitude is the more culpable because the laws of decency and of justice itself command us to glorify the maker of all things visible, not only on our own account but on account of all his other works. Because God endowed none but man here below with a reasonable soul, not only is he the sole visible being that can return thanks and praises in the world, and thereby is obliged to do so for himself and for the rest of the creation, but also it is for man's advantage that God has left no other visible beings in the world by which he can be studied and celebrated. Why? Because reason is such a ray of divinity that if God had given it to other parts of the universe besides man, the absolute dominion of man

over the rest of the world would have to have been shared or abridged. So that he for whom it would have been as easy to make creatures superior to man (as the Scripture tells us of 'legions' and 'myriads' of angels) as to make them inferior to him dealt so obligingly with mankind as to •trust (if I may so speak) our honesty to bring him celebrations from created things we converse with rather than to •lessen our dominion over them or our prerogatives above them.

Knowing the Apostles' Creed is not enough

But I fear that despite all the excellence of revealed truths—and thus of the only authentic repository of them, the Scripture—you and I have both met with *some* (I hope there are not *many*) virtuosi [see Glossary] who think they can excuse their neglect of the study of it by claiming that to them who are laymen, not ecclesiastics, the explicit knowledge required for Salvation consists in a very few points that are so plainly summed up in the Apostles' Creed, and are so often and conspicuously set down in the Scripture, that one does not need to search or study it much to find them there.¹ In answer to this claim I readily grant that through the great goodness of God, who is willing to have all men saved and come to the knowledge of the truth that is necessary to be so, there are many fewer articles •of faith• absolutely necessary to be distinctly believed by all men than are to be found in various long confessions of faith (some of which have, I fear, less promoted knowledge than impaired charity). But then there are four points to bear in mind. **(1)** A rational man

who will not trouble himself to enquire any further than the Apostles Creed will find it hard to satisfy himself on good grounds that all the fundamental articles of Christianity *are* contained in it. **(2)** The Creed proposes only the credenda [see Glossary] and not the agenda [see Glossary] of religion; whereas the Scriptures were designed not only to teach us what truths we are to believe but what rules we are to live by—obedience to Christianity's laws being as necessary to salvation as belief in its mysteries. **(3)** In addition to the things that are absolutely necessary, there are several that are highly useful in making us more clearly understand, more rationally and firmly believe, and more steadily practise the points that *are* necessary. **(4)** [Boyle introduces, in a rather complicated way, Jesus's 'What I do thou. . . shalt know hereafter' [John 13:7], saying that 'know' may be a mistranslation for Greek meaning 'search [the scriptures] for', and that there's a question about whether this was meant as a prediction or a command; and he goes on to say that either way there is no doubt about the imperative nature of Paul's 'Let the word of Christ dwell in you richly' [Colossians 3:16]. He continues:] This teaches us that searching into the matters of religion may become necessary as a duty even if it were not otherwise necessary as a means of attaining salvation. And indeed it is far more pardonable to lack or miss the knowledge of truths than to despise or neglect it. God's goodness to illiterate or mistaken persons should be taken as pity for our frailties, not encouragement for our laziness. He who pardons seekers of his truths who miss them will not necessarily excuse despisers who will not seek them.

¹ [As given in the Book of Common Prayer, 1662, the Apostles' Creed reads thus: 'I believe in God the father almighty, maker of heaven and earth; and in Jesus Christ his only son our lord, who was conceived by the Holy Ghost, born of the virgin Mary, suffered under Pontius Pilate, was crucified, dead, and buried; he descended into hell; the third day he rose again from the dead; he ascended into heaven, and sitteth on the right hand of God the father almighty; from thence he shall come to judge the quick and the dead. —I believe in the Holy Ghost; the holy catholic church; the communion of saints; the forgiveness of sins; the resurrection of the body, and the life everlasting.'

The call of intelligence and intellectual energy

Whether or not by this deliberate neglect of theology the persons I am discussing are careful enough about their own safety, I do not think their conduct says much for their decency. To have received from God a greater measure of intellectual abilities than the general run of Christians, and yet willingly to come short of very many of them in knowledge of the mysteries and other truths of Christianity—which he often invites us, if not expressly commands us, to search after—is conduct that doesn't suggest excessive gratitude! Is it an instance of gratitude and of decency

- to receive one's understanding and one's hopes of eternal felicity from the goodness of God without being solicitous of what can be known of his nature and purposes by so excellent a way as his own revelation of them?
- to dispute anxiously about the properties of an atom and be careless about the inquiry into the attributes of the 'great God who formed all things'?
- to investigate the spontaneous generation of such lowly creatures as insects more than the mysterious generation of the adorable son of God?

and, in short,

- to be more concerned to know everything that makes a corporeal part of the world than ·to know about· the divine and incorporeal author of the whole?

And when these men put so little value on truths that God thought fit to send sometimes prophets and apostles, sometimes angels, and sometimes his only son himself to reveal

that rather than taking trouble to study them they will implicitly (and riskily!) believe whatever is (truly or falsely) said about them by the society of Christians they happen to be born and bred in, do you think they are showing vast respect? And does it show a due regard for points of religion when those who would not believe a proposition in statics (perhaps about a mere point, the centre of gravity) or in geometry (about the properties of some nameless curve or the like)—things ignorance of which is usually not a blemish, and error about which is even more usually without danger—should yet take up the articles of faith, concerning matters of great and everlasting consequence, on the authority of men as fallible as themselves, when satisfaction can be had without them from the infallible word of God? . . .

Again, if a man refused to learn to read any more than just as much as may serve his turn by entitling him to the benefit of the clergy to save him from hanging,¹ would these men think so small a measure of literacy as he had acquired for such a reason could prove that man to be a lover of learning? Similarly, someone who neglects the study of all not-absolutely-necessary divine truths during his life because believing the articles of the creed may manage to keep him from being doomed to hell for ignorance after his death will not be qualified by that degree of knowledge—a *pitiful* one by the standards of a learned man—to count as having the honest love for God and his truths that is appropriate for a rational creature and a Christian.

The ancient prophets, though honoured by God with direct illuminations, were yet very anxious to find out and learn the very circumstances of the evangelical dispensations, which they did not yet know. And some of the

¹ [i.e. to learn to read well enough to count (for legal purposes) as a cleric, and therefore to be tried in a clerical court (with no death penalty) rather than a civil court in which the death penalty was possible.]

gospel mysteries are so noble and excellent that ‘the angels themselves desire to look into them’. And though not all the evangelical truths are precisely necessary to be known, it may be both a duty not to despise the study of them and a happiness to engage in that. It was the earnest prayer of a great king, who was equally a prophet, that his eyes might be opened to behold (not the obvious and necessary truths, but) ‘the wondrous things of God’s law’. At the beginning of the Apocalypse [= book of Revelation] it is said that he is *happy* who reads and observes the things contained in that dark and obscure part of Scripture. And it was not only the truths that make articles of the creed but various other doctrines of the gospel that Christ himself judged worthy to be rounded off with this final sentence: *He that hath ears to hear, let him hear*, for which the excellent Grotius offers this just paraphrase: ‘Intelligence was given to us by God above all so that we might contemplate him in the writings that belong to piety.’

3. Advantages accruing from a study of theology

I come now to our third and last [see page 5] inducement to the study of divine things, namely that the advantages of that study surpass those of all other contemplations by as much as divine things transcend all other objects. And indeed the utility of this study is so powerful a motive and contains in it so many invitations that your friend must have as little sense of self-interest as of gratitude if he can neglect such powerful and such engaging invitations!

Delight

In the first place, theological studies ought to be highly endeared to us by the *delightfulness* of considering such noble and worthy objects as it proposes.

The famous answer given by an excellent philosopher who was asked what he was born for and replied ‘To contemplate the sun’ implies approval for the choice of those who spend their time in contemplating the maker of the Sun, of whom that glorious heavenly body itself is but a shadow. And perhaps that philosopher’s general point was better than his instance of it; for his answer implies that man’s end and happiness consists in the exercise of his noblest faculties on the noblest objects. Surely the seat of formal happiness is the soul, so that happiness consists in the operations of the soul’s faculties; just as the supreme faculty of the mind is the understanding, so the highest pleasures may be expected from the appropriate exercise of the understanding on the sublimest and worthiest objects. Therefore I am not surprised that though some schoolmen assign the will a larger share in man’s felicity than they will allow the intellect, most of them are quite of another opinion and ascribe the pre-eminence in point of felicity to the superior faculty of the soul. But whether or not this is true in all cases, it may at least be admitted in ours. For the chief objects of a Christian philosopher’s contemplation, being God’s infinite goodness as well as his other boundless perfections, are naturally fitted to excite in his mind •an ardent love of that adorable [see Glossary] being and •those other joyous affections and virtuous dispositions that have made some men think that happiness is chiefly seated in the will.

But having intimated this much by the way, I pass on to add that the contentment provided by the assiduous discovery of God and divine mysteries has so much affinity

with the pleasures that will make up men's blessedness in heaven itself that they seem to differ in degree rather than in kind. For the happy state even of angels is represented by our Saviour as consisting in the fact that 'they continually see the face of his father who is in heaven'. And elsewhere the same infallible teacher, intending to express the celestial joys that are reserved for those who for their own sake denied themselves sensual pleasures, employs the vision of God as an emphatic way of referring to *felicity*: 'Blessed are the pure in heart,' he said, 'for they will see God.' And just as Aristotle teaches that the soul does in a way *become* that which it thinks about—because the *form* of the thing will enter the soul.—St. Paul and St. John assure us that God is a *transforming* object, and that in heaven we will be like him because we will see him as he is. And though I readily admit that this beatific vision of God of which the understanding is the proper instrument includes various other things that will jointly contribute to the complete felicity of the future life, I think we may be allowed to argue that that ravishing contemplation of divine objects will make a considerable part of the happy condition these texts refer to in language implying that this contemplation is the whole of it.

I have indicated that the Scripture attributes to the angels themselves transports of wonder and joy in contemplating •God and •the exercises of his wisdom, justice, or other attributes. You may think that in referring you to the angels I am laying aside the person of a naturalist [see Glossary] in favour of divines. If so, I refer you to Descartes himself, whom I am sure your friend will admit to have been a strict philosopher if ever there was one. In that treatise—the *Meditations*—where he thinks he employs a more than mathematical rigour, the impressions made on him by the transcendent excellence of the object he contemplated forced him to utter these (I had almost said *passionate*) words:

'But before examining this point more carefully and investigating other truths that may be derived from it, I want to pause here and spend some time contemplating God; to reflect on his attributes and to gaze with wonder and adoration on the beauty of this immense light, so far as the eye of my darkened intellect can bear it. For just as we believe through faith that the supreme happiness of the next life consists in contemplating the divine majesty, so experience tells us that this same contemplation, though much less perfect, yields the greatest joy we can have in this life.'

Satisfied conscience

But high as the satisfaction is that the study of divine things provides by the nobleness of its object, that same study yields nearly as much contentment through a man's sense of having, in it, performed his duty. To make actions of this nature satisfactory to us there is no need for the things we are employed about to be in themselves excellent or delightful; the inward gratification of conscience for having done our duties is able to gild the bitterest pills and, like the wood that grew by the waters of Marah, to correct and sweeten the liquid that before was the most distasteful. Those ancient pagan heroes whose virtues may make us blush, being guided only by natural reason and innate principles of moral virtues, could find the most difficult and most troublesome duties not only tolerable but pleasant, merely on account of their being duties. And though in our saviour's estimation denying some lusts is as unpleasant as plucking out your right eye or cutting off your right hand, even ladies—such as the Christian martyr Theodora—have with satisfaction chosen not only to deny themselves the greatest pleasures of the senses but even to sacrifice the

seat of them, the body itself, to preserve the satisfaction of being chaste. Nor is it only the dictates of obedience that we comply with in this study, but those of gratitude; and that is a virtue that has so much power over honest minds that some people whose principles and aims were not elevated by religion have, in acknowledgement to their parents and their country, courted the greatest hardships, hazards and sufferings, as if they were as great delights and advantages. And a grateful person spends no part of his life in greater satisfaction than that which he ventures or employs for those to whom he is obliged for his life; and often finds a greater contentment in even the most difficult acknowledgements of a favour than he did in receiving it.

Self-improvement

Another advantage, and not a small one, that may arise from the contemplation of theological truths is the improvement of the contemplator himself in respect of piety and virtue. For just as the gospel is called ‘the mystery of godliness’, and St. Paul elsewhere calls what it teaches ‘the truth which is according to godliness’—i.e. a doctrine formed and fitted to promote the interests of piety and virtue in the world—so this description and praise belongs (though perhaps not equally) to •the more inconspicuous truths discovered by speculation [here = ‘theological research’] as well as to •the more obvious ones that are familiarly taught in catechisms and confessions of faith. I would by no means lessen the excellence and prerogatives of fundamentals; but since the grand and noblest engagements to piety and virtue are a high veneration for God and his Christ and an ardent love of them, I cannot help thinking that the particular inquiries that tend to make greater discoveries of

the attributes of God, the nature and offices and life of our saviour, and the wisdom and goodness they have displayed in planning and bringing about man’s redemption

also tend to increase our admiration and inflame our love for the possessors of such divine excellencies and the authors of such invaluable benefits. . . . Nor is it likely that he who discerns more of the depth of God’s wisdom and goodness will not, other things being equal, be more disposed than others to admire him, to love him, to trust him, and so to allow himself to be governed by him; and this frame of mind •is itself a great part of the worship of God and •directly tends to the production and increase of the virtues without the practice of which (the Scripture plainly tells us) we can neither obey God nor express our love to him. And from this bettering of the mind by the study of theology will incidentally flow another benefit, namely that by giving us a higher value for God and his truths it will endear heaven to us, helping us to get there *and* heightening our felicity when we are there.

I know it may be said that the improvement of the mind is only a moral advantage. But give me leave to answer that •it is a moral advantage that presupposes an intellectual improvement from which it results, and also that •a moral benefit may be great enough, even in the judgment of a mere philosopher and an Epicurean, to deserve as much study as natural philosophy itself. And so that you won’t think that I say this only because in this letter I am writing only as a friend to divines, I will tell you that Epicurus himself, who has nowadays such a numerous sect of naturalists to follow him, studied physics and wrote many treatises about physical matters for this •moral• purpose: so that the mind, by knowing the natural causes of thunder, lightning and other dreadful phenomena, might be freed from the disquieting fears men commonly had that such strange and

formidable things came from some angry deity, and so might trouble the mind as well as the air. This account I have been giving of Epicurus's design seems plainly enough indicated by his own words, preserved for us by Laertius near the end of his letter on physics to Herodotus, where, recommending to him the consideration of what he had said about physical principles in general and meteoric phenomena in particular, he adds: 'If we attend to these things we will give a correct and complete causal account of the source of our disturbance and fear, and so dissolve them.' This fits with what he says at the end of his letter on meteorology to Pythocles; according to his best interpreter, Gassendi, he says: 'Most important, devote yourself to the contemplation of the basic principles from which everything follows, and the nature of the infinite, and things related to them; attend also to the criteria and the feelings and the purpose for which we reason about these things—tranquility and an unperturbed mind.' But this is not all the testimony to the same effect that I can give you from Epicurus himself, for among his *Principal Doctrines*, preserved for us by Laertius (himself reputed to be an Epicurean), I find one that goes further: 'If our suspicions about heavenly phenomena and about death did not trouble us at all and were never anything to us, and if not knowing the limits of aims and desires did not trouble us, then we would have no need for natural science.' Although I do not at all agree with Epicurus's view that the only considerable purpose for physiology [see Glossary] is to free the mind from the belief in a provident deity and the soul's immortality, we can get something from these declarations that in Epicurus's opinion a moral advantage that relates to the government of feelings may reward the trouble of inquiring into nature.

