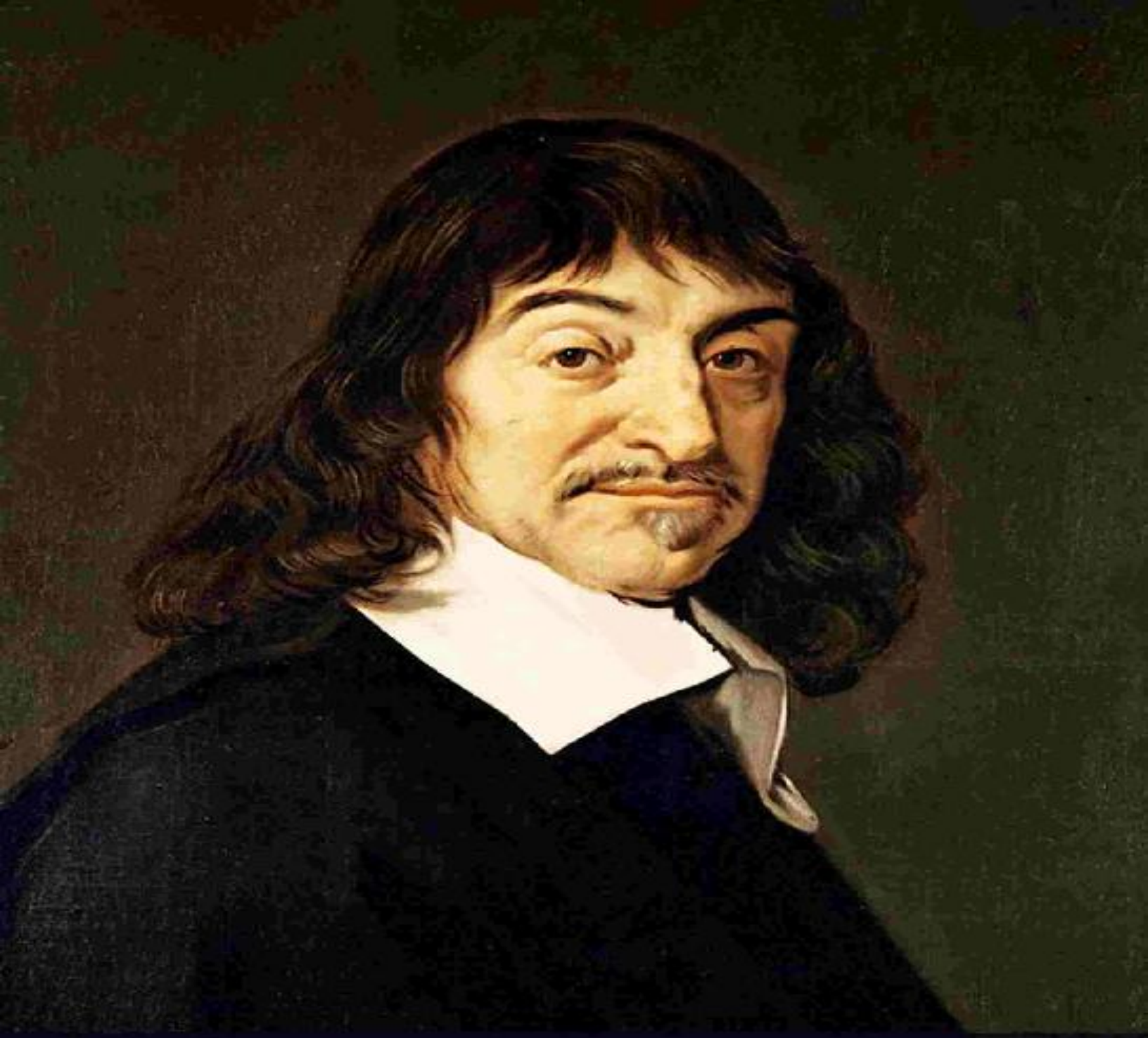


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RENÉ DESCARTES

(1596-1650)



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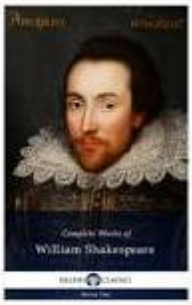
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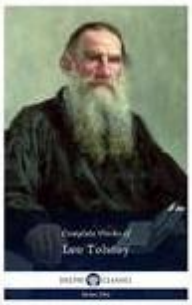
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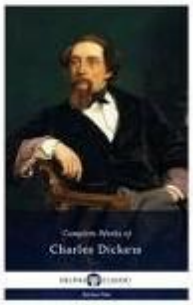
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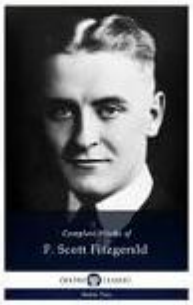
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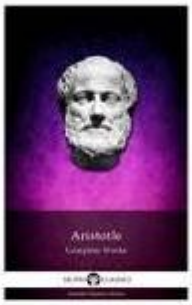








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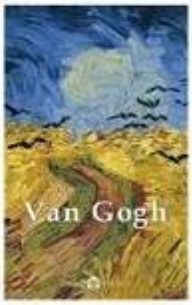


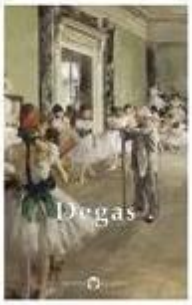






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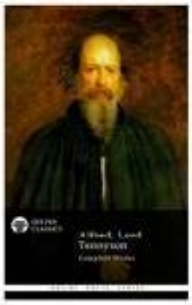


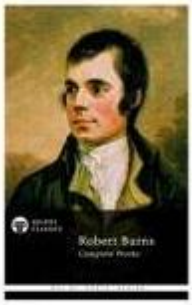




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The Collected Works of

RENÉ DESCARTES



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The Books



Descartes' birthplace in La Haye en Touraine



Descartes was born in La Haye en Touraine (now Descartes, Indre-et-Loire), a commune in the Indre-et-Loire department in central France. It is approximately 13 miles east of Richelieu and about 24 miles east of Loudun, on the banks of the Creuse River.

RULES FOR THE DIRECTION OF THE MIND



Translated by Elizabeth Anscombe and Peter Thomas Geach

In the late 1620's Descartes began work on an unfinished treatise regarding the proper method for scientific and philosophical thinking, titled *Regulae ad directionem ingenii*, which outlined the basis for his later work on complex problems of mathematics, science and philosophy. In total thirty-six rules were planned, although only twenty-one were actually written. The treatise was not published during the author's lifetime and first appeared in a Dutch translation in 1684, with the first Latin edition being published in 1701.

The first 12 rules concern Descartes' proposed scientific methodology in general; scholars now consider them to be early versions of principles that he expanded upon in his later writings.



Portrait of René Descartes by Jan Baptist Weenix, c. 1649

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Rule I

The aim of our studies should be to direct the mind with a view to forming true and sound judgements about whatever comes before it.

Whenever men notice some similarity between two things, they are wont to ascribe to each, even in those respects in which the two differ, what they have found to be true of the other. Thus they erroneously compare the sciences, which entirely consists in the cognitive exercise of the mind, with the arts, which depend upon an exercise and disposition of the body. They see that not all the arts can be acquired by the same man, but that he who restricts himself to one, most readily becomes the best executant, since it is not so easy for the same hand to adapt itself both to agricultural operations and to harp-playing, or to the performance of several such tasks as to one alone.

Rule II

We should attend only to those objects of which our minds seem capable of having certain and indubitable cognition.

Science in its entirety is true and evident cognition. He is no more learned who has doubts on many matters than the man who has never thought of them; nay he appears to be less learned if he has formed wrong opinions on any particulars. Hence it were better not to study at all than to occupy one's self with objects of such difficulty, that, owing to our inability to distinguish true from false, we are forced to regard the doubtful as certain; for in those matters, any hope of augmenting our knowledge is exceeded by the risk of diminishing it. Thus in accordance with the above maxim we reject all such merely probable knowledge and make it a rule to trust only what is completely known and incapable of being doubted. No doubt men of education may persuade themselves that there is but little of such certain knowledge, because, forsooth, a common failing of human nature has made them deem it too easy and open to everyone, and so led them to neglect to think upon such truths; but I nevertheless announce that there are more of these than they think — truths which suffice to give a rigorous demonstration of innumerable propositions, the discussion of which they have hitherto been unable to free from the element of probability. Further, because they have believed that it was unbecoming for a man of education to confess ignorance on any point, they have so accustomed themselves to trick out their fabricated explanations, that they have ended by gradually imposing on themselves and thus have issued them to the public as genuine.

But if we adhere closely to this rule we shall find left but few objects of legitimate study. For there is scarce any question occurring in the sciences about which talented men have not disagreed. But whenever two men come to opposite decisions about the same matter one of them at least must certainly be in the wrong, and apparently there is not even one of them who knows; for if the reasoning of the second were sound and clear he would be able so to lay it before the other to succeed in convincing his understanding also. Hence apparently we cannot attain to a perfect knowledge in any such case of probable opinion, for it would be rashness to hope for more than others have attained to. Consequently if we reckon correctly, of the sciences

already discovered, Arithmetic and Geometry alone are left, to which the observance of this rule reduces us.

Yet we do not therefore condemn that method of philosophizing which others have already discovered, and those weapons of the schoolmen, probable syllogisms, which are so well suited for polemics. They indeed give practice to the wits of youth and, producing emulation among them, act as a stimulus; and it is much better for their minds to be moulded by opinions of this sort, uncertain though they appear, as being objects of controversy amongst the learned, than to be left entirely to their own devices. For thus through lack of guidance they might stray into some abyss, but as long as they follow in their masters' footsteps, though they may diverge at times from the truth, they will yet certainly find a path which is at least in this respect safer, that it has been approved by more prudent people. We ourselves rejoice that we in earlier years experienced this scholastic training; but now, being released from that oath of allegiance which bound us to our old masters and since, as become our riper years, we are no longer subject to the ferule, if we wish in earnest to establish for ourselves those rules which shall aid us in scaling the heights of human knowledge, we must admit assuredly among the primary members of our catalogue that maxim which forbids us to abuse our leisure as many do, who neglect all easy quests and take up their time only with difficult matters; for they, though certainly making all sorts of subtle conjectures and elaborating most plausible arguments with great ingenuity, frequently find too late that after all their labours they have only increased the multitude of their doubts, without acquiring any knowledge whatsoever.

But now let us proceed to explain more carefully our reason for saying , as we did a little while ago, that of all the sciences known as yet, Arithmetic and Geometry alone are free from any taint of falsity or uncertainty. We must note then that there are two ways by which we arrive at the knowledge of facts, viz. by experience and by deduction. We must further observe that while our inferences from experience are frequently fallacious, deduction, or the pure illation of one thing from another, though it may be passed over, if it is not seen through, cannot be erroneous when performed by an understanding that is in the least degree rational. And it seems to me that the operation is profited but little by those constraining bonds by means of which the Dialecticians claim to control human reason, though I do not deny that that discipline may be serviceable for other purposes. My reason

for saying so is that none of the mistakes which men can make (men, I say, not beasts) are due to faulty inference; they are caused merely by the fact that we found upon a basis of poorly comprehended experiences, or that propositions are posited which are hasty and groundless.

This furnishes us with an evident explanation of the great superiority in certitude of arithmetic and Geometry to other sciences. The former alone deal with an object so pure and uncomplicated, that they need make no assumptions at all which experience renders uncertain, but wholly consist in the rational deduction of consequences. They are on that account much the easiest and clearest of all, and possess an object such as we require, for in them it is scarce humanly possible for anyone to err except by inadvertence. And yet we should not be surprised to find that plenty of people of their own accord prefer to apply their intelligence to other studies, or to Philosophy. The reason for this is that every person permits himself the liberty of making guesses in the matter of an obscure subject with more confidence than in one which is clear, and that it is much easier to have some vague notion about any subject, no matter what, than to arrive at the real truth about a single question however simple that may be.

But one conclusion now emerges out of these considerations, viz. not, indeed, that Arithmetic and Geometry are the sole sciences to be studied, but only that in our search for the direct road towards truth we should busy ourselves with no object about which we cannot attain a certitude equal to that of the demonstrations of Arithmetic and Geometry.

Rule III

Concerning objects proposed for study, we ought to investigate what we can clearly and evidently intuit or deduce with certainty, and not what other people have thought or what we ourselves conjecture. For knowledge can be attained in no other way.

We must read the works of the ancients; for it is an extraordinary advantage to have available the labors of so many men, both in order to recognize what true discoveries have already long since been made and - also to become aware of what scope is still left for invention in the various disciplines. There is, however; at the same time a great danger that perhaps some contagion of error, contracted from a too attentive reading of them, may stick to us against our will, in spite of all precautions. For authors are ordinarily so disposed that whenever their heedless credulity has led them to a decision on some controverted opinion, they always try to bring us over to the same side, with the subtlest arguments; if on the other hand they have been fortunate enough to discover something certain and evident, they never set it forth without wrapping it up in all sorts of complications. (I suppose they are afraid that a simple account may lessen the importance they gain by the discovery ; or perhaps they begrudge us the plain truth.)

But in fact, even if all writers were honest and plain; even if they never passed off matters of doubt upon us as if they were truths, but set forth everything in good faith; nevertheless, since there is hardly anything that one of them says but someone else asserts the contrary, we should be continually uncertain which side to believe. It would be no good to count heads, and then follow the opinion that has most authorities for it; for if the question that arises is a difficult one, it is more credible that the truth of the matter may have been discovered by few men than by many. But even if all agreed together, it would not be enough to have their teachings. For we shall never be mathematicians, say, even if we retain in memory all the proofs others have given, unless we ourselves have the mental aptitude of solving any given problem; we shall never be philosophers, if we have read all the arguments of Plato and Aristotle but cannot form a solid judgment on matters set before us; this sort of learning would appear historical rather than scientific. Further, this Rule counsels us against ever mixing up any conjectures with our judgments as to the truth of things. It is of no small

importance to observe this; for the chief reason why in the common philosophy there is nothing to be found whose certitude is so apparent as to be beyond controversy is that those who practice it have not begun by contenting themselves with the recognition of what is clear and certain, but have ventured on the further assertion of what was obscure and unknown and was arrived at only through probable conjectures. These assertions they have later on themselves gradually come to hold with complete confidence, and have mixed them up indiscriminately with evident truths; and the final result was their inability to draw any conclusion that did not seem to depend on some such proposition, and consequently to draw any that was not uncertain.

In order to avoid our subsequently falling into the same error, the Rule enumerates all the intellectual activities by means of which we can attain to knowledge of things without any fear of deception; it allows of only two such intuition and induction. By intuition I mean, not the wavering assurance of the senses, or the deceitful judgment of a misconstructed imagination, but a conception, formed by unclouded mental attention, so easy and distinct as to leave no room for doubt in regard to the thing we are understanding. It comes to the same thing if we say: It is an indubitable conception formed by an unclouded mental mind; one that originates solely from the light of reason, and is more certain even than deduction, because it is simpler (though, as we have previously noted, deduction, too, cannot go wrong if it is a human being that performs it). Thus, anybody can see by mental intuition that he himself exists, that he thinks, that a triangle is bounded by just three lines, and a globe by a single surface, and so on; there are far more of such truths than most people observe, because they disdain to turn their mind to such easy topics.

Some people may perhaps be troubled by this new use of the word intuition, and of other words that I shall later on be obliged to shift away from their common meaning. So I give at this point the general warning that I am not in the least thinking of the usage of particular words that has prevailed in the Schools in modern times, since it would be most difficult to use the same terms while holding quite different views; I take into account only what a given word means in Latin, in order that, whenever there are no proper words for what I mean, I may transfer to that meaning the words that seem to me most suitable. The evidentness and certainty of intuition is, moreover, necessary not only in forming propositions but also for any

inferences. For example, take the inference that 2 and 2 come to the same as 3 and 1; intuition must show us not only that 2 and 2 make 4, and that 3 and 1 also make 4, but furthermore that the above third proposition is a necessary conclusion from these two.

This may raise a doubt as to our reason for having added another mode of knowledge, besides intuition, in this Rule -namely, knowledge by deduction. (By this term I mean any necessary conclusion from other things known with certainty.) We had to do this because many things are known although not self-evident, so long as they are deduced from principles known to be true by a continuous and uninterrupted movement of thought, with clear intuition of each point. It is in the same way that we know the last link of a long chain is connected with the first, even though we do not view in a single glance (Intuitu) all the intermediate links on which the connexion depends; we need only to have gone through the links in succession and to remember that from the first to the last each is joined to the next. Thus we distinguish at this point between intuition and certain deduction'; because the latter, unlike the former, is conceived as involving a movement or succession; and is again unlike intuition in not requiring something evident at the moment, but rather, so to say, borrowing its certainty from memory. From this we may gather that when propositions are direct conclusions from first principles, they may be said to be known by intuition or by deduction, according to different ways of looking at them; but first principles themselves may be said to be known only by intuition; and remote conclusions, on the other hand, only by deduction.

These are the two most certain ways to knowledge; and on the side of the mind no more must be admitted; all others must be rejected as suspect and liable to mislead. This, however, does not prevent our believing that divine revelation is more certain than any knowledge; for our faith in it, so far as it concerns obscure matters, is an act not of the mind but of the will; and any intellectual foundations that it may have can and must be sought chiefly by one or other of the two ways I have mentioned. Perhaps I shall later on show this to be so at greater length.

Rule IV

We need a method if we are to investigate the truth of things.

Rule V

The whole method consists entirely in the ordering and arranging of the objects on which we must concentrate our mind's eye if we are to discover some truth. We shall be following this method exactly if we first reduce complicated and obscure propositions step by step to simpler ones, and then, starting with the intuition of the simplest ones of all, try to ascend through the same steps to knowledge of all the rest.

Rule VI

In order to distinguish the simplest things from those that are complicated and to set them out in an orderly manner, we should attend to what is most simple in each series of things in which we have directly deduced some truths from others, and should observe how all the rest are more, or less, or equally removed from the simplest.

Rule VII

In order to make our knowledge complete, every single thing relating to our undertaking must be surveyed in a continuous and wholly uninterrupted sweep of thought, and be included in a sufficient and well-ordered enumeration.

The observance of these precepts is necessary in order that we may admit to the class of certitudes those truths which, I previously said, are not immediate deductions from the first self-evident principles. For sometimes the succession of inferences is so long that when we arrive at our results we do not readily remember the whole road that has led us so far; and therefore I say that we must aid the weakness of our memory by a continuous movement of thought.

For instance, suppose that by excessive mental acts I have learnt first the relation between the magnitudes A and B, then that between B and C then that between C and D, and finally that between D and E; I do not on this account see the relation between A and E; and I cannot form a precise conception of it from the relations I know already, unless I remember them all. So I will run through these several times over in a continuous movement of the imagination, in which intuition of each relation is simultaneous with transition to the next, until I have learnt to pass from the first to the last so quickly that I leave hardly any parts to the care of memory and seem to have a simultaneous intuition of the whole. In this way memory is aided, and a remedy found for the slowness of the understanding, whose scope is in a way enlarged.

I add that the movement must be uninterrupted because it often happens that people who try to make some deduction in too great haste and from remote principles do not run over the whole chain of intermediate conclusions with sufficient care to avoid making many unconsidered jumps. But assuredly the least oversight immediately breaks the chain and destroys all the certainty of the conclusion. Further, I say that enumeration is required in order to complete our knowledge. For other precepts are helpful in resolving very many questions, but it is only enumeration that enables us to form a true and certain judgment about anything whatever that we apply our mind to, and, by preventing anything from simply escaping our notice, seems to give us some knowledge of everything.

This enumeration, or induction, ranging over everything relevant to some question we have set before us, consists in an inquiry so careful and accurate that it is a certain and evident conclusion that no mistaken omission has been made. When, therefore, we perform this, if the thing we are looking for still eludes us, we are at any rate so much the wiser, that we can see with certainty the impossibility of our finding it by any way known to us; and if we have managed to run over all the ways of attaining it that are humanly practicable (as will often be the case) then we may boldly affirm that knowledge of it has been put quite out of reach of the human mind.

It must further be observed that by adequate enumeration or induction I mean exclusively the sort that makes the truth of conclusions more certain than any other type of proof, apart from simple intuition, makes it. Whenever a piece of knowledge cannot be reduced to simple intuition (if we throw off the fetters of syllogism), this method is the only one left to us that we must entirely rely on. For whenever we have deduced one thing from others, if the inference was an evident one, the case is already reduced to genuine intuition. If on the other hand, we make a single inference from many separate data, our understanding is often not capacious enough to grasp them all in one act of intuition, and in that case we must content ourselves with the certitude of this further operation. In the same way, we cannot visually distinguish all the links of a longish chain in one glance (intuitu); but nevertheless, if we have seen the connexion of each with the next, this will justify us in saying that we have actually seen how the first is connected to the last.

I said this operation must be adequate, because it may often be defective, and consequently liable to error. For sometimes our enumeration includes a number of very obvious points; nevertheless, the least omission breaks the chain and destroys all the certainty of the conclusion. Again, sometimes our enumeration covers everything but the items are not all distinguished, so that we have only a confused knowledge of the whole.

Sometimes, then, this enumeration must be complete, and sometimes it must be distinct; but sometimes neither condition is necessary., This is why I say merely that the enumeration must be adequate. For example, if I want to establish by enumeration how many kinds of things are corporeal, or are in some way the objects of sensation, I shall not assert that there are just so many without first assuring myself that my enumeration comprises all the

kinds and distinguishes each from the others. But if I want to show in the same way that the rational soul is not corporeal, a complete enumeration will not be needed; it will be enough to comprise all bodies in a certain number of classes and show that the rational soul cannot be referred to any of these. Again, if I want to show by enumeration that the area of a circle is greater than the areas of all other figures of equal periphery, I need not give a list of all figures; it is enough to prove this in some particular cases, and then we may inductively extend the conclusion to all other figures.

I added further that the enumeration must be orderly for the defects already enumerated cannot be remedied more directly than they are by an orderly scrutiny of all items. Again, it is often the case that nobody could live long enough to go through each several item that concerns the matter in hand; either because there are too many such items, or because we should keep going back to the same items. But if we arrange these items in the ideal order, then as a rule they will be reduced to certain classes; and it may be enough to have an exact view of one class, or of some member of each class, or of some classes rather than others; at any rate, we shall not ever go futilely over and over the same point. This is a great help; a proper arrangement often enables us to deal rapidly and easily with an apparently unmanageable multitude of details.

This order of enumeration is variable, and depends on the free choice of the individual; skill in devising it requires that we bear in mind the terms of Rule V. There are, indeed, a good many ingenious, trivialities where the device wholly consists in effecting this sort of arrangement. For example, suppose you want to make the best anagram you can by transposing the letters of a certain name. Here there is no need to advance from easy to difficult cases, or to distinguish between what is underived and what is dependent; for these problems do not arise here. It will be enough to determine an order for examining transpositions of letters, so that you never go over the same arrangement twice over, and to divide the possible arrangements into certain classes in a way that makes the most likely source of a solution immediately apparent. The task will then often be no long one-child’s play, in fact.

Really, though, these last three Rules are inseparable; in most cases they have all to be taken into account at once, and they all go together towards the completeness of the method. The order of setting them forth did not much matter; I have explained them here briefly because almost all the rest

of this treatise will be a detailed exposition of what is here summed up in a general way.

Rule VIII

If in the series of things to be examined we come across something which our intellect is unable to intuit sufficiently well, we must stop at that point, and refrain from the superfluous task of examining the remaining items.

Rule IX

We must concentrate our mind's eye totally upon the most insignificant and easiest of matters, and dwell on them long enough to acquire the habit of intuiting the truth distinctly and clearly.

Rule X

In order to acquire discernment we should exercise our intelligence by investigating what others have already discovered, and methodically survey even the most insignificant products of human skill, especially those which display or presuppose order.

Rule XI

If, after intuiting a number of simple propositions, we deduce something else from them, it is useful to run through them in a continuous and completely uninterrupted train of thought, to reflect on their relations to one another, and to form a distinct and, as far as possible, simultaneous conception of several of them. For in this way our knowledge becomes much more certain, and our mental capacity is enormously increased.

It is in place here to give a clearer exposition of what I said before about intuition (Rules III and VII). In the one place I contrasted intuition with deduction; in the other, merely with enumeration. (I defined enumeration as an inference made from many separate data put together; the simple deduction of one thing from another is made, I said, by intuition.) This procedure was necessary because intuition must satisfy two conditions: first, our understanding of a proposition must be clear and distinct; secondly, it must be one simultaneous whole without succession. Now if we are thinking of the act of deduction, as in Rule III, it has not the appearance of being a simultaneous whole; rather, it involves a movement of the mind in which we infer one thing from another. Here, then, we were justified in distinguishing it from intuition. If on the other hand we attend to deduction as something already accomplished, as in the notes on Rule VII, then the term does not stand any longer for such a movement, but for the result of the movement. In that sense, then, I assume that a deduction is something intuitively seen, when it is simple and clear, but not when it is complex and involved; for that, I used the term ‘ enumeration’ or ‘induction ‘. For the latter sort of deduction cannot be grasped all at once; its certainty depends in a way on memory, which must retain judgments about the various points enumerated in order that we may put them all together and get some single conclusion.

All these distinctions had to be made in order to bring out the meaning of the present Rule. Rule IX dealt only with intuition, and Rule X only with enumeration; then comes this Rule, explaining how these two activities cooperate-operate and supplement one another-seem, in fact, to merge into a single activity, in which there is a movement of thought such that attentive intuition of each point is simultaneous with transition to the next.

I mention two advantages of this: the greater certainty in our knowledge of the conclusion we have in view, and the greater aptitude of our mind for making further discoveries. As I said, when conclusions are too complex to be held in a single act of intuition, their certainty depends on memory; and since memory is perishable and weak, it must be revived and strengthened by this continuous and repeated movement of thought. For example, suppose I have learnt, in a number of successive mental acts, the relations between magnitudes 1 and 2, magnitudes 2 and 3, magnitudes 3 and 4, and, finally, magnitudes 4 and 5; this does not make me see the relation between magnitudes 1 and 5, nor can I deduce it from the ones I already know, unless I remember them all; accordingly, I must run over them in thought again and again, until I pass from the first to the last so quickly that I have hardly any parts to the care of memory, but seem to have a simultaneous intuition of the whole.

In this way, as no-one can fail to see, the slowness of the mind is remedied, and its capacity enlarged. But it must further be noticed, as the chief advantage of this Rule, that by reflection upon the interdependence of simple propositions we acquire the practice of rapidly discerning their degrees of derivativeness and the steps of their reduction to what is underived. For example, if I run through a series of magnitudes in continued proportion, I shall reflect on all the following points: it is by concepts of the same level that I discern the ratio of term 1 to term 2, of term 2 to term 3, of term 3 to term 4, and so on, and there are no degrees of difficulty in conceiving these ratios; but it is more difficult for me to conceive the way that term 2 depends on terms 1 and 3 together, and still more difficult to conceive how the same term 2 depends on terms 1 and 4, and so on. This shows me the reason why, given merely terms 1 and 2, 1 can easily find terms 3, 4, etc.; for this is done by means of particular and distinct concepts. But given merely terms 1 and 3, I cannot so easily find their (geometric) mean; this can be done only by means of a concept involving two together of the concepts just mentioned. Given only terms 1 and 4, it is still more difficult to get an intuition of the two mean (proportionals), since this involves three simultaneous concepts. Consequently it might seem to be even more difficult to find three mean (proportionals) given terms 1 and 5; but, for a further reason, this is not the case. Although we have here four concepts joined together, they can be separated, because 4 is divisible by another number; so I can begin by trying to find term 3 from terms 1 and 5,

and then go on to find term 2 from terms 1 and 3 <and then term 4 from terms 3 and 5>. He who is accustomed to reflect on such matters recognizes at once, when he examines each new problem, the source of the difficulty and the simplest method <of solution> ; and this helps very much towards knowledge of the truth.

Rule XII

Finally we must make use of all the aids which intellect, imagination, sense-perception, and memory afford in order, firstly, to intuit simple propositions distinctly; secondly, to combine correctly the matters under investigation with what we already know, so that they too may be known; and thirdly, to find out what things should be compared with each other so that we make the most thorough use of all our human powers.

This Rule sums up all that has been said already, and gives a general account of the various particulars that had to be explained: as follows.

Only two things are relevant to knowledge: ourselves, the subjects of knowledge; and the objects to be known. In ourselves there are just four faculties that can be used for knowledge: understanding, imagination, sense, and memory. Only the understanding is capable of perceiving truth, but it must be aided by imagination, sense, and memory, so that we may not leave anything undone that lies within our endeavor. On the side of the object of knowledge, it is enough to consider three points: first, what is obvious on its own account; secondly, the means of knowing one thing by another; lastly, the inferences that can be made from any given thing. This enumeration seems to me to be complete, and not to leave out anything that can be attained by human endeavor.

Turning therefore to the first point <the subjective aspect of knowledge>, I should like to expound here the nature of the human mind and body, the way that the soul is the form of I the body, the various cognitive faculties that exist in the whole composed <of mind and body> and their several activities; but I think I have not enough space to contain all that would have to be premised before the truth on these matters could be made clear to everybody. For it is my aim always to write in such a way that, before making any assertion on the ordinary controversial points, I give the reasons that have led me to my view and might, in my opinion, convince other people as well.

Since such an exposition is now impossible, I shall content myself with explaining as briefly as possible the way of conceiving our means of knowledge that is most useful for our purpose. You need not, if you like, believe that things are really so; but what is to stop us from following out these suppositions, if it appears that they do not do away with any facts, but

only make everything much clearer ? In the same way, geometry makes certain suppositions about quantity; and although in physics we may often hold a different view as to the nature of quantity, the force of geometrical demonstrations is not in any way weaker on that account.

My first supposition, then, is that the external senses qua bodily organs may indeed be actively applied to their objects, by locomotion, but their having sensation is properly something merely passive, just like the shape Wuram) that wax gets from a seal. You must not think this expression is just an analogy; the external shape of the sentient organ must be regarded as really changed by the object, in exactly the same way as the shape of the surface of the wax is changed by the seal. This supposition must be made, not only as regards tactual sensations of shape, hardness, roughness, etc., but also as regards those of heat, cold, and so on. So also for the other senses. The first opaque part of the eye receives an image (figuram) in this way from many-colored illumination; and the first membrane of the ears, nostrils, or tongue that is impervious to the object perceived similarly derives a new shape from the sound, odor, or savor.

It is of great help to regard all these facts in this way; for no object of sense is more easily got than shape, which is both felt and seen. And no error can follow from our making this supposition rather than any other, as may be proved thus: The concept of shape is so common and simple that it is involved in every sensible object. For example, on any view of color it is undeniably extended and therefore has shape. Let us then beware of uselessly assuming, and rashly imagining, a new entity; let us not deny anyone else’s view of color, but let us abstract from all aspects except shape, and conceive the difference between white, red, blue, etc., as being like the difference between such shapes as these:

What trouble can this lead us into? And so generally; for assuredly the infinite multiplicity of shapes is adequate to explain all varieties of sensible objects.

My second supposition is that when the external sense <organ> is disturbed by the object, the image (figuram) it receives is transmitted to another part of the body, called the <organ of> common sensibility; this happens instantaneously,,, and no real entity travels from one organ to the other. In just the same way (1 conceive) while I am now writing, at the very moment when the various letters are formed on the paper, it is not only the tip of the pen that moves; there could not be the least movement of this that

was not at once communicated to the whole pen; and all these various movements are also described in the air by the top end of the pen; and yet I have not an idea that something real travels from one end of the pen to the other. For who could suppose that the parts of the human body have less interconnexion than those of the pen? and what simpler way of explaining the matter could be devised?

My third supposition is that the <organ of> common sensibility also plays the part of a seal, whereas the phantasy or imagination is the wax on which it impresses these images or ideas, which come from the external sense <organs> unadulterated and without <the transmission of> any body; and this phantasy is a genuine part of the body,. large enough for its various parts to assume a number of distinct shapes. These shapes may be retained for some time; in this case phantasy is precisely what is called memory.

My fourth supposition is that the power of movement, in fact the nerves, originate in the brain, where the phantasy is seated; and that the phantasy moves them in various ways, as the external sense <organ> moves the <organ of> common sensibility, or as the whole pen is moved by its tip. This illustration also shows how it is that the phantasy can cause various movements in the nerves, although it has not images of these formed in itself, but certain other images, of which these movements are possible effects. For the pen as a whole does not move in the same way as its tip; indeed, the greater part of the pen seems to go along with an altogether different, contrary motion. This enables us to understand how the movements of all other animals are accomplished, although we suppose them to have no consciousness (rerum cognitio) but only a bodily <organ of> phantasy; and furthermore, how it is that in ourselves those operations are performed which occur without any aid of reason.

My fifth and last supposition is that the power of cognition properly so called is purely spiritual, and is just as distinct from the body as a whole as blood is from bone or a hand from an eye; and that it is a single power. Sometimes it receives images from the common sensibility at the same time as the phantasy does; sometimes it applies itself to the images preserved in memory; sometimes it forms new images, and these so occupy the imagination that often it is not able at the same time to receive ideas from the common sensibility, or to pass them on to the locomotive power in the way that the body left to itself -would. In all these processes the cognitive power is sometimes passive, sometimes active; it plays the part now of the

seal, now of the wax; here, however, these expressions must be taken as merely analogical, for there is nothing quite like this among corporeal objects. The cognitive power is always one and the same; if it applies itself, along with the imagination, to the common sensibility, it is said to see, feel, etc.; if it applies itself to the imagination alone, in so far as that is already provided with various images, it is said to remember; if it does this in order to form new images, it is said to imagine or conceive; if, finally, it acts by itself, it is said to understand. (The manner of this last operation will be explained at more length in the proper place). In accordance with these diverse functions the same power is called now pure intellect, now imagination, now memory, now sense; and it is properly called mind (ingenium) when it is either forming new ideas in the phantasy or attending to those already formed. We regard it as capable of these various operations; and the distinction between these terms will have to be observed in what follows. In terms of these conceptions, the attentive reader will easily gather how we must seek to aid each faculty, and how far human endeavor can supply what is lacking to the mind.

For the understanding may be set in movement by the imagination, or on the other hand may set it in movement. Again the (organ of> imagination may act on the senses by means of the locomotive power, by applying them to their objects; or on the other hand they may act upon it, since it is upon it that they trace images (imagines) of bodies. Further, memory (considered, that is, as a corporeal faculty like the recollections of brutes) is nothing distinct from imagination. From this it is a certain inference that if the understanding is occupied with objects that have no corporeal or quasi-corporeal aspect, it cannot be aided by these faculties; on the contrary, we must prevent it from being hindered by them; sense must be banished, and imagination stripped (so far as possible) of every distinct impression. If, on the other hand, the understanding intends to examine something that can be referred to <the concept of> body, then we must form in the imagination as distinct an idea of this thing as we can; and in order to provide this in a more advantageous way, the actual object represented by this idea must be presented to the external senses. There are no further means of aiding the distinct intuition of individual facts. The inference of one fact from several, which often has to be carried out, requires that we should discard any element in our ideas that does not need our attention at the moment, in order to make it easier to keep the remainder in our memory; and then we must

similarly present to the external senses, not the actual objects of our ideas, but rather compendious diagrams of them; so long as these are adequate to guard against a lapse of memory, the less space they take up the better. And anybody who observes all these precepts will, I think, have left nothing undone as regards the first point <the subjective conditions of knowledge>.

We must now take the second point <the conditions relating to the object of knowledge>. Here we must make a careful distinction between simple and compound notions, and try to discern, as regards each class, the possible sources of error, in order to avoid it, and the possible objects of assured knowledge, in order to occupy ourselves with these alone. Here, as previously, I shall have to make some assumptions that are perhaps not generally received; but it does not matter much, even if they are no more believed in than the imaginary circles by which astronomers describe their phenomena, so long as they enable you to distinguish the sort of apprehension of any given thing that is liable to be true or false.

In the first place, we must think differently when we regard things from the point of view of our knowledge and when we are talking about them as they are in reality. For example, take a body that has shape and extension. We shall admit that objectively there is one simple fact; we cannot call it, in this sense, ‘ a compound of the natures body, extension, and figure ‘, for these ‘ parts ‘ have never existed separate from one another. But in respect of our understanding we do call it a compound of these three natures; for we had to understand each one separately before judging that the three are found in one and the same subject. Now we are here concerned with things only in so far as they are perceived by the understanding; and so we use the term ‘ simple’ only for realities so clearly and distinctly known that we cannot divide any of them into several realities more distinctly known, for example, shape, extension, motion, etc.; and we conceive of everything else as somehow compounded out of these. This principle must be taken quite generally, without even excepting the concepts that we sometimes form by abstraction even from simple ones. For example, we may say that figure is the terminus of an extended thing, meaning by ‘terminus’ something more general than ‘figure’, since we may also say’ terminus of a duration’, ‘ terminus of a motion’, etc. But although in this case the meaning of ‘ terminus ‘ is abstracted from figure, it is not therefore to be regarded as simpler than figure; on the contrary, since it is predicated also of other things, e.g. the end of a duration or motion, which are wholly different in

kind from figure, it must have been abstracted from these too, and is thus something compounded out of quite diverse natures - in fact, its various applications to these are merely equivocal.

Secondly, the things that are termed simple (in relation to our understanding) are either purely intellectual, or purely material, or common<to both realms>. The purely intellectual objects are those that the understanding knows by means of an innate light, without the help of any corporeal image. For there certainly are some such objects; no corporeal idea can be framed to show us the nature of knowledge, doubt, ignorance, or the action of the will (which we may call volition), or the like; but we really do know all these things, and quite easily at that; we need only have attained to a share of reason in order to do so. Those objects of knowledge are purely corporeal which are known to occur only in <the realm of> bodies: e.g. shape, extension, motion, etc. Finally, we must term common <to both realms> what is predicated indiscriminately now of corporeal things and now of spirits; e.g. existence, unity, duration, etc. We must also refer to this class axioms that form connecting links between other simple natures, and on whose self-evident character all conclusions of reasoning depend. For example: things that are the same as a single third thing are the same as one another; things that cannot be related in the same way to a third thing are in some respect diverse, etc. The understanding may know these common properties either by its own bare act, or by an intuition of images of material things.

Further, among these simple natures I wish to count also privations or negations of them, in so far as we conceive of such; for my intuition of nothingness, an instant, or rest is not less genuine knowledge than my concept of existence, duration, or motion. This way of regarding them will be helpful, for it enables us to say by way of summary that everything else we get to know will be a compound of these simple natures; for example, if I judge that some figure is not moving, I shall say that my thought is in a way a compound of ‘ figure ‘ and ‘rest’; and so in other cases.

Thirdly, the knowledge of each of these simple natures is underived, and never contains any error. This is easily shown if we distinguish the intellectual faculty of intuitive knowledge from that of affirmative or negative judgment. For it is possible for us to think we do not know what in fact we do know; namely, we may be of opinion that besides the actual object of intuition, or what is grasped in our experience (cogitando), some

further element hidden from us is involved, and this opinion (cogitatio) of ours may be false. Hence it is evident that we go wrong if we ever judge that one of these simple natures is not known to us in its entirety. For if our mind grasps the least thing to do with such a nature-as is necessary ex hypothesi if we are forming some judgment about it-this of itself entails that we know it in its entirety; otherwise it could not be termed simple, but would be compounded of the element perceived by us and the supposed unknown element.

Fourthly, the conjunction of these simple natures with one another is either necessary or contingent. It is necessary when one is implicitly contained in the concept of the other, so that we cannot distinctly conceive of either if we judge that they are separated; it is in this way that figure is conjoined with extension, motion with duration or time, etc., since an extensionless figure or a durationless motion is inconceivable. Again, if I say ‘four and three are seven ‘ this is a necessary conjunction; for we have no distinct concept of the number seven that does not implicitly include the numbers three and four. Similarly, any demonstrated property of figures or numbers is necessarily connected with that of which it is asserted. It is not only in the sensible world that we find this sort of necessity, but we have also cases like this: from Socrates’ assertion that he doubts everything there is a necessary consequence ‘ therefore he understands at least what he doubts ‘, or again ‘ therefore he knows that there is something that can be true or false ‘, or the like; for these are necessarily bound up with the nature of the doubt. A combination of natures is contingent when they are not conjoined by any inseparable relation; as when we say that a body is animated, that a man is clothed, etc. Many necessary conjunctions, moreover, are generally counted as contingent, because their real relation is generally unobserved, e.g. the proposition ‘ I am, therefore God is’, or again, ‘ I understand, therefore I have a mind distinct from the body’, and the like. Finally, it is to be observed that very many necessary propositions have contingent converses; e.g. although God’s existence is a certain conclusion from mine, my existence cannot be asserted on account of God’s existence.

Fifthly, we can never have any understanding of anything apart from these single natures and their blending or composition. It is often easier to attend to a conjunction of several than to separate out one from the others; for I may, e.g. know a triangle without ever having thought that this

involves knowledge of angle, line, the number three, figure, extension, etc. But this in no way goes against our saying that the nature of a triangle is composed of all these natures, and that they are prior to ‘ triangle ‘ in the order of knowledge, since they are the very natures that are understood to occur in a triangle. Moreover, there may well be many other natures implicit in ‘triangle’ that escape our notice; e.g. the size of the angles (their being equal to two right angles), and an infinity of relations between the sides and the angles, the sides and the area, etc.

Sixthly, the natures called ‘compound’ are known to us either because we have experience (experimur) of them or because we ourselves compound them. By our experience I mean sense-perception, hearsay, and in general everything that is either brought to our understanding from outside or arises from its own self-contemplation. It must here be remarked that no experience can deceive the understanding if it confines itself to intuition of what is presented to it-of what it itself contains, or what is given by means of a brain-image-and does not go on to judge that imagination faithfully reproduces the objects of the senses, or that the senses give us true pictures (figures) of things, in short, that external things are always what they seem. On all such matters we are liable to go wrong; e.g. if somebody tells us a tale and we believe the thing happened; if a man suffering from jaundice thinks everything is yellow because his eye is suffused with yellow; if again, there is a lesion in the organ of imagination, as in melancholia, and we judge that the disordered images it produces represent real things. But the understanding a sage (sapientis)l will not be misled by such things; as regards any datum of the imagination, he will indeed judge that there really is such a picture in that faculty, but he will never assert that this picture has been transmitted in its entirety and unchanged from the external object to the senses and from the senses to the phantasy, unless he has antecedently had some other means of knowing this fact. I say that an object of understanding is ‘compounded by ourselves ‘ whenever we believe that something is involved in it that has not been directly perceived by the mind in experience. For example, the jaundiced man’s conviction that what he sees is yellow is a mental state (cogitatio) compounded of the representation in his phantasy and an assumption that he makes on his own account, viz. that the yellow color appears not through a defect in the eye but because what he sees really is yellow. From this we conclude that we

can be deceived only so long as the object of our belief is, in a way, of our own compounding.

Seventhly, this ‘compounding’ may take place in three ways; on impulse, or from conjecture, or by deduction. People compound their judgments about things ‘on impulse’ when their own mind’ leads them to believe something without their being convinced by any reasoning; they are determined to do so either by a higher power, or by their own spontaneity, or by the disposition of the phantasy; the first never misleads, the second rarely, the third almost always. But the first does not concern us here, since it is not something attainable by our technique. The following is an example of conjecture: Water, which is further from the center than earth, is also rarer; air, which comes above water, is still more rare; we conjecture that above air there is only a very pure aether, far thinner even than air. Views ‘compounded’ in this way are not misleading, so long as we regard them only as probable and never assert them as truth; they actually add to our stock of information.

There remains deduction-the only way of ‘compounding’ things so that we may be certain that the result is true. But even here all sorts of faults are possible. For example, from the fact that this region (which is full of air) contains nothing that we perceive by sight or touch or any other sense, we may conclude that it is empty, and thus wrongly conjoin the natures ‘ this region ‘ and ‘vacuum’. This error occurs whenever we judge that a general and necessary conclusion can be got from a particular or contingent fact. But it lies within our powers to avoid it; we can do so by never conjoining things unless we see intuitively that their conjunction is absolutely necessary, as we do when we infer that nothing can have shape without extension because shape has a necessary connexion with extension.

From all this the first conclusion to be drawn is that we have now set forth in a distinct way, and with what seems to me to be an adequate enumeration, the truth that we were previously able to establish only confusedly and roughly; viz. that there are no ways of attaining truth open to man except self-evident intuition and necessary inference; and it is moreover clear what ‘simple natures’ are. . . . It is obvious, furthermore, that the scope of intuition covers all these, and knowledge of their necessary connexions; and, in sum, covers everything that is comprised precisely in the experience (experitur) of the understanding, as a content either of its

own or of the phantasy. About deduction. we shall say more in the sequel. . . .

For the rest, in case anybody should miss the interconnexion of my rules, I divide all that can be known into simple propositions and problems (quaestiones). As regards simple propositions, the only rules I give are those that prepare the mind for more distinct intuition and more sagacious examination of any given objects; for such propositions must come to one spontaneously-they cannot be sought for. This was the content of my first twelve Rules, and I think that in these I have set forth all that can facilitate the use of reason. As regards problems, they consist, first, of those that are perfectly understood, even if the solution is unknown; we shall deal exclusively with these in the next twelve Rules: 1 and, secondly, of those that are not perfectly understood; these we reserve for the last twelve. We have made this division on purpose, both in order to avoid having to speak of anything that presupposes an acquaintance with what follows, and also to teach those matters first which, in our view, should be studied first in developing our mental powers. Among ‘ problems perfectly understood’, be it observed, I count only those as regards which we see three things distinctly: first, the criteria for recognizing what we are looking for, when we come upon it; secondly, the precise premise from which to infer it; thirdly, the way to establish their interdependence-the impossibility of modifying one without the other. We must, then, be in possession of all the premises; nothing must remain to be shown except the way of finding the conclusion. This will not be a question of a single inference from a single simple premise (which, as I have said, can be performed without rules), but of a technique for deriving a single conclusion from many premises taken together without needing a greater mental capacity than for the simplest inference. These problems are for the most part abstract ones, and are almost confined to arithmetic and geometry; so novices may regard them as comparatively useless. But I urge the need of long use and practice in acquiring this technique for those who wish to attain a perfect mastery of the latter part of the Method, in which we shall treat of all these other matters.

Rule XIII

If we perfectly understand a problem we must abstract it from every superfluous conception, reduce it to its simplest terms and, by means of an enumeration, divide it up into the smallest possible parts.

Rule XIV

The problem should be re-expressed in terms of the real extension of bodies and should be pictured in our imagination entirely by means of bare figures. Thus it will be perceived much more distinctly by our intellect.

Rule XV

It is generally helpful if we draw these figures and display them before our external senses. In this way it will be easier for us to keep our mind alert.

Rule XVI

As for things which do not require the immediate attention of the mind, however necessary they may be for the conclusion, it is better to represent them by very concise symbols rather than by complete figures. It will thus be impossible for our memory to go wrong, and our mind will not be distracted by having to retain these while it is taken up with deducing other matters.

Rule XVII

We should make a direct survey of the problem to be solved, disregarding the fact that some of its terms are known and others unknown, and intuiting, through a train of sound reasoning, the dependence of one term on another.

Rule XVIII

For this purpose only four operations are required: addition, subtraction, multiplication and division. The latter two operations should seldom be employed here, for they may lead to needless complication, and they can be carried out more easily later.

Rule XIX

Using this method of reasoning, we must try to find as many magnitudes, expressed in two different ways, as there are unknown terms, which we treat as known in order to work out the problem in the direct way. That will give us as many comparisons between two equal terms.

Rule XX

Once we have found the equations, we must carry out the operations which we have left aside, never using multiplication when division is in order.

Rule XXI

If there are many equations of this sort, they should all be reduced to a single one, viz. to the equation whose terms occupy fewer places in the series of magnitudes which are in continued proportion, i.e. the series in which the order of the terms is to be arranged.

THE SEARCH FOR TRUTH



Translated by Elizabeth S. Haldane and G. R. T. Ross

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PREFATORY NOTE TO ‘THE SEARCH AFTER TRUTH.’

This unfinished Dialogue, Descartes’ biographer Baillet tells us, was intended to form two volumes written in French. A Latin translation appeared in an edition of 1701 published at Amsterdam. Leibniz was known to have ‘a Dialogue in French’ amongst the unpublished papers of Descartes, and this French text was sought for in vain by MM. Adam and Tannery at the Royal Library of Hanover where it was likely to be found. A young student named Jules Sire was, however, fortunate enough to discover, not Leibniz’s original copy but another. Leibniz was in Paris with Tschirnhaus, and he took Tschirnhaus to see Clerselier, who had what remained of Descartes’ papers. Tschirnhaus copied ‘The Search after Truth’ and sent it to Leibniz, and this was the copy discovered by Sire. We do not know whether Clerselier’s copy was incomplete, or Tschirnhaus’ transcription of it, but it does not give more than half of the Latin version of 1701. Leibniz himself added at the end, ‘I have the rest elsewhere.’ MM. Adam and Tannery thus published Tschirnhaus’s copy of the original in French, completing it from the Latin, and this is the edition here used. The date of the work is unknown.

E. S. H.

THE SEARCH AFTER TRUTH BY THE LIGHT OF NATURE.

The Search after Truth by means of the Light of Nature which alone, and without the assistance of Religion or Philosophy, determines what are the opinions which a good man should hold on all matters which may occupy his thoughts, and which penetrate into the secrets of the most curious of the sciences.

A good man has no need to have read every book, nor to have carefully learned all that which is taught in the Schools; it would even be a defect in his education were he to have devoted too much of his time to the study of letters. There are many other things to do in life, and he has to direct that life in such a manner that the greater part of it shall remain to him for the performance of good actions which his own reason ought to teach him, even supposing that he were to receive his lessons from it alone. But he comes into the world in ignorance, and as the knowledge of his earliest years rests only on the weakness of the senses and the authority of masters, he can scarcely avoid his imagination being filled with an infinite number of false ideas, before his reason has the power of taking his conduct into its own hands; in consequence he requires to have good natural endowments or else instruction from a wise man, both in order to rid himself of the false doctrines with which his mind is filled, and for building the first foundations of a solid knowledge, and discovering all the means by which he may carry his knowledge to the highest point to which it can possibly attain.

In this work I propose to show what these means are, and to bring to light the true riches of our souls, by opening to each one the road by which he can find in himself, and without borrowing from any, the whole knowledge which is essential to him in the direction of his life, and then by his study succeed in acquiring the most curious forms of knowledge that the human reason is capable of possessing.

R. H.

But in order that the greatness of my scheme may not to begin with seize your minds with an astonishment so great that confidence in my words can no longer find therein a place, I warn you that what I undertake is not as

difficult as might be imagined. Those branches of knowledge which do not extend beyond the capacities of the human mind are, as a matter of fact, united by a bond so marvellous, they are capable of being deduced from one another by sequences so necessary, that it is not essential to possess much art or address in order to discover them, provided that by commencing with those that are most simple we learn gradually to raise ourselves to the most sublime. That is what I shall try to show you here by a system of reasoning so clear and yet so simple, that every one will be able to judge for himself that if he has not observed the same things, it is solely because he has not cast his eyes in the right direction, nor fixed his thoughts on the same considerations as I, and that no more glory is due to me for having discovered them, than is due to a casual passer-by for having accidentally discovered under his feet a rich treasure which had for long successfully eluded the searches of many.

And certainly I am surprised that amongst so many distinguished minds which in a matter of this description should have succeeded much better than I, none have had the patience to find their way out of their difficulties; and that nearly all have followed in the footsteps of these travellers who, abandoning the main route in favour of a cross-road, find themselves lost amongst briars and precipices.

But I do not desire to examine into what others have known or have been ignorant of. It will suffice for me to note that even if all the knowledge which we can desire is to be found in books, that which they contain of good is mingled with so many futilities, and confusedly dispersed in such a mass of great volumes, that, in order to read them, more time would be requisite than human life can supply us with, and more talent in discovering the useful than would be required in ascertaining it for ourselves.

That is what makes me hope that the reader will not be vexed by here finding an easier path, and that the facts which I shall advance will not be the less well received, even although I do not borrow them from Plato or Aristotle, but show that they have current value in the world, just as has money which is in nowise of less value when it proceeds from the purse of a peasant than when it comes from the treasury. I have even made it my business to make them equally useful to all men; and I have not been able to discover a style better adapted to this end than that of genuine conversation, wherein each one familiarly explains to his friends the best of his thoughts. And under the names Eudoxus, Polyander, and Epistemon, I assume that a

man endowed with ordinary mental gifts, but whose judgment is not spoiled by any false ideas, and who is in possession of his whole reason in all the purity of its nature, receives as his guests in the country house which he inhabits, two men the most distinguished and interesting of their time, one of whom has studied not at all, while the other is well acquainted with all that can be learnt in the Schools. And there (in the midst of other discourse which each one can imagine for himself, as well as the local conditions and particular surroundings from which I shall frequently cause them to take examples in order to make their conceptions more clear), they thus introduce the subject of which they will afterwards treat to the end of these two books.

Polyander, Epistemon, Eudoxus.

Polyander. I consider you are so fortunate in having discovered all these wonderful things in the Greek and Latin books, that it seems to me that if I had studied as much as you, I should be as different from what I now am, as angels are from you. And I cannot excuse the folly of my parents who, being persuaded that the study of letters would enfeeble the mind, sent me to the court and camps at so early an age, that I should all my life have had to bewail my ignorance, had I not learned something from my association with you.

Epistemon. The best thing that you could be taught on this subject is that the desire for knowledge, which is common to all men, is an evil which cannot be cured, for curiosity increases with knowledge; and as the deficiencies that are present in our soul only trouble us in so far as we recognise them, you have a certain advantage over us, in that you do not see as we do, that many things are lacking to you.

Eudoxus. Can it be, Epistemon, that you who are so well instructed, can believe that there is in nature any evil so universal that there is no remedy to be applied to it? As for me, I consider that just as there are in each country sufficient fruits and rivers to appease the hunger and thirst of all men, so there are truths that can be known in every matter sufficient to satisfy fully the curiosity of healthy minds; and I think that the body of a dropsical patient is not further removed from its normal condition than the mind of those who are perpetually worked upon by an insatiable curiosity.

Epistemon. I have, it is true, heard in former times that our desires could not extend naturally to things that seemed to us impossible, and that it ought not to do so to those that are vicious or useless; but so many things can be known which appear possible to us, and which are not only good and agreeable, but also very necessary in the conduct of life, that I cannot believe that anyone ever knew enough of them not to have legitimate reasons always to desire to know more.

Eudoxus. What, then, would you say of me, if I tell you that I no longer feel any desire to learn anything at all, and that I am as happy with my small knowledge as Diogenes used to be with his tub, and all this without my having any need of his philosophy? For the knowledge of my neighbours is not the limit of my own, as are their fields which here surround the small piece of ground that I possess; and my mind at its own will disposing of all the truths which it comes across, does not dream that there are others to discover. For it enjoys the same repose that the king of an isolated country would have were he so separated from all others as to imagine that beyond his frontiers there was nothing but unfertile deserts and uninhabitable mountains.

Epistemon. If any other but you spoke to me thus, I should regard him as one whose mind was either very vain or else too little given to curiosity; but the retreat which you have chosen in this solitude, and the small amount of pains that you take to become known, removes from you the charge of vanity; and the time you have hitherto consecrated to journeyings, visiting learned men, and examining everything that is most difficult in each science, suffices to assure us that you are not lacking in curiosity. I can hence say nothing but that I consider you very happy and that I am convinced that you must be in the possession of a knowledge much more perfect than that of others.

Eudoxus. I thank you for the good opinion in which you hold me, but I do not desire to abuse your courtesy to the point of desiring that you should believe what I have just said, solely on the faith of my words. We must not advance opinions so far removed from vulgar beliefs, without at the same time being able to demonstrate certain effects from so doing; that is why I beg you both to be good enough to spend this delightful season here, so that I may have the opportunity of openly showing you some part of the things that I know. For I venture to flatter myself that not alone will you recognise that I have some reason for being happy in this knowledge, but, in addition,

that you yourselves will have much happiness from the things that you will have learned.

Epistemon. I would not wish to refuse a favour that already I so ardently desired of you.

Polyander. And I shall have great pleasure in being present at this discussion, not that I believe myself capable of deriving any good from it.

Eudoxus. On the contrary, Polyander, believe me it will be you who will derive advantage from it, because you are quite unprejudiced, and it will be easier for me to guide aright any one with an open mind than Epistemon, whom we shall often find in opposition to us. But in order to make you more easily understand the nature of the knowledge of which I am going to treat, I beg you to observe a difference which exists between the sciences and those simple forms of knowledge which can be acquired without the aid of reasoning, such as languages, history, geography, &c., or to speak generally, everything that depends on experience alone. I am ready to grant that the life of a man would not suffice to acquire a knowledge of all that the world contains; but I am also persuaded that it would be folly to desire that it should be so, and that it is no longer the duty of an ordinary well-disposed man to know Greek and Latin any more than it is to know the languages of Switzerland or Brittany; or that the history of the Empire should be known any more than that of the smallest state in Europe. And I consider that such a one should consecrate his leisure to good and useful things alone, and occupy his memory only with those that are most necessary. As to those sciences which are nothing but the judgments which we base on some knowledge previously acquired, some are deduced from common objects of which every one is cognisant, and others from rare and well thought out experiments. And I confess likewise that it would be impossible for us to treat in detail each one of these last; for we should first of all have to examine all the herbs and stones brought to us from the Indies; we should have to have beheld the phoenix, and in a word to be ignorant of none of the marvellous secrets of nature. But I shall believe myself to have sufficiently fulfilled my promise if, in explaining to you the truths which may be deduced from common things known to each one of us, I make you capable of discovering all the others when it pleases you to take the trouble to seek them.

Polyander. - For my part I believe that this is likewise all that it is possible to desire, and I would have been satisfied if you had merely taught

me a certain number of propositions which are so celebrated that no one can be ignorant of them, such as those that concern the Deity, the rational soul, the virtues, their reward, &c., propositions which I compare with those ancient families which every one recognises as the most illustrious, although the titles of their nobility are concealed under the ruins of antiquity. For I do not really doubt that those who first of all induced the human race to believe in all these things had excellent reasons for proving them; but their arguments have been so rarely repeated since, that no one knows them any longer: and yet they are truths so important, that the dictates of prudence tell us that we should believe them blindly at the risk of being deceived, rather than that we should await a future life in order to be further instructed in them.

Epistemon. As far as I am concerned I am a little more curious, and I should like you to explain to me certain particular difficulties which suggest themselves to me in each branch of knowledge, and principally in what concerns the secrets of the human arts, apparitions, illusions, and in a word all the wonderful effects attributed to magic. For I believe it to be useful to know all that, not in order to make use of the knowledge, but in order that one should not allow one's judgment to be beguiled into admiration of an unknown thing.

Eudoxus. I shall try to satisfy you in regard to both; and, in order to adopt an order which we may make use of to the end, I wish first of all, Polyander, to talk with you of all things that the world contains, considering them in themselves, on the understanding that Epistemon shall interrupt our talk as little as possible, because his observations would often force us to leave our subject. We shall finally consider all these things anew, though under another aspect, in so far as they are in relation with us, and as they may be termed true or false, good or evil; and it is here that Epistemon will find occasion to set forth all the difficulties which will remain to him from the preceding discourses.

Polyander. Tell us, then, the order that you will follow in your explanations.

Eudoxus. We must commence with the human soul because all our knowledge depends on it; and after having considered its nature and effects, we shall reach its author; and when we come to know who He is and how He has created all things in the world, we shall observe what is most certain regarding other creatures; and we shall inquire how our senses perceive

things, and how our reflections become false or true. Then I shall place before your eyes the works of man upon corporeal objects, and after having struck wonder into you by the sight of machines the most powerful, and automata the most rare, visions the most specious, and tricks the most subtle that artifice can invent, I shall reveal to you secrets which are so simple that you will henceforward wonder at nothing in the works of our hands. After that I shall reach the works of nature, and, after having shown you the cause of all its changes, the diversity of its qualities, and the reason why the soul of plants and animals differs from ours, I shall place under your consideration the whole building up of sensible things. The phenomena of the heavens, and those certain conclusions which we may derive from them being observed, I shall pass on to most sane conjectures regarding what man cannot determine positively, in order to try to give an account of the relation sensible things bear to intellectual, and both to the Creator, of the immortality of the creatures, and of their state after the consummation of centuries. Then we shall come to the second part of this discourse in which we shall treat in detail of all the sciences, selecting in each that which is most solid, and we shall support a method whereby they may be carried on much further, and find of ourselves, with a mind of ordinary ability, what those most subtle can discover. After having thus prepared our minds for judging perfectly of the truth, we must also apply ourselves to the direction of our wills in respect of distinguishing good from evil, and observing the true difference between virtue and vice. That being done, I trust that your desire for knowledge will not be so violent, and that all that I shall have said to you will seem so well established that you will come to believe that a man with a healthy mind, had he been brought up in a desert and never received more than the light of nature to illumine him, could not if he carefully weighed all the same reasons, adopt an opinion different from ours. In order to begin this discourse we must inquire as to what is the first knowledge man arrives at, in what part of the soul it is to be found, and why it is so imperfect to begin with.

Epistemon. All that seems to me to explain itself very clearly if we compare the imagination of children to a *tabula rasa* on which our ideas, which resemble portraits of each object taken from nature, should depict themselves. The senses, the inclinations, our masters and our intelligence, are the various painters who have the power of executing this work; and amongst them, those who are least adapted to succeed in it, i.e. the

imperfect senses, blind instinct, and foolish nurses, are the first to mingle themselves with it. There finally comes the best of all, intelligence, and yet it is still requisite for it to have an apprenticeship of several years, and to follow the example of its masters for long, before daring to rectify a single one of their errors. In my opinion this is one of the principal causes of the difficulty we experience in attaining to true knowledge. For our senses really perceive that alone which is most coarse and common; our natural instinct is entirely corrupted; and as to our masters, although there may no doubt be very perfect ones found amongst them, they yet cannot force our minds to accept their reasoning before our understanding has examined it, for the accomplishment of this end pertains to it alone. But it is like a clever painter who might have been called upon to put the last touches on a bad picture sketched out by prentice hands, and who would probably have to employ all the rules of his art in correcting little by little first a trait here, then a trait there, and finally be required to add to it from his own hand all that was lacking, and who yet could not prevent great faults from remaining in it, because from the beginning the picture would have been badly conceived, the figures badly placed, and the proportions badly observed.

Eudorus. Your comparison places perfectly under our eyes the first obstacle which stands in our way; but you do not show the means of which we must avail ourselves if we wish to avoid it. And according to me it is this, that just as your artist would have done much better, after having effaced by drawing over it a sponge all the features of the picture, to begin it entirely over again rather than lose his time in correcting it, so each one who has reached a certain term of years known as the age of knowledge, should set himself once for all to remove from his imagination all the inexact ideas which have hitherto succeeded in engraving themselves upon it, and seriously begin to form new ones, applying thereto all the strength of his intelligence with such zeal that if he does not bring them to perfection, the fault will not at least be laid on the weakness of the senses, or on the errors of nature.

Epistemon. That would be an excellent remedy if we could easily employ it; but you are not ignorant that the opinions first received by our imagination remain so deeply imprinted there, that our will alone, if it did not employ the aid of certain strong reasons, could not arrive at effacing them.

Eudoxus. It is certain of these reasons that I hope to teach you; and if you wish to derive some fruit from this our intercourse, you must give me your whole attention, and allow me to converse a little with Polyander in order that I may begin by upsetting all the knowledge he has hitherto acquired. And as it is not sufficient to satisfy him, and it cannot but be bad, I may compare it to a badly constructed edifice whose foundations are not solid. I know no better remedy than absolutely to rase it to the ground, in order to raise a new one in its stead. For I do not wish to be placed amongst the number of these insignificant artisans, who apply themselves only to the restoration of old works, because they feel themselves incapable of achieving new. We can, however, Polyander, while we are busy destroying this edifice, at the same time form the foundations which may serve our purpose, and prepare the best and most solid materials that are necessary in order to succeed in our task; provided you are in any degree willing to examine with me which of all the truths men can know, are those that are most certain and easy of knowledge.

Polyander. Is there anyone who can doubt that sensible things (I mean thereby those that can be seen and touched) are much more certain than the others? As for me I should be very much astonished if you would show me as clearly some of those things that are said of God and our soul.

Eudoxus. That, however, is what I hope to do, and it seems to me surprising that men are credulous enough to base their knowledge on the certitude of the senses, when there is no one who is unaware that they frequently deceive us, and that we have good reason for always mistrusting those that have once betrayed us.

Polyander. I am well aware that the senses sometimes deceive us when they are ill affected, just as a sick person thinks that all food is bitter; when they are too far from the object this is also so, just as when we look at the stars they never appear to us as large as they really are: and in general when they do not act freely according to the constitution of their nature. But all their errors are easily known, and do not prevent my being now perfectly persuaded that I see you, that we walk in a garden, that the sun gives light, and, in a word, that all that my senses usually offer to me is true.

Eudoxus. Since it is not sufficient for me to tell you that the senses deceive us in certain cases where you perceive it, in order to make you fear being deceived by them on other occasions when you are not aware of it, I shall go further and ask if you have ever seen a melancholic man of the

nature of those who believe themselves to be vases, or who think some part of their body is of enormous size; they would swear that they see and touch that which they imagine they do. And it is true that any ordinary man would be indignant if anyone were to say to him that he could not have any more reason than they to be certain of his opinion, since it rests equally with theirs on what the senses and his imagination represent to him. But you cannot be annoyed if I ask you whether you are not like other men subject to sleep, and if you cannot think when you sleep that you see me, that you walk in this garden, that the sun gives light, in a word all these other things that you imagine yourself now to be certain of. Have you never heard in comedies this expression for astonishment, "*Am I awake or asleep?*" How can you be certain that your life is not a perpetual dream and that all that you imagine you learn by means of your senses is not as false now as it is when you sleep? More particularly as you have learned that you have been created by a superior Being to whom as omnipotent it would not have been more difficult to make us such as I have described, than such as you believe yourself to be *Polyander.* Certainly these are reasons sufficient to upset all the knowledge of Epistemon if he is contemplative enough to give his attention to it; as for me, I should fear becoming in some degree crazy, if, never having applied my mind to study, or accustomed myself to turn my mind away from the things of the senses, I was going to apply myself to meditations which, as far as I am concerned, a little exceed my capacities.

Epistemon. I think it very dangerous to proceed too far in this mode of reasoning. General doubts of this kind lead us straight to the ignorance of Socrates, or the uncertainty of the Pyrrhonists, which resembles water so deep that one cannot find any footing-in it.

Eudoxus. I confess that it is not without great danger that one ventures without a guide when one does not know the ford, and many have lost their way in doing so; but you have no reason to fear if you follow after me. It is such fears, indeed, that have prevented many learned men from attaining to the knowledge of a doctrine which is solid and certain enough to deserve the name of science; when, imagining that there was nothing on which they could rest their faith more firm and solid than the things that we perceive by the senses, they built on this foundation of sand rather than by digging down further finding a firm substratum of rock or clay. It is not here that we must stop. There is more; even if you did not wish further to examine the reasons which I have just stated, they would yet already in their principal

effect have attained to the goal I wished to reach, so long as they had so affected your imagination as to place you on your guard against them. That is an indication to show you that your knowledge is not so infallible that you may not fear to see its foundations shattered since they make you doubt all; and consequently you are made to doubt your very knowledge itself, and this proves that I have accomplished my end, which was to upset your knowledge by showing you its uncertainty. From fear, however, that you may lack more courage and refuse to follow me further, I declare to you that those doubts which alarmed you to begin with, are like those phantoms and vain images which appear in the night by the uncertain glimmer of a feeble light. Fear pursues you if you flee, but if you approach and touch them, you will find nought but wind and shadow, and you will ever after be better able to meet whatever may arrive.

Polyander. Convinced by your reasoning I desire then to set before myself all these difficulties in the strongest manner possible, and to apply myself to doubt whether I have not been dreaming all my life, and whether even all these ideas that I thought could only enter into my mind by the door of the senses, might not have been formed of themselves, just as similar ideas are formed when I sleep, or when I am certain that my eyes are shut, my ears closed, and, in a word, that none of my senses are in operation. In this way I shall be uncertain not only as to whether you are in the world, if a world exists, if there be a sun, but also whether I have eyes, ears, a body, even whether I talk with you, whether you address me, in short I shall doubt all things.

Eudoxus. There you are, well prepared, and this is the very point I wished to bring you to; but this is the very moment for your giving your attention to the consequences which I wish to derive from your argument. You see very well that you can reasonably doubt all things, the knowledge of which comes to you by the senses alone; but can you doubt of your doubt and remain uncertain whether you doubt or not?

Polyander. I confess that this astonishes me, and the little sagacity which a sufficiently small amount of common sense gives me brings it to pass that I do not without stupefaction find myself forced to confess that I know nothing with certainty, but that I doubt all things and am certain of nothing. But what conclusions do you wish to derive from this? I do not see to what use this universal astonishment can serve, nor by what reason a doubt of this kind can be a principle which is able to carry us very far. Quite on the

contrary, you have made the end of this our converse relief from all our doubts, and the discovery of truths of which Epistemon, wise as he is, may very well have been ignorant.

Eudoxus. Just give me your attention; I am going to conduct you further than you think. For it is really from this universal doubt which is like a fixed and unchangeable point, that I have resolved to derive the knowledge of God, of yourself, and of all that the world contains.

Polyander. You certainly make great promises and provided you carry them out it would certainly be worth our while to grant what you ask for. Keep, then, your promises and we will keep those we made to you.

Eudoxus. Since, then, you cannot deny that you doubt, and that it is on the other hand certain that you doubt, and so certain that you cannot even doubt of that, it is likewise true that you are, you who doubt; and that is so true that you can no longer doubt of it any more.

Polyander. I agree with you, for if I did not exist I could not doubt.

Eudoxus. You are, then, and you know that you are, and you know it because you doubt.

Polyander. All that is very true.

Eudoxus. But in order that you may not be turned aside from your plan, go on little by little, and as I have said to you, you will feel yourself drawn on further than you think. You are, and you know that you are, and you know that because you know that you doubt. But you, who doubt all and who cannot doubt of yourself, what are you?

Polyander. The reply is not difficult and I see very well that you have chosen me in place of Epistemon so that I may respond to your questions. You had no mind to put any question to which it is not quite easy to reply. I shall then tell you that I am a man.

Eudoxus. You pay no attention to my question, and the reply that you make to me, simple as it may appear to you, will bring us into a labyrinth of difficulties, if I try ever so little to press you. Were I for example to ask Epistemon himself what a man is, and were he to reply, as is done in the Schools, that a man is a rational animal; and if, in addition, in order to explain these two terms which are not less obscure than the first, he were to conduct us by ail the steps which are termed metaphysical, we should be dragged into a maze from which it would be impossible for us to emerge. As a matter of fact, from this question two others arise, the first is what is an animal? The second, what is reasonable! And further, if, to explain what

an animal is he were to reply that it is a living thing possessed of sensations, that a living thing is an animate body, that a body is a corporeal substance, you see that the question, like the branches of a genealogical tree, would go on increasing and multiplying; and finally all these wonderful questions would finish in pure tautology, which would clear up nothing, and would leave us in our original ignorance.

Epistemon. I am sorry to see that you despise this tree of Porphyry which has always excited the admiration of the learned, and I am vexed that you wish to show Polyander what be is by another method than the one which for so long has been admitted by the Schools. In fact until now no better means has been found, nor a means more calculated to teach us what we are, than that of placing in sequence under our eyes all the successive items which constitute the totality of our nature, so that by this means, by ascending and descending all the steps, we may be made aware of what we have in common with other beings, and of that in which we differ. That is the highest point to which our knowledge can attain.

Eudoxus. I neither have nor should I ever have any intention of condemning the method employed in the Schools; it is to it that I am indebted for the little that I know, and it is of its assistance that I have availed myself, in order to become aware of the uncertainty of all that I have learned there. Therefore although my teachers taught me nothing that was certain, I yet owe to them my thanks for having been taught by them to acknowledge this; and I now owe them all the greater thanks in that the things they taught me were doubtful, than had they been more in conformity with reason: for in that latter case I might possibly have contented myself with the small amount of reason that I should have discovered there, and that would have rendered me less zealous in the search after truth. The admonition that I gave to Polyander serves less to dissipate the obscurity into which his reply cast you than to make him more attentive to my question. I return then to my subject, and in order that we may not digress further I ask him a second time what he is, he who can doubt all things and cannot doubt of himself.

Polyander. I thought I had satisfied you by saying to you that I was a man, but I now see that I did not calculate well. I see very well that this answer does not satisfy you, and, truth to say, I confess that it does not now satisfy myself, more especially since you have shown me the embarrassment and uncertainty into which it can throw us if we wish to get

light upon it and understand it. As a matter of fact, whatever Epistemon may say, I observe great obscurity in all these metaphysical steps. If, for instance, we say that a body is a corporeal substance without saying what a corporeal substance is, these two words will not teach us more than the word body. In the same way if we say that what lives is an animate body without having first explained what body is, and what animate is, and if we likewise enquire into all the other metaphysical degrees, it may be to put forward words in a certain order, but it is to express nothing; for it indicates nothing that can be conceived or that can form a clear and distinct idea in our mind. Even when, in order to reply to your question, I said that I was a man, I did not think of all the scholastic entities of which I was ignorant, and of which I had never even heard, and which, as far as I am concerned, exist only in the imagination of those who have invented them. But I spoke of the things that we see, that we touch, that we feel, that we experience in ourselves, in a word, of the things that the simplest of men know as well as the greatest philosopher in the world, that is to say that I am a certain whole composed of two arms, two legs, a head, and all the parts which constitute what we call the human body, and which in addition is nourished, walks, feels, and thinks.

Eudoxus. I saw at once by your reply that you had not quite understood my question, and that you replied to more things than I asked of you. But as you have just numbered in the things of which you doubt, the arms, legs, head, and all the other parts composing the human body, I did not wish to interrogate you on any of these things of whose existence you are not sure. Tell me, then, what you really are inasmuch as you doubt. It is on this point alone, the only one which you can know with certainty, that I desired to question you.

Polyander. I now see that I have been mistaken in my reply and that I have gone further than I should, inasmuch as I did not properly understand your idea. That will render me more circumspect in future and at the same time it causes me to marvel at the exactitude of your method, whereby you conduct us little by little by simple and easy paths to the knowledge of the things that you wish to teach us. I have however reason to call the error that I have committed happy, since, thanks to it, I know very well that what I am inasmuch as I doubt, is in no wise what I call my body. And more than that, I do not even know that I have a body, since you have shown me that I might doubt of it. In addition to this I may add that I cannot even absolutely

deny that I have a body. Yet, while entirely setting aside all these suppositions, this will not prevent my being certain that I exist. On the contrary, they confirm me yet more in the certainty that I exist and that I am not a body; otherwise, doubting of my body I should at the same time doubt of myself, and this I cannot do; for I am absolutely convinced that I exist, and I am so much convinced of it, that I can in no wise doubt of it.

Eudoxus. That is beautifully expressed and you bring out the matter so well that I should not do better myself. I see very well that all that now remains is to leave you entirely to yourself, merely taking care to set you on the right road. Nay, further: I think that in order to find the most difficult truths, provided we are well guided, the only necessity is to have common sense, to put it vulgarly; and, as I find you very well provided with that, as I had hoped, all I have to do is to show you the road you should henceforward follow. Continue then to deduce by yourself the consequences which flow from this first principle.

Polyander. This principle seems to me so fertile, and it offers me so many things at once, that it seems as though I should want a great deal of work to reduce them to order. This one admonition that you have given me to consider who I who doubt am, and not to confound myself with what I formerly believed to be me, has thrown such a flood of light upon my mind, and so dissipated the mists, that by the light of this torch I see more accurately in myself what is not visible to the eyes, and that I am more persuaded that I possess what cannot be touched, than I ever have been of possessing a body.

Eudoxus. This warmth pleases me infinitely well although it may displease Epistemon who, because you have not shewn him his error, or placed under his eyes a part of the things that you say are contained in this principle, will always believe, or will at least fear, that the torch offered to you is similar to those wandering fires that are extinguished and vanish away when they are approached, and that so you may fall into your original darkness, i.e. into your former ignorance. And it certainly would be marvellous if you who have never studied nor opened books of philosophy, should all at once gain wisdom at such a small cost. So we should not be astonished that Epistemon judges in this way.

Epistemon. Yes, I confess I took that to be the result of mere enthusiasm, and I thought that Polyander who has never meditated on the great truths which philosophy teaches, was so transported by the discovery of the least

of them that he could not prevent himself from letting you know of it by his shouts of joy. But those who like you have travelled this road for long, have expended much oil and trouble in reading and re-reading the writings of the ancients, and in unravelling and expounding all that is most complicated in the philosophers, are no longer astonished by this enthusiasm, and make no more of it than they do of the vain hopes which frequently lay hold of one in commencing mathematics, when the threshold of the temple alone has so far been saluted. These novices have scarcely been given the line and the circle, and shown what is a straight line and a curved, when they believe that they are going to square the circle and duplicate the cube. But we have so frequently refuted the opinion of the Pyrrhonists, and they themselves have derived so little fruit from this method of philosophizing, that they have been in error all their lives, and have not been able to get free of the doubts which they have introduced into philosophy. They thus seem never to have worked for anything but learning to doubt: that is why, with Polyanders permission, I shall doubt whether he himself can derive anything better from it.

Eudoxus. I see very clearly that you speak to Polyander in order to spare me; your pleasantries are all the same evidently directed against me; but let Polyander speak and after that we shall see which of us will laugh last.

Polyander. I will do so willingly; nay, I fear that this dispute will become hot between you two and that if you plunge into the matter too deeply, I shall end by understanding nothing at all.

Thus shall I lose the fruit which I promise myself in returning to my original studies. I pray then that Epistemon may permit me to nourish this hope for so long as it pleases Eudoxus to lead me by the hand in the path in which he has placed me.

Eudoxus. You have already clearly recognized in considering yourself simply as doubting, that you are not body, and that as such you would not find within you any of the parts which constitute the human machine: that is to say, that you have neither arms, nor legs, nor head, nor eyes, nor ears, nor any organ which may serve for a sense of any kind. But notice whether in the same way you cannot reject all the things that you formerly understood by the description which you gave of the idea which in former times you had of man. For, as you judiciously remarked, that was a fortunate error that you committed in passing beyond the limits of my question. Thanks really to it, you can arrive at a knowledge of what you are by removing from you

and rejecting all that you perceive clearly does not belong to you, and by simply admitting what so necessarily pertains to you that you are as certain of it as of your existence and doubt.

Polyander. I thank you for thus setting me on my way; I did not know any longer where I was. I said first of all that I was a whole formed of arms, legs, a head, and all the parts which form the human body, besides which I walk, am nourished, feel and think. It has been necessary for me, in order to consider myself simply as I know myself to be, to set aside all these parts or all these members which constitute the human machine; that is to say, I must consider myself as ‘without arms, legs, head, and, in a word, without body. But it is true that what in me doubts is not what we call our body; so then it is also true that I, inasmuch as I doubt, do not eat or walk, for neither of these two things can be done without body. Further, I cannot even state that I, inasmuch as I doubt, can feel. As feet really serve for walking, so do eyes for seeing, and ears for hearing. But as I have none of these organs because I have not body, I cannot say that I feel. In addition to that, I have often in dreaming thought I felt many things that I did not really feel at all, and as I resolved to admit nothing here but what was so true that I could not doubt of it, I cannot say that I am a perceiving thing, that is, one that sees with eyes and hears with ears. It might indeed be that I thought I perceived although none of these things happened.

R. H.

Eudoxus. I cannot prevent myself from stopping you here, not to turn you aside, but to encourage you, and make you consider what common sense can do if it is well directed. As a matter of fact, is there anything in all this which is not exact, which is not legitimately argued, and well deduced from what precedes? And all that is said and done without logic, or rule, or a formula for the argument, but with the simple light of reason and with a just sense which, acting alone and of itself, is less exposed to error than when it anxiously tries to follow a thousand diverse routes which art and human idleness have discovered, less to bring it to perfection than to corrupt it. Epistemon even seems to be in this matter of our opinion; for while saying nothing of the matter, he gives us to understand that he approves what we have said. Go on, then, Polyander, and show him how far good sense can carry us, and at the same time what consequences can be derived from our principle.

Polyander. Of all the attributes which I bestowed upon myself, only one remains for me to examine and that is thought; and I see that it is the only one that I cannot separate from myself. For if it is true that I doubt just because I cannot doubt that I do so, it is also equally true that I think; for what is doubting but thinking in a certain way? And in fact if I did not think, I could not know whether I doubt or exist. Yet I am, and I know that I am, and I know it because I doubt, that is to say because I think. And better, it might be that if I ceased for an instant to think I should cease at the same time to be. Likewise the sole thing that I cannot separate from me, that I know certainly to be me and that I can now affirm without fear of deception — that one thing, I repeat, is that I am a thinking thing.

Eudoxus. What, Epistemon, do you think of what Polyander has just said? Do you find his argument to be halting or inconsequent? Should you have thought that an unlettered man, and one who had not studied, would have reasoned so well and followed out his ideas so rigorously? Here, if I do not mistake, you must begin to see that he who knows how properly to avail himself of doubt can deduce from it absolutely certain knowledge, better, more certain, and more useful than that derived from this great principle which we usually establish as the basis or centre to which all other principles are referred and from which they start forth, viz *it is impossible that one and the same thing should both be and not be.* I shall perhaps have occasion to demonstrate the utility of it to you. But let us not interrupt Polyander's discourse, or remove ourselves from our subject; as to you, see if you have anything to say or any objection to make.

Epistemon. Since you lay the blame on me and even exasperate me, I shall show you what logic can do when it is roused, and at the same time I shall raise difficulties and obstacles of such a nature that not only Polyander but you yourself will have much difficulty in getting free of them. Let us then go no further, but stop here and severely examine your principles and deductions. As a matter of fact with the aid of true logic, and after your own principles, I shall show that nothing of what Polyander has said rests on a legitimate foundation or brings about any conclusion. You say that you are and that you know that you are, that you know it because you doubt and because you think. But do you know what doubting or what thinking is? And as you do not desire to admit anything of which you are not certain and do not know perfectly, how can you be certain that you are by means of attributes so obscure and consequently so uncertain? It would have been

better first of all to have taught Polyander what doubt is, what thought is, what existence is, so that his reasoning might have the strength of a demonstration, and that he might first of all understand himself before applying himself to make others comprehend.

Polyander. That is beyond me, so I give it up leaving you to unravel this knot with Epistemon.

Eudoxus. For this occasion I undertake it with pleasure, but on the condition that you will be judge of our differences; for I dare not hope that Epistemon will give way to my reasoning. He who is like him, full of opinions and prepossessed with a hundred prejudices, finds it difficult to hand himself over to the light of nature alone; for long he has been accustomed to yield to authority rather than to lend his ear to the dictates of his own reason. He likes better to interrogate others, to weigh what the ancients have written, than to consult himself on the judgment which he should form; and as from his childhood he has taken as reason what rested only on the authority of precepts, now he gives his authority as a reason and desires that others should pay to him the tribute which he formerly paid them. But I shall have reason to be content and I shall believe myself to have sufficiently answered the objections which have been proposed to you by Epistemon, if you give your assent to what I shall say, and if your reason convinces you of it.

Epistemon. I am *not* so rebellious nor so difficult to persuade, nor is it so difficult to satisfy me as you think. And further, although I had reasons for mistrusting Polyander, I would willingly submit our case to his arbitration; and as soon as he favours you I promise you to confess myself vanquished. But he must guard himself from being deceived and falling into the error for which he reproaches others, that is to say, from taking as a motive for persuasion the esteem which he has formed for you.

Eudoxus. If he allowed himself to rest on so feeble a support he would look badly after his own interests and I presume that he will attend to them. But let us return to our subject matter.

I am quite of your opinion, Epistemon, that we must know what doubt is, what thought is, before being fully convinced of the truth of this reasoning *I doubt therefore I am*; or, what comes to the same, *I think therefore I am.* But do not go and imagine that in order to know this we must do violence to our mind and put it to torture in order to ascertain the *proximate species* and the *essential difference,* and form from it a definition by rule. All that must be

left to him who is going to be a professor or to dispute in the Schools. But whoever desires to examine things by himself and judge of them as he conceives them, cannot be so devoid of mental power not to see clearly whenever he is willing to give attention to it, what doubt is, or thought or existence, and to be required to learn their distinctions. Further I declare that there are certain things which we render more obscure by trying to define them, because, since they are very simple and clear, we cannot know and perceive them better than by themselves. Nay, we must place in the number of those chief errors that can be committed in the sciences, the mistakes committed by those who would try to define what ought only to be conceived, and who cannot distinguish the clear from the obscure, nor discriminate between what, in order to be known, requires and deserves to be defined, from what can be best known by itself. And in the number of the things which are clear in the way above explained and which can be known by themselves, we must place doubt, thought, and existence.

I do not think that anyone has ever existed who is stupid enough to have required to learn what existence is before being able to conclude and affirm that he is; the same holds true of thought and doubt. Indeed I add that one learns those things in no other way than by ones self and that nothing else persuades us of them except our own experience and this knowledge and internal testimony that each one finds within himself when he examines things. In vain shall we define what white is in order to make it comprehensible to him who sees absolutely nothing, while in order to know it, it is only requisite to open one’s eyes and see the white; in the same way in order to know what doubt is, or thought, it is only requisite to doubt and think. That teaches us all that we can know of it, and explains more respecting it than even the most exact definitions. It is thus true that Polyander ought to have known these things, before being able to draw the conclusions which he has advanced; but since we have chosen him as judge, ask him if he has ever been ignorant of what is.