It appears that a mere philosopher who admitted no providence might think it worth his efforts to search into the most abstruse parts of physics and the most difficult phenomena

of nature, only to ease himself of one troublesome feeling, fear; so it need not be thought unphilosophical to pursue a study that will not only •restrain one undue passion but •advance all virtues, free us from all *servile* fears of the Deity, tend to give us a strong well-grounded hope in him, making us view God's greatest power not with terror but with joy.

Consolation

The study of divine truths has yet another advantage, which is too great to be omitted here. While we inhabit our 'cottages of clay' and dwell in this vale of tears, there is hardly anything we encounter more than *afflictions*; so it should considerably endear to us a study that can be easily made to provide us with very powerful consolations in that otherwise unhappy state.

I know it may be said that the speculations about which the naturalist is busied are pleasing diversions as well as noble employments of the mind. And I do not deny that they are often so, when the mind is not hindered from applying itself attentively to them; so that slight and short afflictions may well be weathered out by these philosophical activities; but the greater and sharper sort of afflictions, and the approaches of death, require more powerful remedies than these diversions can afford us. For in such cases, the mind is usually too much discomposed to apply the attention needed for finding pleasure in theorising in physics; and in sicknesses the soul often has as little taste for the pleasures of merely human studies as the languishing body has for the food which at other times was delightful. And few can take any great pleasure in studying the world when they apprehend themselves to be on the point of being driven out of it and in danger of losing all their share in the objects of their contemplation. Knowing that

- the three angles of a triangle are equal to two right ones, or that
- heat is not a real quality (as the schoolmen say) but a special case of the motion of the insensible parts of matter
- and pain not a distinct, inherent quality in the things that produce it but a state of the pained person's sensibility,

will not have much effect on our feeling of the burning heat of a fever or the painful gripes of the colic! The naturalist's activities bring him no consolations that are especially addressed to or exclusive to the state of affliction; and the occupations they present him with •distract his mind from attention to lesser evils rather than •bringing it any advantages to remove or compensate for them; so they work in the manner of opiates rather than of true medicines.

But now if such a person as Dr N. [see page 4] falls into adversity, the case is much otherwise; for when the study of divine things is such as it ought to be, though that study is in itself •an act or exercise of reason, its being engaged in out of obedience, gratitude and love to God makes it—on account of its motives and its aim—•an act of religion; and because it comes from obedience, thankfulness and love to God it is most acceptable to him; and because of his own appointment as well as his goodness it is a most proper and effective means of obtaining his favour; and then I presume it will easily be granted that someone who is so happy as to enjoy *that* can hardly be made miserable by affliction. For—setting aside for now the commonplace of the benefits of afflictions to those who love God and to those who are loved by him—it may suffice that he who (as the Scripture says) 'knows our frame', and has promised those who are his that they will not be 'overburdened', is disposed and accustomed to give his afflicted servants comforts that are

both •extraordinary and •appropriated to that state. Whereas on the one hand

natural philosophy is like its brightest object, the stars, which, however much pleasure the astronomer gets from contemplating them, are mere **natural agents** and so cannot provide him with a kinder influence than usual if he is ill in bed or in prison,

on the other hand

the almighty and compassionate maker of the stars, being a **voluntary agent** (and indeed the most free one), can suit and proportion his reliefs to our needs and alleviate our heaviest afflictions by consolations giving us so much support that the afflictions can never surmount our patience [see Glossary] and are often unable so much as to hinder our joy;

and when death, that 'king of terrors' presents itself, whereas the mere naturalist sadly expects to be deprived of the pleasure of his knowledge by losing the senses and the world that are the instruments and the objects of it; and perhaps (discovering beyond the grave nothing but a state either of eternal destruction or of eternal misery) fears either to be confined for ever to the sepulchre or exposed to torments that will make even such a condition desirable;

on the other hand

the pious student of divine truths is not only •freed from the wracking fears of having his soul annihilated or cast into hell but •enjoys a comfortable expectation of finding far greater satisfaction than ever in the study he now rejoices to have pursued; because the change that others rightly find to be formidable will merely bring him much nearer to the divine objects of his devout curiosity, and strangely elevate and enlarge his faculties to take them in.

Prospect of reward

This leads me to the mention of the last advantage of the study I would persuade you to, which is indeed the highest advantage that can recommend any study or invite men to any undertaking. It is no less than the everlasting enjoyment of the divine objects of our studies •hereafter and the comfortable expectation of it •here. For the employment of one's time and abilities in admiring the nature and providence of God and contemplating the divine mysteries of religion is not only

- one of the chief of those homages and services by which we venerate and obey God, but also
- one of those to which he has been pleased to assign no less a reward than the enjoyment of himself—the greatest reward there can be.

Various saints and angels in heaven have been employed to convey the truths of theology, and are anxious to look into those sacred mysteries; and God has chosen to ordain that those men who study here the same lessons that they do there will study them in their company hereafter. And doubtless though heaven will abound with inexpressible joys, it will not be a minor component of the happiness even of that place that the knowledge of divine things that was so zealously pursued here will be completely attained there. For the things that most excite our desires and quicken the curiosity and industry of our searches here will not only continue there but will be improved to a far greater measure of attractiveness and influence. That is because all those interests, passions and lusts that here below either

- hinder us from clearly discerning, or
- keep us from sufficiently valuing, or
- divert us from attentively enough considering

the beauty and harmony of divine truths will there be either abolished or transfigured. And as the object will be unveiled, so our eye will be enlightened; that is, as God will there disclose those worthy objects of the angels' curiosity, so he will enlarge our faculties to enable us to gaze on those sublime and radiant truths without being dazzled, truths whose harmony and splendour we will then be qualified to discover and consequently to rapturously admire. And this enlargement and elevation of our faculties will proportionately increase our satisfaction at the discoveries it will enable us to make. For theology is like a heaven that has more stars than appear in it to our eyes, which are not quick-sighted and piercing enough to reach them. And as the milky way and other whiter parts of the firmament have been full of immortal lights from the beginning, and our new telescopes have not placed them there but found them there; so when our Saviour after his glorious resurrection instructed his apostles to teach the gospel, it is not said that he altered anything in the Scriptures of Moses and the prophets but only opened and enlarged their intellects so that they could understand the Scriptures. And the royal prophet makes it his prayer 'that God would be pleased to open his eyes, that he might see wonderful things out of the law'; being. . . .so well satisfied that the word of God did not lack admirable things that he is only concerned for the improvement of his own eyes so that they would be qualified to discern them.

Reward for attempt, not for success

I had almost forgotten one aspect of the advantages of theological studies that is too considerable to be left unmentioned. I have spoken of the great benefits arising from the knowledge of divine truths; but to endear theological studies I can safely add that to procure us these benefits the actual attainment

of that knowledge is not always absolutely necessary, and a hearty endeavour after it may suffice to entitle us to them. The patient alchemist who consumes himself and his wealth in seeking after the ·mythical· philosopher's stone, if he does not find his idolised elixir he would have done as well—indeed better—never to have sought it, and remains as poor in effect as he was rich in expectation. The farmer who employs his seed and time to obtain from the ground a plentiful harvest must, if an unkind season happens, see his toil made fruitless—‘the long labours of the year are vain’ [Ovid].

Too many patients who have punctiliously done and undergone all that physicians could prescribe for recovery meet at last with death instead of health. You know how skilful geometricians have been entertained by the laborious attempts even of such famous writers as Scaliger, Longomontanus, and other tetragonists [= ‘would-be squarers of the circle’]; and that their successor Mr Hobbes, after all the methods he has adopted (and others he has proposed) to square the circle and double the cube, by failing in his various attempts has come off not only with disappointment but with disgrace. And (to give an example even in things celestial) how much trouble has been taken to find out longitudes and make astrological predictions with some certainty, the failure in which has have been useless if not prejudicial to the attempters.

But God (to speak with St. Paul on another occasion) ‘who made the world and all things therein, and is Lord of heaven and earth, seeks not our services as though he *needed* anything, seeing he giveth life and breath and all things’. His self-sufficiency and bounty are such that he seeks in our obedience the occasions of rewarding it, and prescribes us

services because the practice of them is not only suitable to our rational nature but such as will prevail with his justice to let his goodness make our persons happy. Agreeably to this doctrine we find in the Scripture that Abraham is said to have been justified by faith when he offered his son Isaac on the altar (though he did not actually sacrifice him), because he tried to do so; and God, accepting the will for the deed, accepted the blood of a ram instead of Isaac's.

And thus we know that it was not David but Solomon who built the temple of Jerusalem, and yet God says to David (as we are told by Solomon) ‘For as much as it was in thine heart to build a house for my name, thou didst well in that it was in thine heart; notwithstanding thou shalt not build the house’ etc. And if we look to the other details of this story, as they are presented in the second book of Samuel, we will find that on David's declaration of a design to build God a house, God himself condescends to honour him, as he once did Moses, with the unique title of his ‘servant’, and commands the prophet to say to him ‘Also the Lord tells thee that he will make thee a house’, to which is added one of the most gracious messages that God ever sent to any man.¹

From this we can learn that God approves and accepts even the endeavours (of his servants) that never come to be actually accomplished, if they are real and sincere. Good designs and endeavours are our part, but the outcomes of those—as of all other things—are in the all-disposing hand of God who if we are true to what lies in us will not •allow us to be losers by the defeating dispositions of his providence but will •crown our endeavours either with success or with some other recompense that will keep us from being losers by missing success.

¹ [It is several verses long, and ends with: ‘And thine house and thy kingdom shall be established for ever before thee: thy throne shall be established for ever’ (2 Samuel 7:16).]

And indeed if we consider the great eulogies that the Scripture, frequently as well as justly, gives to God's goodness (which it represents as over, or as above, all his works) and consider that his 'purer eyes' see *and punish* the murder and adultery of the heart when those intentional sins are hindered from advancing into actual ones, we can hardly doubt that he whose justice punishes sinful aims will allow his infinite goodness to recompense pious attempts. And therefore our Saviour pronounces 'blessed' those who 'hunger and thirst after righteousness', assuring them that they will be satisfied, thereby sufficiently intimating to us that an earnest desire after a spiritual grace (such as the knowledge of divine things) may entitle a man to the complete possession of it, if not in this life then in the next. *There* we will no longer 'walk by faith but by sight', and obtain knowledge as well as other endowments befitting that glorious state in which (we are assured by him who purchased it for us) we will be equal to, or like, the angels.

I hope that the considerations I have so far laid before you to recommend the study of divine truths have persuaded you, Sir, that it is on many accounts both noble and eligible

in itself; and therefore I shall here conclude Part I of this work. And because the undervaluation that Physeophilus [see Glossary] expresses for that excellent employment seems to flow mainly from his fondness and partiality for natural philosophy, it will next concern us to *compare* the study of theology with that of physics, and show that the advantages your friend alleges in favour of the latter are partly •much lessened by disadvantageous circumstances and partly •much out-weighed by the transcendent excellencies of theological contemplations, the study of which will thereby appear to be not only eligible in itself but preferable to its rival. I must warn you to expect to find Part II, which undertakes to make this comparison, a good deal longer than Part I, not only •because it often requires more trouble and more words to detect and disprove an error than to make out a truth, but also because various things tending to the credit of divinity, which consequently might have been brought into Part I, were thought more fit to be interwoven with other things in the answers made to the objections examined in Part II.

Part II

Comparing the advantages of natural philosophy and theology

1. The delights and drawbacks of natural philosophy

Preliminaries

I shall without preamble begin this part of the work by considering the delightfulness of physics as the main thing that seduces your friend and various other virtuosi away from relishing—as they *ought*, and otherwise *would*—the pleasantness of theological discoveries. And to be open with you I shall not scruple to acknowledge that although my courting of nature has lasted several years and has been laborious enough and not inexpensive, I have been pleased enough with the favours (such as they are) that nature has from time to time granted me not to complain of having been unpleasantly employed. But though I readily admit that the attainments of naturalists can give philosophical souls sincerer pleasures than those that the more undiscerning part of mankind is so fond of, I must not therefore accept that they surpass—or even that they *equal*—the contentment that can come to a soul qualified by religion to get the best enjoyment from some kind of theological contemplations.

I presume that this will sufficiently appear if I show you in the first subsection that the study of physiology [see Glossary] is attended with considerable inconveniences, and in the second and third subsections that the pleasantness of it can be enjoyed with endearing circumstances by a person who is *also* studious of divinity.

But before I name any of the particular reasons that I am

to present, I'm afraid I need to interpose a few words—one long paragraph—to block a mistake which, if not prevented, may lead to a misunderstanding not only of this section but of a great deal of Part II. I know that it may be said that whereas I allege various things to lessen the delightfulness of the study of physics, and to depreciate some other advantages by which the following sections would recommend it, some of the same things may be objected against the delightfulness of the study of divinity. But I presume that this objection will not much move you if you consider the argument and scope of the two Parts of this letter. For I have shown by positive proofs in Part I that the study of theology is accompanied by various advantages, some belonging to it and to nothing else, and some belonging to it much more than to anything else. And now I come to consider in Part II whether what is alleged on behalf of the study of philosophy deserves to counter-balance those prerogatives or advantages. So I do not need, and do not intend, to compare (for instance) the delightfulness of the two studies, theology and physics; my aim is only to weaken the argument that is drawn from the delightfulness of physics to conclude that it is preferable to the study of theology—weakening it by showing the inconveniences that are mixed in with the delightfulness of physics. So that my work in this and the following sections is not so much to institute comparisons as to block or answer allegations. Because I have in Part I based the excellence of the study of divinity chiefly on the great advantages that are exclusive to it, my reasonings would not be frustrated if it appeared that in respect of

•delightfulness, •certainty, etc. that study was in many cases open to the same objections as the study of nature, because I recommended divinity not mainly for •those qualities but for other excellences that are exclusive to it. Thus, even if the delightfulness etc. of theology and of physics were weakened by the same or equal inconveniences or imperfections, that would not stop the scales from being swayed in favour of divinity, because of the advantages that are unquestioned and that belong exclusively to it. I do not know whether I need add this: You are not to expect me to give philosophy the wounds of an enemy. My aim is not to discourage you or any able man from

- courting it at all, or from
- courting it much, but from
- courting it too much, and despising divinity for it.

So I employ against it not a **sword** to wound it but a **balance** to show that its excellences, though solid and weighty, are less so than the preponderating ones of theology. And this attitude and purpose of mine makes my task difficult enough to have perhaps some *right to* your pardon—as well as some *need for* it—if I do not everywhere steer so exactly as to avoid ·on one side· injuring the cause I am to plead for and ·on the other· disparaging a study that I am so far from depreciating that I allow it a great part of my inclinations and not a little share of my time. Having said this to keep the design of this work from being misunderstood, I hope we may now proceed to the particulars whose scope I have been declaring.

The laboriousness of true physics

Returning then to what I was about to say before this long but needed preliminary explanation interrupted me, I shall resume my discussion of the delightfulness of the study of physics, about which I was going in the first place to tell you

that I know you and your friend will freely grant me that the knowledge of the empty and barren physiology that is taught in the schools demands not much trouble to be acquired and provides little satisfaction when attained. And as I know you will give me leave to say this, so I shall take leave to say also—being warranted by considerable experience of my own—that **(1)** the study of the experimental philosophy of which your friend is so much enamoured is, if done properly, a very troublesome and laborious employment. To mention just one aspect of this: the great variety of objects that the naturalist is obliged—not only by his curiosity but also by their secret dependences on one another—to *consider* and to *handle* in various ways will involve him in needing and consequently hiring such a variety of mechanic people (as distillers, drugsters, tinsmiths, lathe-operators etc.) that a great part of his time and perhaps all his patience will be spent in waiting on tradesmen,

the next phrase: and repairing the losses he sustains by their disappointments,

presumably meaning: fixing the experimental apparatus after they have botched it,

which is a drudgery greater than can be imagined by anyone who has not experienced it, and which—being as inevitable as it is unwelcome—very much counter-balances and weakens the delightfulness of the study I am discussing, in which so great a part of a man's care and time must be laid out in providing the apparatuses necessary for conducting experiments.

(2) But this is not all. For when you have brought an experiment to a result, though the outcome may often be one you are pleased with, it will seldom prove to be one you can acquiesce in. For the experience of an inquisitive mind studying the book of nature is not like that of someone

reading Aesop's *Fables* or some other collection of assorted moral tales that are independent of one another, where

when you have read as many at one time as you think fit you may leave off when you please and go away with the pleasure of understanding those you have read, without being solicited by any troublesome itch of curiosity to read the rest, as though they were needed for the better understanding of the ones already read, which can hardly be explained without them.

In the book of nature, as in a well-constructed work of fiction, the parts are so connected and inter-related, and the things we want to know are so darkly or incompletely knowable through those that precede them, that the mind is never satisfied till it comes to the end of the book. Until then everything that is discovered in one's progress through the book is unable to keep the mind from being molested with impatience to find what is still concealed, which will not be known till one does at least make some further progress. Whereas the full discovery of *nature's* mysteries is so unlikely to fall to any man's share in this life that the situation of the pursuers of them is at best like that of someone who comes across some excellent romance of which he will never see the later parts. For indeed (to speak now without a simile) there is such a relation between natural bodies—they can in so many ways (and many of them unobserved) affect or be affected by one another—that someone who makes a new experiment or discovers a new phenomenon must not immediately think that he has discovered a new truth or detected an old error. If he is a considering man, he will often find reason to wonder whether the experiment or observation has been so skillfully and warily made in every detail as to provide him with such an account of the matter of fact as a severe naturalist would desire. And even if the historical part—the matter-of-fact account of what actually happened

in that experiment—is in no way defective, there are many other cases in which many different agents may produce the exhibited phenomenon or have a great influence on the experiment or observation; so many of them that anyone to whom experiments do not often •suggest new doubts as much as •present new phenomena must be less vigilant than is appropriate for a philosopher.

(3) And even the trials that end in real discoveries do—because of the connection of physical truths and the relations that natural bodies have to one another—give such hopes and such desires of applying what we have already learned to •solving other difficulties or •making further discoveries that an inquisitive naturalist finds his work to increase daily on his hands, and the outcome of his past labours, whether it be good or bad, only engages him in new ones, either to (2) free himself from his scruples or (3) improve his successes.

So that although the pleasure of making physical discoveries is in itself very great, it is considerably impaired by the fact that the same attempts which provide that delight also frequently create both (2) anxious doubts and (3) a disquieting curiosity. So that if knowledge is as some philosophers have styled it the food of the rational soul, I fear I may too truly say that the naturalist usually has to live on salads and sauces, which though they yield some nourishment arouse more appetite than they satisfy. They give us indeed the pleasure of eating with a good stomach, but then force us always to rise hungry from the table.

Of various things that lessen the delightfulness of physiological studies I have written at such length in other papers that I might well refer you to them; but indeed it is not necessary that I should insist on this argument any further. It is true that such a reference might be very proper if theology related to physics as it does to necromancy or some other part of unlawful magic, where theology could

not be enjoyed without an abhorrence of the other. But as the two great books—of nature and of Scripture—have the same author, the study of the latter does not at all hinder an inquisitive man's delight in the study of the former. The doctor I am pleading for [see pages 4 and 33] may enjoy a physical discovery as much as Physeophilus does; indeed, by being devoted to theology and religion he is so far from being incapable of the contentments arising from the study of nature that beside the things that recommend it to others there are several things that endear it to him in particular. I shall describe two of them.

Things are better for a devout Christian physicist (1)

He has the contentment to look on the wonders of nature not only as the productions of an admirably wise author of things but of one he entirely honours and loves, and *to whom he is related*. Someone who reads an excellent book or sees some rare piece of machinery will be otherwise affected by the reading or the seeing if he knows it to have been made by a friend or a relative than if he considers it only as made by a stranger whom he has no particular reason to be concerned for. And if Rehoboam did not fall away from the sentiments of mankind as well as from his family he could not help looking on that magnificent temple of Solomon differently from the throngs of strangers who came only to gaze at it as an admirable piece of architecture, while he considered that it was his father who built it. And if (as we see)

the same heroic actions that we read in history of some great monarch, which strangers barely and unconcernedly admire, the natives of his country not only venerate but affectionately interest themselves in because they are his countrymen and their ancestors were his subjects,

how much may we suppose the same actions would affect them if they had the honour to be that prince's children? So we may well presume that it is with a singular satisfaction that the contemplator of nature whom I am speaking of discovers in all the wonders of nature how wise, potent, and bountiful the author of nature is—the author in whom he has a great interest, such a great one that he is admitted into the number of his friends and adopted into the number of his sons, and is thereby to some extent concerned in all the admirations and praises that are paid by himself or by others to the adorable [see Glossary] attributes that God has displayed in that great masterpiece of power and wisdom, the world. And when he makes greater discoveries in these expressions and adumbrations [= 'faint indications'] of the divine perfections, the delightfulness of his contemplation is proportionally increased for a reason like

that which endears to the passionate lover of some charming beauty an especially fine picture of her; because that the same things that •make him (like other viewers) look on it as a finer piece also •make him look on it as the more like his mistress, and thereby •entertain him with sublimer ideas of the beloved original, to whose transcendent excellences he supposes that the noblest representations must be the most resembling.

Things are better for a devout Christian physicist (2)

And there is a further reason why our contemplator should find a great deal of contentment in these discoveries. For we have in our nature so much imperfection, and yet so much inclination to self-love, that we too confidently proportion our ideas of what God can do for us to what we have already the knowledge or the possession of. And although when we

set ourselves to it we are able with much fuss and trouble to enlarge somewhat our apprehensions and raise our expectations beyond their usual level, they will not be much promoted and heightened if the things we are satisfied with surpassing are themselves mean and ordinary. A country villager, born and bred in a homely cottage, cannot have any suitable idea of the pleasures and magnificence of a great monarch's court. And if he should be asked to screw up his imagination to form ideas of them, they would be borrowed from the best tiled house he had seen in the market-towns where he had sold his turnips or corn, and the wedding-feast of some neighbouring farmer's daughter. A child in the mother's womb, even if it had the perfect use of reason, could not in that dark cell have any ideas of the sun or moon, or beauties or banquets, or algebra or chemistry, and many other things that his older brothers—who breathe fresh air, freely behold the light, and are in a more mature estate—are capable of knowing and enjoying. Now, among thinking men whose thoughts run much upon the future state that they must shortly enter into but shall never pass out of there will frequently and naturally arise a suspicion which, though seldom admitted to, often proves disquieting enough. Such men are apt to question how the future condition that the gospel promises can provide them with as much happiness as it claims to, because they in heaven will only contemplate the works of God, and praise him, and converse with him, all of which they think can—though not immediately—be done by men here below without being happy. But he who by telescopes and microscopes, dexterous dissections, and well employed furnaces etc. discovers the wondrous power and skill of him who built such a vast and immense mass of matter into such an intricate piece of workmanship as this world will pleasingly be convinced of the boundless power and goodness of the great Architect. And when he sees and

considers

how admirably every animal is equipped with the parts required for its individual nature, and that particular care is taken that a single animal (e.g. a man) has differing provisions made for him according to his differing states within the womb and out of it—a human egg and an embryo being otherwise nourished and fitted for action than is a (complete) man—

and observes the stupendous providence and excellent contrivances that the curious piers into nature (and only they) can discover, he will be able to, and invited to, reason thus within himself [the reasoning runs to the end of this paragraph]: God

(a) who has with such admirable artifice formed silkworms, butterflies, and other insects, and with such wonderful providence made sure that the nobler animals should also not lack anything required for completing their natures, and

(b) who can when he pleases provide some things with properties quite different from those that the knowledge of his other works could have made us imagine (e.g. the lodestone and quicksilver among minerals, the sensitive plant among vegetables, the chameleon among animals),

must surely be (a) fully able to provide those he delights to honour with objects suitable to their improved faculties and with all that is required for the happiness he intends them to have in their glorified state; and be (b) able to bring this about by amazing contrivances that perhaps will be quite unlike any that the things we have yet seen give us any ideas of. And he who has in so immense, intricate and magnificent a fabric made provision for men,

who are at best only very imperfectly good, and in a state where they are not to *enjoy* happiness but by obedience and sufferings to *fit themselves* for it,

can, surely, be safely be trusted to find for them in heaven employments and delights suitable for the felicity he intends them to have there; as we see that here below he provides as well for the soaring eagle as for the creeping caterpillar (and can keep the ocean as fully supplied with rivers as lakes or ponds are with springs and brooks).

And as a state of celestial happiness is so great a blessing that things that give us greater assurances or greater foretastes of it are among the greatest contentments and advantages we can enjoy, short of that blessing itself; so it is hard for any divine to receive as much of this kind of satisfaction as someone who by skillfully looking into the wonders of nature has his apprehensions of God's 'power and manifold wisdom' (as an apostle calls it) elevated and enlarged. As when the queen of Sheba had seen in detail the astonishing prudence that Solomon displayed in the ordering of his magnificent court, she rapturously concluded that the servants of his who were allowed the honour and privilege of constant and immediate attendance on him were happy enough to deserve a monarch's envy.

2. Practical goods resulting from natural philosophy and from theology

No doubt you have too good an opinion of your friend not to think that you can allege in his favour that what mainly makes him prefer physiology to all other kind of knowledge is that it enables those who are proficient in it to do a great deal of good, both by improving trades and by promoting physic [here = 'medical practice'] itself. I . . . do not deny that it can assist a man to advance physic and trades, or that in so doing he may highly advantage mankind. And this I (who want not to lessen your friend's esteem for physics but only his partiality) willingly acknowledge to be such a permissible

endearment of experimental philosophy that I do not know anything that ought more to recommend the study of nature to men of a human as well as a decent disposition—except the opportunity it gives men to be just and grateful to the author of nature and of man. So I do not deny that the true naturalist may very much benefit mankind; but I affirm that if men are not untrue to themselves the divine may benefit them much more.

Two routes to better bodily health

It may be appropriate and relevant for me to tell you on this occasion that •someone who effectively teaches men to subdue their lusts and passions contributes as much as •the physician does to the preservation of their bodies, by freeing them from

those vices whose usual effects are wars, duels, rapines, desolations, as well as the pox, surfeits, and all the train of other diseases that accompany gluttony and drunkenness, idleness and lust; which are enemies to man's life and health not merely on a physical account but on a moral one, because they provoke God to punish them with temporal as well as spiritual judgments, such as plagues, wars, famines and other public calamities that sweep away a great part of mankind;

as well as from

those personal afflictions of bodily sickness and disquiets of conscience that shorten men's lives, and embitter them.

Because piety has (as the Scripture assures us) promises both for this life and for the life to come, those teachers who make men virtuous and religious, thereby making them temperate, chaste, inoffensive, calm, and contented, not only

•provide them with great and excellent dispositions to those blessings, both of the right hand and of the left,¹ which God's goodness makes him eager to bestow on those who by grace and virtue are made fit to receive them, but also •help them to the qualifications which lengthen and sweeten their lives by preserving the mind in a calm and cheerful temper, as well as by providing the body with everything that temperance can confer. I repeat that it would not be irrelevant to insist on these things, but I choose instead to represent to you that the benefits men may receive from the •divine surpass those they receive from the •naturalist, both in the nobleness of the advantages and in their duration.

Be it granted then that the naturalist may much improve both physic and trades; but these were devised for the service of the body (one to preserve or restore its health, the other to provide it with conveniences or delights), so the boasted use of natural philosophy—its advancing trades and physic—will still be to serve the body; which is merely the lodging and instrument of the soul, and which I am sure you—and I presume your friend—will be far from thinking the noblest part of man.