Polyander. I certainly confess that it is with the greatest pleasure that I have heard you disputing regarding a thing which you have not been able to know but from me, and it is not without some joy that I see, at least on this occasion, that it is necessary for me to be recognised as your master and for you to recognise yourselves as my pupils. Therefore in order to put both of you out of pain and quickly to resolve your difficulty (as a matter of fact we say that a thing is promptly done when it is done beyond all hope and

expectation), I can state for certain that I never doubted what doubt is, although I never began to know it, or rather to think of it until the time when Epistemon desired to place it in doubt. You no sooner showed me the small amount of certainty which we have as to the existence of things which are only known to us by the evidence of the senses, than I commenced to doubt of them, and that sufficed to make me know doubt and at the same time my certainty of it, in such a way that I can affirm that as soon as I commenced to doubt I commenced to know with certainty. But my doubt and my certainty did not relate to the same object; my doubt regarded things only which existed outside me, my certainty concerned me and my doubt. Eudoxus then spoke truly when he asserted that there are things that we cannot know without seeing them; therefore to learn what doubt is, what thought is, it is necessary only that we ourselves should think and doubt. The same holds good of existence; it is only necessary to know what we understand by this word; we know at the very same moment what the thing is, at least in so far as we can know it, and there is no necessity here for a definition, which will more confuse than clear up the matter.

Epistemon. Since Polyander is satisfied I likewise give my assent, and I shall not push the dispute further. However I do not see that during the two hours that we have been here and that we have been arguing, he has advanced much. All that Polyander has learnt by the help of this wonderful method of which you so boast, consists solely of the fact that he doubts that he thinks and that he is a thinking thing. A wonderful knowledge in truth! Many words for small results! as much could be said in four words and we should have all given our assent. As for me if I had to employ as many words and as much time in learning something of so small an importance, I confess I should not resign myself to it without regret. Those who are our instructors tell us much more about the matter; they are much more confident; nothing stops them; they take everything upon them and decide about all. Nothing turns them aside from their plan, nothing astonishes them, whatever happens; when they feel themselves pressed too hard, an equivocation or the *distinguo* saves them from all embarrassment. And more, be certain that their method will always be preferred to that of one like you who doubts all and who fears so much to trip that he keeps treading the same spot and thus makes no advance.

Eudoxus. I never intended to prescribe to anyone the method he ought to follow in the search after truth, but merely to expound that of which I have

availed myself, so that if it were found bad it would be set aside; if it were found good and useful others would avail themselves of it in turn; and I always left full liberty to all to set it aside or to admit it. If it is now said that it has advanced me little, it is for experience to decide as to that: and I am certain, provided that you continue to lend me your attention, you will yourself confess that we cannot take too many precautions in the establishment of our bases, and that once they are well established we shall push the consequences further and with much more facility than we had dared to promise ourselves; so that I believe that all the errors which are found in the sciences come from the fact that we have in the beginning formed our judgments too precipitately by admitting as principles obscure things of which we had no clear and distinct notion. The truth of this is shown by the modicum of progress that we have made in the sciences whose principles are certain and known by all; for, on the other hand, in the others, whose principles are obscure or uncertain, those who desire sincerely to express their thought will be forced to confess that after having employed much time, and having read many great volumes, they have to recognise that they know nothing and have learnt nothing.

It must not then appear astonishing to you, my dear Epistemon, if, desiring to lead Polyander in the way that is surer than that in which I was trained to walk, I am so careful and exact that I hold that only to be true of which I have a certainty equal to that with which I am aware that I am, I think, I am a thinking thing.

Epistemon. You seem to me to resemble these tumblers who always fall back on their feet, so ceaselessly do you return to your principle. Yet if you proceed by this path you will go neither far nor quickly. How, as a matter of fact, shall you always find truths of which you are as certain as of your existence?

Eudoxus. That is not as difficult as you think; for all the truths succeed one another and are united by a common bond; the whole secret consists simply in beginning with the first and most simple, and in rising little by little, and so to speak by gradations, to those more remote and complicated. Who now will doubt that what I have set forth as first principle is the first of the things which we might come to know with the help of a method? It is certain that we cannot doubt it, even were we to doubt of all things in the world. As then we are certain of having begun well, we must take pains not to deceive ourselves in what follows, we must apply our whole care not to

admit that to be true which is liable to the smallest doubt. Pursuing this plan we must in my opinion allow Polyander to speak; for as he follows no guidance but that of his common sense, and as his reason is corrupted by no prejudices, it is difficult for him to be deceived, or at any rate he would easily perceive that this was so, and he would without any trouble return to the right road. Let him then speak, and set forth what he himself alleges he has seen in your principle.

Polyander. So many things are contained in the idea of a thinking thing that whole days would be required to develope them. We shall only treat of the principal ones and those that can make the notion clearer and hinder our confounding it with what bears no relationship to it. I mean by a thinking being....

THE WORLD



OR; TREATISE ON THE LIGHT

Translated by Michael S. Mahoney

Written between 1629 and 1633, this treatise contains a nearly complete version of Descartes' philosophy, covering method, metaphysics, physics and biology. *The World* is founded upon the heliocentric view, first explicated in Western Europe by Copernicus. Descartes delayed the book's release upon news of the Roman Inquisition's conviction of Galileo for "suspicion of heresy" and sentencing to house arrest. Some material from the treatise was revised for publication as *Principles of Philosophy* (1644), Descartes' Latin textbook originally intended to replace the Aristotelian textbooks used in universities. In the *Principles* the heliocentric tone was relaxed with a relativist frame of reference. *The World* was not published in its entirety until 1677.

Before Descartes begins to describe his theories in physics, he introduces the concept that there is no relationship between our sensations and what creates these sensations, casting doubt on the Aristotelian belief that such a relationship existed. From here, he describes how fire is capable of breaking wood apart into its minuscule parts through the rapid motion of the particles of fire within the flames. Descartes explains that this rapid motion of particles is what gives fire its heat, since heat is nothing more than the motion of particles and what causes it to produce light.

According to Descartes, the motion, or agitation, of these particles is what gives substances their properties (i.e. their fluidity and hardness). Fire is the most fluid and has enough energy to render most other bodies fluid, while the particles of air lack the force necessary to do the same. Hard bodies have particles that are all equally hard to separate from the whole. Based on his observations of how resistant nature is to a vacuum, Descartes deduces that all particles in nature are packed together so that there is no void or empty space in nature. He describes substances as consisting only of three elementary elements: fire, air and earth, from which the properties of

any substance can be characterised by its composition of these elements, the size and arrangement of the particles in the substance, and the motion of its particles.

In the treatise, Descartes also elaborates on how the universe may have started from utter chaos and with these basic laws could have had its particles arranged so as to resemble the universe that we can observe today. Once the particles in the chaotic universe began to move, the overall motion would have been circular, as there is no void in nature, so whenever a single particle moves, another particle must also move to occupy the space where the previous particle once was. This type of circular motion would have created what Descartes observed to be the orbits of the planets about the sun, with the heavier objects spinning out towards the outside of the vortex and the lighter objects remaining closer to the centre. To explain this, Descartes employs the analogy of a river that carried both floating debris and heavy boats. If the river abruptly arrived at a sharp bend, the boats would follow Descartes third law of motion and hit the shore of the river since the flow of the particles in the river would not have enough force to change the direction of the boat. However, the much lighter floating debris would follow the river since the particles in the river would have sufficient force to change the direction of the debris. In the heavens, the circular flow of celestial particles, or aether, causes the motion of the planets to be circular.

LE

MONDE

DE

Mr DESCARTES,

ou

LE TRAITÉ DE LA

LVMIERE

ET

DES AVTRES PRINCIPAVX

objets des Sens.

Avec un Discours de l'Action des Corps, & un autre des Fièvres, composez selon les principes du même Auteur.



A PARIS,

Chez Theodore Girard, dans la grand'Salle du Palais, à l'Envie.

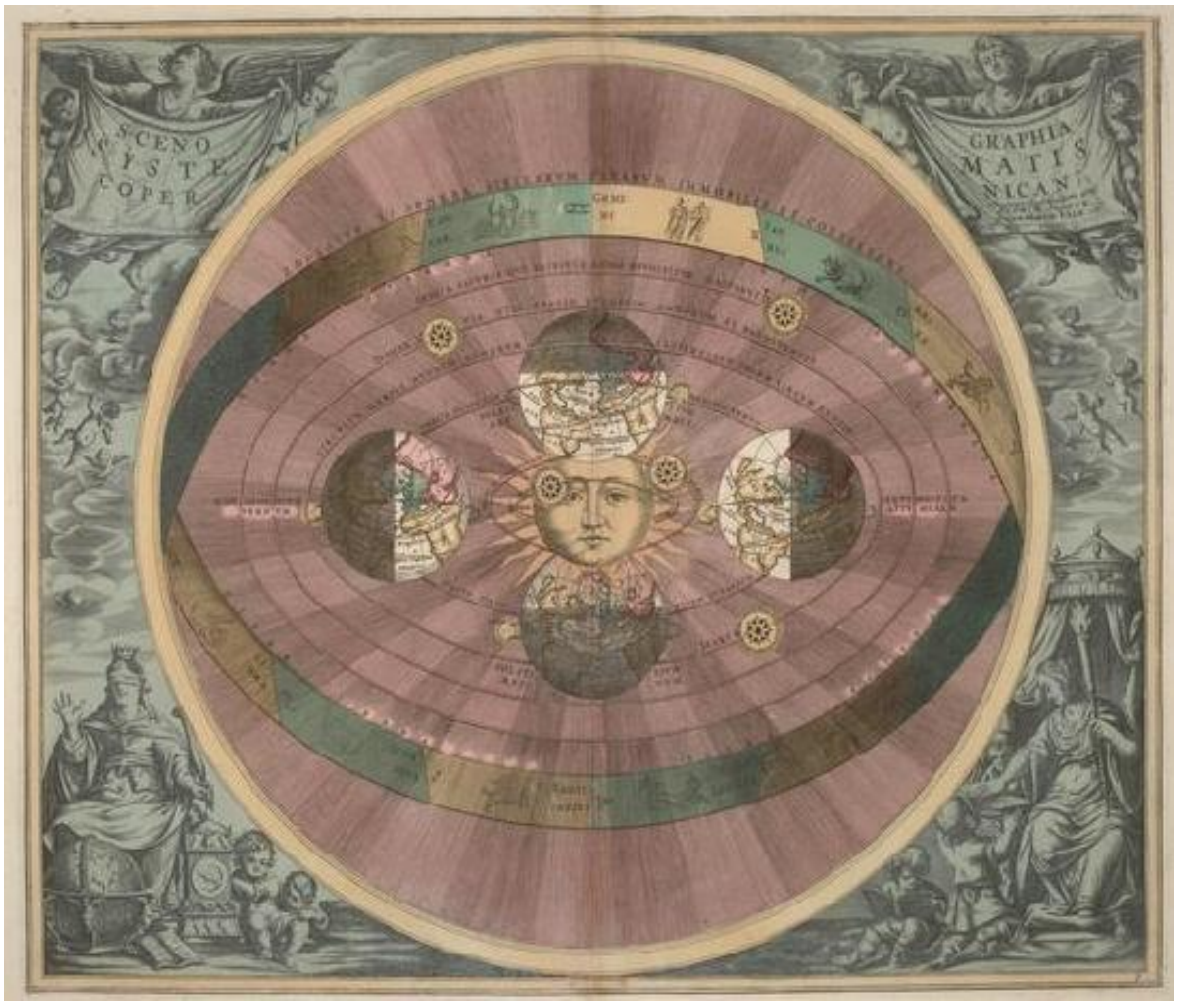
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Avec Privilege du Roy.

The first edition's title page

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Andreas Cellarius' illustration of the Copernican system, from the Harmonia Macrocosmica (1708) — 'The World' rests on the heliocentric view, first explicated in Western Europe by Copernicus.

CHAPTER ONE On the Difference Between Our Sensations and the Things That Produce Them

In proposing to treat here of light, the first thing I want to make clear to you is that there can be a difference between our sensation[1] of light (i.e. the idea that is formed in our imagination through the intermediary of our eyes) and what is in the objects that produces that sensation in us (i.e. what is in the flame or in the sun that is called by the name of "light"). For, even though everyone is commonly persuaded that the ideas that are the objects of our thought are wholly like the objects from which they proceed, nevertheless I can see no reasoning that assures us that this is the case. On the contrary, I note many experiences that should cause us to doubt it.

You well know that words bear no resemblance to the things they signify, and yet they do not cease for that reason to cause us to conceive of those things, indeed often without our paying attention to the sound of the words or to their syllables. Thus it can happen that, after having heard a discourse, the sense of which we have very well understood, we might not be able to say in what language it was uttered.[2] Now, if words, which signify nothing except by human convention, suffice to cause us to conceive of things to which they bear no resemblance, why could not nature also have established a certain sign that would cause us to have the sensation of light, even though that sign in itself bore no similarity to that sensation? Is it not thus that she has established laughter and tears, to cause us to read joy and sorrow on the faces of men?

But perhaps you will say that our ears in fact cause us to hear only the sound of the words, or our eyes to see only the countenance of him who laughs or cries, and that it is our mind that, having remembered what those sounds and that countenance signify, represents their meaning to us at the same time.[3] To that I could respond that it is nonetheless our mind that represents to us the idea of light each time the action that signifies it touches our eye. But, rather than lose time in disputation, I would do better to adduce another example.

Do you think that, even when we do not pay attention to the meaning of words and hear only their sound, the idea of that sound, which forms in our thought, is anything like the object that is the cause of it? A man opens his mouth, moves his tongue, forces out his breath: in all these actions I see

nothing that is not very different from the idea of the sound that they cause us to imagine. Also, most philosophers assure us that sound is nothing other than a certain vibration of air that strikes against our ears. Thus, if our sense of hearing were to report to our mind the true image of its object, then, instead of causing us to conceive of sound, it would have to cause us to conceive of the motion of the parts of air that then vibrate against our ears. But, because not everyone will perhaps want to believe what the philosophers say, I will adduce another example.

Of all our senses, touch is the one thought least misleading and most certain, so that, if I show you that even touch causes us to conceive many ideas that in no way resemble the objects that produce them, I do not think you will find it strange if I say that sight can do the same. Now, there is no one who does not know that the ideas of tickling and of pain, which are formed in our thought when bodies from without touch us, bear no resemblance whatever to those bodies. One passes a feather lightly over the lips of a child who is falling asleep, and he perceives that someone is tickling him.[4] Do you think the idea of tickling that he conceives resembles anything in this feather? A soldier returns from battle; during the heat of combat he could have been wounded without being aware of it. But now that he begins to cool off, he feels pain and believes he has been wounded. A surgeon is called, the soldier’s armor is removed, and he is examined. In the end, one finds that what he felt was nothing but a buckler or a strap, which was caught under his armor and was pressing on him and making him uncomfortable. If, in causing him to feel this strap, his sense of touch had impressed its image on his thought, there would have been no need of a surgeon to show him what he was feeling.

Now, I see no reason that forces us to believe that what is in the objects from which the sensation of light comes to us is any more like that sensation than the actions of a feather and of a strap are like tickling and pain. Nevertheless, I have not adduced these examples to make you believe absolutely that this light is something different in the objects from what it is in our eyes, but only so that you will doubt it and so that, forbearing from being preoccupied by the contrary, you can now better examine with me what light is.

CHAPTER TWO In What the Heat and Light of Fire Consists

I know of only two sorts of bodies in the world in which light is found, to wit, the stars and flame, or fire.[5] And, because the stars are without a doubt farther from human knowledge than is fire or flame, I shall try first to explicate what I observe regarding flame.

When flame burns wood or some other similar material, we can see with our eyes that it moves the small parts of the wood and separates them from one another, thus transforming the subtler parts into fire, air, and smoke, and leaving the grosser parts as ashes. Hence, someone else may, if he wishes, imagine the form of "fire," the quality of "heat," and the action that "burns" it to be completely different things in this wood.[6] For my part, afraid of misleading myself if I suppose anything more than what I see must of necessity be there, I am content to conceive there the motion of its parts. For, posit "fire" in the wood, posit "heat" in the wood, and make the wood "burn" as much as you please. If you do not suppose in addition that some of its parts are moved or detached from their neighbors, I cannot imagine that it would undergo any alteration or change. By contrast, remove the "fire," remove the "heat," prevent the wood from "burning:" provided only that you grant me that there is some power that violently moves the subtler of its parts and separates them from the grosser, I find that that alone will be able to cause in the wood all the same changes that one experiences when it burns.

Now, insofar as it does not seem to me possible to conceive that one body could move another unless it itself were also moving,[7] I conclude from this that the body of the flame that acts against the wood is composed of small parts, which move independently of one another with a very fast and very violent motion. Moving in this way, they push and move with them the parts of the body that they touch and that do not offer them too much resistance. I say that its parts move independently of one another because, even though several of them often act in accord and conspire together to bring about a single effect, we gee nonetheless that each of them acts on its own against the bodies they touch. I say also that their motion is very fast and very violent because, being so small that we cannot distinguish them by

sight, they would not have the force they have to act against other bodies if the quickness of their motion did not compensate for their lack of size.[8]

I add nothing concerning the direction in which each moves. For, if you consider that the power to move and the power that determines in what direction the motion should take place are two completely different things and can exist one without the other (as I have set out in the *Dioptrics*),[9] you will easily judge that each part moves in the manner made least difficult for it by the disposition of the bodies surrounding it.[10] Moreover, in the same flame there can be some parts going upward, and others downward, some in straight lines, and others in circles; indeed, they can go in all directions, without changing anything of the flame's nature. Thus, if you see almost all of them tending upward, you need not think that this is for any other reason than that the other bodies touching them are almost always disposed to offer them greater resistance in any other direction.

But, having recognized that the parts of the flame move in this manner, and that it suffices to conceive of their motions in order to understand how the flame has the power to consume the wood and to burn, pray let us examine if the same will not also suffice to make us understand how the flame heats us and how it sheds light for us. For, if that is the case, it will not be necessary for the flame to possess any other quality, and we will be able to say that it is this motion alone that is called now "heat" and now "light" according to the different effects it produces.

Now, as regards heat, the sensation that we have of it can, it seems to me, be taken for a type of pain when it is violent, and sometimes for a type of tickling when it is moderate.[11] Since we have already said that there is nothing outside our thought that is similar to the ideas we conceive of tickling and pain, we can well believe also that there is nothing that is similar to that which we conceive of heat; rather, anything that can move the small parts of our hands, or of any other part of our body, can arouse this sensation in us. Indeed, many experiences favor this opinion. For merely by rubbing our hands together we heat them, and any other body can also be heated without being placed close to a fire, provided only that it is shaken and rubbed in such a way that many of its small parts are moved and can move with them those of our hands.

As regards light, one can also well imagine that the same motion that is in the flame suffices to cause us to sense light. But, because it is in this that

the main part of my design consists, I want to try to explain it at some length and to take up my discourse from anew.

CHAPTER THREE On Hardness and Liquidity

I consider that there is an infinity of diverse motions that endure perpetually in the world. After having noted the greatest of these (i.e. those that bring about the days, months, and years), I take note that the vapors of the earth never cease to rise to the clouds and to descend from them, that the air is forever agitated by the winds, that the sea is never at rest, that springs and rivers flow ceaselessly, that the strongest buildings finally fall into decay, that plants and animals are always either growing or decaying; in short, that there is nothing anywhere that is not changing. Whence I know clearly that it is not in the flame alone that there are a number of small parts never ceasing to move, but that there are also such parts in every other body, even though their actions are not as violent and they cannot, due to their smallness, be perceived by any of our senses.

I do not stop to seek the cause of their motion, for it is enough for me to think that they began to move as soon as the world began to exist. And that being the case, I find by my reasoning that it is impossible that their motions should ever cease or even that those motions should change in any way other than with regard to the subject in which they are present. That is to say, the virtue or power in a body to move itself can well pass wholly or partially to another body and thus no longer be in the first; but it cannot no longer exist in the world. My arguments, I say, are enough to satisfy me above, but I have not yet had occasion to relate them to you. In the meantime, you can imagine if you choose, as do most of the learned, that there is some first mover which, rolling about the world at an incomprehensible speed, is the origin and source of all the other motions found therein.

Now, in consequence of this consideration, there is a way of explaining the cause of all the changes that take place in the world and of all the variety that appears on the earth. However, I shall be content here to speak of those that serve my purpose.

The difference between hard bodies and those that are liquids is the first thing I would like you to note. To that end, consider that every body can be divided into extremely small parts. I do not wish to determine whether their number is infinite or not; at least it is certain that, with respect to our

knowledge, it is indefinite and that we can suppose that there are several millions in the smallest grain of sand our eyes can perceive.

Note also that, if two of these small parts are touching one another, without being in the act[12] of moving away from one another, some force is necessary to separate them, however small it may be. For, once so placed, they would never be inclined to dispose themselves otherwise. Note also that twice as much force is necessary to separate two of them than to separate one of them, and a thousand times as much to separate a thousand of them. Thus, if it is necessary to separate several millions of them all at once, as is perhaps necessary in order to break a single hair, it is not surprising that a rather sensible force is necessary.

By contrast, if two or more of these small parts touch one another only in passing and while they are in the act of moving, one in one direction and the other in another, certainly it will require less force to separate them than if they were in fact without motion. Indeed, no force at all will be required if the motion with which they are able to separate themselves is equal to or greater than that with which one wishes to separate them. Now, I find no difference between hard bodies and liquid bodies other than that the parts of the one can be separated from the whole much more easily than those of the other. Thus, to constitute the hardest body imaginable, I think it is enough if all the parts touch each other with no space remaining between any two and with none of them being in the act of moving. For what glue or cement can one imagine beyond that to hold them better one to the other?

I think also that to constitute the most liquid body one could find, it is enough if all its smallest parts are moving away from one another in the most diverse ways and as quickly as possible, even though in that state they do not cease to be able to touch one another on all sides and to arrange the~selves in as small a space as if they were without motion. Finally, I believe that every body more or less approaches these extremes, according as its parts are more or less in the act of moving away from one another. All the phenomena on which I cast my eye confirm me in this opinion.

Since, as I have already said, all the parts of flame are perpetually agitated, not only is it liquid, but it also renders most other bodies liquid. Note also that, when it melts metals, it acts with no different power than when it burns wood. Rather, because the parts of metals are just about all equal, the flame cannot move one part without moving the other, and hence it forms completely liquid bodies from them. By contrast, the parts of wood

are unequal in such a way that the flame can separate the smaller of them and render them liquid (i.e. cause them to fly away in smoke) without agitating the larger parts.

After flame, there is nothing more liquid than air, and one can see with the eye that its parts move separately from one another. For, if you take the effort to watch those small bodies that are commonly called “atoms” and that appear in rays of sunlight, you will see them flutter about incessantly here and there in a myriad of different ways, even when there is no wind stirring them up. One can also experience the same sort of thing in all the grosser liquids if one mixes them together in different colors, in order better to distinguish their motions. Finally, the phenomenon appears very clearly in acids[13] when they move and separate the parts of some metal.

But you could ask me here at this point why, if it is only the motion of the parts of flame that cause it to burn and make it liquid, the motion of the parts of air, which also make it extremely liquid, do not at all give it the power to burn but, on the contrary, make it such that our hands can hardly feel it? To this I reply that one must take into account not only the speed of motion, but also the size of the parts. It is the smaller ones that make the more liquid bodies, but it is the larger ones that have more force to burn and in general to act on other bodies.

Note in passing that here, and always hereafter, I take a single part to be everything that is joined together and is not in the act of separation, even though the smallest parts could easily be divided into many other smaller ones. Thus, a grain of sand, a stone, a rock, indeed the whole earth itself, may hereafter be taken as a single part insofar as we are there considering only a completely simple and completely equal motion.[14]

Now if, among the parts of air, there are some that are very large in comparison with the others (as are the “atoms” that are seen there), they also move very slowly; and, if there are some that move more quickly, they are also smaller. If, however, among the parts of flame there are some smaller than in air, there are also larger ones, or at least there is a larger number of parts equal to the largest of those of air. In addition, these larger parts of flame move much more quickly, and hence it is they alone that have the power to burn.

As far as the smaller parts are concerned, one may guess that they penetrate many bodies of which the pores are so narrow that even air cannot enter. As far as the larger parts are concerned (or the equally large parts in

greater number), one sees clearly how air alone does not suffice to nourish flame. The violence of their action is enough to show us that they move more quickly. Finally, that it is the largest of these parts that have the power to burn, and not the others, is apparent from the fact that the flame that issues from brandy, or from other very subtle bodies, hardly burns at all, while on the contrary that which is engendered in hard and heavy bodies is very hot.

CHAPTER FOUR On the Void, and How it Happens that Our Senses Are Not Aware of Certain Bodies

But we must examine in greater detail why air, although it is as much a body as the others, cannot be sensed as well as they. By doing so, we will free ourselves from an error with which we have been preoccupied since childhood, when we believed that there were no other bodies around us except those that could be sensed and thus that, if air were one of them, then, because we sensed it so faintly, it at least could not be as material nor as solid as those we sense more clearly.[15]

On this subject, I would first like you to note that all bodies, both hard and liquid, are made from the same matter, and that it is impossible to conceive of the parts of that matter ever composing a more solid body, or one occupying less space, than they do when each of them is touched on all sides by the others surrounding it. Whence it seems to me to follow that, if there can be a void anywhere, it ought to be in hard bodies rather than liquid ones; for it is evident that the parts of the latter can much more easily press and arrange themselves against one another (because they are moving) than can those of the former (which are without motion).

For example, if you are placing powder in a jar, you shake the jar and pound against it to make room for more powder. But, if you are pouring some liquid into it, the liquid spontaneously arranges itself in as small a place as one can put it. By the same token, if you consider in this regard some of the experiments the philosophers have been wont to use in showing that there is no void in nature,[16] you will easily recognize that all those spaces that people think to be empty, and where we feel only air, are at least as full, and as full of the same matter, as those where we sense other bodies.

For pray tell me what reason would there be to think that nature would cause the heaviest bodies to rise and the most solid to break — as one experiences her doing in certain machines, rather than to suffer that any of their parts should cease to touch one another or to touch some other bodies — and yet permit the parts of air — which are so easy to bend and to be arranged in all manners — to remain next to one another without being touched on all sides, or even without there being another body among them that they touch? Could one really believe that the water in a well should mount upward against its natural inclination merely in order that the pipe of

a pump may be filled and [yet] think that the water in clouds should not fall in order that the spaces here below be filled, if there were even some little void among the parts of the bodies that they contain?[17]

But you could propose to me here a rather considerable problem, to wit, that the parts composing liquid bodies cannot, it seems, move incessantly, as I have said they do, unless there is some empty space among them, at least in the places from which they depart by virtue of their being in motion. I would have trouble responding to this, had I not recognized through various experiences that all the motions that take place in the world are in some way circular. That is to say, when a body leaves its place, it always enters into that of another, and the latter into that of still another, and so on down to the last which occupies in the same instant the place left open by the first.[18] Thus, there is no more of a void among them when they are moving than when they are stopped. And note here that it is not thereby necessary that all the parts of bodies that move together be exactly disposed in the round, as in a true circle, nor even that they be of equal size and shape; for these inequalities can easily be compensated for by other inequalities to be found in their speed.

Now, when bodies move in the air, we do not usually notice these circular motions, because we are accustomed to conceiving of the air only as an empty space. But look at fish swimming in the pool of a fountain: if they do not approach too near to the surface of the water, they cause great speed. Whence it clearly appears that the water they push before them does not push indifferently all the water of the pool, but only that which can best serve to perfect the circle of the fishes' motion and return to the place they leave behind.[19] This experience suffices to show how these circular motions are easy for nature and familiar to her.

Now, however, I want to adduce another experience to show that no motion ever takes place that is not circular. When the wine in a cask does not flow through an opening at the bottom because the top is completely closed, it is improper to say (as one ordinarily does) that this takes place owing to *horror vacui*. One well knows that the wine has no mind to fear anything; and, even if it had one, I do not know for what reason it might fear that void, which is in fact nothing but a chimera. Rather, one should say that the wine cannot leave the cask because outside everything is as full as it can be and that the part of the air, whose place the wine would occupy should it descend, cannot find another place to put itself anywhere in the

rest of the universe unless one makes an opening in the top of the cask, through which this air can rise circularly to its place.

Nevertheless, I do not want to make certain that there is no void at all in nature. I fear my discourse would become too long if I undertook to unfold the whole story, and the experiences of which I have spoken are not sufficient to prove it, although they are enough to persuade us that the spaces where we sense nothing are filled with the same matter, and contain at least as much of that matter, as those occupied by the bodies that we sense. Thus, for example, when a vessel is full of gold or lead, it nonetheless contains no more matter than when we think it is empty. This may well seem strange to many whose [powers of] reasoning do not extend beyond their fingertips and who think there is nothing in the world except what they touch. But when you have considered for a bit what makes us sense a body or not sense it, I am sure you will find nothing incredible in the above. For you will know clearly that, far from all the things around us being sensible, it is on the contrary those that are there most of the time that can be sensed the least, and those that are always there that can never be sensed at all.

The heat of our heart is quite great, but we do not feel it because it is always there. The weight of our body is not small, but it does not discomfort us. We do not even feel the weight of our clothes because we are accustomed to wearing them. The reason for this is clear enough; for it is certain that we cannot sense any body unless it is the cause of some change in our sensory organs, i.e. unless it moves in some way the small parts of the matter of which those organs are composed. The objects that are not always present can well do this, provided only that they have force enough; for, if they corrupt something there while they act, that can be repaired afterward by nature, when they are no longer acting. But if those that continually touch us ever had the power to produce any change in our senses, and to move any parts of their matter, in order to move them they had perforce to separate them entirely from the others at the beginning of our life, and thus they can have left there only those that completely resist their action and by means of which they cannot be sensed in any way. Whence you see that it is no wonder that there are many spaces about us in which we sense no body, even though they contain bodies no less than those in which we sense them the most.

But one need not therefore think that the coarse air that we draw into our lungs while breathing, that is converted into wind when agitated, that appears solid when enclosed in a balloon, and that is composed only of exhalations and smoke is as solid as water or earth. Here one should follow the common opinion of the philosophers, who all assure us that it is rarer, as one also easily recognizes from experience. For the parts of a drop of water, separated from one another by the agitation of heat, can make up much more of this air than the space that held the water can contain. Whence it follows most certainly that there is a great quantity of small intervals among the parts of which the air is composed; for there is no other way to conceive of a rare body. But, because these intervals cannot be empty, as I have said above, I conclude from all this that of necessity there are mixed with the air some other bodies, either one or several, which fill as exactly as possible the small intervals left among its parts. Now there remains to consider only what these other bodies can be; thereafter I hope it will not be difficult to understand what the nature of light can be.

CHAPTER FIVE On the Number of Elements and on Their Qualities

The philosophers assure us that there is above the clouds a certain air much subtler than ours. That air is not composed of vapors of the earth as it is, but constitutes an element in itself. They say also that above this air there is still another, much subtler body, which they call the element of fire. They add, moreover, that these two elements are mixed with water and earth in the composition of all the inferior bodies. Thus~ I am only following their opinion if I say that this subtler air and this element of fire fill the intervals among the parts of the grosser air we breathe, so that these bodies, interlaced with one another, compose a mass as solid as any body can be.

But, in order better to make you understand my thought on this subject, and so that you will not think I want to force you to believe all the philosophers tell us about the elements, I should describe them to you in my fashion.

I conceive of the first, which one may call the element of fire, as the most subtle and penetrating fluid there is in the world. And in consequence of what has been said above concerning the nature of liquid bodies, I imagine its parts to be much smaller and to move much faster than any of those of other bodies. Or rather, in order not to be forced to admit any void in nature, I do not attribute to this first element parts having any determinate size or shape; but I am persuaded that the impetuosity of their motion is sufficient to cause it to be divided, in every way and in every sense, by collision with other bodies and that its parts change shape at every moment to accommodate themselves to the shape of the places they enter. Thus, there is never a passage so narrow, nor an angle so small, among the parts of other bodies, where the parts of this element do not penetrate without any difficulty and which they do not fill exactly.[20]

As for the second, which one may take to be the element of air, I conceive of it also as a very subtle fluid in comparison with the third; but in comparison with the first there is need to attribute some size and shape to each of its parts and to imagine them as just about all round and joined together like grains of sand or dust. Thus, they cannot arrange themselves so well, nor so press against one another that there do not always remain around them many small intervals into which it is much easier for the first

element to slide than for the parts of the second to change shape expressly in order to fill them. And so I am persuaded that this second element cannot be so pure anywhere in the world that there is not always some little matter of the first with it.

Beyond these two elements, I accept only a third, to wit, that of earth. Its parts I judge to be as much larger and to move as much less swiftly in comparison with those of the second as those of the second in comparison with those of the first. Indeed, I believe it is enough to conceive of it as one or more large masses, of which the parts have very little or no motion that might cause them to change position with respect to one another.

If you find it strange that, in setting out these elements, I do not use the qualities called “heat,” “cold,” “moistness,” and “dryness,” as do the philosophers, I shall say to you that these qualities appear to me to be themselves in need of explanation.[21] Indeed, unless I am mistaken, not only these four qualities, but also all the others (indeed all the forms of inanimate bodies) can be explained without the need of supposing for that purpose any other thing in their matter than the motion, size, shape, and arrangement of its parts. In consequence whereof I shall easily be able to make you understand why I do not accept any other elements than the three I have described. For the difference that should exist between them and the other bodies that the philosophers call “mixed” or “composite” consists in the forms of these mixed bodies always containing in themselves some qualities that are contrary and that counteract one another, or at least do not tend to the conservation of one another, whereas the forms of the elements should be simple and not have any qualities that do not accord with one another so perfectly that each tends to the conservation of all the others.

Now I could not find any such forms in the world except the three I have described. For the form I have attributed to the first element consists in its parts moving so extremely fast and being so small that there are no other bodies capable of stopping them. Beyond that, they require no determinate size or shape or position. The form of the second consists in its parts having such a middling motion and size that, if there are in the world many causes that could increase their motion and decrease their size, there are just as many others that can do exactly the opposite. Thus, they always remain balanced as it were in that same middling condition. And the form of the third consists in its parts being so large or so joined together that they have the force always to resist the motions of the other bodies.

Examine as much as you please all the forms that the diverse motions, the diverse shapes and sizes, and the different arrangement of the parts of matter can lend to mixed bodies. I am sure you will find none that does not contain in itself qualities that tend to cause it to change and, in changing, to reduce to one of the forms of the elements.

Flame, for example, the form of which demands its having parts that move very fast and that in addition have some size (as has been said above), cannot last long without being corrupted. For either the size of its parts, in giving them the force to act against other bodies, will be the cause of the diminution of their motion, or the violence of their agitation, in causing them to break upon hurtling themselves against the bodies they encounter, will be the cause of their loss of size. Thus, little by little they will be able to reduce themselves to the form of the third element, or to that of the second, and even also some of them to that of the first.[22] Thereby you can see the difference between this flame, or the fire common among us, and the element of fire I have described. You should know also that the elements of air and of earth (i.e. the second and third elements) are none the more similar to that grosser air we breathe nor to this earth on which we walk, but that generally all the bodies that appear about us are mixed or composite and subject to corruption.

And nevertheless one need not think therefore that the elements have in the world no places that are particularly destined for them and where they can be perpetually conserved in their natural purity.[23] On the contrary, each part of matter always tends to be reduced to one of their forms and, once having been reduced, never tends to leave that form. Hence, even if God at the beginning had created only mixed bodies, nevertheless since the world began all these bodies could have had the chance to leave their forms and to take on those of the elements. Thus, there is now much reason to think that all the bodies that are large enough to be counted among the most notable parts of the universe each have the form of only one of these elements alone, and that there cannot be mixed bodies anywhere but on the surfaces of these large bodies. But there, of necessity, there must be some mixed bodies; for, the elements being of a very contrary nature, it cannot happen that two of them touch one another without acting against each other’s surfaces and thus lending the matter there the diverse forms of these mixed bodies.

Apropos of this, if we consider in general all the bodies of which the universe is composed, we will find among them only three sorts that can be called large and be counted among the principal parts, to wit, the sun and the fixed stars as the first sort, the heavens as the second, and the earth with the planets and the comets as the third. That is why we have good reason to think that the sun and the fixed stars have no other form than that of the wholly pure first element, the heavens that of the second, and the earth with the planets and comets that of the third.

I link the planets and the comets with the earth because, seeing that they, like she, resist light and reflect its rays, I find no difference between them. I also link the sun with the fixed stars and attribute to them a nature totally contrary to that of the earth because the action alone of their light is enough to make me know that their bodies are of a very subtle and very agitated matter.

As for the heavens, in as much as they cannot be perceived by our senses, I think I am right in attributing to them a middle nature between that of the luminous bodies whose action we perceive and that of the solid and heavy bodies whose resistance we perceive.

Finally, we do not perceive mixed bodies in any other place than on the surface of the earth.[24] And, if we consider that the whole space that contains them (i.e. all that which stretches from the highest clouds to the deepest mines that the greed of man has ever dug out to draw metals from them) is extremely small in comparison with the earth and with the immense expanses of the heavens, we will easily be able to imagine to ourselves that these mixed bodies taken all together are but as a crust engendered on top of the earth by the agitation and mixing of the matter of the heavens surrounding it.

And thus we will have reason to think that it is not only in the air we breathe, but also in all the other composite bodies right down to the hardest rocks and the heaviest metals, that there are parts of the element of air mixed with those of earth and, consequently, also parts of the element of fire, because they are always found in the pores of the element of air.

But one should note that, even though there are parts of these three elements mixed with one another in all bodies, nonetheless, properly speaking, only those which (because of their size or the difficulty they have in moving) can be referred to the third element compose all the bodies we see about us. For the parts of the two other elements are so subtle that they

cannot be perceived by our senses. One may picture all these bodies as sponges; even though a sponge has a quantity of pores, or small holes, which are always full of air or water or some other liquid, one nonetheless does not think that these liquids enter into its composition.

Many other things remain for me to explain here, and I would myself be happy to add here several arguments to make my opinions more plausible. In order, however, to make the length of this discourse less boring for you, I want to wrap part of it in the cloak of a fable, in the course of which I hope that the truth will not fail to appear sufficiently and that it will be no less agreeable to see than if I were to set it forth wholly naked.

CHAPTER SIX Description of a New World, and on the Qualities of the Matter of Which it is Composed

For a short time, then, allow your thought to wander beyond this world to view another, wholly new one, which I shall cause to unfold before it in imaginary spaces. The philosophers tell us that these spaces are infinite, and they should very well be believed, since it is they themselves who have made the spaces so.[25] Yet, in order that this infinity not impede us and not embarrass us, let us not try to go all the way to the end; let us enter in only so far that we can lose from view all the creatures that God made five or six thousand years ago and, after having stopped there in some fixed place, let us suppose that God creates from anew so much matter all about us that, in whatever direction our imagination can extend itself, it no longer perceives any place that is empty.

Although the sea is not infinite, those who are on some vessel in the middle of it can extend their view seemingly to infinity, and nevertheless there is still water beyond what they see.[26] Thus, even though our imagination seems to be able to extend itself to infinity, and this new matter is not assumed to be infinite, we can nonetheless well suppose that it fills spaces much greater than all those we shall have imagined. Indeed, in order that there be nothing in all this that you could find to blame, let us not permit our imagination to extend itself as far as it could, but let us purposely restrict it to a determinate space that is no greater, say, than the distance between the earth and the principal stars of the firmament, and let us suppose that the matter that God shall have created extends quite far beyond in all directions, out to an indefinite distance. For there is more reason, and we have much better the power, to prescribe limits to the action of our thought than to the works of God.

Now, since we are taking the liberty of imagining this matter to our fancy, let us attribute to it, if you will, a nature in which there is absolutely nothing that anyone cannot know as perfectly as possible. To that end, let us expressly assume that it does not have the form of earth, nor of fire, nor of air, nor any more particular form (such as wood, or a stone, or of a metal); nor does it have the qualities of being hot or cold, dry or moist, light or heavy, or of having some taste, or smell, or sound or color, or light, or

suchlike, in the nature of which one could say that there is something that is not clearly known by everyone.[27]

Let us not also think, on the other hand, that our matter is that prime matter of the philosophers that has been so well stripped of all its forms and qualities that nothing more remains that can be clearly understood.[28] Let us rather conceive of it as a real, perfectly solid body, which uniformly fills the entire length, breadth, and depth of the great space at the center of which we have halted our thought. Thus, each of its parts always occupies a part of that space and is so proportioned to its size that it could not fill a larger one nor squeeze itself into a smaller one, nor (while it remains there) suffer another to find a place there.

Let us add further that this matter can be divided into any parts and according to any shapes that we can imagine, and that each of its parts is capable of receiving in itself any motions that we can also conceive. Let us suppose in addition that God truly divides it into many such parts, some larger and some smaller, some of one shape and some of another, as it pleases us to imagine them. It is not that He thereby separates them from one another, so that there is some void in between them; rather, let us think that the entire distinction that He makes there consists in the diversity of the motions He gives to them. From the first instant that they are created, He makes some begin to move in one direction and others in another, some faster and others slower (or indeed, if you wish, not at all); thereafter, He makes them continue their motion according to the ordinary laws of nature. For God has so wondrously established these laws that, even if we suppose that He creates nothing more than what I have said, and even if He does not impose any order or proportion on it but makes of it the most confused and most disordered chaos that the poets could describe, the laws are sufficient to make the parts of that chaos untangle themselves and arrange themselves in such right order[29] that they will have the form of a most perfect world, in which one will be able to see not only light, but also all the other things, both general and particular, that appear in this true world.

But, before I explain this at greater length, stop again for a bit to consider that chaos, and note that it contains nothing that is not so perfectly known to you that you could not even pretend not to know it. For, as regards the qualities that I have posited there, I have, if you have noticed, supposed them to be only such as you can imagine them. And, as regards the matter from which I have composed the chaos, there is nothing simpler

nor easier to know among inanimate creatures. The idea of that matter is so included in all those that our imagination can form that you must necessarily conceive of it or you can never imagine anything.

Nonetheless, because the philosophers are so subtle that they can find difficulties in things that appear extremely clear to other men, and because the memory of their prime matter (which they know to be rather difficult to conceive of) could divert them from knowledge of the matter of which I speak, I should say to them at this point that, unless I am mistaken, the whole problem they face with their matter derives only from their wanting to distinguish it from its own proper quantity and from its outward extension, i.e. from the property it has of occupying space. In this, however, I am willing that they think themselves correct, for I have no intention of stopping to contradict them. But they should also not find it strange if I suppose that the quantity of the matter I have described does not differ from its substance any more than number differs from the things numbered. Nor should they find it strange if I conceive of its extension, or the property it has of occupying space, not as an accident, but as its true form and its essence. For they cannot deny that it is quite easy to conceive of it in that way. And my plan is not to set out (as they do) the things that are in fact in the true world, but only to make up as I please from [this matter] a [world] in which there is nothing that the densest minds are not capable of conceiving, and which nevertheless could be created exactly the way I have made it up.

Were I to posit in this new world the least thing that is obscure, it could happen that, within that obscurity, there might be some hidden contradiction I had not perceived, and thus that, without thinking, I might suppose something impossible. Instead, being able to imagine distinctly everything I am positing there, it is certain that, even if there be no such thing in the old world, God can nevertheless create it in a new one; for it is certain that He can create everything we can imagine.[30]

CHAPTER SEVEN On the Laws of Nature of this New World

But I do not want to defer any longer from telling you by what means nature alone could untangle the confusion of the chaos of which I have been speaking, and what the laws of nature are that God has imposed on her.

Know, then, first that by “nature” I do not here mean some deity or other sort of imaginary power. Rather, I use that word to signify matter itself, insofar as I consider it taken together with all the qualities that I have attributed to it, and under the condition that God continues to preserve it in the same way that He created it. For from that alone (i.e. that He continues thus to preserve it) it follows of necessity that there may be many changes in its parts that cannot, it seems to me, be properly attributed to the action of God (because that action does not change) and hence are to be attributed to nature. The rules according to which these changes take place I call the “laws of nature.”

To understand this better, recall that, among the qualities of matter, we have supposed that its parts have had diverse motions since the beginning when they were created, and furthermore that they all touch one another on all sides, without there being any void in between. Whence it follows of necessity that from then on, in beginning to move, they also began to change and diversify their motions by colliding with one another. Thus, if God preserves them thereafter in the same way that He created them, He does not preserve them in the same state. That is to say, with God always acting in the same way and consequently always producing the same effect in substance, there occur, as by accident, many diversities in that effect. And it is easy to believe that God, who, as everyone must know, is immutable, always acts in the same way. Without, however, involving myself any further in these metaphysical considerations, I will set out here two or three of the principal rules according to which one must think God to cause the nature of this new world to act and which will suffice, I believe, for you to know all the others.[31]

The first is that each individual part of matter always continues to remain in the same state unless collision with others constrains it to change that state. That is to say, if the part has some size, it will never become smaller unless others divide it; if it is round or square, it will never change that

shape without others forcing it to do so; if it is stopped in some place, it will never depart from that place unless others chase it away; and if it has once begun to move, it will always continue with an equal force until others stop or retard it.

There is no one who does not believe that this same rule is observed in the old world with respect to size, shape, rest, and a thousand other like things. But from it the philosophers have exempted motion, which is, however, the thing I most expressly desire to include in it. Do not think thereby that I intend to contradict them. The motion of which they speak is so very different from that which I conceive that it can easily happen that what is true of the one is not true of the other.

They themselves avow that the nature of their motion is very little known.[32] To render it in some way intelligible, they have still not been able to explain it more clearly than in these terms: *motus est actus entis in potentia, prout in potentia est*,[33] which terms are for me so obscure that I am constrained to leave them here in their language, because I cannot interpret them. (And, in fact, the words, “motion is the act of a being in potency, insofar as it is in potency,” are no clearer for being in [English].) On the contrary, the nature of the motion of which I mean to speak here is so easy to know that mathematicians themselves, who among all men studied most to conceive very distinctly the things they were considering, judged it simpler and more intelligible than their surfaces and their lines. So it appears from the fact that they explained the line by the motion of a point, and the surface by that of a line.

The philosophers also suppose several motions that they think can be accomplished without any body’s changing place, such as those they call *motus ad formam, motus ad calorem, motus ad quantitatem* (“motion to form,” “motion to heat,” “motion to quantity”), and myriad others. As for me, I conceive of none except that which is easier to conceive of than the lines of mathematicians: the motion by which bodies pass from one place to another and successively occupy all the spaces in between.

Beyond that, the philosophers attribute to the least of these motions a being much more solid and real than they do to rest, which they say is nothing but the privation of motion. As for me, I conceive of rest as being a quality also, which should be attributed to matter while it remains in one place, just as motion is a quality attributed to it while it is changing place.[34]

Finally, the motion of which they speak is of such a strange nature that, whereas all other things have as a goal their perfection and strive only to preserve themselves, it has no other end and no other goal than rest. Contrary to all the laws of nature, it strives on its own to destroy itself. By contrast, the motion I suppose follows the same laws of nature as do generally all the dispositions and all the qualities found in matter, as well those which the scholars call *modos et entia rationis cum fundamento in re* (modes and beings of thought with foundation in the thing) as *qualitates reales* (their real qualities), in which I frankly confess I can find no more reality than in the others.

I suppose as a second rule that, when one of these bodies pushes another, it cannot give the other any motion except by losing as much of its own at the same time; nor can it take away from the other body's motion unless its own is increased by as much. This rule, joined to the preceding, agrees quite well with all experiences in which we see one body begin or cease to move because it is pushed or stopped by some other. For, having supposed the preceding rule, we are free from the difficulty in which the scholars find themselves when they want to explain why a stone continues to move for some time after being out of the hand of him who threw it. For one should ask instead, why does it not continue to move always? Yet the reason is easy to give. For who is there who can deny that the air in which it is moving offers it some resistance? One hears it whistle when it divides the air; and, if one moves in the air a fan or some other very light and very extended body, one will even be able to feel by the weight of one's hand that the air is impeding its motion, far from continuing it, as some have wanted to say. If, however, one fails to explain the effect of the air's resistance according to our second rule, and if one thinks that the more a body can resist the more it is capable of stopping the motion of others (as one can perhaps be persuaded at first), one will in turn have a great deal of trouble explaining why the motion of this stone is weakened more in colliding with a soft body of middling resistance than it is when it collides with a harder one that resists it more. Or also why, as soon as it has made a little effort against the latter, it spontaneously turns on its heels rather than stopping or interrupting the motion it has. Whereas, supposing this rule, there is no difficulty at all in this. For it teaches us that the motion of a body is not retarded by collision with another in proportion to how much the latter resists it, but only in proportion to how much the latter's resistance is

surmounted, and to the extent that, in obeying the law, it receives into itself the force of motion that the former surrenders.[35]

Now, even though in most of the motions we see in the true world we cannot perceive that the bodies that begin or cease to move are pushed or stopped by some others, we do not thereby have reason to judge that these two rules are not being observed exactly. For it is certain that those bodies can often receive their agitation from the two elements of air and fire, which are always found among them without being perceptible (as has just been said), or even from the grosser air, which also cannot be perceived. And they can transfer the agitation, sometimes to that grosser air and sometimes to the whole mass of the earth; dispersed therein, it also cannot be perceived.

But, even if all that our senses have ever experienced in the true world seemed manifestly contrary to what is contained in these two rules, the reasoning that has taught them to me seems to me so strong that I would not cease to believe myself obliged to suppose them in the new world I am describing to you. For what more firm and solid foundation could one find to establish a truth (even if one wanted to choose it at will) than to take the very firmity and immutability that is in God?[36]

Now it is the case that those two rules manifestly follow from this alone: that God is immutable and that, acting always in the same way, He always produces the same effect. For, supposing that He placed a certain quantity of motions in all matter in general at the first instant He created it, one must either avow that He always conserves as many of them there or not believe that He always acts in the same way. Supposing in addition that, from that first instant, the diverse parts of matter, in which these motions are found unequally dispersed began to retain them or to transfer them from one to another according as they had the force to do, one must of necessity think that He causes them always to continue the same thing. And that is what those two rules contain.

I will add as a third rule that, when a body is moving, even if its motion most often takes place along a curved line and (as has been said above) can never take place along any line that is not in some way circular, nevertheless each of its individual parts tends always to continue its motion along a straight line. And thus their action, i.e. the inclination they have to move, is different from their motion.

For example, if a wheel is made to turn on its axle, even though its parts go around (because, being linked to one another, they cannot do otherwise), nevertheless their inclination is to go straight ahead, as appears clearly if perchance one of them is detached from the others. For, as soon as it is free, its motion ceases to be circular and continues in a straight line.

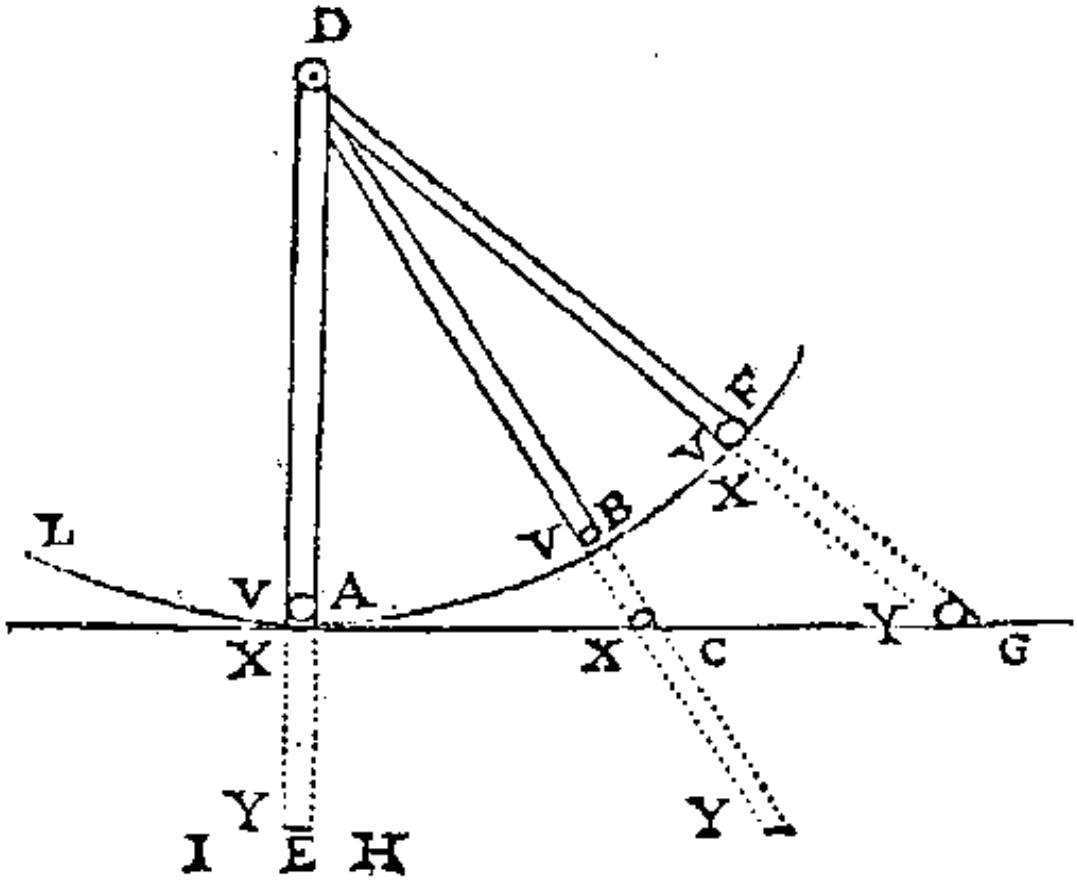
By the same token, when one whirls a stone in a sling, not only does it go straight out as soon as it leaves the sling, but in addition, throughout the time it is in the sling, it presses against the middle of the sling and causes the cord to stretch. It clearly shows thereby that it always has an inclination to go in a straight line and that it goes around only under constraint.

This rule rests on the same foundation as the two others and depends only on God's conserving everything by a continuous action and, consequently, on His conserving it not as it may have been some time earlier but precisely as it is at the same instant that He conserves it. Now it is the case that, of all motions, only the straight is entirely simple; its whole nature is understood in an instant. For, to conceive of it, it suffices to think that a body is in the act of moving in a certain direction, and that is the case in each instant that might be determined during the time that it is moving. By contrast, to conceive of circular motion, or of any other possible motion, one must consider at least two of its instants, or rather two of its parts, and the relation between them.[37]

But, so that the philosophers (or rather the sophists) do not find occasion here to exercise their superfluous subtleties, note that I do not thereby say that rectilinear motion can take place in an instant; but only that all that is required to produce it is found in bodies in each instant that might be determined while they are moving, and not all that is required to produce circular motion.

For example, suppose a stone is moving in a sling along the circle marked *AB* and you consider it precisely as it is at the instant it arrives at point *A*: you will readily find that it is in the act of moving[38] (for it does not stop there) and of moving in a certain direction (that is, toward *C*), for it is in that direction that its action is directed in that instant. But you can find nothing there that makes its motion circular. Thus, supposing that the stone then begins to leave tile sling and that God continues to preserve it as it is at that moment, it is certain that He will not preserve it with the inclination to go circularly along the line *AB*, but with the inclination to go straight ahead toward point *C*.

According to this rule, then, one must say that God alone is the author of all the motions in the world, insofar as they exist and insofar as they are straight, but that it is the diverse dispositions of matter that render the motions irregular and curved. So the theologians teach us that God is also the author of all our actions, insofar as they exist and insofar as they have some goodness, but that it is the diverse dispositions of our wills that can render those actions evil.



I could set out here many additional rules for determining in detail when and how and by how much the motion of each body can be diverted and increased or decreased by colliding with others, something that comprises summarily all the effects of nature.[39] But I shall be content with showing you that, besides the three laws that I have explained, I wish to suppose no others but those that most certainly follow from the eternal truths on which the mathematicians are wont to support their most certain and most evident demonstrations; the truths, I say, according to which God Himself has

taught us He disposed all things in number, weight, and measure.[40] The knowledge of those laws is so natural to our souls that we cannot but judge them infallible when we conceive them distinctly, nor doubt that, if God had created many worlds, the laws would be as true in all of them as in this one. Thus, those who can examine sufficiently the consequences of these truths and of our rules will be able to know effects by their causes and (to explain myself in the language of the School) will be able to have demonstrations *a priori* of everything that can be produced in that new world.

And so there will be no exception that impedes this, we will add, if you wish, to our suppositions that God will never mark any miracle in the new world and that the intelligences, or the rational souls, which we might hereafter suppose to be there, will in no way disturb the ordinary course of nature.

Nonetheless, in consequence of this, I do not promise you to set out here exact demonstrations of all the things I will say. It will be enough for me to open to you the path by which you will be able to find them yourselves, whenever you take the trouble to look for them. Most minds lose interest when one makes things too easy for them. And to compose here a setting that pleases you, I must employ shadow as well as bright colors. Thus I will be content to pursue the description I have begun, as if having no other design than to tell you a fable.

CHAPTER EIGHT On the Formation of the Sun and the Stars of the New World

Whatever inequality and confusion we might suppose God put among the parts of matter at the beginning, the parts must, according to the laws He imposed on nature, thereafter almost all have been reduced to one size and to one middling motion and thus have taken the form of the second element as I described it above. For to consider this matter in the state in which it could have been before God began to move it, one should imagine it as the hardest and most solid body in the world. And, since one could not push any part of such a body without pushing or pulling all the other parts by the same means, so one must imagine that the action or the force of moving or dividing, which had first been placed in some of the parts of matter, spread out and distributed itself in all the others in the same instant, as equally as it could.

It is true that this equality could not be totally perfect. First, because there is no void at all in the new world, it was impossible for all the parts of matter to move in a straight line. Rather, all of them being just about equal and as easily divertible, they all had to unite in some circular motions. And yet, because we suppose that God first moved them diversely, we should not imagine that they all came together to turn about a single center, but about many different ones, which we may imagine to be diversely situated with respect to one another.

Consequently, one can conclude that they had to be naturally less agitated or smaller, or both, toward the places nearest to these centers than toward those farthest away. For, all of them having an inclination to continue their motion in a straight line, it is certain that the strongest (i.e. the largest among those equally agitated and the most agitated among those equally large) had to describe the greatest circles, i.e. the circles most approaching a straight line. As for the matter contained in between three or more of these circles, it could have been at first much less divided and less agitated than all the other. What is more, in as much as we suppose that at the beginning God placed every sort of inequality among the parts of this matter, we must imagine that there were then all sorts of sizes and shapes, and dispositions to move or not to move, in all ways and in all directions.

But that does not prevent them from having afterwards been rendered almost all fairly equal, principally those that remained an equal distance from the centers about which they were turning. For, since some could not move without the others' moving, the more agitated had to communicate some of their motion to those that were less so, and the larger had to break and divide in order to be able to pass through the same places as those that preceded them, or in order to rise higher. Thus, in a short time all the parts were arranged in order, so that each was more or less distant from the center about which it had taken its course, according as it was more or less large and agitated in comparison with the others. Indeed, in as much as size always resists speed of motion, one must imagine that the parts more distant from each center were those which, being a bit smaller than the ones nearer the center, were thereby much more agitated.[41]

Exactly the same holds for their shapes. Even if we were to suppose that there were at the beginning all sorts of shapes and that they had for the most part many angles and many sides, like the pieces that fly off from a stone when it is broken, it is certain that afterward, in moving and hurtling themselves against one another, they little by little had to break the small points of their angles and dull the square edges of their sides, until they had almost all been rendered round, just as grains of sand and pebbles do when they roll with the water of a river. Thus there cannot now be any notable difference among those parts that are rather close, nor indeed even among those that are quite distant, except that they can move a bit more quickly one than another and be a bit larger or a bit smaller, and that does not prevent one's attributing the same form to all of them.

Only one must except some which, having been from the beginning much larger than the others, could not be so easily divided or which, having had very irregular and impeding shapes, joined together severally rather than breaking up and rounding off. Thus, they have retained the form of the third element and have served to compose the planets and the comets, as I shall tell you below.

It is necessary to note in addition that the matter that came out from around the parts of the second element, to the extent that they broke and dulled the small points of their angles in rounding off, necessarily had to acquire a much faster motion than theirs and along with it a facility for dividing and changing shape at every moment to accommodate itself to the shape of the places where it is. Thus, it took the form of the first element.

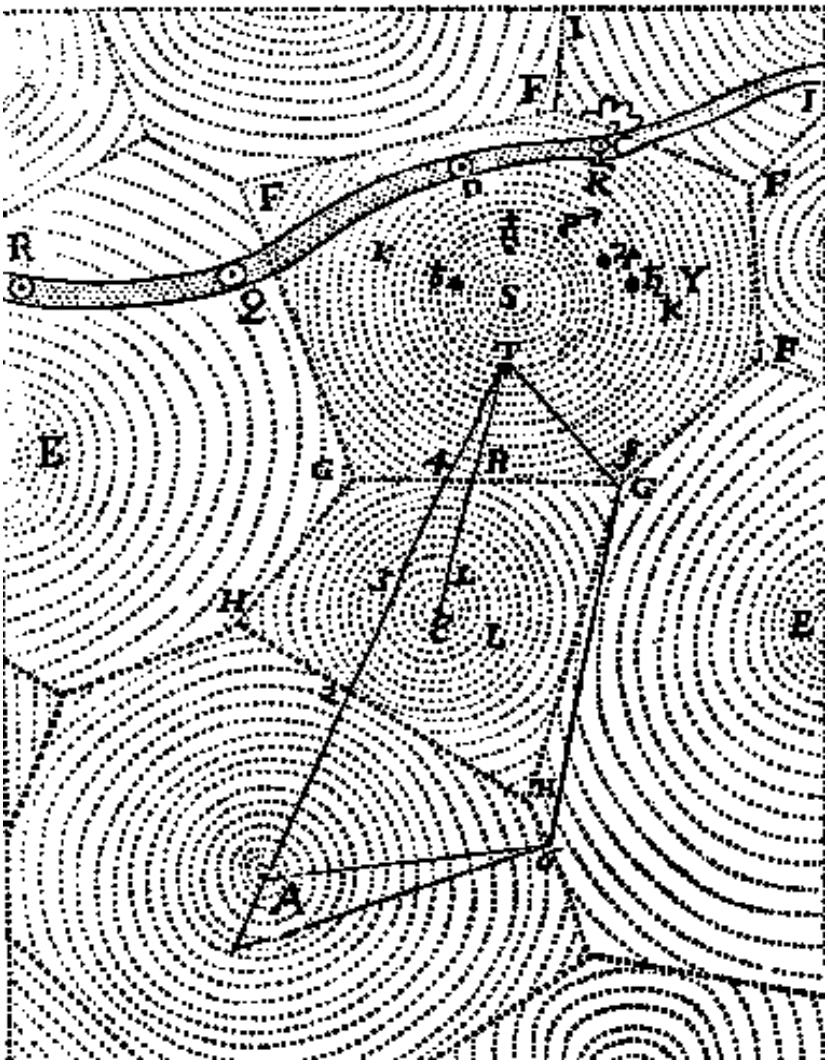
I say that it had to acquire a much faster motion than theirs, and the reason is clear. For, having to go off to the side through very narrow passages and out of the small spaces left between the parts of the second element as they proceeded to collide head-on with one another, it had much more of a path than they to traverse in the same time.

It is also necessary to note that what there is of that first element beyond what is needed to fill the small intervals that the parts of the second (which are round) necessarily leave around them must draw back toward the centers about which those parts turn, because [the parts of the second] occupy all the other, more distant places. At those centers, the remaining first element must compose perfectly liquid and subtle round bodies which, incessantly turning much faster than, and in the same direction as, the parts of the second element surrounding them, have the force to increase the agitation of those parts to which they are closest and even (in moving from the center toward the circumference) to push the parts in all directions, just as they push one another. This takes place by an action that I must soon explain as exactly as I can. For I tell you here in advance that it is this action that we shall take to be light, as also we shall take one of those round bodies composed purely of the matter of the first element to be the sun, and the others to be the fixed stars, of the new world I am describing to you; and we shall take the matter of the second element turning about them to be the heavens.

Imagine, for example, that the points *S*, *E*, ε, and *A* are the centers of which I speak, that all the matter contained in the space *FGGF* is a heaven turning about the sun marked *S*, that all the matter of the space *HGGH* is another heaven turning about the star marked ε, and so on for the others. Thus, there are as many different heavens as there are stars, and, since the number of stars is indefinite, so too is the number of heavens. Thus also the firmament is nothing other than the breadthless surface separating all the heavens from one another.

Imagine also that the parts of the second element toward *F*, or toward *G*, are more agitated than those toward *K*, or toward *L*, so that their speed decreases little by little from the outside circumference of each heaven to a certain place (such as, for example, to the sphere *KK* about the sun, and to the sphere *LL* about the star ε) and then increases little by little from there to the centers of the heavens because of the agitation of the stars that are found there. Thus, while the parts of the second element toward *K* have the chance

to describe there a complete circle about the sun, those toward *T*, which I suppose to be ten times closer, have not only the chance to describe ten circles (as they would do if they moved only equally fast), but perhaps more than thirty.[42] Again, those parts toward *F*, or toward *G*, which I suppose to be two or three thousand times more distant, can perhaps describe more than sixty circles. Whence you will be able to understand immediately that the highest planets must move more slowly than the lowest (i.e. those closest to the sun), and that all the planets together move more slowly than the comets, which are nonetheless more distant.



As for the size of each of the parts of the second element, one can imagine that it is equal among all those between the outside circumference

FGGF of the heaven and the circle *KK*, or even that the highest among them are a bit smaller than the lowest (provided that one does not suppose the difference of their sizes to be proportionately greater than that of their speeds). By contrast, however, one must imagine that, from circle *K* to the sun, it is the lowest parts that are the smallest, and even that the difference of their sizes is proportionately greater than (or at least proportionately as great as) that of their speeds. Otherwise, since those lowest parts are the strongest (due to their agitation), they would go out to occupy the place of the highest.

Note finally that, given the manner in which I have said the sun and the other fixed stars were formed, their bodies can be so small with respect to the heavens containing them that even all the circles *KK*, *LL*, etc., which mark the point to which the agitation of those bodies advances the course of the matter of the second element, can be considered merely as the points that mark the heavens' center. In the same way, the new astronomers consider the whole sphere of Saturn as but a point in comparison with the firmament.

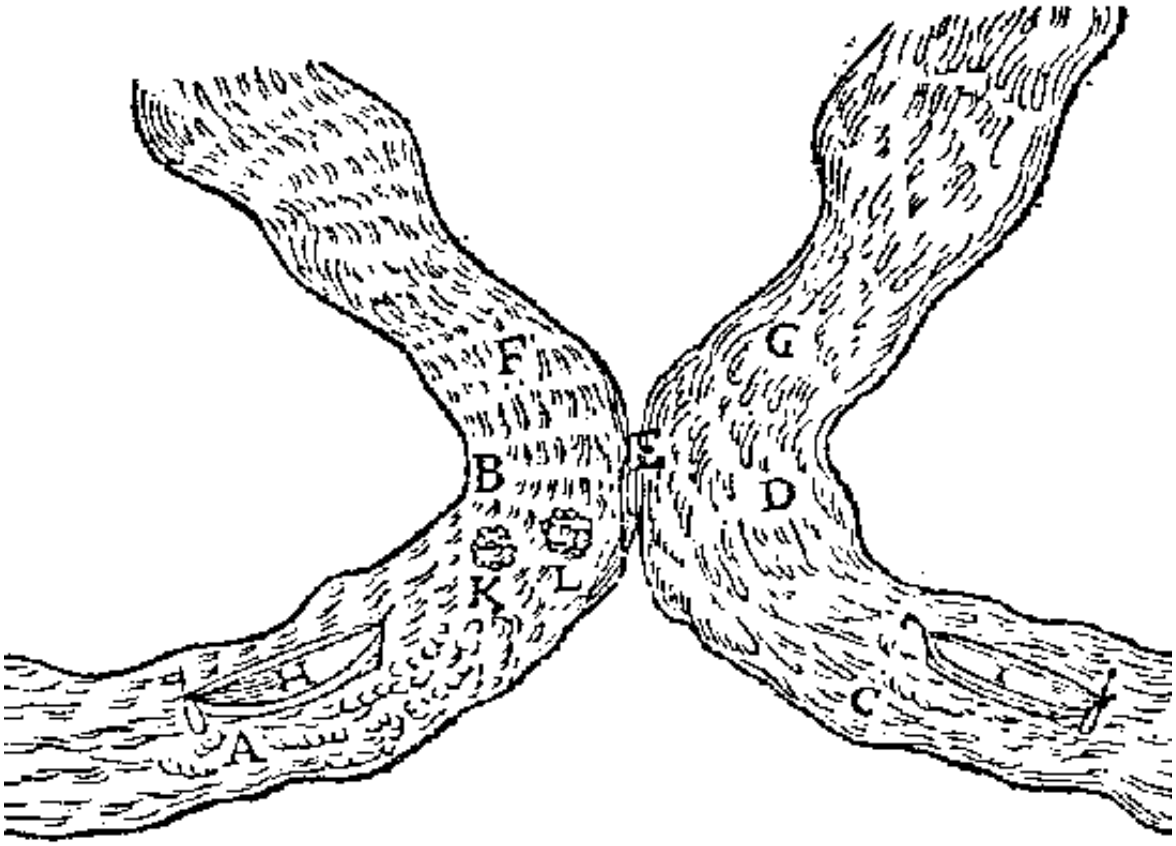
CHAPTER NINE On the Origin and the Course of the Planets and Comets in General; and of Comets in Particular

Now, for me to begin to tell you about the planets and comets, consider that, given the diversity of the parts of the matter I have supposed, even though most of them in breaking and dividing by collision with one another have taken the form of the first or second element, there nevertheless does not cease still to be found among them two sorts that had to retain the form of the third element, to wit, those of which the shapes were so extended and so impeding that, when they collided with one another, it was easier for several to join together, and by this means to become larger than to break up and become smaller; and those which, having been from the beginning the largest and most massive of all, could well break and shatter the others in striking them but not in turn be broken or shattered themselves.

Now, whether you imagine that these two sorts of parts were at first very agitated or very little agitated, or not at all, it is certain that afterward they had to move with the same agitation as the matter of the heaven that contained them. For, if at first they were moving more quickly than that matter, then, not having been able to avoid pushing it upon colliding with it in their path, in a short time they had to transfer to it a part of their agitation. And if, on the contrary, they had in themselves no inclination to move, nevertheless, being surrounded on all sides by that matter of the heaven, they necessarily had to follow its course, just as we see all the time that boats and diverse other bodies floating on water (both the largest and most massive and those that are less so) follow the course of the water they are in when there is nothing else to impede them from doing so.[43]

And note that, among the diverse bodies that thus float on water, those that are rather solid and rather massive (as boats ordinarily are, principally the largest and most heavily laden boats) always have much more force than the water to continue their motion, even though it is from the water alone that they have received their motion. By contrast, those floating bodies that are very light, like those lumps of white scum that one sees floating along the shores during storms, have less force to continue moving. Thus, if you imagine two rivers that join with one another at some point and then separate again shortly thereafter before their waters (which one must

suppose to be very calm and to have a rather equal force, but also to be very rapid) have a chance to mix, then boats or other rather massive and heavy bodies that are borne by the course of the one river will be easily able to pass into the other river, while the lightest bodies will turn away from it and will be thrown back by the force of the water toward the places where it is the least rapid.



For example, if *ABF* and *CDG* are two rivers which, coming from two different directions, meet at E and then turn away from there, *AB* going toward *F* and *CD* toward *G*, it is certain that boat *H* following the course of river *AB* must pass through *E* toward *G*, and reciprocally boat I toward *F*, unless both meet at the passage at the same time, in which case the larger and stronger will break the other. By contrast, scum, leaves of trees, feathers, straw, and other such light bodies that can be floating at *A* must be pushed by the course of the water containing them, not toward *E* and toward *G*, but toward *B*, where one must imagine that the water is less strong and

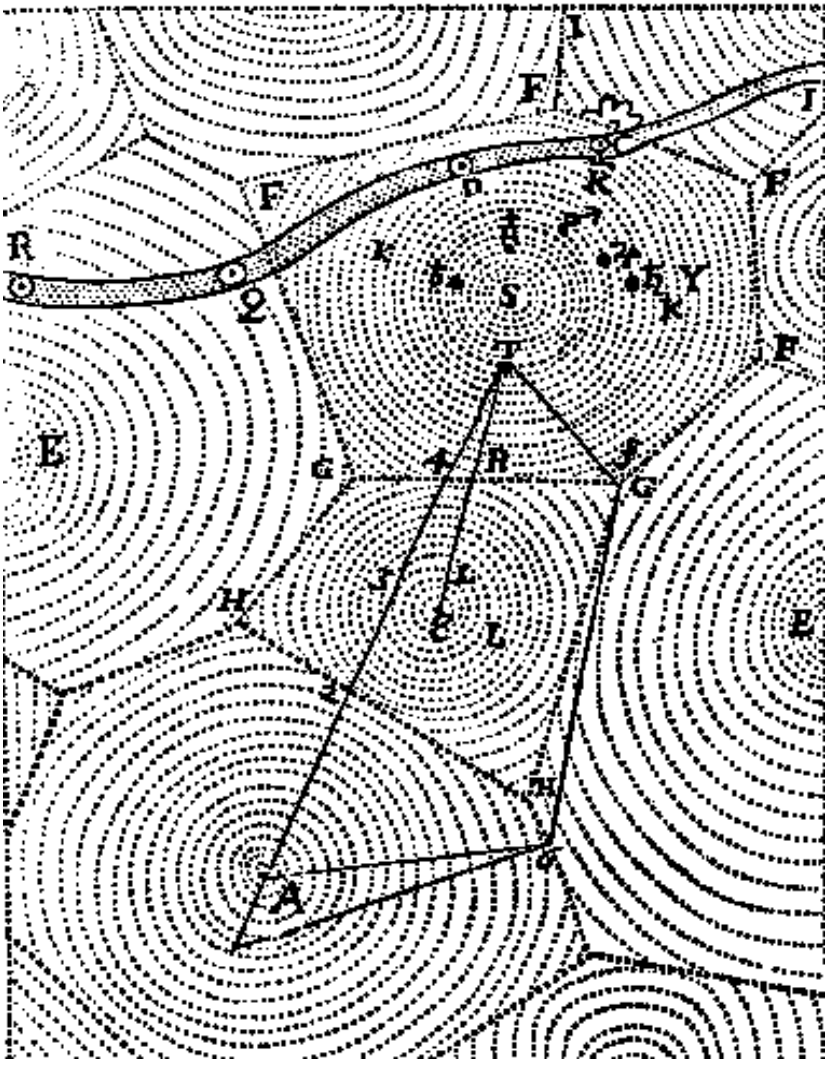
less rapid than at *E*, since at *B* it takes its course along a line that less approaches a straight line.

Moreover, one must consider that not only these light bodies, but also others heavier and more massive can join upon meeting and that, turning then with the water that bears them, several together can compose large balls such as you see at *K* and *L*, of which some, such as *L* go toward *E* and others, such as *K*, go toward *B*, according as each is more or less solid and composed of more or less large and massive parts.

By this example, it is easy to understand that, wherever the parts of matter that could not take the form of the second or of the first element may have been at the beginning, all the larger and more massive among them shortly had to take their course toward the outside circumference of the heavens that contained them and thereafter pass continually from one of these heavens into another without ever stopping for a very long period of time in the same heaven. By contrast, all the less massive had to be pushed, each toward the center of the heaven containing it, by the course of the matter of that heaven. And (given the shapes that I have attributed to them) upon colliding with one another, they had to join together severally and compose large balls which, turning in the heavens, have there a motion tempered by all the motions the separate parts could have if they were in fact separate. Thus, some tend to move toward the circumferences of those heavens, and others toward their centers.

Know also that we should take those that thus tend to range toward the center of any heaven to be the planets, and we should take those that pass across different heavens to be comets.

Now, concerning these comets, one must note first that there must be few of them in this new world in comparison to the number of heavens. For, even if there were many at the beginning, over the course of time in passing across different heavens almost all of them would have to have collided with one another and broken one another up (just as I have said two boats do when they meet), so that now only the largest could remain.



One must also note that, when they pass thus from one heaven into another, they always push before them some small bit of the matter of the heaven they are leaving and remain enveloped by it for some time until they have entered far enough within the limits of the other heaven. Once there, they finally loose themselves from it almost all at once and without taking perhaps more time to do so than does the sun in rising at morning on our horizon. In this way, they move much more slowly when they thus tend to leave some heaven than they do shortly after having entered it.

For example, you see here that the comet that takes its course along the line *CDQR*, having already entered rather far within the limits of the heaven *FG*, nevertheless when it is at point *C* still remains enveloped by matter from the heaven *FI*, from which it comes, and cannot be entirely freed of that matter before it is around point *D*. But, as soon as it has arrived there, it begins to follow the course of the heaven *FG* and thus to move much faster

than it did before. Then, continuing its course from there toward R, its motion must again slow down little by little in proportion as it approaches point *Q*, both because of the resistance of the heaven *FGH*, within the limits of which it is beginning to enter, and because, there being less distance between S and D than between S and Q, all the matter of the heaven between S and D (where the distance is smaller) moves faster there, just as we see that rivers always flow more swiftly in the places where their bed is narrower and more confined than in those where it is wider and more extended.[44]

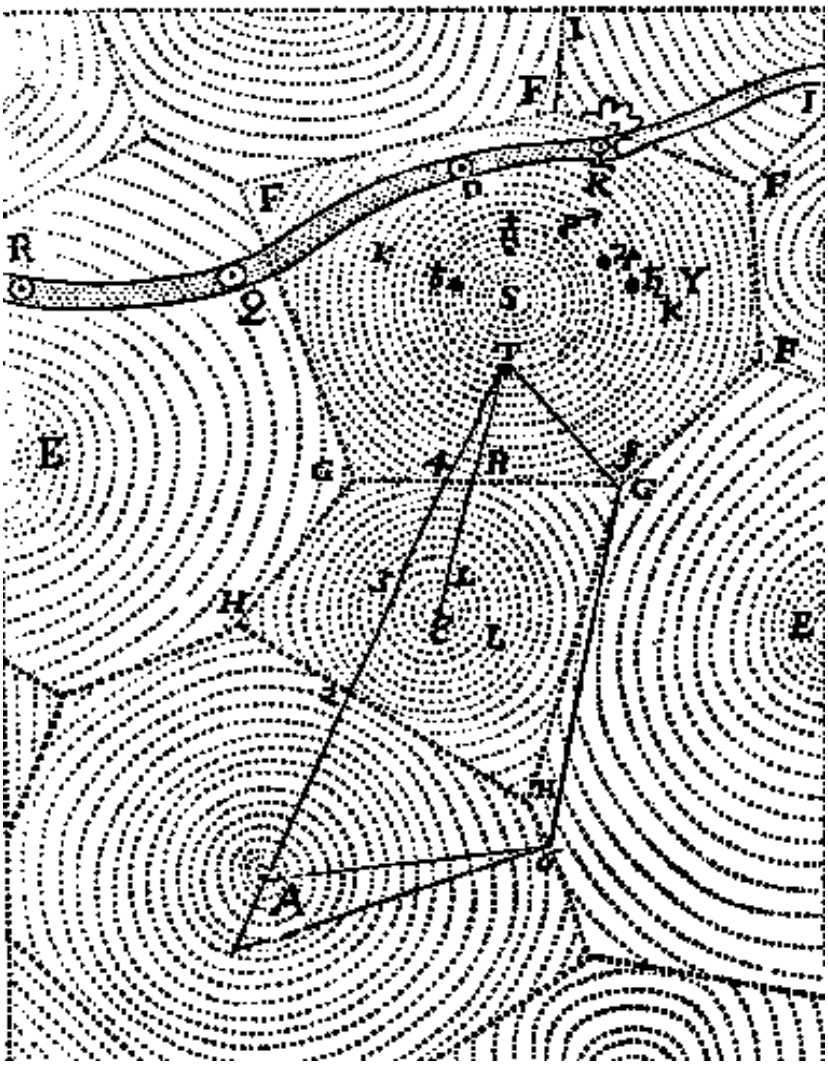
Moreover, one should note that this comet should be visible to those who live at the center of the heaven *FG* only during the time it takes to pass from *D* to *Q*, as you will soon understand more clearly when I have told you what light is. In the same way, you will see that its motion should appear to viewers to be much faster, its body much greater, and its light much brighter, at the beginning of the time they see it than at the end.

Beyond that, if you consider with some care the way in which the light that can come from the comet must spread out and be distributed in all directions in the heaven, you will also be well able to understand that, being very large (as we must suppose it to be), there can appear around it certain rays that sometimes extend in the form of a halo on all sides and sometimes gather together in the form of a tail on one side only, according to the different places from which it is viewed. m us, this comet lacks none of all the properties that have been observed up to now in those that have been seen in the real world, at least none of those properties that should be taken as true. For, if some historians, in order to construct a miracle that warns of the crescent of the Turks, tell us that in the year 1450 the moon was eclipsed by a comet which passed below it, or something similar, and if the astronomers, calculating badly the amount of refraction (which they do not know) of the heavens and the speed of motion of comets (which is uncertain), attribute to them enough parallax to be placed among the planets, or even below them (where some wish to pull them as by force), then we are not obliged to believe them.[45]

CHAPTER TEN On the Planets in General, and in Particular on the Earth and Moon

Similarly, there are several things to note concerning the planets. First, even though they all tend toward the center of the heavens containing them, that is not to say thereby that they could ever arrive at those centers. For, as I have already said above, the sun and the other fixed stars occupy them. But, in order to make you understand distinctly in what places the planets should stop, look for example at the one marked ~ [Saturn], which I suppose to follow the course of the matter of the heaven toward the circle *K*, and consider that, if this planet had the slightest bit more force to continue its motion in a straight line than do the parts of the second element surrounding it, then, instead of always following that circle *K*, it would go toward *Y*, and thus it would be more distant than it is from center *S*. Then, in as much as the parts of the second element that would surround it at *Y* move faster and even are a bit smaller (or at least are not larger) than those at *K*, they would give it still more force to pass beyond toward *F*, so that it would go out to the circumference of that heaven, without being able to stop anywhere in between. Then from there it would easily pass into another heaven and thus, instead of being a planet, would become a comet.

Whence you see that no star can stop anywhere in all that vast space between the circle *K* and the circumference of the heaven *FGGF*, through which the comets take their course. In addition, the planets of necessity cannot have more force to continue their motion in a straight line than have the parts of the second element at *K*, when those planets move with the same agitation along with these parts; and all bodies that have more are comets.



Therefore, let us now imagine that this planet ~ [Saturn] has less force than the parts of the second element surrounding it, so that those parts that follow it and that are placed a bit lower than it can divert it with the result that, instead of following circle *K*, it descends toward the planet marked ~ [Jupiter]. The planet ~ [Saturn] being there, it can happen that it is exactly as strong as the parts of the second element that will then surround it. The reason for this is that, these parts of the second element being more agitated than those at K, they will also agitate the planet more; being in addition smaller, they will not be able to resist it as much. In this case, the planet will remain perfectly balanced in the middle of them and will there take its course in the same direction as they about the sun, without being at one time or another more or less distant from the sun, except insofar as they can also be more or less distant from it.

But, if this planet~ [Saturn], being at ~ [Jupiter], still has less force to continue its motion in a straight line than has the matter of the heaven found there, it will again be pushed lower by the matter, toward the planet marked [Mars], and so on, until finally it is surrounded by a matter that has neither more nor less force than it.

Thus you see that there can be diverse planets, some more and others less distant from the sun, such as here ~[Saturn], *[Jupiter]*, *[Mars]*, *T*, [Venus], .[Mercury][46] Of these the lowest and least massive can reach to the sun's surface, but the highest never pass beyond circle *K* which, although very large in comparison with each planet in particular, is nevertheless so extremely small in comparison with the whole of heaven *FGGF* that, as I have already said above, it can be considered as its center.

But, if I still have not made you understand well enough why it can happen that the parts of the heaven beyond circle *K*, being incomparably smaller than the planets, do not cease to have more force than they to continue their motion in a straight line, consider that this force does not depend solely on the quantity of the matter that is in each body, but also on the extent of its surface. For, even though when two bodies move equally fast it is correct to say that, if one contains twice as much matter as the other, it also has twice as much agitation, that is not to say thereby that it has twice as much force to continue to move in a straight line; rather, it will have exactly twice as much if, in addition, its surface is exactly twice as extended, because it will always meet twice as many other bodies resisting it, and it will have much less force to continue if its surface is extended much more than twice.[47]

Now, you know that parts of the heaven are just about all round and thus that, of all shapes, they have the one that includes the most matter within the least surface, whereas the planets, being composed of small parts having very irregular and extended shapes, have large surfaces in proportion to the quantity of their matter. Thus, the planets can have [a greater ratio of surface to volume] than most of those parts of the heaven and nevertheless also have a smaller one than some of the smallest parts that are closest to the centers. For one must know that, among two wholly massive balls such as are those parts of the heavens, the smaller always has more surface in proportion to its quantity than has the larger.[48]

One can easily confirm all this by experience. For, if one pushes a large ball composed of many tree branches confusedly joined and piled on top of

one another (as one must imagine are the parts of matter of which the planets are composed), it is certain that, even if it be pushed by a force entirely proportional to its size, it will not be able to continue its motion as far as would another ball, very much smaller and composed of the same wood, but wholly massive. By contrast, it is also certain that one could make another ball of the same wood and wholly massive, but so extremely small that it would have much less force to continue its motion than had the first. Finally it is certain that this first ball can have more or less force to continue its motion according as the branches composing it are more or less large and compressed.