Minor brief advantages versus major durable ones

I know it may be said—and I do not deny it—that various mechanical arts are highly beneficial, not only to the inventors but also to the places and perhaps the states where such improvements are found out and cherished. But though I most willingly grant that this consideration ought to recommend experimental philosophy to states as well as to private persons, there are four considerations that detract somewhat from this. (a) Many of these improvements transfer rather

than increase mankind's goods, and harm one group of men as much as they advantage another (as when the Portuguese and Dutch by their later navigations took over the trade in the eastern spices, depriving the Venetians of it). (b) Or they merely increase something which, though very beneficial to the producers, is not really so to mankind in general. We have an example of that in the invention of extracting gold and silver out of the ore with mercury. This has vastly enriched the Spaniards in the West Indies, but it is not of any solid advantage to the world; any more than is the discovery of the Peruvian and other American mines, by which (especially taking account of the multitudes of unhappy men who are made miserable and destroyed in working them) mankind is not put into a better condition than it was before. And if the philosopher's stone itself (supposing there were such a thing) were not an incomparable medicine but only something that could transmute other metals into gold, I doubt whether the discoverer of it would much advantage mankind, because there is already enough gold and silver to maintain •trade and commerce among men; and for all •other purposes I do not know why an abundance of iron, brass, and quicksilver—far more useful metals—should not be more desirable. (c) These advancements of enriching trades bring advantages only to the •outward man, and the many arts and inventions that aim at the heightening the pleasures of the senses belong only to the •body; and even in gratifying *that* they are not so requisite and important as many suppose, because education, custom, etc. have a greater role than most imagine in men's enjoyment even of the pleasures of the senses. As for physic, not to remind you that it has been loudly. . . .complained of that the new philosophy has made far greater promises to it than have yet been

¹ [This echoes Proverbs 3:16, which says of wisdom 'Length of days is in her right hand; and in her left hand riches and honour.']

performed, I shall only point out that since physic usually claims only to preserve health or to restore it, there are multitudes in the world who have no need of the assistance the naturalist would give the physician. A healthy man, as such, is already in a better condition than the philosopher can hope to place him in, and is no more advantaged by the naturalist's contribution to physic than a sound man who sleeps in a whole skin is helped by all the fine tools of a surgeon's case of instruments and the various mixtures in his medicine-chest.

And just as the benefits that may be derived from theology much surpass those that come from physics in the nobleness of the subject they relate to, so also they have a great advantage in point of duration. **(d)** All the service that medicines and engines and improvements can do for a man relate only to this life and therefore end with it. Physic and chemistry do indeed—one more faintly, the other more boldly—claim sometimes not only to cure diseases but to prolong life; but of course the masters of those parts of knowledge would employ their utmost skill to protract their own lives, yet Solomon and Helmont lived no longer than millions who were strangers to philosophy; and even Paracelsus himself, for all his boasted 'arcana', is confessed by Helmont and other chemists to have died some years short of 50; so we may very justly fear that nature will not be so kind to its greatest devotees as to give them much more time than other men for the payment of the last debt all men owe her. And if a few further years of life could be obtained by a scrupulous and troublesome use of diet and remedies, that is not at all considerable in comparison with the eternity that is to follow. But whereas

- within no great number of years. . . all the remedies and reliefs and pleasures and accommodations that philosophical improvements can provide to a man will

not keep him from the grave (which within very few days will make the body of the greatest virtuoso as hideous a carcass as that of any ordinary man),

- the benefits that may come to us through the study of divinity, as they relate chiefly (though not only) to the other world, so they will follow us out of this world and prove then incomparably greater than ever, when they alone can be enjoyed.

So that philosophy, in the capacity we are here considering it, merely provides us with some little conveniences for our passage (like some accommodations for a cabin which does not out-last the voyage), whereas religion provides us with a vast and durable estate—or as the Scripture styles it, an 'unshaken kingdom'—when we arrive at our journey's end. And therefore the benefits coming from religion may well be concluded to be preferable to their competitors because they not only reach to the mind of man but reach beyond the end of time itself; whereas all the variety of inventions that philosophy so much boasts of, because they were (while they were in season) devised for the service of the body, they make us busy with and proud of things that within a short time will not. . . at all concern us.

3. The supposed certainty and clearness of physics versus the darkness and uncertainty of theological matters

I expect you will here urge on your friend's behalf that the study of physics has one prerogative above that of divinity, which, as it is otherwise a great excellence, adds much to the delightfulness of it. I mean the certainty and clearness—and the resulting satisfactoriness—of our knowledge of physical matters, in comparison with any we can have of theological matters, whose darkness and uncertainty are sufficiently

shown by •the nature of the things themselves and •the numerous controversies of differing sects about them.

But on this subject various things are to be considered.

First, as to the fundamental and necessary articles of religion, I do not admit the allegation; I take those articles to be both •evident and capable of a moral [here = ‘utterly convincing’] demonstration. And if there are any articles of religion for which a rational and compelling proof cannot be brought, I shall for that very reason conclude that such articles are not absolutely necessary to be believed; because it seems entirely unreasonable to imagine that God,

having been pleased to send not only his prophets and his apostles but his only son into the world to promulgate the Christian religion to mankind, and both •to cause it to be consigned to writing so that it may be known, and •to alter the course of nature by numerous miracles so that it might be believed,

should not present the truths that he in so wonderful and so solemn a manner recommended, with at least enough clearness for studious and well-disposed readers to grasp such as of them are necessary for them to believe.

Secondly, though I will not here enter into a discussion of the various kinds (or, if you please, *degrees*) of demonstration. . . ., I must tell you that just as a moral certainty [see Glossary] (such as we may attain about the fundamentals of religion) is enough in many cases for a wise man and even a philosopher to acquiesce in, so the physical certainty that is claimed for the truths demonstrated by naturalists is, even where it is rightfully claimed, only an inferior kind or degree of certainty, as moral certainty also is. For even physical demonstrations can generate only

•a physical certainty, i.e. a certainty on the supposition that the principles of physics are true, and not

•a metaphysical certainty, in which it is absolutely impossible that the thing believed should be other than true.

For instance, all the physical demonstrations of the ancients about the causes of particular phenomena of bodies presuppose that *ex nihilo nihil fit*—i.e. that nothing comes from nothing—and this may readily be accepted in a physical sense, because according to the course of nature no body can be produced out of nothing; but speaking universally it may be false, as Christians generally (and even the Cartesian naturalists) asserting the creation of the world must believe that *de facto* it is. And so whereas Epicurus does, I remember, prove that a body once dead cannot be made alive again because of the dissipation and dispersal of the atoms it was composed of when alive, though all men will allow this assertion to be physically demonstrable its contrary may be true if God’s omnipotence intervenes,

•as all the philosophers who acknowledge the authority of the New Testament, where Lazarus and others are recorded to have been raised from the dead, must believe actually did happen, and
•all unprejudiced reasoners must allow it to be possible, because there is no contradiction implied in the nature of the thing.

But now to affirm that *things that are indeed contradictories cannot be both true*, or that *what has been done cannot be undone*, are metaphysical truths which cannot possibly be other than true, and consequently create a metaphysical and absolute certainty. And your master Descartes was so conscious of the dependence of •physical demonstrations on metaphysical truths that he would not allow any certainty to •them or even to geometrical demonstrations until he had shown that there is a God and that he cannot deceive men who make use of their faculties rightly.

Don't confuse high probability with absolute certainty

To which I may add that even in many things that are looked on as physical demonstrations there is really only moral certainty. For instance, when Descartes and other modern philosophers undertake to demonstrate that there are various comets that are not meteors because they have a parallax less than that of the moon, and are of such-and-such a size, and some of them move in such-and-such a line, etc. it is clear that many of these learned men had never the opportunity to observe a comet in their lives, and take these details on the credit of the astronomers who did have such opportunities. And though the *inferences* as such may have •demonstrable certainty, the premises they are drawn from have only •historical certainty; so the presumed physico-mathematical demonstration cannot produce in an intellectually cautious mind anything but moral certainty, and not even the greatest certainty of that kind that is possible to be attained. This will be readily agreed to by anyone who knows from experience how much harder it is than most men imagine to make observations about such nice subjects—i.e. subjects requiring or involving so much precision, accuracy, or minuteness—with the exactness that is required for building an undoubted theory on them. And there are I don't know how many things in physics that men presume they believe on physical and compelling arguments where they really have only a moral assurance. . . . I have been invited to take more particular notice of these things in other papers, written purposely to show the doubtfulness and incompleteness of natural philosophy; and since they are available I do not hesitate to refer you to those papers of mine for my reasons for affirming here that most virtuosi—most even of the modern ones—are apt to fancy more clearness and certainty in their physical theories than

a critical examiner will find in them. But so that you won't see this as a put-off rather than a reference, I will here touch on two subjects that men usually believe to be—and that indeed *ought* to be—the most thoroughly understood: •the nature of body in general and •the nature of sensation.

We don't know whether matter is infinitely divisible

Whichever way we turn, we are everywhere surrounded and incessantly touched by corporeal substances; so one would think that so familiar an object,

which so busily and variously affects our senses, and for the knowledge of which we need not inquire into the distinct nature of particular bodies or into the properties of any one of them,

should be very perfectly known to us. And yet the notion of *body in general*, i.e. what it is that makes a thing to be a corporeal substance and discriminates it from all other things, has been very hotly disputed over, even among the modern philosophers, and it is still *sub judice*. And though your favourite Descartes, in making the nature of a body consist in extension in three dimensions, has a notion of it that is easier to find fault with than to replace by something better, I fear it will appear to bring with it not only the inconvenience of implying that

God cannot, within the compass of this world in which if any body vanishes into nothing, the place or space left behind it must have the three dimensions and so be a true body

annihilate the least particle of matter without at the same instant and place creating as much—which does not square with the necessary and continual dependance that he asserts that matter itself has on God for its very being—

but such other inconveniences that some friends of yours, otherwise very inclinable to the Cartesian philosophy, do not know how to accept it. Yet I need not tell you how fundamental a notion the deviser of it asserts it to be.

Neither do I see how this ·Cartesian· notion of a corporeal substance will—any more than any of the formerly received definitions of it—extricate us from the difficulties of the controversy about *the composition of the continuum*, a controversy as perplexed as it is famous. And though

some able men who perhaps perceive better than others how intricate it is have recently tried to show that men need not be concerned to settle this controversy because the question was not rightly posed by the schoolmen who started it,

and though

I think that natural philosophy may perhaps be daily advanced without settling this question, because there is a multitude of considerable things to be discovered and performed in nature without so much as dreaming of this controversy,

until the difficulties are removed they will spread a thick night over the notion of *body in general*—I mean the difficulties raised by the question as I would pose it.

Either a corporeal and extended substance is (either really or mentally) divisible into parts endowed with extension, and each of these parts is divisible also into other corporeal parts, lesser and lesser, in infinitum; or else this subdivision must stop somewhere (for there is no third way between these two options); and either way the opinion pitched on will be liable to inconveniences—not to say absurdities—that are rationally urged against it by the maintainers of the opposite; the objections on both sides being so strong that some of the more fair-minded of the modern metaphysicians, after having tired themselves and their readers with arguing pro

and con, have confessed the objections on both sides to be insoluble.

We don't understand sensations

But though we do not clearly understand the nature of body in general, surely we must be perfectly acquainted with what happens *within ourselves* in reference to the particular bodies we daily see, hear, smell, taste, and touch. But alas, though we know very little except through the information of our senses, we know very little about *how* our senses inform us. And to avoid prolixity I will at present join you in supposing that the ingenious Descartes and his followers have given the best account of sensation that we yet have. Now, according to him a man's body is just a well-organized statue, so that sensation (properly so-called) is not performed by the ·sense·-organ but by the mind, which perceives the motion produced in the organ (which is why he will not allow brutes to have 'sense' properly so-called); so that if you ask a Cartesian how the soul of man, which he rightly asserts to be an immaterial substance, comes to be worked upon in so many different ways by the external bodies that are the objects of our senses, he will tell you that

- by their impressions on the sense-organs they variously move the fibres or threads of the nerves that those organs are endowed with,
- this motion is propagated to the little kernel in the brain called by many writers the 'conarion', and
- these differing motions ·in the conarion· are perceived by the soul, which resides there, and so become sensations because of the intimate union—the 'intermingling' as Descartes himself expresses it—of the soul with the body.

But now, Sir, let me remark that this union of an incorporeal with a corporeal substance (and that without a medium) is a thing so unexampled in nature, and so difficult to comprehend, that I somewhat question whether the profound secrets of theology—not to mention the adorable [see Glossary] mystery of the incarnation—are more abstruse than this. For how can I conceive, that a purely immaterial substance should be united without a physical medium (for in this case there can be none) with the body, which cannot possibly lay hold on it and which it can pervade and fly away from at pleasure, as Descartes must confess the soul actually does in death. And it is almost as difficult to conceive how any part of the body (including the animal spirits and the conarion, which are as truly corporeal as other parts of the human statue) can make impressions on a substance that is perfectly incorporeal and is not immediately affected by the motions of any other parts except the *genus nervosum* [= muscles, tendons, and other organs supplied by nerves]. Nor is it a small difficulty for a mere naturalist (who does not in physical matters take notice of revelations about angels) to conceive how a finite spirit can •move or (much the same thing) •regulate and determine the motion of a body. But what I want on this occasion to invite you to consider is this: supposing that the soul does in the brain perceive the differing motions communicated to the outward senses, this may give some account of sensation in general but does not at all show us a satisfactory reason for particular and distinct sensations. If I ask this:

Why when I look at a bell that is ringing, such a motion or impression in the conarion produces in the mind the special sort of perception *seeing*, and not *hearing*? And why another motion, coming from that bell at that time, produces the quite differing sort of perception that we call *sound* but not *vision*?

what can be answered except that **it was the good pleasure of the author of human nature to have it so**? And if the question is asked about the differing objects of any one particular sense, e.g. why the great plenty of unperturbed light that is reflected from snow, milk etc. produces a sensation of whiteness rather than redness or yellowness? Or why the smell of castor or asafoetida produces in most persons that •sensation• which they call a stink rather than a perfume? (Especially since we know some hysterical women who think it not only a wholesome but a pleasing smell.) And if you go on to ask why melody and sweet things generally delight us, and discords and bitter things generally displease us; indeed, why a little more than enough of some objects that produce pleasure will produce pain (e.g. holding a cold hand near enough to the fire to be warmed, then nearer still so that it is hurt); or ask any of a thousand other questions of the same kind, the answer will be merely the general one that is already given, namely that **such is the nature of man**. For to say that moderate motions are agreeable to the nature of the sense-organ they are aroused in, whereas violent and disorderly ones (like jarring sounds and scorching heat) put the organ into too violent a motion for its texture, will by no means satisfy. For one thing, this answer gives no account of the variety of sensations of the same kind, as of differing colours, tastes, etc. but reaches only to pleasure and pain; even for these it will reach only a very little way unless its sponsors can show how an immaterial substance should be more harmed by the brisker motion of a body than by a more languid one.

Thoughts about those two failures

You and your friend think you may justly smile at the Aristotelians for imagining that they have given a tolerable

account of the qualities of bodies when they have told us that they spring from certain 'substantial forms', though when they are asked particular questions about these incomprehensible 'forms' they can only say in general that the forms have such-and-such faculties or effects because nature or the author of nature endowed them with those. So I hope you will give me leave to think that it may keep us from boasting of the clearness and certainty of our knowledge about the operations of sensible objects when

- just as the Aristotelians cannot particularly show how their qualities are produced,
- so we cannot particularly explain how they are perceived;

the principal thing that we can say being basically this: our sensations depend on such a union or intermingling of the soul and body as we can give •no example of in all nature and •no more distinct account of than that it pleased God so to couple them together.

I beg your pardon for having detained you so long on one subject, though perhaps it will not prove time mis-spent if it has made you take notice that in spite of the clearness and certainty for which your friend so much prefers physics before theology, we are yet to seek (I say 'yet' because I do not know what time may later reveal) both for the definition of *corporeal substance* and a satisfactory account of the manner of sensation; though without the true notion of a body we cannot understand that object of physics in general, and without knowing the nature of sensation we cannot know that from which we derive almost all that we know of any body in particular.

Sources of ignorance

If after all this your friend says that Descartes's account of body and other things in physics, being the best that men can give, if they are not satisfactory that must be imputed to human nature and not to the Cartesian doctrine, I shall not stay to dispute how far this is true; especially since it will not prejudice my work even if it is true. Whatever the cause of the imperfection of our knowledge about physical matters may be, it is obvious that there is an imperfection in that knowledge, and that ought to keep us from •being puffed up by such an imperfect knowledge and •treating it as a basis for undervaluing the study of the mysteries of divinity which (because of the nobleness and remoteness of the objects) may much better than the nature of corporeal things (which we see, feel, and continually interact with) have their obscurity attributed to the weakness of our human understandings. And if it is a necessary imperfection of human nature that while we remain in this mortal condition our soul—being confined to the dark prison of the body—is capable (as even Aristotle somewhere admits) of only a dim knowledge, so much the greater value we ought to have for the Christian religion, since by its means (and *only* by its means) we may attain a condition in which, just as our nature will otherwise be highly blessed and advanced, so our faculties will be elevated and enlarged, and probably made thereby capable of attaining degrees and kinds of knowledge to which we are *here* only strangers. [He mentions a common claim about what Adam knew before the fall, as possible evidence that we in our more 'noble' condition in heaven will know even more; but says that he won't argue from that because he thinks that the claim is false. He continues:] I will rather remind you •that the sight of the proto-martyr [St. Stephen] was strengthened so as to see the

heavens opened, and Jesus standing at the right hand of God; and •that when the prophet ·Elisha· had prayed that his servant's eyes might be opened, the servant immediately saw a nearby mountain all covered with chariots and horsemen which. . . .were altogether invisible to him before. To which I shall only add, as a higher argument, a couple of passages of Scripture which seem to allow us *vast* expectations as to the knowledge our glorified nature may be advanced to. One is what St. Paul says to the Corinthians:

'For now we see through a glass darkly, but then face to face; now I know in part, but then shall I know even as also I am known.'

The other is what Christ's favourite disciple tells believers:

'Beloved, now we are the sons of God, and it doth not yet appear what we shall be; but we know that when he shall appear we shall be like him, for we shall see him as he is.'

Certainty can be over-rated

What I have said up to here contains the first consideration that I told you might be proposed about the certainty ascribed to the knowledge we are said to have of natural things; but this is not all I have to say to you on this subject. (f) For I consider further that the knowledge of things is endeared to us not only by the certainty we have of them but also by

- (a) the worthiness of the object,
- (b) the number of those who are not acquainted with it,
- (c) its remoteness of it from common apprehensions,

(d) the difficulty of acquiring it without special advantages,

(e) its usefulness when attained,

and other particulars that I need not enumerate here.

You'll be sure (I presume) that your friend very much prefers •the knowledge he has of the mysteries of nature (at many of which we still have only ingenious conjectures) to •the knowledge of someone who understands the elements of arithmetic, although he is demonstratively sure of the truth of most of his rules and operations. And no doubt Copernicus received a much higher satisfaction from •his notion about the stability of the sun and the motion of the earth—although it was not clear ·or certain· enough to prevent Tycho, Ricciolus, and other eminent astronomers from rejecting it—than •from the knowledge of various theorems about the sphere that have been *demonstrated* by Euclid, Theodosius, and other geometricians.¹ Our discovery that some comets are not (as the schools thought) sublunary meteors but celestial bodies, and the *conjectural* theory that is all we have been able to attain of them up to now, give much more pleasure to your friend and you and me than the more certain knowledge we have of the time of the rising and setting of the fixed stars. And the estimates we can make by the help of parallaxes of the heights of those comets and of some of the planets, though they are uncertain enough (as may appear by the vastly different distances that are assigned to those bodies by eminent astronomers), please us far more than our ability with the help of a geometrical quadrant or some such instrument to determine with far greater certainty the height of a tower or a steeple. And a

¹ [In his edition of this work (see opening paragraph of the present document) J. J. MacIntosh has a footnote here, including: 'Classically, spherical geometry was considered a branch of astronomy, so Boyle's contrast between the heliocentric hypothesis of Copernicus and the "theorems about the sphere" would have seemed a natural one.']

mathematician

when he *probably* conjectures the area of the terrestrial globe, and *approximately* divides its surface first into proportions of sea and land, and then into regions of such-and-such extents and bounds, and in short skillfully plays the cosmographer,

thinks himself more nobly and pleasantly employed than

when, being reduced to play the surveyor, he with far more certainty measures how many acres a field contains, and sets out what hedges and ditches it is bounded with.

Now, what I have written has very much miscarried if it have not shown that the knowledge of God and of the mysteries of theology that are (b) not known by far the greatest part of mankind has (a) more sublime and excellent objects and is (c, d) not attained to by the greatest part even of learned men and nevertheless is (e) of invaluable importance and of as much advantage towards purifying and improving of us here as towards making us perfect and happy hereafter. Therefore, just as

being admitted into the privy-council of some great monarch, and thereby be enabled to give a probable guess at the thoughts and designs of his that govern kingdoms and make the fates of nations

is judged to be preferable to

the clearer [here = 'more certain'] knowledge that a notary can have of the dying thoughts and intentions of an ordinary person whose will he makes;

and just as •the knowledge of a skillful physician whose art is nevertheless conjectural is preferable to •the knowledge of the cutler who makes his dissecting knives, although the cutler can more certainly perform what he designs in his own profession than the physician can in his; and (in short) just as

the skill of a jeweller who is conversant about diamonds, rubies, sapphires and some other sorts of small stones, which being mostly brought to us out of the Indies we must take many things about them on hearsay, is because of the nobleness of the object preferred to the skill of a mason who deals in whole quarries of common stones, and can be sure from his own experience of many things concerning them, things which, regarding jewels, we are allowed to know only by hearsay

so

a more dim and imperfect knowledge of God and of the mysteries of religion may be more desirable, and on that account more delightful, than a clearer knowledge of those inferior truths that physics ordinarily teaches.

Two satisfactions at once

(ii) I must now mention one more factor that can be added to those that especially endear physics to the divine who is studious of them. As he contemplates the works of nature not barely •for themselves but •to be better qualified and excited to admire and praise the Author of nature, so his contemplations are delightful to him not barely •as they provide a pleasing exercise to his reason but •as they give him a more welcome approval from his conscience, these distinct satisfactions being not at all inconsistent. No doubt though Esau did eventually miss his aim, while he was hunting venison for the good old patriarch who desired him to do so, he had great pleasure—in addition to his usual pleasure in deer-hunting—from the thought that he was hunting to please his father and in order to obtain an inestimable blessing from him. And when David employed his skillful hand

and voice in praising God with vocal and instrumental music he received in one act a double satisfaction by exercising his skill and his devotion; and was no less pleased with those melodies as they were *hymns* than as they were *songs*.

And this example prompts me to add that just as the devout student of nature we were speaking of [referred to as 'Dr N.' on pages 4 and 33] does intentionally refer the knowledge he seeks of created things to the glory of the creator, so what most contents him in his discoveries is that the wonders he observes in nature •heighten his admiration for the wisdom of God (admiration that he wants to raise to a level less disproportionate to that wisdom itself), and •provide him with a nobler offering to include in the sacrifices of praise he is justly ambitious to offer up to the Deity. When David invented (as the Scripture intimates that he did) new instruments of music, nothing in that invention pleased him so much as the fact that they could help him to praise God more melodiously; and similarly the pious student of nature finds nothing more welcome in his discoveries of its wonders than the help they may give him more worthily to celebrate the divine attributes shown faintly in created things. And just as a huntsman if he meets with some strange beast thinks himself much more fortunate if it happens to be near the court where he can present it to the king than if he kept it for himself or some of his companions; so our devout naturalist has his discoveries of nature's wonders endeared to him by having the Deity to present them to. . . .

4. The natural philosopher's unjustified pride of achievement

But I confess, Sir, to suspecting that what makes your friend have such detracting thoughts of theology is a certain secret pride based on the notion that the attainments of

natural philosophers are of so noble a kind, and display so transcendent an excellence of abilities in the attainer, that he can justly undervalue all other learning, theology included.

I do not think you will expect that a person who has written so much in praise of physics, and worked so hard to acquire a little skill in it, should here try to depreciate that *useful* part of philosophy. But I am not insulting it, I think, in preferring the knowledge of supernatural things to that of mere natural ones, and in thinking that

- the truths that God indiscriminately exposes to the whole race of mankind, and to the bad as well as to the good

are inferior to

- the mysterious truths whose disclosure God counts among his special favours, and the contemplation of which employs the curiosity, and in some points arouses the wonder, of the very angels.

So that I may repress a little the overweening opinion your friend has of his attainments in physics, therefore, give me leave to present a few particulars conducive to that purpose.

First, as for the nobleness of the truths taught by theology and physics, those of the former sort clearly have the advantage, being not only concerned with far nobler objects but revealing things that unaided human reason can by no means reach; as has been sufficiently declared in the earlier part of this letter.

It was easy to refute the ancients

Next: whatever may be said to excuse pride (if there was any) in Moscus the Phoenician, who is said to have first invented the atomic hypothesis, in Democritus and Leucippus (for Epicurus hardly deserves to be named with them) who greatly advanced that philosophy, and

in Monsieur Descartes who either improved or at least much innovated the corpuscularian hypothesis,

I see no great reason why pride should be allowed in such as your friend; who, though ingenious men, are neither inventors nor eminent promoters of the philosophy they would like to be admired for, but are content themselves to learn what others have taught, or at most to make some little further application of the principles that others have established and the discoveries that others have made.

Your friend is not a little proud of being able to refute several errors of Aristotle and the ancients, but it would be well for him to consider that many of the chief truths that overthrow those errors were the products of time and chance and not of his daring reasonings. No great intellect is needed to refute those who maintain •that the torrid zone is uninhabitable or •that there are no land-masses at the antipodes; because navigators have found many parts of the torrid zone well peopled, and sailing around the earth have found men living in countries diametrically opposite to ours. Nor is a man entitled to be proud of not believing •that the moon is the only planet that shines with a borrowed light, or •that the galaxy is a meteor; because the *telescope* shows us that Venus waxes and wanes like the moon, and that the milky way is made up of a vast multitude of little stars that are inconspicuous to the naked eye. And indeed of the other discoveries that overthrow the astronomy of the ancients and much of their philosophy about the celestial bodies, few or none have any cause to boast except for the excellent Galileo, who claims to have been the inventor of the telescope. Once that instrument was discovered, the ability to •reject the thesis that there are exactly seven planets through the detection of the four satellites of Jupiter, or to •talk of the mountains and valleys in the moon, requires little more excellence in your friend than it would to detect

in a ship with the help of a prospective glass the masts, sails and deck, and to perceive a boat towed at her stern, where the naked eye could discern only the body of the vessel. Though indeed Galileo himself had no great cause to boast of the invention of the telescope (though we are much obliged to him for its improvement); because no less a master of dioptrics than Descartes acknowledges—as do other writers—that perspective-glasses were first discovered not by mathematicians or philosophers but casually by one Metius, a dutch spectacle-maker. While I am on this topic, let me remind you—to hide pride from man—that various others of the chief discoveries that have been made in physics have been the products not of philosophy but of *chance*, which led to gunpowder, glass, and (for all we know to the contrary) the lodestone's directional property (to which we owe our knowledge of both the Indies); as (more recently) the milky vessels of the mesentery, the new receptacles of the chyle, and those other vessels that most men call the lymph-ducts, were found only by chance, according to the candid admission of the discoverers themselves.

Corpuscularian physicists as mere mechanics

We may further consider that the very things that are rightly urged in the praise of the corpuscularian philosophy itself ought to *lessen* the pride of those who merely make use of it. That hypothesis supposes the whole universe (the soul of man excepted) to be merely a great automaton or self-moving engine in which all things are performed by the bare motion (or rest), size, shape, and situation or texture of the parts of the universal matter it consists of; and all the phenomena in the universe result from a few fertile principles. . . .that have already been established by the inventors and promoters of the particularian hypothesis; so that all your friend and

his like are left to do is merely to investigate or guess by what kind of motions the three or four other principles are varied. So that the world being only a great piece of clock-work (as it were), the naturalist as such is only a mechanic, however much larger or smaller the parts of the engine he considers are than those of clocks or watches. And for an ordinary naturalist to despise those who study the mysteries of religion as much inferior to physical truths is as unreasonable as it would be for a watch-maker, because he understands his own trade, to despise privy-counsellors who are acquainted with the secrets of monarchs and mysteries of state. . . .

That great restorer of physics, the illustrious Francis Bacon, who has traced out a most useful way to make discoveries in the 'intellectual globe', as he calls it, confesses that his work was 'a child of time rather than of intellect'. And though I am not of his opinion when he says in another place that his way of philosophising 'equalises intellects', I am inclined to think that once

- the fertile principles of the mechanical philosophy have been settled,
- the methods of inquiring and experimenting have been found out, and
- the physico-mechanical instruments of working on the products of nature and of art have been happily invented,

the use of such facilitating helps to make several lesser improvements—especially by correcting some almost obvious or lazy errors of the schools—may fall to the lot of persons not endowed with any extraordinary sagacity or acuteness of abilities. And though the investigation and clear establishment of the true principles of philosophy, and the devising the instruments of knowledge, are things that may be allowed to be the proper work of higher intellects, if a man is provided

with such assistances not every work that he makes or thing that he does with the help of them is difficult enough to raise him to that illustrious rank! And indeed some of the common errors of scholars as well as of other men were mainly grounded on •the mere (and often mistaken) authority of Aristotle, and perhaps on •some frivolous reasons of his scholastic interpreters of such precarious and ungrounded things; so that to demolish them often requires more boldness than skill. It may perhaps be said of your friend, in relation to his philosophical successes against such common errors as I am speaking of, what a Roman said of Alexander's triumph over the effeminate Asiatics, that 'all he needed was to show a just contempt for emptiness'. And in some cases when a grand truth or a happy way of experimenting has been found, and various phenomena of nature that had been left unexplained or were left mis-explained by the schools were at last unriddled and explained, this in my opinion has required a far less straining exercise of the mind than must have been required to dispel the darkness that attended various theological truths that are now cleared up, and perhaps less than I have myself sometimes employed in some of those attempts to illustrate theological matters, attempts that you may have met in some papers that I have presumed to write on such subjects. And indeed the improvements that such virtuosi as your friend are accustomed to make of the fertile theorems and hints that have been presented to them by the founders or prime benefactors of true natural philosophy are so poor and slender, and so much oftener •come from industry and chance than •show transcendent sagacity or elevated reason, that though such persons may have cause enough to be delighted with what they have done they have none to be proud of it. Their performances may deserve our thanks, and perhaps some of our praise, but do not reach high enough to merit our admiration, which is

to be reserved for those who have been either •formers or grand promoters of true and comprehensive hypotheses or else •authors of other noble and useful discoveries that have many different applications.