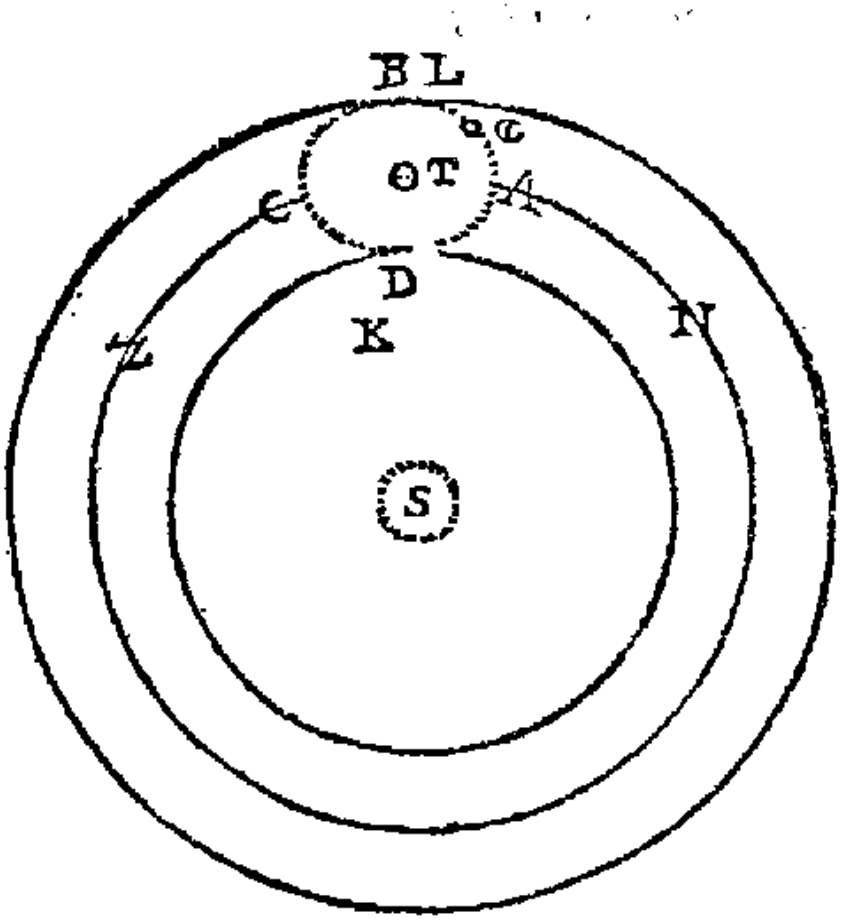
Whence you see how diverse planets can be suspended within circle *K* at diverse distances from the sun, and how it is not simply those that outwardly appear the largest, but those that are the most solid and the most massive in their interior, that should be the most distant.

Thereafter, one must note that, just as we experience that boats following the course of a river never move as fast as the water that bears them, nor indeed the larger among them as fast as the smaller, so too, even though the planets follow the course of the matter of the heaven without resistance and move with the same agitation as it, that is not to say thereby that the planets ever move entirely as fast as the matter. Indeed, the inequality of their motion must bear some relation to the inequality between the size of their mass and the smallness of the parts of the heaven that surround them. The reason for this is that, generally speaking, the larger a body is, the easier it is for it to communicate a part of its motion to other bodies, and the more difficult it is for the others to communicate to it something of their own motion. For, even though many small bodies all working together to act upon a larger one may have as much force as it, nevertheless they can never make it move as fast as they in all directions because, if they agree in some of their motions which they communicate to it, at the same time they most certainly differ in others which they cannot communicate to it.

Now, from this follow two things that seem to me very worth considering. The first is that the matter of the heaven must make the planets turn not only about the sun, but also about their own center (except when there is some particular cause that hinders them from doing so), and consequently that the matter must compose around the planets small heavens that move in the same direction as the greater heaven. The second is that, if there should meet two planets unequal in size but disposed to take

their course in the heaven at the same distance from the sun, and the planets are such that the one is exactly as much more massive as the other is larger, then the smaller of the two, having a faster motion than that of the larger, will have to link itself to the small heaven around that larger planet and turn continually about it.

For, since the parts of the heaven that are, say, at *A* move faster than the planet marked *T*, which they push toward *Z*, it is evident that they must be diverted by it and constrained to take their course toward *B*. I say toward *B* rather than toward *D*; for, having inclination to continue their motion in a straight line, they must go toward the outside of the circle *ACZN* they are describing, rather than toward the center *S*. Now, passing thus from *A* to *B*, they force the planet *T* to turn with them about its center. In turn, this planet in so turning gives them occasion to take their course from *B* to *C*, then to *D* and to *A*, and thus to form about the planet a particular heaven, with which it must thereafter continue to move from the direction one calls the “occident” toward that which one calls the “orient,” not only about the sun but also about its own center.



Moreover, knowing that the planet marked ~ [Moon] is disposed to take its course along the circle *NACZ* (just as is the planet marked *T*) and that it must move faster because it is smaller, it is easy to understand that, wherever it might have been in the heavens at the beginning, it shortly had to tend toward the exterior surface of the small heaven *ABCD*, and that, once having joined that heaven, it must thereafter always follow its course about *T* along with the parts of the second element that are at that surface.

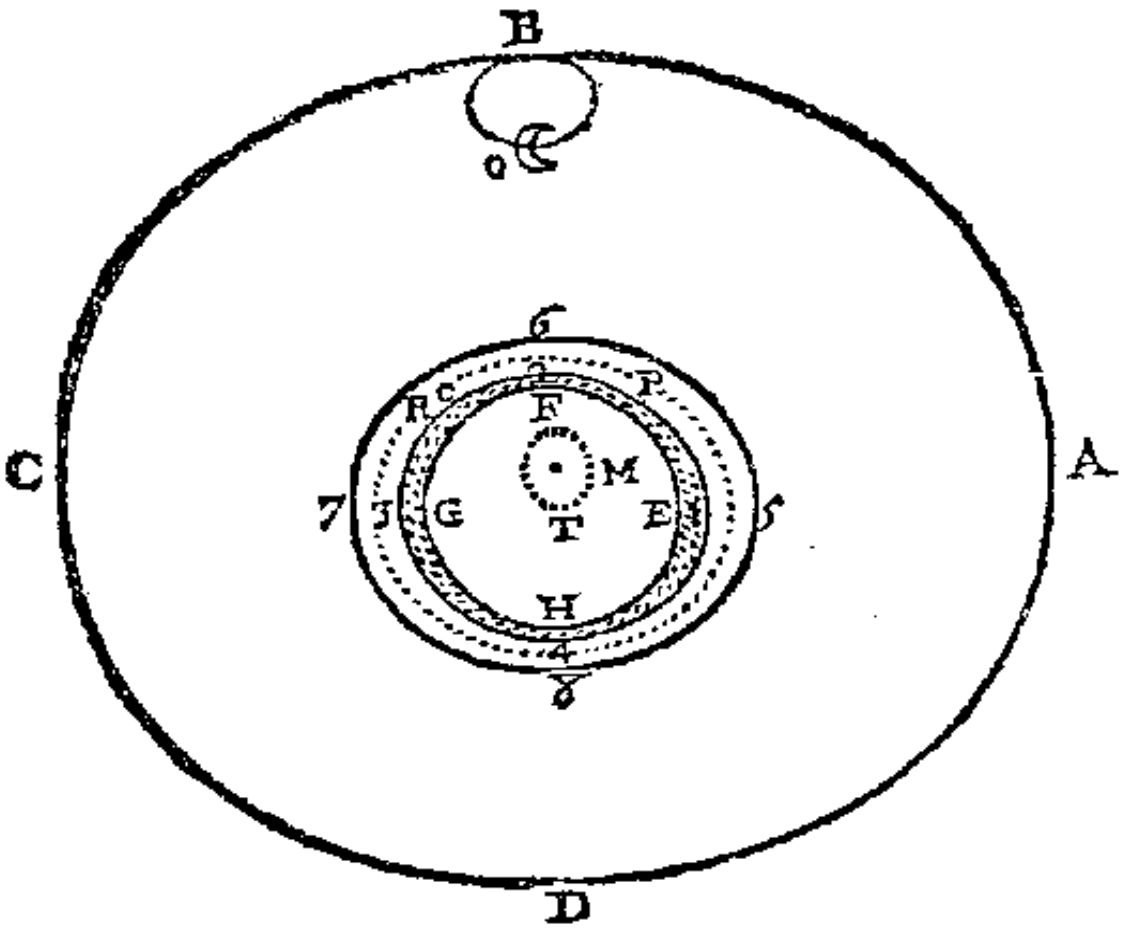
For, since we suppose that it would have exactly as much force as the matter of that heaven to turn along circle *NACZ*, if the other planet were not there, then we must imagine that it has a bit more force to turn along circle *ABCD*, because it is smaller and consequently always moves as far away as possible from the center *T*. In the same way, a stone being moved in a sling always tends to move away from the center of the circle it is describing. This planet, however, being at *A*, will not thereby act to move off toward *L*,

in as much as it would then enter a place in the heaven of which the matter had the force to push it back toward circle *NACZ*. By the same token, being at *C*, it will not act to descend toward *K*, in as much as it would there be surrounded by a matter that would give it the force to ascend again toward that same circle *NACZ*. Nor will it go from *B* toward *Z* — much less from *D* toward *N* — in as much as it could not go as easily nor as fast as it could toward *C* and toward *A*.[49] Thus, it must remain as if attached to the surface of the small heaven *ABCD* and turn continually with it about *T*. That is what impedes its forming another small heaven about it, which would make it turn again about its own center.

I shall not add here how one can find a greater number of planets joined together and taking their course about one another, such as those that the new astronomers have observed about Jupiter and Saturn.[50] For I have not undertaken to say everything, and I have spoken in particular about the two planets discussed above only in order to represent to you (by the planet marked *T*) the earth we inhabit and (by that marked ¢ [Moon]) the moon that turns about it.

CHAPTER ELEVEN On Weight

Now, however, I would like you to consider what the weight of this earth is; that is to say, what the force is that unites all its parts and that makes them all tend toward its center, each more or less according as it is more or less large and solid. That force is nothing other than, and consists in nothing other than, the fact that, since the parts of the small heaven surrounding it turn much faster than its parts about its center, they also tend to move away with more force from its center and consequently to push the parts of the earth back toward its center. You may find some difficulty in this, in light of my just saying that the most massive and most solid bodies — such as I have supposed those of the comets to be — tend to move outward toward the circumferences of the heavens and that only those that are less massive and solid are pushed back toward their centers. For it should follow therefrom that only the less solid parts of the earth could be pushed back toward its center and that the others should move away from it. But note that, when I said that the most solid and most massive bodies tended to move away from the center of any heaven, I supposed that they were already previously moving with the same agitation as the matter of that heaven. For it is certain that, if they have not yet begun to move, or if they are moving less fast than is required to follow the course of this matter, they must at first be pushed by it toward the center about which it is turning. Indeed, it is certain that, to the extent that they are larger and more solid, they will be pushed with more force and speed. Nevertheless, if they are solid and massive enough to compose comets, this does not hinder them from tending to move shortly thereafter toward the exterior circumferences of the heavens, in as much as the agitation they have acquired in descending toward any one of the heavens' centers will most certainly give them the force to pass beyond and to ascend again toward its circumference.



But, in order to understand this more clearly, consider the earth *EFGH* with water *1234* and air *5678*, which (as I shall tell you below) are composed simply of some of the less solid of the earth's parts and constitute a single mass with it. Then consider also the matter of the heaven, which fills not only all the space between the circles *ABCD* and *5678* but also all the small intervals below it among the parts of the air, the water, and the earth. And imagine that, as that heaven and this earth turn together about center *T*, all their parts tend to move away from it, but those of the heaven much more quickly than those of the earth, because the former are much more agitated. Or, indeed, imagine that, among the parts of the earth, those more agitated in the same direction as those of the heaven tend more to move away from the center than do the others. Thus, if the whole space beyond circle *ABCD* were void, i.e., were filled only with a matter that could not resist the actions of other bodies nor produce any considerable effect (for it is thus that we must construe the name "void"), then all the

parts of the heaven in the circle *ABCD* would be the first to leave it; then those of the air and of the water would follow them, and finally also those of the earth, each that much sooner as it were less attached to the rest of its mass.[51] In the same way, a stone leaves a sling in which it is being moved as soon as one releases the cord, and the dust one throws on a top while it is turning immediately flies off from it in all directions.

Then consider that since there is no such space beyond circle *ABCD* that is void and where the parts of the heaven contained within that circle can go, unless at the same instant others completely like them enter in their place, the parts of the earth also cannot move away any farther than they do from center *T*, unless there descend in their place just as many parts of the heaven or other terrestrial parts as are needed to fill it. Nor, in turn, can they move closer to the center unless just as many others rise in their stead. Thus they are all opposed to one another, each to those that must enter in its place in the case that it should rise, and similarly to those that must enter therein in the case that it should descend, just as the two sides of a balance are opposed to one another. That is to say, just as one side of a balance can be raised or lowered only if the other side does exactly the contrary at the same instant and just as the heavier always raises the lighter, so too the stone *R*, for example, is so opposed to the quantity (exactly equal in size) of air above it, whose place it should occupy in the case that it were to move farther away from center *T*, that that air would necessarily have to descend to the extent that the stone rose. And, in the same way, it is also so opposed to another, like quantity of air below it, whose place it should occupy in the case that it were to move closer to that center, that the stone must descend when this air rises.

Now, it is evident that, since this stone contains in it much more of the matter of the earth than a quantity of air of equal extent — and in recompense contains that much less of the matter of the heaven — and since also its terrestrial parts are less agitated by the matter of the heaven than those of that air, the stone should not have the force to rise above that quantity of air, but on the contrary the quantity of air should have the force to make the stone fall downward. Thus, that quantity of air is light when compared with the stone but is heavy when instead it is compared with the wholly pure matter of the heaven. And so you see that each part of terrestrial bodies is pressed toward *T*, not indifferently by the whole matter surrounding it, but only by a quantity of this matter exactly equal to the size

of the part; that quantity, being underneath the part, can take its place in the case that the part falls. That is the reason why, among the parts of any single body designated “homogeneous” (such as among those of air or water), the lowest are not notably more pressed than the highest, and why a man down below in very deep water does not feel it weigh on his back any more than if he were swimming right on top.[52]

But it may seem to you that the matter of the heaven, in thus causing the stone *R* to fall toward *T* and below the air surrounding it, should also cause it to go toward *6* or toward *7* (i.e. toward the occident or toward the orient) faster than this air, so that the stone does not fall in a straight, plumb line as heavy bodies do on the real earth. If so, consider first that all the terrestrial parts contained in the circle *5678*, in being pressed toward *T* by the matter of the heaven in the way I have just explained, and having in addition very irregular and diverse shapes, must join together and approach one another and thus compose only one mass, which is borne as a whole by the course of the heaven *ABCD*. Thus, while the mass turns, those of its parts that are, say, at *6* always remain opposite those that are at *2* and at *F*, without notably moving aside one way or the other except insofar as winds or other particular causes constrain them to do so.

Note moreover that the little heaven *ABCD* turns much faster than the earth, but that those of its parts that are caught in the pores of terrestrial bodies cannot turn notably faster than those bodies about the center *T*, even though those parts move much faster in diverse other directions, according to the disposition of these pores.

Then you should know that, even though the matter of the heaven makes the stone *R* move closer to that center (because the matter tends to move away from it with more force than the stone), the matter nevertheless cannot force the stone to back up toward the occident, even though the matter also tends with more force than the stone to go toward the orient. To see this, consider that this matter of the heaven tends to move away from the center *T* because it tends to continue its motion in a straight line; but it tends to move from the occident toward the orient only because it tends to continue its motion at the same speed and because it is moreover indifferent toward being at *6* or at *7*.

Now it is evident that the matter moves a bit more in a straight line while causing the stone *R* to fall toward *T* than it does in leaving the stone at *R*; but it could not move as fast toward the orient if it caused the stone to move

back toward the occident as it could if it left the stone in its place or even if it pushed the stone before it.

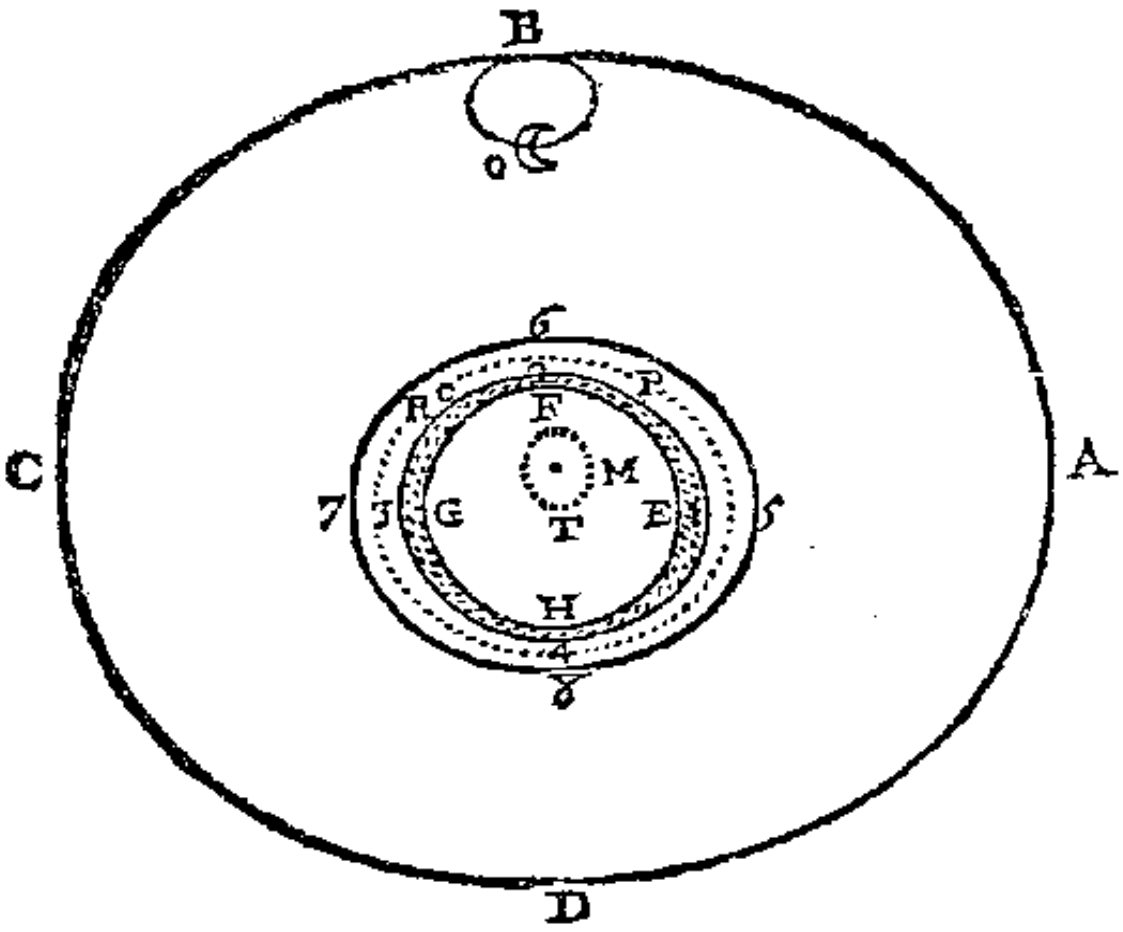
You should also know, however, that, even though this matter of the heaven has more force to cause this stone *R* to descend toward *T* than to cause the air surrounding the stone to descend there, it should nevertheless not have more force to push the stone before it from the occident toward the orient, nor consequently to cause the stone to move faster in that direction than the air. To see this, consider that there is exactly as much of this matter of the heaven acting on the stone to cause it to fall toward *T* (and using its full force to that end) as there is matter of the earth in the composition of the stone's body and that, in as much as there is much more matter of the earth in the stone than in a quantity of air of equal extent, the stone must be pressed much more strongly toward T than is that air. By contrast, to cause the stone to turn toward the orient, all the matter of the heaven contained in circle R acts on it and conjointly on all the terrestrial parts of the air that is contained in that same circle. Thus, there being no more acting on the stone than on this air, the stone should not turn faster than the air in that direction.

You can understand from this that the arguments that many philosophers use to refute the motion of the real earth have no force against the motion of the earth I am describing to you. For example, when they say that, if the earth moved, heavy bodies could not descend in a plumb line toward its center, but rather would have to depart from it every which way toward the heaven; and that cannons pointed toward the occident should carry much farther than if pointed toward the orient; and that one should always feel great winds in the air and hear great noises: these and like things do not take place except in the case that one supposes that the earth is not carried by the course of the heaven surrounding it, but that it is moved by some other force and in some other direction than that heaven.[53]

CHAPTER TWELVE On the Ebb and Flow of the Sea

Now, after having thus explained the weight of the parts of this earth, which is caused by the action of the matter of the heaven in their pores, I must now speak to you about a certain motion of its whole mass, which is caused by the presence of the moon, and also about some particular things that depend on that motion.

To that end, consider the moon at, say, *B* (where you can suppose it to be immobile in comparison with the speed at which the matter of the heaven below it moves), and consider that this matter of the heaven, having less space to pass through between *O* and *6* than between *B* and *6* (if the moon does not occupy the space between *O* and *B*), and consequently having to move a bit faster there, cannot fail to have the force to push the whole earth a little bit toward *D*, so that its center *T* moves away (as you can see) a little bit from the point *M*, which is the center of the small heaven *ABCD*. For nothing but the course alone of the matter of that heaven maintains the earth in the place where it is. And, because the air *5678* and the water *1234* surrounding this earth are liquid bodies, it is evident that the same force that presses the earth in this way must also make them sink toward *T*, not only from the side *6,2* but also from its opposite *8,4*, and in recompense cause them to rise in the places *5,1* and *7,3*. Thus, the surface *EFGH* of the earth remaining round (because it is hard), that of the water *1234* and that of the air *5678* (which are liquids) must form an oval.



Then consider that, since the earth is meanwhile turning about its center and by this means making the days that one divides up into 24 hours (like ours), the side *F*, which is now directly opposite the moon and on which the water is for that reason less high, must in six hours be directly opposite the heaven marked *C*, in which position this water will be higher; in twelve hours it should be directly opposite the place of the heaven marked *D*, where again the water will be lower. Thus the sea, which is represented by this water *1234*, should have its ebb and flow about this earth once every six hours, just as it has about the earth we inhabit.

Consider also that, while this earth turns from *E* through *F* to *G* (i.e. from the occident through the meridian toward the orient), the flood of the water and the air that remains at *1* and *5* and at *3* and *7* passes from its oriental side toward the occidental, there causing a flow without ebb very much like that which, according to the report of our pilots, makes

navigation on our seas much easier going from the orient to the occident than from the occident to the orient.

In order to forget nothing at this point, let us add that the moon each month makes the same circuit as the earth does each day, and thus that it cause to advance little by little toward the orient the points *1*, *2*, *3*, *4* that mark high and low water. Hence, these waters do not change precisely every six hours, but rather lag behind by approximately the fifth part of an hour each time, as do those of our seas also.

Consider in addition that the small heaven *ABCD* is not exactly round, but that it extends a bit more freely at *A* and at *C* and there moves proportionately more slowly than at *B* and at *D*, where it cannot so easily break the course of the matter of the other heaven containing it. Thus the moon, which always remains as if attached to its exterior surface, must move a bit faster and remove itself less from its path, and consequently be the reason why the ebb and flow of the sea are much greater when the moon is at *B* (where it is full) and at *D* (where it is new) than when it is at *A* or at *C* (where it is only half full). These are peculiarities also wholly like those that the astronomers observe in the real moon, although they perhaps cannot explain them as easily by the hypotheses they use.

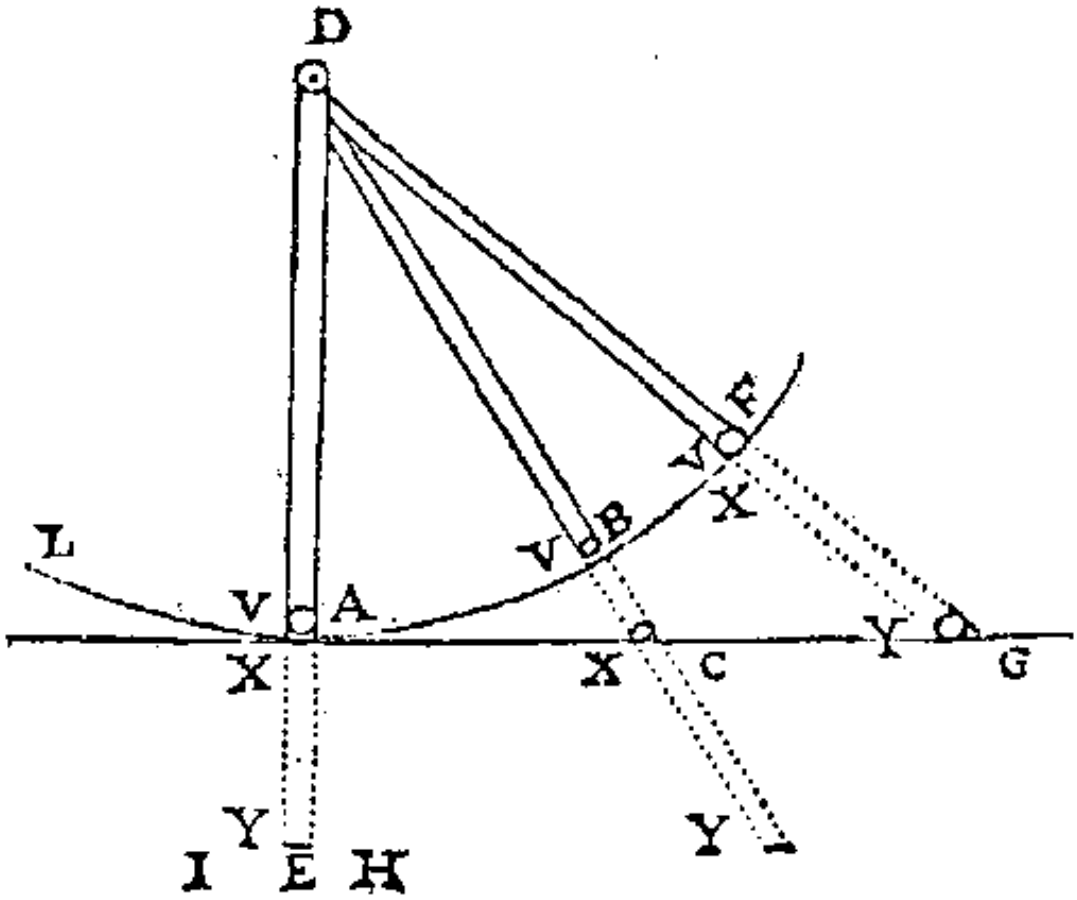
As for the other effects of this moon, which are different when it is full from when it is new, they manifestly depend on its light. And as for the other special properties of the ebb and flow of the sea, they depend in part on the diverse situation of the seacoasts and in part on the winds prevailing at the time and at the place they are observed. Finally, as for the other general motions, both of the earth and moon and of the other stars and heavens, either you can understand them well enough from what I have said, or they do not serve my purpose here; not falling under the same heading as those of which I have spoken, they would take me too long to describe. Thus, there remains for me here only to explain this action of the heavens and the stars that I have just said should be taken to be their light.

CHAPTER THIRTEEN On Light

I have already said several times that bodies that revolve always tend to move away from the centers of the circles they describe. Here, however, I must determine more specifically in what directions the parts of the matter of which the heavens and the stars are composed do tend.[54]

To that end, one must know that, when I say that a body tends in some direction, I do not thereby want anyone to imagine that there is in the body a thought or a desire carrying it there, but only that it is disposed to move there, whether it truly moves or, rather, some other body prevents it from doing so. It is principally in this last sense that I use the word “tend,” because it seems to signify some effort and because every effort presupposes some resistance. Now, in as much as there are often diverse causes that, acting together on the same body, impede one another’s effect, one can, according to various points of view, say that the same body tends in different directions at the same time. Thus it has just been said that the parts of the earth tend to move away from its center insofar as they are considered all alone, and that they tend on the contrary to move closer to it insofar as one considers the force of the parts of the heaven pushing them there, and again that they tend to move away from it if one considers them as opposed to other terrestrial parts that compose bodies more massive than they.

Thus, for example, the stone turning in a sling along circle *AB* tends toward *C* when it is at point *A*, if one considers nothing other than its agitation all alone; and it tends circularly from *A* to *B*, if one considers its motion as regulated and determined by the length of the cord retaining it; and finally the same stone tends toward *E* if, without considering the part of its agitation of which the effect is not impeded, one opposes the other part of it to the resistance that this sling continually makes to it.



But, to understand this last point distinctly, imagine the inclination this stone has to move from *A* toward *C* as if it were composed of two other inclinations, of which one were to turn along the circle *AB* and the other to rise straight up along the line *VXY*; and imagine the inclinations were in such a proportion that, if the stone were at the place of the sling marked *V* when the sling was at the place of the circle marked *A*, it should thereafter be at the place marked *X* when the sling is at *B*, and at the place marked *Y* when the sling is at *F*, and thus should always remain in the straight line *ACG*. Then, knowing that one of the parts of its inclination (to wit, that which carries it along the circle *AB*) is in no way impeded by the sling, you will easily see that the stone meets resistance only for the other part (to wit, for that which would cause it to move along the line *DVXY* if it were not impeded). Consequently, it tends (that is, it makes an effort) only to move directly away from the center *D*. And note that, from this point of view,

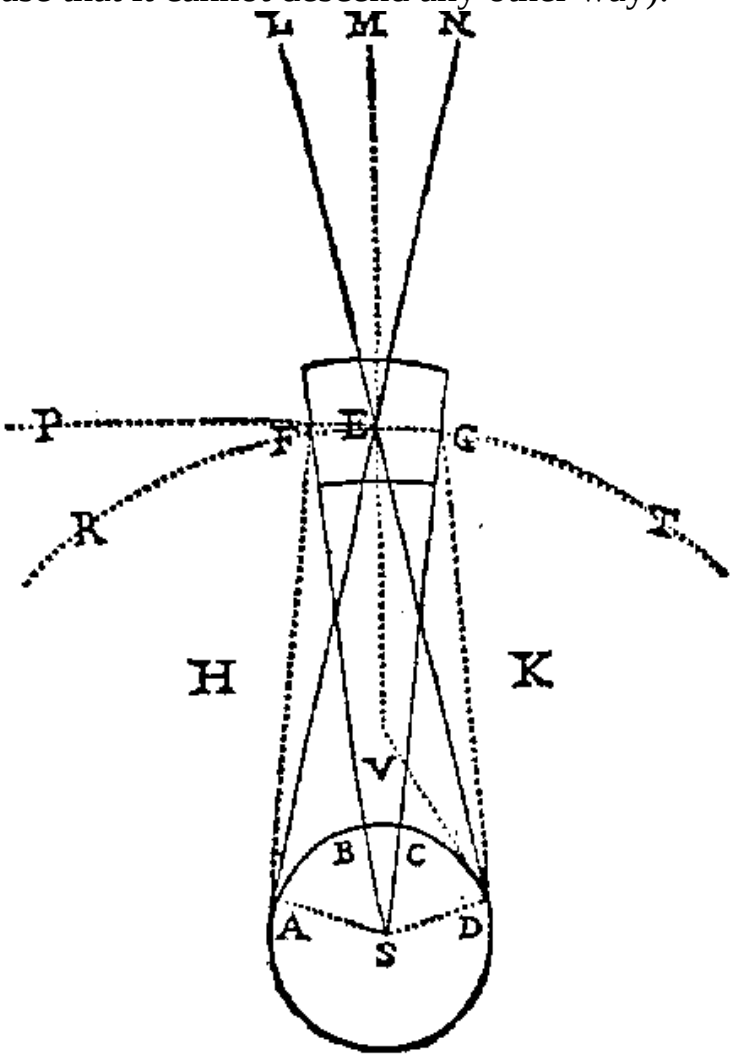
when the stone is at point *A*, it tends so truly toward *E* that it is not at all more disposed to move toward *H* than toward *I*, although one could easily persuade oneself of the contrary if one failed to consider the difference between the motion it already has and the inclination to move that remains with it.

Now, you should think of each of the parts of the second element that compose the heavens in the same way that you think of this stone, to wit, that those which are, say, at *E* tend of their own inclination only toward *P*, but that the resistance of the other parts of the heaven which are above them cause them to tend (i.e. dispose them to move) along the circle *ER*. In turn, this resistance, opposed to the inclination they have to continue their motion in a straight line, causes them to tend (i.e. is the reason why they make an effort to move) toward *M*. And thus, judging all the others in the same way, you see in what sense one can say that they tend toward the places that are directly opposite the center of the heaven they compose.

But there is still more to consider in the parts of the heaven than in a stone turning in a sling: the parts are continually pushed, both by all those like them between them and the star that occupies the center of their heaven and by the matter of that star; and they are not pushed at all by the others. For example, those at *E* are not pushed by those at *M*, or at *T*, or at *R*, or at *K* or at *H*, but only by all those that are between the two lines *AF* and *DG* together with the matter of the sun. That is why they tend, not only toward *M*, but also toward *L* and toward *N*, and generally toward all the points which the rays or straight lines, coming from some part of the sun and passing through the place where the parts are, can reach.[55]

But, in order that the explanation of all this be easier, I want you to consider the parts of the second element all alone, as if all the spaces occupied by the matter of the first element, both [the space] where the sun is and the other [spaces], were void. Indeed, because there is no better means of knowing if a body is being pushed by some others than to see if these others actually advance toward the place where it is in order to fill the place in the case that it is void,[56] I also want you to imagine that the parts of the second element at *E* are removed from it and, having posited that, to note in the first place that none of those above the circle *TER*, say at *M*, is disposed to fill their place, in as much as each tends on the contrary to move away from it. Then note in the second place also that those in that circle, to

wit, at *T* are no more disposed to do so; for, even though they really move from *T* toward *G* along the course of the whole heaven, nevertheless, because those at *F* also move with the same speed toward *R*, the space *E* (which one must imagine to be mobile like them) will not fail to remain void between *G* and *F*, provided others do not come from elsewhere to fill it. In the third place, those that are below that circle but that are not contained between the lines *AF* and *DG* (such as those at *H* and at *K*) also do not tend in any way to advance toward that space *E* to fill it, even though the inclination they have to move away from point *S* disposes them in some way to do so (as the weight of a stone disposes it, not only to descend along a straight line in the free air, but also to roll sideways on the slope of a mountain in the case that it cannot descend any other way).



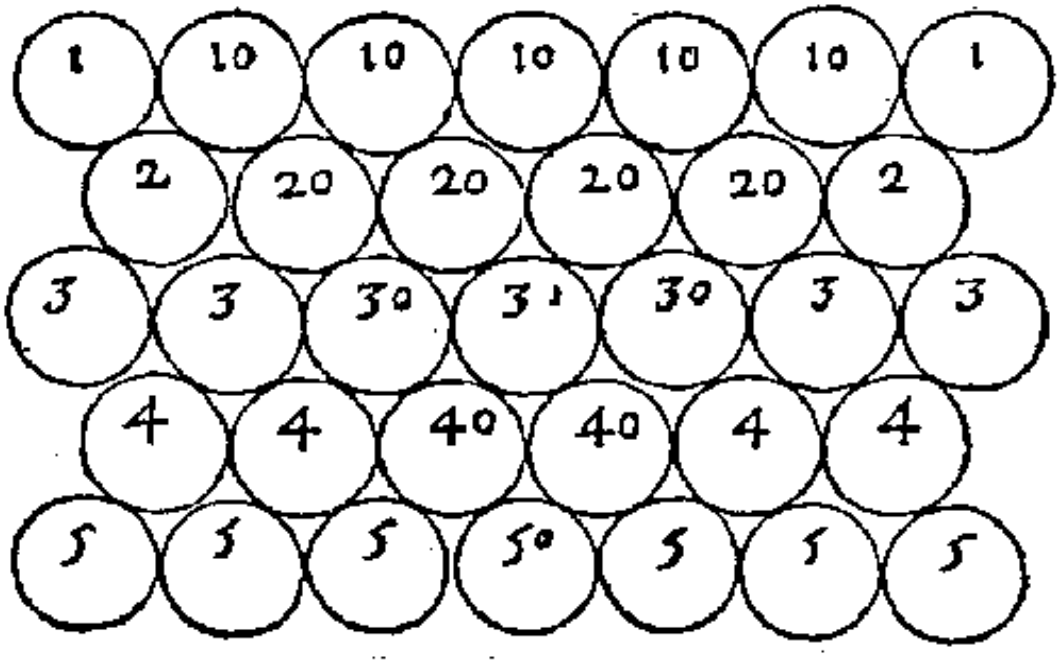
Now the reason that impedes them from tending toward that space is that all motions continue, so far as is possible, in a straight line, and

consequently, when nature has many ways of arriving at the same effect, she most certainly always follows the shortest.[57] For, if the parts of the second element which are, say, at *K* advanced toward *E*, all those closer to the sun than they would also advance at the same instant toward the place they were leaving; hence, the effect of their motion would be only that space *E* would be filled and there would be another of equal size in the circumference *ABCD* that would become void at the same time. But it is manifest that same effect can follow much better if those parts that are between the lines *AF* and *DG* advance straightaway toward *E*; and consequently, when there is nothing to impede the latter from doing so, the others do not tend at all toward *E*, no more than a stone ever tends to fall obliquely toward the center of the earth when it can fall in a straight line.

Finally, consider that all the parts of the second element that are between the lines *AF* and *DG* must advance together toward that space *E* in order to fill it at the same instant it is void. For, even though it is only the inclination they have to move away from point *S* that carries them toward *E*, and this inclination causes those between the lines *BF* and *CG* to tend more directly toward *E* than those that remain between the lines *AF* and *BF* and *DG* and *CG*, you will nevertheless see that these latter parts do not fail to be as disposed as the others to go there, if you take note of the effect that should follow from their motion. That effect is none other than, as I have just now said, that space *E* is filled and that there is another of equal size in the circumference *ABCD* that becomes void at the same time. For, as regards the change of position they undergo in the other places that they were previously filling and that still remain full of them afterwards, it is not at all considerable, in as much as they must be supposed to be so equal and so completely like one another that it does not matter by which parts each of these places is filled. Note, nevertheless, that one should not conclude from this that they are all equal, but merely that the motions of which their inequality can be the cause are not pertinent to the action of which we are speaking.

Now there is no shorter way of causing one part *E* of space to be filled while another, for example at *D*, becomes void than if all the parts of matter on the straight line *DG*, or *DE*, advance together toward *E*. For, if it were only those between the lines *BF* and *CF* that were to advance first toward that space *E*, they would leave another space below them at *V*, into which

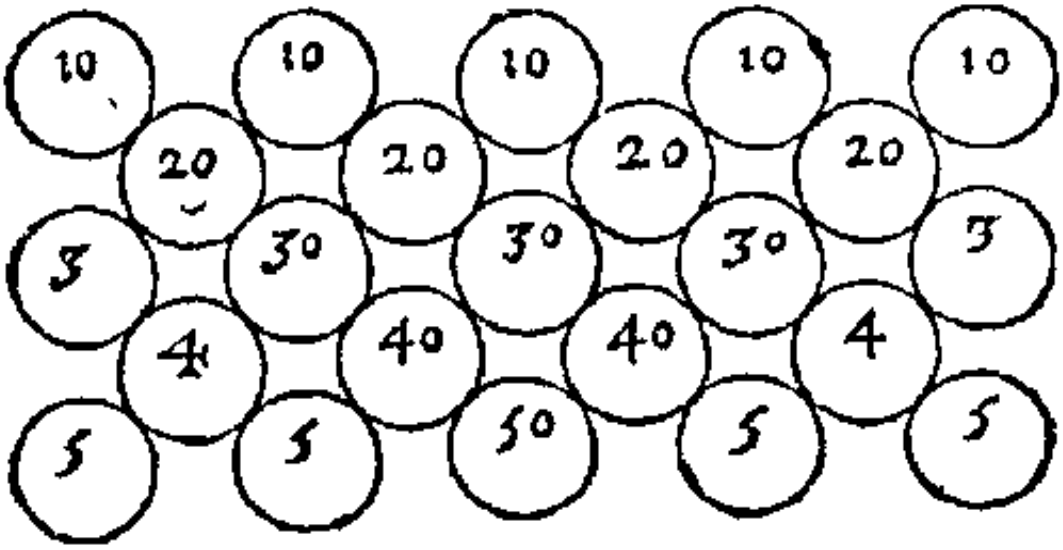
those which are at *D* had to come. Thus, the same effect that can be produced by the motion of the matter in the straight line *DG*, or *DE*, would be made by the motion of that in the curved line *DVE*:, and that is contrary to the laws of motion.

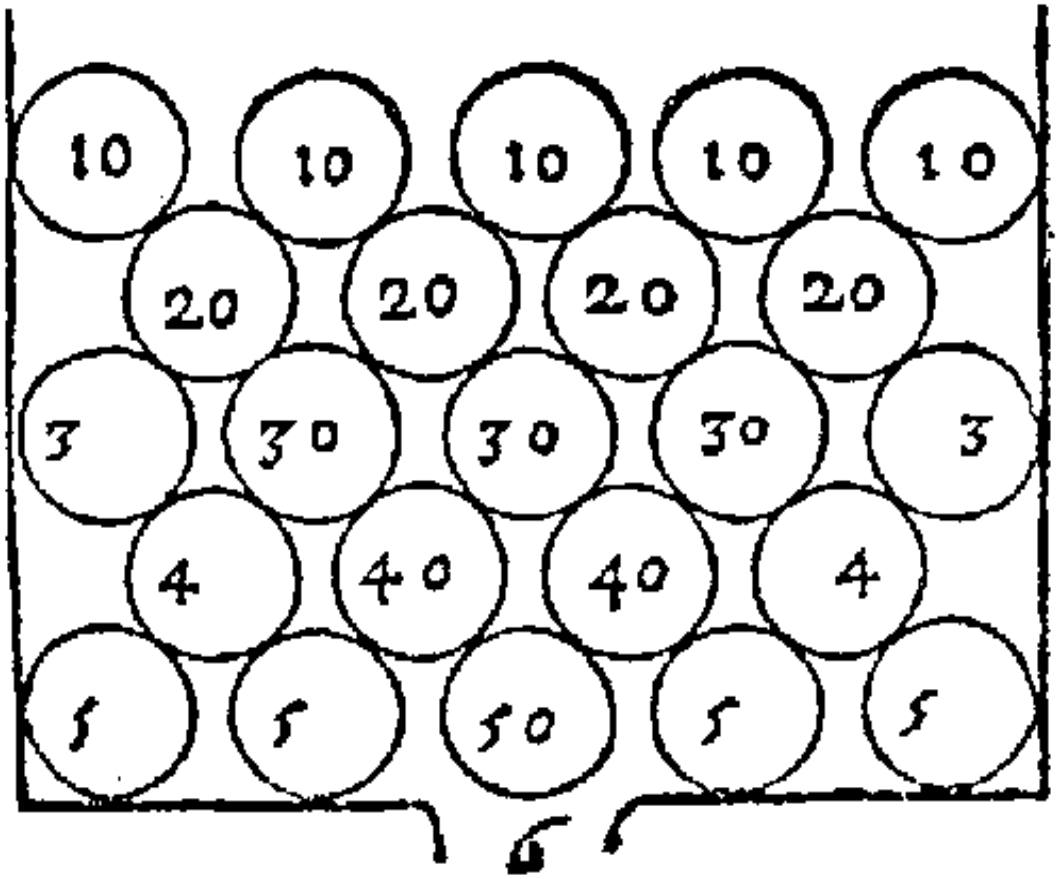


But you may find here some difficulty in understanding how the parts of the second element between the lines *AF* and *DG* can advance all together toward *E*, considering that, since the distance between *A* and *D* is greater than that between *F* and *G*, the space they must enter to advance thus is narrower than that they must leave. If so, consider that the action by which they tend to move away from the center of their heaven does not force them to touch those of their neighbors that are at the same distance as they from that center, But only to touch those that are to a degree more distant from it.[58] Thus the weight of the small balls *1*, *2*, *3*, *4*, *5* does not force those marked by the same numerals to touch one another, but only forces those marked *1* or *10* to rest on those marked *2* or *20*, and the latter to rest on those marked *3* or *30*, and so on. Thus, these small balls can well be arranged not only as you see them in Figure 7 but also as they are in Figures 8 and 9 and in myriad other diverse ways.

Then consider that those parts of the second element, moving separately from one another (as has been said above that they must do), cannot ever be

arranged like the balls in Figure 7. Nonetheless, it is only in that mode [of arrangement] that the proposed difficulty can obtain. For one could not suppose between those of its parts that are the same distance from the center of their heaven an interval so small that it would not suffice to conceive that the inclination they have to move away from that center must cause those between the lines *AF* and *DG* to advance all together toward the space *E* when it is void. Thus you see in Figure 9, compared with Figure 10, that the weight of the small balls *40*, *30*, etc. must cause them to fall all together toward the space occupied by that marked *50* as soon as the latter can leave it.





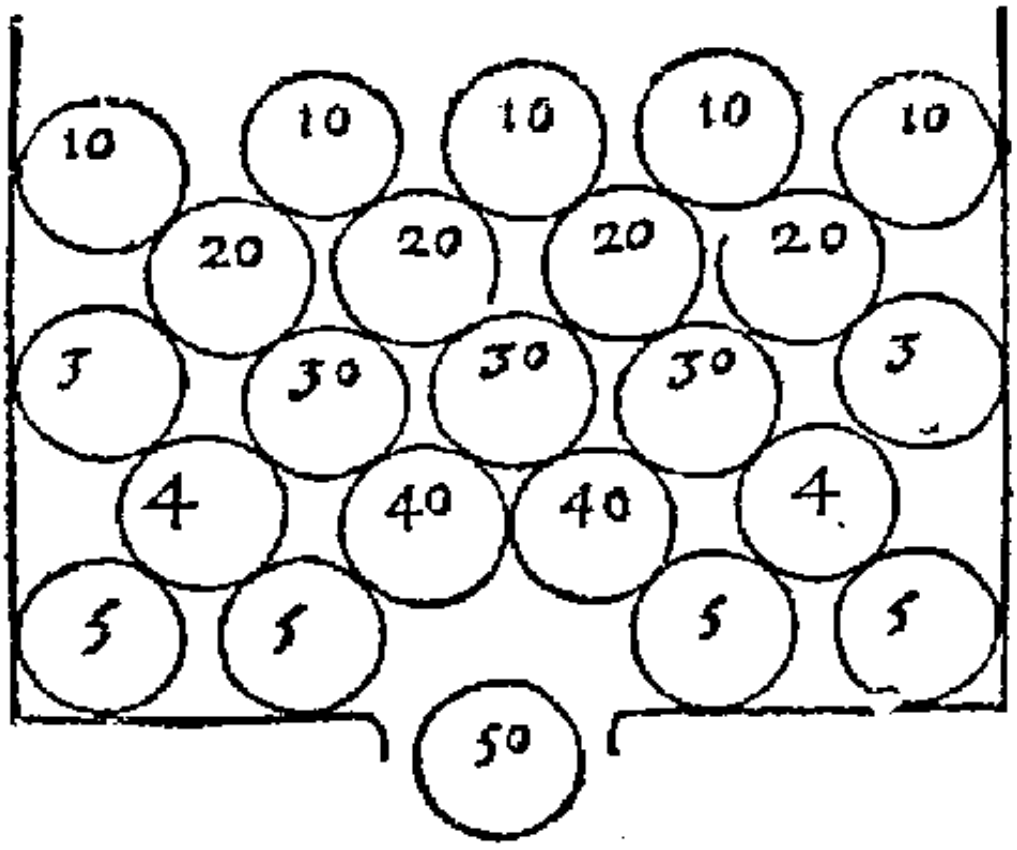
And one can clearly perceive here how those of the balls that are marked with the same numeral are arranged in a space narrower than that which they leave, that is, by moving closer to one another. One can also perceive that the two balls marked *40* must fall a bit faster, and move proportionately a bit closer to one another, than the three marked *30*, and these three must move faster and closer to one another than the four marked *20*, and so on.

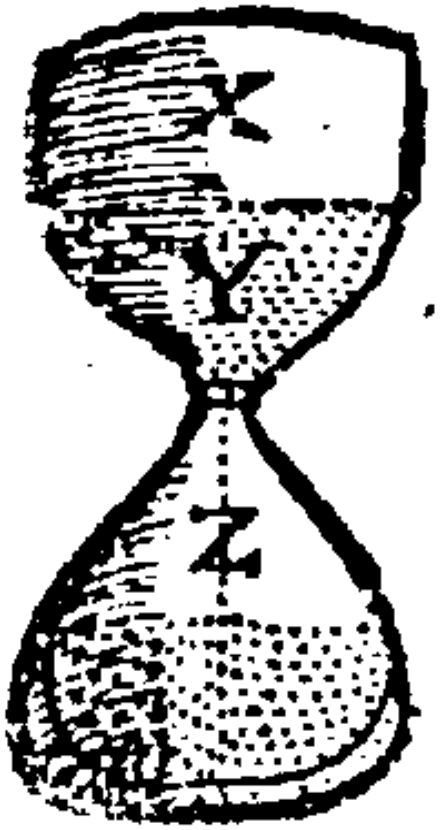
Hereupon you will perhaps say to me that, as it appears in Figure 10 that the two balls *40*, *40*, after having fallen the slightest bit, come to touch one another (which is why they stop without being able to fall lower). In the very same way, the parts of the second element that should advance toward E will stop before having succeeded in filling the whole space we have supposed there.

But I respond thereto that they cannot advance toward E the slightest bit without it being enough to prove perfectly what I have said, to wit, that

since the whole space that is there is already filled by some body (whatever it might be), the parts press continually on that body and make an effort against it as if to chase it out of its place.[59]

Then, beyond that, I reply that, since their other motions, which continue in them while they are thus advancing toward *E*, do not permit them for a moment to remain arranged in the same way, those motions impede them from touching one another, or rather cause them, upon touching, immediately to separate again and thus not to cease for that reason to advance uninterruptedly toward the space *E*, until it is completely filled. Thus one cannot conclude from this anything other than that the force with which they tend toward *E* is perhaps vibratory in nature and redoubles and relaxes in diverse small tremors according as the parts change position. This seems to be a property quite suited to light.





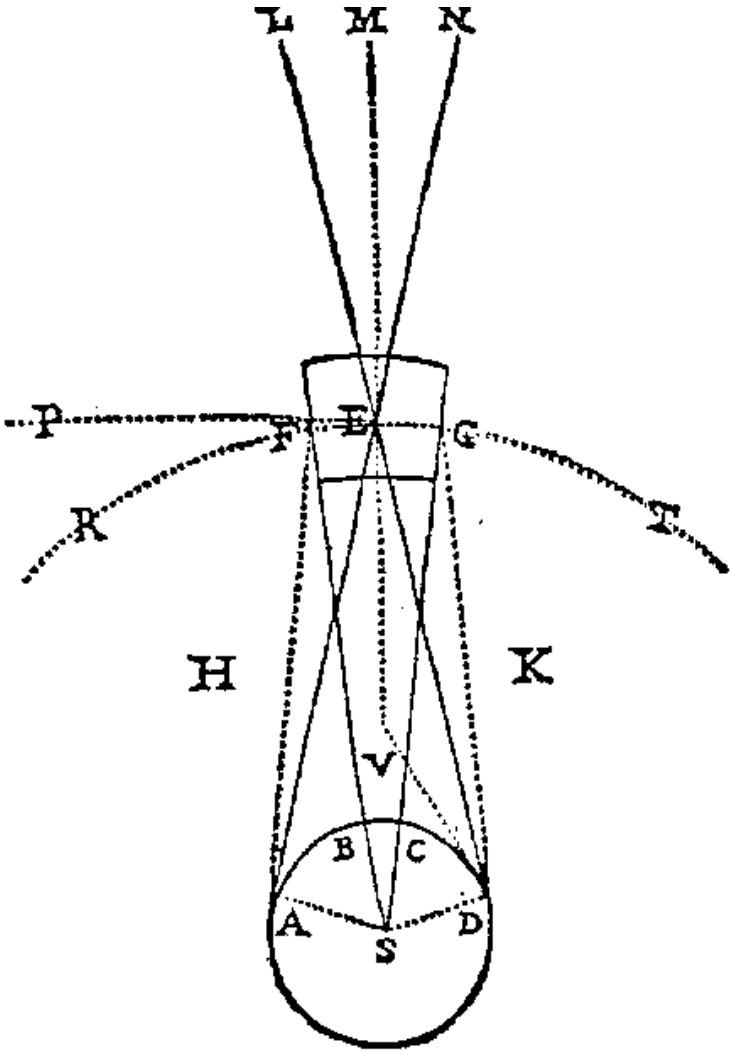
Now, if you have understood all this sufficiently by supposing the spaces *E* and *S* and all the small angles between the parts of the heaven to be empty, you will understand it still better by supposing them filled with the matter of the first element. For the parts of that first element in the space *E* cannot impede those of the second between the lines *AF* and *DG* from advancing to fill it in just the same way as they would if it were void, because, being extremely subtle and extremely agitated, they are always as ready to leave the places where they are as any other body might be to enter them. And for this same reason, the parts of the first element that occupy the small angles between the parts of the heaven cede their place without resistance to those coming from that space *E* and tending to go toward the point *S*. I say toward *S* rather than toward any other place because the other bodies which, being more united and larger, have more force all tend to move away from it.

Indeed, one should note that they pass from *E* toward *S* among the parts of the second element that go from *S* toward *E*, without the ones in any way impeding the others. Thus, the air enclosed in the sand clock *XYZ* rises from *Z* toward *X* through the sand *Y*, which does not for that reason cease to fall in the meantime toward *Z*.

Finally, the parts of that first element that are in the space *ABCD*, where they compose the body of the sun and there turn very rapidly in a circle about point *S*, tend to move away from it in all directions in a straight line, in accordance with what I have just set out. By this means, all those in line *SD* together push the part of the second element that is at point *D*, and all those in line *SA* push that which is at point *A*, and so on. And they do so in such a way that this alone suffices to cause all those parts of the second element between the lines *AF* and *DG* to advance toward the space *E*, even though they might have no inclination themselves to do so.

Moreover, since they must thus advance toward that space *E* when it is occupied only by the matter of the first element, it is certain that they also tend to go there even though it is filled by some other body and, consequently, that they push and make an effort against that body as if to drive it out of its place. Thus, if it were the eye of a man that were at the point *E*, it would actually be pushed, both by the sun and by all the matter of the heaven between the lines *AF* and *DG*.

Now one must know that the men of this new world will be of such a nature that, when their eyes are pushed in this manner, they will have from it a sensation very much like that which we have of light, as I will say more fully below.


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CHAPTER FOURTEEN On the Properties of Light

But I want to stop a while at this point to set out the properties of the action by which their eyes can be thus pushed. For they all agree so perfectly with those that we note in light that, when you have considered them, I am sure you will admit, like me, that there is no need to imagine in the stars or in the heavens any other quality but this action that is called by the name of "light."

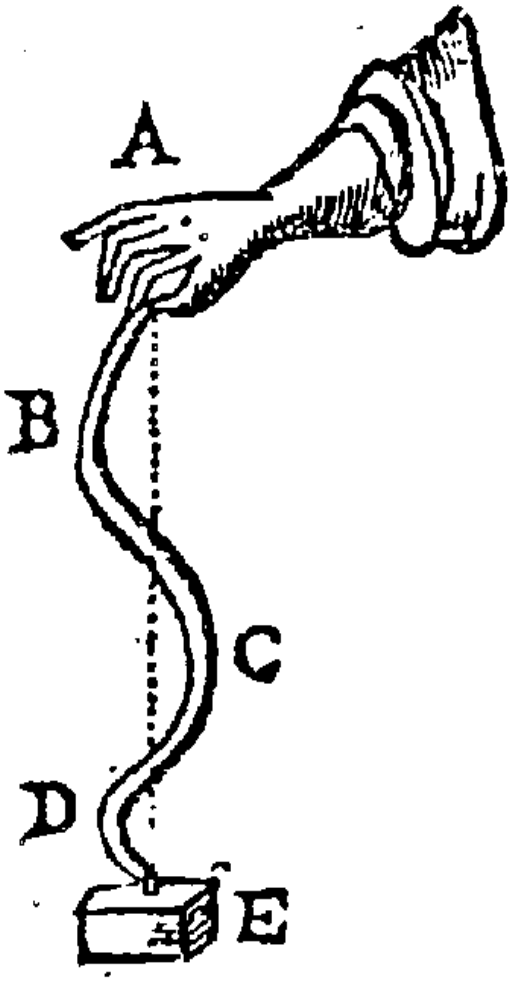
The principal properties of light are: (1) that it extends around in all directions about bodies one calls "luminous," (2) to any distance, (3) and in an instant, (4) and ordinarily in straight lines, which must be taken to be the rays of light; (5) and that several of these rays coming from diverse points can come together at the same point, (6) or, coming from the same point, can go out toward different points, (7) or, coming from diverse points and going toward diverse points, can pass through the same point without impeding one another; (8) and that they can also sometimes impede one another, to wit, when their force is very unequal and that of some of the rays is much greater than that of the others; (9) and, finally, that they can be diverted by reflection, (10) or by refraction, (11) and that their force can be increased, (12) or diminished, by the diverse dispositions or qualities of the matter that receives them. There are the principal qualities that one observes in light and that all agree with this action, as you are about to see.

(l) The reason is evident why this action should extend in all directions around luminous bodies, because it proceeds from the circular motion of their parts.

(2) It is also evident that it can extend to any distance. For example, supposing that the parts of the heaven between *AF* and *DG* are already themselves disposed to advance toward *E*, as we have said they are, one can no longer doubt that the force with which the sun pushes those at *ABCD* should also extend out to *E*, even though there is a greater distance from the one to the other than there is from the highest stars of the firmament down to us.

(3) And knowing that the parts of the second element between *AF* and *DG* all touch and press one another as much as possible, one also cannot doubt that the action by which the first ones are pushed must pass in an instant out to the last, in just the same way that the force with which one

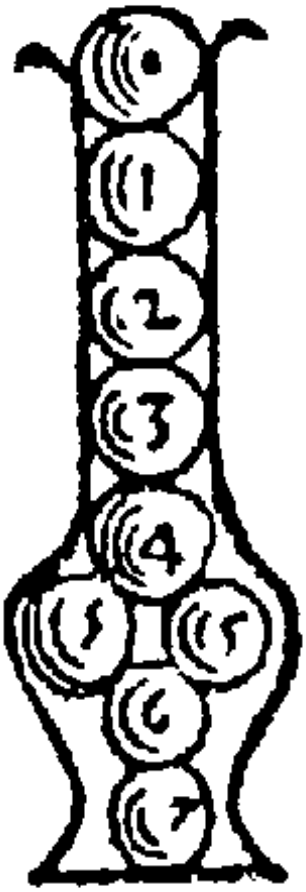
pushes one end of a stick passes to the other end in the same instant; or rather (so you make no difficulty on the basis that the parts of the heaven are not attached to one another as are those of a stick) in just the same way that, as the small ball marked *50* falls toward *6*, the others marked *10* also fall toward *6* at the same instant.

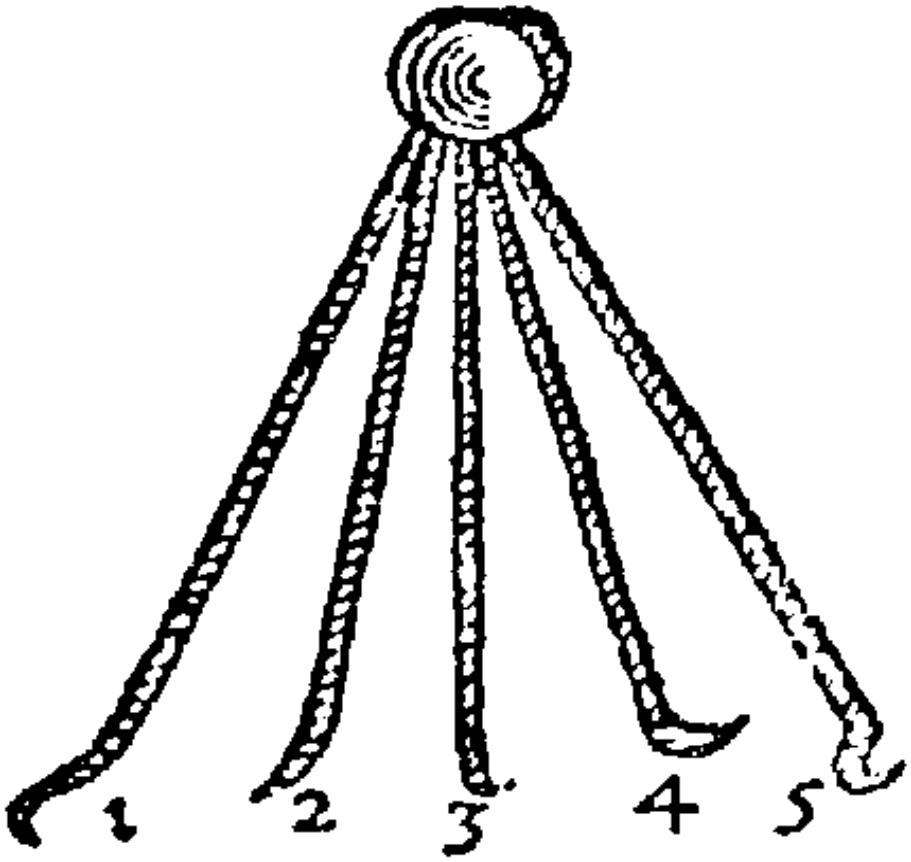


(4) Regarding the lines along which this action is communicated and which are properly the rays of light, one must note that they differ from the parts of the second element through the intermediary of which this same action is communicated, and that they are nothing material in the medium through which they pass, but they designate only in what direction and according to what determination the luminous body acts on the body it is illuminating. Thus, one should not cease to conceive of them as exactly straight even though the parts of the second element that serve to transmit this action, i.e. light, can almost never be placed so directly one on the other

that they compose completely straight lines. In just the same way, you can easily conceive that the hand *A* pushes the body *E* along the straight line *AE* even though it pushes it only through the intermediary of the stick *BCD*, which is twisted. And in just the same way, you can conceive that the ball marked *1* pushes that marked *7* through the intermediary of the two marked *5* and *5* as directly as through the intermediary of the others, *2*, *3*, *4*, *6*.

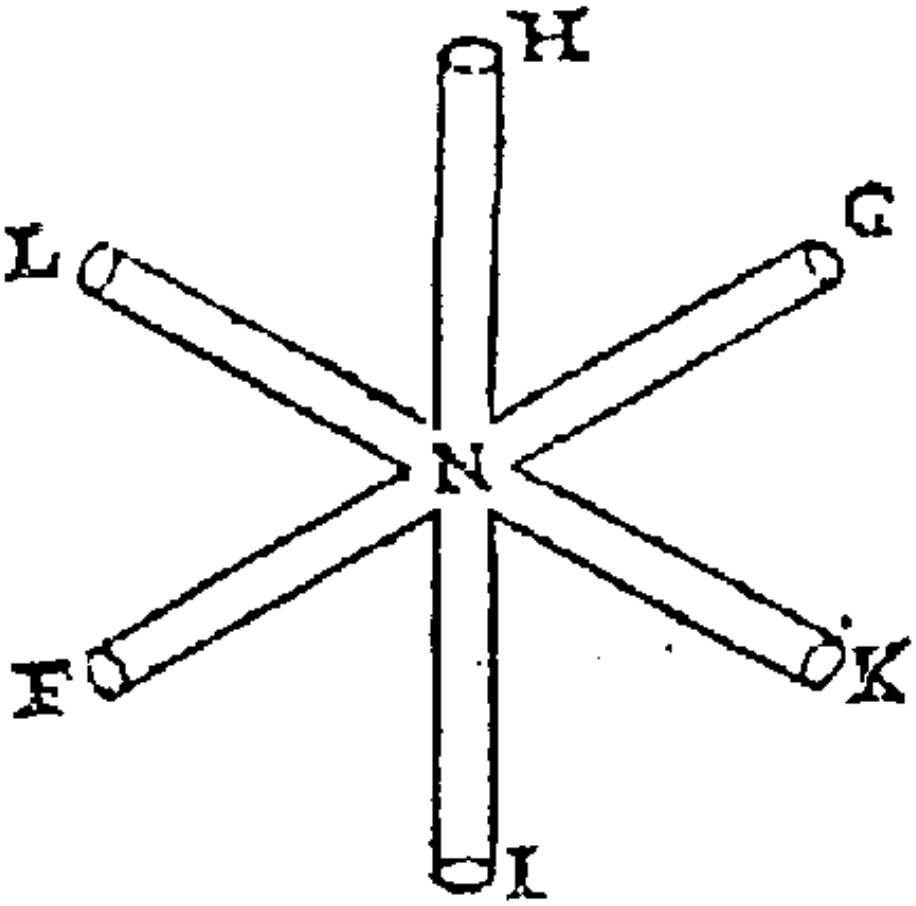
(5-6) You can also easily conceive how several of these rays, coming from diverse points, come together at the same point (or, coming from the same point, go out toward different points) without impeding or depending on one another. As you see in Figure 6, several of them come from the points *A*, *B*, *C*, *D* and come together at point *L*, and several come from the single point *D* and extend, one toward *E*, another toward *K*, and thus toward an infinity of other places. In just the same way, the diverse forces with which one pulls the cords *1*, *2*, *3*, *4*, *5* all come together in the pulley, and the resistance of this pulley extends to all the diverse hands that are pulling those cords.


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(7) But to conceive how several of those rays, coming from diverse points and going toward diverse points, can pass through the same point without impeding one another, just as in Figure 6 the two rays *AN* and *DL* pass through point *E*, one must consider that each of the parts of the second element is capable of receiving several diverse motions at the same time. Thus, the part at, say, point *E* can be pushed as a whole toward *L* by the action coming from the place on the sun marked *D* and, at the same time, toward *N* by that coming from the place marked *A*. You will understand this still better if you consider that one can push the air at the same time from *F* toward *G*, from *H* toward *I*, and from *K* toward *L*, through the three tubes *FG*, *HI*, and *KL*, even if those tubes are so joined at point N that all the air that passes through the middle of each of them must necessarily also pass through the middle of the other two.

(8) And this same comparison can serve to explain how a strong light impedes the effect of those that are weaker. For, if one pushes the air much more strongly F through than through *H* or through *K*, it will not tend at all toward *I* or toward *L*, but only toward *G*.



(9-10) As for reflection and refraction, I have already explained them sufficiently elsewhere.[60] Nevertheless, because I then used the example of the motion of a ball instead of speaking of rays of light, in order by this means to render my discourse more intelligible, it still remains for me here to have you consider that the action, or the inclination to move, that is transmitted from one place to another by means of several bodies that touch one another and that continuously fill all the space between the places follows exactly the same path along which this same action could cause the first of those bodies to move if the others were not in its way.[61] The only difference is that it requires time for that body to move, whereas the action

that is in it can, through the intermediary of those touching it, extend to all sorts of distances in an instant. Whence it follows that, just as a ball is reflected when it strikes against the wall of a tennis court and undergoes refraction when it enters or leaves a body of water obliquely, so too, when the rays of light meet a body that does not permit them to pass beyond, they must be reflected, and when they enter obliquely some place through which they can extend more or less easily than they can through that from which they are coming, they must also be diverted and undergo refraction at the point of that change.

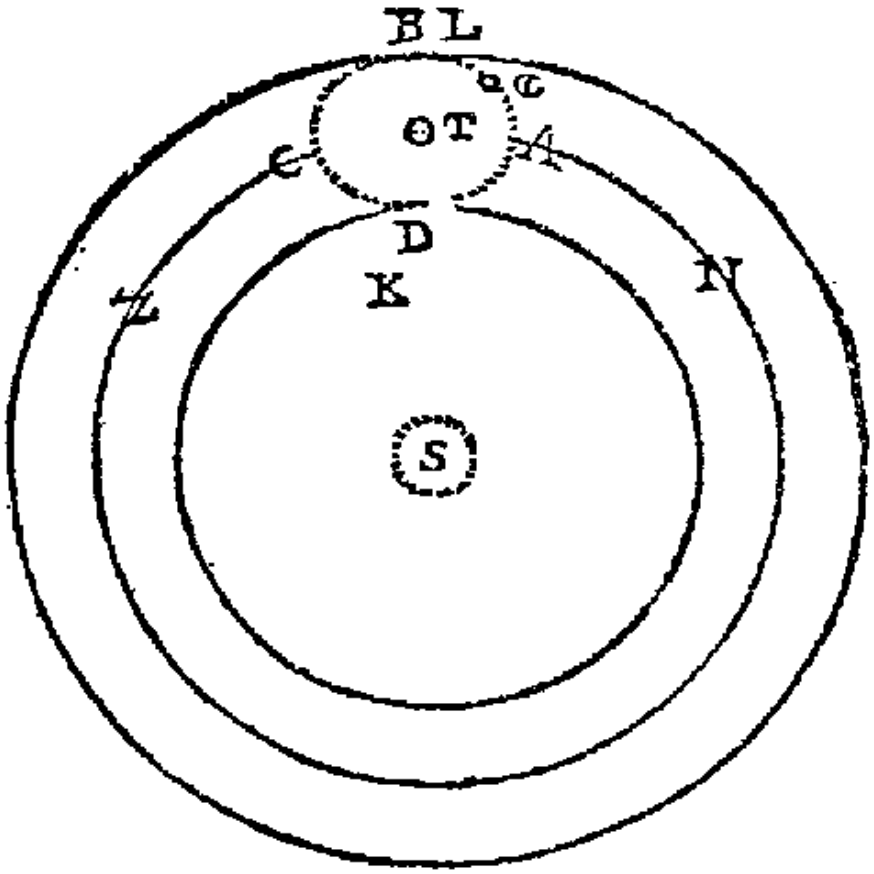
(11-12) Finally, the force of light is not only more or less great in each place according to the quantity of the rays that come together there, but it can also be increased or diminished by the diverse dispositions of the bodies in the places through which it passes. In the same way, the speed of a ball or a stone one is pushing in the air can be increased by winds blowing in the same direction that it is moving and diminished by their contraries.

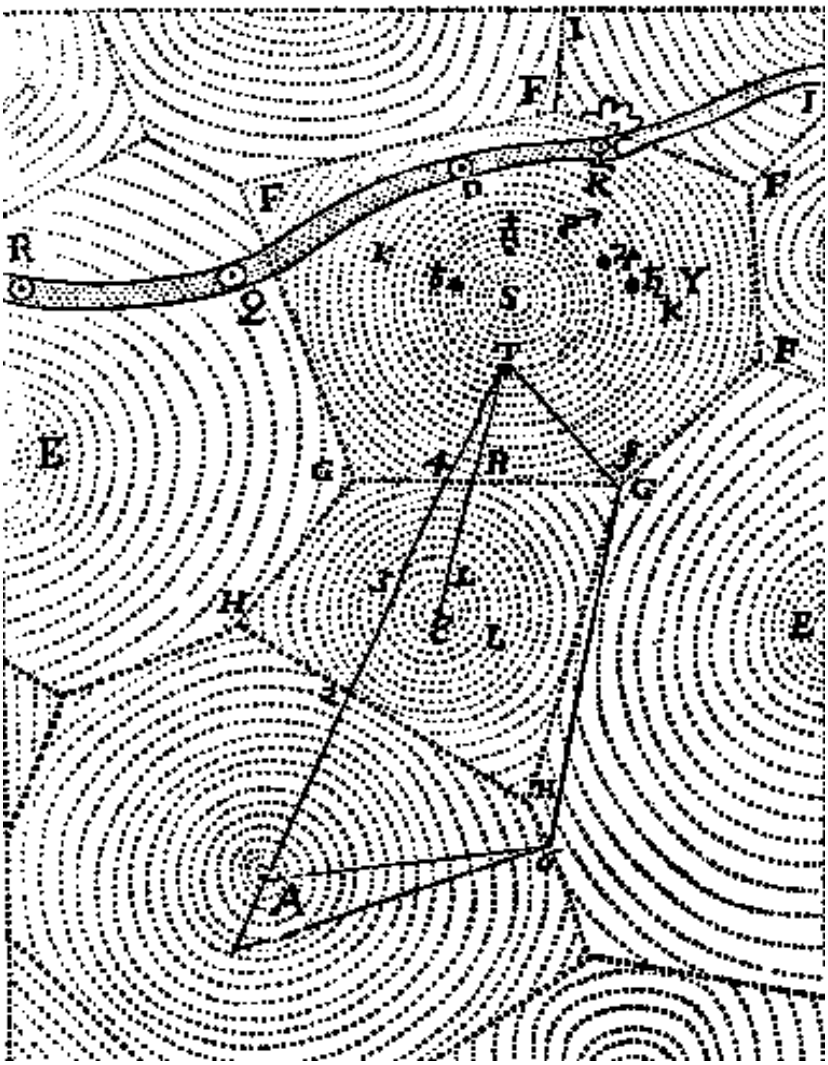
CHAPTER FIFTEEN That the Face of the Heaven of that New World Must Appear to Its Inhabitants Completely Like That of Our World

Having thus explained the nature and the properties of the action I have taken to be light, I must also explain how, by its means, the inhabitants of the planet I have supposed to be the earth can see the face of their heaven as wholly like that of ours.

First, there is no doubt that they must see the body marked *S* as completely full of light and like our sun, given that that body sends rays from all points of its surface toward their eyes. And, because it is much closer to them than the stars, it must appear much greater to them. It is true that the parts of the small heaven *ABCD* that turns about the earth offer some resistance to those rays; but, because all the parts of the great heaven that are between *S* and *D* strengthen the rays, those that are between *D* and *T*, being comparatively small in number, can take away only very little of their force from them. And even all the action of the parts of the large heaven FGGF does not suffice to impede the rays of many fixed stars from reaching to the earth from the side on which it is not illuminated by the sun.

For one must know that, although the large heavens (i.e. those that have a fixed star or the sun for their center) may perhaps be rather unequal in size, they must always be exactly of the same force, so that all the matter that is, say, in the line *SB* must tend as strongly toward ε as that which is in the line ε*B* tends toward *S*. For, if they do not have that equality among them, they will most certainly be destroyed in a short time, or at least they will change until they have acquired it.


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Now, since the whole force of the ray *SB*, for example, is just exactly equal to that of the ray ε*B*, it is manifest that that of the ray *TB* (which is less) cannot impede the force of the ray ε*B* to extend to *T*. And in the same way, it is evident that the star *A* can extend its rays to the earth *T*, in as much as the matter of the heaven between *A* and *2* aids them more than that between *4* and *T* resists them, and in addition in as much as that between *3* and *4* aids them no less than that between *3* and *2* resists them. And thus, judging others proportionately, you can understand that those stars must appear no less confusedly arranged, nor less in number, nor less unequal to one another, than do those we see in the real world.

But you must still consider in regard to their arrangement that they can just about never appear in the true place where they are. For example, that marked e appears as if it were in the straight line *TB*, and the other marked *A* as if it were in the straight line *T4*.

The reason for this is that, since the heavens are unequal in size, the surfaces that separate them are just about never so disposed that the rays that pass through them to go from the stars toward the earth meet them at right angles. And when the rays meet them obliquely, it is certain, according to what has been demonstrated in the *Dioptrics*,[62] that there they must bend and undergo a great deal of refraction, in as much as they pass much more easily through one side of this surface than through the other. And one must suppose those lines *TB*, *T4*, and ones like them to be so extremely long in comparison with the diameter of the circle the earth describes about the sun that, wherever the earth is on that circle, the men on it always see the stars as fixed and attached to the same places in the firmament; that is, to use the terms of the astronomers, they cannot observe parallax in the stars.[63]

Regarding the number of those stars, consider also that the same star can often appear in different places because of the different surfaces that divert its rays toward the earth. Here, for example, that marked *A* appears in the line *T4* by means of the ray *A24T* and simultaneously in the line *Tf* by means of the ray *A6fT*. In the same way are the objects multiplied that one looks at through glasses or other transparent bodies cut along several faces.

Moreover, regarding their size, consider that they must appear much smaller than they are, because of their extreme distance; for this reason the greater part of them must not appear at all, and others appear only insofar as the rays of several joined together render the parts of the firmament through which they pass a bit whiter and similar to certain stars the astronomers call “nebulous,” or to that great belt of our heaven that the poets pretend to be whitened by the milk of Juno.[64] Despite this, it nevertheless suffices to suppose the less distant stars to be about equal to our sun, in order to judge that they can appear as large as the largest of our world.

For, generally, all the bodies that send out stronger rays against the eyes of onlookers than do the bodies surrounding them appear proportionately that much greater than they, and consequently those stars must always seem larger than the parts of their heavens that are equal to them and that neighbor them, as I will explain below. In addition to this, however, the surfaces *FG*, *GG*, *GF* and ones like them, where the refractions of [the stars’] rays take place, can be curved in such a way that they greatly increase [the stars’] size; indeed, even when completely flat, they increase it.

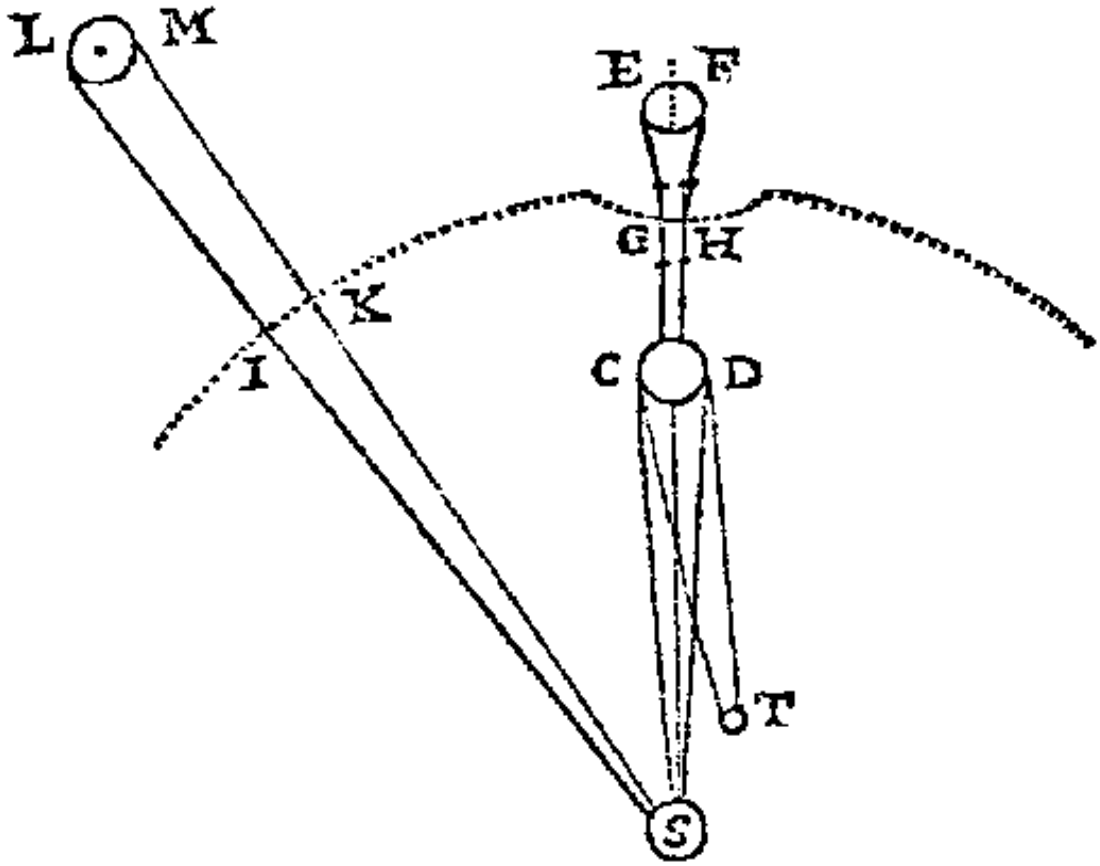
Moreover, it is very probable that those surfaces, being in a matter that is very fluid and that never ceases to move, should always shake and quiver somewhat, and consequently that the stars one sees through them should appear to scintillate and vibrate, just as ours do, and even, because of their vibration, appear a bit larger. In this way, the image of the moon appears larger when viewed from the bottom of a lake of which the surface is not very stirred up or agitated, but merely a bit rippled by the breath of some wind.

And, finally, it can happen that, over the course of time, those surfaces change a bit, or indeed even that some of them bend rather noticeably in a short time, even if this is only on the occasion of a comet's approaching them. By this means, several stars seem after a long time to change a bit in place without changing in size, or to change a bit in size without changing in place. Indeed, some even begin rather suddenly to appear or to disappear, just as one has seen happen in the real world.[65]

As for the planets and the comets that are in the same heaven as the sun, knowing that the parts of the third element of which they are composed are so large or so joined severally together that they can resist the action of light, it is easy to understand that they must appear by means of the rays that the sun sends toward them and that are reflected from there toward the earth, just as the opaque or obscure objects that are in a room can be seen there by means of the rays that the lamp shining there sends toward them and that return from them toward the eyes of the onlookers. In addition, the rays of the sun have a quite noteworthy advantage over those of a lamp. It consists in their force's being conserved, or even being increasingly strengthened to the degree that they move away from the sun, until they have reached the exterior surface of its heaven, because all the matter of that heaven tends there. By contrast, the rays of a lamp are weakened as they move away, in proportion to the size of the spherical surfaces they illuminate and, indeed, still somewhat more because of the resistance of the air through which they pass. Whence it is that the objects close to that lamp are noticeably more lighted by it than those far from it, and that the lowest planets are not, in the same proportion, more lighted by the sun than the highest, nor even more than the comets, which are incomparably more distant.

Now, experience shows us that the same thing also happens in the real world. I do not believe, however, that it is possible to give a reason for it if

one supposes that light is anything in the objects other than an action or disposition such as I have set forth. I say an action or disposition; for, if you have attended well to what I have just demonstrated, to wit, that, if the space where the sun is were totally void, the parts of its heaven would not cease to tend toward the eyes of onlookers in the same way as when they are pushed by its matter (and even with almost as much force), you can well judge that there is just about no need to have any action in the sun itself nor just about even for it to be anything other than pure space in order to appear as we see it. This is something you would perhaps earlier have taken to be a quite paradoxical proposition. Furthermore, the motion those planets have about their center is the reason why they twinkle, though much less strongly and in another way than do the fixed stars; because the moon is deprived of that motion, it does not twinkle at all.

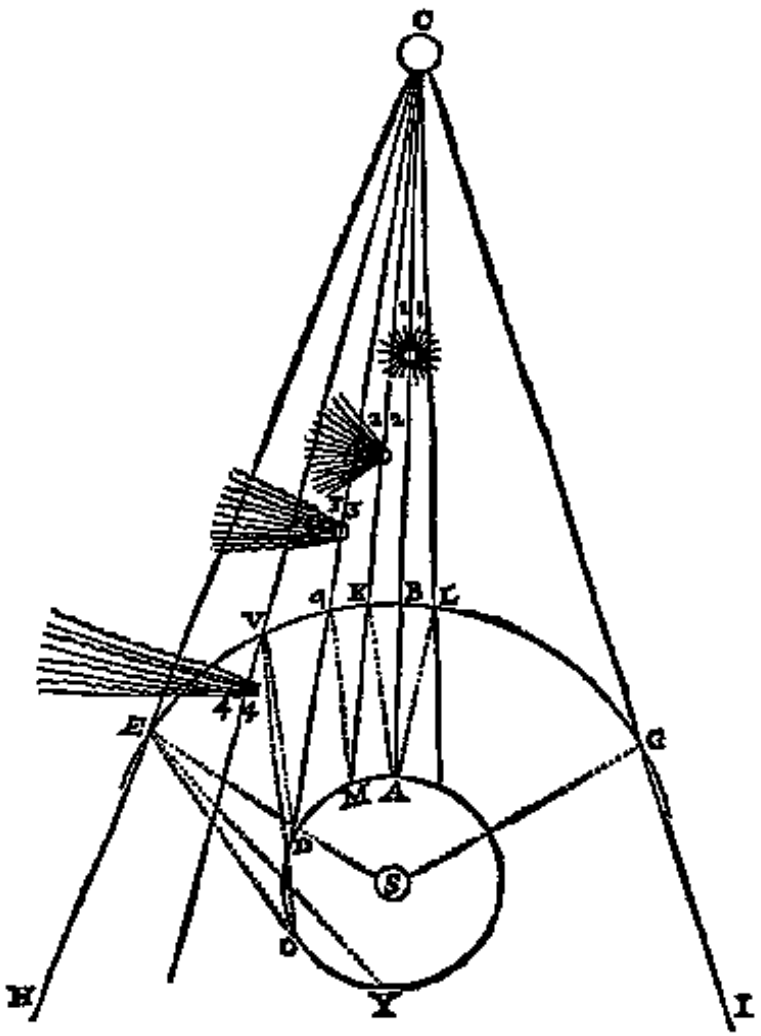


As for the comets that are not in the same heaven as the sun, they are far from being able to send out as many rays toward the earth as they could if they were in the same heaven, not even when they are all ready to enter it.