Small scope of our physical knowledge

It will not perhaps be improper to add here that just as our knowledge is not very deep, not reaching with any certainty to the bottom of things or penetrating to their intimate or innermost natures, so its extent is not very wide, not being able to give us with any clearness and particularity an account of the celestial and deeply subterranean parts of the world, of which all the other parts make but a very small (not to say contemptible) portion.

As to the very globe that we inhabit—not to mention how many plants, animals and minerals we are still wholly ignorant of, and how many others we are only slenderly acquainted with—I consider that the objects that our experiments and inquiries deal with all belong to the superficial parts of the terrestrial globe, of which the earth that we know seems to be merely the crust, as it were. What the internal part of this globe is made up of is no less disputable than what substance composes the remotest stars we can detect. Even among the modern philosophers some think the internal portion of the earth to be pure and elementary *earth*, which (they say) must be found there or nowhere. Others imagine it to be fiery, and to be the receptacle of either natural or hellish flames. Others maintain that the body of the terrestrial globe is a great and solid magnet. And the Cartesians on the other side (though they all admit store of subterranean lodestones) teach that this same globe was once a fixed star, and that although it has since degenerated into a planet the internal part of it is still of the same nature

that it was before, the change it has received coming only from having had its outward parts covered over with thick spots (like those to be often observed about the sun) by the condensation of which the firm earth we inhabit was formed. And the mischief is that each of these jarring opinions is almost as difficult to be demonstratively proved false as true. According to the most modest account of our recent cosmographers the distance to the centre of the earth is more than 3,500 miles; and my inquiries among navigators and miners have not yet satisfied me that men's curiosity has actually reached more than a mile or two at most downwards (and that in not more than three or four places) either into the earth or into the sea. So our experience so far has hardly scratched deep into *the husk* (if I may so speak) and has not at all reached *the kernel* of the terraqueous globe.

And alas! what is this globe of ours of which itself we know so little, in comparison to those vast and luminous globes that we call the fixed stars, of which we know much less? Earlier astronomers have been pleased to tell us their distances and sizes, with a seeming precision as if they had certain ways of measuring them; but later and better mathematicians will (I know) allow me to doubt what those earlier astronomers have told us. It is admitted that we can observe no parallax in the fixed stars (or perhaps in the highest planets), so men have yet to find a method to measure the distance of those bodies. And not only the Copernicans make it to be I know not how many hundred thousands of miles greater than the Ptolemeans, and very much greater than even Tycho; but Ricciolus himself, though a great anti-Copernican, makes the distance of the fixed stars vastly greater not only than Tycho but (if I mis-remember not) than some of the Copernicans themselves. Nor do I wonder at these vast discrepancies (though some may amount to millions of miles) when I consider that astronomers do not

•measure the distance of the fixed stars by their instruments but •accommodate it to their particular hypotheses. And from this uncertainty about the distance to the fixed stars you will easily gather that we are not very sure of their size, even in comparison with one another; since it remains doubtful whether the differing sizes they appear to us to have come from a real inequality of bulk or only from an inequality of distance, or partly from one of those causes and partly from the other.

But it is not my design to take notice of things that the famous disputes among the modern astronomers show to be dubious. I am thinking about various things relating to the stars that are so remote from our knowledge that the causes of them are not even disputed over or inquired into. For example:

- Why is the number of the stars neither greater nor lesser than it is?
- Why are so many of those celestial lights placed so that they are not visible to our naked eyes, or even through ordinary telescopes? (which extraordinarily good ones have assured me of)
- Why among the familiarly visible stars are there so many in some parts of the sky and so few in others?
- Why are their sizes so different, and yet not more different?
- Why are they not placed in a more orderly way so as to make up constellations of regular or handsome figures (of which the triangle is perhaps the single example), but seem to be scattered in the sky as it were by chance, and have configurations as confused as the drops that fall on one's hat in a shower of rain?

To these questions about the stars we might add various others about the interstellar part of heaven. Several of the modern Epicureans hold that it is empty except where the

beams of light (and perhaps some other celestial effluvia) pass through it; and the Cartesians on the contrary think it to be full of an ethereal matter, which some who otherwise favour their philosophy confess they are reduced to accepting merely as an hypothesis.

Thus our knowledge is much short of what many think, not only (to put it in scholastic terms) intensively but also extensively. There is so great a disproportion between the heavens and the earth that some moderns think the earth to be little better than a *point* in comparison even with the orb of the sun; and the Cartesians and other Copernicans think that the great orb itself (which is equal to what the Ptolemeans called the sun's orb) is a mere *point* in comparison with the firmament; and all our astronomers agree with at least this: the earth is but a physical point in comparison with the starry heaven. How little extent our knowledge must have, which •leaves us ignorant of so many things concerning the vast bodies above us, and •penetrates such a short way even into the earth beneath us, that it seems to be confined to a small share of the superficial part of a physical point! The natural result of this will be that •though what we call our 'knowledge' may be allowed to count as a large reward for our minds, it ought not to puff them up; and •that what we know of the system and the nature of corporeal things is not so perfect and satisfactory as to justify our despising the discoveries of spiritual things.

God himself tells us which to prefer

One of the earlier parts of this letter [on page 34?] may furnish me with one thing more to show the excellences and prerogatives of the knowledge of the mysteries of religion; and that one thing is such that I hope I shall not need to add anything more, because it is not possible to add anything

higher. It is the preeminence of divine truths over all other knowledge according to the judgment of a judge above all exception and above all comparison, namely God himself.

Having already shown this, I shall not now repeat it but rather *apply* it. If he who determines in favour of divine truths •knew less than our over-weening naturalists of the secrets of their idolised physics, or if he •were (like an angel) a mere contemplator of what we call the ‘works of nature’ without having any interest in their productions, your friend’s not acquiescing in his estimate of things might have, though not a fair excuse, yet a stronger temptation.

But when he by whose direction we prefer the higher truths revealed in the Scripture to those which reason alone teaches us concerning those comparatively lowly subjects, corporeal things, is the same God who not only **understands** the whole universe and all its parts far more perfectly than a watch-maker can understand one of his own watches

(in which he can give an account only of the structure, and not of the cause of the spring or the nature of the gold, steel and other bodies his watch consists of)

but **made** both this great automaton, the world, and man in it, we have not the faintest excuse for imagining that he would be ignorant of his own workmanship, or injuriously disparage it, or mislead his favourite creature, man, in telling him what sort of knowledge he ought most to covet and prize. So since it is he who framed the world and all the things in it we most admire who would have us prefer •the knowledge he has granted us in his word to •the knowledge he has allowed us of his works, it is surely very unreasonable and unnatural to make the excellences of the workmanship a disparagement to the author, and to make the effects of his wisdom a motive against accepting the decisions of his judgment! . . .

5. The value of the fame that scientific attainments bring

I would be guilty of a most important omission if I forgot to consider one thing that I’m afraid has a large part in the partiality your friend expresses in his preference of physics to theology—namely his supposing that through physics he will acquire a fame that is more certain and more durable than can be hoped for from the theology.

I acknowledge readily, and indeed with some pleasure in the felicity of this age, that there is hardly any sort of knowledge more in vogue than the sort natural philosophy claims to teach; and that among the awakened and inquiring part of mankind as much reputation and esteem can be gained by an insight into the secrets of nature as •can be gained• by being entrusted with the secrets of princes or dignified with the most splendid marks of their favour.

But though I readily confess that much, and though I may be thought to have had—I know not by what fate—as great a share of applause (that perfumed smoke!) as at least some of those writers who are now alive and whom your friend seems most to envy for it, yet I shall not scruple to tell you, partly from observation of what has happened to others and partly too on some experience of my own, that **(i)** it is not as easy as your friend seems to believe to get by the study of nature a sure and lasting reputation, and **(ii)** the expectation of it is not a sound reason for men to undervalue the study of divinity. It is no use arguing by way of counter-attack that the difficulties and impediments of acquiring and securing reputation lie in the way of divines as much as of philosophers, since this objection has been already considered at the beginning of Part II of this present letter [on page 37?]. Besides that, my coming discussion will show that the naturalist aspiring to fame is liable to

some inconveniences which the divine is not so much, if at all, liable to. So I shall take no further notice of this counter-attacking allegation, and shall proceed to defend part (i) of the assertion that preceded it. . . .

Fame, intellectual theft, and misrepresentation

First, if your Physeophilus should think to secure a great reputation by forbearing to report any of his thoughts or experiments in writing, he may find himself not a little mistaken in this. For once he has gained a reputation (for whatever reason) for knowing some things that may be useful to others or that studious men are usually anxious to know, he will not avoid the visits and questions of the curious. If he retreats into solitude, hiding himself so as to hide the things he knows, he will not escape the solicitations that will be made him by letters. And if these ways of tempting him to disclose himself do not bring him to do so, he will provoke the persons who have employed them; finding themselves disobliged by being defeated of their desires if not also their expectations, they will for the most part try to revenge themselves on him by giving him the character of a discourteous and ill-natured person; and they will try—perhaps successfully enough—to decry his abilities by suggesting that his deliberate concealments come from his awareness that the things he is presumed to possess would cease to be valued if they began to be known.

You may say that so much reservedness is a fault. I shall not argue with you about that; but if he is open and communicative in work to the strangers who come to pump him, such is the dishonest temperament of all too many men that he will be in great danger of having his notions or experiments arrogated [= 'claimed as their own'] by those to whom he imparts them, or at least by others to whom

those. . . .happen to speak of them. And then if Physeophilus, or any of his friends who know him to be the author of what is thus usurped, mention him as such, the usurpers and their friends will at once become his enemies; and to secure their own reputation they will be solicitous to lessen and blemish his.

You might now tell me:

'My friend might take a middle way—the one that in most cases is thought to be the best—by speaking of his discoveries in a way that somewhat gratifies those who have a curiosity to learn them, but not speaking so clearly as divest himself of his ownership of them.'

I reply that this expedient is not a sure one, or free from inconveniences. For most men are so self-opinionated that they will easily believe themselves to be masters of things that they only half understand. And even if the persons to whom the work is immediately made known do not have too great an opinion of themselves. . . ., they may easily, by repeating what they heard and observed, give some abler person sufficient to enable him to make out the whole notion or discovery, which he will then without scruple—and with almost no possibility of being disproved—claim as his own. But if it happens (as it often will in extemporaneous work) that a philosopher is not rightly understood, either because

- he has not the leisure, any more than the intention, to explain himself fully, or because
- the persons he converses with do not bring to the conversation a competent capacity and attention,

he then runs a greater danger than before. For the pride most men take in being known to have conversed with eminent philosophers makes them eager to repeat what they heard the famous man say; and—often being sure of not being contradicted—ignorantly to misreport it or knowingly to wrench it around so that it favours the opinion they want

it to support. So that whereas by the formerly mentioned frankness of work he is only in danger of having the truths he discovered arrogated by others, this reservedness exposes him to having fathered on him opinions and errors that he never dreamed of. And once a man's opinions or discoveries come to be publicly talked about without being proposed by himself or some friend well instructed by him, he knows not what errors or extravagances may be attributed to him. . . .by the mistake of the weak, or the dishonesty of the biased, or the tricks of the malicious. And even the greatness of a man's reputation sometimes gives plausibility to vain reports and surmises—so much plausibility that that reputation is gradually shaken, if not ruined. As we see that Roger Bacon and Trithemius and Paracelsus—who for their times were *knowing* as well as *famous* men—had ascribed to them feats which, by appearing fabulous to most of the judicious, have tempted many to think that all the great things that were said about them were fabulous too.

The problems of scientific publication

Those are some of the inconveniences that a naturalist may be liable to if he abstains from communicating his thoughts and discoveries himself. But if Physeophilus should, to avoid these, aim at fame by the usual method of writing books, he may indeed avoid *these* but perhaps not without running into *other* inconveniences and hazards that are nearly as bad. Whether he

- (i) writes in a systematic way, as they have done who have published entire bodies of natural philosophy or methodical treatises on a considerable part of it, or
- (ii) writes in a more loose and unconfined way about any particular subject that belongs to physics,

he will find that, either way, his choice between these two ways of writing books will be liable to inconvenience enough.

(i) If he writes systematically, (a) he will be obliged (so as not to omit anything necessary) to say various things that have already been said (perhaps many times) by others, which is bound to be unpleasant to the reader and (if he is competent) to the writer. (b) There are so many things in nature of which we know little or nothing, and so many more of which we do not know enough, that our systematic writer—even if he is very learned—*must* either •leave various things that belong to his theme undiscussed or •discuss them slightly and often (in likelihood) erroneously. So that in books of this kind there is always much said that the reader did know, and commonly not a little that the writer does not know. And to this I must add (c) that because natural philosophy is such a vast and pregnant subject that (especially in such an inquisitive age as this) almost every day reveals some new thing about it, it is hardly possible for a method that is adapted only to what is already known to continue for long to be the most proper; as the same clothes will not for long fit a child whose age will make him quickly out-grow them. So later writers will have a fair claim to compile new systems that may be more adequate to philosophy improved since the publication of the earlier work. And even if there is little that is new to be added, and it would be easier to alter than to mend the method of our supposed author, novelty itself is so pleasing and inviting to the generality of men that it often recommends things that have nothing else to recommend them. . . .

(ii) But if someone declines the systematic way and chooses the other way—writing loose tracts and works—he may indeed avoid some of the above-mentioned inconveniences, but he will hardly avoid being plundered by systematic writers. For these will be apt to cull out the things they

like best and insert them in their methodical books (perhaps much curtailed or otherwise injured in the repeating), and will place them not as their own author did •where they may best confirm or adorn his work and be illustrated or upheld by it, but •where it may best serve the purposes of the compiler. And these methodical books promise so much more compendious a way than others to the attainment of the sciences they deal with that most readers take it for granted that if earlier writers had anything considerable to offer it has all been carefully extracted and digested in an orderly way by the later compilers. In fact, the methodical books for the most part give more help to the memory than to the the understanding; but most readers—through lack of judgment or lack of patience—see them differently. And though I take their view to be a very erroneous and prejudicial misconception, it is so widespread that just as

- goldsmiths who only give shape and lustre to gold are far more esteemed, and in a better financial-condition, than •miners who find the ore in the bowels of the earth and with great pains and industry dig it up and refine it into metal, so also
- those who with great study and toil successfully penetrate into the hidden recesses of nature and discover latent truths are usually less regarded or taken notice of by the general run of men than •those who by plausible methods and a neat style reduce the truths that others have found out into systems that are attractively ordered and of a convenient size.

I consider in the **second** place that not only the method of the books one writes can prove prejudicial to the naturalist who aspires to fame but so also can their size. If he writes large books he is likely to write in them many things that are inaccurate if not irrelevant, or to be obliged to repeat many things that others have said before; and if

he writes only small tracts—as is the custom of the most judicious authors who want to publish only what is new and considerable—their excellence will speed up their spread but their smallness will put them in danger of being quickly lost. Experience shows us various excellent little tracts which, though published not many years ago, are already ‘out of print’ (as they say) and not to be met with except by chance in stationers’ shops. So that these writings (which deserve a better fate) come after a while either •to be lost (which has been the fate of many) or •to have their memory preserved only in the larger volume of some compiler whose industry is better than his judgment. For it is it is observable that (by I know not what unlucky fate) very few (I do not say *none*) who devote themselves to making collections out of the works of others have the judgment to pick out the choicest things in them; and the small tracts I am speaking of, being preserved only by such a quoter or abridger, will run a very great danger of being conveyed to posterity only in a form that pleases the compiler.

The danger of misrepresentation

This leads on to my **third** consideration. The fame of a naturalist who publishes only small tracts may be made uncertain not only because of

- the lack of judgment that (I repeat) is too often observable in compilers, whereby they often leave far better things than they take, but also because of
- the compilers’ lack of skill to understand the author they cite and summarise or of candour to treat him fairly.

For sometimes men’s physical opinions and several passages of their writings are so misrepresented by mistake or design—especially if those who report their opinions do not share

them—that they are made to teach or deliver things quite different from their sense and perhaps quite contrary to it. I myself have had some unwelcome experience of this: a learned writer claimed, I know not how often, that I asserted an opinion which I had explicitly rejected. Another noted writer—not maliciously but through not being acquainted with mechanics and the subject I wrote about—commended me for having, by a new experiment, proved something the opposite of what I intended the experiment to show (and I am not the only one who thinks that it *did* show it). I have met with other naturalists whose writings compilers have traduced out of hatred for their persons or their religion; as if truth could in nothing be a friend to one who is the traducer’s enemy! or as if—despite all the truths we owe to Aristotle, Epicurus and the other heathen philosophers—a man who falls into an error in religion could not come upon a good notion in philosophy! Indeed, there are some who will set themselves to decry a man’s writings not because they are directly his enemies but because he is esteemed by their enemies; as you may remember the example of a servant of yours who had various things written against him for this very reason. And a worthy writer’s reputation may be prejudiced not only by the citations of professed adversaries or opponents but also—as quite often happens—by those who mention him with praise and seem disposed to honour him. For I have observed it to be the trick of certain writers to name an author with much compliment for *one or a few* of the *least* considerable things they borrow from him; by which artifice they try to conceal their being plagiarists of *more* and *better*; though this is more excusable than the conduct of some who proceed to that pitch of dishonesty that they will rail at an author so as not to be thought to be beholden to him, when in fact they owe him too much.

Various other hazards

And I must add **fourthly** that besides these dangers that a naturalists’ reputation with posterity may run because of men’s ignorance or perverseness, it is vulnerable to various other hazards from the very nature of men, of opinions, and of things.

Men’s abilities and inclinations are naturally various in reference to studies, one man passionately loving one sort of them and another being fond of quite different ones; and those inclinations are often variously and generally determined by external and accidental causes. As when some great monarch happens to be a great patron—or a despiser and perhaps an adversary—of this or that kind of learning; and when one man has gained much applause for this or that kind of study, imitation or the desire to do better often makes many others devote themselves to it. Thus though Rome under the consuls was inconsiderable for learning, the reputation of Cicero and the favour of Augustus brought learning into vogue there; whereas the small favour it met with among most of the succeeding emperors kept it far inferior to what it had been among the Greeks around the time of Alexander. And the age of that same Augustus was ennobled with many poets, not only by the favour that he and Maecenas gave them but probably also by the examples they gave to one another and the rivalry they aroused among poets. And after the decay of the Roman empire in the fourth century, natural philosophy and mathematics being very little valued and even less understood because men’s studies were by the genius of those ages applied to other subjects, every century hardly produced one improver (let alone one eminent cultivator) of mathematics or of physics. From this you can see how little certainty there is that because a man is skilled in natural philosophy and that science is now in

vogue, his reputation when the science itself has grown out of repute will be as great as it is now.

Shifts of intellectual fashion

Besides the contingencies that may happen to a naturalist's fame because the science he cultivates is—as are others—subject to wanes and eclipses in the general esteem of men, there is another uncertainty arising from the vicissitudes that are to be met with in men's estimates of different hypotheses, sects, and ways of philosophising about the same science, and particularly about natural philosophy. During those learned times when physics first and most flourished among the Greeks, almost all the naturalists who preceded Aristotle—including Democritus, Leucippus, Epicurus, Anaxagoras, Plato—were corpuscularians who tried, though not all by the same way, to give an account of the phenomena of nature and even of qualities themselves in terms of the size, shape, motion etc. of corpuscles, or the minutest active parts of matter. Whereas Aristotle,

- having tried to deduce the phenomena from the four first qualities, the four elements, and a few other barren hypotheses,
- ascribing what could not be explained by them (and consequently far the greatest part of nature's phenomena) to 'substantial forms' and 'occult qualities' (principles [here = 'causes'] that are readily named but hardly even *claimed* to be understood), and
- having on these slight and narrow principles reduced physics to a kind of system, which the judicious modesty of the corpuscularians had made them reluctant to do,

the reputation that his great pupil Alexander as well as his own learning gave him, the easiness of the way he proposed

to the attainment of natural philosophy, the good luck his writings had to survive those of Democritus and almost all the rest of the corpuscularians when Charles the Great began to establish learning in Europe—these and some other lucky accidents that concurred did for about seven or eight centuries together make the corpuscularian philosophy not only be *jostled* but even *exploded* out of the schools by the Aristotelian philosophy. In our times, with the revival of the corpuscularian philosophy, the Aristotelian one is rejected, and by more than a few derided as precarious, unintelligible, and useless. To give a particular instance (which, though mentioned earlier [page 10] deserves to be mentioned again for our present purpose), Aristotle himself somewhere confesses (not to say *brags*) that the Greek philosophers, his predecessors, unanimously taught that the world was (I do not say created, but) made, and yet he—almost by his single authority, and the subtle arguments (as some have thought them) that he employed. . . .—was able for many ages to introduce into the schools of philosophers that irreligious and ill-grounded opinion of the eternity of the world, which •the Christian doctrine later made men begin to question and which now both •that and right reason have persuaded most men to reject.

This invites me to consider further that the present success of the opinions that your Physeophilus befriends ought not to make him so sure as he thinks he is that the same opinions will be always in vogue and have the same advantages in general esteem that they now have over their rivals. Opinions seem to have their fatal seasons and vicissitudes, as well as other things; as can be seen not only from the examples I have just given but also from the hypothesis of the earth's motion:

Having been in great vogue before Pythagoras (who is commonly thought to have invented it), and having its

reputation much increased by the vote of the famous sect of the Pythagoreans (whom Aristotle himself takes notice of as the patrons of that opinion), for the next nearly 2000 years it was laughed at as not only false but ridiculous. After all that time this so long antiquated opinion, revived by Copernicus, has in a little time made so great a progress among the modern astronomers and philosophers that if it goes on like this the motion of the earth will be acknowledged by all its mathematical-ly competent inhabitants.

But though it is often the fate of an oppressed *truth* to have at length a resurrection, not only truths have this privilege; for obsolete errors are sometimes revived, as well as discredited truths. So that the general disrepute of an opinion in one age will not give us an absolute security that it will not be in vogue in another, in which it may not only revive but reign.

And we can observe inconstancy and vicissitude not only in •the acceptance of men's opinions about philosophical matters but also in •the very way and method of philosophising. Democritus, Plato, Pythagoras and others—who were some of the more sincere and able cultivators of physics among the Greeks—exercised themselves chiefly

- in making particular experiments and observations, as Democritus did in his dissections of animals, or
- in applying mathematics to explaining some particular phenomenon of nature, as can be seen...in the accounts that Democritus, Plato and others give of fire and other elements, from the shape and motion of the corpuscles they consist of.

And although this way of philosophising was so much in vogue before Aristotle that...there are manifest and considerable footsteps of it to be met with in some of his writings (particularly in his books on animals and his mechanical questions); yet for many ages his scholastic followers

neglected the way of philosophising of the ancients and (to the great prejudice of learning) introduced everywhere instead of it a quite contrary way of writing. Not only did they lay aside mathematics (of which they were for the most part very ignorant), but instead of giving us intelligible and explicit (if not accurate) accounts of **particular** subjects, based on a clear-eyed and attentive consideration of them they contented themselves with hotly disputing in general certain unnecessary—or at least unimportant—questions about the objects of physics, about

- materia prima*,
- substantial forms,
- privation,
- place,
- generation,
- corruption,

and other such **general** things. And when they had quite tired themselves and their readers with all this they usually •remained utter strangers to the **particular** productions of the nature about which they had so much wrangled, and •were not able to give a man as much true and useful information about particular bodies as even the lowest-level manual workers—mine-diggers, butchers, smiths, even dairy-maids—could do. Which made their philosophy appear so imperfect and useless not only to the general run of men but to the more elevated and philosophical intellects, that our great Francis Bacon tried with much skill and industry (and some indignation!) to restore to its former vogue the more modest and useful way practised by the ancients, of inquiring into particular bodies without hastening to make systems; in which he was considerably aided by the admirable industry of two of our London physicians, Gilbert and Harvey. And I need not tell you that since Bacon—with Descartes, Gassendi and others having taken in the application of geometrical

theorems in explaining physical problems—he and they and other restorers of natural philosophy have brought the experimental and mathematical way of inquiring into nature into at least as high and growing an esteem as ever it possessed when it was most in vogue among the naturalists who preceded Aristotle.

The likelihood of being wrong

To the considerations I have so far adduced, which might alone suffice for my purpose, I shall add one that I take to be of greater weight than any of them for showing how difficult it is to be sure that the physical opinions which at present procure veneration for a champion or promoter of them will still be in vogue at later times. As well as the inconstant fate of applauded opinions that may be imputed to the inconstancy of men there is a greater danger that threatens the aspirer's reputation from the very nature of things. For the most general causal factors of all—namely the shape, size, motion, and other mechanical features of the small parts of matter—being (as your friend believes) sufficiently and clearly established already, he must expect to grow his reputation from subordinate hypotheses and theories; and I shall not scruple to say that with *these* it is extremely difficult, even for those who are more exercised than your friend is in forming them and in making experiments, to have such a comprehensive and clear prospect of everything they need to know that they are not to be liable to have their doctrine made doubtful or disproved by something they did not discover and that may come to light later. I am sure you would easily be persuaded of this if I had leisure and convenience to transmit to you my *Sceptical Naturalist*. But without having recourse to that tract it may suffice that we consider that one of the conditions of a good hypothesis is

that it should be consistent with . . . all other phenomena of nature as well as those it is designed to explain. For this being granted (and it cannot be denied), anyone who establishes a theory that he expects to be accepted at all succeeding times and make him famous in them must have a care not only that none of the phenomena of nature that are already known contradict his hypothesis at the present but that no phenomena that may be hereafter discovered will contradict it for the future. And I very much question whether Physeophilus *does* or, on no greater a number and variety of experiments than most men build on, *can* know how incomplete the history of nature is that we now have, and how difficult it is to build an accurate hypothesis on an incomplete history of the phenomena it is to apply to; especially considering that (as I was saying) many things may be discovered later by industry or chance that are not now so much as dreamed of, and that may yet overthrow doctrines which fit, attractively enough, the observations that have been made up to now.

The ancient philosophers who thought the torrid zone to be uninhabitable did not base their opinion on wild reasonings; and after continuing uncontrolled for many ages the opinion might have been accepted for ever if the discoveries made by modern navigations had not shown it to be erroneous. The solidity of the celestial orbs was the general opinion of astronomers and philosophers for more than ten centuries, yet in the last age and in ours the observation of

- comets moving freely across from one of the supposed orbs to another,
- the intricate motions in the planet Mars (observed by Kepler and others to be sometimes nearer the earth than the sun is, and sometimes further away), and
- other phenomena undiscovered by the ancients,

have made even Tycho, as well as most of the recent astronomers, exchange the too-long-received opinion of solid orbs for the more warrantable belief in a fluid ether. And though the remoteness from us of the celestial part of the world makes it the most unlikely part to provide us with the means of overthrowing old theories by new discoveries, yet even there we may take notice of various instances to our present purpose, though I shall here name only this one: after the Ptolemaic number and order of the planets had passed uncontradicted for very many ages, and even the Tychonians and Copernicans, though dissenting from the Ptolemaic system as regards order, still accepted it as regards the number of the planets, after the happy discoveries made by Galileo of the satellites of Jupiter and by the excellent Huygens of the new planet about Saturn (which I think I had the luck to be the first who observed and showed disbelievers of it in England) the astronomers of all persuasions are brought to add to the old number 'seven' of the planets and take in five others that their predecessors did not dream of. [And he adds a second example, from human physiology.]

It would be easy to multiply instances of this kind, but I rather choose to add that it is not only about •the qualities and other attributes of things that new and often accidental discoveries may destroy the credit of long and generally approved opinions but also about •their causes. That quicklime exceedingly heats the water that is poured on to quench it because of antiperistasis [see Glossary] has been very long and universally accepted by the school-philosophers, for whom it is the grand and usual argument to establish antiperistasis; but I presume you have become aware that this proof is made wholly ineffectual (in the judgment of many of the virtuosi) by some contrary experiments of mine, and particularly that of arousing in quicklime as great an effervescence by the addition of hot water as by cold. Again, it has been generally

believed that in the freezing of water that liquid is condensed into a smaller space, whereas our recent experiments have satisfied most of the curious that ice is water *expanded*, i.e. that ice occupies more space than the water did when it remained unfrozen. And whereas the notion of nature's abhorrence of a vacuum has not only ever since Aristotle's time made a great noise in the schools but seems to be confirmed by a multitude of phenomena, the experiments of Torricelli and some of mine, showing the air has a great weight and a strong spring, have (I think) persuaded almost everyone who has impartially considered them that, whether or not there is such a thing as they call *fuga vacui* [= 'avoidance of vacuum'], the phenomena that are generally ascribed to it—such as suction and the rising of water in pumps—can be well explained without it, and are indeed caused by the weight of the atmosphere and the elastic power of the air.