Consequently, they cannot be seen by men, unless perhaps when their size is extraordinary. The reason for this is that most of the rays that the sun sends out toward them are borne away here and there and effectively dissipated by the refraction they undergo in the part of the firmament through which they pass. For example, whereas the comet *CD* receives from the sun, marked *S*, all the rays between the lines *SC* and *SD* and sends back toward the earth all those between the lines *CT* and *DT*,[66] one must imagine that the comet *EF* receives from the same sun only the rays between the lines *SGE* and *SHF* because, since they pass much more easily from *S* to the surface *GH* (which I take to be a part of the firmament that they cannot pass beyond), their refraction there must be very great and very much outward. This diverts many of them from going toward the comet *EF*, given first of all that this surface is curved inward toward the sun, just as you know it should curve when a comet approaches it. But, even if it were completely flat, or even curved in the other direction, most of the rays that the sun sent out to it would not cease to be impeded by the refraction, if not from going up to it, at least from returning from there to the earth. For example, if one supposes the part *IK* of the firmament to be a portion of a sphere of which the center is at *S*, the rays *SIL* and *SKM* should not bend there at all in going toward the comet *LM*; by the same token, however, they should bend greatly in returning from the comet toward the earth, so that they can reach the earth only very feebly and in very small quantity. Beyond that, since this can happen when the comet is still rather far from the heaven that contains the sun (for otherwise, if it were close to that heaven, it would cause the heaven's surface to curve inward), its distance also impedes it from receiving as many rays as when it is ready to enter the heaven. As for the rays it receives from the fixed star at the center of the heaven containing it, it cannot send them back toward the earth any more than the moon, being new, can send back those of the sun.

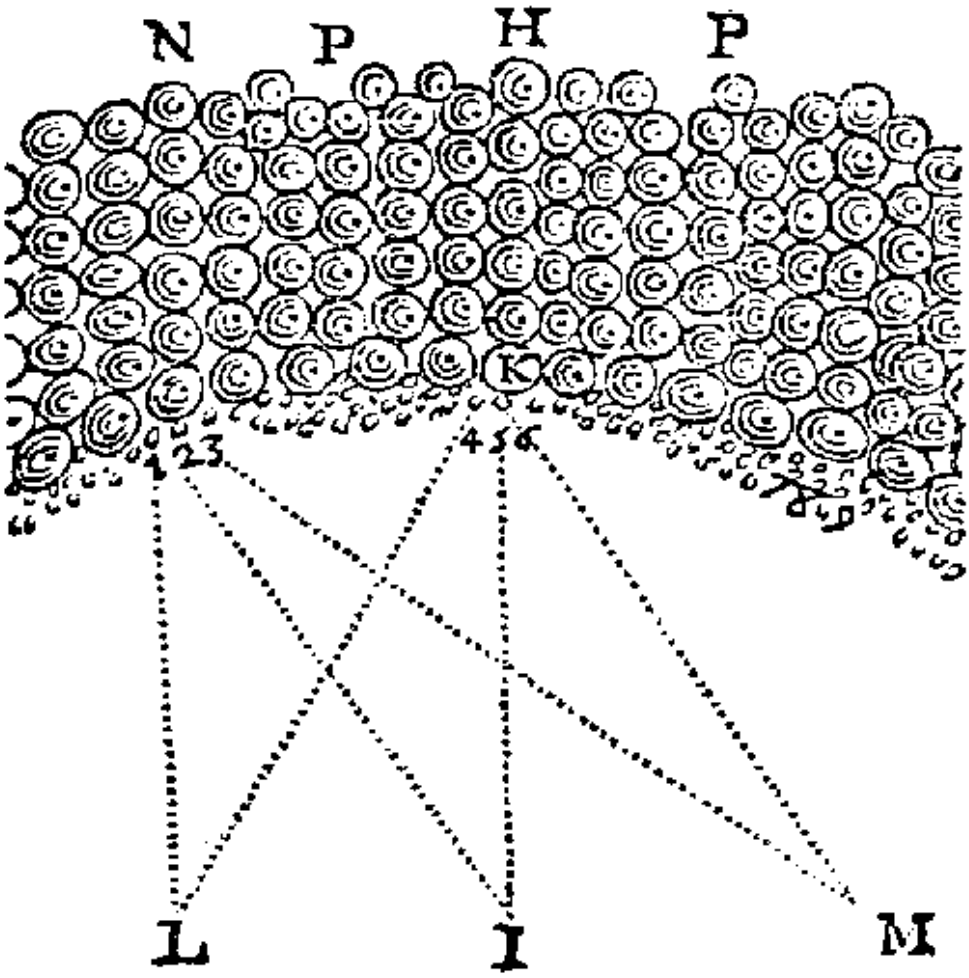
But, what is even more noteworthy regarding those comets is a certain refraction of their rays, which is ordinarily the reason why some of them appear about [the comets] in the form of a tail or of a curl.[67] You will easily understand this if you cast your eyes on this figure, where *S* is the sun, *C* a comet, *EBG* the sphere that (according to what has been said above) is composed of those parts of the second element that are the largest and least agitated of all, and *DA* the circle described by the annual motion of the

earth. Imagine further that the ray coming from *C* toward *B* passes straightaway to point *A*, but that in addition it begins at point *B* to grow larger and to be divided into many other rays, which extend every which way in all directions. Thus, each of them is that much weaker as it is carried farther away from the one in the middle, BA, which is the principal ray of all and the strongest. Then, too, when the ray *CE* is at point *E*, it begins to grow larger and also to be divided into many others, such as *EH*, *EY*, *ES*; the principal and strongest of these, however, is *EH*, and the feeblest is *ES*. In the same way, *CG* passes principally from *G* toward *I*, but in addition it is also carried away from *S* and toward all the spaces between *GI* and *GS*. Finally, all the other rays that can be imagined between those three rays *CE*, *CB*, and *CG* hold more or less to the nature of each of them, according as they are more or less close. To this I might add that they should be a bit bent toward the sun; but that is in fact not necessary for my purposes, and I often omit many things in order to render those I do explain that much simpler and easier.



Now, this refraction having been supposed, it is manifest that, when the earth is at *A*, not only should the ray *BA* cause men on it to see the body of comet *C*, but also the rays *LA*, *KA*, and others like them, which come to their eyes more feebly than *BA*, should cause to appear to them a crown or curl of light uniformly spread out in all directions around the comet (as you see at the place marked *11*), at least if they are strong enough to be perceived. They can often be strong enough coming from comets, which we suppose to be very large, but not coming from planets, or even from fixed stars, which one must imagine to be smaller. It is also manifest that, when the earth is at *M* and the comet appears by means of the ray *CKM*, its curl should appear by means of *QM* and all the other rays tending toward *M*, so that it extends farther than before in the direction opposite to the sun, and less far or not at all toward the person looking at it, as you can see here at *22*. And thus appearing longer and longer on the side opposite the sun, to

the degree that the earth is farther away from point *A*, it little by little loses the shape of a curl and is transformed into a long tail, which the comet trails behind it. For example, when the earth is at *D*, the rays *QD* and *VD* make it appear like *33*. And, when the earth is at *O*, the rays *VO*, *EO*, and others like them make it appear still longer. And, finally, when the earth is at *Y*, one can no longer see the comet because of the interposition of the sun; however, the rays *VY*, *EY*, and others like them do not cease to cause its tail still to appear in the shape of a chevron or of a torch, such as here at *44*. And one should note that, since the sphere *EBG* is not always exactly round, nor also any of the others it contains (as is easy to judge from what we have set out), those tails or torches should not always appear exactly straight, nor in fact in the same plane as the sun.



As for the refraction that is the cause of all this, I confess that it is of a nature very special and very different from all those commonly observed elsewhere. But you will not fail to see clearly that it should take place in the manner I have just described to you if you consider that the ball *H*, being pushed toward *I*, also pushes toward *I* all those below it down to *K*, but that the latter, *K*, being surrounded by many other smaller balls, such as *4*, *5*, and *6*, only pushes *5* toward *I*, and meanwhile pushes *4* toward *L* and *6* toward *M*, and so on. Nevertheless, it does so in such a way that it pushes the middle one, *5*, much more strongly than the others, *4*, *6*, and those like them which are on the sides. In the same way, the ball *N*, being pushed toward *L*, pushes the small balls *1*, *2*, and *3*, one toward *L*, the other toward *I*, and the other toward *M*; but with this difference, that it pushes *1* the most strongly of all, and not the middle one, *2*. Moreover, the small balls *1*, *2*, *3*, *4*, etc., being thus all pushed at the same time by the other balls *N*, *P*, *H*, *P*, impede one another from being able to go in the directions *L* and *M* as easily as toward the middle, *I*. Thus, if the whole space *LIM* were full of similar small balls, the rays of their action would be distributed there in the same manner as I have said are those of the comets within the sphere *EBG*.

If to this you object that the inequality between the balls *N*, *P*, *H*, *P* and *1*, *2*, *3*, *4*, etc. is much greater than that which I have supposed between the parts of the second element that compose the sphere *EBG* and those that are immediately below them toward the sun, I respond that one can draw no other consequence from this than that there should not take place as much refraction in the sphere *EBG* as in that composed by the balls *1*, *2*, *3*, *4*, etc. However, since there is in turn some inequality between the parts of the second element that are immediately below this sphere *EBG* and those that are still lower toward the sun, this refraction increases more and more as the rays penetrate farther. Thus, when the rays reach to the sphere of the earth *DAF*, the refraction can well be as great as, or even greater than, that of the action by which the small balls *1*, *2*, *3*, *4*, etc. are pushed. For it is very likely that the parts of the second element toward this sphere of the earth *DAF* are no less small in comparison with those toward the sphere *EBG* than are those balls *1*, *2*, *3*, *4*, etc. in comparison with the other balls *N*, *P*, *H*, *P* . . .

[*The extant text breaks off here.*]

ENDNOTES

[1] *sentiment.* It is difficult to render this word into English with full precision. Descartes' own parenthetical explication— "idea that is formed in our imagination through the intermediary of our eyes" — is of limited help, since at the time of writing *The World* he had not yet worked out the details of his metaphysics or theory of mind. But it does place *sentiments* in the mind and makes them more than merely the sensory data connoted by "sensations". Moreover, in *Man* the brain has *sentiments* not only of heat and of the color red (note the judgment involved), but also of pain, tickling, and taste. Hence, the term covers both sensations caused by external objects and feelings originating within the body; in an example soon to follow a soldier who mistakenly thinks himself wounded in battle "senses" [*sent*] both pain and a strap. The mind's involvement in a *sentiment* tempts one to translate it by "perception", especially since the French cognate does not appear either in *The World* or in *Man.* However, it does occur in the *Principles of Philosophy* and in the *Passions of the Soul*. The latter includes *sentiment* among several different sorts of *perception.* Perception in a general sense is any thought that does not result from the action or will of the soul, and in a restricted sense is "evident knowledge"; *sentiment* is "what is received in the soul in the same way as objects of the external senses and is not otherwise known by the soul" (*Passions*, I, 28; AT.XI.349). Perceptions may arise in the imagination, in which case their objects do not really exist. *Sentiments* arise in the body by the intermediary of the nervous system and, whether really or only apparently, involve the body's external senses. Since here in *The World* it is the external senses and their relation to the external world that Descartes is discussing, "sensation" seems the best English equivalent.

[2] Like all university-educated people of his day, Descartes was as fluent in Latin as he was in his native tongue. Not having to translate Latin discourse to understand it, he might well have been unable later to recall in what language he had heard or read something.

[3] For the theory of mind underlying this argument, see Rule XII of *Rules for the Direction of the Mind* and *Man* (AT.XI.170ff.).

[4] Galileo used this example of the feather drawn lightly over the skin to make roughly the same point about sensory data; see his *Assayer* (1624), Chap. 48.

[5] In Discourse I of the *Dioptrics* Descartes adds to this list of light sources the eyes of cats and other animals that can see in the dark.

[6] I have added quotation marks here to reflect Descartes' belief that these Aristotelian terms are merely names signifying nothing real.

[7] Cf. Aristotle, *Physics*, III, 2, 202a, where in addition the mover must be in contact with the moved.

[8] Here Descartes hints for the first time that the measure of force in his world is the product of size and speed. The hint never becomes an explicit statement, however, and "size" is later used ambiguously; see below, n.50 .

[9] Discourse II, "Of Refraction:" "It is only necessary to note that the power, whatever it be, which causes the movement of this ball to continue is different from that which determines it to move in one direction rather than in another, . . ." (Descartes: *Discourse on Method, Optics, Geometry, and Meteorology,* trans. P.J. Olscamp, Indianapolis, 1965, p.75). On the distinction, which Descartes discusses in greater detail in Chapters 7 and 13 below, see the analyses of A.I. Sabra, *Theories of Light from Descartes to Newton* (London, 1967), Chapters I-IV, and M.S. Mahoney, *The Mathematical Career of Pierre de Fermat* (Princeton, 1973; 2nd ed. 1994), App. II.

[10] Here Descartes invokes for the first of several times a principle of natural economy for which he provides no justification. He states it most clearly below, p. 46: "When nature has many ways of arriving at the same effect, she most certainly always follows the shortest." Neither the nature of matter nor the conserving action of God, both soon to be introduced as the basic principles of the physical universe, seems to imply that nature always takes the most direct path.

[11] Descartes develops the mechanism for these sensations in *Man*; cf. AT.XI.143-144.

[12] *en action de*. *Action* acquires a technical meaning in Chap. VII, where Descartes introduces and explains the laws of motion; cf. below, n. 37. But the phrase as used here seems to mean no more than that the balls are in continuing contact and not, as in the next paragraph, touching one another only in passing, i.e. in contact for an instant and no more.

[13] *eaux fortes*. F. Alquié, *Descartes. Oeuvres philosophiques* (Paris, 1963ff), I, 328, n.3, identifies these "strong waters" as nitric acid, used at the time especially for etching copper plates.

[14] This removal of any upper limit to the size of a part, combined with the absence of any lower limit (cf. Chap. V on the first element), distinguishes Descartes' theory of matter from other atomist and corpuscularist theories, all of which posited a finite, but imperceptibly small size for the ultimate constituents of matter.

[15] See Rule XII of *Rules for the Direction of the Mind*, AT.X.424.

[16] For examples of such "experiments" from the works of the fourteenth-century philosophers Albert of Saxony, Jean Buridan, and Marsilius of Inghen, see Edward Grant (ed.), *Source Book in Medieval Science* (Cambridge, MA, 1974), 324-328. For later writers, see Charles B. Schmitt, "Experimental Evidence for and against a Void: The Sixteenth-Century Arguments", *Isis* 58(1967), 352-66.

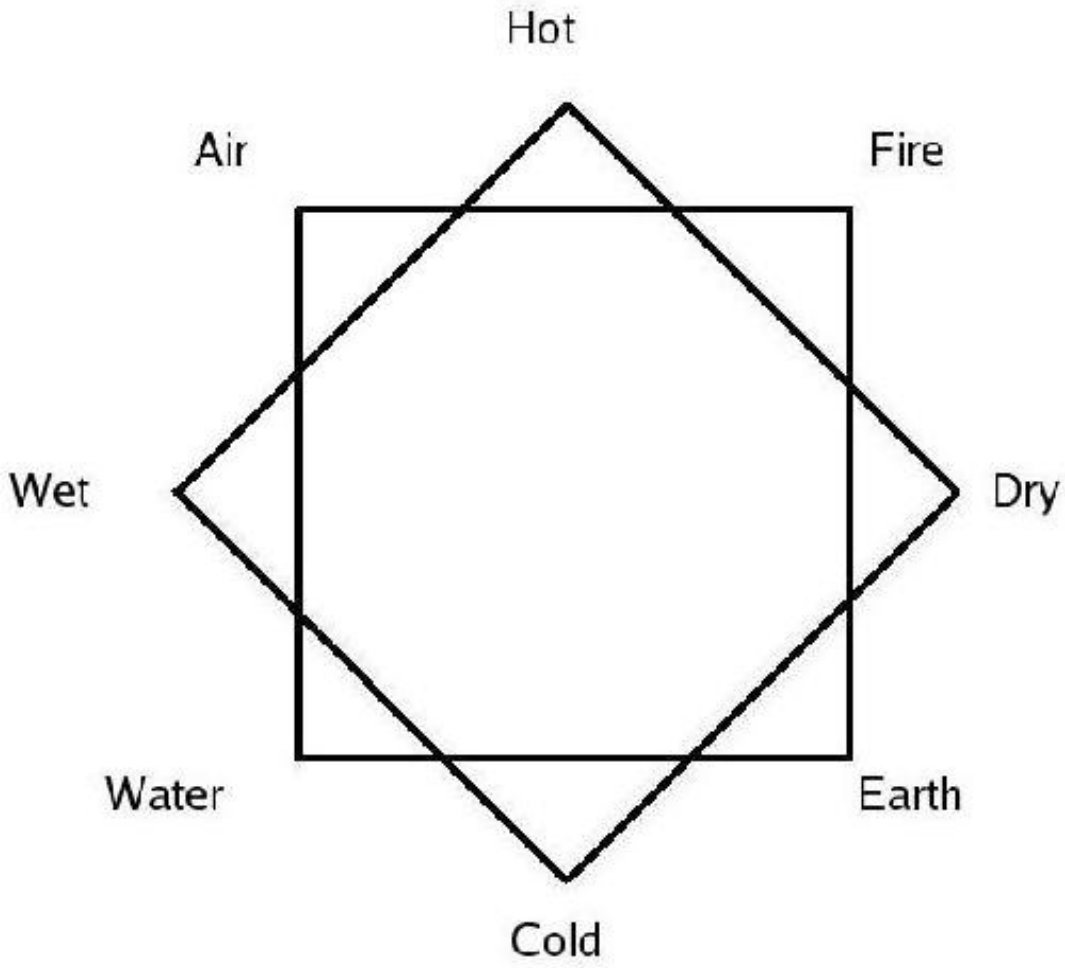
[17] The argument here employs unstated premises to achieve a *reductio ad absurdum* of the theory that vacua exist but that nature "abhors" them. First, it is argued that machines lift great weights before breaking because for, say, a beam to break would require the creation (at least for an instant) of a vacuum between its ruptured parts. But, if so, how could air contain interstitial vacua and still have any body at all (which its resistance to motion through it shows it does)? Why would it not simply dissipate? Second, it is argued that in pumps the water rises against its natural inclination in order to prevent the formation of a vacuum as the piston is withdrawn. But, if so, then why would the water not fall naturally from the clouds to fill interstitial vacua in the air below?

[18] This motion of mutual replacement is quite reminiscent of Aristotle's *antiperistasis*, mentioned in *Physics* IV, 8, 215a, as one possible mechanism for the continued motion of projectiles. Aristotle uses it, however, not to account for motion in a plenum, but to argue against the existence of a vacuum.

[19] Descartes here again posits a principle of natural economy for which he offers no independent justification; cf. above, n.10. Its application here contravenes the results of his earlier research in hydrostatics while conforming to arguments to be made later (below, Chap. XIII) about the propagation of light through the second element.

[20] Here the first element assumes the properties of the mathematical continuum. There are no atoms in Descartes' world, just a fragmented continuous space. Cf. above, n.14.

[21] In traditional Aristotelian cosmology, the four elements were themselves compounds of the terms, taken two at a time, of two pairs of contrary "principles" or qualities: hot — cold and wet — dry. Fire was hot and dry, air hot and wet, water cold and wet, and earth cold and dry. The compositions were often displayed schematically in the form to the right. Reference to the principles here leads to Descartes' statement of his mechanistic program and emphasizes what a radically different approach that program represents. Rather than serving as explanatory constituents of the elements, the principal qualities must be explained in terms of the nature and behavior of those elements.



[22] Hence, differing only by size and speed, all elements are transformable into one another merely by change of size or speed.

[23] Descartes retains here some vestige of the Aristotelian doctrine of natural place. It is no less justified by his argument so far than is his assumption of three elementary states of matter.

[24] It would seem to follow from Descartes' principles that mixed bodies exist along the surfaces of all the planets. In restricting his claim to the surface of the earth, he may have been reflecting his uncertainty about the theological acceptability of a plurality of (possibly inhabited) worlds.

[25] Cf. Edward Grant, "Medieval and Seventeenth-Century Conceptions of an Infinite Void Space beyond the Cosmos," *Isis*, 60(1969), 39-60.

[26] It is perhaps worth asking here whether Descartes might be hinting at the distinction between a boundless space and an infinite one. On an ocean-covered, spherical earth the surface water, though finite in area, nonetheless appears endless through the absence of any boundaries.

[27] Descartes here appeals without further explication to his doctrine of clear and evident ideas.

[28] See below, p.19 , for some elucidation of this remark. There Descartes insists on at least half of the identification of space and matter, i.e. that the essential property of matter is to take up space. Although the arguments just presented against the void would seem to complete the identification, note that God creates matter in an already existing space of indefinite extent.

[29] Here cosmogony and cosmology are reduced to the same mechanism.

[30] But, "[We cannot be sure] . . . that He cannot do what we cannot understand; for it would be temerity to think that our imagination is as extensive as His power." Descartes to Mersenne, 15.IV.30, AT.I.14.

[31] Descartes set out the "others" in the *Principles of Philosophy*; see below, n. 39.

[32] Descartes repeats here in somewhat different terms the critique he made in Rule XII of *Rules for the Direction of the Mind.*

[33] Aristotle, *Physics*, III, 1, 201a.

[34] Although Descartes here places rest and motion on the same ontological level, it is not until the Principles of Philosophy that he argues the relative nature of motion; cf. Principles, Pt. II, pars. 24 and 25.

[35] Since Descartes has nowhere given quantitative meaning to "motion," it must remain unclear what is being transferred here and what governs that transfer.

[36] When finally published in the *Principles*, the rules of impact derived from the laws of motion indeed were "manifestly contrary" to empirical data, as critics immediately pointed out. Descartes anticipated the criticism in Pt. II, par. 53 by noting how difficult it was to single out the bodies involved in any real exchange of motion. He expanded this defense in a letter to Clerselier in February 1645 (AT.IV.183-188) and added to it another version of his principle of economy: When two bodies, which have in them incompatible modes [of motion], collide, some change must certainly take place in these modes to render them compatible, but . . . this change is always the least

possible." True to his word in *The World*, Descartes steadfastly refused to accept empirical evidence against his laws of motion, and several of his followers took an equally stubborn stance after his death.

[37] Note the determinative role of mathematics in this argument.

[38] Cf. above, n.12; Here the phrase *en action de* seems to preserve its meaning, although *action* has picked up (p. 23) the technical sense of inclination to move." So later, for example, light is an action; Chap. XI sets out the properties of the action by which [men's] eyes can be thus pushed [to see light],"but it establishes no parameters by which it might be measured.

[39] The rules are contained in pars. 45-52 of Part II of the *Principles*; for a handy schematic presentation, see E.J. Aiton, *The Vortex Theory of Planetary Motions* (New York, 1972), 36.

[40] *Sapientia*, VIII, 21. The statement was a commonplace of medieval thought and was encountered by every schoolboy in the opening line of Johannes de Sacrobosco's *Algorismus vulgaris*, the standard arithmetic textbook from the mid-thirteenth to the mid-sixteenth century.

[41] To compound the vagueness of the measure of "motion," Descartes here seems to suggest a non-linear gradient of motion in the vortex, though he offers no reason for it.

[42] Here again is the non-linear variation of orbital speed with respect to radial distance.

[43] Descartes shifts here from explication of the mechanism to illustration of it by analogy with more familiar phenomena.

[44] Compare this explanation with Descartes' theory of the tides, below, Chap. XII.

[45] The nature and location of the three comets observed in 1618 became the focal issues in an acrid debate between Galileo and the Jesuit astronomer Orazio Grassi. The debate triggered Galileo's masterful *Assayer* (1624), in which he defended empirical investigation and the use of mathematics and the telescope at the samxtime that he argued that comets were little more than atmospheric optical illusions. For the central texts of that debate, see S. Drake and C.D. O'Malley (trans.), *The Controversy on the Comets of 1618* (Philadelphia, 1960).

[46] In order: Saturn, Jupiter, Mars, Earth, Venus, Mercury.

[47] This shift from volume to surface as a measure of a body's magnitude only further confuses the question of the parameters of "motion" or "force."

[48] The surface varies as the square of the ball's radius, the volume as its cube; hence, the ratio of surface to volume varies as 1/radius and so decreases with increasing radius.

[49] Here again a principle of natural economy substitutes for a missing mechanism; cf. above, n. 10.

[50] Foremost among the new astronomers, of course, was Galileo, who first reported the moons of Jupiter in his *Starry Messenger* (1610). Later that year he observed what he thought were satellites about Saturn; he mentioned them in the dedication of his *Floating Bodies* (1611) to Cosimo II of Tuscany.

[51] Descartes here introduces the void as a counterfactual hypothesis. He employs the same device later in explicating his theory of light; cf. below, Chap. XIII.

[52] Descartes had clearly never been down to any depth himself nor talked to anyone who had. Nonetheless, one would think that his hydrostatical investigations and his knowledge of those of Stevin and Beeckman would have compensated for the absence of direct experience. The replacement principle just invoked here is the obverse of Archimedes' famous principle that a body immersed in a fluid loses as much weight as the weight of the fluid displaced.

[53] This paragraph in particular shows the necessity of the earth's motion in Descartes' universe.

[54] Compare this and the following chapter to Discourses I and II of the *Dioptrics,* for which they supply the real model of light.

[55] It is important to follow the construction of the diagram here, and hence to modify it. Strictly speaking *E* is a point, the apex of the visual cone *EAD*. By taking a neighborhood of points about E, Descartes generates a space, which he also calls *E*. The light coming to that space is the light contained in all the visual cones having a vertex in the space and a base in the sun, i.e. it is the light contained in the truncated cone *FADG*, where *F* and *G* should lie at the upper corners of the space, as shown in the following figure:

The whole argument seems motivated solely by the need to have a person's eye at *E* see the whole disk of the sun.

[56] Here again the counterfactual use of the void introduced above; cf. n. 51.

[57] The principle of economy again; cf. n.10.

[58] Compare the "packing" argument to follow with the analogy of the wine vat in Discourse I of the *Dioptrics*.

[59] Note the virtue of conceiving of light as a *force* or *tendency to move* rather than as a motion.

[60] Discourse II of the *Dioptrics*.

[61] On the relation of the real model of light (an impulse propagated instantaneously through a medium) and the heuristic model used in the *Dioptrics* (a tennis ball moving through empty space), see M.S. Mahoney, *The Mathematical Career of Pierre de Fermat* (Princeton, 1973, 2nd ed. 1994), App. II.

[62] Discourse I.

[63] Thus Descartes removes perhaps the strongest empirical argument against the Copernican system. If, that is, the earth makes an annual circuit about the sun at a distance sufficient to account for observed planetary phenomena, observations of the fixed stars made from opposite sides of the orbit ought to differ by some amount. No one had been able to ascertain any difference, nor would anyone do so until the nineteenth century. Descartes joined Galileo and other defenders by arguing away the point with reference to the immense distance of the fixed stars.

[64] Among the startling telescopic discoveries announced by Galileo in his Copernican works of the 1610s was the composition of the Milky Way; magnification revealed it to consist of a huge number of separate stars.

[65] The *novae* or "new stars" observed in 1572 and 1604 had much to do with the spread of Copernicanism and of opposition to it.

[66] Note the sloppiness of Descartes' mathematics here. *C* and *D* cannot be common points of tangency unless *T* coincides with *S*. The error makes clear how little of Descartes' argument in fact rested on mathematical reasoning.

[67] In the *Assayer* (trans. Drake in Drake and O'Malley, *Controversy* (see n.45), 190), Galileo describes the phenomenon as a "curl" [*chioma*]; Descartes' term is *chevelure*, which literally means "head of hair."

DISCOURSE ON THE METHOD



Translated by John Veitch

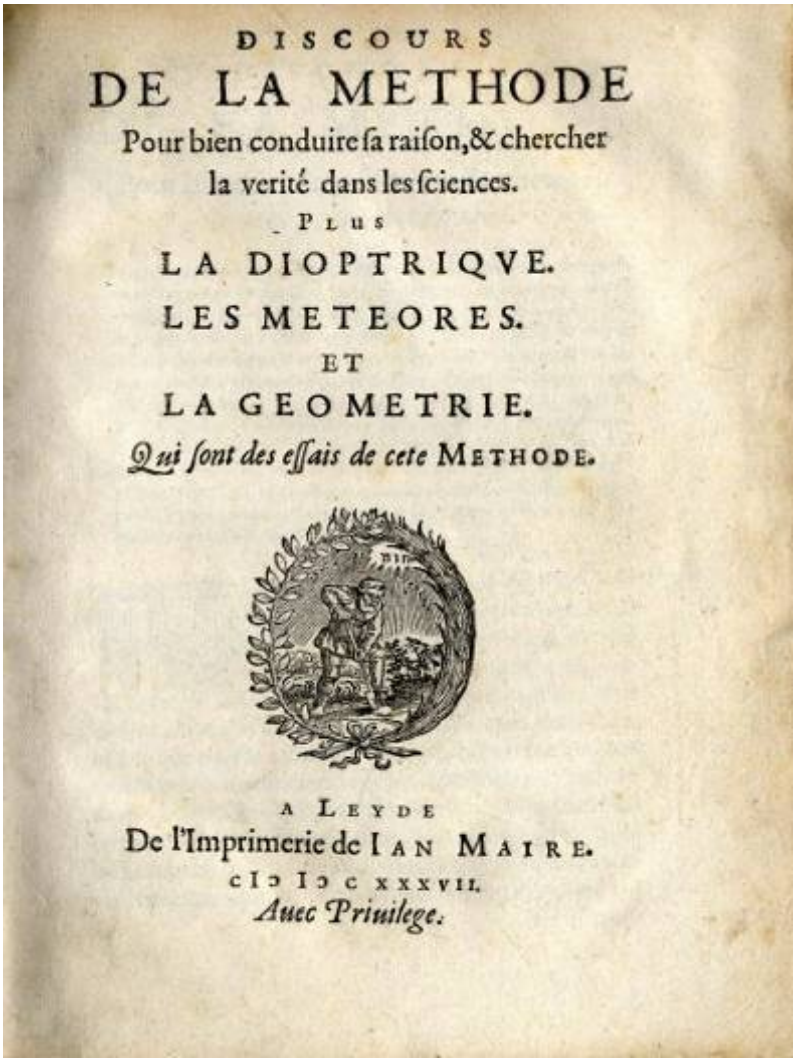
This philosophical and autobiographical treatise was first published in 1637 and is best known as the source of the famous quotation “Je pense, donc je suis” (I think, therefore I am), which appears in Part IV. *The Discourse on the Method* is now regarded as one of the most influential works in the history of modern philosophy. Descartes tackles the problem of skepticism, which had previously been studied by Sextus Empiricus, Al-Ghazali and Michel de Montaigne. Descartes modifies his concept of skepticism to account for a truth he found to be incontrovertible. Beginning his line of reasoning by doubting everything, Descartes assesses the world from a fresh perspective, clear of any preconceived notions.

The book was originally published in Leiden in the Netherlands. Later, it was translated into Latin and published in 1656 in Amsterdam. It was intended as an introduction to three works *Dioptrique*, *Météores* and *Géométrie*. The latter work contains Descartes’ first introduction of the Cartesian coordinate system.

Discourse on the Method is divided into six parts, described in the author’s preface as:

- Various considerations touching the Sciences
- The principal rules of the Method which the Author has discovered
- Certain of the rules of Morals which he has deduced from this Method
- The reasonings by which he establishes the existence of God and of the Human Soul
- The order of the Physical questions which he has investigated, and, in particular, the explication of the motion of the heart and of some other difficulties pertaining to Medicine, as also the difference between the soul of man and that of the brutes

- What the Author believes to be required in order to greater advancement in the investigation of Nature than has yet been made, with the reasons that have induced him to write


DISCOURS
DE LA METHODE
Pour bien conduire ſa raiſon, & chercher
la verité dans les ſciences.
PLUS
LA DIOPTRIQVE.
LES METEORES.
ET
LA GEOMETRIE.
Qui ſont des eſſais de cete METHODE.

A LEYDE
De l'Imprimerie de IAN MAIRE.
cIↃ IↃ C XXXVII.
Auec Priuilege.

The first edition's title page

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William Harvey (1578-1657) was an English physician, who made seminal contributions in anatomy and physiology. He was the first known to describe in detail the systemic circulation and properties of blood being pumped to the brain and body by the heart. Descartes endorses the findings of Harvey, though not by name, ascribing them to "a physician of England," but ascribing the motive power of the circulation to heat rather than muscle power.

PREFATORY NOTE BY THE AUTHOR

If this Discourse appear too long to be read at once, it may be divided into six Parts: and, in the first, will be found various considerations touching the Sciences; in the second, the principal rules of the Method which the Author has discovered, in the third, certain of the rules of Morals which he has deduced from this Method; in the fourth, the reasonings by which he establishes the existence of God and of the Human Soul, which are the foundations of his Metaphysic; in the fifth, the order of the Physical questions which he has investigated, and, in particular, the explication of the motion of the heart and of some other difficulties pertaining to Medicine, as also the difference between the soul of man and that of the brutes; and, in the last, what the Author believes to be required in order to greater advancement in the investigation of Nature than has yet been made, with the reasons that have induced him to write.

PART I

Good sense is, of all things among men, the most equally distributed; for every one thinks himself so abundantly provided with it, that those even who are the most difficult to satisfy in everything else, do not usually desire a larger measure of this quality than they already possess. And in this it is not likely that all are mistaken the conviction is rather to be held as testifying that the power of judging aright and of distinguishing truth from error, which is properly what is called good sense or reason, is by nature equal in all men; and that the diversity of our opinions, consequently, does not arise from some being endowed with a larger share of reason than others, but solely from this, that we conduct our thoughts along different ways, and do not fix our attention on the same objects. For to be possessed of a vigorous mind is not enough; the prime requisite is rightly to apply it. The greatest minds, as they are capable of the highest excellences, are open likewise to the greatest aberrations; and those who travel very slowly may yet make far greater progress, provided they keep always to the straight road, than those who, while they run, forsake it.

For myself, I have never fancied my mind to be in any respect more perfect than those of the generality; on the contrary, I have often wished that I were equal to some others in promptitude of thought, or in clearness and distinctness of imagination, or in fullness and readiness of memory. And besides these, I know of no other qualities that contribute to the perfection of the mind; for as to the reason or sense, inasmuch as it is that alone which constitutes us men, and distinguishes us from the brutes, I am disposed to believe that it is to be found complete in each individual; and on this point to adopt the common opinion of philosophers, who say that the difference of greater and less holds only among the accidents, and not among the forms or natures of individuals of the same species.

I will not hesitate, however, to avow my belief that it has been my singular good fortune to have very early in life fallen in with certain tracks which have conducted me to considerations and maxims, of which I have formed a method that gives me the means, as I think, of gradually augmenting my knowledge, and of raising it by little and little to the highest point which the mediocrity of my talents and the brief duration of my life will permit me to reach. For I have already reaped from it such fruits that,

although I have been accustomed to think lowly enough of myself, and although when I look with the eye of a philosopher at the varied courses and pursuits of mankind at large, I find scarcely one which does not appear in vain and useless, I nevertheless derive the highest satisfaction from the progress I conceive myself to have already made in the search after truth, and cannot help entertaining such expectations of the future as to believe that if, among the occupations of men as men, there is any one really excellent and important, it is that which I have chosen.

After all, it is possible I may be mistaken; and it is but a little copper and glass, perhaps, that I take for gold and diamonds. I know how very liable we are to delusion in what relates to ourselves, and also how much the judgments of our friends are to be suspected when given in our favor. But I shall endeavor in this discourse to describe the paths I have followed, and to delineate my life as in a picture, in order that each one may also be able to judge of them for himself, and that in the general opinion entertained of them, as gathered from current report, I myself may have a new help towards instruction to be added to those I have been in the habit of employing.

My present design, then, is not to teach the method which each ought to follow for the right conduct of his reason, but solely to describe the way in which I have endeavored to conduct my own. They who set themselves to give precepts must of course regard themselves as possessed of greater skill than those to whom they prescribe; and if they err in the slightest particular, they subject themselves to censure. But as this tract is put forth merely as a history, or, if you will, as a tale, in which, amid some examples worthy of imitation, there will be found, perhaps, as many more which it were advisable not to follow, I hope it will prove useful to some without being hurtful to any, and that my openness will find some favor with all.

From my childhood, I have been familiar with letters; and as I was given to believe that by their help a clear and certain knowledge of all that is useful in life might be acquired, I was ardently desirous of instruction. But as soon as I had finished the entire course of study, at the close of which it is customary to be admitted into the order of the learned, I completely changed my opinion. For I found myself involved in so many doubts and errors, that I was convinced I had advanced no farther in all my attempts at learning, than the discovery at every turn of my own ignorance. And yet I was studying in one of the most celebrated schools in Europe, in which I

thought there must be learned men, if such were anywhere to be found. I had been taught all that others learned there; and not contented with the sciences actually taught us, I had, in addition, read all the books that had fallen into my hands, treating of such branches as are esteemed the most curious and rare. I knew the judgment which others had formed of me; and I did not find that I was considered inferior to my fellows, although there were among them some who were already marked out to fill the places of our instructors. And, in fine, our age appeared to me as flourishing, and as fertile in powerful minds as any preceding one. I was thus led to take the liberty of judging of all other men by myself, and of concluding that there was no science in existence that was of such a nature as I had previously been given to believe.

I still continued, however, to hold in esteem the studies of the schools. I was aware that the languages taught in them are necessary to the understanding of the writings of the ancients; that the grace of fable stirs the mind; that the memorable deeds of history elevate it; and, if read with discretion, aid in forming the judgment; that the perusal of all excellent books is, as it were, to interview with the noblest men of past ages, who have written them, and even a studied interview, in which are discovered to us only their choicest thoughts; that eloquence has incomparable force and beauty; that poesy has its ravishing graces and delights; that in the mathematics there are many refined discoveries eminently suited to gratify the inquisitive, as well as further all the arts an lessen the labour of man; that numerous highly useful precepts and exhortations to virtue are contained in treatises on morals; that theology points out the path to heaven; that philosophy affords the means of discoursing with an appearance of truth on all matters, and commands the admiration of the more simple; that jurisprudence, medicine, and the other sciences, secure for their cultivators honors and riches; and, in fine, that it is useful to bestow some attention upon all, even upon those abounding the most in superstition and error, that we may be in a position to determine their real value, and guard against being deceived.

But I believed that I had already given sufficient time to languages, and likewise to the reading of the writings of the ancients, to their histories and fables. For to hold converse with those of other ages and to travel, are almost the same thing. It is useful to know something of the manners of different nations, that we may be enabled to form a more correct judgment

regarding our own, and be prevented from thinking that everything contrary to our customs is ridiculous and irrational, a conclusion usually come to by those whose experience has been limited to their own country. On the other hand, when too much time is occupied in traveling, we become strangers to our native country; and the over curious in the customs of the past are generally ignorant of those of the present. Besides, fictitious narratives lead us to imagine the possibility of many events that are impossible; and even the most faithful histories, if they do not wholly misrepresent matters, or exaggerate their importance to render the account of them more worthy of perusal, omit, at least, almost always the meanest and least striking of the attendant circumstances; hence it happens that the remainder does not represent the truth, and that such as regulate their conduct by examples drawn from this source, are apt to fall into the extravagances of the knight-errants of romance, and to entertain projects that exceed their powers.

I esteemed eloquence highly, and was in raptures with poesy; but I thought that both were gifts of nature rather than fruits of study. Those in whom the faculty of reason is predominant, and who most skillfully dispose their thoughts with a view to render them clear and intelligible, are always the best able to persuade others of the truth of what they lay down, though they should speak only in the language of Lower Brittany, and be wholly ignorant of the rules of rhetoric; and those whose minds are stored with the most agreeable fancies, and who can give expression to them with the greatest embellishment and harmony, are still the best poets, though unacquainted with the art of poetry.

I was especially delighted with the mathematics, on account of the certitude and evidence of their reasonings; but I had not as yet a precise knowledge of their true use; and thinking that they but contributed to the advancement of the mechanical arts, I was astonished that foundations, so strong and solid, should have had no loftier superstructure reared on them. On the other hand, I compared the disquisitions of the ancient moralists to very towering and magnificent palaces with no better foundation than sand and mud: they laud the virtues very highly, and exhibit them as estimable far above anything on earth; but they give us no adequate criterion of virtue, and frequently that which they designate with so fine a name is but apathy, or pride, or despair, or parricide.

I revered our theology, and aspired as much as any one to reach heaven: but being given assuredly to understand that the way is not less open to the

most ignorant than to the most learned, and that the revealed truths which lead to heaven are above our comprehension, I did not presume to subject them to the impotency of my reason; and I thought that in order competently to undertake their examination, there was need of some special help from heaven, and of being more than man.

Of philosophy I will say nothing, except that when I saw that it had been cultivated for many ages by the most distinguished men, and that yet there is not a single matter within its sphere which is not still in dispute, and nothing, therefore, which is above doubt, I did not presume to anticipate that my success would be greater in it than that of others; and further, when I considered the number of conflicting opinions touching a single matter that may be upheld by learned men, while there can be but one true, I reckoned as well-nigh false all that was only probable.

As to the other sciences, inasmuch as these borrow their principles from philosophy, I judged that no solid superstructures could be reared on foundations so infirm; and neither the honor nor the gain held out by them was sufficient to determine me to their cultivation: for I was not, thank Heaven, in a condition which compelled me to make merchandise of science for the bettering of my fortune; and though I might not profess to scorn glory as a cynic, I yet made very slight account of that honor which I hoped to acquire only through fictitious titles. And, in fine, of false sciences I thought I knew the worth sufficiently to escape being deceived by the professions of an alchemist, the predictions of an astrologer, the impostures of a magician, or by the artifices and boasting of any of those who profess to know things of which they are ignorant.

For these reasons, as soon as my age permitted me to pass from under the control of my instructors, I entirely abandoned the study of letters, and resolved no longer to seek any other science than the knowledge of myself, or of the great book of the world. I spent the remainder of my youth in traveling, in visiting courts and armies, in holding intercourse with men of different dispositions and ranks, in collecting varied experience, in proving myself in the different situations into which fortune threw me, and, above all, in making such reflection on the matter of my experience as to secure my improvement. For it occurred to me that I should find much more truth in the reasonings of each individual with reference to the affairs in which he is personally interested, and the issue of which must presently punish him if he has judged amiss, than in those conducted by a man of letters in his

study, regarding speculative matters that are of no practical moment, and followed by no consequences to himself, farther, perhaps, than that they foster his vanity the better the more remote they are from common sense; requiring, as they must in this case, the exercise of greater ingenuity and art to render them probable. In addition, I had always a most earnest desire to know how to distinguish the true from the false, in order that I might be able clearly to discriminate the right path in life, and proceed in it with confidence.

It is true that, while busied only in considering the manners of other men, I found here, too, scarce any ground for settled conviction, and remarked hardly less contradiction among them than in the opinions of the philosophers. So that the greatest advantage I derived from the study consisted in this, that, observing many things which, however extravagant and ridiculous to our apprehension, are yet by common consent received and approved by other great nations, I learned to entertain too decided a belief in regard to nothing of the truth of which I had been persuaded merely by example and custom; and thus I gradually extricated myself from many errors powerful enough to darken our natural intelligence, and incapacitate us in great measure from listening to reason. But after I had been occupied several years in thus studying the book of the world, and in essaying to gather some experience, I at length resolved to make myself an object of study, and to employ all the powers of my mind in choosing the paths I ought to follow, an undertaking which was accompanied with greater success than it would have been had I never quitted my country or my books.

PART II

I was then in Germany, attracted thither by the wars in that country, which have not yet been brought to a termination; and as I was returning to the army from the coronation of the emperor, the setting in of winter arrested me in a locality where, as I found no society to interest me, and was besides fortunately undisturbed by any cares or passions, I remained the whole day in seclusion, with full opportunity to occupy my attention with my own thoughts. Of these one of the very first that occurred to me was, that there is seldom so much perfection in works composed of many separate parts, upon which different hands had been employed, as in those completed by a single master. Thus it is observable that the buildings which a single architect has planned and executed, are generally more elegant and commodious than those which several have attempted to improve, by making old walls serve for purposes for which they were not originally built. Thus also, those ancient cities which, from being at first only villages, have become, in course of time, large towns, are usually but ill laid out compared with the regularity constructed towns which a professional architect has freely planned on an open plain; so that although the several buildings of the former may often equal or surpass in beauty those of the latter, yet when one observes their indiscriminate juxtaposition, there a large one and here a small, and the consequent crookedness and irregularity of the streets, one is disposed to allege that chance rather than any human will guided by reason must have led to such an arrangement. And if we consider that nevertheless there have been at all times certain officers whose duty it was to see that private buildings contributed to public ornament, the difficulty of reaching high perfection with but the materials of others to operate on, will be readily acknowledged. In the same way I fancied that those nations which, starting from a semi-barbarous state and advancing to civilization by slow degrees, have had their laws successively determined, and, as it were, forced upon them simply by experience of the hurtfulness of particular crimes and disputes, would by this process come to be possessed of less perfect institutions than those which, from the commencement of their association as communities, have followed the appointments of some wise legislator. It is thus quite certain that the constitution of the true religion, the ordinances of which are derived from God, must be

incomparably superior to that of every other. And, to speak of human affairs, I believe that the pre-eminence of Sparta was due not to the goodness of each of its laws in particular, for many of these were very strange, and even opposed to good morals, but to the circumstance that, originated by a single individual, they all tended to a single end. In the same way I thought that the sciences contained in books (such of them at least as are made up of probable reasonings, without demonstrations), composed as they are of the opinions of many different individuals massed together, are farther removed from truth than the simple inferences which a man of good sense using his natural and unprejudiced judgment draws respecting the matters of his experience. And because we have all to pass through a state of infancy to manhood, and have been of necessity, for a length of time, governed by our desires and preceptors (whose dictates were frequently conflicting, while neither perhaps always counseled us for the best), I farther concluded that it is almost impossible that our judgments can be so correct or solid as they would have been, had our reason been mature from the moment of our birth, and had we always been guided by it alone.

It is true, however, that it is not customary to pull down all the houses of a town with the single design of rebuilding them differently, and thereby rendering the streets more handsome; but it often happens that a private individual takes down his own with the view of erecting it anew, and that people are even sometimes constrained to this when their houses are in danger of falling from age, or when the foundations are insecure. With this before me by way of example, I was persuaded that it would indeed be preposterous for a private individual to think of reforming a state by fundamentally changing it throughout, and overturning it in order to set it up amended; and the same I thought was true of any similar project for reforming the body of the sciences, or the order of teaching them established in the schools: but as for the opinions which up to that time I had embraced, I thought that I could not do better than resolve at once to sweep them wholly away, that I might afterwards be in a position to admit either others more correct, or even perhaps the same when they had undergone the scrutiny of reason. I firmly believed that in this way I should much better succeed in the conduct of my life, than if I built only upon old foundations, and leaned upon principles which, in my youth, I had taken upon trust. For although I recognized various difficulties in this undertaking, these were not, however, without remedy, nor once to be

compared with such as attend the slightest reformation in public affairs. Large bodies, if once overthrown, are with great difficulty set up again, or even kept erect when once seriously shaken, and the fall of such is always disastrous. Then if there are any imperfections in the constitutions of states (and that many such exist the diversity of constitutions is alone sufficient to assure us), custom has without doubt materially smoothed their inconveniences, and has even managed to steer altogether clear of, or insensibly corrected a number which sagacity could not have provided against with equal effect; and, in fine, the defects are almost always more tolerable than the change necessary for their removal; in the same manner that highways which wind among mountains, by being much frequented, become gradually so smooth and commodious, that it is much better to follow them than to seek a straighter path by climbing over the tops of rocks and descending to the bottoms of precipices.

Hence it is that I cannot in any degree approve of those restless and busy meddlers who, called neither by birth nor fortune to take part in the management of public affairs, are yet always projecting reforms; and if I thought that this tract contained aught which might justify the suspicion that I was a victim of such folly, I would by no means permit its publication. I have never contemplated anything higher than the reformation of my own opinions, and basing them on a foundation wholly my own. And although my own satisfaction with my work has led me to present here a draft of it, I do not by any means therefore recommend to every one else to make a similar attempt. Those whom God has endowed with a larger measure of genius will entertain, perhaps, designs still more exalted; but for the many I am much afraid lest even the present undertaking be more than they can safely venture to imitate. The single design to strip one’s self of all past beliefs is one that ought not to be taken by every one. The majority of men is composed of two classes, for neither of which would this be at all a befitting resolution: in the first place, of those who with more than a due confidence in their own powers, are precipitate in their judgments and want the patience requisite for orderly and circumspect thinking; whence it happens, that if men of this class once take the liberty to doubt of their accustomed opinions, and quit the beaten highway, they will never be able to thread the byway that would lead them by a shorter course, and will lose themselves and continue to wander for life; in the second place, of those who, possessed of sufficient sense or modesty to determine that there are

others who excel them in the power of discriminating between truth and error, and by whom they may be instructed, ought rather to content themselves with the opinions of such than trust for more correct to their own reason.

For my own part, I should doubtless have belonged to the latter class, had I received instruction from but one master, or had I never known the diversities of opinion that from time immemorial have prevailed among men of the greatest learning. But I had become aware, even so early as during my college life, that no opinion, however absurd and incredible, can be imagined, which has not been maintained by some on of the philosophers; and afterwards in the course of my travels I remarked that all those whose opinions are decidedly repugnant to ours are not in that account barbarians and savages, but on the contrary that many of these nations make an equally good, if not better, use of their reason than we do. I took into account also the very different character which a person brought up from infancy in France or Germany exhibits, from that which, with the same mind originally, this individual would have possessed had he lived always among the Chinese or with savages, and the circumstance that in dress itself the fashion which pleased us ten years ago, and which may again, perhaps, be received into favor before ten years have gone, appears to us at this moment extravagant and ridiculous. I was thus led to infer that the ground of our opinions is far more custom and example than any certain knowledge. And, finally, although such be the ground of our opinions, I remarked that a plurality of suffrages is no guarantee of truth where it is at all of difficult discovery, as in such cases it is much more likely that it will be found by one than by many. I could, however, select from the crowd no one whose opinions seemed worthy of preference, and thus I found myself constrained, as it were, to use my own reason in the conduct of my life.

But like one walking alone and in the dark, I resolved to proceed so slowly and with such circumspection, that if I did not advance far, I would at least guard against falling. I did not even choose to dismiss summarily any of the opinions that had crept into my belief without having been introduced by reason, but first of all took sufficient time carefully to satisfy myself of the general nature of the task I was setting myself, and ascertain the true method by which to arrive at the knowledge of whatever lay within the compass of my powers.

Among the branches of philosophy, I had, at an earlier period, given some attention to logic, and among those of the mathematics to geometrical analysis and algebra, — three arts or sciences which ought, as I conceived, to contribute something to my design. But, on examination, I found that, as for logic, its syllogisms and the majority of its other precepts are of avail — rather in the communication of what we already know, or even as the art of Lully, in speaking without judgment of things of which we are ignorant, than in the investigation of the unknown; and although this science contains indeed a number of correct and very excellent precepts, there are, nevertheless, so many others, and these either injurious or superfluous, mingled with the former, that it is almost quite as difficult to effect a severance of the true from the false as it is to extract a Diana or a Minerva from a rough block of marble. Then as to the analysis of the ancients and the algebra of the moderns, besides that they embrace only matters highly abstract, and, to appearance, of no use, the former is so exclusively restricted to the consideration of figures, that it can exercise the understanding only on condition of greatly fatiguing the imagination; and, in the latter, there is so complete a subjection to certain rules and formulas, that there results an art full of confusion and obscurity calculated to embarrass, instead of a science fitted to cultivate the mind. By these considerations I was induced to seek some other method which would comprise the advantages of the three and be exempt from their defects. And as a multitude of laws often only hampers justice, so that a state is best governed when, with few laws, these are rigidly administered; in like manner, instead of the great number of precepts of which logic is composed, I believed that the four following would prove perfectly sufficient for me, provided I took the firm and unwavering resolution never in a single instance to fail in observing them.

The first was never to accept anything for true which I did not clearly know to be such; that is to say, carefully to avoid precipitancy and prejudice, and to comprise nothing more in my judgement than what was presented to my mind so clearly and distinctly as to exclude all ground of doubt.

The second, to divide each of the difficulties under examination into as many parts as possible, and as might be necessary for its adequate solution.

The third, to conduct my thoughts in such order that, by commencing with objects the simplest and easiest to know, I might ascend by little and

little, and, as it were, step by step, to the knowledge of the more complex; assigning in thought a certain order even to those objects which in their own nature do not stand in a relation of antecedence and sequence.

And the last, in every case to make enumerations so complete, and reviews so general, that I might be assured that nothing was omitted.

The long chains of simple and easy reasonings by means of which geometers are accustomed to reach the conclusions of their most difficult demonstrations, had led me to imagine that all things, to the knowledge of which man is competent, are mutually connected in the same way, and that there is nothing so far removed from us as to be beyond our reach, or so hidden that we cannot discover it, provided only we abstain from accepting the false for the true, and always preserve in our thoughts the order necessary for the deduction of one truth from another. And I had little difficulty in determining the objects with which it was necessary to commence, for I was already persuaded that it must be with the simplest and easiest to know, and, considering that of all those who have hitherto sought truth in the sciences, the mathematicians alone have been able to find any demonstrations, that is, any certain and evident reasons, I did not doubt but that such must have been the rule of their investigations. I resolved to commence, therefore, with the examination of the simplest objects, not anticipating, however, from this any other advantage than that to be found in accustoming my mind to the love and nourishment of truth, and to a distaste for all such reasonings as were unsound. But I had no intention on that account of attempting to master all the particular sciences commonly denominated mathematics: but observing that, however different their objects, they all agree in considering only the various relations or proportions subsisting among those objects, I thought it best for my purpose to consider these proportions in the most general form possible, without referring them to any objects in particular, except such as would most facilitate the knowledge of them, and without by any means restricting them to these, that afterwards I might thus be the better able to apply them to every other class of objects to which they are legitimately applicable. Perceiving further, that in order to understand these relations I should sometimes have to consider them one by one and sometimes only to bear them in mind, or embrace them in the aggregate, I thought that, in order the better to consider them individually, I should view them as subsisting between straight lines, than which I could find no objects more simple, or

capable of being more distinctly represented to my imagination and senses; and on the other hand, that in order to retain them in the memory or embrace an aggregate of many, I should express them by certain characters the briefest possible. In this way I believed that I could borrow all that was best both in geometrical analysis and in algebra, and correct all the defects of the one by help of the other.

And, in point of fact, the accurate observance of these few precepts gave me, I take the liberty of saying, such ease in unraveling all the questions embraced in these two sciences, that in the two or three months I devoted to their examination, not only did I reach solutions of questions I had formerly deemed exceedingly difficult but even as regards questions of the solution of which I continued ignorant, I was enabled, as it appeared to me, to determine the means whereby, and the extent to which a solution was possible; results attributable to the circumstance that I commenced with the simplest and most general truths, and that thus each truth discovered was a rule available in the discovery of subsequent ones Nor in this perhaps shall I appear too vain, if it be considered that, as the truth on any particular point is one whoever apprehends the truth, knows all that on that point can be known. The child, for example, who has been instructed in the elements of arithmetic, and has made a particular addition, according to rule, may be assured that he has found, with respect to the sum of the numbers before him, and that in this instance is within the reach of human genius. Now, in conclusion, the method which teaches adherence to the true order, and an exact enumeration of all the conditions of the thing sought includes all that gives certitude to the rules of arithmetic.

But the chief ground of my satisfaction with thus method, was the assurance I had of thereby exercising my reason in all matters, if not with absolute perfection, at least with the greatest attainable by me: besides, I was conscious that by its use my mind was becoming gradually habituated to clearer and more distinct conceptions of its objects; and I hoped also, from not having restricted this method to any particular matter, to apply it to the difficulties of the other sciences, with not less success than to those of algebra. I should not, however, on this account have ventured at once on the examination of all the difficulties of the sciences which presented themselves to me, for this would have been contrary to the order prescribed in the method, but observing that the knowledge of such is dependent on principles borrowed from philosophy, in which I found nothing certain, I

thought it necessary first of all to endeavor to establish its principles. And because I observed, besides, that an inquiry of this kind was of all others of the greatest moment, and one in which precipitancy and anticipation in judgment were most to be dreaded, I thought that I ought not to approach it till I had reached a more mature age (being at that time but twenty-three), and had first of all employed much of my time in preparation for the work, as well by eradicating from my mind all the erroneous opinions I had up to that moment accepted, as by amassing variety of experience to afford materials for my reasonings, and by continually exercising myself in my chosen method with a view to increased skill in its application.

PART III

And finally, as it is not enough, before commencing to rebuild the house in which we live, that it be pulled down, and materials and builders provided, or that we engage in the work ourselves, according to a plan which we have beforehand carefully drawn out, but as it is likewise necessary that we be furnished with some other house in which we may live commodiously during the operations, so that I might not remain irresolute in my actions, while my reason compelled me to suspend my judgement, and that I might not be prevented from living thenceforward in the greatest possible felicity, I formed a provisory code of morals, composed of three or four maxims, with which I am desirous to make you acquainted.

The first was to obey the laws and customs of my country, adhering firmly to the faith in which, by the grace of God, I had been educated from my childhood and regulating my conduct in every other matter according to the most moderate opinions, and the farthest removed from extremes, which should happen to be adopted in practice with general consent of the most judicious of those among whom I might be living. For as I had from that time begun to hold my own opinions for nought because I wished to subject them all to examination, I was convinced that I could not do better than follow in the meantime the opinions of the most judicious; and although there are some perhaps among the Persians and Chinese as judicious as among ourselves, expediency seemed to dictate that I should regulate my practice conformably to the opinions of those with whom I should have to live; and it appeared to me that, in order to ascertain the real opinions of such, I ought rather to take cognizance of what they practised than of what they said, not only because, in the corruption of our manners, there are few disposed to speak exactly as they believe, but also because very many are not aware of what it is that they really believe; for, as the act of mind by which a thing is believed is different from that by which we know that we believe it, the one act is often found without the other. Also, amid many opinions held in equal repute, I chose always the most moderate, as much for the reason that these are always the most convenient for practice, and probably the best (for all excess is generally vicious), as that, in the event of my falling into error, I might be at less distance from the truth than if, having chosen one of the extremes, it should turn out to be the other which I

ought to have adopted. And I placed in the class of extremes especially all promises by which somewhat of our freedom is abridged; not that I disapproved of the laws which, to provide against the instability of men of feeble resolution, when what is sought to be accomplished is some good, permit engagements by vows and contracts binding the parties to persevere in it, or even, for the security of commerce, sanction similar engagements where the purpose sought to be realized is indifferent: but because I did not find anything on earth which was wholly superior to change, and because, for myself in particular, I hoped gradually to perfect my judgments, and not to suffer them to deteriorate, I would have deemed it a grave sin against good sense, if, for the reason that I approved of something at a particular time, I therefore bound myself to hold it for good at a subsequent time, when perhaps it had ceased to be so, or I had ceased to esteem it such.

My second maxim was to be as firm and resolute in my actions as I was able, and not to adhere less steadfastly to the most doubtful opinions, when once adopted, than if they had been highly certain; imitating in this the example of travelers who, when they have lost their way in a forest, ought not to wander from side to side, far less remain in one place, but proceed constantly towards the same side in as straight a line as possible, without changing their direction for slight reasons, although perhaps it might be chance alone which at first determined the selection; for in this way, if they do not exactly reach the point they desire, they will come at least in the end to some place that will probably be preferable to the middle of a forest. In the same way, since in action it frequently happens that no delay is permissible, it is very certain that, when it is not in our power to determine what is true, we ought to act according to what is most probable; and even although we should not remark a greater probability in one opinion than in another, we ought notwithstanding to choose one or the other, and afterwards consider it, in so far as it relates to practice, as no longer dubious, but manifestly true and certain, since the reason by which our choice has been determined is itself possessed of these qualities. This principle was sufficient thenceforward to rid me of all those repentings and pangs of remorse that usually disturb the consciences of such feeble and uncertain minds as, destitute of any clear and determinate principle of choice, allow themselves one day to adopt a course of action as the best, which they abandon the next, as the opposite.

My third maxim was to endeavor always to conquer myself rather than fortune, and change my desires rather than the order of the world, and in general, accustom myself to the persuasion that, except our own thoughts, there is nothing absolutely in our power; so that when we have done our best in things external to us, all wherein we fail of success is to be held, as regards us, absolutely impossible: and this single principle seemed to me sufficient to prevent me from desiring for the future anything which I could not obtain, and thus render me contented; for since our will naturally seeks those objects alone which the understanding represents as in some way possible of attainment, it is plain, that if we consider all external goods as equally beyond our power, we shall no more regret the absence of such goods as seem due to our birth, when deprived of them without any fault of ours, than our not possessing the kingdoms of China or Mexico, and thus making, so to speak, a virtue of necessity, we shall no more desire health in disease, or freedom in imprisonment, than we now do bodies incorruptible as diamonds, or the wings of birds to fly with. But I confess there is need of prolonged discipline and frequently repeated meditation to accustom the mind to view all objects in this light; and I believe that in this chiefly consisted the secret of the power of such philosophers as in former times were enabled to rise superior to the influence of fortune, and, amid suffering and poverty, enjoy a happiness which their gods might have envied. For, occupied incessantly with the consideration of the limits prescribed to their power by nature, they became so entirely convinced that nothing was at their disposal except their own thoughts, that this conviction was of itself sufficient to prevent their entertaining any desire of other objects; and over their thoughts they acquired a sway so absolute, that they had some ground on this account for esteeming themselves more rich and more powerful, more free and more happy, than other men who, whatever be the favors heaped on them by nature and fortune, if destitute of this philosophy, can never command the realization of all their desires.

In fine, to conclude this code of morals, I thought of reviewing the different occupations of men in this life, with the view of making choice of the best. And, without wishing to offer any remarks on the employments of others, I may state that it was my conviction that I could not do better than continue in that in which I was engaged, viz., in devoting my whole life to the culture of my reason, and in making the greatest progress I was able in the knowledge of truth, on the principles of the method which I had

prescribed to myself. This method, from the time I had begun to apply it, had been to me the source of satisfaction so intense as to lead me to, believe that more perfect or more innocent could not be enjoyed in this life; and as by its means I daily discovered truths that appeared to me of some importance, and of which other men were generally ignorant, the gratification thence arising so occupied my mind that I was wholly indifferent to every other object. Besides, the three preceding maxims were founded singly on the design of continuing the work of self-instruction. For since God has endowed each of us with some light of reason by which to distinguish truth from error, I could not have believed that I ought for a single moment to rest satisfied with the opinions of another, unless I had resolved to exercise my own judgment in examining these whenever I should be duly qualified for the task. Nor could I have proceeded on such opinions without scruple, had I supposed that I should thereby forfeit any advantage for attaining still more accurate, should such exist. And, in fine, I could not have restrained my desires, nor remained satisfied had I not followed a path in which I thought myself certain of attaining all the knowledge to the acquisition of which I was competent, as well as the largest amount of what is truly good which I could ever hope to secure Inasmuch as we neither seek nor shun any object except in so far as our understanding represents it as good or bad, all that is necessary to right action is right judgment, and to the best action the most correct judgment, that is, to the acquisition of all the virtues with all else that is truly valuable and within our reach; and the assurance of such an acquisition cannot fail to render us contented.

Having thus provided myself with these maxims, and having placed them in reserve along with the truths of faith, which have ever occupied the first place in my belief, I came to the conclusion that I might with freedom set about ridding myself of what remained of my opinions. And, inasmuch as I hoped to be better able successfully to accomplish this work by holding intercourse with mankind, than by remaining longer shut up in the retirement where these thoughts had occurred to me, I betook me again to traveling before the winter was well ended. And, during the nine subsequent years, I did nothing but roam from one place to another, desirous of being a spectator rather than an actor in the plays exhibited on the theater of the world; and, as I made it my business in each matter to reflect particularly upon what might fairly be doubted and prove a source of error, I gradually

rooted out from my mind all the errors which had hitherto crept into it. Not that in this I imitated the sceptics who doubt only that they may doubt, and seek nothing beyond uncertainty itself; for, on the contrary, my design was singly to find ground of assurance, and cast aside the loose earth and sand, that I might reach the rock or the clay. In this, as appears to me, I was successful enough; for, since I endeavored to discover the falsehood or incertitude of the propositions I examined, not by feeble conjectures, but by clear and certain reasonings, I met with nothing so doubtful as not to yield some conclusion of adequate certainty, although this were merely the inference, that the matter in question contained nothing certain. And, just as in pulling down an old house, we usually reserve the ruins to contribute towards the erection, so, in destroying such of my opinions as I judged to be Ill-founded, I made a variety of observations and acquired an amount of experience of which I availed myself in the establishment of more certain. And further, I continued to exercise myself in the method I had prescribed; for, besides taking care in general to conduct all my thoughts according to its rules, I reserved some hours from time to time which I expressly devoted to the employment of the method in the solution of mathematical difficulties, or even in the solution likewise of some questions belonging to other sciences, but which, by my having detached them from such principles of these sciences as were of inadequate certainty, were rendered almost mathematical: the truth of this will be manifest from the numerous examples contained in this volume. And thus, without in appearance living otherwise than those who, with no other occupation than that of spending their lives agreeably and innocently, study to sever pleasure from vice, and who, that they may enjoy their leisure without ennui, have recourse to such pursuits as are honorable, I was nevertheless prosecuting my design, and making greater progress in the knowledge of truth, than I might, perhaps, have made had I been engaged in the perusal of books merely, or in holding converse with men of letters.

These nine years passed away, however, before I had come to any determinate judgment respecting the difficulties which form matter of dispute among the learned, or had commenced to seek the principles of any philosophy more certain than the vulgar. And the examples of many men of the highest genius, who had, in former times, engaged in this inquiry, but, as appeared to me, without success, led me to imagine it to be a work of so much difficulty, that I would not perhaps have ventured on it so soon had I

not heard it currently rumored that I had already completed the inquiry. I know not what were the grounds of this opinion; and, if my conversation contributed in any measure to its rise, this must have happened rather from my having confessed my Ignorance with greater freedom than those are accustomed to do who have studied a little, and expounded perhaps, the reasons that led me to doubt of many of those things that by others are esteemed certain, than from my having boasted of any system of philosophy. But, as I am of a disposition that makes me unwilling to be esteemed different from what I really am, I thought it necessary to endeavor by all means to render myself worthy of the reputation accorded to me; and it is now exactly eight years since this desire constrained me to remove from all those places where interruption from any of my acquaintances was possible, and betake myself to this country, in which the long duration of the war has led to the establishment of such discipline, that the armies maintained seem to be of use only in enabling the inhabitants to enjoy more securely the blessings of peace and where, in the midst of a great crowd actively engaged in business, and more careful of their own affairs than curious about those of others, I have been enabled to live without being deprived of any of the conveniences to be had in the most populous cities, and yet as solitary and as retired as in the midst of the most remote deserts.

PART IV

I am in doubt as to the propriety of making my first meditations in the place above mentioned matter of discourse; for these are so metaphysical, and so uncommon, as not, perhaps, to be acceptable to every one. And yet, that it may be determined whether the foundations that I have laid are sufficiently secure, I find myself in a measure constrained to advert to them. I had long before remarked that, in relation to practice, it is sometimes necessary to adopt, as if above doubt, opinions which we discern to be highly uncertain, as has been already said; but as I then desired to give my attention solely to the search after truth, I thought that a procedure exactly the opposite was called for, and that I ought to reject as absolutely false all opinions in regard to which I could suppose the least ground for doubt, in order to ascertain whether after that there remained aught in my belief that was wholly indubitable. Accordingly, seeing that our senses sometimes deceive us, I was willing to suppose that there existed nothing really such as they presented to us; and because some men err in reasoning, and fall into paralogisms, even on the simplest matters of geometry, I, convinced that I was as open to error as any other, rejected as false all the reasonings I had hitherto taken for demonstrations; and finally, when I considered that the very same thoughts (presentations) which we experience when awake may also be experienced when we are asleep, while there is at that time not one of them true, I supposed that all the objects (presentations) that had ever entered into my mind when awake, had in them no more truth than the illusions of my dreams. But immediately upon this I observed that, whilst I thus wished to think that all was false, it was absolutely necessary that I, who thus thought, should be somewhat; and as I observed that this truth, I think, therefore I am (COGITO ERGO SUM), was so certain and of such evidence that no ground of doubt, however extravagant, could be alleged by the sceptics capable of shaking it, I concluded that I might, without scruple, accept it as the first principle of the philosophy of which I was in search.

In the next place, I attentively examined what I was and as I observed that I could suppose that I had no body, and that there was no world nor any place in which I might be; but that I could not therefore suppose that I was not; and that, on the contrary, from the very circumstance that I thought to doubt of the truth of other things, it most clearly and certainly followed that

I was; while, on the other hand, if I had only ceased to think, although all the other objects which I had ever imagined had been in reality existent, I would have had no reason to believe that I existed; I thence concluded that I was a substance whose whole essence or nature consists only in thinking, and which, that it may exist, has need of no place, nor is dependent on any material thing; so that "I," that is to say, the mind by which I am what I am, is wholly distinct from the body, and is even more easily known than the latter, and is such, that although the latter were not, it would still continue to be all that it is.

After this I inquired in general into what is essential to the truth and certainty of a proposition; for since I had discovered one which I knew to be true, I thought that I must likewise be able to discover the ground of this certitude. And as I observed that in the words I think, therefore I am, there is nothing at all which gives me assurance of their truth beyond this, that I see very clearly that in order to think it is necessary to exist, I concluded that I might take, as a general rule, the principle, that all the things which we very clearly and distinctly conceive are true, only observing, however, that there is some difficulty in rightly determining the objects which we distinctly conceive.

In the next place, from reflecting on the circumstance that I doubted, and that consequently my being was not wholly perfect (for I clearly saw that it was a greater perfection to know than to doubt), I was led to inquire whence I had learned to think of something more perfect than myself; and I clearly recognized that I must hold this notion from some nature which in reality was more perfect. As for the thoughts of many other objects external to me, as of the sky, the earth, light, heat, and a thousand more, I was less at a loss to know whence these came; for since I remarked in them nothing which seemed to render them superior to myself, I could believe that, if these were true, they were dependencies on my own nature, in so far as it possessed a certain perfection, and, if they were false, that I held them from nothing, that is to say, that they were in me because of a certain imperfection of my nature. But this could not be the case with-the idea of a nature more perfect than myself; for to receive it from nothing was a thing manifestly impossible; and, because it is not less repugnant that the more perfect should be an effect of, and dependence on the less perfect, than that something should proceed from nothing, it was equally impossible that I could hold it from myself: accordingly, it but remained that it had been

placed in me by a nature which was in reality more perfect than mine, and which even possessed within itself all the perfections of which I could form any idea; that is to say, in a single word, which was God. And to this I added that, since I knew some perfections which I did not possess, I was not the only being in existence (I will here, with your permission, freely use the terms of the schools); but, on the contrary, that there was of necessity some other more perfect Being upon whom I was dependent, and from whom I had received all that I possessed; for if I had existed alone, and independently of every other being, so as to have had from myself all the perfection, however little, which I actually possessed, I should have been able, for the same reason, to have had from myself the whole remainder of perfection, of the want of which I was conscious, and thus could of myself have become infinite, eternal, immutable, omniscient, all-powerful, and, in fine, have possessed all the perfections which I could recognize in God. For in order to know the nature of God (whose existence has been established by the preceding reasonings), as far as my own nature permitted, I had only to consider in reference to all the properties of which I found in my mind some idea, whether their possession was a mark of perfection; and I was assured that no one which indicated any imperfection was in him, and that none of the rest was awanting. Thus I perceived that doubt, inconstancy, sadness, and such like, could not be found in God, since I myself would have been happy to be free from them. Besides, I had ideas of many sensible and corporeal things; for although I might suppose that I was dreaming, and that all which I saw or imagined was false, I could not, nevertheless, deny that the ideas were in reality in my thoughts. But, because I had already very clearly recognized in myself that the intelligent nature is distinct from the corporeal, and as I observed that all composition is an evidence of dependency, and that a state of dependency is manifestly a state of imperfection, I therefore determined that it could not be a perfection in God to be compounded of these two natures and that consequently he was not so compounded; but that if there were any bodies in the world, or even any intelligences, or other natures that were not wholly perfect, their existence depended on his power in such a way that they could not subsist without him for a single moment.

I was disposed straightway to search for other truths and when I had represented to myself the object of the geometers, which I conceived to be a continuous body or a space indefinitely extended in length, breadth, and

height or depth, divisible into divers parts which admit of different figures and sizes, and of being moved or transposed in all manner of ways (for all this the geometers suppose to be in the object they contemplate), I went over some of their simplest demonstrations. And, in the first place, I observed, that the great certitude which by common consent is accorded to these demonstrations, is founded solely upon this, that they are clearly conceived in accordance with the rules I have already laid down In the next place, I perceived that there was nothing at all in these demonstrations which could assure me of the existence of their object: thus, for example, supposing a triangle to be given, I distinctly perceived that its three angles were necessarily equal to two right angles, but I did not on that account perceive anything which could assure me that any triangle existed: while, on the contrary, recurring to the examination of the idea of a Perfect Being, I found that the existence of the Being was comprised in the idea in the same way that the equality of its three angles to two right angles is comprised in the idea of a triangle, or as in the idea of a sphere, the equidistance of all points on its surface from the center, or even still more clearly; and that consequently it is at least as certain that God, who is this Perfect Being, is, or exists, as any demonstration of geometry can be.

But the reason which leads many to persuade them selves that there is a difficulty in knowing this truth, and even also in knowing what their mind really is, is that they never raise their thoughts above sensible objects, and are so accustomed to consider nothing except by way of imagination, which is a mode of thinking limited to material objects, that all that is not imaginable seems to them not intelligible. The truth of this is sufficiently manifest from the single circumstance, that the philosophers of the schools accept as a maxim that there is nothing in the understanding which was not previously in the senses, in which however it is certain that the ideas of God and of the soul have never been; and it appears to me that they who make use of their imagination to comprehend these ideas do exactly the some thing as if, in order to hear sounds or smell odors, they strove to avail themselves of their eyes; unless indeed that there is this difference, that the sense of sight does not afford us an inferior assurance to those of smell or hearing; in place of which, neither our imagination nor our senses can give us assurance of anything unless our understanding intervene.

Finally, if there be still persons who are not sufficiently persuaded of the existence of God and of the soul, by the reasons I have adduced, I am

desirous that they should know that all the other propositions, of the truth of which they deem themselves perhaps more assured, as that we have a body, and that there exist stars and an earth, and such like, are less certain; for, although we have a moral assurance of these things, which is so strong that there is an appearance of extravagance in doubting of their existence, yet at the same time no one, unless his intellect is impaired, can deny, when the question relates to a metaphysical certitude, that there is sufficient reason to exclude entire assurance, in the observation that when asleep we can in the same way imagine ourselves possessed of another body and that we see other stars and another earth, when there is nothing of the kind. For how do we know that the thoughts which occur in dreaming are false rather than those other which we experience when awake, since the former are often not less vivid and distinct than the latter? And though men of the highest genius study this question as long as they please, I do not believe that they will be able to give any reason which can be sufficient to remove this doubt, unless they presuppose the existence of God. For, in the first place even the principle which I have already taken as a rule, viz., that all the things which we clearly and distinctly conceive are true, is certain only because God is or exists and because he is a Perfect Being, and because all that we possess is derived from him: whence it follows that our ideas or notions, which to the extent of their clearness and distinctness are real, and proceed from God, must to that extent be true. Accordingly, whereas we not infrequently have ideas or notions in which some falsity is contained, this can only be the case with such as are to some extent confused and obscure, and in this proceed from nothing (participate of negation), that is, exist in us thus confused because we are not wholly perfect. And it is evident that it is not less repugnant that falsity or imperfection, in so far as it is imperfection, should proceed from God, than that truth or perfection should proceed from nothing. But if we did not know that all which we possess of real and true proceeds from a Perfect and Infinite Being, however clear and distinct our ideas might be, we should have no ground on that account for the assurance that they possessed the perfection of being true.

But after the knowledge of God and of the soul has rendered us certain of this rule, we can easily understand that the truth of the thoughts we experience when awake, ought not in the slightest degree to be called in question on account of the illusions of our dreams. For if it happened that an individual, even when asleep, had some very distinct idea, as, for

example, if a geometer should discover some new demonstration, the circumstance of his being asleep would not militate against its truth; and as for the most ordinary error of our dreams, which consists in their representing to us various objects in the same way as our external senses, this is not prejudicial, since it leads us very properly to suspect the truth of the ideas of sense; for we are not infrequently deceived in the same manner when awake; as when persons in the jaundice see all objects yellow, or when the stars or bodies at a great distance appear to us much smaller than they are. For, in fine, whether awake or asleep, we ought never to allow ourselves to be persuaded of the truth of anything unless on the evidence of our reason. And it must be noted that I say of our reason, and not of our imagination or of our senses: thus, for example, although we very clearly see the sun, we ought not therefore to determine that it is only of the size which our sense of sight presents; and we may very distinctly imagine the head of a lion joined to the body of a goat, without being therefore shut up to the conclusion that a chimaera exists; for it is not a dictate of reason that what we thus see or imagine is in reality existent; but it plainly tells us that all our ideas or notions contain in them some truth; for otherwise it could not be that God, who is wholly perfect and veracious, should have placed them in us. And because our reasonings are never so clear or so complete during sleep as when we are awake, although sometimes the acts of our imagination are then as lively and distinct, if not more so than in our waking moments, reason further dictates that, since all our thoughts cannot be true because of our partial imperfection, those possessing truth must infallibly be found in the experience of our waking moments rather than in that of our dreams.

PART V

I would here willingly have proceeded to exhibit the whole chain of truths which I deduced from these primary but as with a view to this it would have been necessary now to treat of many questions in dispute among the earned, with whom I do not wish to be embroiled, I believe that it will be better for me to refrain from this exposition, and only mention in general what these truths are, that the more judicious may be able to determine whether a more special account of them would conduce to the public advantage. I have ever remained firm in my original resolution to suppose no other principle than that of which I have recently availed myself in demonstrating the existence of God and of the soul, and to accept as true nothing that did not appear to me more clear and certain than the demonstrations of the geometers had formerly appeared; and yet I venture to state that not only have I found means to satisfy myself in a short time on all the principal difficulties which are usually treated of in philosophy, but I have also observed certain laws established in nature by God in such a manner, and of which he has impressed on our minds such notions, that after we have reflected sufficiently upon these, we cannot doubt that they are accurately observed in all that exists or takes place in the world and farther, by considering the concatenation of these laws, it appears to me that I have discovered many truths more useful and more important than all I had before learned, or even had expected to learn.

But because I have essayed to expound the chief of these discoveries in a treatise which certain considerations prevent me from publishing, I cannot make the results known more conveniently than by here giving a summary of the contents of this treatise. It was my design to comprise in it all that, before I set myself to write it, I thought I knew of the nature of material objects. But like the painters who, finding themselves unable to represent equally well on a plain surface all the different faces of a solid body, select one of the chief, on which alone they make the light fall, and throwing the rest into the shade, allow them to appear only in so far as they can be seen while looking at the principal one; so, fearing lest I should not be able to compense in my discourse all that was in my mind, I resolved to expound singly, though at considerable length, my opinions regarding light; then to take the opportunity of adding something on the sun and the fixed stars,

since light almost wholly proceeds from them; on the heavens since they transmit it; on the planets, comets, and earth, since they reflect it; and particularly on all the bodies that are upon the earth, since they are either colored, or transparent, or luminous; and finally on man, since he is the spectator of these objects. Further, to enable me to cast this variety of subjects somewhat into the shade, and to express my judgment regarding them with greater freedom, without being necessitated to adopt or refute the opinions of the learned, I resolved to leave all the people here to their disputes, and to speak only of what would happen in a new world, if God were now to create somewhere in the imaginary spaces matter sufficient to compose one, and were to agitate variously and confusedly the different parts of this matter, so that there resulted a chaos as disordered as the poets ever feigned, and after that did nothing more than lend his ordinary concurrence to nature, and allow her to act in accordance with the laws which he had established. On this supposition, I, in the first place, described this matter, and essayed to represent it in such a manner that to my mind there can be nothing clearer and more intelligible, except what has been recently said regarding God and the soul; for I even expressly supposed that it possessed none of those forms or qualities which are so debated in the schools, nor in general anything the knowledge of which is not so natural to our minds that no one can so much as imagine himself ignorant of it. Besides, I have pointed out what are the laws of nature; and, with no other principle upon which to found my reasonings except the infinite perfection of God, I endeavored to demonstrate all those about which there could be any room for doubt, and to prove that they are such, that even if God had created more worlds, there could have been none in which these laws were not observed. Thereafter, I showed how the greatest part of the matter of this chaos must, in accordance with these laws, dispose and arrange itself in such a way as to present the appearance of heavens; how in the meantime some of its parts must compose an earth and some planets and comets, and others a sun and fixed stars. And, making a digression at this stage on the subject of light, I expounded at considerable length what the nature of that light must be which is found in the sun and the stars, and how thence in an instant of time it traverses the immense spaces of the heavens, and how from the planets and comets it is reflected towards the earth. To this I likewise added much respecting the substance, the situation, the motions, and all the different qualities of these heavens and stars; so that I thought I

had said enough respecting them to show that there is nothing observable in the heavens or stars of our system that must not, or at least may not appear precisely alike in those of the system which I described. I came next to speak of the earth in particular, and to show how, even though I had expressly supposed that God had given no weight to the matter of which it is composed, this should not prevent all its parts from tending exactly to its center; how with water and air on its surface, the disposition of the heavens and heavenly bodies, more especially of the moon, must cause a flow and ebb, like in all its circumstances to that observed in our seas, as also a certain current both of water and air from east to west, such as is likewise observed between the tropics; how the mountains, seas, fountains, and rivers might naturally be formed in it, and the metals produced in the mines, and the plants grow in the fields and in general, how all the bodies which are commonly denominated mixed or composite might be generated and, among other things in the discoveries alluded to inasmuch as besides the stars, I knew nothing except fire which produces light, I spared no pains to set forth all that pertains to its nature, — the manner of its production and support, and to explain how heat is sometimes found without light, and light without heat; to show how it can induce various colors upon different bodies and other diverse qualities; how it reduces some to a liquid state and hardens others; how it can consume almost all bodies, or convert them into ashes and smoke; and finally, how from these ashes, by the mere intensity of its action, it forms glass: for as this transmutation of ashes into glass appeared to me as wonderful as any other in nature, I took a special pleasure in describing it. I was not, however, disposed, from these circumstances, to conclude that this world had been created in the manner I described; for it is much more likely that God made it at the first such as it was to be. But this is certain, and an opinion commonly received among theologians, that the action by which he now sustains it is the same with that by which he originally created it; so that even although he had from the beginning given it no other form than that of chaos, provided only he had established certain laws of nature, and had lent it his concurrence to enable it to act as it is wont to do, it may be believed, without discredit to the miracle of creation, that, in this way alone, things purely material might, in course of time, have become such as we observe them at present; and their nature is much more easily conceived when they are beheld coming in this

manner gradually into existence, than when they are only considered as produced at once in a finished and perfect state.

From the description of inanimate bodies and plants, I passed to animals, and particularly to man. But since I had not as yet sufficient knowledge to enable me to treat of these in the same manner as of the rest, that is to say, by deducing effects from their causes, and by showing from what elements and in what manner nature must produce them, I remained satisfied with the supposition that God formed the body of man wholly like to one of ours, as well in the external shape of the members as in the internal conformation of the organs, of the same matter with that I had described, and at first placed in it no rational soul, nor any other principle, in room of the vegetative or sensitive soul, beyond kindling in the heart one of those fires without light, such as I had already described, and which I thought was not different from the heat in hay that has been heaped together before it is dry, or that which causes fermentation in new wines before they are run clear of the fruit. For, when I examined the kind of functions which might, as consequences of this supposition, exist in this body, I found precisely all those which may exist in us independently of all power of thinking, and consequently without being in any measure owing to the soul; in other words, to that part of us which is distinct from the body, and of which it has been said above that the nature distinctively consists in thinking, functions in which the animals void of reason may be said wholly to resemble us; but among which I could not discover any of those that, as dependent on thought alone, belong to us as men, while, on the other hand, I did afterwards discover these as soon as I supposed God to have created a rational soul, and to have annexed it to this body in a particular manner which I described.

But, in order to show how I there handled this matter, I mean here to give the explication of the motion of the heart and arteries, which, as the first and most general motion observed in animals, will afford the means of readily determining what should be thought of all the rest. And that there may be less difficulty in understanding what I am about to say on this subject, I advise those who are not versed in anatomy, before they commence the perusal of these observations, to take the trouble of getting dissected in their presence the heart of some large animal possessed of lungs (for this is throughout sufficiently like the human), and to have shown to them its two ventricles or cavities: in the first place, that in the right side, with which correspond two very ample tubes, viz., the hollow vein (vena

cava), which is the principal receptacle of the blood, and the trunk of the tree, as it were, of which all the other veins in the body are branches; and the arterial vein (vena arteriosa), inappropriately so denominated, since it is in truth only an artery, which, taking its rise in the heart, is divided, after passing out from it, into many branches which presently disperse themselves all over the lungs; in the second place, the cavity in the left side, with which correspond in the same manner two canals in size equal to or larger than the preceding, viz., the venous artery (arteria venosa), likewise inappropriately thus designated, because it is simply a vein which comes from the lungs, where it is divided into many branches, interlaced with those of the arterial vein, and those of the tube called the windpipe, through which the air we breathe enters; and the great artery which, issuing from the heart, sends its branches all over the body. I should wish also that such persons were carefully shown the eleven pellicles which, like so many small valves, open and shut the four orifices that are in these two cavities, viz., three at the entrance of the hollow veins where they are disposed in such a manner as by no means to prevent the blood which it contains from flowing into the right ventricle of the heart, and yet exactly to prevent its flowing out; three at the entrance to the arterial vein, which, arranged in a manner exactly the opposite of the former, readily permit the blood contained in this cavity to pass into the lungs, but hinder that contained in the lungs from returning to this cavity; and, in like manner, two others at the mouth of the venous artery, which allow the blood from the lungs to flow into the left cavity of the heart, but preclude its return; and three at the mouth of the great artery, which suffer the blood to flow from the heart, but prevent its reflux. Nor do we need to seek any other reason for the number of these pellicles beyond this that the orifice of the venous artery being of an oval shape from the nature of its situation, can be adequately closed with two, whereas the others being round are more conveniently closed with three. Besides, I wish such persons to observe that the grand artery and the arterial vein are of much harder and firmer texture than the venous artery and the hollow vein; and that the two last expand before entering the heart, and there form, as it were, two pouches denominated the auricles of the heart, which are composed of a substance similar to that of the heart itself; and that there is always more warmth in the heart than in any other part of the body — and finally, that this heat is capable of causing any drop of blood

that passes into the cavities rapidly to expand and dilate, just as all liquors do when allowed to fall drop by drop into a highly heated vessel.

For, after these things, it is not necessary for me to say anything more with a view to explain the motion of the heart, except that when its cavities are not full of blood, into these the blood of necessity flows, — from the hollow vein into the right, and from the venous artery into the left; because these two vessels are always full of blood, and their orifices, which are turned towards the heart, cannot then be closed. But as soon as two drops of blood have thus passed, one into each of the cavities, these drops which cannot but be very large, because the orifices through which they pass are wide, and the vessels from which they come full of blood, are immediately rarefied, and dilated by the heat they meet with. In this way they cause the whole heart to expand, and at the same time press home and shut the five small valves that are at the entrances of the two vessels from which they flow, and thus prevent any more blood from coming down into the heart, and becoming more and more rarefied, they push open the six small valves that are in the orifices of the other two vessels, through which they pass out, causing in this way all the branches of the arterial vein and of the grand artery to expand almost simultaneously with the heart which immediately thereafter begins to contract, as do also the arteries, because the blood that has entered them has cooled, and the six small valves close, and the five of the hollow vein and of the venous artery open anew and allow a passage to other two drops of blood, which cause the heart and the arteries again to expand as before. And, because the blood which thus enters into the heart passes through these two pouches called auricles, it thence happens that their motion is the contrary of that of the heart, and that when it expands they contract. But lest those who are ignorant of the force of mathematical demonstrations and who are not accustomed to distinguish true reasons from mere verisimilitudes, should venture, without examination, to deny what has been said, I wish it to be considered that the motion which I have now explained follows as necessarily from the very arrangement of the parts, which may be observed in the heart by the eye alone, and from the heat which may be felt with the fingers, and from the nature of the blood as learned from experience, as does the motion of a clock from the power, the situation, and shape of its counterweights and wheels.

But if it be asked how it happens that the blood in the veins, flowing in this way continually into the heart, is not exhausted, and why the arteries do

not become too full, since all the blood which passes through the heart flows into them, I need only mention in reply what has been written by a physician of England, who has the honor of having broken the ice on this subject, and of having been the first to teach that there are many small passages at the extremities of the arteries, through which the blood received by them from the heart passes into the small branches of the veins, whence it again returns to the heart; so that its course amounts precisely to a perpetual circulation. Of this we have abundant proof in the ordinary experience of surgeons, who, by binding the arm with a tie of moderate straitness above the part where they open the vein, cause the blood to flow more copiously than it would have done without any ligature; whereas quite the contrary would happen were they to bind it below; that is, between the hand and the opening, or were to make the ligature above the opening very tight. For it is manifest that the tie, moderately straightened, while adequate to hinder the blood already in the arm from returning towards the heart by the veins, cannot on that account prevent new blood from coming forward through the arteries, because these are situated below the veins, and their coverings, from their greater consistency, are more difficult to compress; and also that the blood which comes from the heart tends to pass through them to the hand with greater force than it does to return from the hand to the heart through the veins. And since the latter current escapes from the arm by the opening made in one of the veins, there must of necessity be certain passages below the ligature, that is, towards the extremities of the arm through which it can come thither from the arteries. This physician likewise abundantly establishes what he has advanced respecting the motion of the blood, from the existence of certain pellicles, so disposed in various places along the course of the veins, in the manner of small valves, as not to permit the blood to pass from the middle of the body towards the extremities, but only to return from the extremities to the heart; and farther, from experience which shows that all the blood which is in the body may flow out of it in a very short time through a single artery that has been cut, even although this had been closely tied in the immediate neighborhood of the heart and cut between the heart and the ligature, so as to prevent the supposition that the blood flowing out of it could come from any other quarter than the heart.

But there are many other circumstances which evince that what I have alleged is the true cause of the motion of the blood: thus, in the first place,

the difference that is observed between the blood which flows from the veins, and that from the arteries, can only arise from this, that being rarefied, and, as it were, distilled by passing through the heart, it is thinner, and more vivid, and warmer immediately after leaving the heart, in other words, when in the arteries, than it was a short time before passing into either, in other words, when it was in the veins; and if attention be given, it will be found that this difference is very marked only in the neighborhood of the heart; and is not so evident in parts more remote from it. In the next place, the consistency of the coats of which the arterial vein and the great artery are composed, sufficiently shows that the blood is impelled against them with more force than against the veins. And why should the left cavity of the heart and the great artery be wider and larger than the right cavity and the arterial vein, were it not that the blood of the venous artery, having only been in the lungs after it has passed through the heart, is thinner, and rarefies more readily, and in a higher degree, than the blood which proceeds immediately from the hollow vein? And what can physicians conjecture from feeling the pulse unless they know that according as the blood changes its nature it can be rarefied by the warmth of the heart, in a higher or lower degree, and more or less quickly than before? And if it be inquired how this heat is communicated to the other members, must it not be admitted that this is effected by means of the blood, which, passing through the heart, is there heated anew, and thence diffused over all the body? Whence it happens, that if the blood be withdrawn from any part, the heat is likewise withdrawn by the same means; and although the heart were as-hot as glowing iron, it would not be capable of warming the feet and hands as at present, unless it continually sent thither new blood. We likewise perceive from this, that the true use of respiration is to bring sufficient fresh air into the lungs, to cause the blood which flows into them from the right ventricle of the heart, where it has been rarefied and, as it were, changed into vapors, to become thick, and to convert it anew into blood, before it flows into the left cavity, without which process it would be unfit for the nourishment of the fire that is there. This receives confirmation from the circumstance, that it is observed of animals destitute of lungs that they have also but one cavity in the heart, and that in children who cannot use them while in the womb, there is a hole through which the blood flows from the hollow vein into the left cavity of the heart, and a tube through which it passes from the arterial vein into the grand artery without passing through the lung. In the next

place, how could digestion be carried on in the stomach unless the heart communicated heat to it through the arteries, and along with this certain of the more fluid parts of the blood, which assist in the dissolution of the food that has been taken in? Is not also the operation which converts the juice of food into blood easily comprehended, when it is considered that it is distilled by passing and repassing through the heart perhaps more than one or two hundred times in a day? And what more need be adduced to explain nutrition, and the production of the different humors of the body, beyond saying, that the force with which the blood, in being rarefied, passes from the heart towards the extremities of the arteries, causes certain of its parts to remain in the members at which they arrive, and there occupy the place of some others expelled by them; and that according to the situation, shape, or smallness of the pores with which they meet, some rather than others flow into certain parts, in the same way that some sieves are observed to act, which, by being variously perforated, serve to separate different species of grain? And, in the last place, what above all is here worthy of observation, is the generation of the animal spirits, which are like a very subtle wind, or rather a very pure and vivid flame which, continually ascending in great abundance from the heart to the brain, thence penetrates through the nerves into the muscles, and gives motion to all the members; so that to account for other parts of the blood which, as most agitated and penetrating, are the fittest to compose these spirits, proceeding towards the brain, it is not necessary to suppose any other cause, than simply, that the arteries which carry them thither proceed from the heart in the most direct lines, and that, according to the rules of mechanics which are the same with those of nature, when many objects tend at once to the same point where there is not sufficient room for all (as is the case with the parts of the blood which flow forth from the left cavity of the heart and tend towards the brain), the weaker and less agitated parts must necessarily be driven aside from that point by the stronger which alone in this way reach it I had expounded all these matters with sufficient minuteness in the treatise which I formerly thought of publishing. And after these, I had shown what must be the fabric of the nerves and muscles of the human body to give the animal spirits contained in it the power to move the members, as when we see heads shortly after they have been struck off still move and bite the earth, although no longer animated; what changes must take place in the brain to produce waking, sleep, and dreams; how light, sounds, odors, tastes, heat,

and all the other qualities of external objects impress it with different ideas by means of the senses; how hunger, thirst, and the other internal affections can likewise impress upon it divers ideas; what must be understood by the common sense (sensus communis) in which these ideas are received, by the memory which retains them, by the fantasy which can change them in various ways, and out of them compose new ideas, and which, by the same means, distributing the animal spirits through the muscles, can cause the members of such a body to move in as many different ways, and in a manner as suited, whether to the objects that are presented to its senses or to its internal affections, as can take place in our own case apart from the guidance of the will. Nor will this appear at all strange to those who are acquainted with the variety of movements performed by the different automata, or moving machines fabricated by human industry, and that with help of but few pieces compared with the great multitude of bones, muscles, nerves, arteries, veins, and other parts that are found in the body of each animal. Such persons will look upon this body as a machine made by the hands of God, which is incomparably better arranged, and adequate to movements more admirable than is any machine of human invention. And here I specially stayed to show that, were there such machines exactly resembling organs and outward form an ape or any other irrational animal, we could have no means of knowing that they were in any respect of a different nature from these animals; but if there were machines bearing the image of our bodies, and capable of imitating our actions as far as it is morally possible, there would still remain two most certain tests whereby to know that they were not therefore really men. Of these the first is that they could never use words or other signs arranged in such a manner as is competent to us in order to declare our thoughts to others: for we may easily conceive a machine to be so constructed that it emits vocables, and even that it emits some correspondent to the action upon it of external objects which cause a change in its organs; for example, if touched in a particular place it may demand what we wish to say to it; if in another it may cry out that it is hurt, and such like; but not that it should arrange them variously so as appositely to reply to what is said in its presence, as men of the lowest grade of intellect can do. The second test is, that although such machines might execute many things with equal or perhaps greater perfection than any of us, they would, without doubt, fail in certain others from which it could be discovered that they did not act from knowledge, but solely from

the disposition of their organs: for while reason is an universal instrument that is alike available on every occasion, these organs, on the contrary, need a particular arrangement for each particular action; whence it must be morally impossible that there should exist in any machine a diversity of organs sufficient to enable it to act in all the occurrences of life, in the way in which our reason enables us to act. Again, by means of these two tests we may likewise know the difference between men and brutes. For it is highly deserving of remark, that there are no men so dull and stupid, not even idiots, as to be incapable of joining together different words, and thereby constructing a declaration by which to make their thoughts understood; and that on the other hand, there is no other animal, however perfect or happily circumstanced, which can do the like. Nor does this inability arise from want of organs: for we observe that magpies and parrots can utter words like ourselves, and are yet unable to speak as we do, that is, so as to show that they understand what they say; in place of which men born deaf and dumb, and thus not less, but rather more than the brutes, destitute of the organs which others use in speaking, are in the habit of spontaneously inventing certain signs by which they discover their thoughts to those who, being usually in their company, have leisure to learn their language. And this proves not only that the brutes have less reason than man, but that they have none at all: for we see that very little is required to enable a person to speak; and since a certain inequality of capacity is observable among animals of the same species, as well as among men, and since some are more capable of being instructed than others, it is incredible that the most perfect ape or parrot of its species, should not in this be equal to the most stupid infant of its kind or at least to one that was crack-brained, unless the soul of brutes were of a nature wholly different from ours. And we ought not to confound speech with the natural movements which indicate the passions, and can be imitated by machines as well as manifested by animals; nor must it be thought with certain of the ancients, that the brutes speak, although we do not understand their language. For if such were the case, since they are endowed with many organs analogous to ours, they could as easily communicate their thoughts to us as to their fellows. It is also very worthy of remark, that, though there are many animals which manifest more industry than we in certain of their actions, the same animals are yet observed to show none at all in many others: so

that the circumstance that they do better than we does not prove that they are endowed with mind, for it would thence follow that they possessed greater reason than any of us, and could surpass us in all things; on the contrary, it rather proves that they are destitute of reason, and that it is nature which acts in them according to the disposition of their organs: thus it is seen, that a clock composed only of wheels and weights can number the hours and measure time more exactly than we with all our skin.

I had after this described the reasonable soul, and shown that it could by no means be educed from the power of matter, as the other things of which I had spoken, but that it must be expressly created; and that it is not sufficient that it be lodged in the human body exactly like a pilot in a ship, unless perhaps to move its members, but that it is necessary for it to be joined and united more closely to the body, in order to have sensations and appetites similar to ours, and thus constitute a real man. I here entered, in conclusion, upon the subject of the soul at considerable length, because it is of the greatest moment: for after the error of those who deny the existence of God, an error which I think I have already sufficiently refuted, there is none that is more powerful in leading feeble minds astray from the straight path of virtue than the supposition that the soul of the brutes is of the same nature with our own; and consequently that after this life we have nothing to hope for or fear, more than flies and ants; in place of which, when we know how far they differ we much better comprehend the reasons which establish that the soul is of a nature wholly independent of the body, and that consequently it is not liable to die with the latter and, finally, because no other causes are observed capable of destroying it, we are naturally led thence to judge that it is immortal.

PART VI

Three years have now elapsed since I finished the treatise containing all these matters; and I was beginning to revise it, with the view to put it into the hands of a printer, when I learned that persons to whom I greatly defer, and whose authority over my actions is hardly less influential than is my own reason over my thoughts, had condemned a certain doctrine in physics, published a short time previously by another individual to which I will not say that I adhered, but only that, previously to their censure I had observed in it nothing which I could imagine to be prejudicial either to religion or to the state, and nothing therefore which would have prevented me from giving expression to it in writing, if reason had persuaded me of its truth; and this led me to fear lest among my own doctrines likewise some one might be found in which I had departed from the truth, notwithstanding the great care I have always taken not to accord belief to new opinions of which I had not the most certain demonstrations, and not to give expression to aught that might tend to the hurt of any one. This has been sufficient to make me alter my purpose of publishing them; for although the reasons by which I had been induced to take this resolution were very strong, yet my inclination, which has always been hostile to writing books, enabled me immediately to discover other considerations sufficient to excuse me for not undertaking the task. And these reasons, on one side and the other, are such, that not only is it in some measure my interest here to state them, but that of the public, perhaps, to know them.

I have never made much account of what has proceeded from my own mind; and so long as I gathered no other advantage from the method I employ beyond satisfying myself on some difficulties belonging to the speculative sciences, or endeavoring to regulate my actions according to the principles it taught me, I never thought myself bound to publish anything respecting it. For in what regards manners, every one is so full of his own wisdom, that there might be found as many reformers as heads, if any were allowed to take upon themselves the task of mending them, except those whom God has constituted the supreme rulers of his people or to whom he has given sufficient grace and zeal to be prophets; and although my speculations greatly pleased myself, I believed that others had theirs, which perhaps pleased them still more. But as soon as I had acquired some general

notions respecting physics, and beginning to make trial of them in various particular difficulties, had observed how far they can carry us, and how much they differ from the principles that have been employed up to the present time, I believed that I could not keep them concealed without sinning grievously against the law by which we are bound to promote, as far as in us lies, the general good of mankind. For by them I perceived it to be possible to arrive at knowledge highly useful in life; and in room of the speculative philosophy usually taught in the schools, to discover a practical, by means of which, knowing the force and action of fire, water, air the stars, the heavens, and all the other bodies that surround us, as distinctly as we know the various crafts of our artisans, we might also apply them in the same way to all the uses to which they are adapted, and thus render ourselves the lords and possessors of nature. And this is a result to be desired, not only in order to the invention of an infinity of arts, by which we might be enabled to enjoy without any trouble the fruits of the earth, and all its comforts, but also and especially for the preservation of health, which is without doubt, of all the blessings of this life, the first and fundamental one; for the mind is so intimately dependent upon the condition and relation of the organs of the body, that if any means can ever be found to render men wiser and more ingenious than hitherto, I believe that it is in medicine they must be sought for. It is true that the science of medicine, as it now exists, contains few things whose utility is very remarkable: but without any wish to depreciate it, I am confident that there is no one, even among those whose profession it is, who does not admit that all at present known in it is almost nothing in comparison of what remains to be discovered; and that we could free ourselves from an infinity of maladies of body as well as of mind, and perhaps also even from the debility of age, if we had sufficiently ample knowledge of their causes, and of all the remedies provided for us by nature. But since I designed to employ my whole life in the search after so necessary a science, and since I had fallen in with a path which seems to me such, that if any one follow it he must inevitably reach the end desired, unless he be hindered either by the shortness of life or the want of experiments, I judged that there could be no more effectual provision against these two impediments than if I were faithfully to communicate to the public all the little I might myself have found, and incite men of superior genius to strive to proceed farther, by contributing, each according to his inclination and ability, to the experiments which it would be

necessary to make, and also by informing the public of all they might discover, so that, by the last beginning where those before them had left off, and thus connecting the lives and labours of many, we might collectively proceed much farther than each by himself could do.

I remarked, moreover, with respect to experiments, that they become always more necessary the more one is advanced in knowledge; for, at the commencement, it is better to make use only of what is spontaneously presented to our senses, and of which we cannot remain ignorant, provided we bestow on it any reflection, however slight, than to concern ourselves about more uncommon and recondite phenomena: the reason of which is, that the more uncommon often only mislead us so long as the causes of the more ordinary are still unknown; and the circumstances upon which they depend are almost always so special and minute as to be highly difficult to detect. But in this I have adopted the following order: first, I have essayed to find in general the principles, or first causes of all that is or can be in the world, without taking into consideration for this end anything but God himself who has created it, and without educing them from any other source than from certain germs of truths naturally existing in our minds In the second place, I examined what were the first and most ordinary effects that could be deduced from these causes; and it appears to me that, in this way, I have found heavens, stars, an earth, and even on the earth water, air, fire, minerals, and some other things of this kind, which of all others are the most common and simple, and hence the easiest to know. Afterwards when I wished to descend to the more particular, so many diverse objects presented themselves to me, that I believed it to be impossible for the human mind to distinguish the forms or species of bodies that are upon the earth, from an infinity of others which might have been, if it had pleased God to place them there, or consequently to apply them to our use, unless we rise to causes through their effects, and avail ourselves of many particular experiments. Thereupon, turning over in my mind I the objects that had ever been presented to my senses I freely venture to state that I have never observed any which I could not satisfactorily explain by the principles had discovered. But it is necessary also to confess that the power of nature is so ample and vast, and these principles so simple and general, that I have hardly observed a single particular effect which I cannot at once recognize as capable of being deduced in man different modes from the principles, and that my greatest difficulty usually is to discover in which of

these modes the effect is dependent upon them; for out of this difficulty cannot otherwise extricate myself than by again seeking certain experiments, which may be such that their result is not the same, if it is in the one of these modes at we must explain it, as it would be if it were to be explained in the other. As to what remains, I am now in a position to discern, as I think, with sufficient clearness what course must be taken to make the majority those experiments which may conduce to this end: but I perceive likewise that they are such and so numerous, that neither my hands nor my income, though it were a thousand times larger than it is, would be sufficient for them all; so that according as henceforward I shall have the means of making more or fewer experiments, I shall in the same proportion make greater or less progress in the knowledge of nature. This was what I had hoped to make known by the treatise I had written, and so clearly to exhibit the advantage that would thence accrue to the public, as to induce all who have the common good of man at heart, that is, all who are virtuous in truth, and not merely in appearance, or according to opinion, as well to communicate to me the experiments they had already made, as to assist me in those that remain to be made.

But since that time other reasons have occurred to me, by which I have been led to change my opinion, and to think that I ought indeed to go on committing to writing all the results which I deemed of any moment, as soon as I should have tested their truth, and to bestow the same care upon them as I would have done had it been my design to publish them. This course commended itself to me, as well because I thus afforded myself more ample inducement to examine them thoroughly, for doubtless that is always more narrowly scrutinized which we believe will be read by many, than that which is written merely for our private use (and frequently what has seemed to me true when I first conceived it, has appeared false when I have set about committing it to writing), as because I thus lost no opportunity of advancing the interests of the public, as far as in me lay, and since thus likewise, if my writings possess any value, those into whose hands they may fall after my death may be able to put them to what use they deem proper. But I resolved by no means to consent to their publication during my lifetime, lest either the oppositions or the controversies to which they might give rise, or even the reputation, such as it might be, which they would acquire for me, should be any occasion of my losing the time that I had set apart for my own improvement. For though it be true that every one

is bound to promote to the extent of his ability the good of others, and that to be useful to no one is really to be worthless, yet it is likewise true that our cares ought to extend beyond the present, and it is good to omit doing what might perhaps bring some profit to the living, when we have in view the accomplishment of other ends that will be of much greater advantage to posterity. And in truth, I am quite willing it should be known that the little I have hitherto learned is almost nothing in comparison with that of which I am ignorant, and to the knowledge of which I do not despair of being able to attain; for it is much the same with those who gradually discover truth in the sciences, as with those who when growing rich find less difficulty in making great acquisitions, than they formerly experienced when poor in making acquisitions of much smaller amount. Or they may be compared to the commanders of armies, whose forces usually increase in proportion to their victories, and who need greater prudence to keep together the residue of their troops after a defeat than after a victory to take towns and provinces. For he truly engages in battle who endeavors to surmount all the difficulties and errors which prevent him from reaching the knowledge of truth, and he is overcome in fight who admits a false opinion touching a matter of any generality and importance, and he requires thereafter much more skill to recover his former position than to make great advances when once in possession of thoroughly ascertained principles. As for myself, if I have succeeded in discovering any truths in the sciences (and I trust that what is contained in this volume I will show that I have found some), I can declare that they are but the consequences and results of five or six principal difficulties which I have surmounted, and my encounters with which I reckoned as battles in which victory declared for me. I will not hesitate even to avow my belief that nothing further is wanting to enable me fully to realize my designs than to gain two or three similar victories; and that I am not so far advanced in years but that, according to the ordinary course of nature, I may still have sufficient leisure for this end. But I conceive myself the more bound to husband the time that remains the greater my expectation of being able to employ it aright, and I should doubtless have much to rob me of it, were I to publish the principles of my physics: for although they are almost all so evident that to assent to them no more is needed than simply to understand them, and although there is not one of them of which I do not expect to be able to give demonstration, yet, as it is impossible that they can be in accordance with all the diverse

opinions of others, I foresee that I should frequently be turned aside from my grand design, on occasion of the opposition which they would be sure to awaken.

It may be said, that these oppositions would be useful both in making me aware of my errors, and, if my speculations contain anything of value, in bringing others to a fuller understanding of it; and still farther, as many can see better than one, in leading others who are now beginning to avail themselves of my principles, to assist me in turn with their discoveries. But though I recognize my extreme liability to error, and scarce ever trust to the first thoughts which occur to me, yet-the experience I have had of possible objections to my views prevents me from anticipating any profit from them. For I have already had frequent proof of the judgments, as well of those I esteemed friends, as of some others to whom I thought I was an object of indifference, and even of some whose malignancy and envy would, I knew, determine them to endeavor to discover what partiality concealed from the eyes of my friends. But it has rarely happened that anything has been objected to me which I had myself altogether overlooked, unless it were something far removed from the subject: so that I have never met with a single critic of my opinions who did not appear to me either less rigorous or less equitable than myself. And further, I have never observed that any truth before unknown has been brought to light by the disputations that are practised in the schools; for while each strives for the victory, each is much more occupied in making the best of mere verisimilitude, than in weighing the reasons on both sides of the question; and those who have been long good advocates are not afterwards on that account the better judges.

As for the advantage that others would derive from the communication of my thoughts, it could not be very great; because I have not yet so far prosecuted them as that much does not remain to be added before they can be applied to practice. And I think I may say without vanity, that if there is any one who can carry them out that length, it must be myself rather than another: not that there may not be in the world many minds incomparably superior to mine, but because one cannot so well seize a thing and make it one’s own, when it has been learned from another, as when one has himself discovered it. And so true is this of the present subject that, though I have often explained some of my opinions to persons of much acuteness, who, whilst I was speaking, appeared to understand them very distinctly, yet, when they repeated them, I have observed that they almost always changed

them to such an extent that I could no longer acknowledge them as mine. I am glad, by the way, to take this opportunity of requesting posterity never to believe on hearsay that anything has proceeded from me which has not been published by myself; and I am not at all astonished at the extravagances attributed to those ancient philosophers whose own writings we do not possess; whose thoughts, however, I do not on that account suppose to have been really absurd, seeing they were among the ablest men of their times, but only that these have been falsely represented to us. It is observable, accordingly, that scarcely in a single instance has any one of their disciples surpassed them; and I am quite sure that the most devoted of the present followers of Aristotle would think themselves happy if they had as much knowledge of nature as he possessed, were it even under the condition that they should never afterwards attain to higher. In this respect they are like the ivy which never strives to rise above the tree that sustains it, and which frequently even returns downwards when it has reached the top; for it seems to me that they also sink, in other words, render themselves less wise than they would be if they gave up study, who, not contented with knowing all that is intelligibly explained in their author, desire in addition to find in him the solution of many difficulties of which he says not a word, and never perhaps so much as thought. Their fashion of philosophizing, however, is well suited to persons whose abilities fall below mediocrity; for the obscurity of the distinctions and principles of which they make use enables them to speak of all things with as much confidence as if they really knew them, and to defend all that they say on any subject against the most subtle and skillful, without its being possible for any one to convict them of error. In this they seem to me to be like a blind man, who, in order to fight on equal terms with a person that sees, should have made him descend to the bottom of an intensely dark cave: and I may say that such persons have an interest in my refraining from publishing the principles of the philosophy of which I make use; for, since these are of a kind the simplest and most evident, I should, by publishing them, do much the same as if I were to throw open the windows, and allow the light of day to enter the cave into which the combatants had descended. But even superior men have no reason for any great anxiety to know these principles, for if what they desire is to be able to speak of all things, and to acquire a reputation for learning, they will gain their end more easily by remaining satisfied with the appearance of truth, which can be found without much difficulty in all sorts

of matters, than by seeking the truth itself which unfolds itself but slowly and that only in some departments, while it obliges us, when we have to speak of others, freely to confess our ignorance. If, however, they prefer the knowledge of some few truths to the vanity of appearing ignorant of none, as such knowledge is undoubtedly much to be preferred, and, if they choose to follow a course similar to mine, they do not require for this that I should say anything more than I have already said in this discourse. For if they are capable of making greater advancement than I have made, they will much more be able of themselves to discover all that I believe myself to have found; since as I have never examined aught except in order, it is certain that what yet remains to be discovered is in itself more difficult and recondite, than that which I have already been enabled to find, and the gratification would be much less in learning it from me than in discovering it for themselves. Besides this, the habit which they will acquire, by seeking first what is easy, and then passing onward slowly and step by step to the more difficult, will benefit them more than all my instructions. Thus, in my own case, I am persuaded that if I had been taught from my youth all the truths of which I have since sought out demonstrations, and had thus learned them without labour, I should never, perhaps, have known any beyond these; at least, I should never have acquired the habit and the facility which I think I possess in always discovering new truths in proportion as I give myself to the search. And, in a single word, if there is any work in the world which cannot be so well finished by another as by him who has commenced it, it is that at which I labour.

It is true, indeed, as regards the experiments which may conduce to this end, that one man is not equal to the task of making them all; but yet he can advantageously avail himself, in this work, of no hands besides his own, unless those of artisans, or parties of the same kind, whom he could pay, and whom the hope of gain (a means of great efficacy) might stimulate to accuracy in the performance of what was prescribed to them. For as to those who, through curiosity or a desire of learning, of their own accord, perhaps, offer him their services, besides that in general their promises exceed their performance, and that they sketch out fine designs of which not one is ever realized, they will, without doubt, expect to be compensated for their trouble by the explication of some difficulties, or, at least, by compliments and useless speeches, in which he cannot spend any portion of his time without loss to himself. And as for the experiments that others have already

made, even although these parties should be willing of themselves to communicate them to him (which is what those who esteem them secrets will never do), the experiments are, for the most part, accompanied with so many circumstances and superfluous elements, as to make it exceedingly difficult to disentangle the truth from its adjuncts — besides, he will find almost all of them so ill described, or even so false (because those who made them have wished to see in them only such facts as they deemed conformable to their principles), that, if in the entire number there should be some of a nature suited to his purpose, still their value could not compensate for the time what would be necessary to make the selection. So that if there existed any one whom we assuredly knew to be capable of making discoveries of the highest kind, and of the greatest possible utility to the public; and if all other men were therefore eager by all means to assist him in successfully prosecuting his designs, I do not see that they could do aught else for him beyond contributing to defray the expenses of the experiments that might be necessary; and for the rest, prevent his being deprived of his leisure by the unseasonable interruptions of any one. But besides that I neither have so high an opinion of myself as to be willing to make promise of anything extraordinary, nor feed on imaginations so vain as to fancy that the public must be much interested in my designs; I do not, on the other hand, own a soul so mean as to be capable of accepting from any one a favor of which it could be supposed that I was unworthy.

These considerations taken together were the reason why, for the last three years, I have been unwilling to publish the treatise I had on hand, and why I even resolved to give publicity during my life to no other that was so general, or by which the principles of my physics might be understood. But since then, two other reasons have come into operation that have determined me here to subjoin some particular specimens, and give the public some account of my doings and designs. Of these considerations, the first is, that if I failed to do so, many who were cognizant of my previous intention to publish some writings, might have imagined that the reasons which induced me to refrain from so doing, were less to my credit than they really are; for although I am not immoderately desirous of glory, or even, if I may venture so to say, although I am averse from it in so far as I deem it hostile to repose which I hold in greater account than aught else, yet, at the same time, I have never sought to conceal my actions as if they were crimes, nor made use of many precautions that I might remain unknown;

and this partly because I should have thought such a course of conduct a wrong against myself, and partly because it would have occasioned me some sort of uneasiness which would again have been contrary to the perfect mental tranquillity which I court. And forasmuch as, while thus indifferent to the thought alike of fame or of forgetfulness, I have yet been unable to prevent myself from acquiring some sort of reputation, I have thought it incumbent on me to do my best to save myself at least from being ill-spoken of. The other reason that has determined me to commit to writing these specimens of philosophy is, that I am becoming daily more and more alive to the delay which my design of self-instruction suffers, for want of the infinity of experiments I require, and which it is impossible for me to make without the assistance of others: and, without flattering myself so much as to expect the public to take a large share in my interests, I am yet unwilling to be found so far wanting in the duty I owe to myself, as to give occasion to those who shall survive me to make it matter of reproach against me some day, that I might have left them many things in a much more perfect state than I have done, had I not too much neglected to make them aware of the ways in which they could have promoted the accomplishment of my designs.

And I thought that it was easy for me to select some matters which should neither be obnoxious to much controversy, nor should compel me to expound more of my principles than I desired, and which should yet be sufficient clearly to exhibit what I can or cannot accomplish in the sciences. Whether or not I have succeeded in this it is not for me to say; and I do not wish to forestall the judgments of others by speaking myself of my writings; but it will gratify me if they be examined, and, to afford the greater inducement to this I request all who may have any objections to make to them, to take the trouble of forwarding these to my publisher, who will give me notice of them, that I may endeavor to subjoin at the same time my reply; and in this way readers seeing both at once will more easily determine where the truth lies; for I do not engage in any case to make prolix replies, but only with perfect frankness to avow my errors if I am convinced of them, or if I cannot perceive them, simply to state what I think is required for defense of the matters I have written, adding thereto no explication of any new matte that it may not be necessary to pass without end from one thing to another.

If some of the matters of which I have spoken in the beginning of the “Dioptrics” and “Meteorics” should offend at first sight, because I call them hypotheses and seem indifferent about giving proof of them, I request a patient and attentive reading of the whole, from which I hope those hesitating will derive satisfaction; for it appears to me that the reasonings are so mutually connected in these treatises, that, as the last are demonstrated by the first which are their causes, the first are in their turn demonstrated by the last which are their effects. Nor must it be imagined that I here commit the fallacy which the logicians call a circle; for since experience renders the majority of these effects most certain, the causes from which I deduce them do not serve so much to establish their reality as to explain their existence; but on the contrary, the reality of the causes is established by the reality of the effects. Nor have I called them hypotheses with any other end in view except that it may be known that I think I am able to deduce them from those first truths which I have already expounded; and yet that I have expressly determined not to do so, to prevent a certain class of minds from thence taking occasion to build some extravagant philosophy upon what they may take to be my principles, and my being blamed for it. I refer to those who imagine that they can master in a day all that another has taken twenty years to think out, as soon as he has spoken two or three words to them on the subject; or who are the more liable to error and the less capable of perceiving truth in very proportion as they are more subtle and lively. As to the opinions which are truly and wholly mine, I offer no apology for them as new, — persuaded as I am that if their reasons be well considered they will be found to be so simple and so conformed, to common sense as to appear less extraordinary and less paradoxical than any others which can be held on the same subjects; nor do I even boast of being the earliest discoverer of any of them, but only of having adopted them, neither because they had nor because they had not been held by others, but solely because reason has convinced me of their truth.

Though artisans may not be able at once to execute the invention which is explained in the “Dioptrics,” I do not think that any one on that account is entitled to condemn it; for since address and practice are required in order so to make and adjust the machines described by me as not to overlook the smallest particular, I should not be less astonished if they succeeded on the first attempt than if a person were in one day to become an accomplished

performer on the guitar, by merely having excellent sheets of music set up before him. And if I write in French, which is the language of my country, in preference to Latin, which is that of my preceptors, it is because I expect that those who make use of their unprejudiced natural reason will be better judges of my opinions than those who give heed to the writings of the ancients only; and as for those who unite good sense with habits of study, whom alone I desire for judges, they will not, I feel assured, be so partial to Latin as to refuse to listen to my reasonings merely because I expound them in the vulgar tongue.

In conclusion, I am unwilling here to say anything very specific of the progress which I expect to make for the future in the sciences, or to bind myself to the public by any promise which I am not certain of being able to fulfill; but this only will I say, that I have resolved to devote what time I may still have to live to no other occupation than that of endeavoring to acquire some knowledge of Nature, which shall be of such a kind as to enable us therefrom to deduce rules in medicine of greater certainty than those at present in use; and that my inclination is so much opposed to all other pursuits, especially to such as cannot be useful to some without being hurtful to others, that if, by any circumstances, I had been constrained to engage in such, I do not believe that I should have been able to succeed. Of this I here make a public declaration, though well aware that it cannot serve to procure for me any consideration in the world, which, however, I do not in the least affect; and I shall always hold myself more obliged to those through whose favor I am permitted to enjoy my retirement without interruption than to any who might offer me the highest earthly preferments.

MEDITATIONS ON FIRST PHILOSOPHY



IN WHICH THE EXISTENCE OF GOD AND THE IMMORTALITY OF THE SOUL ARE DEMONSTRATED

Translated by John Veitch

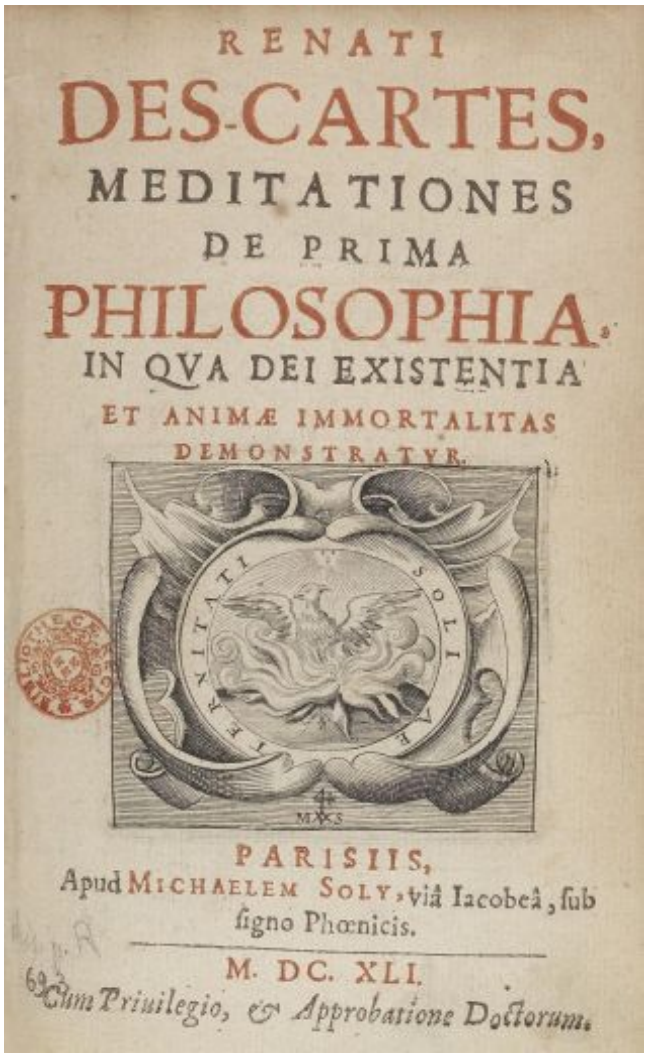
First published in Latin in 1641, *Meditations on First Philosophy* presents Descartes' metaphysical system in its most detailed level, expanding the philosophical system that he had first introduced in the fourth part of the *Discourse on Method* (1637). The treatise is composed of six meditations, in which Descartes first discards all belief in things that are not absolutely certain, and then tries to establish what can be known for certain. He wrote the meditations as if he had meditated for six days: each meditation refers to the last one as "yesterday" One of the most influential philosophical texts ever written, the treatise is widely read to this day.

The work opens with Descartes' first consideration that the existence of God should be demonstrated philosophically, besides the theological reasons for belief, particularly as a demonstration for the non-believers. Moreover, the believers could be accused of making a circular reasoning, when saying that we must believe in God because of the Scriptures and in the authority of the Scriptures as they have been inspired by God. He further indicates how the very Scriptures say that the mind of man is sufficient to discover God. His aim is to apply a method to demonstrate these two truths in a clear and evident manner.

In the *Preface* Descartes explains how he had referred to two questions, the existence of God, and the soul, in the *Discourse on Method*. Following this, he received objections, and two of them he considers are of importance. The first is how he concludes that the essence of the soul is a thing that thinks, excluding all other nature. To this he says that he has a clear perception that he is a thinking being and has no other clear perception, and from this he concludes that there is nothing else in the essence of the self. The second is that from the idea I have of something that is more perfect than myself, it cannot be concluded that it exists. In the

treatise we will see that in fact from the idea that there is something more perfect than myself, it follows that this exists.

The First Meditation, subtitled “What can be called into doubt”, opens with the Meditator reflecting on the number of falsehoods he has believed during his life and on the subsequent faultiness of the body of knowledge he has built up from these falsehoods. He has resolved to sweep away all he thinks he knows and to start again from the foundations, building up his knowledge once more on more certain grounds. He has seated himself alone, by the fire, free of all worries so that he can demolish his former opinions with care. The Meditator reasons that he need only find some reason to doubt his present opinions in order to prompt him to seek sturdier foundations for knowledge. Rather than doubt every one of his opinions individually, he reasons that he might cast them all into doubt if he can doubt the foundations and basic principles on which the opinions are founded.


RENATI

DES-CARTES,

MEDITATIONES

DE PRIMA

PHILOSOPHIA.

IN QVA DEI EXISTENTIA

ET ANIMÆ IMMORTALITAS

DEMONSTRATVR.

PARISIIS,

Apud MICHAELEM SOLY, viâ Iacobeâ, sub signo Phœnicis.

M. DC. XLI.

Cum Priuilegio, & Approbatione Doctorum.

The first edition's title page

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LETTER OF DEDICATION

TO THE VERY SAGE AND ILLUSTRIOUS THE DEAN AND DOCTORS OF THE SACRED FACULTY OF THEOLOGY OF PARIS.

GENTLEMEN,

1. The motive which impels me to present this Treatise to you is so reasonable, and when you shall learn its design, I am confident that you also will consider that there is ground so valid for your taking it under your protection, that I can in no way better recommend it to you than by briefly stating the end which I proposed to myself in it.

2. I have always been of the opinion that the two questions respecting God and the Soul were the chief of those that ought to be determined by help of Philosophy rather than of Theology; for although to us, the faithful, it be sufficient to hold as matters of faith, that the human soul does not perish with the body, and that God exists, it yet assuredly seems impossible ever to persuade infidels of the reality of any religion, or almost even any moral virtue, unless, first of all, those two things be proved to them by natural reason. And since in this life there are frequently greater rewards held out to vice than to virtue, few would prefer the right to the useful, if they were restrained neither by the fear of God nor the expectation of another life; and although it is quite true that the existence of God is to be believed since it is taught in the sacred Scriptures, and that, on the other hand, the sacred Scriptures are to be believed because they come from God (for since faith is a gift of God, the same Being who bestows grace to enable us to believe other things, can likewise impart of it to enable us to believe his own existence), nevertheless, this cannot be submitted to infidels, who would consider that the reasoning proceeded in a circle. And, indeed, I have observed that you, with all the other theologians, not only affirmed the sufficiency of natural reason for the proof of the existence of God, but also, that it may be inferred from sacred Scripture, that the knowledge of God is much clearer than of many created things, and that it is really so easy of acquisition as to leave those who do not possess it blameworthy. This is manifest from these words of the Book of Wisdom, chap. xiii., where it is said, Howbeit they are not to be excused; for if their understanding was so great that they could discern the world and the

creatures, why did they not rather find out the Lord thereof? And in Romans, chap. i., it is said that they are without excuse; and again, in the same place, by these words,That which may be known of God is manifest in them — we seem to be admonished that all which can be known of God may be made manifest by reasons obtained from no other source than the inspection of our own minds. I have, therefore, thought that it would not be unbecoming in me to inquire how and by what way, without going out of ourselves, God may be more easily and certainly known than the things of the world.

3. And as regards the Soul, although many have judged that its nature could not be easily discovered, and some have even ventured to say that human reason led to the conclusion that it perished with the body, and that the contrary opinion could be held through faith alone; nevertheless, since the Lateran Council, held under Leo X. (in session viii.), condemns these, and expressly enjoins Christian philosophers to refute their arguments, and establish the truth according to their ability, I have ventured to attempt it in this work.

4. Moreover, I am aware that most of the irreligious deny the existence of God, and the distinctness of the human soul from the body, for no other reason than because these points, as they allege, have never as yet been demonstrated. Now, although I am by no means of their opinion, but, on the contrary, hold that almost all the proofs which have been adduced on these questions by great men, possess, when rightly understood, the force of demonstrations, and that it is next to impossible to discover new, yet there is, I apprehend, no more useful service to be performed in Philosophy, than if some one were, once for all, carefully to seek out the best of these reasons, and expound them so accurately and clearly that, for the future, it might be manifest to all that they are real demonstrations. And finally, since many persons were greatly desirous of this, who knew that I had cultivated a certain Method of resolving all kinds of difficulties in the sciences, which is not indeed new (there being nothing older than truth), but of which they were aware I had made successful use in other instances, I judged it to be my duty to make trial of it also on the present matter.

5. Now the sum of what I have been able to accomplish on the subject is contained in this Treatise. Not that I here essayed to collect all the diverse reasons which might be adduced as proofs on this subject, for this does not seem to be necessary, unless on matters where no one proof of adequate

certainty is to be had; but I treated the first and chief alone in such a manner that I should venture now to propose them as demonstrations of the highest certainty and evidence. And I will also add that they are such as to lead me to think that there is no way open to the mind of man by which proofs superior to them can ever be discovered for the importance of the subject, and the glory of God, to which all this relates, constrain me to speak here somewhat more freely of myself than I have been accustomed to do. Nevertheless, whatever certitude and evidence I may find in these demonstrations, I cannot therefore persuade myself that they are level to the comprehension of all. But just as in geometry there are many of the demonstrations of Archimedes, Apollonius, Pappus, and others, which, though received by all as evident even and certain (because indeed they manifestly contain nothing which, considered by itself, it is not very easy to understand, and no consequents that are inaccurately related to their antecedents), are nevertheless understood by a very limited number, because they are somewhat long, and demand the whole attention of the reader: so in the same way, although I consider the demonstrations of which I here make use, to be equal or even superior to the geometrical in certitude and evidence, I am afraid, nevertheless, that they will not be adequately understood by many, as well because they also are somewhat long and involved, as chiefly because they require the mind to be entirely free from prejudice, and able with ease to detach itself from the commerce of the senses. And, to speak the truth, the ability for metaphysical studies is less general than for those of geometry. And, besides, there is still this difference that, as in geometry, all are persuaded that nothing is usually advanced of which there is not a certain demonstration, those but partially versed in it err more frequently in assenting to what is false, from a desire of seeming to understand it, than in denying what is true. In philosophy, on the other hand, where it is believed that all is doubtful, few sincerely give themselves to the search after truth, and by far the greater number seek the reputation of bold thinkers by audaciously impugning such truths as are of the greatest moment.

6. Hence it is that, whatever force my reasonings may possess, yet because they belong to philosophy, I do not expect they will have much effect on the minds of men, unless you extend to them your patronage and approval. But since your Faculty is held in so great esteem by all, and since the name of SORBONNE is of such authority, that not only in matters of

faith, but even also in what regards human philosophy, has the judgment of no other society, after the Sacred Councils, received so great deference, it being the universal conviction that it is impossible elsewhere to find greater perspicacity and solidity, or greater wisdom and integrity in giving judgment, I doubt not,if you but condescend to pay so much regard to this Treatise as to be willing, in the first place, to correct it (for mindful not only of my humanity, but chiefly also of my ignorance, I do not affirm that it is free from errors); in the second place, to supply what is wanting in it, to perfect what is incomplete, and to give more ample illustration where it is demanded, or at least to indicate these defects to myself that I may endeavour to remedy them; and, finally, when the reasonings contained in it, by which the existence of God and the distinction of the human soul from the body are established, shall have been brought to such degree of perspicuity as to be esteemed exact demonstrations, of which I am assured they admit, if you condescend to accord them the authority of your approbation, and render a public testimony of their truth and certainty, I doubt not, I say, but that henceforward all the errors which have ever been entertained on these questions will very soon be effaced from the minds of men. For truth itself will readily lead the remainder of the ingenious and the learned to subscribe to your judgment; and your authority will cause the atheists, who are in general sciolists rather than ingenious or learned, to lay aside the spirit of contradiction, and lead them, perhaps, to do battle in their own persons for reasonings which they find considered demonstrations by all men of genius, lest they should seem not to understand them; and, finally, the rest of mankind will readily trust to so many testimonies, and there will no longer be any one who will venture to doubt either the existence of God or the real distinction of mind and body. It is for you, in your singular wisdom, to judge of the importance of the establishment of such beliefs, [who are cognisant of the disorders which doubt of these truths produces].* But it would not here become me to commend at greater length the cause of God and of religion to you, who have always proved the strongest support of the Catholic Church.

PREFACE TO THE READER

1. I have already slightly touched upon the questions respecting the existence of God and the nature of the human soul, in the “Discourse on the Method of rightly conducting the Reason, and seeking Truth in the Sciences,” published in French in the year 1637; not however, with the design of there treating of them fully, but only, as it were, in passing, that I might learn from the judgment of my readers in what way I should afterward handle them; for these questions appeared to me to be of such moment as to be worthy of being considered more than once, and the path which I follow in discussing them is so little trodden, and so remote from the ordinary route that I thought it would not be expedient to illustrate it at greater length in French, and in a discourse that might be read by all, lest even the more feeble minds should believe that this path might be entered upon by them.

2. But, as in the “ Discourse on Method,” I had requested all who might find aught meriting censure in my writings, to do me the favor of pointing it out to me, I may state that no objections worthy of remark have been alleged against what I then said on these questions except two, to which I will here briefly reply, before undertaking their more detailed discussion.

3. The first objection is that though, while the human mind reflects on itself, it does not perceive that it is any other than a thinking thing, it does not follow that its nature or essence consists only in its being a thing which thinks; so that the word ONLY shall exclude all other things which might also perhaps be said to pertain to the nature of the mind. To this objection I reply, that it was not my intention in that place to exclude these according to the order of truth in the matter (of which I did not then treat),but only according to the order of thought (perception); so that my meaning was, that I clearly apprehended nothing, so far as I was conscious, as belonging to my essence, except that I was a thinking thing, or a thing possessing in itself the faculty of thinking. But I will show hereafter how, from the consciousness that nothing besides thinking belongs to the essence of the mind, it follows that nothing else does in truth belong to it.

4. The second objection is that it does not follow, from my possessing the idea of a thing more perfect than I am, that the idea itself is more perfect than myself, and much less that what is represented by the idea exists. But I

reply that in the term idea there is here something equivocal; for it may be taken either materially for an act of the understanding, and in this sense it cannot be said to be more perfect than I, or objectively, for the thing represented by that act, which, although it be not supposed to exist out of my understanding, may, nevertheless, be more perfect than myself, by reason of its essence. But, in the sequel of this treatise I will show more amply how, from my possessing the idea of a thing more perfect than myself, it follows that this thing really exists.

5. Besides these two objections, I have seen, indeed, two treatises of sufficient length relating to the present matter. In these, however, my conclusions, much more than my premises, were impugned, and that by arguments borrowed from the common places of the atheists. But, as arguments of this sort can make no impression on the minds of those who shall rightly understand my reasonings, and as the judgments of many are so irrational and weak that they are persuaded rather by the opinions on a subject that are first presented to them, however false and opposed to reason they may be, than by a true and solid, but subsequently received, refutation of them, I am unwilling here to reply to these strictures from a dread of being, in the first instance, obliged to state them. I will only say, in general, that all which the atheists commonly allege in favor of the non-existence of God, arises continually from one or other of these two things, namely, either the ascription of human affections to Deity, or the undue attribution to our minds of so much vigor and wisdom that we may essay to determine and comprehend both what God can and ought to do; hence all that is alleged by them will occasion us no difficulty, provided only we keep in remembrance that our minds must be considered finite, while Deity is incomprehensible and infinite.

6. Now that I have once, in some measure, made proof of the opinions of men regarding my work, I again undertake to treat of God and the human soul, and at the same time to discuss the principles of the entire First Philosophy, without, however, expecting any commendation from the crowd for my endeavors, or a wide circle of readers. On the contrary, I would advise none to read this work, unless such as are able and willing to meditate with me in earnest, to detach their minds from commerce with the senses, and likewise to deliver themselves from all prejudice; and individuals of this character are, I well know, remarkably rare. But with regard to those who, without caring to comprehend the order and

connection of the reasonings, shall study only detached clauses for the purpose of small but noisy criticism, as is the custom with many, I may say that such persons will not profit greatly by the reading of this treatise; and although perhaps they may find opportunity for cavilling in several places, they will yet hardly start any pressing objections, or such as shall be deserving of reply.

7. But since, indeed, I do not promise to satisfy others on all these subjects at first sight, nor arrogate so much to myself as to believe that I have been able to forsee all that may be the source of difficulty to each ones I shall expound, first of all, in the Meditations, those considerations by which I feel persuaded that I have arrived at a certain and evident knowledge of truth, in order that I may ascertain whether the reasonings which have prevailed with myself will also be effectual in convincing others. I will then reply to the objections of some men, illustrious for their genius and learning, to whom these Meditations were sent for criticism before they were committed to the press; for these objections are so numerous and varied that I venture to anticipate that nothing, at least nothing of any moment, will readily occur to any mind which has not been touched upon in them. Hence it is that I earnestly entreat my readers not to come to any judgment on the questions raised in the Meditations until they have taken care to read the whole of the Objections, with the relative Replies.

SYNOPSIS OF THE SIX FOLLOWING MEDITATIONS.

1. IN THE First Meditation I expound the grounds on which we may doubt in general of all things, and especially of material objects, so long at least, as we have no other foundations for the sciences than those we have hitherto possessed. Now, although the utility of a doubt so general may not be manifest at first sight, it is nevertheless of the greatest, since it delivers us from all prejudice, and affords the easiest pathway by which the mind may withdraw itself from the senses; and finally makes it impossible for us to doubt wherever we afterward discover truth.

2. In the Second, the mind which, in the exercise of the freedom peculiar to itself, supposes that no object is, of the existence of which it has even the slightest doubt, finds that, meanwhile, it must itself exist. And this point is likewise of the highest moment, for the mind is thus enabled easily to distinguish what pertains to itself, that is, to the intellectual nature, from what is to be referred to the body. But since some, perhaps, will expect, at this stage of our progress, a statement of the reasons which establish the doctrine of the immortality of the soul, I think it proper here to make such aware, that it was my aim to write nothing of which I could not give exact demonstration, and that I therefore felt myself obliged to adopt an order similar to that in use among the geometers, viz., to premise all upon which the proposition in question depends, before coming to any conclusion respecting it. Now, the first and chief prerequisite for the knowledge of the immortality of the soul is our being able to form the clearest possible conception (conceptus — concept) of the soul itself, and such as shall be absolutely distinct from all our notions of body; and how this is to be accomplished is there shown. There is required, besides this, the assurance that all objects which we clearly and distinctly think are true (really exist) in that very mode in which we think them; and this could not be established previously to the Fourth Meditation. Farther, it is necessary, for the same purpose, that we possess a distinct conception of corporeal nature, which is given partly in the Second and partly in the Fifth and Sixth Meditations. And, finally, on these grounds, we are necessitated to conclude, that all those objects which are clearly and distinctly conceived to be diverse substances, as mind and body, are substances really reciprocally distinct; and this inference is made in the Sixth Meditation. The absolute distinction

of mind and body is, besides, confirmed in this Second Meditation, by showing that we cannot conceive body unless as divisible; while, on the other hand, mind cannot be conceived unless as indivisible. For we are not able to conceive the half of a mind, as we can of any body, however small, so that the natures of these two substances are to be held, not only as diverse, but even in some measure as contraries. I have not, however, pursued this discussion further in the present treatise, as well for the reason that these considerations are sufficient to show that the destruction of the mind does not follow from the corruption of the body, and thus to afford to men the hope of a future life, as also because the premises from which it is competent for us to infer the immortality of the soul, involve an explication of the whole principles of Physics: in order to establish, in the first place, that generally all substances, that is, all things which can exist only in consequence of having been created by God, are in their own nature incorruptible, and can never cease to be, unless God himself, by refusing his concurrence to them, reduce them to nothing; and, in the second place, that body, taken generally, is a substance, and therefore can never perish, but that the human body, in as far as it differs from other bodies, is constituted only by a certain configuration of members, and by other accidents of this sort, while the human mind is not made up of accidents, but is a pure substance. For although all the accidents of the mind be changed — although, for example, it think certain things, will others, and perceive others, the mind itself does not vary with these changes; while, on the contrary, the human body is no longer the same if a change take place in the form of any of its parts: from which it follows that the body may, indeed, without difficulty perish, but that the mind is in its own nature immortal.

3. In the Third Meditation, I have unfolded at sufficient length, as appears to me, my chief argument for the existence of God. But yet, since I was there desirous to avoid the use of comparisons taken from material objects, that I might withdraw, as far as possible, the minds of my readers from the senses, numerous obscurities perhaps remain, which, however, will, I trust, be afterward entirely removed in the Replies to the Objections: thus among other things, it may be difficult to understand how the idea of a being absolutely perfect, which is found in our minds, possesses so much objective reality [i. e., participates by representation in so many degrees of being and perfection] that it must be held to arise from a cause absolutely perfect. This is illustrated in the Replies by the comparison of a highly

perfect machine, the idea of which exists in the mind of some workman; for as the objective (i.e.., representative) perfection of this idea must have some cause, viz, either the science of the workman, or of some other person from whom he has received the idea, in the same way the idea of God, which is found in us, demands God himself for its cause.

4. In the Fourth, it is shown that all which we clearly and distinctly perceive (apprehend) is true; and, at the same time, is explained wherein consists the nature of error, points that require to be known as well for confirming the preceding truths, as for the better understanding of those that are to follow. But, meanwhile, it must be observed, that I do not at all there treat of Sin, that is, of error committed in the pursuit of good and evil, but of that sort alone which arises in the determination of the true and the false. Nor do I refer to matters of faith, or to the conduct of life, but only to what regards speculative truths, and such as are known by means of the natural light alone.

5. In the Fifth, besides the illustration of corporeal nature, taken generically, a new demonstration is given of the existence of God, not free, perhaps, any more than the former, from certain difficulties, but of these the solution will be found in the Replies to the Objections. I further show, in what sense it is true that the certitude of geometrical demonstrations themselves is dependent on the knowledge of God.

6. Finally, in the Sixth, the act of the understanding (intellectio) is distinguished from that of the imagination (imaginatio); the marks of this distinction are described; the human mind is shown to be really distinct from the body, and, nevertheless, to be so closely conjoined therewith, as together to form, as it were, a unity. The whole of the errors which arise from the senses are brought under review, while the means of avoiding them are pointed out; and, finally, all the grounds are adduced from which the existence of material objects may be inferred; not, however, because I deemed them of great utility in establishing what they prove, viz., that there is in reality a world, that men are possessed of bodies, and the like, the truth of which no one of sound mind ever seriously doubted; but because, from a close consideration of them, it is perceived that they are neither so strong nor clear as the reasonings which conduct us to the knowledge of our mind and of God; so that the latter are, of all which come under human knowledge, the most certain and manifest — a conclusion which it was my single aim in these Meditations to establish; on which account I here omit

mention of the various other questions which, in the course of the discussion, I had occasion likewise to consider.

Meditation I

OF THE THINGS OF WHICH WE MAY DOUBT.

1. SEVERAL years have now elapsed since I first became aware that I had accepted, even from my youth, many false opinions for true, and that consequently what I afterward based on such principles was highly doubtful; and from that time I was convinced of the necessity of undertaking once in my life to rid myself of all the opinions I had adopted, and of commencing anew the work of building from the foundation, if I desired to establish a firm and abiding superstructure in the sciences. But as this enterprise appeared to me to be one of great magnitude, I waited until I had attained an age so mature as to leave me no hope that at any stage of life more advanced I should be better able to execute my design. On this account, I have delayed so long that I should henceforth consider I was doing wrong were I still to consume in deliberation any of the time that now remains for action. To-day, then, since I have opportunely freed my mind from all cares [and am happily disturbed by no passions], and since I am in the secure possession of leisure in a peaceable retirement, I will at length apply myself earnestly and freely to the general overthrow of all my former opinions.

2. But, to this end, it will not be necessary for me to show that the whole of these are false — a point, perhaps, which I shall never reach; but as even now my reason convinces me that I ought not the less carefully to withhold belief from what is not entirely certain and indubitable, than from what is manifestly false, it will be sufficient to justify the rejection of the whole if I shall find in each some ground for doubt. Nor for this purpose will it be necessary even to deal with each belief individually, which would be truly an endless labor; but, as the removal from below of the foundation necessarily involves the downfall of the whole edifice, I will at once approach the criticism of the principles on which all my former beliefs rested.

3. All that I have, up to this moment, accepted as possessed of the highest truth and certainty, I received either from or through the senses. I observed, however, that these sometimes misled us; and it is the part of

prudence not to place absolute confidence in that by which we have even once been deceived.

4. But it may be said, perhaps, that, although the senses occasionally mislead us respecting minute objects, and such as are so far removed from us as to be beyond the reach of close observation, there are yet many other of their informations (presentations), of the truth of which it is manifestly impossible to doubt; as for example, that I am in this place, seated by the fire, clothed in a winter dressing gown, that I hold in my hands this piece of paper, with other intimations of the same nature. But how could I deny that I possess these hands and this body, and withal escape being classed with persons in a state of insanity, whose brains are so disordered and clouded by dark bilious vapors as to cause them pertinaciously to assert that they are monarchs when they are in the greatest poverty; or clothed [in gold] and purple when destitute of any covering; or that their head is made of clay, their body of glass, or that they are gourds? I should certainly be not less insane than they, were I to regulate my procedure according to examples so extravagant.

5. Though this be true, I must nevertheless here consider that I am a man, and that, consequently, I am in the habit of sleeping, and representing to myself in dreams those same things, or even sometimes others less probable, which the insane think are presented to them in their waking moments. How often have I dreamt that I was in these familiar circumstances, that I was dressed, and occupied this place by the fire, when I was lying undressed in bed? At the present moment, however, I certainly look upon this paper with eyes wide awake; the head which I now move is not asleep; I extend this hand consciously and with express purpose, and I perceive it; the occurrences in sleep are not so distinct as all this. But I cannot forget that, at other times I have been deceived in sleep by similar illusions; and, attentively considering those cases, I perceive so clearly that there exist no certain marks by which the state of waking can ever be distinguished from sleep, that I feel greatly astonished; and in amazement I almost persuade myself that I am now dreaming.

6. Let us suppose, then, that we are dreaming, and that all these particulars — namely, the opening of the eyes, the motion of the head, the forth-putting of the hands — are merely illusions; and even that we really possess neither an entire body nor hands such as we see. Nevertheless it must be admitted at least that the objects which appear to us in sleep are, as

it were, painted representations which could not have been formed unless in the likeness of realities; and, therefore, that those general objects, at all events, namely, eyes, a head, hands, and an entire body, are not simply imaginary, but really existent. For, in truth, painters themselves, even when they study to represent sirens and satyrs by forms the most fantastic and extraordinary, cannot bestow upon them natures absolutely new, but can only make a certain medley of the members of different animals; or if they chance to imagine something so novel that nothing at all similar has ever been seen before, and such as is, therefore, purely fictitious and absolutely false, it is at least certain that the colors of which this is composed are real. And on the same principle, although these general objects, viz. [a body], eyes, a head, hands, and the like, be imaginary, we are nevertheless absolutely necessitated to admit the reality at least of some other objects still more simple and universal than these, of which, just as of certain real colors, all those images of things, whether true and real, or false and fantastic, that are found in our consciousness (cogitatio), are formed.

7. To this class of objects seem to belong corporeal nature in general and its extension; the figure of extended things, their quantity or magnitude, and their number, as also the place in, and the time during, which they exist, and other things of the same sort.

8. We will not, therefore, perhaps reason illegitimately if we conclude from this that Physics, Astronomy, Medicine, and all the other sciences that have for their end the consideration of composite objects, are indeed of a doubtful character; but that Arithmetic, Geometry, and the other sciences of the same class, which regard merely the simplest and most general objects, and scarcely inquire whether or not these are really existent, contain somewhat that is certain and indubitable: for whether I am awake or dreaming, it remains true that two and three make five, and that a square has but four sides; nor does it seem possible that truths so apparent can ever fall under a suspicion of falsity [or incertitude].

9. Nevertheless, the belief that there is a God who is all powerful, and who created me, such as I am, has, for a long time, obtained steady possession of my mind. How, then, do I know that he has not arranged that there should be neither earth, nor sky, nor any extended thing, nor figure, nor magnitude, nor place, providing at the same time, however, for [the rise in me of the perceptions of all these objects, and] the persuasion that these do not exist otherwise than as I perceive them ? And further, as I sometimes

think that others are in error respecting matters of which they believe themselves to possess a perfect knowledge, how do I know that I am not also deceived each time I add together two and three, or number the sides of a square, or form some judgment still more simple, if more simple indeed can be imagined? But perhaps Deity has not been willing that I should be thus deceived, for he is said to be supremely good. If, however, it were repugnant to the goodness of Deity to have created me subject to constant deception, it would seem likewise to be contrary to his goodness to allow me to be occasionally deceived; and yet it is clear that this is permitted.

10. Some, indeed, might perhaps be found who would be disposed rather to deny the existence of a Being so powerful than to believe that there is nothing certain. But let us for the present refrain from opposing this opinion, and grant that all which is here said of a Deity is fabulous: nevertheless, in whatever way it be supposed that I reach the state in which I exist, whether by fate, or chance, or by an endless series of antecedents and consequents, or by any other means, it is clear (since to be deceived and to err is a certain defect) that the probability of my being so imperfect as to be the constant victim of deception, will be increased exactly in proportion as the power possessed by the cause, to which they assign my origin, is lessened. To these reasonings I have assuredly nothing to reply, but am constrained at last to avow that there is nothing of all that I formerly believed to be true of which it is impossible to doubt, and that not through thoughtlessness or levity, but from cogent and maturely considered reasons; so that henceforward, if I desire to discover anything certain, I ought not the less carefully to refrain from assenting to those same opinions than to what might be shown to be manifestly false.

11. But it is not sufficient to have made these observations; care must be taken likewise to keep them in remembrance. For those old and customary opinions perpetually recur — long and familiar usage giving them the right of occupying my mind, even almost against my will, and subduing my belief; nor will I lose the habit of deferring to them and confiding in them so long as I shall consider them to be what in truth they are, viz, opinions to some extent doubtful, as I have already shown, but still highly probable, and such as it is much more reasonable to believe than deny. It is for this reason I am persuaded that I shall not be doing wrong, if, taking an opposite judgment of deliberate design, I become my own deceiver, by supposing, for a time, that all those opinions are entirely false and imaginary, until at

length, having thus balanced my old by my new prejudices, my judgment shall no longer be turned aside by perverted usage from the path that may conduct to the perception of truth. For I am assured that, meanwhile, there will arise neither peril nor error from this course, and that I cannot for the present yield too much to distrust, since the end I now seek is not action but knowledge.

12. I will suppose, then, not that Deity, who is sovereignly good and the fountain of truth, but that some malignant demon, who is at once exceedingly potent and deceitful, has employed all his artifice to deceive me; I will suppose that the sky, the air, the earth, colors, figures, sounds, and all external things, are nothing better than the illusions of dreams, by means of which this being has laid snares for my credulity; I will consider myself as without hands, eyes, flesh, blood, or any of the senses, and as falsely believing that I am possessed of these; I will continue resolutely fixed in this belief, and if indeed by this means it be not in my power to arrive at the knowledge of truth, I shall at least do what is in my power, viz., [suspend my judgment], and guard with settled purpose against giving my assent to what is false, and being imposed upon by this deceiver, whatever be his power and artifice. But this undertaking is arduous, and a certain indolence insensibly leads me back to my ordinary course of life; and just as the captive, who, perchance, was enjoying in his dreams an imaginary liberty, when he begins to suspect that it is but a vision, dreads awakening, and conspires with the agreeable illusions that the deception may be prolonged; so I, of my own accord, fall back into the train of my former beliefs, and fear to arouse myself from my slumber, lest the time of laborious wakefulness that would succeed this quiet rest, in place of bringing any light of day, should prove inadequate to dispel the darkness that will arise from the difficulties that have now been raised.

Meditation II

OF THE NATURE OF THE HUMAN MIND; AND THAT IT IS MORE EASILY KNOWN THAN THE BODY.

1. The Meditation of yesterday has filled my mind with so many doubts, that it is no longer in my power to forget them. Nor do I see, meanwhile, any principle on which they can be resolved; and, just as if I had fallen all of a sudden into very deep water, I am so greatly disconcerted as to be unable either to plant my feet firmly on the bottom or sustain myself by swimming on the surface. I will, nevertheless, make an effort, and try anew the same path on which I had entered yesterday, that is, proceed by casting aside all that admits of the slightest doubt, not less than if I had discovered it to be absolutely false; and I will continue always in this track until I shall find something that is certain, or at least, if I can do nothing more, until I shall know with certainty that there is nothing certain. Archimedes, that he might transport the entire globe from the place it occupied to another, demanded only a point that was firm and immovable; so, also, I shall be entitled to entertain the highest expectations, if I am fortunate enough to discover only one thing that is certain and indubitable.

2. I suppose, accordingly, that all the things which I see are false (fictitious); I believe that none of those objects which my fallacious memory represents ever existed; I suppose that I possess no senses; I believe that body, figure, extension, motion, and place are merely fictions of my mind. What is there, then, that can be esteemed true ? Perhaps this only, that there is absolutely nothing certain.

3. But how do I know that there is not something different altogether from the objects I have now enumerated, of which it is impossible to entertain the slightest doubt? Is there not a God, or some being, by whatever name I may designate him, who causes these thoughts to arise in my mind ? But why suppose such a being, for it may be I myself am capable of producing them? Am I, then, at least not something? But I before denied that I possessed senses or a body; I hesitate, however, for what follows from that? Am I so dependent on the body and the senses that without these I cannot exist? But I had the persuasion that there was absolutely nothing in the world, that there was no sky and no earth, neither minds nor bodies; was

I not, therefore, at the same time, persuaded that I did not exist? Far from it; I assuredly existed, since I was persuaded. But there is I know not what being, who is possessed at once of the highest power and the deepest cunning, who is constantly employing all his ingenuity in deceiving me. Doubtless, then, I exist, since I am deceived; and, let him deceive me as he may, he can never bring it about that I am nothing, so long as I shall be conscious that I am something. So that it must, in fine, be maintained, all things being maturely and carefully considered, that this proposition (pronunciatum) I am, I exist, is necessarily true each time it is expressed by me, or conceived in my mind.

4. But I do not yet know with sufficient clearness what I am, though assured that I am; and hence, in the next place, I must take care, lest perchance I inconsiderately substitute some other object in room of what is properly myself, and thus wander from truth, even in that knowledge (cognition) which I hold to be of all others the most certain and evident. For this reason, I will now consider anew what I formerly believed myself to be, before I entered on the present train of thought; and of my previous opinion I will retrench all that can in the least be invalidated by the grounds of doubt I have adduced, in order that there may at length remain nothing but what is certain and indubitable.

5. What then did I formerly think I was ? Undoubtedly I judged that I was a man. But what is a man ? Shall I say a rational animal ? Assuredly not; for it would be necessary forthwith to inquire into what is meant by animal, and what by rational, and thus, from a single question, I should insensibly glide into others, and these more difficult than the first; nor do I now possess enough of leisure to warrant me in wasting my time amid subtleties of this sort. I prefer here to attend to the thoughts that sprung up of themselves in my mind, and were inspired by my own nature alone, when I applied myself to the consideration of what I was. In the first place, then, I thought that I possessed a countenance, hands, arms, and all the fabric of members that appears in a corpse, and which I called by the name of body. It further occurred to me that I was nourished, that I walked, perceived, and thought, and all those actions I referred to the soul; but what the soul itself was I either did not stay to consider, or, if I did, I imagined that it was something extremely rare and subtile, like wind, or flame, or ether, spread through my grosser parts. As regarded the body, I did not even doubt of its nature, but thought I distinctly knew it, and if I had wished to

describe it according to the notions I then entertained, I should have explained myself in this manner: By body I understand all that can be terminated by a certain figure; that can be comprised in a certain place, and so fill a certain space as therefrom to exclude every other body; that can be perceived either by touch, sight, hearing, taste, or smell; that can be moved in different ways, not indeed of itself, but by something foreign to it by which it is touched [and from which it receives the impression]; for the power of self-motion, as likewise that of perceiving and thinking, I held as by no means pertaining to the nature of body; on the contrary, I was somewhat astonished to find such faculties existing in some bodies.

6. But [as to myself, what can I now say that I am], since I suppose there exists an extremely powerful, and, if I may so speak, malignant being, whose whole endeavors are directed toward deceiving me ? Can I affirm that I possess any one of all those attributes of which I have lately spoken as belonging to the nature of body ? After attentively considering them in my own mind, I find none of them that can properly be said to belong to myself. To recount them were idle and tedious. Let us pass, then, to the attributes of the soul. The first mentioned were the powers of nutrition and walking; but, if it be true that I have no body, it is true likewise that I am capable neither of walking nor of being nourished. Perception is another attribute of the soul; but perception too is impossible without the body; besides, I have frequently, during sleep, believed that I perceived objects which I afterward observed I did not in reality perceive. Thinking is another attribute of the soul; and here I discover what properly belongs to myself. This alone is inseparable from me. I am — I exist: this is certain; but how often? As often as I think; for perhaps it would even happen, if I should wholly cease to think, that I should at the same time altogether cease to be. I now admit nothing that is not necessarily true. I am therefore, precisely speaking, only a thinking thing, that is, a mind (mens sive animus), understanding, or reason, terms whose signification was before unknown to me. I am, however, a real thing, and really existent; but what thing? The answer was, a thinking thing.

7. The question now arises, am I aught besides ? I will stimulate my imagination with a view to discover whether I am not still something more than a thinking being. Now it is plain I am not the assemblage of members called the human body; I am not a thin and penetrating air diffused through all these members, or wind, or flame, or vapor, or breath, or any of all the

things I can imagine; for I supposed that all these were not, and, without changing the supposition, I find that I still feel assured of my existence. But it is true, perhaps, that those very things which I suppose to be non-existent, because they are unknown to me, are not in truth different from myself whom I know. This is a point I cannot determine, and do not now enter into any dispute regarding it. I can only judge of things that are known to me: I am conscious that I exist, and I who know that I exist inquire into what I am. It is, however, perfectly certain that the knowledge of my existence, thus precisely taken, is not dependent on things, the existence of which is as yet unknown to me: and consequently it is not dependent on any of the things I can feign in imagination. Moreover, the phrase itself, I frame an image (effingo), reminds me of my error; for I should in truth frame one if I were to imagine myself to be anything, since to imagine is nothing more than to contemplate the figure or image of a corporeal thing; but I already know that I exist, and that it is possible at the same time that all those images, and in general all that relates to the nature of body, are merely dreams [or chimeras]. From this I discover that it is not more reasonable to say, I will excite my imagination that I may know more distinctly what I am, than to express myself as follows: I am now awake, and perceive something real; but because my perception is not sufficiently clear, I will of express purpose go to sleep that my dreams may represent to me the object of my perception with more truth and clearness. And, therefore, I know that nothing of all that I can embrace in imagination belongs to the knowledge which I have of myself, and that there is need to recall with the utmost care the mind from this mode of thinking, that it may be able to know its own nature with perfect distinctness.

8. But what, then, am I ? A thinking thing, it has been said. But what is a thinking thing? It is a thing that doubts, understands, [conceives], affirms, denies, wills, refuses; that imagines also, and perceives.

9. Assuredly it is not little, if all these properties belong to my nature. But why should they not belong to it ? Am I not that very being who now doubts of almost everything; who, for all that, understands and conceives certain things; who affirms one alone as true, and denies the others; who desires to know more of them, and does not wish to be deceived; who imagines many things, sometimes even despite his will; and is likewise percipient of many, as if through the medium of the senses. Is there nothing of all this as true as that I am, even although I should be always dreaming,

and although he who gave me being employed all his ingenuity to deceive me ? Is there also any one of these attributes that can be properly distinguished from my thought, or that can be said to be separate from myself ? For it is of itself so evident that it is I who doubt, I who understand, and I who desire, that it is here unnecessary to add anything by way of rendering it more clear. And I am as certainly the same being who imagines; for although it may be (as I before supposed) that nothing I imagine is true, still the power of imagination does not cease really to exist in me and to form part of my thought. In fine, I am the same being who perceives, that is, who apprehends certain objects as by the organs of sense, since, in truth, I see light, hear a noise, and feel heat. But it will be said that these presentations are false, and that I am dreaming. Let it be so. At all events it is certain that I seem to see light, hear a noise, and feel heat; this cannot be false, and this is what in me is properly called perceiving (sentire), which is nothing else than thinking.

10. From this I begin to know what I am with somewhat greater clearness and distinctness than heretofore. But, nevertheless, it still seems to me, and I cannot help believing, that corporeal things, whose images are formed by thought [which fall under the senses], and are examined by the same, are known with much greater distinctness than that I know not what part of myself which is not imaginable; although, in truth, it may seem strange to say that I know and comprehend with greater distinctness things whose existence appears to me doubtful, that are unknown, and do not belong to me, than others of whose reality I am persuaded, that are known to me, and appertain to my proper nature; in a word, than myself. But I see clearly what is the state of the case. My mind is apt to wander, and will not yet submit to be restrained within the limits of truth. Let us therefore leave the mind to itself once more, and, according to it every kind of liberty [permit it to consider the objects that appear to it from without], in order that, having afterward withdrawn it from these gently and opportunely [and fixed it on the consideration of its being and the properties it finds in itself], it may then be the more easily controlled.

11. Let us now accordingly consider the objects that are commonly thought to be [the most easily, and likewise] the most distinctly known, viz, the bodies we touch and see; not, indeed, bodies in general, for these general notions are usually somewhat more confused, but one body in particular. Take, for example, this piece of wax; it is quite fresh, having

been but recently taken from the beehive; it has not yet lost the sweetness of the honey it contained; it still retains somewhat of the odor of the flowers from which it was gathered; its color, figure, size, are apparent (to the sight); it is hard, cold, easily handled; and sounds when struck upon with the finger. In fine, all that contributes to make a body as distinctly known as possible, is found in the one before us. But, while I am speaking, let it be placed near the fire — what remained of the taste exhales, the smell evaporates, the color changes, its figure is destroyed, its size increases, it becomes liquid, it grows hot, it can hardly be handled, and, although struck upon, it emits no sound. Does the same wax still remain after this change ? It must be admitted that it does remain; no one doubts it, or judges otherwise. What, then, was it I knew with so much distinctness in the piece of wax? Assuredly, it could be nothing of all that I observed by means of the senses, since all the things that fell under taste, smell, sight, touch, and hearing are changed, and yet the same wax remains.

12. It was perhaps what I now think, viz, that this wax was neither the sweetness of honey, the pleasant odor of flowers, the whiteness, the figure, nor the sound, but only a body that a little before appeared to me conspicuous under these forms, and which is now perceived under others. But, to speak precisely, what is it that I imagine when I think of it in this way? Let it be attentively considered, and, retrenching all that does not belong to the wax, let us see what remains. There certainly remains nothing, except something extended, flexible, and movable. But what is meant by flexible and movable ? Is it not that I imagine that the piece of wax, being round, is capable of becoming square, or of passing from a square into a triangular figure ? Assuredly such is not the case, because I conceive that it admits of an infinity of similar changes; and I am, moreover, unable to compass this infinity by imagination, and consequently this conception which I have of the wax is not the product of the faculty of imagination. But what now is this extension ? Is it not also unknown ? for it becomes greater when the wax is melted, greater when it is boiled, and greater still when the heat increases; and I should not conceive [clearly and] according to truth, the wax as it is, if I did not suppose that the piece we are considering admitted even of a wider variety of extension than I ever imagined, I must, therefore, admit that I cannot even comprehend by imagination what the piece of wax is, and that it is the mind alone (mens, Lat., entendement, F.) which perceives it. I speak of one piece in particular; for as to wax in

general, this is still more evident. But what is the piece of wax that can be perceived only by the [understanding or] mind? It is certainly the same which I see, touch, imagine; and, in fine, it is the same which, from the beginning, I believed it to be. But (and this it is of moment to observe) the perception of it is neither an act of sight, of touch, nor of imagination, and never was either of these, though it might formerly seem so, but is simply an intuition (inspectio) of the mind, which may be imperfect and confused, as it formerly was, or very clear and distinct, as it is at present, according as the attention is more or less directed to the elements which it contains, and of which it is composed.

13. But, meanwhile, I feel greatly astonished when I observe [the weakness of my mind, and] its proneness to error. For although, without at all giving expression to what I think, I consider all this in my own mind, words yet occasionally impede my progress, and I am almost led into error by the terms of ordinary language. We say, for example, that we see the same wax when it is before us, and not that we judge it to be the same from its retaining the same color and figure: whence I should forthwith be disposed to conclude that the wax is known by the act of sight, and not by the intuition of the mind alone, were it not for the analogous instance of human beings passing on in the street below, as observed from a window. In this case I do not fail to say that I see the men themselves, just as I say that I see the wax; and yet what do I see from the window beyond hats and cloaks that might cover artificial machines, whose motions might be determined by springs ? But I judge that there are human beings from these appearances, and thus I comprehend, by the faculty of judgment alone which is in the mind, what I believed I saw with my eyes.

14. The man who makes it his aim to rise to knowledge superior to the common, ought to be ashamed to seek occasions of doubting from the vulgar forms of speech: instead, therefore, of doing this, I shall proceed with the matter in hand, and inquire whether I had a clearer and more perfect perception of the piece of wax when I first saw it, and when I thought I knew it by means of the external sense itself, or, at all events, by the common sense (sensus communis), as it is called, that is, by the imaginative faculty; or whether I rather apprehend it more clearly at present, after having examined with greater care, both what it is, and in what way it can be known. It would certainly be ridiculous to entertain any doubt on this point. For what, in that first perception, was there distinct ?

What did I perceive which any animal might not have perceived ? But when I distinguish the wax from its exterior forms, and when, as if I had stripped it of its vestments, I consider it quite naked, it is certain, although some error may still be found in my judgment, that I cannot, nevertheless, thus apprehend it without possessing a human mind.

15. But finally, what shall I say of the mind itself, that is, of myself ? for as yet I do not admit that I am anything but mind. What, then! I who seem to possess so distinct an apprehension of the piece of wax, do I not know myself, both with greater truth and certitude, and also much more distinctly and clearly? For if I judge that the wax exists because I see it, it assuredly follows, much more evidently, that I myself am or exist, for the same reason: for it is possible that what I see may not in truth be wax, and that I do not even possess eyes with which to see anything; but it cannot be that when I see, or, which comes to the same thing, when I think I see, I myself who think am nothing. So likewise, if I judge that the wax exists because I touch it, it will still also follow that I am; and if I determine that my imagination, or any other cause, whatever it be, persuades me of the existence of the wax, I will still draw the same conclusion. And what is here remarked of the piece of wax, is applicable to all the other things that are external to me. And further, if the [notion or] perception of wax appeared to me more precise and distinct, after that not only sight and touch, but many other causes besides, rendered it manifest to my apprehension, with how much greater distinctness must I now know myself, since all the reasons that contribute to the knowledge of the nature of wax, or of any body whatever, manifest still better the nature of my mind ? And there are besides so many other things in the mind itself that contribute to the illustration of its nature, that those dependent on the body, to which I have here referred, scarcely merit to be taken into account.

16. But, in conclusion, I find I have insensibly reverted to the point I desired; for, since it is now manifest to me that bodies themselves are not properly perceived by the senses nor by the faculty of imagination, but by the intellect alone; and since they are not perceived because they are seen and touched, but only because they are understood [or rightly comprehended by thought], I readily discover that there is nothing more easily or clearly apprehended than my own mind. But because it is difficult to rid one’s self so promptly of an opinion to which one has been long accustomed, it will be desirable to tarry for some time at this stage, that, by

long continued meditation, I may more deeply impress upon my memory this new knowledge.

Meditation III

OF GOD: THAT HE EXISTS.

1. I WILL now close my eyes, I will stop my ears, I will turn away my senses from their objects, I will even efface from my consciousness all the images of corporeal things; or at least, because this can hardly be accomplished, I will consider them as empty and false; and thus, holding converse only with myself, and closely examining my nature, I will endeavor to obtain by degrees a more intimate and familiar knowledge of myself. I am a thinking (conscious) thing, that is, a being who doubts, affirms, denies, knows a few objects, and is ignorant of many, — [who loves, hates], wills, refuses, who imagines likewise, and perceives; for, as I before remarked, although the things which I perceive or imagine are perhaps nothing at all apart from me [and in themselves], I am nevertheless assured that those modes of consciousness which I call perceptions and imaginations, in as far only as they are modes of consciousness, exist in me.

2. And in the little I have said I think I have summed up all that I really know, or at least all that up to this time I was aware I knew. Now, as I am endeavoring to extend my knowledge more widely, I will use circumspection, and consider with care whether I can still discover in myself anything further which I have not yet hitherto observed. I am certain that I am a thinking thing; but do I not therefore likewise know what is required to render me certain of a truth ? In this first knowledge, doubtless, there is nothing that gives me assurance of its truth except the clear and distinct perception of what I affirm, which would not indeed be sufficient to give me the assurance that what I say is true, if it could ever happen that anything I thus clearly and distinctly perceived should prove false; and accordingly it seems to me that I may now take as a general rule, that all that is very clearly and distinctly apprehended (conceived) is true.

3. Nevertheless I before received and admitted many things as wholly certain and manifest, which yet I afterward found to be doubtful. What, then, were those? They were the earth, the sky, the stars, and all the other objects which I was in the habit of perceiving by the senses. But what was it that I clearly [and distinctly] perceived in them ? Nothing more than that the ideas and the thoughts of those objects were presented to my mind. And

even now I do not deny that these ideas are found in my mind. But there was yet another thing which I affirmed, and which, from having been accustomed to believe it, I thought I clearly perceived, although, in truth, I did not perceive it at all; I mean the existence of objects external to me, from which those ideas proceeded, and to which they had a perfect resemblance; and it was here I was mistaken, or if I judged correctly, this assuredly was not to be traced to any knowledge I possessed (the force of my perception, Lat.).