The limits of much-praised practical devices

And this reminds me to take notice that even practical inventions, where one would think the matter of fact to be evident, may be brought by undreamed-of discoveries to lose the general reputation they had for completeness in their kind. ·I shall give three examples of this·. **(a)** To enhance the invention of sucking pumps and of siphons it has been generally presumed that water and any other liquid can be raised by either of these, *ob fugam vacui* [= 'to avoid a vacuum'], to whatever height one pleases; and accordingly ways have been proposed by famous authors to convey water from one side of a high mountain to the other. But the unexpected disappointments that were met with by some pump-makers, and afterwards experiments purposely made, sufficiently show that neither a pump nor a siphon will raise water more than about 35 feet or quicksilver more than 35 inches.

(b) As to the invention of weather-glasses, which has been so much and justly applauded and used, as it has been generally accepted as the truest standard of the heat and cold of the weather, so it seems to be liable to no suspicion of deceiving us, because:

Not only it is evident that in winter when the air is very cold the water rises much higher than in summer and other seasons when it is not so, but if you simply apply your warm hand to the bubble at the top the water will be visibly depressed by the rarefied air, and when your hand is removed so that the air returns to its former coldness the water will at once visibly ascend again.

And yet by **finding** that the atmosphere has a considerable weight which is not always the same but varies much, I have had the luck to satisfy many of the curious that these open thermometers are not to be safely relied on because in them the liquid is made to rise and fall not only (as men have hitherto supposed) by the cold and heat of the ambient air but (as I have shown by various new experiments) according to the varying gravity of the atmosphere, which variation has a visible and indeed a very considerable influence on the weather-glass. [Boyle builds into this sentence a caution about this **finding** of his: ‘... as far as I can yet discover, uncertainly enough...’.]

(c) To these examples I shall add only one more, from which we can learn that

despite a very attentive survey of everything that a man can at present take notice of or reasonably suspect that he ought to take into his consideration, the case may be such that having devised an instrument he may use it for many years with good success and yet—unless he could live for very many more—not be sure to out-live the danger of finding the same instrument (though not defective) to be fallacious.

He who first applied a magnetic needle to finding the meridian line, and finding that his needle pointed directly N and S or declining from that line just two or three or some other determinate number of degrees, might very plausibly conclude that he had discovered a certain and ready way, without the help of sun or stars or astronomical instruments, to describe a meridian line, and if he lived only an ordinary number of years after his observation he might probably have found his instrument not to be deceitful; but it may now *be* deceitful, because the magnetic needle not only declines in many places from the true N-S line but (as later discoveries inform us) in the course of time varies its declination in a single place.

The considerations I have presented might easily enough be increased by more to the same effect, especially if I thought fit to borrow from a work of mine purposely written about *The Partiality and Uncertainty of Fame*; but instead of adding to their number I would think myself obliged to excuse my having already mentioned so many, and insisted so much on them, if I did not strongly suspect that in your Physeophilus (as well as in many other modern naturalists) hardly anything contributes more to an undervaluation of the study of divinity than his confidence that physiology will help him to get the *certain* as well as *posthumous* fame that he is eagerly ambitious for; and therefore

next phrase: the design of his discourse

presumably meaning: the general trend of what he had to say on the occasion I am responding to

made me think it expedient to spend some time to show that it is far less easy than he thinks to be as sure that he will have the praises of future ages as ·it is sure· that (even if he has them) he will not hear them.

Theological seriousness does not rule out scientific fame

Those considerations have, I presume, convinced you that it is no such easy matter for a naturalist to acquire a great reputation and be sure it will prove a lasting one. Now, wanting to confirm second part of what I proposed earlier [i.e. item (ii) on page 57], I proceed to show that even if the case were otherwise he would still have no reason to slight the study of divinity.

[A] In the first place, nothing hinders a man who values and inquires into the mysteries of religion from achieving eminence in the knowledge of those of nature. Frequently men with great abilities successfully apply themselves to more than one study; and few of them have their thoughts and hours so much engrossed by that one subject or activity that they cannot find time not only to cultivate the study of nature but to excel in it, if they have a great inclination as well as fitness for it. You need not be told that Copernicus, to whom our late philosophers owe so much, was a churchman, that his champion Lansbergius was a minister, and that Gassendi himself was a doctor of divinity. Among the Jesuits you know that Clavius and various others have as prosperously devoted themselves to mathematics as to divinity. And as for physics: not only Scheiner, Aquilonius, Kircher, Schottus, Zucchius and others have very laudably cultivated the optical and some other parts of philosophy, but Ricciolus himself—the learned compiler of that voluminous and judicious work the *Almagestum Novum*, in which he has inserted some accurate observations of his own—is not only a divine but a professor of divinity. And without going out of our own country, if I were not afraid of offending the modesty of those I named or injuring the merit of those I omitted, I could name several of our English ecclesiastics who, though

they apply themselves so much to the study of the Scripture as to be not only solid divines but excellent preachers, have also been so happily conversant with nature that if they had lived in the learned times of the Greeks some of them would have rivalled if not eclipsed Pythagoras and Euclid, others of them Anaxagoras and Epicurus, and some of them even Archimedes and Democritus themselves.

Lower and higher goals for scientific inquiry

And certainly, provided enough curiosity and industry are employed in the study of nature, it is not necessary that the knowledge of nature should be the *ultimate* goal of that study. Fondness of the object is required only for engaging the mind in such a serious application; and a higher aim may sufficiently invite us to *that*, promoting rather than discouraging it. David became no less skillful in music than those who were devoted to it only to please themselves in it, though (we may reasonably suppose) such a pious author of psalms and instruments aspired to excellence in that delightful science so that he might offer it to the service of the temple and promote the celebration of God's praises with it. And as experience has shown that the heathen philosophers

- who courted moral virtue for itself

did not raise it to the pitch to which it was advanced by the heroic practices of those true Christians

- who in the highest exercise of virtue had the religious aim of pleasing and enjoying God,

I do not see why natural knowledge must be more prosperously cultivated by those selfish naturalists

- who aim only at pleasing themselves in the attainment of that knowledge

than it is by those religious naturalists

•who are invited to attention and industry not only by the pleasantness of the knowledge itself but by a higher and more engaging consideration, namely that by the discoveries they make in the book of nature both themselves and others may be excited and qualified the better to admire and praise the author, whose goodness so well matches the wisdom they celebrate that he declares in his word that he will honour those who honour him.

And just as a man who is not in love with a fair lady but has only a respect for her may have an idea of her face that is as true and perfect (though not as discomposing!) as the most passionate lover has, I do not see why a religious and inquisitive contemplator of nature may not be able to give a good account of it without preferring it so far to all other objects of his study as to make it his mistress and perhaps too his idol.

Theological study can itself bring fame

[B] Now I proceed to consider in the second place that matters of divinity, as well as those of philosophy, can provide a reputation to him who discovers or illustrates them. The fundamental articles of Christian religion are, as I have formerly declared, nearly as evident as they are important; but there are many other points in divinity and passages in the Scripture which (for reasons I have mentioned elsewhere) are exceedingly hard to be cleared, and not only •challenge ordinary readers and the common sort of scholars but will •sufficiently exercise the abilities of a high intellect, giving him opportunity enough to manifest that he is one. Many of the points I speak of are made obscure by the sublimity of the things they treat of, such as the nature, attributes, and decrees of God, which cannot be easy for the dim

understandings of us who are merely men. And many others that are not abstruse in their own nature are made obscure to us by our ignorance (or at least imperfect knowledge) of the disused languages in which they are delivered, and the great remoteness of the ages when and the countries where the things recorded were done or said. So that often a man may need and show as much learning and judgment to dispel the darkness in which •time has involved things as •to dispel• that which •nature has cast on them. And in fact we see, that St. Augustine, St. Jerome, Origen, and others of the Fathers have acquired as much reputation as Empedocles, Anaxagoras, and Zeno. And Grotius, Salmasius, Mr Mede, Dr Hamond, and some other critical expounders of difficult texts of Scripture have got as much credit through that work as Fracastorius has by his book *De sympathia & antipathia*, Levinus Lemnius by his *De occultis rerum miraculis* or Cardanus and his adversary Scaliger by what they wrote *De subtilitate*—or even Fernelius himself by his book *De abditis rerum causis*.

And it will contribute to the credit that theological discoveries and illustrations may procure for a man that the importance of the subjects and the earnestness with which men are given to busying themselves about them—

- some on grounds of piety,
- others on that of interest,
- some to learn truths,
- others to defend what they have long or publicly taught as truths

—makes greater numbers of men take notice of such matters, and concern themselves far more about them, than about almost anything else, and especially far more than about purely philosophical matters, which few think themselves fit to judge of or are concerned to trouble themselves about. And accordingly we see that the writings of Socinus, Calvin,

Bellarmino, Padre Paulo, Arminius etc. are more famous and more studied than those of Telesius, Campanella, Severinus Danus, Magnenus and various other innovators in natural philosophy. And Erastus, though a very learned physician, is much less famous for all his elaborate disputations against Paracelsus than for his little tract against particular forms of church-government. And I presume you have taken notice, as I have, that there are scarce any five new controversies in all physics that match the five ·theological· articles of the remonstrants in how many people know about them and how hotly they are contended for.

Fame is relatively unimportant

[C] It remains for me to tell you in the third place that even if it *were* the case that to prosecute the study of divinity one must of necessity neglect the acquisition of reputation, this inconvenience itself ought not to deter us from the duty in question. In any deliberation in which something is proposed to be quitted or declined in order to obey or please God, I think we may fitly apply what the prophet said to the Jewish king who—

being urged (to express his concern for God's glory) to decline the assistance of an idolatrous army of Israelites, and objecting that by complying with this advice he would lose a sum of money amounting to no less than the hire of a potent army

—received from the prophet this brisk but rational answer: 'The Lord is able to give thee far more than this.' The apostle Paul, who had been traduced, reviled, buffeted, scourged, imprisoned, shipwrecked, and stoned for his zeal to propagate the truths whose study I plead for, after he had once had a glimpse of that great recompense of reward that is reserved for us in heaven, confidently announces that on casting up

the account (for he uses the arithmetical term that is Greek for 'calculate') he finds that 'the sufferings of this present time are not worthy to be compared with the glory that is to be revealed in us'. And if all that the persecuted Christians of his time could suffer were not. . . proportional to that glory, the latter will surely far outweigh what we can now forgo or decline for it; because the loss of an advantage—and much more the mere missing of it—is usually only a negative affliction, in comparison with the actual suffering of evil. Not only did Christ tell his disciples that anyone who gave the least of his followers so much as a cup of cold water because of their relation to him would not be unrewarded, but when the same persons asked him what would be done for those who had left all to follow him, he immediately allots them *thrones*, outvaluing all that they had lost by as much as an ordinary recompense may exceed a cup of cold water. And indeed God's goodness is so great, and his treasures so unexhausted, that as he is eager to recompense even the least services that can be done him so he is able to give the greatest a proportional reward. Solomon had an opportunity—such as no mortal ever had (that we know of) either before or since—to satisfy his desires, whether for fame or anything else he could wish: 'Ask what I shall give thee' was the offer made him by Him who could give all things worth receiving; and yet the wisdom even of Solomon's choice, approved by God himself, consisted in declining •the things people have most ambition for in this life, for •things that might the better qualify him to serve and please God.

And to give you an example of someone greater than Solomon we may consider that he who

being in the form of God, thought it not robbery to be equal with God; and who by leaving heaven to dwell on earth gave up more than any inhabitant of the earth can give up to gain heaven; and who gave up

more to become capable of being tempted than he gave up when he was tempted with an offer of all the kingdoms of the world and the glory of them

—this Saviour is said in Scripture to have ‘for the joy that was set before him, endured the cross and despised the shame’; as if heaven had been a sufficient recompense for even his renouncing honours and embracing torments.

Anyone who declines the acquisition of the applause of men for the contemplation of the truths of God merely forbears to gather while it is immature something which by waiting God’s time he will more seasonably gather when it is fully ripe, wholesome and sweet. That incorruptible crown (as St. Peter calls it) which the gospel promises to those ‘who by patient continuance in well doing seek for glory and honour’ will make rich amends for the declining of a fading wreath here on earth, where reputation is often acquired as undeservedly as it is lost; whereas in heaven the sheer fact of *having* celestial honours shows that one is entitled to them. And since our Saviour reasons that his disciples ought to rejoice when their reputation is pursued by calumny and their lives by persecution ‘because their reward is great in heaven’, we may justly infer that

- the grounded expectation of such an illustrious condition, even when it is not accompanied by present applause

may bring us more contentment than

- this applause can give those who do not have that comfortable expectation.

So we have no reason to despond, or to complain of the study of theology, if it makes us decline an empty and transitory fame for a solid and eternal glory.

Conclusion

By this time, Sir, I have said as much as I think fit (and therefore, I hope, more than was necessary just for you) to show that Physeophilus had no just cause to undervalue •the study of divinity or •our friend the doctor for devoting himself to it. I hope you have not forgotten what I explicitly enough declared at the beginning of this letter, namely that because both your friend and you admit the holy Scriptures I knew that this entitled me to draw proofs from their authority. And if I need not remind you of this, perhaps I need not tell you by way of apology that I am acquainted with the laws of discoursing: if I had been arguing with atheists or sceptics I would have refrained from using some of the arguments I have employed here, as based on unconceded premises, and substituted others; but I think it very allowable for me to urge •the arguments I have used• when I deal with a person like your friend, who does not *reject the authority* of the Scriptures but only *undervalues the study* of them. And if the prolixity I have been guilty of already did not forbid me to increase it by apologies that are not absolutely necessary, I might think myself obliged to excuse the plainness of the style of this work, which may seem to require a richer dress—both because of the subject and because of you. But the matter is very serious, and you are a philosopher, and when the things we treat of are highly important I think that the most persuasive pieces of oratory are truths clearly made out. And a work of this nature is more likely to prove effectual on intelligent readers by having the reasons it presents •clearly proposed and unprejudicedly entertained than by their being •emotionally urged or elaborately adorned. And I have been all the more concerned to avoid expressions that might seem more proper to move than to convince because I foresee that I may soon have occasion to employ some of

the 'moving' sort in another letter to a friend of yours and mine, who will no doubt make you a sharer in the trouble of reading it. But in writing this for you and Physeophilus I was far more solicitous to give my arguments a good structure than ·to give them· a bright gloss. For even when we want to excite devotion, if it be in rational men, the most effective pieces of oratory are the ones which like burning-glasses inflame purely by bringing together numerous beams of light. If this letter proves so happy as to give you any satisfaction, it will thereby bring me a great one. For prizing you as I do, I cannot but wish to see you esteem those things now which I am confident we shall always have cause to esteem,

especially when the light of glory makes us better judges of the true worth of things. And it would extremely trouble me to see you disesteeming those divine things which as long as a man undervalues them the possession of heaven itself would not make him happy. And therefore if the blessing of him whose glory is aimed at in it make the success of this paper answerable to the wishes, the importance of the subject will make the service done you by it suitable to the desires, of

Sir,

Your most faithful, most affectionate, and most humble servant.