4. But when I considered any matter in arithmetic and geometry, that was very simple and easy, as, for example, that two and three added together make five, and things of this sort, did I not view them with at least sufficient clearness to warrant me in affirming their truth? Indeed, if I afterward judged that we ought to doubt of these things, it was for no other reason than because it occurred to me that a God might perhaps have given me such a nature as that I should be deceived, even respecting the matters that appeared to me the most evidently true. But as often as this preconceived opinion of the sovereign power of a God presents itself to my mind, I am constrained to admit that it is easy for him, if he wishes it, to cause me to err, even in matters where I think I possess the highest evidence; and, on the other hand, as often as I direct my attention to things which I think I apprehend with great clearness, I am so persuaded of their truth that I naturally break out into expressions such as these: Deceive me who may, no one will yet ever be able to bring it about that I am not, so long as I shall be conscious that I am, or at any future time cause it to be true that I have never been, it being now true that I am, or make two and three more or less than five, in supposing which, and other like absurdities, I discover a manifest contradiction. And in truth, as I have no ground for believing that Deity is deceitful, and as, indeed, I have not even considered the reasons by which the existence of a Deity of any kind is established, the ground of doubt that rests only on this supposition is very slight, and, so to speak, metaphysical. But, that I may be able wholly to remove it, I must inquire whether there is a God, as soon as an opportunity of doing so shall present itself; and if I find that there is a God, I must examine likewise whether he can be a deceiver; for, without the knowledge of these two truths, I do not see that I can ever be certain of anything. And that I may be enabled to examine this without interrupting the order of meditation I have proposed to myself [which is, to pass by degrees from the notions that I shall find first in

my mind to those I shall afterward discover in it], it is necessary at this stage to divide all my thoughts into certain classes, and to consider in which of these classes truth and error are, strictly speaking, to be found.

5. Of my thoughts some are, as it were, images of things, and to these alone properly belongs the name IDEA; as when I think [represent to my mind] a man, a chimera, the sky, an angel or God. Others, again, have certain other forms; as when I will, fear, affirm, or deny, I always, indeed, apprehend something as the object of my thought, but I also embrace in thought something more than the representation of the object; and of this class of thoughts some are called volitions or affections, and others judgments.

6. Now, with respect to ideas, if these are considered only in themselves, and are not referred to any object beyond them, they cannot, properly speaking, be false; for, whether I imagine a goat or chimera, it is not less true that I imagine the one than the other. Nor need we fear that falsity may exist in the will or affections; for, although I may desire objects that are wrong, and even that never existed, it is still true that I desire them. There thus only remain our judgments, in which we must take diligent heed that we be not deceived. But the chief and most ordinary error that arises in them consists in judging that the ideas which are in us are like or conformed to the things that are external to us; for assuredly, if we but considered the ideas themselves as certain modes of our thought (consciousness), without referring them to anything beyond, they would hardly afford any occasion of error.

7. But among these ideas, some appear to me to be innate, others adventitious, and others to be made by myself (factitious); for, as I have the power of conceiving what is called a thing, or a truth, or a thought, it seems to me that I hold this power from no other source than my own nature; but if I now hear a noise, if I see the sun, or if I feel heat, I have all along judged that these sensations proceeded from certain objects existing out of myself; and, in fine, it appears to me that sirens, hippogryphs, and the like, are inventions of my own mind. But I may even perhaps come to be of opinion that all my ideas are of the class which I call adventitious, or that they are all innate, or that they are all factitious; for I have not yet clearly discovered their true origin.

8. What I have here principally to do is to consider, with reference to those that appear to come from certain objects without me, what grounds

there are for thinking them like these objects. The first of these grounds is that it seems to me I am so taught by nature; and the second that I am conscious that those ideas are not dependent on my will, and therefore not on myself, for they are frequently presented to me against my will, as at present, whether I will or not, I feel heat; and I am thus persuaded that this sensation or idea (sensum vel ideam) of heat is produced in me by something different from myself, viz., by the heat of the fire by which I sit. And it is very reasonable to suppose that this object impresses me with its own likeness rather than any other thing.

9. But I must consider whether these reasons are sufficiently strong and convincing. When I speak of being taught by nature in this matter, I understand by the word nature only a certain spontaneous impetus that impels me to believe in a resemblance between ideas and their objects, and not a natural light that affords a knowledge of its truth. But these two things are widely different; for what the natural light shows to be true can be in no degree doubtful, as, for example, that I am because I doubt, and other truths of the like kind; inasmuch as I possess no other faculty whereby to distinguish truth from error, which can teach me the falsity of what the natural light declares to be true, and which is equally trustworthy; but with respect to [seemingly] natural impulses, I have observed, when the question related to the choice of right or wrong in action, that they frequently led me to take the worse part; nor do I see that I have any better ground for following them in what relates to truth and error.

10. Then, with respect to the other reason, which is that because these ideas do not depend on my will, they must arise from objects existing without me, I do not find it more convincing than the former, for just as those natural impulses, of which I have lately spoken, are found in me, notwithstanding that they are not always in harmony with my will, so likewise it may be that I possess some power not sufficiently known to myself capable of producing ideas without the aid of external objects, and, indeed, it has always hitherto appeared to me that they are formed during sleep, by some power of this nature, without the aid of aught external.

11. And, in fine, although I should grant that they proceeded from those objects, it is not a necessary consequence that they must be like them. On the contrary, I have observed, in a number of instances, that there was a great difference between the object and its idea. Thus, for example, I find in my mind two wholly diverse ideas of the sun; the one, by which it appears

to me extremely small draws its origin from the senses, and should be placed in the class of adventitious ideas; the other, by which it seems to be many times larger than the whole earth, is taken up on astronomical grounds, that is, elicited from certain notions born with me, or is framed by myself in some other manner. These two ideas cannot certainly both resemble the same sun; and reason teaches me that the one which seems to have immediately emanated from it is the most unlike.

12. And these things sufficiently prove that hitherto it has not been from a certain and deliberate judgment, but only from a sort of blind impulse, that I believed existence of certain things different from myself, which, by the organs of sense, or by whatever other means it might be, conveyed their ideas or images into my mind [and impressed it with their likenesses].

13. But there is still another way of inquiring whether, of the objects whose ideas are in my mind, there are any that exist out of me. If ideas are taken in so far only as they are certain modes of consciousness, I do not remark any difference or inequality among them, and all seem, in the same manner, to proceed from myself; but, considering them as images, of which one represents one thing and another a different, it is evident that a great diversity obtains among them. For, without doubt, those that represent substances are something more, and contain in themselves, so to speak, more objective reality [that is, participate by representation in higher degrees of being or perfection], than those that represent only modes or accidents; and again, the idea by which I conceive a God [sovereign], eternal, infinite, [immutable], all-knowing, all-powerful, and the creator of all things that are out of himself, this, I say, has certainly in it more objective reality than those ideas by which finite substances are represented.

14. Now, it is manifest by the natural light that there must at least be as much reality in the efficient and total cause as in its effect; for whence can the effect draw its reality if not from its cause ? And how could the cause communicate to it this reality unless it possessed it in itself? And hence it follows, not only that what is cannot be produced by what is not, but likewise that the more perfect, in other words, that which contains in itself more reality, cannot be the effect of the less perfect; and this is not only evidently true of those effects, whose reality is actual or formal, but likewise of ideas, whose reality is only considered as objective. Thus, for example, the stone that is not yet in existence, not only cannot now commence to be, unless it be produced by that which possesses in itself,

formally or eminently, all that enters into its composition, [in other words, by that which contains in itself the same properties that are in the stone, or others superior to them]; and heat can only be produced in a subject that was before devoid of it, by a cause that is of an order, [degree or kind], at least as perfect as heat; and so of the others. But further, even the idea of the heat, or of the stone, cannot exist in me unless it be put there by a cause that contains, at least, as much reality as I conceive existent in the heat or in the stone for although that cause may not transmit into my idea anything of its actual or formal reality, we ought not on this account to imagine that it is less real; but we ought to consider that, [as every idea is a work of the mind], its nature is such as of itself to demand no other formal reality than that which it borrows from our consciousness, of which it is but a mode [that is, a manner or way of thinking]. But in order that an idea may contain this objective reality rather than that, it must doubtless derive it from some cause in which is found at least as much formal reality as the idea contains of objective; for, if we suppose that there is found in an idea anything which was not in its cause, it must of course derive this from nothing. But, however imperfect may be the mode of existence by which a thing is objectively [or by representation] in the understanding by its idea, we certainly cannot, for all that, allege that this mode of existence is nothing, nor, consequently, that the idea owes its origin to nothing.

15. Nor must it be imagined that, since the reality which considered in these ideas is only objective, the same reality need not be formally (actually) in the causes of these ideas, but only objectively: for, just as the mode of existing objectively belongs to ideas by their peculiar nature, so likewise the mode of existing formally appertains to the causes of these ideas (at least to the first and principal), by their peculiar nature. And although an idea may give rise to another idea, this regress cannot, nevertheless, be infinite; we must in the end reach a first idea, the cause of which is, as it were, the archetype in which all the reality [or perfection] that is found objectively [or by representation] in these ideas is contained formally [and in act]. I am thus clearly taught by the natural light that ideas exist in me as pictures or images, which may, in truth, readily fall short of the perfection of the objects from which they are taken, but can never contain anything greater or more perfect.

16. And in proportion to the time and care with which I examine all those matters, the conviction of their truth brightens and becomes distinct.

But, to sum up, what conclusion shall I draw from it all? It is this: if the objective reality [or perfection] of any one of my ideas be such as clearly to convince me, that this same reality exists in me neither formally nor eminently, and if, as follows from this, I myself cannot be the cause of it, it is a necessary consequence that I am not alone in the world, but that there is besides myself some other being who exists as the cause of that idea; while, on the contrary, if no such idea be found in my mind, I shall have no sufficient ground of assurance of the existence of any other being besides myself, for, after a most careful search, I have, up to this moment, been unable to discover any other ground.

17. But, among these my ideas, besides that which represents myself, respecting which there can be here no difficulty, there is one that represents a God; others that represent corporeal and inanimate things; others angels; others animals; and, finally, there are some that represent men like myself.

18. But with respect to the ideas that represent other men, or animals, or angels, I can easily suppose that they were formed by the mingling and composition of the other ideas which I have of myself, of corporeal things, and of God, although they were, apart from myself, neither men, animals, nor angels.

19. And with regard to the ideas of corporeal objects, I never discovered in them anything so great or excellent which I myself did not appear capable of originating; for, by considering these ideas closely and scrutinizing them individually, in the same way that I yesterday examined the idea of wax, I find that there is but little in them that is clearly and distinctly perceived. As belonging to the class of things that are clearly apprehended, I recognize the following, viz, magnitude or extension in length, breadth, and depth; figure, which results from the termination of extension; situation, which bodies of diverse figures preserve with reference to each other; and motion or the change of situation; to which may be added substance, duration, and number. But with regard to light, colors, sounds, odors, tastes, heat, cold, and the other tactile qualities, they are thought with so much obscurity and confusion, that I cannot determine even whether they are true or false; in other words, whether or not the ideas I have of these qualities are in truth the ideas of real objects. For although I before remarked that it is only in judgments that formal falsity, or falsity properly so called, can be met with, there may nevertheless be found in ideas a certain material falsity, which arises when they represent what is nothing as

if it were something. Thus, for example, the ideas I have of cold and heat are so far from being clear and distinct, that I am unable from them to discover whether cold is only the privation of heat, or heat the privation of cold; or whether they are or are not real qualities: and since, ideas being as it were images there can be none that does not seem to us to represent some object, the idea which represents cold as something real and positive will not improperly be called false, if it be correct to say that cold is nothing but a privation of heat; and so in other cases.

20. To ideas of this kind, indeed, it is not necessary that I should assign any author besides myself: for if they are false, that is, represent objects that are unreal, the natural light teaches me that they proceed from nothing; in other words, that they are in me only because something is wanting to the perfection of my nature; but if these ideas are true, yet because they exhibit to me so little reality that I cannot even distinguish the object represented from nonbeing, I do not see why I should not be the author of them.

21. With reference to those ideas of corporeal things that are clear and distinct, there are some which, as appears to me, might have been taken from the idea I have of myself, as those of substance, duration, number, and the like. For when I think that a stone is a substance, or a thing capable of existing of itself, and that I am likewise a substance, although I conceive that I am a thinking and non-extended thing, and that the stone, on the contrary, is extended and unconscious, there being thus the greatest diversity between the two concepts, yet these two ideas seem to have this in common that they both represent substances. In the same way, when I think of myself as now existing, and recollect besides that I existed some time ago, and when I am conscious of various thoughts whose number I know, I then acquire the ideas of duration and number, which I can afterward transfer to as many objects as I please. With respect to the other qualities that go to make up the ideas of corporeal objects, viz, extension, figure, situation, and motion, it is true that they are not formally in me, since I am merely a thinking being; but because they are only certain modes of substance, and because I myself am a substance, it seems possible that they may be contained in me eminently.

22. There only remains, therefore, the idea of God, in which I must consider whether there is anything that cannot be supposed to originate with myself. By the name God, I understand a substance infinite, [eternal, immutable], independent, all-knowing, all-powerful, and by which I myself,

and every other thing that exists, if any such there be, were created. But these properties are so great and excellent, that the more attentively I consider them the less I feel persuaded that the idea I have of them owes its origin to myself alone. And thus it is absolutely necessary to conclude, from all that I have before said, that God exists.

23. For though the idea of substance be in my mind owing to this, that I myself am a substance, I should not, however, have the idea of an infinite substance, seeing I am a finite being, unless it were given me by some substance in reality infinite.

24. And I must not imagine that I do not apprehend the infinite by a true idea, but only by the negation of the finite, in the same way that I comprehend repose and darkness by the negation of motion and light: since, on the contrary, I clearly perceive that there is more reality in the infinite substance than in the finite, and therefore that in some way I possess the perception (notion) of the infinite before that of the finite, that is, the perception of God before that of myself, for how could I know that I doubt, desire, or that something is wanting to me, and that I am not wholly perfect, if I possessed no idea of a being more perfect than myself, by comparison of which I knew the deficiencies of my nature ?

25. And it cannot be said that this idea of God is perhaps materially false, and consequently that it may have arisen from nothing [in other words, that it may exist in me from my imperfections as I before said of the ideas of heat and cold, and the like: for, on the contrary, as this idea is very clear and distinct, and contains in itself more objective reality than any other, there can be no one of itself more true, or less open to the suspicion of falsity. The idea, I say, of a being supremely perfect, and infinite, is in the highest degree true; for although, perhaps, we may imagine that such a being does not exist, we cannot, nevertheless, suppose that his idea represents nothing real, as I have already said of the idea of cold. It is likewise clear and distinct in the highest degree, since whatever the mind clearly and distinctly conceives as real or true, and as implying any perfection, is contained entire in this idea. And this is true, nevertheless, although I do not comprehend the infinite, and although there may be in God an infinity of things that I cannot comprehend, nor perhaps even compass by thought in any way; for it is of the nature of the infinite that it should not be comprehended by the finite; and it is enough that I rightly understand this, and judge that all which I clearly perceive, and in which I

know there is some perfection, and perhaps also an infinity of properties of which I am ignorant, are formally or eminently in God, in order that the idea I have of him may be come the most true, clear, and distinct of all the ideas in my mind.

26. But perhaps I am something more than I suppose myself to be, and it may be that all those perfections which I attribute to God, in some way exist potentially in me, although they do not yet show themselves, and are not reduced to act. Indeed, I am already conscious that my knowledge is being increased [and perfected] by degrees; and I see nothing to prevent it from thus gradually increasing to infinity, nor any reason why, after such increase and perfection, I should not be able thereby to acquire all the other perfections of the Divine nature; nor, in fine, why the power I possess of acquiring those perfections, if it really now exist in me, should not be sufficient to produce the ideas of them.

27. Yet, on looking more closely into the matter, I discover that this cannot be; for, in the first place, although it were true that my knowledge daily acquired new degrees of perfection, and although there were potentially in my nature much that was not as yet actually in it, still all these excellences make not the slightest approach to the idea I have of the Deity, in whom there is no perfection merely potentially [but all actually] existent; for it is even an unmistakable token of imperfection in my knowledge, that it is augmented by degrees. Further, although my knowledge increase more and more, nevertheless I am not, therefore, induced to think that it will ever be actually infinite, since it can never reach that point beyond which it shall be incapable of further increase. But I conceive God as actually infinite, so that nothing can be added to his perfection. And, in fine, I readily perceive that the objective being of an idea cannot be produced by a being that is merely potentially existent, which, properly speaking, is nothing, but only by a being existing formally or actually.

28. And, truly, I see nothing in all that I have now said which it is not easy for any one, who shall carefully consider it, to discern by the natural light; but when I allow my attention in some degree to relax, the vision of my mind being obscured, and, as it were, blinded by the images of sensible objects, I do not readily remember the reason why the idea of a being more perfect than myself, must of necessity have proceeded from a being in reality more perfect. On this account I am here desirous to inquire further,

whether I, who possess this idea of God, could exist supposing there were no God.

29. And I ask, from whom could I, in that case, derive my existence ? Perhaps from myself, or from my parents, or from some other causes less perfect than God; for anything more perfect, or even equal to God, cannot be thought or imagined.

30. But if I [were independent of every other existence, and] were myself the author of my being, I should doubt of nothing, I should desire nothing, and, in fine, no perfection would be awanting to me; for I should have bestowed upon myself every perfection of which I possess the idea, and I should thus be God. And it must not be imagined that what is now wanting to me is perhaps of more difficult acquisition than that of which I am already possessed; for, on the contrary, it is quite manifest that it was a matter of much higher difficulty that I, a thinking being, should arise from nothing, than it would be for me to acquire the knowledge of many things of which I am ignorant, and which are merely the accidents of a thinking substance; and certainly, if I possessed of myself the greater perfection of which I have now spoken [in other words, if I were the author of my own existence], I would not at least have denied to myself things that may be more easily obtained [as that infinite variety of knowledge of which I am at present destitute]. I could not, indeed, have denied to myself any property which I perceive is contained in the idea of God, because there is none of these that seems to me to be more difficult to make or acquire; and if there were any that should happen to be more difficult to acquire, they would certainly appear so to me (supposing that I myself were the source of the other things I possess), because I should discover in them a limit to my power.

31. And though I were to suppose that I always was as I now am, I should not, on this ground, escape the force of these reasonings, since it would not follow, even on this supposition, that no author of my existence needed to be sought after. For the whole time of my life may be divided into an infinity of parts, each of which is in no way dependent on any other; and, accordingly, because I was in existence a short time ago, it does not follow that I must now exist, unless in this moment some cause create me anew as it were, that is, conserve me. In truth, it is perfectly clear and evident to all who will attentively consider the nature of duration, that the conservation of a substance, in each moment of its duration, requires the same power and

act that would be necessary to create it, supposing it were not yet in existence; so that it is manifestly a dictate of the natural light that conservation and creation differ merely in respect of our mode of thinking [and not in reality].

32. All that is here required, therefore, is that I interrogate myself to discover whether I possess any power by means of which I can bring it about that I, who now am, shall exist a moment afterward: for, since I am merely a thinking thing (or since, at least, the precise question, in the meantime, is only of that part of myself), if such a power resided in me, I should, without doubt, be conscious of it; but I am conscious of no such power, and thereby I manifestly know that I am dependent upon some being different from myself.

33. But perhaps the being upon whom I am dependent is not God, and I have been produced either by my parents, or by some causes less perfect than Deity. This cannot be: for, as I before said, it is perfectly evident that there must at least be as much reality in the cause as in its effect; and accordingly, since I am a thinking thing and possess in myself an idea of God, whatever in the end be the cause of my existence, it must of necessity be admitted that it is likewise a thinking being, and that it possesses in itself the idea and all the perfections I attribute to Deity. Then it may again be inquired whether this cause owes its origin and existence to itself, or to some other cause. For if it be self-existent, it follows, from what I have before laid down, that this cause is God; for, since it possesses the perfection of self-existence, it must likewise, without doubt, have the power of actually possessing every perfection of which it has the idea — in other words, all the perfections I conceive to belong to God. But if it owe its existence to another cause than itself, we demand again, for a similar reason, whether this second cause exists of itself or through some other, until, from stage to stage, we at length arrive at an ultimate cause, which will be God.

34. And it is quite manifest that in this matter there can be no infinite regress of causes, seeing that the question raised respects not so much the cause which once produced me, as that by which I am at this present moment conserved.

35. Nor can it be supposed that several causes concurred in my production, and that from one I received the idea of one of the perfections I attribute to Deity, and from another the idea of some other, and thus that all

those perfections are indeed found somewhere in the universe, but do not all exist together in a single being who is God; for, on the contrary, the unity, the simplicity, or inseparability of all the properties of Deity, is one of the chief perfections I conceive him to possess; and the idea of this unity of all the perfections of Deity could certainly not be put into my mind by any cause from which I did not likewise receive the ideas of all the other perfections; for no power could enable me to embrace them in an inseparable unity, without at the same time giving me the knowledge of what they were [and of their existence in a particular mode].

36. Finally, with regard to my parents [from whom it appears I sprung], although all that I believed respecting them be true, it does not, nevertheless, follow that I am conserved by them, or even that I was produced by them, in so far as I am a thinking being. All that, at the most, they contributed to my origin was the giving of certain dispositions (modifications) to the matter in which I have hitherto judged that I or my mind, which is what alone I now consider to be myself, is inclosed; and thus there can here be no difficulty with respect to them, and it is absolutely necessary to conclude from this alone that I am, and possess the idea of a being absolutely perfect, that is, of God, that his existence is most clearly demonstrated.

37. There remains only the inquiry as to the way in which I received this idea from God; for I have not drawn it from the senses, nor is it even presented to me unexpectedly, as is usual with the ideas of sensible objects, when these are presented or appear to be presented to the external organs of the senses; it is not even a pure production or fiction of my mind, for it is not in my power to take from or add to it; and consequently there but remains the alternative that it is innate, in the same way as is the idea of myself.

38. And, in truth, it is not to be wondered at that God, at my creation, implanted this idea in me, that it might serve, as it were, for the mark of the workman impressed on his work; and it is not also necessary that the mark should be something different from the work itself; but considering only that God is my creator, it is highly probable that he in some way fashioned me after his own image and likeness, and that I perceive this likeness, in which is contained the idea of God, by the same faculty by which I apprehend myself, in other words, when I make myself the object of reflection, I not only find that I am an incomplete, [imperfect] and

dependent being, and one who unceasingly aspires after something better and greater than he is; but, at the same time, I am assured likewise that he upon whom I am dependent possesses in himself all the goods after which I aspire [and the ideas of which I find in my mind], and that not merely indefinitely and potentially, but infinitely and actually, and that he is thus God. And the whole force of the argument of which I have here availed myself to establish the existence of God, consists in this, that I perceive I could not possibly be of such a nature as I am, and yet have in my mind the idea of a God, if God did not in reality exist — this same God, I say, whose idea is in my mind — that is, a being who possesses all those lofty perfections, of which the mind may have some slight conception, without, however, being able fully to comprehend them, and who is wholly superior to all defect [and has nothing that marks imperfection]: whence it is sufficiently manifest that he cannot be a deceiver, since it is a dictate of the natural light that all fraud and deception spring from some defect.

39. But before I examine this with more attention, and pass on to the consideration of other truths that may be evolved out of it, I think it proper to remain here for some time in the contemplation of God himself — that I may ponder at leisure his marvelous attributes — and behold, admire, and adore the beauty of this light so unspeakably great, as far, at least, as the strength of my mind, which is to some degree dazzled by the sight, will permit. For just as we learn by faith that the supreme felicity of another life consists in the contemplation of the Divine majesty alone, so even now we learn from experience that a like meditation, though incomparably less perfect, is the source of the highest satisfaction of which we are susceptible in this life.

Meditation IV

OF TRUTH AND ERROR.

1. I HAVE been habituated these bygone days to detach my mind from the senses, and I have accurately observed that there is exceedingly little which is known with certainty respecting corporeal objects, that we know much more of the human mind, and still more of God himself. I am thus able now without difficulty to abstract my mind from the contemplation of [sensible or] imaginable objects, and apply it to those which, as disengaged from all matter, are purely intelligible. And certainly the idea I have of the human mind in so far as it is a thinking thing, and not extended in length, breadth, and depth, and participating in none of the properties of body, is incomparably more distinct than the idea of any corporeal object; and when I consider that I doubt, in other words, that I am an incomplete and dependent being, the idea of a complete and independent being, that is to say of God, occurs to my mind with so much clearness and distinctness, and from the fact alone that this idea is found in me, or that I who possess it exist, the conclusions that God exists, and that my own existence, each moment of its continuance, is absolutely dependent upon him, are so manifest, as to lead me to believe it impossible that the human mind can know anything with more clearness and certitude. And now I seem to discover a path that will conduct us from the contemplation of the true God, in whom are contained all the treasures of science and wisdom, to the knowledge of the other things in the universe.

2. For, in the first place, I discover that it is impossible for him ever to deceive me, for in all fraud and deceit there is a certain imperfection: and although it may seem that the ability to deceive is a mark of subtlety or power, yet the will testifies without doubt of malice and weakness; and such, accordingly, cannot be found in God.

3.In the next place, I am conscious that I possess a certain faculty of judging [or discerning truth from error], which I doubtless received from God, along with whatever else is mine; and since it is impossible that he should will to deceive me, it is likewise certain that he has not given me a faculty that will ever lead me into error, provided I use it aright.

4. And there would remain no doubt on this head, did it not seem to follow from this, that I can never therefore be deceived; for if all I possess be from God, and if he planted in me no faculty that is deceitful, it seems to follow that I can never fall into error. Accordingly, it is true that when I think only of God (when I look upon myself as coming from God, Fr.), and turn wholly to him, I discover [in myself] no cause of error or falsity: but immediately thereafter, recurring to myself, experience assures me that I am nevertheless subject to innumerable errors. When I come to inquire into the cause of these, I observe that there is not only present to my consciousness a real and positive idea of God, or of a being supremely perfect, but also, so to speak, a certain negative idea of nothing, in other words, of that which is at an infinite distance from every sort of perfection, and that I am, as it were, a mean between God and nothing, or placed in such a way between absolute existence and non-existence, that there is in truth nothing in me to lead me into error, in so far as an absolute being is my creator; but that, on the other hand, as I thus likewise participate in some degree of nothing or of nonbeing, in other words, as I am not myself the supreme Being, and as I am wanting in many perfections, it is not surprising I should fall into error. And I hence discern that error, so far as error is not something real, which depends for its existence on God, but is simply defect; and therefore that, in order to fall into it, it is not necessary God should have given me a faculty expressly for this end, but that my being deceived arises from the circumstance that the power which God has given me of discerning truth from error is not infinite.

5. Nevertheless this is not yet quite satisfactory; for error is not a pure negation, [in other words, it is not the simple deficiency or want of some knowledge which is not due], but the privation or want of some knowledge which it would seem I ought to possess. But, on considering the nature of God, it seems impossible that he should have planted in his creature any faculty not perfect in its kind, that is, wanting in some perfection due to it: for if it be true, that in proportion to the skill of the maker the perfection of his work is greater, what thing can have been produced by the supreme Creator of the universe that is not absolutely perfect in all its parts? And assuredly there is no doubt that God could have created me such as that I should never be deceived; it is certain, likewise, that he always wills what is best: is it better, then, that I should be capable of being deceived than that I should not ?

6. Considering this more attentively the first thing that occurs to me is the reflection that I must not be surprised if I am not always capable of comprehending the reasons why God acts as he does; nor must I doubt of his existence because I find, perhaps, that there are several other things besides the present respecting which I understand neither why nor how they were created by him; for, knowing already that my nature is extremely weak and limited, and that the nature of God, on the other hand, is immense, incomprehensible, and infinite, I have no longer any difficulty in discerning that there is an infinity of things in his power whose causes transcend the grasp of my mind: and this consideration alone is sufficient to convince me, that the whole class of final causes is of no avail in physical [or natural] things; for it appears to me that I cannot, without exposing myself to the charge of temerity, seek to discover the [impenetrable] ends of Deity.

7. It further occurs to me that we must not consider only one creature apart from the others, if we wish to determine the perfection of the works of Deity, but generally all his creatures together; for the same object that might perhaps, with some show of reason, be deemed highly imperfect if it were alone in the world, may for all that be the most perfect possible, considered as forming part of the whole universe: and although, as it was my purpose to doubt of everything, I only as yet know with certainty my own existence and that of God, nevertheless, after having remarked the infinite power of Deity, I cannot deny that we may have produced many other objects, or at least that he is able to produce them, so that I may occupy a place in the relation of a part to the great whole of his creatures.

8. Whereupon, regarding myself more closely, and considering what my errors are (which alone testify to the existence of imperfection in me), I observe that these depend on the concurrence of two causes, viz, the faculty of cognition, which I possess, and that of election or the power of free choice, — in other words, the understanding and the will. For by the understanding alone, I [neither affirm nor deny anything but] merely apprehend (percipio) the ideas regarding which I may form a judgment; nor is any error, properly so called, found in it thus accurately taken. And although there are perhaps innumerable objects in the world of which I have no idea in my understanding, it cannot, on that account be said that I am deprived of those ideas [as of something that is due to my nature], but simply that I do not possess them, because, in truth, there is no ground to prove that Deity ought to have endowed me with a larger faculty of

cognition than he has actually bestowed upon me; and however skillful a workman I suppose him to be, I have no reason, on that account, to think that it was obligatory on him to give to each of his works all the perfections he is able to bestow upon some. Nor, moreover, can I complain that God has not given me freedom of choice, or a will sufficiently ample and perfect, since, in truth, I am conscious of will so ample and extended as to be superior to all limits. And what appears to me here to be highly remarkable is that, of all the other properties I possess, there is none so great and perfect as that I do not clearly discern it could be still greater and more perfect. For, to take an example, if I consider the faculty of understanding which I possess, I find that it is of very small extent, and greatly limited, and at the same time I form the idea of another faculty of the same nature, much more ample and even infinite, and seeing that I can frame the idea of it, I discover, from this circumstance alone, that it pertains to the nature of God. In the same way, if I examine the faculty of memory or imagination, or any other faculty I possess, I find none that is not small and circumscribed, and in God immense [and infinite]. It is the faculty of will only, or freedom of choice, which I experience to be so great that I am unable to conceive the idea of another that shall be more ample and extended; so that it is chiefly my will which leads me to discern that I bear a certain image and similitude of Deity. For although the faculty of will is incomparably greater in God than in myself, as well in respect of the knowledge and power that are conjoined with it, and that render it stronger and more efficacious, as in respect of the object, since in him it extends to a greater number of things, it does not, nevertheless, appear to me greater, considered in itself formally and precisely: for the power of will consists only in this, that we are able to do or not to do the same thing (that is, to affirm or deny, to pursue or shun it), or rather in this alone, that in affirming or denying, pursuing or shunning, what is proposed to us by the understanding, we so act that we are not conscious of being determined to a particular action by any external force. For, to the possession of freedom, it is not necessary that I be alike indifferent toward each of two contraries; but, on the contrary, the more I am inclined toward the one, whether because I clearly know that in it there is the reason of truth and goodness, or because God thus internally disposes my thought, the more freely do I choose and embrace it; and assuredly divine grace and natural knowledge, very far from diminishing liberty, rather augment and fortify it. But the

indifference of which I am conscious when I am not impelled to one side rather than to another for want of a reason, is the lowest grade of liberty, and manifests defect or negation of knowledge rather than perfection of will; for if I always clearly knew what was true and good, I should never have any difficulty in determining what judgment I ought to come to, and what choice I ought to make, and I should thus be entirely free without ever being indifferent.

9. From all this I discover, however, that neither the power of willing, which I have received from God, is of itself the source of my errors, for it is exceedingly ample and perfect in its kind; nor even the power of understanding, for as I conceive no object unless by means of the faculty that God bestowed upon me, all that I conceive is doubtless rightly conceived by me, and it is impossible for me to be deceived in it. Whence, then, spring my errors ? They arise from this cause alone, that I do not restrain the will, which is of much wider range than the understanding, within the same limits, but extend it even to things I do not understand, and as the will is of itself indifferent to such, it readily falls into error and sin by choosing the false in room of the true, and evil instead of good.

10. For example, when I lately considered whether aught really existed in the world, and found that because I considered this question, it very manifestly followed that I myself existed, I could not but judge that what I so clearly conceived was true, not that I was forced to this judgment by any external cause, but simply because great clearness of the understanding was succeeded by strong inclination in the will; and I believed this the more freely and spontaneously in proportion as I was less indifferent with respect to it. But now I not only know that I exist, in so far as I am a thinking being, but there is likewise presented to my mind a certain idea of corporeal nature; hence I am in doubt as to whether the thinking nature which is in me, or rather which I myself am, is different from that corporeal nature, or whether both are merely one and the same thing, and I here suppose that I am as yet ignorant of any reason that would determine me to adopt the one belief in preference to the other; whence it happens that it is a matter of perfect indifference to me which of the two suppositions I affirm or deny, or whether I form any judgment at all in the matter.

11. This indifference, moreover, extends not only to things of which the understanding has no knowledge at all, but in general also to all those which it does not discover with perfect clearness at the moment the will is

deliberating upon them; for, however probable the conjectures may be that dispose me to form a judgment in a particular matter, the simple knowledge that these are merely conjectures, and not certain and indubitable reasons, is sufficient to lead me to form one that is directly the opposite. Of this I lately had abundant experience, when I laid aside as false all that I had before held for true, on the single ground that I could in some degree doubt of it.

12. But if I abstain from judging of a thing when I do not conceive it with sufficient clearness and distinctness, it is plain that I act rightly, and am not deceived; but if I resolve to deny or affirm, I then do not make a right use of my free will; and if I affirm what is false, it is evident that I am deceived; moreover, even although I judge according to truth, I stumble upon it by chance, and do not therefore escape the imputation of a wrong use of my freedom; for it is a dictate of the natural light, that the knowledge of the understanding ought always to precede the determination of the will. And it is this wrong use of the freedom of the will in which is found the privation that constitutes the form of error. Privation, I say, is found in the act, in so far as it proceeds from myself, but it does not exist in the faculty which I received from God, nor even in the act, in so far as it depends on him.

13. For I have assuredly no reason to complain that God has not given me a greater power of intelligence or more perfect natural light than he has actually bestowed, since it is of the nature of a finite understanding not to comprehend many things, and of the nature of a created understanding to be finite; on the contrary, I have every reason to render thanks to God, who owed me nothing, for having given me all the perfections I possess, and I should be far from thinking that he has unjustly deprived me of, or kept back, the other perfections which he has not bestowed upon me.

14. I have no reason, moreover, to complain because he has given me a will more ample than my understanding, since, as the will consists only of a single element, and that indivisible, it would appear that this faculty is of such a nature that nothing could be taken from it [without destroying it]; and certainly, the more extensive it is, the more cause I have to thank the goodness of him who bestowed it upon me.

15. And, finally, I ought not also to complain that God concurs with me in forming the acts of this will, or the judgments in which I am deceived, because those acts are wholly true and good, in so far as they depend on God; and the ability to form them is a higher degree of perfection in my

nature than the want of it would be. With regard to privation, in which alone consists the formal reason of error and sin, this does not require the concurrence of Deity, because it is not a thing [or existence], and if it be referred to God as to its cause, it ought not to be called privation, but negation [according to the signification of these words in the schools]. For in truth it is no imperfection in Deity that he has accorded to me the power of giving or withholding my assent from certain things of which he has not put a clear and distinct knowledge in my understanding; but it is doubtless an imperfection in me that I do not use my freedom aright, and readily give my judgment on matters which I only obscurely and confusedly conceive. I perceive, nevertheless, that it was easy for Deity so to have constituted me as that I should never be deceived, although I still remained free and possessed of a limited knowledge, viz., by implanting in my understanding a clear and distinct knowledge of all the objects respecting which I should ever have to deliberate; or simply by so deeply engraving on my memory the resolution to judge of nothing without previously possessing a clear and distinct conception of it, that I should never forget it. And I easily understand that, in so far as I consider myself as a single whole, without reference to any other being in the universe, I should have been much more perfect than I now am, had Deity created me superior to error; but I cannot therefore deny that it is not somehow a greater perfection in the universe, that certain of its parts are not exempt from defect, as others are, than if they were all perfectly alike. And I have no right to complain because God, who placed me in the world, was not willing that I should sustain that character which of all others is the chief and most perfect.

16. I have even good reason to remain satisfied on the ground that, if he has not given me the perfection of being superior to error by the first means I have pointed out above, which depends on a clear and evident knowledge of all the matters regarding which I can deliberate, he has at least left in my power the other means, which is, firmly to retain the resolution never to judge where the truth is not clearly known to me: for, although I am conscious of the weakness of not being able to keep my mind continually fixed on the same thought, I can nevertheless, by attentive and oft-repeated meditation, impress it so strongly on my memory that I shall never fail to recollect it as often as I require it, and I can acquire in this way the habitude of not erring.

17. And since it is in being superior to error that the highest and chief perfection of man consists, I deem that I have not gained little by this day's meditation, in having discovered the source of error and falsity. And certainly this can be no other than what I have now explained: for as often as I so restrain my will within the limits of my knowledge, that it forms no judgment except regarding objects which are clearly and distinctly represented to it by the understanding, I can never be deceived; because every clear and distinct conception is doubtless something, and as such cannot owe its origin to nothing, but must of necessity have God for its author — God, I say, who, as supremely perfect, cannot, without a contradiction, be the cause of any error; and consequently it is necessary to conclude that every such conception [or judgment] is true. Nor have I merely learned to-day what I must avoid to escape error, but also what I must do to arrive at the knowledge of truth; for I will assuredly reach truth if I only fix my attention sufficiently on all the things I conceive perfectly, and separate these from others which I conceive more confusedly and obscurely; to which for the future I shall give diligent heed.

Meditation V

OF THE ESSENCE OF MATERIAL THINGS; AND, AGAIN, OF GOD; THAT HE EXISTS.

1. SEVERAL other questions remain for consideration respecting the attributes of God and my own nature or mind. I will, however, on some other occasion perhaps resume the investigation of these. Meanwhile, as I have discovered what must be done and what avoided to arrive at the knowledge of truth, what I have chiefly to do is to essay to emerge from the state of doubt in which I have for some time been, and to discover whether anything can be known with certainty regarding material objects.

2. But before considering whether such objects as I conceive exist without me, I must examine their ideas in so far as these are to be found in my consciousness, and discover which of them are distinct and which confused.

3. In the first place, I distinctly imagine that quantity which the philosophers commonly call continuous, or the extension in length, breadth, and depth that is in this quantity, or rather in the object to which it is attributed. Further, I can enumerate in it many diverse parts, and attribute to each of these all sorts of sizes, figures, situations, and local motions; and, in fine, I can assign to each of these motions all degrees of duration.

4. And I not only distinctly know these things when I thus consider them in general; but besides, by a little attention, I discover innumerable particulars respecting figures, numbers, motion, and the like, which are so evidently true, and so accordant with my nature, that when I now discover them I do not so much appear to learn anything new, as to call to remembrance what I before knew, or for the first time to remark what was before in my mind, but to which I had not hitherto directed my attention.

5. And what I here find of most importance is, that I discover in my mind innumerable ideas of certain objects, which cannot be esteemed pure negations, although perhaps they possess no reality beyond my thought, and which are not framed by me though it may be in my power to think, or not to think them, but possess true and immutable natures of their own. As, for example, when I imagine a triangle, although there is not perhaps and never was in any place in the universe apart from my thought one such figure, it

remains true nevertheless that this figure possesses a certain determinate nature, form, or essence, which is immutable and eternal, and not framed by me, nor in any degree dependent on my thought; as appears from the circumstance, that diverse properties of the triangle may be demonstrated, viz, that its three angles are equal to two right, that its greatest side is subtended by its greatest angle, and the like, which, whether I will or not, I now clearly discern to belong to it, although before I did not at all think of them, when, for the first time, I imagined a triangle, and which accordingly cannot be said to have been invented by me.

6. Nor is it a valid objection to allege, that perhaps this idea of a triangle came into my mind by the medium of the senses, through my having. seen bodies of a triangular figure; for I am able to form in thought an innumerable variety of figures with regard to which it cannot be supposed that they were ever objects of sense, and I can nevertheless demonstrate diverse properties of their nature no less than of the triangle, all of which are assuredly true since I clearly conceive them: and they are therefore something, and not mere negations; for it is highly evident that all that is true is something, [truth being identical with existence]; and I have already fully shown the truth of the principle, that whatever is clearly and distinctly known is true. And although this had not been demonstrated, yet the nature of my mind is such as to compel me to assert to what I clearly conceive while I so conceive it; and I recollect that even when I still strongly adhered to the objects of sense, I reckoned among the number of the most certain truths those I clearly conceived relating to figures, numbers, and other matters that pertain to arithmetic and geometry, and in general to the pure mathematics.

7. But now if because I can draw from my thought the idea of an object, it follows that all I clearly and distinctly apprehend to pertain to this object, does in truth belong to it, may I not from this derive an argument for the existence of God? It is certain that I no less find the idea of a God in my consciousness, that is the idea of a being supremely perfect, than that of any figure or number whatever: and I know with not less clearness and distinctness that an [actual and] eternal existence pertains to his nature than that all which is demonstrable of any figure or number really belongs to the nature of that figure or number; and, therefore, although all the conclusions of the preceding Meditations were false, the existence of God would pass

with me for a truth at least as certain as I ever judged any truth of mathematics to be.

8. Indeed such a doctrine may at first sight appear to contain more sophistry than truth. For, as I have been accustomed in every other matter to distinguish between existence and essence, I easily believe that the existence can be separated from the essence of God, and that thus God may be conceived as not actually existing. But, nevertheless, when I think of it more attentively, it appears that the existence can no more be separated from the essence of God, than the idea of a mountain from that of a valley, or the equality of its three angles to two right angles, from the essence of a [rectilinear] triangle; so that it is not less impossible to conceive a God, that is, a being supremely perfect, to whom existence is awanting, or who is devoid of a certain perfection, than to conceive a mountain without a valley.

9. But though, in truth, I cannot conceive a God unless as existing, any more than I can a mountain without a valley, yet, just as it does not follow that there is any mountain in the world merely because I conceive a mountain with a valley, so likewise, though I conceive God as existing, it does not seem to follow on that account that God exists; for my thought imposes no necessity on things; and as I may imagine a winged horse, though there be none such, so I could perhaps attribute existence to God, though no God existed.

10. But the cases are not analogous, and a fallacy lurks under the semblance of this objection: for because I cannot conceive a mountain without a valley, it does not follow that there is any mountain or valley in existence, but simply that the mountain or valley, whether they do or do not exist, are inseparable from each other; whereas, on the other hand, because I cannot conceive God unless as existing, it follows that existence is inseparable from him, and therefore that he really exists: not that this is brought about by my thought, or that it imposes any necessity on things, but, on the contrary, the necessity which lies in the thing itself, that is, the necessity of the existence of God, determines me to think in this way: for it is not in my power to conceive a God without existence, that is, a being supremely perfect, and yet devoid of an absolute perfection, as I am free to imagine a horse with or without wings.

11. Nor must it be alleged here as an objection, that it is in truth necessary to admit that God exists, after having supposed him to possess all perfections, since existence is one of them, but that my original supposition

was not necessary; just as it is not necessary to think that all quadrilateral figures can be inscribed in the circle, since, if I supposed this, I should be constrained to admit that the rhombus, being a figure of four sides, can be therein inscribed, which, however, is manifestly false. This objection is, I say, incompetent; for although it may not be necessary that I shall at any time entertain the notion of Deity, yet each time I happen to think of a first and sovereign being, and to draw, so to speak, the idea of him from the storehouse of the mind, I am necessitated to attribute to him all kinds of perfections, though I may not then enumerate them all, nor think of each of them in particular. And this necessity is sufficient, as soon as I discover that existence is a perfection, to cause me to infer the existence of this first and sovereign being; just as it is not necessary that I should ever imagine any triangle, but whenever I am desirous of considering a rectilinear figure composed of only three angles, it is absolutely necessary to attribute those properties to it from which it is correctly inferred that its three angles are not greater than two right angles, although perhaps I may not then advert to this relation in particular. But when I consider what figures are capable of being inscribed in the circle, it is by no means necessary to hold that all quadrilateral figures are of this number; on the contrary, I cannot even imagine such to be the case, so long as I shall be unwilling to accept in thought aught that I do not clearly and distinctly conceive; and consequently there is a vast difference between false suppositions, as is the one in question, and the true ideas that were born with me, the first and chief of which is the idea of God. For indeed I discern on many grounds that this idea is not factitious depending simply on my thought, but that it is the representation of a true and immutable nature: in the first place because I can conceive no other being, except God, to whose essence existence [necessarily] pertains; in the second, because it is impossible to conceive two or more gods of this kind; and it being supposed that one such God exists, I clearly see that he must have existed from all eternity, and will exist to all eternity; and finally, because I apprehend many other properties in God, none of which I can either diminish or change.

12. But, indeed, whatever mode of probation I in the end adopt, it always returns to this, that it is only the things I clearly and distinctly conceive which have the power of completely persuading me. And although, of the objects I conceive in this manner, some, indeed, are obvious to every one, while others are only discovered after close and careful investigation;

nevertheless after they are once discovered, the latter are not esteemed less certain than the former. Thus, for example, to take the case of a right-angled triangle, although it is not so manifest at first that the square of the base is equal to the squares of the other two sides, as that the base is opposite to the greatest angle; nevertheless, after it is once apprehended, we are as firmly persuaded of the truth of the former as of the latter. And, with respect to God if I were not pre-occupied by prejudices, and my thought beset on all sides by the continual presence of the images of sensible objects, I should know nothing sooner or more easily then the fact of his being. For is there any truth more clear than the existence of a Supreme Being, or of God, seeing it is to his essence alone that [necessary and eternal] existence pertains?

13. And although the right conception of this truth has cost me much close thinking, nevertheless at present I feel not only as assured of it as of what I deem most certain, but I remark further that the certitude of all other truths is so absolutely dependent on it that without this knowledge it is impossible ever to know anything perfectly.

14. For although I am of such a nature as to be unable, while I possess a very clear and distinct apprehension of a matter, to resist the conviction of its truth, yet because my constitution is also such as to incapacitate me from keeping my mind continually fixed on the same object, and as I frequently recollect a past judgment without at the same time being able to recall the grounds of it, it may happen meanwhile that other reasons are presented to me which would readily cause me to change my opinion, if I did not know that God existed; and thus I should possess no true and certain knowledge, but merely vague and vacillating opinions. Thus, for example, when I consider the nature of the [rectilinear] triangle, it most clearly appears to me, who have been instructed in the principles of geometry, that its three angles are equal to two right angles, and I find it impossible to believe otherwise, while I apply my mind to the demonstration; but as soon as I cease from attending to the process of proof, although I still remember that I had a clear comprehension of it, yet I may readily come to doubt of the truth demonstrated, if I do not know that there is a God: for I may persuade myself that I have been so constituted by nature as to be sometimes deceived, even in matters which I think I apprehend with the greatest evidence and certitude, especially when I recollect that I frequently

considered many things to be true and certain which other reasons afterward constrained me to reckon as wholly false.

15. But after I have discovered that God exists, seeing I also at the same time observed that all things depend on him, and that he is no deceiver, and thence inferred that all which I clearly and distinctly perceive is of necessity true: although I no longer attend to the grounds of a judgment, no opposite reason can be alleged sufficient to lead me to doubt of its truth, provided only I remember that I once possessed a clear and distinct comprehension of it. My knowledge of it thus becomes true and certain. And this same knowledge extends likewise to whatever I remember to have formerly demonstrated, as the truths of geometry and the like: for what can be alleged against them to lead me to doubt of them ? Will it be that my nature is such that I may be frequently deceived? But I already know that I cannot be deceived in judgments of the grounds of which I possess a clear knowledge. Will it be that I formerly deemed things to be true and certain which I afterward discovered to be false ? But I had no clear and distinct knowledge of any of those things, and, being as yet ignorant of the rule by which I am assured of the truth of a judgment, I was led to give my assent to them on grounds which I afterward discovered were less strong than at the time I imagined them to be. What further objection, then, is there ? Will it be said that perhaps I am dreaming (an objection I lately myself raised), or that all the thoughts of which I am now conscious have no more truth than the reveries of my dreams ? But although, in truth, I should be dreaming, the rule still holds that all which is clearly presented to my intellect is indisputably true.

16. And thus I very clearly see that the certitude and truth of all science depends on the knowledge alone of the true God, insomuch that, before I knew him, I could have no perfect knowledge of any other thing. And now that I know him, I possess the means of acquiring a perfect knowledge respecting innumerable matters, as well relative to God himself and other intellectual objects as to corporeal nature, in so far as it is the object of pure mathematics [which do not consider whether it exists or not].

Meditation VI

OF THE EXISTENCE OF MATERIAL THINGS, AND OF THE REAL DISTINCTION BETWEEN THE MIND AND BODY OF MAN.

1. THERE now only remains the inquiry as to whether material things exist. With regard to this question, I at least know with certainty that such things may exist, in as far as they constitute the object of the pure mathematics, since, regarding them in this aspect, I can conceive them clearly and distinctly. For there can be no doubt that God possesses the power of producing all the objects I am able distinctly to conceive, and I never considered anything impossible to him, unless when I experienced a contradiction in the attempt to conceive it aright. Further, the faculty of imagination which I possess, and of which I am conscious that I make use when I apply myself to the consideration of material things, is sufficient to persuade me of their existence: for, when I attentively consider what imagination is, I find that it is simply a certain application of the cognitive faculty (facultas cognoscitiva) to a body which is immediately present to it, and which therefore exists.

2. And to render this quite clear, I remark, in the first place, the difference that subsists between imagination and pure intellection [or conception]. For example, when I imagine a triangle I not only conceive (intelligo) that it is a figure comprehended by three lines, but at the same time also I look upon (intueor) these three lines as present by the power and internal application of my mind (acie mentis), and this is what I call imagining. But if I desire to think of a chiliogon, I indeed rightly conceive that it is a figure composed of a thousand sides, as easily as I conceive that a triangle is a figure composed of only three sides; but I cannot imagine the thousand sides of a chiliogon as I do the three sides of a triangle, nor, so to speak, view them as present [with the eyes of my mind]. And although, in accordance with the habit I have of always imagining something when I think of corporeal things, it may happen that, in conceiving a chiliogon, I confusedly represent some figure to myself, yet it is quite evident that this is not a chiliogon, since it in no wise differs from that which I would represent to myself, if I were to think of a myriogon, or any other figure of many sides; nor would this representation be of any use in discovering and

unfolding the properties that constitute the difference between a chiliogon and other polygons. But if the question turns on a pentagon, it is quite true that I can conceive its figure, as well as that of a chiliogon, without the aid of imagination; but I can likewise imagine it by applying the attention of my mind to its five sides, and at the same time to the area which they contain. Thus I observe that a special effort of mind is necessary to the act of imagination, which is not required to conceiving or understanding (ad intelligendum); and this special exertion of mind clearly shows the difference between imagination and pure intellection (imaginatio et intellectio pura).

3. I remark, besides, that this power of imagination which I possess, in as far as it differs from the power of conceiving, is in no way necessary to my [nature or] essence, that is, to the essence of my mind; for although I did not possess it, I should still remain the same that I now am, from which it seems we may conclude that it depends on something different from the mind. And I easily understand that, if some body exists, with which my mind is so conjoined and united as to be able, as it were, to consider it when it chooses, it may thus imagine corporeal objects; so that this mode of thinking differs from pure intellection only in this respect, that the mind in conceiving turns in some way upon itself, and considers some one of the ideas it possesses within itself; but in imagining it turns toward the body, and contemplates in it some object conformed to the idea which it either of itself conceived or apprehended by sense. I easily understand, I say, that imagination may be thus formed, if it is true that there are bodies; and because I find no other obvious mode of explaining it, I thence, with probability, conjecture that they exist, but only with probability; and although I carefully examine all things, nevertheless I do not find that, from the distinct idea of corporeal nature I have in my imagination, I can necessarily infer the existence of any body.

4. But I am accustomed to imagine many other objects besides that corporeal nature which is the object of the pure mathematics, as, for example, colors, sounds, tastes, pain, and the like, although with less distinctness; and, inasmuch as I perceive these objects much better by the senses, through the medium of which and of memory, they seem to have reached the imagination, I believe that, in order the more advantageously to examine them, it is proper I should at the same time examine what sense-perception is, and inquire whether from those ideas that are apprehended by

this mode of thinking (consciousness), I cannot obtain a certain proof of the existence of corporeal objects.

5. And, in the first place, I will recall to my mind the things I have hitherto held as true, because perceived by the senses, and the foundations upon which my belief in their truth rested; I will, in the second place, examine the reasons that afterward constrained me to doubt of them; and, finally, I will consider what of them I ought now to believe.

6. Firstly, then, I perceived that I had a head, hands, feet and other members composing that body which I considered as part, or perhaps even as the whole, of myself. I perceived further, that that body was placed among many others, by which it was capable of being affected in diverse ways, both beneficial and hurtful; and what was beneficial I remarked by a certain sensation of pleasure, and what was hurtful by a sensation of pain. And besides this pleasure and pain, I was likewise conscious of hunger, thirst, and other appetites, as well as certain corporeal inclinations toward joy, sadness, anger, and similar passions. And, out of myself, besides the extension, figure, and motions of bodies, I likewise perceived in them hardness, heat, and the other tactile qualities, and, in addition, light, colors, odors, tastes, and sounds, the variety of which gave me the means of distinguishing the sky, the earth, the sea, and generally all the other bodies, from one another. And certainly, considering the ideas of all these qualities, which were presented to my mind, and which alone I properly and immediately perceived, it was not without reason that I thought I perceived certain objects wholly different from my thought, namely, bodies from which those ideas proceeded; for I was conscious that the ideas were presented to me without my consent being required, so that I could not perceive any object, however desirous I might be, unless it were present to the organ of sense; and it was wholly out of my power not to perceive it when it was thus present. And because the ideas I perceived by the senses were much more lively and clear, and even, in their own way, more distinct than any of those I could of myself frame by meditation, or which I found impressed on my memory, it seemed that they could not have proceeded from myself, and must therefore have been caused in me by some other objects; and as of those objects I had no knowledge beyond what the ideas themselves gave me, nothing was so likely to occur to my mind as the supposition that the objects were similar to the ideas which they caused. And because I recollected also that I had formerly trusted to the senses,

rather than to reason, and that the ideas which I myself formed were not so clear as those I perceived by sense, and that they were even for the most part composed of parts of the latter, I was readily persuaded that I had no idea in my intellect which had not formerly passed through the senses. Nor was I altogether wrong in likewise believing that that body which, by a special right, I called my own, pertained to me more properly and strictly than any of the others; for in truth, I could never be separated from it as from other bodies; I felt in it and on account of it all my appetites and affections, and in fine I was affected in its parts by pain and the titillation of pleasure, and not in the parts of the other bodies that were separated from it. But when I inquired into the reason why, from this I know not what sensation of pain, sadness of mind should follow, and why from the sensation of pleasure, joy should arise, or why this indescribable twitching of the stomach, which I call hunger, should put me in mind of taking food, and the parchedness of the throat of drink, and so in other cases, I was unable to give any explanation, unless that I was so taught by nature; for there is assuredly no affinity, at least none that I am able to comprehend, between this irritation of the stomach and the desire of food, any more than between the perception of an object that causes pain and the consciousness of sadness which springs from the perception. And in the same way it seemed to me that all the other judgments I had formed regarding the objects of sense, were dictates of nature; because I remarked that those judgments were formed in me, before I had leisure to weigh and consider the reasons that might constrain me to form them.

7. But, afterward, a wide experience by degrees sapped the faith I had reposed in my senses; for I frequently observed that towers, which at a distance seemed round, appeared square, when more closely viewed, and that colossal figures, raised on the summits of these towers, looked like small statues, when viewed from the bottom of them; and, in other instances without number, I also discovered error in judgments founded on the external senses; and not only in those founded on the external, but even in those that rested on the internal senses; for is there aught more internal than pain ? And yet I have sometimes been informed by parties whose arm or leg had been amputated, that they still occasionally seemed to feel pain in that part of the body which they had lost, — a circumstance that led me to think that I could not be quite certain even that any one of my members was affected when I felt pain in it. And to these grounds of doubt I shortly

afterward also added two others of very wide generality: the first of them was that I believed I never perceived anything when awake which I could not occasionally think I also perceived when asleep, and as I do not believe that the ideas I seem to perceive in my sleep proceed from objects external to me, I did not any more observe any ground for believing this of such as I seem to perceive when awake; the second was that since I was as yet ignorant of the author of my being or at least supposed myself to be so, I saw nothing to prevent my having been so constituted by nature as that I should be deceived even in matters that appeared to me to possess the greatest truth. And, with respect to the grounds on which I had before been persuaded of the existence of sensible objects, I had no great difficulty in finding suitable answers to them; for as nature seemed to incline me to many things from which reason made me averse, I thought that I ought not to confide much in its teachings. And although the perceptions of the senses were not dependent on my will, I did not think that I ought on that ground to conclude that they proceeded from things different from myself, since perhaps there might be found in me some faculty, though hitherto unknown to me, which produced them.

8. But now that I begin to know myself better, and to discover more clearly the author of my being, I do not, indeed, think that I ought rashly to admit all which the senses seem to teach, nor, on the other hand, is it my conviction that I ought to doubt in general of their teachings.

9. And, firstly, because I know that all which I clearly and distinctly conceive can be produced by God exactly as I conceive it, it is sufficient that I am able clearly and distinctly to conceive one thing apart from another, in order to be certain that the one is different from the other, seeing they may at least be made to exist separately, by the omnipotence of God; and it matters not by what power this separation is made, in order to be compelled to judge them different; and, therefore, merely because I know with certitude that I exist, and because, in the meantime, I do not observe that aught necessarily belongs to my nature or essence beyond my being a thinking thing, I rightly conclude that my essence consists only in my being a thinking thing [or a substance whose whole essence or nature is merely thinking]. And although I may, or rather, as I will shortly say, although I certainly do possess a body with which I am very closely conjoined; nevertheless, because, on the one hand, I have a clear and distinct idea of myself, in as far as I am only a thinking and unextended thing, and as, on

the other hand, I possess a distinct idea of body, in as far as it is only an extended and unthinking thing, it is certain that I, [that is, my mind, by which I am what I am], is entirely and truly distinct from my body, and may exist without it.

10. Moreover, I find in myself diverse faculties of thinking that have each their special mode: for example, I find I possess the faculties of imagining and perceiving, without which I can indeed clearly and distinctly conceive myself as entire, but I cannot reciprocally conceive them without conceiving myself, that is to say, without an intelligent substance in which they reside, for [in the notion we have of them, or to use the terms of the schools] in their formal concept, they comprise some sort of intellection; whence I perceive that they are distinct from myself as modes are from things. I remark likewise certain other faculties, as the power of changing place, of assuming diverse figures, and the like, that cannot be conceived and cannot therefore exist, any more than the preceding, apart from a substance in which they inhere. It is very evident, however, that these faculties, if they really exist, must belong to some corporeal or extended substance, since in their clear and distinct concept there is contained some sort of extension, but no intellection at all. Further, I cannot doubt but that there is in me a certain passive faculty of perception, that is, of receiving and taking knowledge of the ideas of sensible things; but this would be useless to me, if there did not also exist in me, or in some other thing, another active faculty capable of forming and producing those ideas. But this active faculty cannot be in me [in as far as I am but a thinking thing], seeing that it does not presuppose thought, and also that those ideas are frequently produced in my mind without my contributing to it in any way, and even frequently contrary to my will. This faculty must therefore exist in some substance different from me, in which all the objective reality of the ideas that are produced by this faculty is contained formally or eminently, as I before remarked; and this substance is either a body, that is to say, a corporeal nature in which is contained formally [and in effect] all that is objectively [and by representation] in those ideas; or it is God Himself, or some other creature, of a rank superior to body, in which the same is contained eminently. But as God is no deceiver, it is manifest that He does not of Himself and immediately communicate those ideas to me, nor even by the intervention of any creature in which their objective reality is not formally, but only eminently, contained. For as He has given me no faculty

whereby I can discover this to be the case, but, on the contrary, a very strong inclination to believe that those ideas arise from corporeal objects, I do not see how He could be vindicated from the charge of deceit, if in truth they proceeded from any other source, or were produced by other causes than corporeal things: and accordingly it must be concluded, that corporeal objects exist. Nevertheless, they are not perhaps exactly such as we perceive by the senses, for their comprehension by the senses is, in many instances, very obscure and confused; but it is at least necessary to admit that all which I clearly and distinctly conceive as in them, that is, generally speaking all that is comprehended in the object of speculative geometry, really exists external to me.

11. But with respect to other things which are either only particular, as, for example, that the sun is of such a size and figure, etc., or are conceived with less clearness and distinctness, as light, sound, pain, and the like, although they are highly dubious and uncertain, nevertheless on the ground alone that God is no deceiver, and that consequently he has permitted no falsity in my opinions which he has not likewise given me a faculty of correcting, I think I may with safety conclude that I possess in myself the means of arriving at the truth. And, in the first place, it cannot be doubted that in each of the dictates of nature there is some truth: for by nature, considered in general, I now understand nothing more than God Himself, or the order and disposition established by God in created things; and by my nature in particular I understand the assemblage of all that God has given me.

12. But there is nothing which that nature teaches me more expressly [or more sensibly] than that I have a body which is ill affected when I feel pain, and stands in need of food and drink when I experience the sensations of hunger and thirst, etc. And therefore I ought not to doubt but that there is some truth in these informations.

13. Nature likewise teaches me by these sensations of pain, hunger, thirst, etc., that I am not only lodged in my body as a pilot in a vessel, but that I am besides so intimately conjoined, and as it were intermixed with it, that my mind and body compose a certain unity. For if this were not the case, I should not feel pain when my body is hurt, seeing I am merely a thinking thing, but should perceive the wound by the understanding alone, just as a pilot perceives by sight when any part of his vessel is damaged; and when my body has need of food or drink, I should have a clear

knowledge of this, and not be made aware of it by the confused sensations of hunger and thirst: for, in truth, all these sensations of hunger, thirst, pain, etc., are nothing more than certain confused modes of thinking, arising from the union and apparent fusion of mind and body.

14. Besides this, nature teaches me that my own body is surrounded by many other bodies, some of which I have to seek after, and others to shun. And indeed, as I perceive different sorts of colors, sounds, odors, tastes, heat, hardness, etc., I safely conclude that there are in the bodies from which the diverse perceptions of the senses proceed, certain varieties corresponding to them, although, perhaps, not in reality like them; and since, among these diverse perceptions of the senses, some are agreeable, and others disagreeable, there can be no doubt that my body, or rather my entire self, in as far as I am composed of body and mind, may be variously affected, both beneficially and hurtfully, by surrounding bodies.

15. But there are many other beliefs which though seemingly the teaching of nature, are not in reality so, but which obtained a place in my mind through a habit of judging inconsiderately of things. It may thus easily happen that such judgments shall contain error: thus, for example, the opinion I have that all space in which there is nothing to affect [or make an impression on] my senses is void: that in a hot body there is something in every respect similar to the idea of heat in my mind; that in a white or green body there is the same whiteness or greenness which I perceive; that in a bitter or sweet body there is the same taste, and so in other instances; that the stars, towers, and all distant bodies, are of the same size and figure as they appear to our eyes, etc. But that I may avoid everything like indistinctness of conception, I must accurately define what I properly understand by being taught by nature. For nature is here taken in a narrower sense than when it signifies the sum of all the things which God has given me; seeing that in that meaning the notion comprehends much that belongs only to the mind [to which I am not here to be understood as referring when I use the term nature]; as, for example, the notion I have of the truth, that what is done cannot be undone, and all the other truths I discern by the natural light [without the aid of the body]; and seeing that it comprehends likewise much besides that belongs only to body, and is not here any more contained under the name nature, as the quality of heaviness, and the like, of which I do not speak, the term being reserved exclusively to designate the things which God has given to me as a being composed of mind and

body. But nature, taking the term in the sense explained, teaches me to shun what causes in me the sensation of pain, and to pursue what affords me the sensation of pleasure, and other things of this sort; but I do not discover that it teaches me, in addition to this, from these diverse perceptions of the senses, to draw any conclusions respecting external objects without a previous [careful and mature] consideration of them by the mind: for it is, as appears to me, the office of the mind alone, and not of the composite whole of mind and body, to discern the truth in those matters. Thus, although the impression a star makes on my eye is not larger than that from the flame of a candle, I do not, nevertheless, experience any real or positive impulse determining me to believe that the star is not greater than the flame; the true account of the matter being merely that I have so judged from my youth without any rational ground. And, though on approaching the fire I feel heat, and even pain on approaching it too closely, I have, however, from this no ground for holding that something resembling the heat I feel is in the fire, any more than that there is something similar to the pain; all that I have ground for believing is, that there is something in it, whatever it may be, which excites in me those sensations of heat or pain. So also, although there are spaces in which I find nothing to excite and affect my senses, I must not therefore conclude that those spaces contain in them no body; for I see that in this, as in many other similar matters, I have been accustomed to pervert the order of nature, because these perceptions of the senses, although given me by nature merely to signify to my mind what things are beneficial and hurtful to the composite whole of which it is a part, and being sufficiently clear and distinct for that purpose, are nevertheless used by me as infallible rules by which to determine immediately the essence of the bodies that exist out of me, of which they can of course afford me only the most obscure and confused knowledge.

16. But I have already sufficiently considered how it happens that, notwithstanding the supreme goodness of God, there is falsity in my judgments. A difficulty, however, here presents itself, respecting the things which I am taught by nature must be pursued or avoided, and also respecting the internal sensations in which I seem to have occasionally detected error, [and thus to be directly deceived by nature]: thus, for example, I may be so deceived by the agreeable taste of some viand with which poison has been mixed, as to be induced to take the poison. In this case, however, nature may be excused, for it simply leads me to desire the

viand for its agreeable taste, and not the poison, which is unknown to it; and thus we can infer nothing from this circumstance beyond that our nature is not omniscient; at which there is assuredly no ground for surprise, since, man being of a finite nature, his knowledge must likewise be of a limited perfection.

17. But we also not unfrequently err in that to which we are directly impelled by nature, as is the case with invalids who desire drink or food that would be hurtful to them. It will here, perhaps, be alleged that the reason why such persons are deceived is that their nature is corrupted; but this leaves the difficulty untouched, for a sick man is not less really the creature of God than a man who is in full health; and therefore it is as repugnant to the goodness of God that the nature of the former should be deceitful as it is for that of the latter to be so. And as a clock, composed of wheels and counter weights, observes not the less accurately all the laws of nature when it is ill made, and points out the hours incorrectly, than when it satisfies the desire of the maker in every respect; so likewise if the body of man be considered as a kind of machine, so made up and composed of bones, nerves, muscles, veins, blood, and skin, that although there were in it no mind, it would still exhibit the same motions which it at present manifests involuntarily, and therefore without the aid of the mind, [and simply by the dispositions of its organs], I easily discern that it would also be as natural for such a body, supposing it dropsical, for example, to experience the parchedness of the throat that is usually accompanied in the mind by the sensation of thirst, and to be disposed by this parchedness to move its nerves and its other parts in the way required for drinking, and thus increase its malady and do itself harm, as it is natural for it, when it is not indisposed to be stimulated to drink for its good by a similar cause; and although looking to the use for which a clock was destined by its maker, I may say that it is deflected from its proper nature when it incorrectly indicates the hours, and on the same principle, considering the machine of the human body as having been formed by God for the sake of the motions which it usually manifests, although I may likewise have ground for thinking that it does not follow the order of its nature when the throat is parched and drink does not tend to its preservation, nevertheless I yet plainly discern that this latter acceptation of the term nature is very different from the other: for this is nothing more than a certain denomination, depending entirely on my thought, and hence called extrinsic, by which I compare a sick man and an

imperfectly constructed clock with the idea I have of a man in good health and a well made clock; while by the other acceptation of nature is understood something which is truly found in things, and therefore possessed of some truth.

18. But certainly, although in respect of a dropsical body, it is only by way of exterior denomination that we say its nature is corrupted, when, without requiring drink, the throat is parched; yet, in respect of the composite whole, that is, of the mind in its union with the body, it is not a pure denomination, but really an error of nature, for it to feel thirst when drink would be hurtful to it: and, accordingly, it still remains to be considered why it is that the goodness of God does not prevent the nature of man thus taken from being fallacious.

19. To commence this examination accordingly, I here remark, in the first place, that there is a vast difference between mind and body, in respect that body, from its nature, is always divisible, and that mind is entirely indivisible. For in truth, when I consider the mind, that is, when I consider myself in so far only as I am a thinking thing, I can distinguish in myself no parts, but I very clearly discern that I am somewhat absolutely one and entire; and although the whole mind seems to be united to the whole body, yet, when a foot, an arm, or any other part is cut off, I am conscious that nothing has been taken from my mind; nor can the faculties of willing, perceiving, conceiving, etc., properly be called its parts, for it is the same mind that is exercised [all entire] in willing, in perceiving, and in conceiving, etc. But quite the opposite holds in corporeal or extended things; for I cannot imagine any one of them [how small soever it may be], which I cannot easily sunder in thought, and which, therefore, I do not know to be divisible. This would be sufficient to teach me that the mind or soul of man is entirely different from the body, if I had not already been apprised of it on other grounds.

20. I remark, in the next place, that the mind does not immediately receive the impression from all the parts of the body, but only from the brain, or perhaps even from one small part of it, viz, that in which the common sense (senses communis) is said to be, which as often as it is affected in the same way gives rise to the same perception in the mind, although meanwhile the other parts of the body may be diversely disposed, as is proved by innumerable experiments, which it is unnecessary here to enumerate.

21. I remark, besides, that the nature of body is such that none of its parts can be moved by another part a little removed from the other, which cannot likewise be moved in the same way by any one of the parts that lie between those two, although the most remote part does not act at all. As, for example, in the cord A, B, C, D, [which is in tension], if its last part D, be pulled, the first part A, will not be moved in a different way than it would be were one of the intermediate parts B or C to be pulled, and the last part D meanwhile to remain fixed. And in the same way, when I feel pain in the foot, the science of physics teaches me that this sensation is experienced by means of the nerves dispersed over the foot, which, extending like cords from it to the brain, when they are contracted in the foot, contract at the same time the inmost parts of the brain in which they have their origin, and excite in these parts a certain motion appointed by nature to cause in the mind a sensation of pain, as if existing in the foot; but as these nerves must pass through the tibia, the leg, the loins, the back, and neck, in order to reach the brain, it may happen that although their extremities in the foot are not affected, but only certain of their parts that pass through the loins or neck, the same movements, nevertheless, are excited in the brain by this motion as would have been caused there by a hurt received in the foot, and hence the mind will necessarily feel pain in the foot, just as if it had been hurt; and the same is true of all the other perceptions of our senses.

22. I remark, finally, that as each of the movements that are made in the part of the brain by which the mind is immediately affected, impresses it with but a single sensation, the most likely supposition in the circumstances is, that this movement causes the mind to experience, among all the sensations which it is capable of impressing upon it; that one which is the best fitted, and generally the most useful for the preservation of the human body when it is in full health. But experience shows us that all the perceptions which nature has given us are of such a kind as I have mentioned; and accordingly, there is nothing found in them that does not manifest the power and goodness of God. Thus, for example, when the nerves of the foot are violently or more than usually shaken, the motion passing through the medulla of the spine to the innermost parts of the brain affords a sign to the mind on which it experiences a sensation, viz, of pain, as if it were in the foot, by which the mind is admonished and excited to do its utmost to remove the cause of it as dangerous and hurtful to the foot. It is true that God could have so constituted the nature of man as that the same

motion in the brain would have informed the mind of something altogether different: the motion might, for example, have been the occasion on which the mind became conscious of itself, in so far as it is in the brain, or in so far as it is in some place intermediate between the foot and the brain, or, finally, the occasion on which it perceived some other object quite different, whatever that might be; but nothing of all this would have so well contributed to the preservation of the body as that which the mind actually feels. In the same way, when we stand in need of drink, there arises from this want a certain parchedness in the throat that moves its nerves, and by means of them the internal parts of the brain; and this movement affects the mind with the sensation of thirst, because there is nothing on that occasion which is more useful for us than to be made aware that we have need of drink for the preservation of our health; and so in other instances.

23. Whence it is quite manifest that, notwithstanding the sovereign goodness of God, the nature of man, in so far as it is composed of mind and body, cannot but be sometimes fallacious. For, if there is any cause which excites, not in the foot, but in some one of the parts of the nerves that stretch from the foot to the brain, or even in the brain itself, the same movement that is ordinarily created when the foot is ill affected, pain will be felt, as it were, in the foot, and the sense will thus be naturally deceived; for as the same movement in the brain can but impress the mind with the same sensation, and as this sensation is much more frequently excited by a cause which hurts the foot than by one acting in a different quarter, it is reasonable that it should lead the mind to feel pain in the foot rather than in any other part of the body. And if it sometimes happens that the parchedness of the throat does not arise, as is usual, from drink being necessary for the health of the body, but from quite the opposite cause, as is the case with the dropsical, yet it is much better that it should be deceitful in that instance, than if, on the contrary, it were continually fallacious when the body is well-disposed; and the same holds true in other cases.

24. And certainly this consideration is of great service, not only in enabling me to recognize the errors to which my nature is liable, but likewise in rendering it more easy to avoid or correct them: for, knowing that all my senses more usually indicate to me what is true than what is false, in matters relating to the advantage of the body, and being able almost always to make use of more than a single sense in examining the same object, and besides this, being able to use my memory in connecting present

with past knowledge, and my understanding which has already discovered all the causes of my errors, I ought no longer to fear that falsity may be met with in what is daily presented to me by the senses. And I ought to reject all the doubts of those bygone days, as hyperbolical and ridiculous, especially the general uncertainty respecting sleep, which I could not distinguish from the waking state: for I now find a very marked difference between the two states, in respect that our memory can never connect our dreams with each other and with the course of life, in the way it is in the habit of doing with events that occur when we are awake. And, in truth, if some one, when I am awake, appeared to me all of a sudden and as suddenly disappeared, as do the images I see in sleep, so that I could not observe either whence he came or whither he went, I should not without reason esteem it either a specter or phantom formed in my brain, rather than a real man. But when I perceive objects with regard to which I can distinctly determine both the place whence they come, and that in which they are, and the time at which they appear to me, and when, without interruption, I can connect the perception I have of them with the whole of the other parts of my life, I am perfectly sure that what I thus perceive occurs while I am awake and not during sleep. And I ought not in the least degree to doubt of the truth of these presentations, if, after having called together all my senses, my memory, and my understanding for the purpose of examining them, no deliverance is given by any one of these faculties which is repugnant to that of any other: for since God is no deceiver, it necessarily follows that I am not herein deceived. But because the necessities of action frequently oblige us to come to a determination before we have had leisure for so careful an examination, it must be confessed that the life of man is frequently obnoxious to error with respect to individual objects; and we must, in conclusion, ac. knowledge the weakness of our nature.

SELECTIONS FROM ‘THE PRINCIPLES OF PHILOSOPHY’



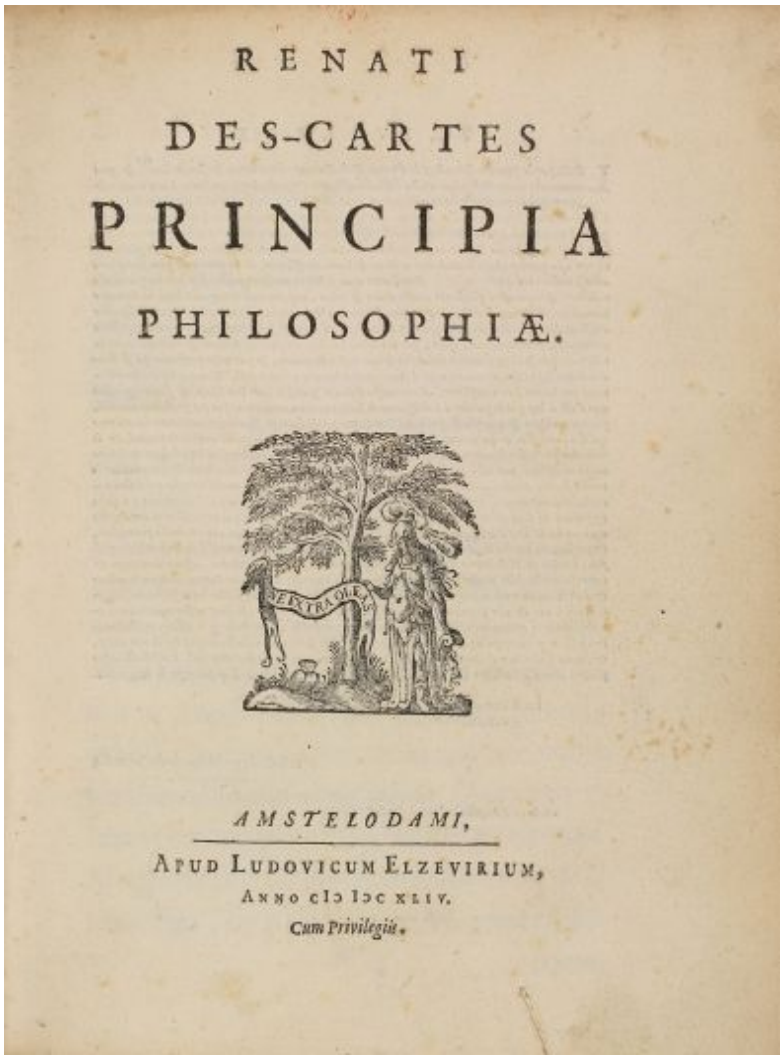
Translated by John Veitch

Descartes’ *Principles of Philosophy* is in essence a synthesis of the *Discourse on Method* and *Meditations on First Philosophy*. Originally written in Latin, it was published in 1644 and dedicated to Elisabeth of Bohemia, with whom Descartes had a long-standing friendship. A French version, *Les Principes de la Philosophie*, followed in 1647. It set forth the principles of nature — the Laws of Physics — as Descartes viewed them, explaining the principle that in the absence of external forces, an object’s motion will be uniform and in a straight line. Newton borrowed this principle from Descartes and included it in his own *Principia*; to this day, it is still generally referred to as Newton’s First Law of Motion.

Principles of Philosophy was primarily intended to replace the Aristotelian curriculum then used in French and British universities. The work provides a systematic statement of Descartes’ metaphysics and natural philosophy, representing the first truly comprehensive and mechanistic account of the universe.

Descartes introduces Philosophy as the study of wisdom, understood as the ability to conduct the human activities and also as the perfect knowledge of all the things that a man can know for the direction of his life, maintenance of his health, and knowledge of the arts. He argues that only God is perfectly wise and that man is more or less wise, in proportion to the knowledge he has of the most important truths.

The work is notable for concerning the degrees of knowledge. Descartes identifies four degrees of knowledge, which he names common, and a fifth that he designates as higher. The first degree consists on clear and evident notions that can be acquired without need of any meditation. The second degree is all that is learned by means of the senses. The third comprises what we learn when talking with other men. The fourth consists on what we can learn from the writings of men capable of giving good instructions.


RENATI

DES-CARTES

PRINCIPIA

PHILOSOPHIÆ.

AMSTELODAMI,

APUD LUDOVICUM ELZEVIRIUM,

ANNO CIↃ IↃC XLIV.

Cum Privilegiis.

The first edition's title page

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Elisabeth of the Palatinate (1618-1680), also known as Elisabeth of Bohemia, was the eldest daughter of Frederick V, Elector Palatine (who was briefly King of Bohemia), and Elizabeth Stuart. She influenced many key figures and philosophers, most notably being famous for questioning Descartes' idea of Dualism, or the mind being separate from the body, in addition to questioning his theories regarding communication between the mind and body. The written correspondence of Descartes and Elisabeth is regarded as an important philosophical document, giving insight into the theoretical debates of the seventeenth century.

LETTER OF THE AUTHOR

TO THE FRENCH TRANSLATOR OF THE PRINCIPLES OF PHILOSOPHY SERVING FOR A PREFACE.

Sir, — The version of my principles which you have been at pains to make, is so elegant and finished as to lead me to expect that the work will be more generally read in French than in Latin, and better understood. The only apprehension I entertain is lest the title should deter some who have not been brought up to letters, or with whom philosophy is in bad repute, because the kind they were taught has proved unsatisfactory; and this makes me think that it will be useful to add a preface to it for the purpose of showing what the MATTER of the work is, what END I had in view in writing it, and what UTILITY may be derived from it. But although it might be my part to write a preface of this nature, seeing I ought to know those particulars better than any other person, I cannot nevertheless prevail upon myself to do anything more than merely to give a summary of the chief points that fall, as I think, to be discussed in it: and I leave it to your discretion to present to the public such part of them as you shall judge proper.

I should have desired, in the first place, to explain in it what philosophy is, by commencing with the most common matters, as, for example, that the word PHILOSOPHY signifies the study of wisdom, and that by wisdom is to be understood not merely prudence in the management of affairs, but a perfect knowledge of all that man can know, as well for the conduct of his life as for the preservation of his health and the discovery of all the arts, and that knowledge to subserve these ends must necessarily be deduced from first causes; so that in order to study the acquisition of it (which is properly called philosophizing), we must commence with the investigation of those first causes which are called PRINCIPLES. Now these principles must possess TWO CONDITIONS: in the first place, they must be so clear and evident that the human mind, when it attentively considers them, cannot doubt of their truth; in the second place, the knowledge of other things must be so dependent on them as that though the principles themselves may indeed be known apart from what depends on them, the latter cannot nevertheless be known apart from the former. It will accordingly be

necessary thereafter to endeavour so to deduce from those principles the knowledge of the things that depend on them, as that there may be nothing in the whole series of deductions which is not perfectly manifest. God is in truth the only being who is absolutely wise, that is, who possesses a perfect knowledge of all things; but we may say that men are more or less wise as their knowledge of the most important truths is greater or less. And I am confident that there is nothing, in what I have now said, in which all the learned do not concur.

I should, in the next place, have proposed to consider the utility of philosophy, and at the same time have shown that, since it embraces all that the human mind can know, we ought to believe that it is by it we are distinguished from savages and barbarians, and that the civilisation and culture of a nation is regulated by the degree in which true philosophy nourishes in it, and, accordingly, that to contain true philosophers is the highest privilege a state can enjoy. Besides this, I should have shown that, as regards individuals, it is not only useful for each man to have intercourse with those who apply themselves to this study, but that it is incomparably better he should himself direct his attention to it; just as it is doubtless to be preferred that a man should make use of his own eyes to direct his steps, and enjoy by means of the same the beauties of colour and light, than that he should blindly follow the guidance of another; though the latter course is certainly better than to have the eyes closed with no guide except one's self. But to live without philosophizing is in truth the same as keeping the eyes closed without attempting to open them; and the pleasure of seeing all that sight discloses is not to be compared with the satisfaction afforded by the discoveries of philosophy. And, finally, this study is more imperatively requisite for the regulation of our manners, and for conducting us through life, than is the use of our eyes for directing our steps. The brutes, which have only their bodies to conserve, are continually occupied in seeking sources of nourishment; but men, of whom the chief part is the mind, ought to make the search after wisdom their principal care, for wisdom is the true nourishment of the mind; and I feel assured, moreover, that there are very many who would not fail in the search, if they would but hope for success in it, and knew the degree of their capabilities for it. There is no mind, how ignoble soever it be, which remains so firmly bound up in the objects of the senses, as not sometime or other to turn itself away from them in the aspiration after some higher good, although not knowing frequently wherein

that good consists. The greatest favourites of fortune — those who have health, honours, and riches in abundance — are not more exempt from aspirations of this nature than others; nay, I am persuaded that these are the persons who sigh the most deeply after another good greater and more perfect still than any they already possess. But the supreme good, considered by natural reason without the light of faith, is nothing more than the knowledge of truth through its first causes, in other words, the wisdom of which philosophy is the study. And, as all these particulars are indisputably true, all that is required to gain assent to their truth is that they be well stated.

But as one is restrained from assenting to these doctrines by experience, which shows that they who make pretensions to philosophy are often less wise and reasonable than others who never applied themselves to the study, I should have here shortly explained wherein consists all the science we now possess, and what are the degrees of wisdom at which we have arrived. The first degree contains only notions so clear of themselves that they can be acquired without meditation; the second comprehends all that the experience of the senses dictates; the third, that which the conversation of other men teaches us; to which may be added as the fourth, the reading, not of all books, but especially of such as have been written by persons capable of conveying proper instruction, for it is a species of conversation we hold with their authors. And it seems to me that all the wisdom we in ordinary possess is acquired only in these four ways; for I do not class divine revelation among them, because it does not conduct us by degrees, but elevates us at once to an infallible faith.

There have been, indeed, in all ages great minds who endeavoured to find a fifth road to wisdom, incomparably more sure and elevated than the other four. The path they essayed was the search of first causes and true principles, from which might be deduced the reasons of all that can be known by man; and it is to them the appellation of philosophers has been more especially accorded. I am not aware that there is any one of them up to the present who has succeeded in this enterprise. The first and chief whose writings we possess are Plato and Aristotle, between whom there was no difference, except that the former, following in the footsteps of his master, Socrates, ingenuously confessed that he had never yet been able to find anything certain, and that he was contented to write what seemed to him probable, imagining, for this end, certain principles by which he

endeavoured to account for the other things. Aristotle, on the other hand, characterised by less candour, although for twenty years the disciple of Plato, and with no principles beyond those of his master, completely reversed his mode of putting them, and proposed as true and certain what it is probable he himself never esteemed as such. But these two men had acquired much judgment and wisdom by the four preceding means, qualities which raised their authority very high, so much so that those who succeeded them were willing rather to acquiesce in their opinions, than to seek better for themselves. The chief question among their disciples, however, was as to whether we ought to doubt of all things or hold some as certain, — a dispute which led them on both sides into extravagant errors; for a part of those who were for doubt, extended it even to the actions of life, to the neglect of the most ordinary rules required for its conduct; those, on the other hand, who maintained the doctrine of certainty, supposing that it must depend upon the senses, trusted entirely to them. To such an extent was this carried by Epicurus, that it is said he ventured to affirm, contrary to all the reasonings of the astronomers, that the sun is no larger than it appears.

It is a fault we may remark in most disputes, that, as truth is the mean between the two opinions that are upheld, each disputant departs from it in proportion to the degree in which he possesses the spirit of contradiction. But the error of those who leant too much to the side of doubt, was not followed for any length of time, and that of the opposite party has been to some extent corrected by the doctrine that the senses are deceitful in many instances. Nevertheless, I do not know that this error was wholly removed by showing that certitude is not in the senses, but in the understanding alone when it has clear perceptions; and that while we only possess the knowledge which is acquired in the first four grades of wisdom, we ought not to doubt of the things that appear to be true in what regards the conduct of life, nor esteem them as so certain that we cannot change our opinions regarding them, even though constrained by the evidence of reason.

From ignorance of this truth, or, if there was any one to whom it was known, from neglect of it, the majority of those who in these later ages aspired to be philosophers, blindly followed Aristotle, so that they frequently corrupted the sense of his writings, and attributed to him various opinions which he would not recognise as his own were he now to return to the world; and those who did not follow him, among whom are to be found

many of the greatest minds, did yet not escape being imbued with his opinions in their youth, as these form the staple of instruction in the schools; and thus their minds were so preoccupied that they could not rise to the knowledge of true principles. And though I hold all the philosophers in esteem, and am unwilling to incur odium by my censure, I can adduce a proof of my assertion, which I do not think any of them will gainsay, which is, that they all laid down as a principle what they did not perfectly know. For example, I know none of them who did not suppose that there was gravity in terrestrial bodies; but although experience shows us very clearly that bodies we call heavy descend towards the center of the earth, we do not, therefore, know the nature of gravity, that is, the cause or principle in virtue of which bodies descend, and we must derive our knowledge of it from some other source. The same may be said of a vacuum and atoms, of heat and cold, of dryness and humidity, and of salt, sulphur, and mercury, and the other things of this sort which some have adopted as their principles. But no conclusion deduced from a principle which is not clear can be evident, even although the deduction be formally valid; and hence it follows that no reasonings based on such principles could lead them to the certain knowledge of any one thing, nor consequently advance them one step in the search after wisdom. And if they did discover any truth, this was due to one or other of the four means above mentioned. Notwithstanding this, I am in no degree desirous to lessen the honour which each of them can justly claim; I am only constrained to say, for the consolation of those who have not given their attention to study, that just as in travelling, when we turn our back upon the place to which we were going, we recede the farther from it in proportion as we proceed in the new direction for a greater length of time and with greater speed, so that, though we may be afterwards brought back to the right way, we cannot nevertheless arrive at the destined place as soon as if we had not moved backwards at all; so in philosophy, when we make use of false principles, we depart the farther from the knowledge of truth and wisdom exactly in proportion to the care with which we cultivate them, and apply ourselves to the deduction of diverse consequences from them, thinking that we are philosophizing well, while we are only departing the farther from the truth; from which it must be inferred that they who have learned the least of all that has been hitherto distinguished by the name of philosophy are the most fitted for the apprehension of truth.

After making those matters clear, I should, in the next place, have desired to set forth the grounds for holding that the true principles by which we may reach that highest degree of wisdom wherein consists the sovereign good of human life, are those I have proposed in this work; and two considerations alone are sufficient to establish this — the first of which is, that these principles are very clear, and the second, that we can deduce all other truths from them; for it is only these two conditions that are required in true principles. But I easily prove that they are very clear; firstly, by a reference to the manner in which I found them, namely, by rejecting all propositions that were in the least doubtful, for it is certain that such as could not be rejected by this test when they were attentively considered, are the most evident and clear which the human mind can know. Thus by considering that he who strives to doubt of all is unable nevertheless to doubt that he is while he doubts, and that what reasons thus, in not being able to doubt of itself and doubting nevertheless of everything else, is not that which we call our body, but what we name our mind or thought, I have taken the existence of this thought for the first principle, from which I very clearly deduced the following truths, namely, that there is a God who is the author of all that is in the world, and who, being the source of all truth, cannot have created our understanding of such a nature as to be deceived in the judgments it forms of the things of which it possesses a very clear and distinct perception. Those are all the principles of which I avail myself touching immaterial or metaphysical objects, from which I most clearly deduce these other principles of physical or corporeal things, namely, that there are bodies extended in length, breadth, and depth, which are of diverse figures and are moved in a variety of ways. Such are in sum the principles from which I deduce all other truths. The second circumstance that proves the clearness of these principles is, that they have been known in all ages, and even received as true and indubitable by all men, with the exception only of the existence of God, which has been doubted by some, because they attributed too much to the perceptions of the senses, and God can neither be seen nor touched.

But, though all the truths which I class among my principles were known at all times, and by all men, nevertheless, there has been no one up to the present, who, so far as I know, has adopted them as principles of philosophy: in other words, as such that we can deduce from them the knowledge of whatever else is in the world. It accordingly now remains for

me to prove that they are such; and it appears to me that I cannot better establish this than by the test of experience: in other words, by inviting readers to peruse the following work. For, though I have not treated in it of all matters- -that being impossible — I think I have so explained all of which I had occasion to treat, that they who read it attentively will have ground for the persuasion that it is unnecessary to seek for any other principles than those I have given, in order to arrive at the most exalted knowledge of which the mind of man is capable; especially if, after the perusal of my writings, they take the trouble to consider how many diverse questions are therein discussed and explained, and, referring to the writings of others, they see how little probability there is in the reasons that are adduced in explanation of the same questions by principles different from mine. And that they may the more easily undertake this, I might have said that those imbued with my doctrines have much less difficulty in comprehending the writings of others, and estimating their true value, than those who have not been so imbued; and this is precisely the opposite of what I before said of such as commenced with the ancient philosophy, namely, that the more they have studied it the less fit are they for rightly apprehending the truth.

I should also have added a word of advice regarding the manner of reading this work, which is, that I should wish the reader at first to go over the whole of it, as he would a romance, without greatly straining his attention, or tarrying at the difficulties he may perhaps meet with in it, with the view simply of knowing in general the matters of which I treat; and that afterwards, if they seem to him to merit a more careful examination, and he feel a desire to know their causes, he may read it a second time, in order to observe the connection of my reasonings; but that he must not then give it up in despair, although he may not everywhere sufficiently discover the connection of the proof, or understand all the reasonings — it being only necessary to mark with a pen the places where the difficulties occur, and continue to read without interruption to the end; then, if he does not grudge to take up the book a third time, I am confident he will find in a fresh perusal the solution of most of the difficulties he will have marked before; and that, if any still remain, their solution will in the end be found in another reading.

I have observed, on examining the natural constitutions of different minds, that there are hardly any so dull or slow of understanding as to be

incapable of apprehending good opinions, or even of acquiring all the highest sciences, if they be but conducted along the right road. And this can also be proved by reason; for, as the principles are clear, and as nothing ought to be deduced from them, unless most manifest inferences, no one is so devoid of intelligence as to be unable to comprehend the conclusions that flow from them. But, besides the entanglement of prejudices, from which no one is entirely exempt, although it is they who have been the most ardent students of the false sciences that receive the greatest detriment from them, it happens very generally that people of ordinary capacity neglect to study from a conviction that they want ability, and that others, who are more ardent, press on too rapidly: whence it comes to pass that they frequently admit principles far from evident, and draw doubtful inferences from them. For this reason, I should wish to assure those who are too distrustful of their own ability that there is nothing in my writings which they may not entirely understand, if they only take the trouble to examine them; and I should wish, at the same time, to warn those of an opposite tendency that even the most superior minds will have need of much time and attention to remark all I designed to embrace therein.

After this, that I might lead men to understand the real design I had in publishing them, I should have wished here to explain the order which it seems to me one ought to follow with the view of instructing himself. In the first place, a man who has merely the vulgar and imperfect knowledge which can be acquired by the four means above explained, ought, before all else, to endeavour to form for himself a code of morals, sufficient to regulate the actions of his life, as well for the reason that this does not admit of delay as because it ought to be our first care to live well. In the next place, he ought to study Logic, not that of the schools, for it is only, properly speaking, a dialectic which teaches the mode of expounding to others what we already know, or even of speaking much, without judgment, of what we do not know, by which means it corrupts rather than increases good sense — but the logic which teaches the right conduct of the reason with the view of discovering the truths of which we are ignorant; and, because it greatly depends on usage, it is desirable he should exercise himself for a length of time in practising its rules on easy and simple questions, as those of the mathematics. Then, when he has acquired some skill in discovering the truth in these questions, he should commence to apply himself in earnest to true philosophy, of which the first part is

Metaphysics, containing the principles of knowledge, among which is the explication of the principal attributes of God, of the immateriality of the soul, and of all the clear and simple notions that are in us; the second is Physics, in which, after finding the true principles of material things, we examine, in general, how the whole universe has been framed; in the next place, we consider, in particular, the nature of the earth, and of all the bodies that are most generally found upon it, as air, water, fire, the loadstone and other minerals. In the next place it is necessary also to examine singly the nature of plants, of animals, and above all of man, in order that we may thereafter be able to discover the other sciences that are useful to us. Thus, all Philosophy is like a tree, of which Metaphysics is the root, Physics the trunk, and all the other sciences the branches that grow out of this trunk, which are reduced to three principal, namely, Medicine, Mechanics, and Ethics. By the science of Morals, I understand the highest and most perfect which, presupposing an entire knowledge of the other sciences, is the last degree of wisdom.

But as it is not from the roots or the trunks of trees that we gather the fruit, but only from the extremities of their branches, so the principal utility of philosophy depends on the separate uses of its parts, which we can only learn last of all. But, though I am ignorant of almost all these, the zeal I have always felt in endeavouring to be of service to the public, was the reason why I published, some ten or twelve years ago, certain Essays on the doctrines I thought I had acquired. The first part of these Essays was a “Discourse on the Method of rightly conducting the Reason, and seeking Truth in the Sciences,” in which I gave a summary of the principal rules of logic, and also of an imperfect ethic, which a person may follow provisionally so long as he does not know any better. The other parts were three treatises: the first of Dioptrics, the second of Meteors, and the third of Geometry. In the Dioptrics, I designed to show that we might proceed far enough in philosophy as to arrive, by its means, at the knowledge of the arts that are useful to life, because the invention of the telescope, of which I there gave an explanation, is one of the most difficult that has ever been made. In the treatise of Meteors, I desired to exhibit the difference that subsists between the philosophy I cultivate and that taught in the schools, in which the same matters are usually discussed. In fine, in the Geometry, I professed to demonstrate that I had discovered many things that were before unknown, and thus afford ground for believing that we may still discover

many others, with the view of thus stimulating all to the investigation of truth. Since that period, anticipating the difficulty which many would experience in apprehending the foundations of the Metaphysics, I endeavoured to explain the chief points of them in a book of Meditations, which is not in itself large, but the size of which has been increased, and the matter greatly illustrated, by the Objections which several very learned persons sent to me on occasion of it, and by the Replies which I made to them. At length, after it appeared to me that those preceding treatises had sufficiently prepared the minds of my readers for the Principles of Philosophy, I also published it; and I have divided this work into four parts, the first of which contains the principles of human knowledge, and which may be called the First Philosophy, or Metaphysics. That this part, accordingly, may be properly understood, it will be necessary to read beforehand the book of Meditations I wrote on the same subject. The other three parts contain all that is most general in Physics, namely, the explication of the first laws or principles of nature, and the way in which the heavens, the fixed stars, the planets, comets, and generally the whole universe, were composed; in the next place, the explication, in particular, of the nature of this earth, the air, water, fire, the magnet, which are the bodies we most commonly find everywhere around it, and of all the qualities we observe in these bodies, as light, heat, gravity, and the like. In this way, it seems to me, I have commenced the orderly explanation of the whole of philosophy, without omitting any of the matters that ought to precede the last which I discussed. But to bring this undertaking to its conclusion, I ought hereafter to explain, in the same manner, the nature of the other more particular bodies that are on the earth, namely, minerals, plants, animals, and especially man; finally, to treat thereafter with accuracy of Medicine, Ethics, and Mechanics. I should require to do this in order to give to the world a complete body of philosophy; and I do not yet feel myself so old,- - I do not so much distrust my strength, nor do I find myself so far removed from the knowledge of what remains, as that I should not dare to undertake to complete this design, provided I were in a position to make all the experiments which I should require for the basis and verification of my reasonings. But seeing that would demand a great expenditure, to which the resources of a private individual like myself would not be adequate, unless aided by the public, and as I have no ground to expect this aid, I believe that I ought for the future to content myself with studying for my own

instruction, and posterity will excuse me if I fail hereafter to labour for them.

Meanwhile, that it may be seen wherein I think I have already promoted the general good, I will here mention the fruits that may be gathered from my Principles. The first is the satisfaction which the mind will experience on finding in the work many truths before unknown; for although frequently truth does not so greatly affect our imagination as falsity and fiction, because it seems less wonderful and is more simple, yet the gratification it affords is always more durable and solid. The second fruit is, that in studying these principles we will become accustomed by degrees to judge better of all the things we come in contact with, and thus be made wiser, in which respect the effect will be quite the opposite of the common philosophy, for we may easily remark in those we call pedants that it renders them less capable of rightly exercising their reason than they would have been if they had never known it. The third is, that the truths which they contain, being highly clear and certain, will take away all ground of dispute, and thus dispose men's minds to gentleness and concord; whereas the contrary is the effect of the controversies of the schools, which, as they insensibly render those who are exercised in them more wrangling and opinionative, are perhaps the prime cause of the heresies and dissensions that now harass the world. The last and chief fruit of these Principles is, that one will be able, by cultivating them, to discover many truths I myself have not unfolded, and thus passing by degrees from one to another, to acquire in course of time a perfect knowledge of the whole of philosophy, and to rise to the highest degree of wisdom. For just as all the arts, though in their beginnings they are rude and imperfect, are yet gradually perfected by practice, from their containing at first something true, and whose effect experience evinces; so in philosophy, when we have true principles, we cannot fail by following them to meet sometimes with other truths; and we could not better prove the falsity of those of Aristotle, than by saying that men made no progress in knowledge by their means during the many ages they prosecuted them.

I well know that there are some men so precipitate and accustomed to use so little circumspection in what they do, that, even with the most solid foundations, they could not rear a firm superstructure; and as it is usually those who are the readiest to make books, they would in a short time mar all that I have done, and introduce uncertainty and doubt into my manner of

philosophizing, from which I have carefully endeavoured to banish them, if people were to receive their writings as mine, or as representing my opinions. I had, not long ago, some experience of this in one of those who were believed desirous of following me the most closely, [Footnote: Regius; see La Vie de M. Descartes, reduite en abrege (Baillet). Liv. vii., chap. vii. — T.] and one too of whom I had somewhere said that I had such confidence in his genius as to believe that he adhered to no opinions which I should not be ready to avow as mine; for he last year published a book entitled “Fundamental Physics,” in which, although he seems to have written nothing on the subject of Physics and Medicine which he did not take from my writings, as well from those I have published as from another still imperfect on the nature of animals, which fell into his hands; nevertheless, because he has copied them badly, and changed the order, and denied certain metaphysical truths upon which all Physics ought to be based, I am obliged wholly to disavow his work, and here to request readers not to attribute to me any opinion unless they find it expressly stated in my own writings, and to receive no opinion as true, whether in my writings or elsewhere, unless they see that it is very clearly deduced from true principles. I well know, likewise, that many ages may elapse ere all the truths deducible from these principles are evolved out of them, as well because the greater number of such as remain to be discovered depend on certain particular experiments that never occur by chance, but which require to be investigated with care and expense by men of the highest intelligence, as because it will hardly happen that the same persons who have the sagacity to make a right use of them, will possess also the means of making them, and also because the majority of the best minds have formed so low an estimate of philosophy in general, from the imperfections they have remarked in the kind in vogue up to the present time, that they cannot apply themselves to the search after truth.

But, in conclusion, if the difference discernible between the principles in question and those of every other system, and the great array of truths deducible from them, lead them to discern the importance of continuing the search after these truths, and to observe the degree of wisdom, the perfection and felicity of life, to which they are fitted to conduct us, I venture to believe that there will not be found one who is not ready to labour hard in so profitable a study, or at least to favour and aid with all his might those who shall devote themselves to it with success.

The height of my wishes is, that posterity may sometime behold the happy issue of it, etc.

TO THE MOST SERENE PRINCESS,

ELIZABETH, ELDEST DAUGHTER OF FREDERICK, KING OF BOHEMIA, COUNT PALATINE, AND ELECTOR OF THE SACRED ROMAN EMPIRE.

MADAM, — The greatest advantage I have derived from the writings which I have already published, has arisen from my having, through means of them, become known to your Highness, and thus been privileged to hold occasional converse with one in whom so many rare and estimable qualities are united, as to lead me to believe I should do service to the public by proposing them as an example to posterity. It would ill become me to flatter, or to give expression to anything of which I had no certain knowledge, especially in the first pages of a work in which I aim at laying down the principles of truth. And the generous modesty that is conspicuous in all your actions, assures me that the frank and simple judgment of a man who only writes what he believes will be more agreeable to you than the ornate laudations of those who have studied the art of compliment. For this reason, I will give insertion to nothing in this letter for which I have not the certainty both of experience and reason; and in the exordium, as in the rest of the work, I will write only as becomes a philosopher. There is a vast difference between real and apparent virtues; and there is also a great discrepancy between those real virtues that proceed from an accurate knowledge of the truth, and such as are accompanied with ignorance or error. The virtues I call apparent are only, properly speaking, vices, which, as they are less frequent than the vices that are opposed to them, and are farther removed from them than the intermediate virtues, are usually held in higher esteem than those virtues. Thus, because those who fear dangers too much are more numerous than they who fear them too little, temerity is frequently opposed to the vice of timidity, and taken for a virtue, and is commonly more highly esteemed than true fortitude. Thus, also, the prodigal are in ordinary more praised than the liberal; and none more easily acquire a great reputation for piety than the superstitious and hypocritical. With regard to true virtues, these do not all proceed from true knowledge,

for there are some that likewise spring from defect or error; thus, simplicity is frequently the source of goodness, fear of devotion, and despair of courage. The virtues that are thus accompanied with some imperfections differ from each other, and have received diverse appellations. But those pure and perfect virtues that arise from the knowledge of good alone are all of the same nature, and may be comprised under the single term wisdom. For, whoever owns the firm and constant resolution of always using his reason as well as lies in his power, and in all his actions of doing what he judges to be best, is truly wise, as far as his nature permits; and by this alone he is just, courageous, temperate, and possesses all the other virtues, but so well balanced as that none of them appears more prominent than another: and for this reason, although they are much more perfect than the virtues that blaze forth through the mixture of some defect, yet, because the crowd thus observes them less, they are not usually extolled so highly. Besides, of the two things that are requisite for the wisdom thus described, namely, the perception of the understanding and the disposition of the will, it is only that which lies in the will which all men can possess equally, inasmuch as the understanding of some is inferior to that of others. But although those who have only an inferior understanding may be as perfectly wise as their nature permits, and may render themselves highly acceptable to God by their virtue, provided they preserve always a firm and constant resolution to do all that they shall judge to be right, and to omit nothing that may lead them to the knowledge of the duties of which they are ignorant; nevertheless, those who preserve a constant resolution of performing the right, and are especially careful in instructing themselves, and who possess also a highly perspicacious intellect, arrive doubtless at a higher degree of wisdom than others; and I see that these three particulars are found in great perfection in your Highness. For, in the first place, your desire of self-instruction is manifest, from the circumstance that neither the amusements of the court, nor the accustomed mode of educating ladies, which ordinarily condemns them to ignorance, have been sufficient to prevent you from studying with much care all that is best in the arts and sciences; and the incomparable perspicacity of your intellect is evinced by this, that you penetrated the secrets of the sciences and acquired an accurate knowledge of them in a very short period. But of the vigour of your intellect I have a still stronger proof, and one peculiar to myself, in that I have never yet met any one who understood so generally and so well as yourself all that is

contained in my writings. For there are several, even among men of the highest intellect and learning, who find them very obscure. And I remark, in almost all those who are versant in Metaphysics, that they are wholly disinclined from Geometry; and, on the other hand, that the cultivators of Geometry have no ability for the investigations of the First Philosophy: insomuch that I can say with truth I know but one mind, and that is your own, to which both studies are alike congenial, and which I therefore, with propriety, designate incomparable. But what most of all enhances my admiration is, that so accurate and varied an acquaintance with the whole circle of the sciences is not found in some aged doctor who has employed many years in contemplation, but in a Princess still young, and whose countenance and years would more fitly represent one of the Graces than a Muse or the sage Minerva. In conclusion, I not only remark in your Highness all that is requisite on the part of the mind to perfect and sublime wisdom, but also all that can be required on the part of the will or the manners, in which benignity and gentleness are so conjoined with majesty that, though fortune has attacked you with continued injustice, it has failed either to irritate or crush you. And this constrains me to such veneration that I not only think this work due to you, since it treats of philosophy which is the study of wisdom, but likewise feel not more zeal for my reputation as a philosopher than pleasure in subscribing myself, —

Of your most Serene Highness, The most devoted servant,

DESCARTES.

PART I. OF THE PRINCIPLES OF HUMAN KNOWLEDGE.

I. THAT in order to seek truth, it is necessary once in the course of our life, to doubt, as far as possible, of all things.

As we were at one time children, and as we formed various judgments regarding the objects presented to our senses, when as yet we had not the entire use of our reason, numerous prejudices stand in the way of our arriving at the knowledge of truth; and of these it seems impossible for us to rid ourselves, unless we undertake, once in our lifetime, to doubt of all those things in which we may discover even the smallest suspicion of uncertainty.

II. That we ought also to consider as false all that is doubtful.

Moreover, it will be useful likewise to esteem as false the things of which we shall be able to doubt, that we may with greater clearness discover what possesses most certainty and is the easiest to know.

III. That we ought not meanwhile to make use of doubt in the conduct of life.

In the meantime, it is to be observed that we are to avail ourselves of this general doubt only while engaged in the contemplation of truth. For, as far as concerns the conduct of life, we are very frequently obliged to follow opinions merely probable, or even sometimes, though of two courses of action we may not perceive more probability in the one than in the other, to choose one or other, seeing the opportunity of acting would not unfrequently pass away before we could free ourselves from our doubts.

IV. Why we may doubt of sensible things.

Accordingly, since we now only design to apply ourselves to the investigation of truth, we will doubt, first, whether of all the things that have ever fallen under our senses, or which we have ever imagined, any one really exist; in the first place, because we know by experience that the senses sometimes err, and it would be imprudent to trust too much to what has even once deceived us; secondly, because in dreams we perpetually seem to perceive or imagine innumerable objects which have no existence. And to one who has thus resolved upon a general doubt, there appear no marks by which he can with certainty distinguish sleep from the waking state.

V. Why we may also doubt of mathematical demonstrations.

We will also doubt of the other things we have before held as most certain, even of the demonstrations of mathematics, and of their principles which we have hitherto deemed self-evident; in the first place, because we have sometimes seen men fall into error in such matters, and admit as absolutely certain and self evident what to us appeared false, but chiefly because we have learnt that God who created us is all-powerful; for we do not yet know whether perhaps it was his will to create us so that we are always deceived, even in the things we think we know best: since this does not appear more impossible than our being occasionally deceived, which, however, as observation teaches us, is the case. And if we suppose that an all- powerful God is not the author of our being, and that we exist of ourselves or by some other means, still, the less powerful we suppose our author to be, the greater reason will we have for believing that we are not so perfect as that we may not be continually deceived.

VI. That we possess a free-will, by which we can withhold our assent from what is doubtful, and thus avoid error.

But meanwhile, whoever in the end may be the author of our being, and however powerful and deceitful he may be, we are nevertheless conscious of a freedom, by which we can refrain from admitting to a place in our belief aught that is not manifestly certain and undoubted, and thus guard against ever being deceived.

VII. That we cannot doubt of our existence while we doubt, and that this is the first knowledge we acquire when we philosophize in order.

While we thus reject all of which we can entertain the smallest doubt, and even imagine that it is false, we easily indeed suppose that there is neither God, nor sky, nor bodies, and that we ourselves even have neither hands nor feet, nor, finally, a body; but we cannot in the same way suppose that we are not while we doubt of the truth of these things; for there is a repugnance in conceiving that what thinks does not exist at the very time when it thinks. Accordingly, the knowledge, *I* THINK, THEREFORE *I* AM, is the first and most certain that occurs to one who philosophizes orderly.

VIII. That we hence discover the distinction between the mind and the body, or between a thinking and corporeal thing.

And this is the best mode of discovering the nature of the mind, and its distinctness from the body: for examining what we are, while supposing, as we now do, that there is nothing really existing apart from our thought, we

clearly perceive that neither extension, nor figure, nor local motion, [Footnote: Instead of “local motion,” the French has “existence in any place.”] nor anything similar that can be attributed to body, pertains to our nature, and nothing save thought alone; and, consequently, that the notion we have of our mind precedes that of any corporeal thing, and is more certain, seeing we still doubt whether there is any body in existence, while we already perceive that we think.

IX. What thought (COGITATIO) is.

By the word thought, I understand all that which so takes place in us that we of ourselves are immediately conscious of it; and, accordingly, not only to understand (INTELLIGERE, ENTENDRE), to will (VELLE), to imagine (IMAGINARI), but even to perceive (SENTIRE, SENTIR), are here the same as to think (COGITARE, PENSER). For if I say, I see, or, I walk, therefore I am; and if I understand by vision or walking the act of my eyes or of my limbs, which is the work of the body, the conclusion is not absolutely certain, because, as is often the case in dreams, I may think that I see or walk, although I do not open my eyes or move from my place, and even, perhaps, although I have no body: but, if I mean the sensation itself, or consciousness of seeing or walking, the knowledge is manifestly certain, because it is then referred to the mind, which alone perceives or is conscious that it sees or walks. [Footnote: In the French, “which alone has the power of perceiving, or of being conscious in any other way whatever.”]

X. That the notions which are simplest and self-evident, are obscured by logical definitions; and that such are not to be reckoned among the cognitions acquired by study, [but as born with us].

I do not here explain several other terms which I have used, or design to use in the sequel, because their meaning seems to me sufficiently self-evident. And I frequently remarked that philosophers erred in attempting to explain, by logical definitions, such truths as are most simple and self-evident; for they thus only rendered them more obscure. And when I said that the proposition, *I* THINK, THEREFORE *I* AM, is of all others the first and most certain which occurs to one philosophizing orderly, I did not therefore deny that it was necessary to know what thought, existence, and certitude are, and the truth that, in order to think it is necessary to be, and the like; but, because these are the most simple notions, and such as of themselves afford the knowledge of nothing existing, I did not judge it proper there to enumerate them.

XI. How we can know our mind more clearly than our body.

But now that it may be discerned how the knowledge we have of the mind not only precedes, and has greater certainty, but is even clearer, than that we have of the body, it must be remarked, as a matter that is highly manifest by the natural light, that to nothing no affections or qualities belong; and, accordingly, that where we observe certain affections, there a thing or substance to which these pertain, is necessarily found. The same light also shows us that we know a thing or substance more clearly in proportion as we discover in it a greater number of qualities. Now, it is manifest that we remark a greater number of qualities in our mind than in any other thing; for there is no occasion on which we know anything whatever when we are not at the same time led with much greater certainty to the knowledge of our own mind. For example, if I judge that there is an earth because I touch or see it, on the same ground, and with still greater reason, I must be persuaded that my mind exists; for it may be, perhaps, that I think I touch the earth while there is one in existence; but it is not possible that I should so judge, and my mind which thus judges not exist; and the same holds good of whatever object is presented to our mind.

XII. How it happens that every one does not come equally to know this.

Those who have not philosophized in order have had other opinions on this subject, because they never distinguished with sufficient care the mind from the body. For, although they had no difficulty in believing that they themselves existed, and that they had a higher assurance of this than of any other thing, nevertheless, as they did not observe that by THEMSELVES, they ought here to understand their MINDS alone [when the question related to metaphysical certainty]; and since, on the contrary, they rather meant their bodies which they saw with their eyes, touched with their hands, and to which they erroneously attributed the faculty of perception, they were prevented from distinctly apprehending the nature of the mind.

XIII. In what sense the knowledge of other things depends upon the knowledge of God.

But when the mind, which thus knows itself but is still in doubt as to all other things, looks around on all sides, with a view to the farther extension of its knowledge, it first of all discovers within itself the ideas of many things; and while it simply contemplates them, and neither affirms nor denies that there is anything beyond itself corresponding to them, it is in no danger of erring. The mind also discovers certain common notions out of

which it frames various demonstrations that carry conviction to such a degree as to render doubt of their truth impossible, so long as we give attention to them. For example, the mind has within itself ideas of numbers and figures, and it has likewise among its common notions the principle THAT IF EQUALS BE ADDED TO EQUALS THE WHOLES WILL BE EQUAL and the like; from which it is easy to demonstrate that the three angles of a triangle are equal to two right angles, etc. Now, so long as we attend to the premises from which this conclusion and others similar to it were deduced, we feel assured of their truth; but, as the mind cannot always think of these with attention, when it has the remembrance of a conclusion without recollecting the order of its deduction, and is uncertain whether the author of its being has created it of a nature that is liable to be deceived, even in what appears most evident, it perceives that there is just ground to distrust the truth of such conclusions, and that it cannot possess any certain knowledge until it has discovered its author.

XIV. That we may validly infer the existence of God from necessary existence being comprised in the concept we have of him.

When the mind afterwards reviews the different ideas that are in it, it discovers what is by far the chief among them — that of a Being omniscient, all-powerful, and absolutely perfect; and it observes that in this idea there is contained not only possible and contingent existence, as in the ideas of all other things which it clearly perceives, but existence absolutely necessary and eternal. And just as because, for example, the equality of its three angles to two right angles is necessarily comprised in the idea of a triangle, the mind is firmly persuaded that the three angles of a triangle are equal to two right angles; so, from its perceiving necessary and eternal existence to be comprised in the idea which it has of an all-perfect Being, it ought manifestly to conclude that this all-perfect Being exists.

XV. That necessary existence is not in the same way comprised in the notions which we have of other things, but merely contingent existence.

The mind will be still more certain of the truth of this conclusion, if it consider that it has no idea of any other thing in which it can discover that necessary existence is contained; for, from this circumstance alone, it will discern that the idea of an all-perfect Being has not been framed by itself, and that it does not represent a chimera, but a true and immutable nature, which must exist since it can only be conceived as necessarily existing.

XVI. That prejudices hinder many from clearly knowing the necessity of the existence of God.

Our mind would have no difficulty in assenting to this truth, if it were, first of all, wholly free from prejudices; but as we have been accustomed to distinguish, in all other things, essence from existence, and to imagine at will many ideas of things which neither are nor have been, it easily happens, when we do not steadily fix our thoughts on the contemplation of the all-perfect Being, that a doubt arises as to whether the idea we have of him is not one of those which we frame at pleasure, or at least of that class to whose essence existence does not pertain.

XVII. That the greater objective (representative) perfection there is in our idea of a thing, the greater also must be the perfection of its cause.

When we further reflect on the various ideas that are in us, it is easy to perceive that there is not much difference among them, when we consider them simply as certain modes of thinking, but that they are widely different, considered in reference to the objects they represent; and that their causes must be so much the more perfect according to the degree of objective perfection contained in them. [Footnote: “as what they represent of their object has more perfection.” — FRENCH.] For there is no difference between this and the case of a person who has the idea of a machine, in the construction of which great skill is displayed, in which circumstances we have a right to inquire how he came by this idea, whether, for example, he somewhere saw such a machine constructed by another, or whether he was so accurately taught the mechanical sciences, or is endowed with such force of genius, that he was able of himself to invent it, without having elsewhere seen anything like it; for all the ingenuity which is contained in the idea objectively only, or as it were in a picture, must exist at least in its first and chief cause, whatever that may be, not only objectively or representatively, but in truth formally or eminently.

XVIII. That the existence of God may be again inferred from the above.

Thus, because we discover in our minds the idea of God, or of an all-perfect Being, we have a right to inquire into the source whence we derive it; and we will discover that the perfections it represents are so immense as to render it quite certain that we could only derive it from an all-perfect Being; that is, from a God really existing. For it is not only manifest by the natural light that nothing cannot be the cause of anything whatever, and that the more perfect cannot arise from the less perfect, so as to be thereby

produced as by its efficient and total cause, but also that it is impossible we can have the idea or representation of anything whatever, unless there be somewhere, either in us or out of us, an original which comprises, in reality, all the perfections that are thus represented to us; but, as we do not in any way find in ourselves those absolute perfections of which we have the idea, we must conclude that they exist in some nature different from ours, that is, in God, or at least that they were once in him; and it most manifestly follows [from their infinity] that they are still there.

XIX. That, although we may not comprehend the nature of God, there is yet nothing which we know so clearly as his perfections.

This will appear sufficiently certain and manifest to those who have been accustomed to contemplate the idea of God, and to turn their thoughts to his infinite perfections; for, although we may not comprehend them, because it is of the nature of the infinite not to be comprehended by what is finite, we nevertheless conceive them more clearly and distinctly than material objects, for this reason, that, being simple, and unobscured by limits, [Footnote: After LIMITS, “what of them we do conceive is much less confused. There is, besides, no speculation more calculated to aid in perfecting our understanding, and which is more important than this, inasmuch as the consideration of an object that has no limits to its perfections fills us with satisfaction and assurance.”-FRENCH.] they occupy our mind more fully.

XX. That we are not the cause of ourselves, but that this is God, and consequently that there is a God.

But, because every one has not observed this, and because, when we have an idea of any machine in which great skill is displayed, we usually know with sufficient accuracy the manner in which we obtained it, and as we cannot even recollect when the idea we have of a God was communicated to us by him, seeing it was always in our minds, it is still necessary that we should continue our review, and make inquiry after our author, possessing, as we do, the idea of the infinite perfections of a God: for it is in the highest degree evident by the natural light, that that which knows something more perfect than itself, is not the source of its own being, since it would thus have given to itself all the perfections which it knows; and that, consequently, it could draw its origin from no other being

than from him who possesses in himself all those perfections, that is, from God.

XXI. That the duration alone of our life is sufficient to demonstrate the existence of God.

The truth of this demonstration will clearly appear, provided we consider the nature of time, or the duration of things; for this is of such a kind that its parts are not mutually dependent, and never co-existent; and, accordingly, from the fact that we now are, it does not necessarily follow that we shall be a moment afterwards, unless some cause, viz., that which first produced us, shall, as it were, continually reproduce us, that is, conserve us. For we easily understand that there is no power in us by which we can conserve ourselves, and that the being who has so much power as to conserve us out of himself, must also by so much the greater reason conserve himself, or rather stand in need of being conserved by no one whatever, and, in fine, be God.

XXII. That in knowing the existence of God, in the manner here explained, we likewise know all his attributes, as far as they can be known by the natural light alone.

There is the great advantage in proving the existence of God in this way, viz., by his idea, that we at the same time know what he is, as far as the weakness of our nature allows; for, reflecting on the idea we have of him which is born with us, we perceive that he is eternal, omniscient, omnipotent, the source of all goodness and truth, creator of all things, and that, in fine, he has in himself all that in which we can clearly discover any infinite perfection or good that is not limited by any imperfection.

XXIII. That God is not corporeal, and does not perceive by means of senses as we do, or will the evil of sin.

For there are indeed many things in the world that are to a certain extent imperfect or limited, though possessing also some perfection; and it is accordingly impossible that any such can be in God. Thus, looking to corporeal nature,[Footnote: In the French, “since extension constitutes the nature of body.”] since divisibility is included in local extension, and this indicates imperfection, it is certain that God is not body. And although in men it is to some degree a perfection to be capable of perceiving by means of the senses, nevertheless since in every sense there is passivity [Footnote: In the French, “because our perceptions arise from impressions made upon us from another source,” i.e., than ourselves.] which indicates dependency,

we must conclude that God is in no manner possessed of senses, and that he only understands and wills, not, however, like us, by acts in any way distinct, but always by an act that is one, identical, and the simplest possible, understands, wills, and operates all, that is, all things that in reality exist; for he does not will the evil of sin, seeing this is but the negation of being.

XXIV. That in passing from the knowledge of God to the knowledge of the creatures, it is necessary to remember that our understanding is finite, and the power of God infinite.

But as we know that God alone is the true cause of all that is or can be, we will doubtless follow the best way of philosophizing, if, from the knowledge we have of God himself, we pass to the explication of the things which he has created, and essay to deduce it from the notions that are naturally in our minds, for we will thus obtain the most perfect science, that is, the knowledge of effects through their causes. But that we may be able to make this attempt with sufficient security from error, we must use the precaution to bear in mind as much as possible that God, who is the author of things, is infinite, while we are wholly finite.

XXV. That we must believe all that God has revealed, although it may surpass the reach of our faculties.

Thus, if perhaps God reveal to us or others, matters concerning himself which surpass the natural powers of our mind, such as the mysteries of the incarnation and of the trinity, we will not refuse to believe them, although we may not clearly understand them; nor will we be in any way surprised to find in the immensity of his nature, or even in what he has created, many things that exceed our comprehension.

XXVI. That it is not needful to enter into disputes [Footnote: “to essay to comprehend the infinite.” — FRENCH.] regarding the infinite, but merely to hold all that in which we can find no limits as indefinite, such as the extension of the world, the divisibility of the parts of matter, the number of the stars, etc.

We will thus never embarrass ourselves by disputes about the infinite, seeing it would be absurd for us who are finite to undertake to determine anything regarding it, and thus as it were to limit it by endeavouring to comprehend it. We will accordingly give ourselves no concern to reply to those who demand whether the half of an infinite line is also infinite, and whether an infinite number is even or odd, and the like, because it is only

such as imagine their minds to be infinite who seem bound to entertain questions of this sort. And, for our part, looking to all those things in which in certain senses, we discover no limits, we will not, therefore, affirm that they are infinite, but will regard them simply as indefinite. Thus, because we cannot imagine extension so great that we cannot still conceive greater, we will say that the magnitude of possible things is indefinite, and because a body cannot be divided into parts so small that each of these may not be conceived as again divided into others still smaller, let us regard quantity as divisible into parts whose number is indefinite; and as we cannot imagine so many stars that it would seem impossible for God to create more, let us suppose that their number is indefinite, and so in other instances.

XXVII. What difference there is between the indefinite and the infinite.

And we will call those things indefinite rather than infinite, with the view of reserving to God alone the appellation of infinite; in the first place, because not only do we discover in him alone no limits on any side, but also because we positively conceive that he admits of none; and in the second place, because we do not in the same way positively conceive that other things are in every part unlimited, but merely negatively admit that their limits, if they have any, cannot be discovered by us.

XXVIII. That we must examine, not the final, but the efficient, causes of created things.

Likewise, finally, we will not seek reasons of natural things from the end which God or nature proposed to himself in their creation (i. e., final causes), [Footnote: “We will not stop to consider the ends which God proposed to himself in the creation of the world, and we will entirely reject from our philosophy the search of final causes!” — French.] for we ought not to presume so far as to think that we are sharers in the counsels of Deity, but, considering him as the efficient cause of all things, let us endeavour to discover by the natural light [Footnote: “Faculty of reasoning.” — FRENCH.] which he has planted in us, applied to those of his attributes of which he has been willing we should have some knowledge, what must be concluded regarding those effects we perceive by our senses; bearing in mind, however, what has been already said, that we must only confide in this natural light so long as nothing contrary to its dictates is revealed by God himself. [Footnote: The last clause, beginning “bearing in mind.” is omitted in the French.]

XXIX. That God is not the cause of our errors.

The first attribute of God which here falls to be considered, is that he is absolutely veracious and the source of all light, so that it is plainly repugnant for him to deceive us, or to be properly and positively the cause of the errors to which we are consciously subject; for although the address to deceive seems to be some mark of subtlety of mind among men, yet without doubt the will to deceive only proceeds from malice or from fear and weakness, and consequently cannot be attributed to God.

XXX. That consequently all which we clearly perceive is true, and that we are thus delivered from the doubts above proposed.

Whence it follows, that the light of nature, or faculty of knowledge given us by God, can never compass any object which is not true, in as far as it attains to a knowledge of it, that is, in as far as the object is clearly and distinctly apprehended. For God would have merited the appellation of a deceiver if he had given us this faculty perverted, and such as might lead us to take falsity for truth [when we used it aright]. Thus the highest doubt is removed, which arose from our ignorance on the point as to whether perhaps our nature was such that we might be deceived even in those things that appear to us the most evident. The same principle ought also to be of avail against all the other grounds of doubting that have been already enumerated. For mathematical truths ought now to be above suspicion, since these are of the clearest. And if we perceive anything by our senses, whether while awake or asleep, we will easily discover the truth provided we separate what there is of clear and distinct in the knowledge from what is obscure and confused. There is no need that I should here say more on this subject, since it has already received ample treatment in the metaphysical Meditations; and what follows will serve to explain it still more accurately.

XXXI. That our errors are, in respect of God, merely negations, but, in respect of ourselves, privations.

But as it happens that we frequently fall into error, although God is no deceiver, if we desire to inquire into the origin and cause of our errors, with a view to guard against them, it is necessary to observe that they depend less on our understanding than on our will, and that they have no need of the actual concourse of God, in order to their production; so that, when considered in reference to God, they are merely negations, but in reference to ourselves, privations.

XXXII. That there are only two modes of thinking in us, viz., the perception of the understanding and the action of the will.

For all the modes of thinking of which we are conscious may be referred to two general classes, the one of which is the perception or operation of the understanding, and the other the volition or operation of the will. Thus, to perceive by the senses (SENTIRE), to imagine, and to conceive things purely intelligible, are only different modes of perceiving (PERCIP IENDI); but to desire, to be averse from, to affirm, to deny, to doubt, are different modes of willing.

XXXIII. That we never err unless when we judge of something which we do not sufficiently apprehend.

When we apprehend anything we are in no danger of error, if we refrain from judging of it in any way; and even when we have formed a judgment regarding it, we would never fall into error, provided we gave our assent only to what we clearly and distinctly perceived; but the reason why we are usually deceived, is that we judge without possessing an exact knowledge of that of which we judge.

XXXIV. That the will as well as the understanding is required for judging.

I admit that the understanding is necessary for judging, there being no room to suppose that we can judge of that which we in no way apprehend; but the will also is required in order to our assenting to what we have in any degree perceived. It is not necessary, however, at least to form any judgment whatever, that we have an entire and perfect apprehension of a thing; for we may assent to many things of which we have only a very obscure and confused knowledge.

XXXV. That the will is of greater extension than the understanding, and is thus the source of our errors.

Further, the perception of the intellect extends only to the few things that are presented to it, and is always very limited: the will, on the other hand, may, in a certain sense, be said to be infinite, because we observe nothing that can be the object of the will of any other, even of the unlimited will of God, to which ours cannot also extend, so that we easily carry it beyond the objects we clearly perceive; and when we do this, it is not wonderful that we happen to be deceived.

XXXVI. That our errors cannot be imputed to God.

But although God has not given us an omniscient understanding, he is not on this account to be considered in any wise the author of our errors, for it is of the nature of created intellect to be finite, and of finite intellect not to embrace all things.

XXXVII. That the chief perfection of man is his being able to act freely or by will, and that it is this which renders him worthy of praise or blame.

That the will should be the more extensive is in harmony with its nature: and it is a high perfection in man to be able to act by means of it, that is, freely; and thus in a peculiar way to be the master of his own actions, and merit praise or blame. For self- acting machines are not commended because they perform with exactness all the movements for which they were adapted, seeing their motions are carried on necessarily; but the maker of them is praised on account of the exactness with which they were framed, because he did not act of necessity, but freely; and, on the same principle, we must attribute to ourselves something more on this account, that when we embrace truth, we do so not of necessity, but freely.

XXXVIII. That error is a defect in our mode of acting, not in our nature; and that the faults of their subjects may be frequently attributed to other masters, but never to God.

It is true, that as often as we err, there is some defect in our mode of action or in the use of our liberty, but not in our nature, because this is always the same, whether our judgments be true or false. And although God could have given to us such perspicacity of intellect that we should never have erred, we have, notwithstanding, no right to demand this of him; for, although with us he who was able to prevent evil and did not is held guilty of it, God is not in the same way to be reckoned responsible for our errors because he had the power to prevent them, inasmuch as the dominion which some men possess over others has been instituted for the purpose of enabling them to hinder those under them from doing evil, whereas the dominion which God exercises over the universe is perfectly absolute and free. For this reason we ought to thank him for the goods he has given us, and not complain that he has not blessed us with all which we know it was in his power to impart.

XXXIX. That the liberty of our will is self-evident.

Finally, it is so manifest that we possess a free will, capable of giving or withholding its assent, that this truth must be reckoned among the first and most common notions which are born with us. This, indeed, has already

very clearly appeared, for when essaying to doubt of all things, we went so far as to suppose even that he who created us employed his limitless power in deceiving us in every way, we were conscious nevertheless of being free to abstain from believing what was not in every respect certain and undoubted. Bat that of which we are unable to doubt at such a time is as self- evident and clear as any thing we can ever know.

XL. That it is likewise certain that God has fore-ordained all things.

But because what we have already discovered of God, gives us the assurance that his power is so immense that we would sin in thinking ourselves capable of ever doing anything which he had not ordained beforehand, we should soon be embarrassed in great difficulties if we undertook to harmonise the pre-ordination of God with the freedom of our will, and endeavoured to comprehend both truths at once.

XLI. How the freedom of our will may be reconciled with the Divine pre-ordination.

But, in place of this, we will be free from these embarrassments if we recollect that our mind is limited, while the power of God, by which he not only knew from all eternity what is or can be, but also willed and pre-ordained it, is infinite. It thus happens that we possess sufficient intelligence to know clearly and distinctly that this power is in God, but not enough to comprehend how he leaves the free actions of men indeterminate} and, on the other hand, we have such consciousness of the liberty and indifference which exists in ourselves, that there is nothing we more clearly or perfectly comprehend: [so that the omnipotence of God ought not to keep us from believing it]. For it would be absurd to doubt of that of which we are fully conscious, and which we experience as existing in ourselves, because we do not comprehend another matter which, from its very nature, we know to be incomprehensible.

XLII. How, although we never will to err, it is nevertheless by our will that we do err.

But now since we know that all our errors depend upon our will, and as no one wishes to deceive himself, it may seem wonderful that there is any error in our judgments at all. It is necessary to remark, however, that there is a great difference between willing to be deceived, and willing to yield assent to opinions in which it happens that error is found. For though there is no one who expressly wishes to fall into error, we will yet hardly find any one who is not ready to assent to things in which, unknown to himself, error

lurks; and it even frequently happens that it is the desire itself of following after truth that leads those not fully aware of the order in which it ought to be sought for, to pass judgment on matters of which they have no adequate knowledge, and thus to fall into error.

XLIII. That we shall never err if we give our assent only to what we clearly and distinctly perceive.

But it is certain we will never admit falsity for truth, so long as we judge only of that which we clearly and distinctly perceive; because, as God is no deceiver, the faculty of knowledge which he has given us cannot be fallacious, nor, for the same reason, the faculty of will, when we do not extend it beyond the objects we clearly know. And even although this truth could not be established by reasoning, the minds of all have been so impressed by nature as spontaneously to assent to whatever is clearly perceived, and to experience an impossibility to doubt of its truth.

XLIV. That we uniformly judge improperly when we assent to what we do not clearly perceive, although our judgment may chance to be true; and that it is frequently our memory which deceives us by leading us to believe that certain things were formerly sufficiently understood by us.

It is likewise certain that, when we approve of any reason which we do not apprehend, we are either deceived, or, if we stumble on the truth, it is only by chance, and thus we can never possess the assurance that we are not in error. I confess it seldom happens that we judge of a thing when we have observed we do not apprehend it, because it is a dictate of the natural light never to judge of what we do not know. But we most frequently err in this, that we presume upon a past knowledge of much to which we give our assent, as to something treasured up in the memory, and perfectly known to us; whereas, in truth, we have no such knowledge.

XLV. What constitutes clear and distinct perception.

There are indeed a great many persons who, through their whole lifetime, never perceive anything in a way necessary for judging of it properly; for the knowledge upon which we can establish a certain and indubitable judgment must be not only clear, but also, distinct. I call that clear which is present and manifest to the mind giving attention to it, just as we are said clearly to see objects when, being present to the eye looking on, they stimulate it with sufficient force. and it is disposed to regard them; but the distinct is that which is so precise and different from all other objects as

to comprehend in itself only what is clear. [Footnote: “what appears manifestly to him who considers it as he ought.” — FRENCH.]

XLVI. It is shown, from the example of pain, that a perception may be clear without being distinct, but that it cannot be distinct unless it is clear.

For example, when any one feels intense pain, the knowledge which he has of this pain is very clear, but it is not always distinct; for men usually confound it with the obscure judgment they form regarding its nature, and think that there is in the suffering part something similar to the sensation of pain of which they are alone conscious. And thus perception may be clear without being distinct, but it can never be distinct without likewise being clear.

XLVII. That, to correct the prejudices of our early years, we must consider what is clear in each of our simple [Footnote: “first.” — FRENCH.] notions.

And, indeed, in our early years, the mind was so immersed in the body, that, although it perceived many things with sufficient clearness, it yet knew nothing distinctly; and since even at that time we exercised our judgment in many matters, numerous prejudices were thus contracted, which, by the majority, are never afterwards laid aside. But that we may now be in a position to get rid of these, I will here briefly enumerate all the simple notions of which our thoughts are composed, and distinguish in each what is clear from what is obscure, or fitted to lead into error.

XLVIII. That all the objects of our knowledge are to be regarded either (1) as things or the affections of things: or (2) as eternal truths; with the enumeration of things.

Whatever objects fall under our knowledge we consider either as things or the affections of things,[Footnote: Things and the affections of things are (in the French) equivalent to “what has some (i.e., a REAL) existence,” as opposed to the class of “eternal truths,” which have merely an IDEAL existence.] or as eternal truths possessing no existence beyond our thought. Of the first class the most general are substance, duration, order, number, and perhaps also some others, which notions apply to all the kinds of things. I do not, however, recognise more than two highest kinds (SUMMA GENERA) of things; the first of intellectual things, or such as have the power of thinking, including mind or thinking substance and its properties; the second, of material things, embracing extended substance, or body and its properties. Perception, volition, and all modes as well of knowing as of

willing, are related to thinking substance; on the other hand, to extended substance we refer magnitude, or extension in length, breadth, and depth, figure, motion, situation, divisibility of parts themselves, and the like. There are, however, besides these, certain things of which we have an internal experience that ought not to be referred either to the mind of itself, or to the body alone, but to the close and intimate union between them, as will hereafter be shown in its place. Of this class are the appetites of hunger and thirst, etc., and also the emotions or passions of the mind which are not exclusively mental affections, as the emotions of anger, joy, sadness, love, etc.; and, finally, all the sensations, as of pain, titillation, light and colours, sounds, smells, tastes, heat, hardness, and the other tactile qualities.

XLIX. That the eternal truths cannot be thus enumerated, but that this is not necessary.

What I have already enumerated we are to regard as things, or the qualities or modes of things. We now come to speak of eternal truths. When we apprehend that it is impossible a thing can arise from nothing, this proposition, EX NIHILO NIHIL FIT, is not considered as somewhat existing, or as the mode of a thing, but as an eternal truth having its seat in our mind, and is called a common notion or axiom. Of this class are the following: — It is impossible the same thing can at once be and not be; what is done cannot be undone; he who thinks must exist while he thinks; and innumerable others, the whole of which it is indeed difficult to enumerate, but this is not necessary, since, if blinded by no prejudices, we cannot fail to know them when the occasion of thinking them occurs.

L. That these truths are clearly perceived, but not equally by all men, on account of prejudices.

And, indeed, with regard to these common notions, it is not to be doubted that they can be clearly and distinctly known, for otherwise they would not merit this appellation: as, in truth, some of them are not, with respect to all men, equally deserving of the name, because they are not equally admitted by all: not, however, from this reason, as I think, that the faculty of knowledge of one man extends farther than that of another, but rather because these common notions are opposed to the prejudices of some, who, on this account, are not able readily to embrace them, even although others, who are free from those prejudices, apprehend them with the greatest clearness.

LI. What substance is, and that the term is not applicable to God and the creatures in the same sense.

But with regard to what we consider as things or the modes of things, it is worth while to examine each of them by itself. By substance we can conceive nothing else than a thing which exists in such a way as to stand in need of nothing beyond itself in order to its existence. And, in truth, there can be conceived but one substance which is absolutely independent, and that is God. We perceive that all other things can exist only by help of the concourse of God. And, accordingly, the term substance does not apply to God and the creatures UNIVOCALLY, to adopt a term familiar in the schools; that is, no signification of this word can be distinctly understood which is common to God and them.

LII. That the term is applicable univocally to the mind and the body, and how substance itself is known.

Created substances, however, whether corporeal or thinking, may be conceived under this common concept; for these are things which, in order to their existence, stand in need of nothing but the concourse of God. But yet substance cannot be first discovered merely from its being a thing which exists independently, for existence by itself is not observed by us. We easily, however, discover substance itself from any attribute of it, by this common notion, that of nothing there are no attributes, properties, or qualities: for, from perceiving that some attribute is present, we infer that some existing thing or substance to which it may be attributed is also of necessity present.

LIII. That of every substance there is one principal attribute, as thinking of the mind, extension of the body.

But, although any attribute is sufficient to lead us to the knowledge of substance, there is, however, one principal property of every substance, which constitutes its nature or essence, and upon which all the others depend. Thus, extension in length, breadth, and depth, constitutes the nature of corporeal substance; and thought the nature of thinking substance. For every other thing that can be attributed to body, presupposes extension, and is only some mode of an extended thing; as all the properties we discover in the mind are only diverse modes of thinking. Thus, for example, we cannot conceive figure unless in something extended, nor motion unless in extended space, nor imagination, sensation, or will, unless in a thinking thing. But, on the other hand, we can conceive extension without figure or

motion, and thought without imagination or sensation, and so of the others; as is clear to any one who attends to these matters.

LIV. How we may have clear and distinct notions of the substance which thinks, of that which is corporeal, and of God.

And thus we may easily have two clear and distinct notions or ideas, the one of created substance, which thinks, the other of corporeal substance, provided we carefully distinguish all the attributes of thought from those of extension. We may also have a clear and distinct idea of an uncreated and independent thinking substance, that is, of God, provided we do not suppose that this idea adequately represents to us all that is in God, and do not mix up with it anything fictitious, but attend simply to the characters that are comprised in the notion we have of him, and which we clearly know to belong to the nature of an absolutely perfect Being. For no one can deny that there is in us such an idea of God, without groundlessly supposing that there is no knowledge of God at all in the human mind.

LV. How duration, order, and number may be also distinctly conceived.

We will also have most distinct conceptions of duration, order, and number, if, in place of mixing up with our notions of them that which properly belongs to the concept of substance, we merely think that the duration of a thing is a mode under which we conceive this thing, in so far as it continues to exist; and, in like manner, that order and number are not in reality different from things disposed in order and numbered, but only modes under which we diversely consider these things.

LVI. What are modes, qualities, attributes.

And, indeed, we here understand by modes the same with what we elsewhere designate attributes or qualities. But when we consider substance as affected or varied by them, we use the term modes; when from this variation it may be denominated of such a kind, we adopt the term qualities [to designate the different modes which cause it to be so named]; and, finally, when we simply regard these modes as in the substance, we call them attributes. Accordingly, since God must be conceived as superior to change, it is not proper to say that there are modes or qualities in him, but simply attributes; and even in created things that which is found in them always in the same mode, as existence and duration in the thing which exists and endures, ought to be called attribute and not mode or quality.

LVII. That some attributes exist in the things to which they are attributed, and others only in our thought; and what duration and time are.

Of these attributes or modes there are some which exist in the things themselves, and others that have only an existence in our thought; thus, for example, time, which we distinguish from duration taken in its generality, and call the measure of motion, is only a certain mode under which we think duration itself, for we do not indeed conceive the duration of things that are moved to be different from the duration of things that are not moved: as is evident from this, that if two bodies are in motion for an hour, the one moving quickly and the other slowly, we do not reckon more time in the one than in the other, although there may be much more motion in the one of the bodies than in the other. But that we may comprehend the duration of all things under a common measure, we compare their duration with that of the greatest and most regular motions that give rise to years and days, and which we call time; hence what is so designated is nothing superadded to duration, taken in its generality, but a mode of thinking.

LVIII. That number and all universals are only modes of thought.

In the same way number, when it is not considered as in created things, but merely in the abstract or in general, is only a mode of thinking; and the same is true of all those general ideas we call universals.

LIX. How universals are formed; and what are the five common, viz., genus, species, difference, property, and accident.

Universals arise merely from our making use of one and the same idea in thinking of all individual objects between which there subsists a certain likeness; and when we comprehend all the objects represented by this idea under one name, this term likewise becomes universal. For example, when we see two stones, and do not regard their nature farther than to remark that there are two of them, we form the idea of a certain number, which we call the binary; and when we afterwards see two birds or two trees, and merely take notice of them so far as to observe that there are two of them, we again take up the same idea as before, which is, accordingly, universal; and we likewise give to this number the same universal appellation of binary. In the same way, when we consider a figure of three sides, we form a certain idea, which we call the idea of a triangle, and we afterwards make use of it as the universal to represent to our mind all other figures of three sides. But when we remark more particularly that of figures of three sides, some have a right angle and others not, we form the universal idea of a right-angled triangle, which being related to the preceding as more general, may be called species; and the right angle the universal difference by which right-angled

triangles are distinguished from all others; and farther, because the square of the side which sustains the right angle is equal to the squares of the other two sides, and because this property belongs only to this species of triangles, we may call it the universal property of the species. Finally, if we suppose that of these triangles some are moved and others not, this will be their universal accident; and, accordingly, we commonly reckon five universals, viz., genus, species, difference, property, accident.

LX. Of distinctions; and first of the real.

But number in things themselves arises from the distinction there is between them: and distinction is threefold, viz., real, modal, and of reason. The real properly subsists between two or more substances; and it is sufficient to assure us that two substances are really mutually distinct, if only we are able clearly and distinctly to conceive the one of them without the other. For the knowledge we have of God renders it certain that he can effect all that of which we have a distinct idea: wherefore, since we have now, for example, the idea of an extended and corporeal substance, though we as yet do not know with certainty whether any such thing is really existent, nevertheless, merely because we have the idea of it, we may be assured that such may exist; and, if it really exists, that every part which we can determine by thought must be really distinct from the other parts of the same substance. In the same way, since every one is conscious that he thinks, and that he in thought can exclude from himself every other substance, whether thinking or extended, it is certain that each of us thus considered is really distinct from every other thinking and corporeal substance. And although we suppose that God united a body to a soul so closely that it was impossible to form a more intimate union, and thus made a composite whole, the two substances would remain really distinct, notwithstanding this union; for with whatever tie God connected them, he was not able to rid himself of the power he possessed of separating them, or of conserving the one apart from the other, and the things which God can separate or conserve separately are really distinct.

LXI. Of the modal distinction.

There are two kinds of modal distinctions, viz., that between the mode properly so-called and the substance of which it is a mode, and that between two modes of the same substance. Of the former we have an example in this, that we can clearly apprehend substance apart from the mode which we say differs from it; while, on the other hand, we cannot conceive this mode

without conceiving the substance itself. There is, for example, a modal distinction between figure or motion and corporeal substance in which both exist; there is a similar distinction between affirmation or recollection and the mind. Of the latter kind we have an illustration in our ability to recognise the one of two modes apart from the other, as figure apart from motion, and motion apart from figure; though we cannot think of either the one or the other without thinking of the common substance in which they adhere. If, for example, a stone is moved, and is withal square, we can, indeed, conceive its square figure without its motion, and reciprocally its motion without its square figure; but we can conceive neither this motion nor this figure apart from the substance of the stone. As for the distinction according to which the mode of one substance is different from another substance, or from the mode of another substance, as the motion of one body is different from another body or from the mind, or as motion is different from doubt, it seems to me that it should be called real rather than modal, because these modes cannot be clearly conceived apart from the really distinct substances of which they are the modes.

LXII. Of the distinction of reason (logical distinction).

Finally, the distinction of reason is that between a substance and some one of its attributes, without which it is impossible, however, we can have a distinct conception of the substance itself; or between two such attributes of a common substance, the one of which we essay to think without the other. This distinction is manifest from our inability to form a clear and distinct idea of such substance, if we separate from it such attribute; or to have a clear perception of the one of two such attributes if we separate it from the other. For example, because any substance which ceases to endure ceases also to exist, duration is not distinct from substance except in thought (RATIONE); and in general all the modes of thinking which we consider as in objects differ only in thought, as well from the objects of which they are thought as from each other in a common object.[Footnote: “and generally all the attributes that lead us to entertain different thoughts of the same thing, such as, for example, the extension of body and its property of divisibility, do not differ from the body which is to us the object of them, or from each other, unless as we sometimes confusedly think the one without thinking the other.” — FRENCH.] It occurs, indeed, to me that I have elsewhere classed this kind of distinction with the modal (viz., towards the end of the Reply to the First Objections to the Meditations on the First

Philosophy); but there it was only necessary to treat of these distinctions generally, and it was sufficient for my purpose at that time simply to distinguish both of them from the real.

LXIII. How thought and extension may be distinctly known, as constituting, the one the nature of mind, the other that of body.

Thought and extension may be regarded as constituting the natures of intelligent and corporeal substance; and then they must not be otherwise conceived than as the thinking and extended substances themselves, that is, as mind and body, which in this way are conceived with the greatest clearness and distinctness. Moreover, we more easily conceive extended or thinking substance than substance by itself, or with the omission of its thinking or extension. For there is some difficulty in abstracting the notion of substance from the notions of thinking and extension, which, in truth, are only diverse in thought itself (i.e., logically different); and a concept is not more distinct because it comprehends fewer properties, but because we accurately distinguish what is comprehended in it from all other notions.

LXIV. How these may likewise be distinctly conceived as modes of substance.

Thought and extension may be also considered as modes of substance; in as far, namely, as the same mind may have many different thoughts, and the same body, with its size unchanged, may be extended in several diverse ways, at one time more in length and less in breadth or depth, and at another time more in breadth and less in length; and then they are modally distinguished from substance, and can be conceived not less clearly and distinctly, provided they be not regarded as substances or things separated from others, but simply as modes of things. For by regarding them as in the substances of which they are the modes, we distinguish them from these substances, and take them for what in truth they are: whereas, on the other hand, if we wish to consider them apart from the substances in which they are, we should by this itself regard them as self-subsisting things, and thus confound the ideas of mode and substance.

LXV. How we may likewise know their modes.

In the same way we will best apprehend the diverse modes of thought, as intellection, imagination, recollection, volition, etc., and also the diverse modes of extension, or those that belong to extension, as all figures, the situation of parts and their motions, provided we consider them simply as modes of the things in which they are; and motion as far as it is concerned,

provided we think merely of locomotion, without seeking to know the force that produces it, and which nevertheless I will essay to explain in its own place.

LXVI. How our sensations, affections, and appetites may be clearly known, although we are frequently wrong in our judgments regarding them.

There remain our sensations, affections, and appetites, of which we may also have a clear knowledge, if we take care to comprehend in the judgments we form of them only that which is precisely contained in our perception of them, and of which we are immediately conscious. There is, however, great difficulty in observing this, at least in respect of sensations; because we have all, without exception, from our youth judged that all the things we perceived by our senses had an existence beyond our thought, and that they were entirely similar to the sensations, that is, perceptions, we ad of them. Thus when, for example, we saw a certain colour, we thought we saw something occupying a place out of us, and which was entirely similar to that idea of colour we were then conscious of; and from the habit of judging in this way, we seemed to see this so clearly and distinctly that we esteemed it (i.e., the externality of the colour) certain and indubitable.

LXVII. That we are frequently deceived in our judgments regarding pain itself.

The same prejudice has place in all our other sensations, even in those of titillation and pain. For though we are not in the habit of believing that there exist out of us objects that resemble titillation and pain, we do not nevertheless consider these sensations as in the mind alone, or in our perception, but as in the hand, or foot, or some other part of our body. There is no reason, however, to constrain us to believe that the pain, for example, which we feel, as it were, in the foot is something out of the mind existing in the foot, or that the light which we see, as it were, in the sun exists in the sun as it is in us. Both these beliefs are prejudices of our early years, as will clearly appear in the sequel.

LXVIII. How in these things what we clearly conceive is to be distinguished from that in which we may be deceived.

But that we may distinguish what is clear in our sensations from what is obscure, we ought most carefully to observe that we possess a clear and distinct knowledge of pain, colour, and other things of this sort, when we consider them simply as sensations or thoughts; but that, when they are judged to be certain things subsisting beyond our mind, we are wholly

unable to form any conception of them. Indeed, when any one tells us that he sees colour in a body or feels pain in one of his limbs, this is exactly the same as if he said that he there saw or felt something of the nature of which he was entirely ignorant, or that he did not know what he saw or felt. For although, when less attentively examining his thoughts, a person may easily persuade himself that he has some knowledge of it, since he supposes that there is something resembling that sensation of colour or of pain of which he is conscious; yet, if he reflects on what the sensation of colour or pain represents to him as existing in a coloured body or in a wounded member, he will find that of such he has absolutely no knowledge.

LXIX. That magnitude, figure, etc., are known far differently from colour, pain, etc.

What we have said above will be more manifest; especially if we consider that size in the body perceived, figure, motion (at least local, for philosophers by fancying other kinds of motion have rendered its nature less intelligible to themselves), the situation of parts, duration, number, and those other properties which, as we have already said, we clearly perceive in all bodies, are known by us in a way altogether different from that in which we know what colour is in the same body, or pain, smell, taste, or any other of those properties which I have said above must be referred to the senses. For although when we see a body we are not less assured of its existence from its appearing figured than from its appearing coloured, [Footnote: “by the colour we perceive on occasion of it.” — FRENCH.] we yet know with far greater clearness its property of figure than its colour.

LXX. That we may judge of sensible things in two ways, by the one of which we avoid error, by the other fall into it.

It is thus manifest that to say we perceive colours in objects is in reality equivalent to saying we perceive something in objects and are yet ignorant of what it is, except as that which determines in us a certain highly vivid and clear sensation, which we call the sensation of colours. There is, however, very great diversity in the manner of judging: for so long as we simply judge that there is an unknown something in objects (that is, in things such as they are, from which the sensation reached us), so far are we from falling into error that, on the contrary, we thus rather provide against it, for we are less apt to judge rashly of a thing which we observe we do not know. But when we think we perceive colours in objects, although we are in reality ignorant of what we then denominate colour, and are unable to

conceive any resemblance between the colour we suppose to be in objects, and that of which we are conscious in sensation, yet because we do not observe this, or because there are in objects several properties, as size, figure, number, etc., which, as we clearly know, exist, or may exist in them as they are perceived by our senses or conceived by our understanding, we easily glide into the error of holding that what is called colour in objects is something entirely resembling the colour we perceive, and thereafter of supposing that we have a clear perception of what is in no way perceived by us.

LXXI. That the chief cause of our errors is to be found in the prejudices of our childhood.

And here we may notice the first and chief cause of our errors. In early life the mind was so closely bound to the body that it attended to nothing beyond the thoughts by which it perceived the objects that made impression on the body; nor as yet did it refer these thoughts to anything existing beyond itself, but simply felt pain when the body was hurt, or pleasure when anything beneficial to the body occurred, or if the body was so highly affected that it was neither greatly benefited nor hurt, the mind experienced the sensations we call tastes, smells, sounds, heat, cold, light, colours, and the like, which in truth are representative of nothing existing out of our mind, and which vary according to the diversities of the parts and modes in which the body is affected. [Footnote: “which vary according to the diversities of the movements that pass from all parts of our body to the part of the brain to which it (the mind) is closely joined and united.” — FRENCH.] The mind at the same time also perceived magnitudes, figures, motions, and the like, which were not presented to it as sensations but as things or the modes of things existing, or at least capable of existing out of thought, although it did not yet observe this difference between these two kinds of perceptions. And afterwards when the machine of the body, which has been so fabricated by nature that it can of its own inherent power move itself in various ways, by turning itself at random on every side, followed after what was useful and avoided what was detrimental; the mind, which was closely connected with it, reflecting on the objects it pursued or avoided, remarked, for the first time, that they existed out of itself, and not only attributed to them magnitudes, figures, motions, and the like, which it apprehended either as things or as the modes of things, but, in addition, attributed to them tastes, odours, and the other ideas of that sort, the

sensations of which were caused by itself; [Footnote: “which it perceived on occasion of them” (i.e., of external objects). — FRENCH.] and as it only considered other objects in so far as they were useful to the body, in which it was immersed, it judged that there was greater or less reality in each object, according as the impressions it caused on the body were more or less powerful. Hence arose the belief that there was more substance or body in rocks and metals than in air or water, because the mind perceived in them more hardness and weight. Moreover, the air was thought to be merely nothing so long as we experienced no agitation of it by the wind, or did not feel it hot or cold. And because the stars gave hardly more light than the slender flames of candles, we supposed that each star was but of this size. Again, since the mind did not observe that the earth moved on its axis, or that its superficies was curved like that of a globe, it was on that account more ready to judge the earth immovable and its surface flat. And our mind has been imbued from our infancy with a thousand other prejudices of the same sort which afterwards in our youth we forgot we had accepted without sufficient examination, and admitted as possessed of the highest truth and clearness, as if they had been known by means of our senses, or implanted in us by nature.

LXXII. That the second cause of our errors is that we cannot forget these prejudices.

And although now in our mature years, when the mind, being no longer wholly subject to the body, is not in the habit of referring all things to it, but also seeks to discover the truth of things considered in themselves, we observe the falsehood of a great many of the judgments we had before formed; yet we experience a difficulty in expunging them from our memory, and, so long as they remain there, they give rise to various errors. Thus, for example, since from our earliest years we imagined the stars to be of very small size, we find it highly difficult to rid ourselves of this imagination, although assured by plain astronomical reasons that they are of the greatest, — so prevailing is the power of preconceived opinion.

LXXIII. The third cause is, that we become fatigued by attending to those objects which are not present to the senses; and that we are thus accustomed to judge of these not from present perception but from pre-conceived opinion.

Besides, our mind cannot attend to any object without at length experiencing some pain and fatigue; and of all objects it has the greatest

difficulty in attending to those which are present neither to the senses nor to the imagination: whether for the reason that this is natural to it from its union with the body, or because in our early years, being occupied merely with perceptions and imaginations, it has become more familiar with, and acquired greater facility in thinking in those modes than in any other. Hence it also happens that many are unable to conceive any substance except what is imaginable and corporeal, and even sensible. For they are ignorant of the circumstance, that those objects alone are imaginable which consist in extension, motion, and figure, while there are many others besides these that are intelligible; and they persuade themselves that nothing can subsist but body, and, finally, that there is no body which is not sensible. And since in truth we perceive no object such as it is by sense alone [but only by our reason exercised upon sensible objects], as will hereafter be clearly shown, it thus happens that the majority during life perceive nothing unless in a confused way.

LXXIV. The fourth source of our errors is, that we attach our thoughts to words which do not express them with accuracy.

Finally, since for the use of speech we attach all our conceptions to words by which to express them, and commit to memory our thoughts in connection with these terms, and as we afterwards find it more easy to recall the words than the things signified by them, we can scarcely conceive anything with such distinctness as to separate entirely what we conceive from the words that were selected to express it. On this account the majority attend to words rather than to things; and thus very frequently assent to terms without attaching to them any meaning, either because they think they once understood them, or imagine they received them from others by whom they were correctly understood. This, however, is not the place to treat of this matter in detail, seeing the nature of the human body has not yet been expounded, nor the existence even of body established; enough, nevertheless, appears to have been said to enable one to distinguish such of our conceptions as are clear and distinct from those that are obscure and confused.

LXXV. Summary of what must be observed in order to philosophize correctly.

Wherefore if we would philosophize in earnest, and give ourselves to the search after all the truths we are capable of knowing, we must, in the first place, lay aside our prejudices; in other words, we must take care

scrupulously to withhold our assent from the opinions we have formerly admitted, until upon new examination we discover that they are true. We must, in the next place, make an orderly review of the notions we have in our minds, and hold as true all and only those which we will clearly and distinctly apprehend. In this way we will observe, first of all, that we exist in so far as it is our nature to think, and at the same time that there is a God upon whom we depend; and after considering his attributes we will be able to investigate the truth of all other things, since God is the cause of them. Besides the notions we have of God and of our mind, we will likewise find that we possess the knowledge of many propositions which are eternally true, as, for example, that nothing cannot be the cause of anything, etc. We will farther discover in our minds the knowledge of a corporeal or extended nature that may be moved, divided, etc., and also of certain sensations that affect us, as of pain, colours, tastes, etc., although we do not yet know the cause of our being so affected; and, comparing what we have now learne'd, by examining those things in their order, with our former confused knowledge of them, we will acquire the habit of forming clear and distinct conceptions of all the objects we are capable of knowing. In these few precepts seem to me to be comprised the most general and important principles of human knowledge.

LXXVI. That we ought to prefer the Divine authority to our perception; [Footnote: "reasonings." — FRENCH]. but that, apart from things revealed, we ought to assent to nothing that we do not clearly apprehend.

Above all, we must impress on our memory the infallible rule, that what God has revealed is incomparably more certain than anything else; and that, we ought to submit our belief to the Divine authority rather than to our own judgment, even although perhaps the light of reason should, with the greatest clearness and evidence, appear to suggest to us something contrary to what is revealed. But in things regarding which there is no revelation, it is by no means consistent with the character of a philosopher to accept as true what he has not ascertained to be such, and to trust more to the senses, in other words, to the inconsiderate judgments of childhood than to the dictates of mature reason.

PART II. OF THE PRINCIPLES OF MATERIAL THINGS.

I. The grounds on which the existence of material things may be known with certainty.

Although we are all sufficiently persuaded of the existence of material things, yet, since this was before called in question by us, and since we reckoned the persuasion of their existence as among the prejudices of our childhood, it is now necessary for us to investigate the grounds on which this truth may be known with certainty. In the first place, then, it cannot be doubted that every perception we have comes to us from some object different from our mind; for it is not in our power to cause ourselves to experience one perception rather than another, the perception being entirely dependent on the object which affects our senses. It may, indeed, be matter of inquiry whether that object be God, or something different from God; but because we perceive, or rather, stimulated by sense, clearly and distinctly apprehend, certain matter extended in length, breadth, and thickness, the various parts of which have different figures and motions, and give rise to the sensation we have of colours, smells, pain, etc., God would, without question, deserve to be regarded as a deceiver, if he directly and of himself presented to our mind the idea of this extended matter, or merely caused it to be presented to us by some object which possessed neither extension, figure, nor motion. For we clearly conceive this matter as entirely distinct from God, and from ourselves, or our mind; and appear even clearly to discern that the idea of it is formed in us on occasion of objects existing out of our minds, to which it is in every respect similar. But since God cannot deceive us, for this is repugnant to his nature, as has been already remarked, we must unhesitatingly conclude that there exists a certain object extended in length, breadth, and thickness, and possessing all those properties which we clearly apprehend to belong to what is extended. And this extended substance is what we call body or matter.

II. How we likewise know that the human body is closely connected with the mind.

We ought also to conclude that a certain body is more closely united to our mind than any other, because we clearly observe that pain and other sensations affect us without our foreseeing them; and these, the mind is conscious, do not arise from itself alone, nor pertain to it, in so far as it is a

thing which thinks, but only in so far as it is united to another thing extended and movable, which is called the human body. But this is not the place to treat in detail of this matter.

III. That the perceptions of the senses do not teach us what is in reality in things, but what is beneficial of hurtful to the composite whole of mind and body.

It will be sufficient to remark that the perceptions of the senses are merely to be referred to this intimate union of the human body and mind, and that they usually make us aware of what, in external objects, may be useful or adverse to this union, but do not present to us these objects as they are in themselves, unless occasionally and by accident. For, after this observation, we will without difficulty lay aside the prejudices of the senses, and will have recourse to our understanding alone on this question by reflecting carefully on the ideas implanted in it by nature.

IV. That the nature of body consists not in weight hardness, colour and the like, but in extension alone.

In this way we will discern that the nature of matter or body, considered in general, does not consist in its being hard, or ponderous, or coloured, or that which affects our senses in any other way, but simply in its being a substance extended in length, breadth, and depth. For with respect to hardness, we know nothing of it by sense farther than that the parts of hard bodies resist the motion of our hands on coming into contact with them; but if every time our hands moved towards any part, all the bodies in that place receded as quickly as our hands approached, we should never feel hardness; and yet we have no reason to believe that bodies which might thus recede would on this account lose that which makes them bodies. The nature of body does not, therefore, consist in hardness. In the same way, it may be shown that weight, colour, and all the other qualities of this sort, which are perceived in corporeal matter, may be taken from it, itself meanwhile remaining entire: it thus follows that the nature of body depends on none of these.

V. That the truth regarding the nature of body is obscured by the opinions respecting rarefaction and a vacuum with which we are pre-occupied.

There still remain two causes to prevent its being fully admitted that the true nature of body consists in extension alone. The first is the prevalent opinion, that most bodies admit of being so rarefied and condensed that,

when rarefied, they have greater extension than when condensed; and some even have subtilized to such a degree as to make a distinction between the substance of body and its quantity, and between quantity itself and extension. The second cause is this, that where we conceive only extension in length, breadth, and depth, we are not in the habit of saying that body is there, but only space and further void space, which the generality believe to be a mere negation.

VI. In what way rarefaction takes place.

But with regard to rarefaction and condensation, whoever gives his attention to his own thoughts, and admits nothing of which he is not clearly conscious, will not suppose that there is anything in those processes further than a change of figure in the body rarefied or condensed: so that, in other words, rare bodies are those between the parts of which there are numerous distances filled with other bodies; and dense bodies, on the other hand, those whose parts approaching each other, either diminish these distances or take them wholly away, in the latter of which cases the body is rendered absolutely dense. The body, however, when condensed, has not, therefore, less extension than when the parts embrace a greater space, owing to their removal from each other, and their dispersion into branches. For we ought not to attribute to it the extension of the pores or distances which its parts do not occupy when it is rarefied, but to the other bodies that fill these interstices; just as when we see a sponge full of water or any other liquid, we do not suppose that each part of the sponge has on this account greater extension than when compressed and dry, but only that its pores are wider, and therefore that the body is diffused over a larger space.

VII. That rarefaction cannot be intelligibly explained unless in the way here proposed.

And indeed I am unable to discover the force of the reasons which have induced some to say that rarefaction is the result of the augmentation of the quantity of body, rather than to explain it on the principle exemplified in the case of a sponge. For although when air or water is rarefied we do not see any of the pores that are rendered large, or the new body that is added to occupy them, it is yet less agreeable to reason to suppose something that is unintelligible for the purpose of giving a verbal and merely apparent explanation of the rarefaction of bodies, than to conclude, because of their rarefaction, that there are pores or distances between the parts which are increased in size, and filled with some new body. Nor ought we to refrain

from assenting to this explanation, because we perceive this new body by none of our senses, for there is no reason which obliges us to believe that we should perceive by our senses all the bodies in existence. And we see that it is very easy to explain rarefaction in this manner, but impossible in any other; for, in fine, there would be, as appears to me, a manifest contradiction in supposing that any body was increased by a quantity or extension which it had not before, without the addition to it of a new extended substance, in other words, of another body, because it is impossible to conceive any addition of extension or quantity to a thing without supposing the addition of a substance having quantity or extension, as will more clearly appear from what follows.

VIII. That quantity and number differ only in thought (RATIONE) from that which has quantity and is numbered.

For quantity differs from extended substance, and number from what is numbered, not in reality but merely in our thought; so that, for example, we may consider the whole nature of a corporeal substance which is comprised in a space of ten feet, although we do not attend to this measure of ten feet, for the obvious reason that the thing conceived is of the same nature in any part of that space as in the whole; and, on the other hand, we can conceive the number ten, as also a continuous quantity of ten feet, without thinking of this determinate substance, because the concept of the number ten is manifestly the same whether we consider a number of ten feet or ten of anything else; and we can conceive a continuous quantity of ten feet without thinking of this or that determinate substance, although we cannot conceive it without some extended substance of which it is the quantity. It is in reality, however, impossible that any, even the least part, of such quantity or extension, can be taken away, without the retrenchment at the same time of as much of the substance, nor, on the other hand, can we lessen the substance, without at the same time taking as much from the quantity or extension.

IX. That corporeal substance, when distinguished from its quantity, is confusedly conceived as something incorporeal.

Although perhaps some express themselves otherwise on this matter, I am nevertheless convinced that they do not think differently from what I have now said: for when they distinguish (corporeal) substance from extension or quantity, they either mean nothing by the word (corporeal) substance, or they form in their minds merely a confused idea of

incorporeal substance, which they falsely attribute to corporeal, and leave to extension the true idea of this corporeal substance; which extension they call an accident, but with such impropriety as to make it easy to discover that their words are not in harmony with their thoughts.

X. What space or internal place is.

Space or internal place, and the corporeal substance which is comprised in it, are not different in reality, but merely in the mode in which they are wont to be conceived by us. For, in truth, the same extension in length, breadth, and depth, which constitutes space, constitutes body; and the difference between them lies only in this, that in body we consider extension as particular, and conceive it to change with the body; whereas in space we attribute to extension a generic unity, so that after taking from a certain space the body which occupied it, we do not suppose that we have at the same time removed the extension of the space, because it appears to us that the same extension remains there so long as it is of the same magnitude and figure, and preserves the same situation in respect to certain bodies around it, by means of which we determine this space.

XI. How space is not in reality different from corporeal substance.

And indeed it will be easy to discern that it is the same extension which constitutes the nature of body as of space, and that these two things are mutually diverse only as the nature of the genus and species differs from that of the individual, provided we reflect on the idea we have of any body, taking a stone for example, and reject all that is not essential to the nature of body. In the first place, then, hardness may be rejected, because if the stone were liquefied or reduced to powder, it would no longer possess hardness, and yet would not cease to be a body; colour also may be thrown out of account, because we have frequently seen stones so transparent as to have no colour; again, we may reject weight, because we have the case of fire, which, though very light, is still a body; and, finally, we may reject cold, heat, and all the other qualities of this sort, either because they are not considered as in the stone, or because, with the change of these qualities, the stone is not supposed to have lost the nature of body. After this examination we will find that nothing remains in the idea of body, except that it is something extended in length, breadth, and depth; and this something is comprised in our idea of space, not only of that which is full of body, but even of what is called void space.

XII. How space differs from body in our mode of conceiving it.

There is, however, some difference between them in the mode of conception; for if we remove a stone from the space or place in which it was, we conceive that its extension also is taken away, because we regard this as particular, and inseparable from the stone itself: but meanwhile we suppose that the same extension of place in which this stone was remains, although the place of the stone be occupied by wood, water, air, or by any other body, or be even supposed vacant, because we now consider extension in general, and think that the same is common to stones, wood, water, air, and other bodies, and even to a vacuum itself, if there is any such thing, provided it be of the same magnitude and figure as before, and preserve the same situation among the external bodies which determine this space.

XIII. What external place is.

The reason of which is, that the words place and space signify nothing really different from body which is said to be in place, but merely designate its magnitude, figure, and situation among other bodies. For it is necessary, in order to determine this situation, to regard certain other bodies which we consider as immovable; and, according as we look to different bodies, we may see that the same thing at the same time does and does not change place. For example, when a vessel is being carried out to sea, a person sitting at the stern may be said to remain always in one place, if we look to the parts of the vessel, since with respect to these he preserves the same situation; and on the other hand, if regard be had to the neighbouring shores, the same person will seem to be perpetually changing place, seeing he is constantly receding from one shore and approaching another. And besides, if we suppose that the earth moves, and that it makes precisely as much way from west to east as the vessel from east to west, we will again say that the person at the stern does not change his place, because this place will be determined by certain immovable points which we imagine to be in the heavens. But if at length we are persuaded that there are no points really immovable in the universe, as will hereafter be shown to be probable, we will thence conclude that nothing has a permanent place unless in so far as it is fixed by our thought.

XIV. Wherein place and space differ.

The terms place and space, however, differ in signification, because place more expressly designates situation than magnitude or figure, while, on the other hand, we think of the latter when we speak of space. For we frequently say that a thing succeeds to the place of another, although it be

not exactly of the same magnitude or figure; but we do not therefore admit that it occupies the same space as the other; and when the situation is changed we say that the place also is changed, although there are the same magnitude and figure as before: so that when we say that a thing is in a particular place, we mean merely that it is situated in a determinate way in respect of certain other objects; and when we add that it occupies such a space or place, we understand besides that it is of such determinate magnitude and figure as exactly to fill this space.

XV. How external place is rightly taken for the superficies of the surrounding body.

And thus we never indeed distinguish space from extension in length, breadth, and depth; we sometimes, however, consider place as in the thing placed, and at other times as out of it. Internal place indeed differs in no way from space; but external place may be taken for the superficies that immediately surrounds the thing placed. It ought to be remarked that by superficies we do not here understand any part of the surrounding body, but only the boundary between the surrounding and surrounded bodies, which is nothing more than a mode; or at least that we speak of superficies in general which is no part of one body rather than another, but is always considered the same, provided it retain the same magnitude and figure. For although the whole surrounding body with its superficies were changed, it would not be supposed that the body which was surrounded by it had therefore changed its place, if it meanwhile preserved the same situation with respect to the other bodies that are regarded as immovable. Thus, if we suppose that a boat is carried in one direction by the current of a stream, and impelled by the wind in the opposite with an equal force, so that its situation with respect to the banks is not changed, we will readily admit that it remains in the same place, although the whole superficies which surrounds it is incessantly changing.

XVI. That a vacuum or space in which there is absolutely no body is repugnant to reason.

With regard to a vacuum, in the philosophical sense of the term, that is, a space in which there is no substance, it is evident that such does not exist, seeing the extension of space or internal place is not different from that of body. For since from this alone, that a body has extension in length, breadth, and depth, we have reason to conclude that it is a substance, it being absolutely contradictory that nothing should possess extension, we

ought to form a similar inference regarding the space which is supposed void, viz., that since there is extension in it there is necessarily also substance.

XVII. That a vacuum in the ordinary use of the term does not exclude all body.

And, in truth, by the term vacuum in its common use, we do not mean a place or space in which there is absolutely nothing, but only a place in which there is none of those things we presume ought to be there. Thus, because a pitcher is made to hold water, it is said to be empty when it is merely filled with air; or if there are no fish in a fish-pond, we say there is nothing in it, although it be full of water; thus a vessel is said to be empty, when, in place of the merchandise which it was designed to carry, it is loaded with sand only, to enable it to resist the violence of the wind; and, finally, it is in the same sense that we say space is void when it contains nothing sensible, although it contain created and self-subsisting matter; for we are not in the habit of considering the bodies near us, unless in so far as they cause in our organs of sense, impressions strong enough to enable us to perceive them. And if, in place of keeping in mind what ought to be understood by these terms a vacuum and nothing, we afterwards suppose that in the space we called a vacuum, there is not only no sensible object, but no object at all, we will fall into the same error as if, because a pitcher in which there is nothing but air, is, in common speech, said to be empty, we were therefore to judge that the air contained in it is not a substance (RES SUBSISTENS).

XVIII. How the prejudice of an absolute vacuum is to be corrected.

We have almost all fallen into this error from the earliest age, for, observing that there is no necessary connection between a vessel and the body it contains, we thought that God at least could take from a vessel the body which occupied it, without it being necessary that any other should be put in the place of the one removed. But that we may be able now to correct this false opinion, it is necessary to remark that there is in truth no connection between the vessel and the particular body which it contains, but that there is an absolutely necessary connection between the concave figure of the vessel and the extension considered generally which must be comprised in this cavity; so that it is not more contradictory to conceive a mountain without a valley than such a cavity without the extension it contains, or this extension apart from an extended substance, for, as we

have often said, of nothing there can be no extension. And accordingly, if it be asked what would happen were God to remove from a vessel all the body contained in it, without permitting another body to occupy its place, the answer must be that the sides of the vessel would thus come into proximity with each other. For two bodies must touch each other when there is nothing between them, and it is manifestly contradictory for two bodies to be apart, in other words, that there should be a distance between them, and this distance yet be nothing; for all distance is a mode of extension, and cannot therefore exist without an extended substance.

XIX. That this confirms what was said of rarefaction.

After we have thus remarked that the nature of corporeal substance consists only in its being an extended thing, and that its extension is not different from that which we attribute to space, however empty, it is easy to discover the impossibility of any one of its parts in any way whatsoever occupying more space at one time than at another, and thus of being otherwise rarefied than in the way explained above; and it is easy to perceive also that there cannot be more matter or body in a vessel when it is filled with lead or gold, or any other body however heavy and hard, than when it but contains air and is supposed to be empty: for the quantity of the parts of which a body is composed does not depend on their weight or hardness, but only on the extension, which is always equal in the same vase.

XX. That from this the non-existence of atoms may likewise be demonstrated.

We likewise discover that there cannot exist any atoms or parts of matter that are of their own nature indivisible. For however small we suppose these parts to be, yet because they are necessarily extended, we are always able in thought to divide any one of them into two or more smaller parts, and may accordingly admit their divisibility. For there is nothing we can divide in thought which we do not thereby recognize to be divisible; and, therefore, were we to judge it indivisible our judgment would not be in harmony with the knowledge we have of the thing; and although we should even suppose that God had reduced any particle of matter to a smallness so extreme that it did not admit of being further divided, it would nevertheless be improperly styled indivisible, for though God had rendered the particle so small that it was not in the power of any creature to divide it, he could not however deprive himself of the ability to do so, since it is absolutely impossible for him to lessen his own omnipotence, as was before observed. Wherefore,

absolutely speaking, the smallest extended particle is always divisible, since it is such of its very nature.

XXI. It is thus also demonstrated that the extension of the world is indefinite.

We further discover that this world or the whole (universitas) of corporeal substance, is extended without limit, for wherever we fix a limit, we still not only imagine beyond it spaces indefinitely extended, but perceive these to be truly imaginable, in other words, to be in reality such as we imagine them; so that they contain in them corporeal substance indefinitely extended, for, as has been already shown at length, the idea of extension which we conceive in any space whatever is plainly identical with the idea of corporeal substance.

XXII. It also follows that the matter of the heavens and earth is the same, and that there cannot be a plurality of worlds.

And it may also be easily inferred from all this that the earth and heavens are made of the same matter; and that even although there were an infinity of worlds, they would all be composed of this matter; from which it follows that a plurality of worlds is impossible, because we clearly conceive that the matter whose nature consists only in its being an extended substance, already wholly occupies all the imaginable spaces where these other worlds could alone be, and we cannot find in ourselves the idea of any other matter.

XXIII. That all the variety of matter, or the diversity of its forms, depends on motion.

There is therefore but one kind of matter in the whole universe, and this we know only by its being extended. All the properties we distinctly perceive to belong to it are reducible to its capacity of being divided and moved according to its parts; and accordingly it is capable of all those affections which we perceive can arise from the motion of its parts. For the partition of matter in thought makes no change in it; but all variation of it, or diversity of form, depends on motion. The philosophers even seem universally to have observed this, for they said that nature was the principle of motion and rest, and by nature they understood that by which all corporeal things become such as they are found in experience.

XXIV. What motion is, taking the term in its common use.

But motion (viz., local, for I can conceive no other kind of motion, and therefore I do not think we ought to suppose there is any other in nature), in the ordinary sense of the term, is nothing more than the action by which a

body passes from one place to another. And just as we have remarked above that the same thing may be said to change and not to change place at the same time, so also we may say that the same thing is at the same time moved and not moved. Thus, for example, a person seated in a vessel which is setting sail, thinks he is in motion if he look to the shore that he has left, and consider it as fixed; but not if he regard the ship itself, among the parts of which he preserves always the same situation. Moreover, because we are accustomed to suppose that there is no motion without action, and that in rest there is the cessation of action, the person thus seated is more properly said to be at rest than in motion, seeing he is not conscious of being in action.

XXV. What motion is properly so called.

But if, instead of occupying ourselves with that which has no foundation, unless in ordinary usage, we desire to know what ought to be understood by motion according to the truth of the thing, we may say, in order to give it a determinate nature, that it is THE TRANSPORTING OF ONE PART OF MATTER OR OF ONE BODY FROM THE VICINITY OF THOSE BODIES THAT ARE IN IMMEDIATE CONTACT WITH IT, OR WHICH WE REGARD AS AT REST, to the vicinity of other bodies. By a body as a part of matter, I understand all that which is transferred together, although it be perhaps composed of several parts, which in themselves have other motions; and I say that it is the transporting and not the force or action which transports, with the view of showing that motion is always in the movable thing, not in that which moves; for it seems to me that we are not accustomed to distinguish these two things with sufficient accuracy. Farther, I understand that it is a mode of the movable thing, and not a substance, just as figure is a property of the thing figured, and repose of that which is at rest.

PART III. OF THE VISIBLE WORLD.

I. That we cannot think too highly of the works of God.

Having now ascertained certain principles of material things, which were sought, not by the prejudices of the senses, but by the light of reason, and which thus possess so great evidence that we cannot doubt of their truth, it remains for us to consider whether from these alone we can deduce the explication of all the phenomena of nature. We will commence with those phenomena that are of the greatest generality, and upon which the others depend, as, for example, with the general structure of this whole visible world. But in order to our philosophizing aright regarding this, two things are first of all to be observed. The first is, that we should ever bear in mind the infinity of the power and goodness of God, that we may not fear falling into error by imagining his works to be too great, beautiful, and perfect, but that we may, on the contrary, take care lest, by supposing limits to them of which we have no certain knowledge, we appear to think less highly than we ought of the power of God.

II. That we ought to beware lest, in our presumption, we imagine that the ends which God proposed to himself in the creation of the world are understood by us.

The second is, that we should beware of presuming too highly of ourselves, as it seems we should do if we supposed certain limits to the world, without being assured of their existence either by natural reasons or by divine revelation, as if the power of our thought extended beyond what God has in reality made; but likewise still more if we persuaded ourselves that all things were created by God for us only, or if we merely supposed that we could comprehend by the power of our intellect the ends which God proposed to himself in creating the universe.

III. In what sense it may be said that all things were created for the sake of man.

For although, as far as regards morals, it may be a pious thought to believe that God made all things for us, seeing we may thus be incited to greater gratitude and love toward him; and although it is even in some sense true, because there is no created thing of which we cannot make some use, if it be only that of exercising our mind in considering it, and honouring God on account of it, it is yet by no means probable that all things were

created for us in this way that God had no other end in their creation; and this supposition would be plainly ridiculous and inept in physical reasoning, for we do not doubt but that many things exist, or formerly existed and have now ceased to be, which were never seen or known by man, and were never of use to him.

PART IV. OF THE EARTH.

CLXXXVIII. Of what is to be borrowed from disquisitions on animals and man to advance the knowledge of material objects.

I should add nothing farther to this the Fourth Part of the Principles of Philosophy, did I purpose carrying out my original design of writing a Fifth and Sixth Part, the one treating of things possessed of life, that is, animals and plants, and the other of man. But because I have not yet acquired sufficient knowledge of all the matters of which I should desire to treat in these two last parts, and do not know whether I shall ever have sufficient leisure to finish them, I will here subjoin a few things regarding the objects of our senses, that I may not, for the sake of the latter, delay too long the publication of the former parts, or of what may be desiderated in them, which I might have reserved for explanation in those others: for I have hitherto described this earth, and generally the whole visible world, as if it were merely a machine in which there was nothing at all to consider except the figures and motions of its parts, whereas our senses present to us many other things, for example colours, smells, sounds, and the like, of which, if I did not speak at all, it would be thought I had omitted the explication of the majority of the objects that are in nature.

CLXXXIX. What perception (SENSUS) is, and how we perceive.

We must know, therefore, that although the human soul is united to the whole body, it has, nevertheless, its principal seat in the brain, where alone it not only understands and imagines, but also perceives; and this by the medium of the nerves, which are extended like threads from the brain to all the other members, with which they are so connected that we can hardly touch any one of them without moving the extremities of some of the nerves spread over it; and this motion passes to the other extremities of those nerves which are collected in the brain round the seat of the soul, [Footnote: * * * FOOTNOTE NOT VISIBLE IN PAGE IMAGE (#98, Text p 195)] as I have already explained with sufficient minuteness in the fourth chapter of the Dioptrics. But the movements which are thus excited in the brain by the nerves variously affect the soul or mind, which is intimately conjoined with the brain, according to the diversity of the motions themselves. And the diverse affections of the mind or thoughts that immediately arise from these motions, are called perceptions of the senses

(SENSUUM PERCEPTIONES), or, as we commonly speak, sensations (SENSUS).

CXC. Of the distinction of the senses; and, first, of the internal, that is, of the affections of the mind (passions), and the natural appetites.

The varieties of these sensations depend, firstly, on the diversity of the nerves themselves, and, secondly, of the movements that are made in each nerve. We have not, however, as many different senses as there are nerves. We can distinguish but seven principal classes of nerves, of which two belong to the internal, and the other five to the external senses. The nerves which extend to the stomach, the oesophagus, the fauces, and the other internal parts that are subservient to our natural wants, constitute one of our internal senses. This is called the natural appetite (APPETITUS NATURALIS). The other internal sense, which embraces all the emotions (COMMOTIONES) of the mind or passions, and affections, as joy, sadness, love, hate, and the like, depends upon the nerves which extend to the heart and the parts about the heart, and are exceedingly small; for, by way of example, when the blood happens to be pure and well tempered, so that it dilates in the heart more readily and strongly than usual, this so enlarges and moves the small nerves scattered around the orifices, that there is thence a corresponding movement in the brain, which affects the mind with a certain natural feeling of joy; and as often as these same nerves are moved in the same way, although this is by other causes, they excite in our mind the same feeling (sensus, sentiment). Thus, the imagination of the enjoyment of a good does not contain in itself the feeling of joy, but it causes the animal spirits to pass from the brain to the muscles in which these nerves are inserted; and thus dilating the orifices of the heart, it also causes these small nerves to move in the way appointed by nature to afford the sensation of joy. Thus, when we receive news, the mind first of all judges of it, and if the news be good, it rejoices with that intellectual joy (GAUDIUM INTELLECTUALE) which is independent of any emotion (COMMOTIO) of the body, and which the Stoics did not deny to their wise man [although they supposed him exempt from all passion]. But as soon as this joy passes from the understanding to the imagination, the spirits flow from the brain to the muscles that are about the heart, and there excite the motion of the small nerves, by means of which another motion is caused in the brain, which affects the mind with the sensation of animal joy (LAETITIA ANIMALIS). On the same principle, when the blood is so

thick that it flows but sparingly into the ventricles of the heart, and is not there sufficiently dilated, it excites in the same nerves a motion quite different from the preceding, which, communicated to the brain, gives to the mind the sensation of sadness, although the mind itself is perhaps ignorant of the cause of its sadness. And all the other causes which move these nerves in the same way may also give to the mind the same sensation. But the other movements of the same nerves produce other effects, as the feelings of love, hate, fear, anger, etc., as far as they are merely affections or passions of the mind; in other words, as far as they are confused thoughts which the mind has not from itself alone, but from its being closely joined to the body, from which it receives impressions; for there is the widest difference between these passions and the distinct thoughts which we have of what ought to be loved, or chosen, or shunned, etc., [although these are often enough found together]. The natural appetites, as hunger, thirst, and the others, are likewise sensations excited in the mind by means of the nerves of the stomach, fauces, and other parts, and are entirely different from the will which we have to eat, drink, [and to do all that which we think proper for the conservation of our body]; but, because this will or appetition almost always accompanies them, they are therefore named appetites.

CXCI. Of the external senses; and first of touch.

We commonly reckon the external senses five in number, because there are as many different kinds of objects which move the nerves and their organs, and an equal number of kinds of confused thoughts excited in the soul by these emotions. In the first place, the nerves terminating in the skin of the whole body can be touched through this medium by any terrene objects whatever, and moved by these wholes, in one way by their hardness, in another by their gravity, in a third by their heat, in a fourth by their humidity, etc. — and in as many diverse modes as they are either moved or hindered from their ordinary motion, to that extent are diverse sensations excited in the mind, from which a corresponding number of tactile qualities derive their appellations. Besides this, when these nerves are moved a little more powerfully than usual, but not nevertheless to the degree by which our body is in any way hurt, there thus arises a sensation of titillation, which is naturally agreeable to the mind, because it testifies to it of the powers of the body with which it is joined, [in that the latter can suffer the action causing this titillation, without being hurt]. But if this action be strong enough to hurt our body in any way, this gives to our mind the sensation of pain. And

we thus see why corporeal pleasure and pain, although sensations of quite an opposite character, arise nevertheless from causes nearly alike.

CXCII. Of taste.

In the second place, the other nerves scattered over the tongue and the parts in its vicinity are diversely moved by the particles of the same bodies, separated from each other and floating in the saliva in the mouth, and thus cause sensations of diverse tastes according to the diversity of figure in these particles. [Footnote: In the French this section begins, “Taste, after touch the grossest of the senses,” etc.]

CXCIII. Of smell.

Thirdly, two nerves also or appendages of the brain, for they do not go beyond the limits of the skull, are moved by the particles of terrestrial bodies, separated and flying in the air, not indeed by all particles indifferently, but by those only that are sufficiently subtle and penetrating to enter the pores of the bone we call the spongy, when drawn into the nostrils, and thus to reach the nerves. From the different motions of these particles arise the sensations of the different smells.

CXCIV. Of hearing.

Fourthly, there are two nerves within the ears, so attached to three small bones that are mutually sustaining, and the first of which rests on the small membrane that covers the cavity we call the tympanum of the ear, that all the diverse vibrations which the surrounding air communicates to this membrane are transmitted to the mind by these nerves, and these vibrations give rise, according to their diversity, to the sensations of the different sounds.

CXCV. Of sight.

Finally, the extremities of the optic nerves, composing the coat in the eyes called the retina, are not moved by the air nor by any terrestrial object, but only by the globules of the second element, whence we have the sense of light and colours: as I have already at sufficient length explained in the Dioptrics and treatise of Meteors. [Footnote: In the French this section begins, “Finally, sight is the most subtle of all the senses,” etc.]

CXCVI. That the soul perceives only in so far as it is in the brain.

It is clearly established, however, that the soul does not perceive in so far as it is in each member of the body, but only in so far as it is in the brain, where the nerves by their movements convey to it the diverse actions of the external objects that touch the parts of the body in which they are inserted.

For, in the first place, there are various maladies, which, though they affect the brain alone, yet bring disorder upon, or deprive us altogether of the use of, our senses, just as sleep, which affects the brain only, and yet takes from us daily during a great part of our time the faculty of perception, which afterwards in our waking state is restored to us. The second proof is, that though there be no disease in the brain, [or in the members in which the organs of the external senses are], it is nevertheless sufficient to take away sensation from the part of the body where the nerves terminate, if only the movement of one of the nerves that extend from the brain to these members be obstructed in any part of the distance that is between the two. And the last proof is, that we sometimes feel pain as if in certain of our members, the cause of which, however, is not in these members where it is felt, but somewhere nearer the brain, through which the nerves pass that give to the mind the sensation of it. I could establish this fact by innumerable experiments; I will here, however, merely refer to one of them. A girl suffering from a bad ulcer in the hand, had her eyes bandaged whenever the surgeon came to visit her, not being able to bear the sight of the dressing of the sore; and, the gangrene having spread, after the expiry of a few days the arm was amputated from the elbow [without the girl's knowledge]; linen cloths tied one above the other were substituted in place of the part amputated, so that she remained for some time without knowing that the operation had been performed, and meanwhile she complained of feeling various pains, sometimes in one finger of the hand that was cut off, and sometimes in another. The only explanation of this is, that the nerves which before stretched downwards from the brain to the hand, and then terminated in the arm close to the elbow, were there moved in the same way as they required to be moved before in the hand for the purpose of impressing on the mind residing in the brain the sensation of pain in this or that finger. [And this clearly shows that the pain of the hand is not felt by the mind in so far as it is in the hand, but in so far as it is in the brain.]

CXCVII. That the nature of the mind is such that from the motion alone of body the various sensations can be excited in it.

In the next place, it can be proved that our mind is of such a nature that the motions of the body alone are sufficient to excite in it all sorts of thoughts, without it being necessary that these should in any way resemble the motions which give rise to them, and especially that these motions can excite in it those confused thoughts called sensations (SENSUS,

SENSATIONES). For we see that words, whether uttered by the voice or merely written, excite in our minds all kinds of thoughts and emotions. On the same paper, with the same pen and ink, by merely moving the point of the pen over the paper in a particular way, we can trace letters that will raise in the minds of our readers the thoughts of combats, tempests, or the furies, and the passions of indignation and sorrow; in place of which, if the pen be moved in another way hardly different from the former, this slight change will cause thoughts widely different from the above, such as those of repose, peace, pleasantness, and the quite opposite passions of love and joy. Some one will perhaps object that writing and speech do not immediately excite in the mind any passions, or imaginations of things different from the letters and sounds, but afford simply the knowledge of these, on occasion of which the mind, understanding the signification of the words, afterwards excites in itself the imaginations and passions that correspond to the words. But what will be said of the sensations of pain and titillation? The motion merely of a sword cutting a part of our skin causes pain, [but does not on that account make us aware of the motion or figure of the sword]. And it is certain that this sensation of pain is not less different from the motion that causes it, or from that of the part of our body which the sword cuts, than are the sensations we have of colour, sound, odour, or taste. On this ground we may conclude that our mind is of such a nature that the motions alone of certain bodies can also easily excite in it all the other sensations, as the motion of a sword excites in it the sensation of pain.

CXCVIII. That by our senses we know nothing of external objects beyond their figure [or situation], magnitude, and motion.

Besides, we observe no such difference between the nerves as to lead us to judge that one set of them convey to the brain from the organs of the external senses anything different from another, or that anything at all reaches the brain besides the local motion of the nerves themselves. And we see that local motion alone causes in us not only the sensation of titillation and of pain, but also of light and sounds. For if we receive a blow on the eye of sufficient force to cause the vibration of the stroke to reach the retina, we see numerous sparks of fire, which, nevertheless, are not out of our eye; and when we stop our ear with our finger, we hear a humming sound, the cause of which can only proceed from the agitation of the air that is shut up within it. Finally, we frequently observe that heat [hardness, weight], and the other sensible qualities, as far as they are in objects, and also the forms

of those bodies that are purely material, as, for example, the forms of fire, are produced in them by the motion of certain other bodies, and that these in their turn likewise produce other motions in other bodies. And we can easily conceive how the motion of one body may be caused by that of another, and diversified by the size, figure, and situation of its parts, but we are wholly unable to conceive how these same things (viz., size, figure, and motion), can produce something else of a nature entirely different from themselves, as, for example, those substantial forms and real qualities which many philosophers suppose to be in bodies; nor likewise can we conceive how these qualities or forms possess force to cause motions in other bodies. But since we know, from the nature of our soul, that the diverse motions of body are sufficient to produce in it all the sensations which it has, and since we learn from experience that several of its sensations are in reality caused by such motions, while we do not discover that anything besides these motions ever passes from the organs of the external senses to the brain, we have reason to conclude that we in no way likewise apprehend that in external objects, which we call light, colour, smell, taste, sound, heat or cold, and the other tactile qualities, or that which we call their substantial forms, unless as the various dispositions of these objects which have the power of moving our nerves in various ways. [Footnote: “the diverse figures, situations, magnitudes, and motions of their parts.” — French.]

CXCIX. That there is no phenomenon of nature whose explanation has been omitted in this treatise.

And thus it may be gathered, from an enumeration that is easily made, that there is no phenomenon of nature whose explanation has been omitted in this treatise; for beyond what is perceived by the senses, there is nothing that can be considered a phenomenon of nature. But leaving out of account motion, magnitude, figure, [and the situation of the parts of each body], which I have explained as they exist in body, we perceive nothing out of us by our senses except light, colours, smells, tastes, sounds, and the tactile qualities; and these I have recently shown to be nothing more, at least so far as they are known to us, than certain dispositions of the objects, consisting in magnitude, figure, and motion.

CC. That this treatise contains no principles which are not universally received; and that this philosophy is not new, but of all others the most ancient and common.

But I am desirous also that it should be observed that, though I have here endeavoured to give an explanation of the whole nature of material things, I have nevertheless made use of no principle which was not received and approved by Aristotle, and by the other philosophers of all ages; so that this philosophy, so far from being new, is of all others the most ancient and common: for I have in truth merely considered the figure, motion, and magnitude of bodies, and examined what must follow from their mutual concourse on the principles of mechanics, which are confirmed by certain and daily experience. But no one ever doubted that bodies are moved, and that they are of various sizes and figures, according to the diversity of which their motions also vary, and that from mutual collision those somewhat greater than others are divided into many smaller, and thus change figure. We have experience of the truth of this, not merely by a single sense, but by several, as touch, sight, and hearing: we also distinctly imagine and understand it. This cannot be said of any of the other things that fall under our senses, as colours, sounds, and the like; for each of these affects but one of our senses, and merely impresses upon our imagination a confused image of itself, affording our understanding no distinct knowledge of what it is.

CCI. That sensible bodies are composed of insensible particles.

But I allow many particles in each body that are perceived by none of our senses, and this will not perhaps be approved of by those who take the senses for the measure of the knowable. [We greatly wrong human reason, however, as appears to me, if we suppose that it does not go beyond the eye-sight]; for no one can doubt that there are bodies so small as not to be perceptible by any of our senses, provided he only consider what is each moment added to those bodies that are being increased little by little, and what is taken from those that are diminished in the same way. A tree increases daily, and it is impossible to conceive how it becomes greater than it was before, unless we at the same time conceive that some body is added to it. But who ever observed by the senses those small bodies that are in one day added to a tree while growing? Among the philosophers at least, those who hold that quantity is indefinitely divisible, ought to admit that in the division the parts may become so small as to be wholly imperceptible. And indeed it ought not to be a matter of surprise, that we are unable to perceive very minute bodies; for the nerves that must be moved by objects to cause perception are not themselves very minute, but are like small cords, being

composed of a quantity of smaller fibres, and thus the most minute bodies are not capable of moving them. Nor do I think that any one who makes use of his reason will deny that we philosophize with much greater truth when we judge of what takes place in those small bodies which are imperceptible from their minuteness only, after the analogy of what we see occurring in those we do perceive, [and in this way explain all that is in nature, as I have essayed to do in this treatise], than when we give an explanation of the same things by inventing I know not what novelties, that have no relation to the things we actually perceive, [as first matter, substantial forms, and all that grand array of qualities which many are in the habit of supposing, each of which is more difficult to comprehend than all that is professed to be explained by means of them].

CCII. That the philosophy of Democritus is not less different from ours than from the common. [Footnote: “that of Aristotle or the others.” — French.]

But it may be said that Democritus also supposed certain corpuscles that were of various figures, sizes, and motions, from the heaping together and mutual concourse of which all sensible bodies arose; and, nevertheless, his mode of philosophizing is commonly rejected by all. To this I reply that the philosophy of Democritus was never rejected by any one, because he allowed the existence of bodies smaller than those we perceive, and attributed to them diverse sizes, figures, and motions, for no one can doubt that there are in reality such, as we have already shown; but it was rejected, in the first place, because he supposed that these corpuscles were indivisible, on which ground I also reject it; in the second place, because he imagined there was a vacuum about them, which I show to be impossible; thirdly, because he attributed gravity to these bodies, of which I deny the existence in any body, in so far as a body is considered by itself, because it is a quality that depends on the relations of situation and motion which several bodies bear to each other; and, finally, because he has not explained in particular how all things arose from the concourse of corpuscles alone, or, if he gave this explanation with regard to a few of them, his whole reasoning was far from being coherent, [or such as would warrant us in extending the same explanation to the whole of nature]. This, at least, is the verdict we must give regarding his philosophy, if we may judge of his opinions from what has been handed down to us in writing. I leave it to others to determine whether the philosophy I profess possesses a valid

coherency, [and whether on its principles we can make the requisite number of deductions; and, inasmuch as the consideration of figure, magnitude, and motion has been admitted by Aristotle and by all the others, as well as by Democritus, and since I reject all that the latter has supposed, with this single exception, while I reject generally all that has been supposed by the others, it is plain that this mode of philosophizing has no more affinity with that of Democritus than of any other particular sect].

CCIII. How we may arrive at the knowledge of the figures, [magnitudes], and motions of the insensible particles of bodies.

But, since I assign determinate figures, magnitudes, and motions to the insensible particles of bodies, as if I had seen them, whereas I admit that they do not fall under the senses, some one will perhaps demand how I have come by my knowledge of them. [To this I reply, that I first considered in general all the clear and distinct notions of material things that are to be found in our understanding, and that, finding no others except those of figures, magnitudes, and motions, and of the rules according to which these three things can be diversified by each other, which rules are the principles of geometry and mechanics, I judged that all the knowledge man can have of nature must of necessity be drawn from this source; because all the other notions we have of sensible things, as confused and obscure, can be of no avail in affording us the knowledge of anything out of ourselves, but must serve rather to impede it]. Thereupon, taking as my ground of inference the simplest and best known of the principles that have been implanted in our minds by nature, I considered the chief differences that could possibly subsist between the magnitudes, and figures, and situations of bodies insensible on account of their smallness alone, and what sensible effects could be produced by their various modes of coming into contact; and afterwards, when I found like effects in the bodies that we perceive by our senses, I judged that they could have been thus produced, especially since no other mode of explaining them could be devised. And in this matter the example of several bodies made by art was of great service to me: for I recognize no difference between these and natural bodies beyond this, that the effects of machines depend for the most part on the agency of certain instruments, which, as they must bear some proportion to the hands of those who make them, are always so large that their figures and motions can be seen; in place of which, the effects of natural bodies almost always depend upon certain organs so minute as to escape our senses. And it is certain that

all the rules of mechanics belong also to physics, of which it is a part or species, [so that all that is artificial is withal natural]: for it is not less natural for a clock, made of the requisite number of wheels, to mark the hours, than for a tree, which has sprung from this or that seed, to produce the fruit peculiar to it. Accordingly, just as those who are familiar with automata, when they are informed of the use of a machine, and see some of its parts, easily infer from these the way in which the others, that are not seen by them, are made; so from considering the sensible effects and parts of natural bodies, I have essayed to determine the character of their causes and insensible parts.

CCIV. That, touching the things which our senses do not perceive, it is sufficient to explain how they can be, [and that this is all that Aristotle has essayed].

But here some one will perhaps reply, that although I have supposed causes which could produce all natural objects, we ought not on this account to conclude that they were produced by these causes; for, just as the same artisan can make two clocks, which, though they both equally well indicate the time, and are not different in outward appearance, have nevertheless nothing resembling in the composition of their wheels; so doubtless the Supreme Maker of things has an infinity of diverse means at his disposal, by each of which he could have made all the things of this world to appear as we see them, without it being possible for the human mind to know which of all these means he chose to employ. I most freely concede this; and I believe that I have done all that was required, if the causes I have assigned are such that their effects accurately correspond to all the phenomena of nature, without determining whether it is by these or by others that they are actually produced. And it will be sufficient for the use of life to know the causes thus imagined, for medicine, mechanics, and in general all the arts to which the knowledge of physics is of service, have for their end only those effects that are sensible, and that are accordingly to be reckoned among the phenomena of nature. [Footnote: “have for their end only to apply certain sensible bodies to each other in such a way that, in the course of natural causes, certain sensible effects may be produced; and we will be able to accomplish this quite as well by considering the series of certain causes thus imagined, although false, as if they were the true, since this series is supposed similar as far as regards sensible effects.”-French.]

And lest it should be supposed that Aristotle did, or professed to do, anything more than this, it ought to be remembered that he himself expressly says, at the commencement of the seventh chapter of the first book of the Meteorologies, that, with regard to things which are not manifest to the senses, he thinks to adduce sufficient reasons and demonstrations of them, if he only shows that they may be such as he explains them. [Footnote: words in Greek]

CCV. That nevertheless there is a moral certainty that all the things of this world are such as has been here shown they may be.

But nevertheless, that I may not wrong the truth by supposing it less certain than it is, I will here distinguish two kinds of certitude. The first is called moral, that is, a certainty sufficient for the conduct of life, though, if we look to the absolute power of God, what is morally certain may be false. [Thus, those who never visited Rome do not doubt that it is a city of Italy, though it might be that all from whom they got their information were deceived]. Again, if any one, wishing to decipher a letter written in Latin characters that are not placed in regular order, bethinks himself of reading a B wherever an A is found, and a C wherever there is a B, and thus of substituting in place of each letter the one which follows it in the order of the alphabet, and if by this means he finds that there are certain Latin words composed of these, he will not doubt that the true meaning of the writing is contained in these words, although he may discover this only by conjecture, and although it is possible that the writer of it did not arrange the letters on this principle of alphabetical order, but on some other, and thus concealed another meaning in it: for this is so improbable [especially when the cipher contains a number of words] as to seem incredible. But they who observe how many things regarding the magnet, fire, and the fabric of the whole world, are here deduced from a very small number of principles, though they deemed that I had taken them up at random and without grounds, will yet perhaps acknowledge that it could hardly happen that so many things should cohere if these principles were false.

CCVI. That we possess even more than a moral certainty of it.

Besides, there are some, even among natural, things which we judge to be absolutely certain. [Absolute certainty arises when we judge that it is impossible a thing can be otherwise than as we think it]. This certainty is founded on the metaphysical ground, that, as God is supremely good and the source of all truth, the faculty of distinguishing truth from error which

he gave us, cannot be fallacious so long as we use it aright, and distinctly perceive anything by it. Of this character are the demonstrations of mathematics, the knowledge that material things exist, and the clear reasonings that are formed regarding them. The results I have given in this treatise will perhaps be admitted to a place in the class of truths that are absolutely certain, if it be considered that they are deduced in a continuous series from the first and most elementary principles of human knowledge; especially if it be sufficiently understood that we can perceive no external objects unless some local motion be caused by them in our nerves, and that such motion cannot be caused by the fixed stars, owing to their great distance from us, unless a motion be also produced in them and in the whole heavens lying between them and us: for these points being admitted, all the others, at least the more general doctrines which I have advanced regarding the world or earth [e. g., the fluidity of the heavens, Part III., Section XLVI.], will appear to be almost the only possible explanations of the phenomena they present.

CCVII. That, however, I submit all my opinions to the authority of the church.

Nevertheless, lest I should presume too far, I affirm nothing, but submit all these my opinions to the authority of the church and the judgment of the more sage; and I desire no one to believe anything I may have said, unless he is constrained to admit it by the force and evidence of reason.

NOTES DIRECTED AGAINST A CERTAIN PROGRAMME



Translated by Elizabeth S. Haldane and G. R. T. Ross

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RENÉ DESCARTES: NOTES DIRECTED AGAINST A CERTAIN PROGRAMME PUBLISHED IN BELGIUM AT THE END OF THE YEAR 1647 UNDER THIS TITLE

PREFATORY NOTE TO THE NOTAE IN PROGRAMMA.

THE former friend and now opponent of Descartes, Regius or Le Roy, had issued from Utrecht in anonymous form a sort of poster or manifesto on the nature of the human mind. Descartes undertook a refutation written in Latin which is here translated. It was printed, apparently without his knowledge, in December 1647, and was accompanied by Verses and a Preface which had not his approbation. Neither the Verses nor the Preface are reproduced here. This is the last writing on Descartes' part which concerns the relationship between him and his former disciple at Utrecht. The latter, however, did not confess himself defeated but returned later to the charge.

E. S. H.

RENÉ DESCARTES: NOTES DIRECTED AGAINST A CERTAIN PROGRAMME PUBLISHED IN BELGIUM AT THE END OF THE YEAR 1647 UNDER THIS TITLE

An Explanation of the Human Mind or Rational Soul: What it is and what it may be.

A few days ago I received two pamphlets attacking me, one openly and directly, the other only covertly and by implication. Of the first I make no account; indeed I am indebted to the author, for by the very fact that with all his inordinate labour he has succeeded in collecting nothing but groundless revilings and calumnies that none could credit, he has borne me witness that he could find nothing in my writings to which he could reasonably take exception, and thus has corroborated their truth better than he would have done by praising them, and moreover has effected this at the expense of his own reputation. The other pamphlet troubles me more, though I am not mentioned openly in the discussion, and it is published without the name of author or printer; for it contains opinions which I deem pernicious and erroneous and is issued in the shape of a Programme which may be affixed to Church doors, and exposed to the view of any chance reader. It is said, however, that it was previously printed in another form, with the name appended (purporting to be the author's), of one whose doctrine is believed by many to be identical with my own. I am constrained to expose his errors, lest, perchance, they be attributed to me myself by those who happen to come across these papers, and have not read my writings.

The following is the Programme in the form in which it finally saw the light: —

AN EXPLANATION of the Human Mind or Rational Soul: What it is, and what it may be.

I. *The Human Mind is that wherein the processes of thought are first accomplished by man; and it consists of the faculty of thinking alone, and the inward principle.*

II. *So far as the laws of nature are concerned, they seem to allow that the mind may be either a substance, or a mode of a corporeal substance, or, if we follow some other philosophers who state that extension and thought are attributes inherent in certain substances, as in subjects, then, as these attributes are not mutually opposed but diverse, there is no reason why mind should not be an attribute co-existing in the same subject with extension, though the one attribute is not comprised in the concept of the other. Whatever we can conceive can exist. But mind can be conceived, so that it can be any one of the aforesaid, for none of them involves a contradiction. Therefore it may be any one of these things.*

III. *Hence they are in error who assert that we conceive the human mind clearly and distinctly, as though it were necessarily and really distinct from the body.*

IV. *The fact that mind is in truth nothing other than a substance, or an entity really distinct from body, in actuality separable from it, and capable of existing apart and independently, is revealed to us in Holy Scripture, in many places. And thus what in the view of some, the study of nature leaves doubtful is already placed beyond all doubt for us through divine revelation in Scripture.*

V. *Nor is it any objection that we may have doubts about the body, but in nowise about the mind. For this only proves that, so long as we doubt about body, we cannot say that mind is a mode of body.*

VI. *The human mind, though it is a substance really distinct from body, is nevertheless, so long as it is in the body, organic in all its activities. And therefore as there are diverse dispositions of the body, so there are correspondingly diverse processes of the mind.*

VII. As *mind is of a nature diverse from body, and from the disposition of body, and cannot arise from this disposition, therefore it is incorruptible.*

VIII. *As it has no parts and no extension in its concept, it is idle to speculate whether it exists as a whole in the whole, and is present as a whole in each individual part.*

IX. *As mind can be affected in equal degree by things imaginary and by things real, hence the study of Nature leaves us doubtful whether any material things are really perceived by us. But even this doubt is banished by divine revelation in Holy Writ, whereby it is beyond all doubt that God created heaven and earth, and all that in them is, and even now conserves them.*

X. *The bond which maintains body and sold in union is the law of the unchangeableness of Nature whereby every individual thing persists in the state in which it is, until it is thrown out of that state by some other thing.*

XI. *As mind is a substance and in being born is brought for the first time into existence, the most accurate opinion seems to be that of those who hold that the rational soul was brought forth by God, by generation and by an immediate act of creation.*

XII. *The mind has no need of innate ideas, or notions, or axioms, but of itself the faculty of thinking suffices for the accomplishment of its processes.*

XIII. *Therefore all common notions, engraven on the mind, owe their origin to the observation of things or to tradition.*

XIV. *In fact the very idea of God which is implanted in the mind, is the outcome of divine revelation, or of tradition, or of observation.*

XV. *Our concept of God, or the idea of God which exists in our mind, is not an argument strong enough to prove the existence of God, since all things do not exist of which concepts are observed within us; and this idea, as conceived by us, and that imperfectly, does not, more than the concept of any other thing, transcend our proper powers of thought.*

XVI. *The thought of the mind is twofold*: *intellect and will.*

XVII. *Intellect is perception and judgment.*

XVIII. *Perception is sense, memory, and imagination.*

XIX. *All sensation is the perception of some corporeal movement, which requires no intentional images and it is effected, not in the outward channels of sense, but in the brain alone.*

XX. *The will is free, and inclines indifferently to opposites in nature, as our self-consciousness bears us witness.*

XXI. *Will is self-determined, and is to be termed blind no more than vision is to be termed deaf.*

'No men more easily attain a great reputation for piety than the superstitious and the hypocrites.'

The following is an examination of the programme.

Notes to the Title.

I observe *in the title* a promise is made, not of bare assertions regarding the rational soul, but of an explanation of it, so that we must needs believe that in this programme are contained all, or at least, the principal arguments, which the author had, not only for proving his propositions, but also for unfolding them, and that no other arguments are to be expected from him. In that he terms the *rational soul* '*the human mind,*' he has my approbation, for thus he avoids the ambiguity of the word *soul* and in this point follows me.

Notes to the Individual Articles.

In the first article he seems to aim at a *definition* of the rational soul, with imperfect success, for he omits the genus (i.e. that it is a substance, or a mode, or something else) and he expounds only the *differentia*, which he has borrowed from me, for no one before me, so far as I know, asserted that mind consisted in *one thing alone*, namely the *faculty of thinking and the inward source* (sc of thinking).

In the second article he begins to speculate about its genus, and says that *the laws of nature seem to allow that the human mind may he either a substance, or a mode of a corporeal substance* This assertion involves a contradiction, no less than if he had said, 'The laws of nature allow that a mountain can exist with or without a valley. For a distinction must be drawn

between things which from their nature can change, like the facts that I am at present either writing or not writing, that one man is prudent, another imprudent; and things which never change, such as are all the things that pertain to the essence of anything, as is generally acknowledged by philosophers. Of course there is no doubt that it can be said of contingent things that the laws of nature permit these things to be either one way or another — for instance, the fact that I am at present either writing or not writing. But when the point at issue is the essence of something, it is manifestly foolish and contradictory to say that the laws of nature allow that it may be after any fashion save the fashion after which it really is. Nor does it more pertain to the nature of a mountain that it cannot exist without a valley, than to the nature of the human mind that it is what it is, namely, that it is a substance, if substance it be, or, indeed, that it is a mode of a corporeal substance, if in truth it be such a mode. Of this *our friend* endeavours at this point to convince us, and to prove it throws in these words, '*or if we are to follow some other philosophers* etc.,' while by '*other philosophers*' he obviously means myself, for I was the first to consider thought the predominant attribute of immaterial substance, and extension the predominant attribute of material substance. But I did not say that these attributes were inherent in the substances, as in subjects diverse from themselves. Here we must beware of understanding by the word 'attribute' nothing other than 'mode.' Whenever we see a quality assigned to anything by nature, whether it be a mode that can suffer change, or the very essence of that thing, manifestly unchangeable, we term that quality its attribute. Thus in God there are many attributes, but no modes. Thus too one of the attributes of any substance is this, that it exists *per se.* Thus the extension of any body can, within itself, admit diverse modes, for it is one mode of its extension, if that body be spherical, another if it be square; but extension itself, which is the subject of these modes, is not in itself a mode of material substance, but an attribute, because it constitutes the essence and nature of material substance. Thus, finally, the modes of thought are diverse, for affirmation is a different mode of thought from negation, and so on; but thought itself, being the inward source from which these modes arise, and in which they are inherent, is not conceived as a mode, but as an attribute which constitutes the nature of a substance. Whether thought be material, or immaterial, is the question at present before us.

He adds that ‘ *these attributes are not mutually opposed*’, *but diverse.*’ In these words again there is a contradiction, for when the question concerns attributes that constitute the essence of substances, there can be no greater opposition between them than the fact that they are different. Once it is admitted that ‘this is different from that,’ it is equivalent to saying that ‘this is not that’; but to be and not to be are contraries. ‘*Since they are not mutually opposed*,’ he says, ‘*but different, there is no reason why mind should not be an attribute co-existing in the same subject with extension, though the one attribute is not comprised in the concept of the other.*’ In these words there is an obvious fallacy, for he comes to a conclusion with regard to every possible attribute, which can be valid only in the case of modes properly so called; and yet he nowhere proves that the mind, or inward principle of thought, is such a mode. On the contrary, from his own words in *Article* V I will soon demonstrate that it is not so. Of the other attributes which constitute the natures of things, it cannot be said that those which are different, and of which neither is contained in the concept of the other, are co-existent in one and the same subject, for that is equivalent to saying that one and the same subject has two different natures, and this involves a contradiction, at least so long as the subject in question is simple and not composite — as in the present case.

Three points are to be noted here, a sufficient grasp of which would have prevented this writer from falling into such obvious errors.

First: It belongs to the theory of modes that, though we can easily comprehend a substance apart from a mode, we cannot, conversely, clearly comprehend a mode unless at the same time we conceive the substance of which it is a mode (as I have explained in the *first part of the Principles*, *Article* LXP), and on this point all philosophers are agreed. That *our friend* however paid no respect to this rule, is manifest from his 5*th Article.* In that passage he admits that *we can doubt about the existence of the body, while, at the same time, we do not doubt about the existence of the mind.*’ Hence it follows that the mind can be comprehended by us apart from the body, and, accordingly, is not a mode of the body.

The *second point* which I would note here is the difference between simple and composite entities. A composite entity is one in which are found two or more attributes, any one of which can be comprehended distinctly apart from the other, for it is from the fact that one can be thus cognised

without the other, that each of these constituent elements is seen to be, not a mode, but a thing, or the attribute of a thing which exists by virtue of that attribute. A simple entity is one in which such attributes are not found. Hence it is clear that that subject in which we understand extension only, with the various modes of extension, is a simple entity. So, too, is a subject in which we comprehend thought only, with the various modes of thought. But that in which we observe extension and thought co-existent is a composite entity, to wit, a Man, who consists of soul and body. *Our author* seems to assume that man is body alone and that mind is but a mode of body.

Finally, we must note here that in subjects compounded of several substances there is frequently one substance predominant. This we contemplate in such a way as to treat any of the remaining substances which we connect with it as nothing more than a mode. Thus a *man* clad may be contemplated as a compound of man and clothes, but the being clad, in comparison with the man, is only a mode, although garments are substances. In the same way *our author* might, in the case of man, who is a compound of soul and body, consider body the predominant element, in relation to which the being animate, or the possession of thought, is nothing other than a mode. But it is foolish to infer from that, that the mind itself, or that through which the body thinks, is not a substance different from the body.

This dictum he endeavours to corroborate by means of the following syllogism: '*Whatever we can conceive can exist. But the mind is one of the aforesaid* (viz a substance, or a mode of a corporeal substance), *because it can be conceived; for none of these things involves a contradiction. Therefore* etc.' Here it must be noted that though the rule, '*whatever we can conceive can exist.*' is mine, and true, so long as the question concerns a clear and distinct concept, in which is contained the possibility of the thing to be realised (because God can bring into being everything which we clearly perceive to be possible), nevertheless we must not make rash use of it. A man might quite easily imagine that he rightly understood something which in reality he did not understand, being utterly blinded by some sort of prejudice. This is the case of *our author* when he maintains that there is no contradiction involved in the statement that one and the same thing possesses either of two natures which are utterly incompatible, to wit, that it is a substance, *or* a mode. If he had only said that he perceived no reasons

for believing the human mind to be an immaterial substance rather than a mode of a material substance, his ignorance might have been excused. If he had said that no reasons could be found by the brain of man to prove either alternative, his arrogance would certainly have been reprehensible, but his statement would have evinced no contradiction. But when he says that the '*laws of nature allow that the same thing may be a substance, or a mode,*' his words are altogether self-contradictory and betray the irrationality of his brain.

In the third article he makes known his judgment concerning me. For it was *I* who wrote that 'the human mind can be clearly and distinctly perceived as a substance different from corporeal substance.' *Our friend,* however, though he relies on no other arguments than those self-contradictory ones which he has unfolded in the preceding article, proclaims that I am in error. Of that I make no account. Nor do I examine the words '*of necessity*' or ' *in actuality,*' which contain a certain ambiguity; for they are not of great moment.

Moreover, I scruple to examine the statements regarding Holy Writ in the *fourth article,* lest I should appear to assume the right of investigating another man's religion. Thus much I will say: Here one must distinguish between three types of questions. Certain things are believed through faith alone. Such are the mystery of the Incarnation, the Trinity, and the like. Others, however, though they have a certain bearing on faith, can nevertheless be investigated by the natural reason. Among these are generally ranked by the orthodox theologians the existence of God, and the distinction of mind from body. Finally, there are others which belong in no wise to the sphere of faith, but only to the sphere of human reason, e g the question of the squaring of the circle or of making gold by the art of alchemy. And even as these men abuse the words of Holy Scripture, who, from a distorted interpretation of it presume to elicit these last questions, so do those others diminish its authority who undertake to solve the first type of question by arguments sought from philosophy alone. Nevertheless all theologians contend that these questions should be shown to be in nowise incompatible with the light of nature, and to this end they direct their most zealous endeavours. As for questions of the second class, not only do they deem them in no way incompatible with the light of nature, but they even exhort philosophers to solve these questions, so far as in them lies, by theories evolved from the mind of man. But never have I seen any one who

would affirm that the laws of nature allow that anything should be otherwise than Holy Scripture teaches, unless he wished to show indirectly that he had no faith in Scripture. For as we were born men before we became Christians, it is beyond belief that any man should seriously embrace opinions which he thinks contrary to that right reason that constitutes a man, in order that he may cling to the faith through which he is a Christian.

But perhaps *our author* does not imply this, for his words are, '*Through study of nature some may find doubtful that which is already* '*placed beyond all doubt for us by the Divine Revelation in Holy Writ*' In these words I find a two-fold contradiction. In the first place, though he refutes the doctrine that the essence of one and the same thing does not always remain the same (because, if it be supposed to become different, it will be by this very fact a different thing, to be indicated by a different name), yet he supposes that that essence, so far as the study of Nature goes, is doubtful, and accordingly changeable. The second contradiction is in the word ' *some,*' because, as Nature is the same for all men a thing that can be doubtful only to 'some' is not doubtful according to Nature's showing.

The fifth article is to be related to the second rather than to the *fourth,* for in it the *author* is concerned, not with Divine Revelation, but with the nature of mind — the question as to whether it is a substance or a mode. To prove the defensibility of the view that mind is nothing other than a mode, he attempts to refute an objection taken from my writings. I wrote that we could not doubt that our mind existed, because, from the very fact that we doubted, it followed that our mind existed, but that meantime we might doubt whether any material things existed; whence I deduced and demonstrated that mind was clearly perceived by us as an existence, or substance, even supposing we had no concept whatever of the body, and denied that any material things had existence; and, accordingly, that the concept of mind did not involve any concept of body. This argument he thinks to explode by saying that ' *it only proves that, so long as we doubt about the body, we cannot term mind a mode of body.*' Here he shows that he is utterly ignorant of what it is that philosophers term a 'mode'; for the nature of a mode consists in this, that it can by no means be comprehended, except it involve in its own concept the concept of the thing of which it is a mode — as I have explained above. *Our friend,* however, admits that mind can sometimes be cognized apart from body, to wit, when there are doubts

about the body; whence it assuredly follows that mind cannot be termed a mode of body. And what is sometimes true about the essence or nature of a thing is always true. Nevertheless he affirms that *the laws of nature allow that mind may be only a mode of body.* These two statements are manifestly irreconcilable.

In the sixth article I fail to apprehend his meaning. Certainly I remember hearing in the Schools that the *mind is an activity of the organic body,* but till this day I never heard the mind itself termed ‘organic.’ For this reason I crave *our authors* indulgence, to the end that, as I have nothing certain to base my remarks on at this point, I may expound my conjectures, not as though they were true to fact, but simply as conjectures. I seem to observe two irreconcilable statements. One of these is to the effect that the human mind is a substance really distinct from the body. This *the author* openly states, but, so far as he can, waives argument on the point, and contends that it can be proved only by the authority of Holy Scripture. The other statement is that that same human mind, in all its activities, is *organic* or instrumental, that is to say, such that it does not act of itself, but is used by the body as though it were something that strengthened its members and other corporeal modes, and so he affirms in effect, if not in so many words, that *the mind is nothing other than a mode of body*, as though he had drawn up his whole artillery of argument to prove this point and this alone. These two statements are so manifestly contraries that I do not think *the author* wished them both, at one and the same time, to find credence with readers, but deliberately coupled them together, so that he might in some sort give satisfaction to the more simple-minded, and to his friends the theologians, by his citation of Scriptural authority, and that, meantime, his more keen-witted readers might realize that, when he said ‘ *mind is distinct from body,*’ he was speaking in irony, and that he was heart and soul of the opinion that mind is nothing but a mode.

In the seventh article again, *and the eighth,* he seems to be speaking merely in irony. And he retains the same Socratic figure of speech in *the latter part of article* IX. But *in the first part* he appends a reason to his assertion, and thus, it would seem, is to be taken seriously in this passage. He teaches that, *so far as nature shows, it is doubtful whether any material things are really perceived by us,* and submits as his reason the statement

that ‘ *the mind can be affected in the same degree by things imaginary as by things real*’ If this theory is to be received as true, it must be granted that we have use of no understanding properly so called, but only of that faculty which is usually termed the ‘ *common sense*’ whereby impressions are received of things imaginary as much as of things real, so that they affect the mind — a faculty which philosophers commonly allow even to the brute creation. But surely those who have understanding, and are not fashioned like the horse or mule, even although they are affected not only by images of real things but also by those which occur in the brain from other causes (as happens in sleep), can distinguish the one kind of image from the other with the utmost clearness, by the light of reason. The method in which this happens, surely and infallibly, I have explained *in my writings*, so accurately that I am convinced that no one who has read them throughout, and is capable of understanding them, can be a sceptic.

In *the tenth and eleventh articles* it is still possible to suspect him of irony. If the soul be believed to be a substance, it is foolish and ridiculous to say ‘ *the bond which maintains body and soul in union is the law of the unchangeableness of nature, whereby every individual thing persists in the state in which it is.*’ For it is equally true of things disunited as of things united that they persist in the same state so long as nothing changes that state.

This is not at present the point at issue. The question is, how it happens that the mind is united with the body, and not dissevered from it. But if soul be supposed to be a mode of body, it is rightly said that no bond of union need be sought other than the fact that it persists in the state in which it is, since modes have no other state than that present to the things of which they are modes.

In article twelve he appears to dissent from me only in words, for when he says that *the mind has no need of innate ideas, or notions, or axioms,* and at the same time allows it the faculty of thinking (to be considered natural or innate), he makes an affirmation in effect identical with mine, but denies it in words. For I never wrote or concluded that the mind required innate ideas which were in some sort different from its faculty of thinking; but when I observed the existence in me of certain thoughts which proceeded, not from extraneous objects nor from the determination of my will, but solely from the faculty of thinking which is within me, then, that I might distinguish the ideas or notions (which are the forms of these thoughts)

from other thoughts *adventitious* or *factitious*, I termed the former '*innate*.' In the same sense we say that in some families generosity is innate, in others certain diseases like gout or gravel, not that on this account the babes of these families suffer from these diseases in their mother's womb, but because they are born with a certain disposition or propensity for contracting them.

The conclusion which he deduces in *article* XIII from the preceding article is indeed wonderful. ' *For this reason*,' he says (i.e. because the mind has no need of innate ideas, but the faculty of thinking of itself is sufficient), ' *all common notions, engraven on the mind, owe their origin to the observation of things or to tradition* ' — as though the faculty of thinking could of itself execute nothing, nor perceive nor think anything save what it received from observation or tradition, that is, from the senses. So far is this from being true, that, on the contrary, any man who rightly observes the limitations of the senses, and what precisely it is that can penetrate through this medium to our faculty of thinking must needs admit that no ideas of things, in the shape in which we envisage them by thought, are presented to us by the senses. So much so that in our ideas there is nothing which was not innate in the mind, or faculty of thinking, except only these circumstances which point to experience — the fact, for instance, that we judge that this or that idea, which we now have present to our thought, is to be referred to a certain extraneous thing, not that these extraneous things transmitted the ideas themselves to our minds through the organs of sense, but because they transmitted something which gave the mind occasion to form these ideas, by means of an innate faculty, at this time rather than at another. For nothing reaches our mind from external objects through the organs of sense beyond certain corporeal movements, as *our author* himself affirms, in *article* XIX, taking the doctrine from *my Principles;* but even these movements, and the figures which arise from them, are not conceived by us in the shape they assume in the organs of sense, as I have explained at great length in my *Dioptrics.* Hence it follows that the ideas of the movements and figures are themselves innate in us. So much the more must the ideas of pain, colour, sound and the like be innate, that our mind may, on occasion of certain corporeal movements, envisage these ideas, for they have no likeness to the corporeal movements. Could anything be imagined more preposterous than that all common notions which are inherent in our mind should arise from these movements, and

should be incapable of existing without them? I should like *our friend* to instruct me as to what corporeal movement it is which can form in our mind any common notion, e g the notion that *things which are equal to the same thing are equal to one another*,' or any other he pleases; for all these movements are particular, but notions are universal having-no affinity with movements and no relation to them.

He goes on to affirm, *in article* XIV, that even the idea of God which is in us is the outcome, not of our faculty of thinking, as being native to it, but of *Divine Revelation or tradition, or observation.* The error of this assertion we shall the more readily realise if we reflect that anything can be said to be the outcome of another, either because this other is its proximate and primary cause, without which it could not exist, or only because it is a remote and accidental cause, which, certainly, gives the primary cause occasion to produce its effect at one time rather than at another. Thus all workmen are the primary and proximate causes of their works, but those who give them orders, or promise them reward, that they may perform these works, are accidental and remote causes, because, probably, they would not have performed the tasks unbidden. There is no doubt that tradition or observation is a remote cause, inviting us to bethink ourselves of the idea which we may have of God, and to present it vividly to our thought. But no one can maintain that this is the proximate and efficient cause, except the man who thinks that 'we can apprehend nothing regarding God save this name '*God*,' and the corporeal figure which painters exhibit to us as a representation of God. For observation, if it takes place through the medium of sight, can of its own proper power present nothing to the mind beyond pictures, and pictures consisting only of a permutation of corporeal movements, as *our author* himself instructs us. If it takes place through the medium of hearing, it presents nothing beyond words and voices; if through the other senses, it has nothing in it which can have reference to God. And surely it is manifest to every man that sight, of itself and by its proper function, presents nothing beyond pictures, and hearing nothing beyond voices or sounds, so that all these things that we think of, beyond these voices or pictures, as being symbolised by them, are presented to us by means of ideas which come from no other source than our faculty of thinking, and are accordingly together with that faculty innate in us, that is, always existing in us potentially; for existence in any faculty is not actual but merely potential existence, since the very word 'faculty' designates

nothing more or less than a potentiality. But that with regard to God we can comprehend nothing beyond a name or a bodily effigy, no one can affirm, save a man who openly professes himself an atheist, and moreover destitute of all intellect.

After expounding his opinion concerning God, *our author, in article* XV, thinks to refute all the arguments by which I have proved God's existence. At this point it occurs to one to marvel at the man's self-confidence, in that he imagines that he can so easily and in so few words overturn all that I have built up by dint of long and concentrated meditation, and to the explanation of which I have devoted a whole volume. But all the arguments which I have adduced in this matter can be subordinated to *two. In the first place* I have shown that we have a notion or idea of God such that, when we sufficiently attend to it and ponder the matter in the manner I have expounded, we realise from this contemplation alone, that it cannot be but that God exists, since existence, not merely possible or contingent as in the ideas of all other things, but altogether necessary and actual, is contained in this concept. This argument, which is held as certainly and obviously proved, not only by myself but by several others, and these men pre-eminent in learning and genius who have sedulously investigated the matter — this argument, I say, *the author of the Programme* thinks to refute in this fashion: '*Our concept of God, or the idea of God which exists in our mind, is not an argument sufficiently strong to prom the existence of God, since all things do not exist of which concepts are observed within us.*' By these words he shows that he has read my writings, but has in nowise had either the power or the will to understand them. For the point of my argument is, not the idea in general, but its peculiar property, a property which is evident in the highest degree in the idea we have of God, and which can be found in the concept of no other thing, namely, the necessity of existence, which is required as that crown of perfections without which we cannot comprehend God. *The other* argument by which I proved the existence of God, I deduced from my clear proof of the fact that we should not have had the faculty for conceiving all the perfections which we recognise in God, had it not been true that God existed, and that we were created by Him. This argument *our friend* thinks he has more than exploded by saying that *the idea we have of God does not, more than the concept of any other thing, transcend our proper powers of thinking*. If by these words he only means that the concept which we have of God without the aid of supernatural grace is no less

natural than all the concepts we have of other things, he is at one with me; but on that basis nothing can be concluded against me. If, however, he thinks that that concept does not involve more objective perfections than all the others taken together, he is obviously wrong. I myself, on the other hand, have founded my argument entirely on this preponderance of perfections, in which our concept of God transcends other concepts.

In the six remaining articles there is nothing worthy of note except the fact that, when he wishes to distinguish the properties of the soul, he speaks of them confusedly and inappropriately. I have said that these are all to be subordinated to two predominant properties, one of which is the perception of the understanding, the other the determination of the will. These two *our friend* calls '*understanding*' and ' will.' Then he subdivides what he calls ' *understanding* ' into '*perception*' and ' *judgment*.' In this point he differs from me, for when I saw that, over and above perception, which is required as a basis for judgment, there must needs be affirmation, or negation, to constitute the form of the judgment, and that it is frequently open to us to withhold our assent, even if we perceive a thing, I referred the act of judging, which consists in nothing but *assent*, i.e. affirmation or negation, not to the perception of the understanding, but to the determination of the will. Thereafter he enumerates, among the species of perception, nothing but *sense*, *memory*, and *imagination;* from which one may gather that he admits no *pure intellection* (i.e. intellection which deals with no corporeal images), and, accordingly, that he himself believes that no cognition is possessed of God, or of the human mind, or of other immaterial things. Of this I can imagine but one cause, namely, that the thoughts he has concerning these things are so confused that he never observes in himself a pure thought, different from every corporeal image.

Finally, in closing, he adds these words, taken from some portion of my writings: ' *No men more easily attain a great reputation for piety*, *than the superstitious and the hypocrites*.' What he means by these words I fail to see, unless perhaps he ascribes to hypocrisy the use he has made of irony, in many places, but I do not think that by that means he can attain a great reputation for piety.

For the rest, I am constrained to admit here, that I am covered with shame to think that in time past I lauded *this author* as a man of most penetrative genius, and wrote somewhere or other that 'I did not think he taught any doctrines which I should be unwilling to acknowledge as my

own.’ But in truth when I wrote these words I had as yet seen no specimen of his work in which he was not a faithful copyist, except only on one occasion in one little phrase, which brought such ill results to him, that I hoped he would make no further venture in that line; and, as I saw him in other matters embrace with a great show of zeal the opinions that I deemed nearest the truth, I attributed this to his genius and penetration. But now a manifold experience compels me to conclude that he is swayed not so much by love of truth as by love of novelty. As he holds all he has learned from others to be old-world and out-worn, thinking nothing sufficiently novel except what he has hammered out of his own brain; and, at the same time, is so unhappy in his inventions, that I have never noted a single word in his writings (excluding what he transcribed from other men), which I did not condemn as containing some error, I must therefore warn all those who are convinced that he is a champion of my opinions, that of these opinions — I speak, not only of those in the *Metaphysics,* on which he openly opposes me, but also of those in the *Physics,* for he treats of this subject somewhere in his writings — there is none which he does not state awry and distort. Hence it causes me more indignation that such a Physician should handle my writings and undertake to interpret, or, in other words, to falsify them, than that other men should attack them with the utmost bitterness.

For I never yet saw one of these bitter critics who did not father on me opinions different from mine by a whole heaven, and so maundering and preposterous, that I had no fear that any man of intelligence could be persuaded that they were mine. Thus, even as I write these words, two new pamphlets are brought me — productions of an adversary of this type. In the first of these it is stated that ‘*There are some Neoterics who deny all credibility to the senses, who contend that the Philosophers deny God, and dare to doubt His existence, and who, meantime, admit that there are implanted by Nature in the human mind actual notions, species, and ideas of God!* In the second it is said that ‘*these Neoterics barefacedly proclaim that God is, not only negatively, but positively, the efficient cause of Himself!* In either pamphlet the only thing effected is the conglomeration of numerous arguments to prove, first, that we have no *actual* knowledge *(cognitio)* of God in our mother’s womb, and accordingly that ‘*no actual species or idea of God is inborn in our mind*’; secondly, that ‘*we must not deny God*’ and that ‘*they are atheists and punishable by law who deny*

Him’*;* and thirdly and finally that ‘God is not the *efficient* cause of Himself.’

I might well suppose that all these *dicta* were not directed against me, because my name is not mentioned in the pamphlets, and of the opinions attacked in them there is none which I do not think absurd and erroneous. Nevertheless, as they are not dissimilar to those which have often ere now been slanderously imputed to me by men of that kidney, and as there are no other persons recognizable to whom these opinions could be attributed; as, finally, there are many who do not doubt that I am the object of attack in these pamphlets, I take this occasion to admonish their author to this effect:

First: — By innate ideas I never understood anything other than that which he himself, on page 6 of his second pamphlet, affirms in so many words to be true, viz that ‘*there is innate in ns by nature a potentiality whereby we know God*’*;* but that these ideas are *actual*, or that they are some kind of species different from the faculty of thought I never wrote nor concluded. On the contrary, I, more than any other man, am utterly averse to that empty stock of scholastic entities — so much so, that I cannot refrain from laughter when I see that mighty heap which our hero — a very inoffensive fellow no doubt — has laboriously brought together to prove that *infants ham no notion of God so long as they are in their mother*’*s womb* — as though in this fashion he was bringing a magnificent charge against me.

Secondly: — I have never taught that *God is to be denied, or that He can deceive us, or that one must doubt about every thing, or that all credibility is to be denied to the senses, or that sleep cannot be distinguished from waking*, or the like — doctrines which are sometimes thrown in my teeth by ignorant detractors. I have repudiated all these doctrines expressly and with the strongest arguments — stronger, I make bold to say, than any that have by any man before me been brought to the refutation of these doctrines. That I might the more fittingly and effectively compass this end, I proposed, at the beginning of my Meditations, to regard as doubtful all the doctrines which did not owe their original discovery to me, but had been for long denounced by the sceptics. What could be more unjust than to attribute to a writer opinions which he states only to the end that he may refute them? What more foolish than to imagine that, at least for the time being, while these false opinions are being propounded previous to their refutation, the author commits himself to them, and that, accordingly, the man who states

the arguments of the Atheists *is an Atheist for the time*? What more childish than to say that, if he were to die meantime, before writing or evolving the *hoped for refutation* he would die an Atheist — that he taught pernicious doctrine merely as a preliminary, but that '*evil should not be done that good may come of it*' and so forth? Some one will say, perhaps, that I related these false opinions, not as the opinions of others, but as my own. But what of that? In the self-same book in which I related them I refuted them all. From the very title of the book it might be understood that I was altogether hostile to these beliefs, for it purports to give '*proofs of the existence of God*' Is there anyone obtuse enough to think that the man who compiled such a book was ignorant, so long as he was penning its first pages, of what he had undertaken to prove in the following? I enunciated the objections as though they were my own, to suit the exigencies of the style of 'meditations,' which I judged the style best fitted for unfolding arguments. If this explanation does not satisfy our captious critics, I should like to know what they say of Holy Scripture — with which no human documents are to be compared — when they see in it some things that cannot be rightly understood unless they be supposed to be the utterance of impious men, or, at least, of others than the Holy Ghost and the Prophets? Such are Ecclesiastes, chap, ii., these words ' *There is nothing better for a man than that he should eat and drink, and that he should make his soul enjoy good in his labour. This also I saw that it was from the hand of God. For who can eat or who else can hasten thereunto more than I?*' and, in the following chapter, '*I said in mine heart concerning the estate of the sons of men, that God might manifest them, and that they might see that they themselves are beasts; for that which befalleth the sons of men befalleth beasts; even one thing befalleth them: as the one dieth so dieth the other: yea they have all one breath: so that a man hath no pre-eminence above a beast,*' etc. Do they believe that here the Holy Spirit teaches us that we should indulge the belly, and have abundance of delights, and that our souls are no more immortal than the souls of beasts? I do not think they are so mad. Neither should they calumniate me because in writing I have not made use of the precautions which are observed by some other writers, but not by the Holy Spirit.

In the third place, and finally, I warn the author of these pamphlets that I never wrote that '*God should be said to be, not only negatively, but*

positively, the efficient cause of Himself,' as he affirms in a very rash and ill-considered manner in page 8 of his second pamphlet. Let him turn over, read, and thoroughly search my writings, he will find in them nothing like this, but the very reverse. The fact that I am far indeed from accepting such monstrous opinions is well known to all who have read my writings, or have any knowledge of myself, or, at any rate, do not think me utterly fatuous. On this account I am only moved to wonder what is the aim of these detractors; for if they wish to convince any one that I wrote things of which the very contrary is found in my writings, they should have taken the preliminary precaution of suppressing all my publications, and should even have wiped out the memory of them from the minds of those who had already read them; for so long as they fail to effect this they do themselves more harm than me. Moreover, I marvel that they should inveigh with such bitterness and such zeal against me, who have never troubled them, nor done them any hurt, though, perhaps, possessing the power to hurt them if they provoked me; and meantime should take no action against many other men who devote whole books to the refutation of their doctrine, and ridicule them as simpletons and blindfold gladiators. But I am unwilling to add any word here that might make them renounce their habit of impugning me in their pamphlets. I am glad to see that they think me of so much importance. Meantime I pray Heaven to grant them sanity.

Written at Egmond, in Holland, towards the end of December 1647.

PASSIONS OF THE SOUL

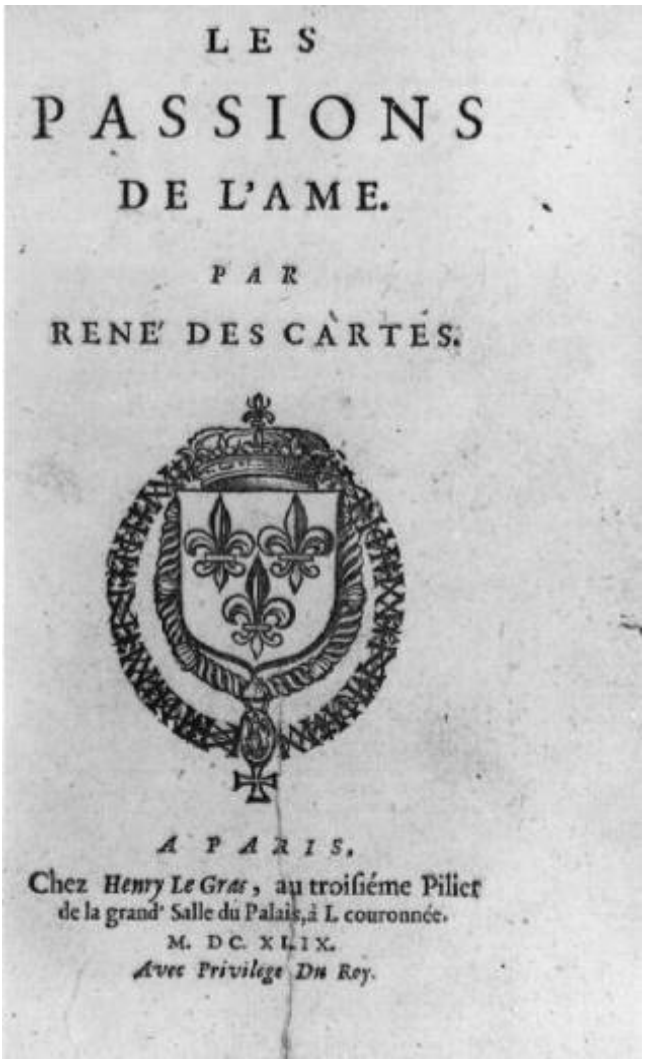


Translated by Elizabeth S. Haldane and G. R. T. Ross

This treatise, Descartes' last published work, was completed in 1649 and dedicated once again to Princess Elisabeth of Bohemia. In *Passions of the Soul* the author contributes to a long tradition of theorising "the passions" — experiences now commonly regarded as emotions, which were a subject of debate among natural philosophers since the time of Plato. Notable precursors to Descartes, who articulated their own theories of the passions, include St. Augustine, St. Thomas Aquinas and Thomas Hobbes.

In 1643 Descartes began a prolific written correspondence with Princess Elisabeth of Bohemia, in which he answered her moral questions, especially the nature of happiness, passions and ethics. *Passions of the Soul* was composed as a synthesis of this exchange. Descartes regarded the passions neither as a moralist nor from a psychological perspective, but as a method of exploring a fundamental aspect of natural science. "My design is not to explain the passions as an Orator," he wrote in a letter to his editor dated August 14, 1649, "nor even as a Philosopher, but only as a Physicist." In doing so, Descartes broke not only from the Aristotelian tradition (according to which the movements of the body originate in the soul), but also the Stoic and Christian traditions that defined the passions as the illnesses of the soul and which dictate that they be treated as such. He therefore affirmed that the passions "are all intrinsically good, and that all we have to avoid is their misuse or their excess."

In the context of the mechanistic view of life that was gaining popularity in seventeenth century science, Descartes perceived the body as an autonomous machine, capable of moving independently of the soul. It was from this physiological perception of the body that Descartes developed his theories on the passions of the soul. Previously considered to be an anomaly, the passions became a natural phenomenon, necessitating a scientific explanation.


LES
PASSIONS
DE L'AME.
PAR
RENE' DES CARTES.
A PARIS,
Chez Henry Le Gras, au troiſiéme Pilier
de la grand' Salle du Palais, à L couronnée.
M. DC. XLIX.
Avec Privilege Du Roy.

The first edition's title page

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PREFATORY NOTE TO ‘THE PASSIONS OF THE SOUL’.

THE work entitled ‘The Passions of the Soul’ was written in French during the winter of 1645-6, four years before its author’s death. It was the last work published by Descartes, who, indeed, expressed himself as very unwilling to appear again in print; the publication of the work was probably due to the urgent entreaties of Clerselier, Chanut, and other friends. Baillet, his biographer, says Descartes never published without regretting it, and certainly his publishers did not encourage him to do so, for complaints were constant as to the small sale of his books. The ‘Passions’ was sent to Queen Christina of Sweden, with whom Descartes had carried on a correspondence on the subjects allied to those discussed in this book. The first sketch had been sent to his other royal friend, Princess Elizabeth of Palatine in April, 1646, and she suggested some slight alterations upon it. The manuscript was placed in Clerselier’s hands in August, 1649 and was printed in Amsterdam in the end of November by Louis Elzevir, while Henry le Gras issued it at the same time in Paris. The author was at this period in Sweden, where he died, but he had probably revised the proofs before leaving Holland. He received copies of the book before his death, which was accelerated by the early morning lessons given in the depth of winter to Queen Christina at Stockholm.

E. S. H.

PART FIRST. OF THE PASSIONS IN GENERAL, AND INCIDENTALLY OF THE WHOLE NATURE OF MAN.

ARTICLE I.

That what in respect of a subject is passion, is in some other regard always action.

There is nothing in which the defective nature of the sciences which we have received from the ancients appears more clearly than in what they have written on the passions; for, although this is a matter which has at all times been the object of much investigation, and though it would not appear to be one of the most difficult, inasmuch as since every one has experience of the passions within himself, there is no necessity to borrow one's observations from elsewhere in order to discover their nature; yet that which the ancients have taught regarding them is both so slight, and for the most part so far from credible, that I am unable to entertain any hope of approximating to the truth excepting by shunning the paths which they have followed. This is why I shall be here obliged to write just as though I were treating of a matter which no one had ever touched on before me; and, to begin with, I consider that all that which occurs or that happens anew, is by the philosophers, generally speaking, termed a passion, in as far as the subject to which it occurs is concerned, and an action in respect of him who causes it to occur. Thus although the agent and the recipient [patient] are frequently very different, the action and the passion are always one and the same thing, although having different names, because of the two diverse subjects to which it may be related.

ARTICLE II.

That in order to understand the passions of the soul its functions must be distinguished from those of body.

Next I note also that we do not observe the existence of any subject which more immediately acts upon our soul than the body to which it is joined, and that we must consequently consider that what in the soul is a passion is in the body commonly speaking an action; so that there is no better means

of arriving at a knowledge of our passions than to examine the difference which exists between soul and body in order to know to which of the two we must attribute each one of the functions which are within us.

ARTICLE III.

What rule we must follow to bring about th is result.

As to this we shall not find much difficulty if we realise that all that we experience as being in us, and that to observation may exist in wholly inanimate bodies, must be attributed to our body alone; and, on the other hand, that all that which is in us and which we cannot in any way conceive as possibly pertaining to a body, must be attributed to our soul.

ARTICLE IV.

That the heat and movement of the members proceed from the body, the thoughts from the soul.

Thus because we have no conception of the body as thinking in any way, we have reason to believe that every kind of thought which exists in us belongs to the soul: and because we do not doubt there being inanimate bodies which can move in as many as or in more diverse modes than can ours, and which have as much heat or move (experience demonstrates this to us in flame, which of itself has much more heat and movement than any of our members), we must believe that all the heat and all the movements which are in us pertain only to body, inasmuch as they do not depend on thought of all

ARTICLE V.

That it is an error to believe that the soul supplies the movement and heat to body.

By this means we shall avoid a very considerable error into which many have fallen; so much so that I am of opinion that this is the primary cause which has prevented our being able hitherto satisfactorily to explain the passions and the other properties of the soul. It arises from the fact that

from observing that all dead bodies are devoid of heat and consequently of movement, it has been thought that it was the absence of soul which caused these movements and this heat to cease; and thus, without any reason, it was thought that our natural heat and all the movements of our body depend on the soul: while in fact we ought on the contrary to believe that the soul quits us on death only because this heat ceases, and the organs which serve to move the body disintegrate.

ARTICLE VI.

The difference that exists between a living body and a dead body.

In order, then, that we may avoid this error, let us consider that death never comes to pass by reason of the soul, but only because some one of the principal parts of the body decays; and we may judge that the body of a living man differs from that of a dead man just as does a watch or other automaton (i.e. a machine that moves of itself), when it is wound up and contains in itself the corporeal principle of those movements for which it is designed along with all that is requisite for its action, from the same watch or other machine when it is broken and when the principle of its movement ceases to act.

ARTICLE VII.

A brief explanation of the parts of the body and some of its functions.

In order to render this more intelligible, I shall here explain in a few words the whole method in which the bodily machine is composed. There is no one who does not already know that there are in us a heart, a brain, a stomach, muscles, nerves, arteries, veins, and such things. We also know that the food that we eat descends into the stomach and bowels where its juice, passing into the liver and into all the veins, mingles with, and thereby increases the quantity of the blood which they contain. Those who have acquired even the minimum of medical knowledge further know how the heart is composed, and how all the blood in the veins can easily flow from the vena cava into its right side and from thence pass into the lung by the vessel which we term the arterial vein, and then return from the lung into the left side of the heart, by the vessel called the venous artery, and finally

pass from there into the great artery, whose branches spread throughout all the body. Likewise all those whom the authority of the ancients has not entirely blinded, and who have chosen to open their eyes for the purpose of investigating the opinion of Harvey regarding the circulation of the blood, do not doubt that all the veins and arteries of the body are like streams by which the blood ceaselessly flows with great swiftness, taking its course from the right cavity of the heart by the arterial vein whose branches are spread over the whole of the lung, and joined to that of the venous artery by which it passes from the lung into the left side of the heart; from these, again, it goes into the great artery whose branches, spread throughout all the rest of the body, are united to the branches of the vein, which branches once more carry the same blood into the right cavity of the heart. Thus these two cavities are like sluices through each of which all the blood passes in the course of each circuit which it makes in the body. We further know that all the movements of the members depend on the muscles, and that these muscles are so mutually related one to another that when the one is contracted it draws toward itself the part of the body to which it is attached, which causes the opposite muscle at the same time to become elongated; then if at another time it happens that this last contracts, it causes the former to become elongated and it draws back to itself the part to which they are attached. We know finally that all these movements of the muscles, as also all the senses, depend on the nerves, which resemble small filaments, or little tubes, which all proceed from the brain, and thus contain like it a certain very subtle air or wind which is called the animal spirits.

ARTICLE VIII.

What is the principle of all these functions!

But it is not usually known in what way these animal spirits and these nerves contribute to the movements and to the senses, nor what is the corporeal principle which causes them to act. That is why, although I have already made some mention of them in my other writings, I shall not here omit to say shortly that so long as we live there is a continual heat in our heart, which is a species of fire which the blood of the veins there maintains, and that this fire is the corporeal principle of all the movements of our members.

ARTICLE IX.

How the movement of the heart is carried on.

Its first effect is to dilate the blood with which the cavities of the heart are filled; that causes this blood, which requires a greater space for its occupation, to pass impetuously from the right cavity into the arterial vein, and from the left into the great artery; then when this dilation ceases, new blood immediately enters from the vena cava into the right cavity of the heart, and from the venous artery into the left; for there are little membranes at the entrances of these four vessels, disposed in such a manner that they do not allow the blood to enter the heart but by the two last, nor to issue from it but by the two others. The new blood which has entered into the heart is then immediately afterwards rarefied, in the same manner as that which preceded it; and it is just this which causes the pulse, or beating of the heart and arteries; so that this beating repeats itself as often as the new blood enters the heart. It is also just this which gives its motion to the blood, and causes it to flow ceaselessly and very quickly in all the arteries and veins, whereby it carries the heat which it acquires in the heart to every part of the body, and supplies them with nourishment.

ARTICLE X.

How the animal spirits are produced in the brain.

But what is here most worthy of remark is that all the most animated and subtle portions of the blood which the heat has rarefied in the heart, enter ceaselessly in large quantities into the cavities of the brain. And the reason which causes them to go there rather than elsewhere, is that all the blood which issues from the heart by the great artery takes its course in a straight line towards that place, and not being able to enter it in its entirety, because there are only very narrow passages there, those of its parts which are the most agitated and the most subtle alone pass through, while the rest spreads abroad in all the other portions of the body. But these very subtle parts of the blood form the animal spirits; and for this end they have no need to experience any other change in the brain, unless it be that they are separated from the other less subtle portions of the blood; for what I here name spirits are nothing but material bodies and their one peculiarity is that they are

bodies of extreme minuteness and that they move very quickly like the particles of the flame which issues from a torch. Thus it is that they never remain at rest in any spot, and just as some of them enter into the cavities of the brain, others issue forth by the pores which are in its substance, which pores conduct them into the nerves, and from there into the muscles, by means of which they move the body in all the different ways in which it can be moved.

ARTICLE XI.

How the movements of the muscles take place.

For the sole cause of all the movements of the members is that certain muscles contract, and that those opposite to them elongate, as has already been said; and the sole cause of one muscle contracting rather than that set against it, is that there comes from the brain some additional amount of animal spirits, however little it may be, to it rather than to the other. Not that the spirits which proceed immediately from the brain suffice in themselves to move the muscles, but they determine the other spirits which are already in these two muscles, all to issue very quickly from the one of them and to pass into the other. By this means that from which they issue becomes longer and more flaccid, and that into which they enter, being rapidly distended by them, contracts, and pulls the member to which it is attached. This is easy to understand provided that we know that there are but very few animal spirits which continually proceed from the brain to each muscle, but that there are always a quantity of others enclosed in the same muscle, which move there very quickly, sometimes by only turning about in the place where they are, — that is, when they do not find any passage open from which to issue forth from it — and sometimes by flowing into the opposite muscle; and inasmuch as there are little openings in each of these muscles by which the spirits can flow from one to the other, and which are so arranged that when the spirits that come from the brain to one of them have ever so little more strength than those that proceed to the other, they open all the entrances by which the spirits, of the other muscle can pass into this one, and at the same time close all those by which the spirits of this last can pass into the other. By this means all the spirits formerly contained in

these two muscles very quickly collect in one of them and then distend and shorten it, while the other becomes elongated and flaccid.

ARTICLE XII.

How outside objects act upon the organs of the senses.

We have still to understand the reasons why the spirits do not flow always from the brain into the muscles in the same fashion, and why occasionally more flow towards some than towards others. For in addition to the action of the soul which is truly in our case one of these causes, as I shall subsequently explain, there are two others which depend only on the body, and of these we must speak. The first consists in the diversity of movements which are excited in the organs of sense by their objects, and this I have already explained fully enough in the Dioptric: but in order that those who see this work may not be necessitated to read others, I shall here repeat that there are three things to consider in respect of the nerves, i.e. first of all their marrow or interior substance, which extends in the form of little filaments from the brain, from which it originates, to the extremities of the other members to which these filaments are attached; secondly the membranes which surround them, and which, being conterminous with those which envelope the brain, form the little tubes in which these little filaments are enclosed; and finally the animal spirits which, being carried by these same tubes from the brain to the muscles, are the reason of these filaments remaining there perfectly free and extended, so that the least thing that moves the part of the body to which the extremity of any one of them is attached, causes by that same means the part of the brain from which it proceeds to move, just as when one draws one end of a cord the other end is made to move.

ARTICLE XIII.

That this action of outside objects may lead the spirits into the muscles in diverse ways.

And I have explained in the Dioptric how all the objects of sight communicate themselves to us only through the fact that they move locally by the intermission of transparent bodies which are between them and us,

the little filaments of the optic nerves which are at the back of our eyes, and then the parts of the brain from which these nerves proceed; I explained, I repeat, how they move them in as many diverse ways as the diversities which they cause us to see in things, and that it is not immediately the movements which occur in the eye, but those that occur in the brain which represent these objects to the soul. To follow this example, it is easy to conceive how sounds, scents, tastes, heat, pain, hunger, thirst and generally speaking all objects of our other external senses as well as of our internal appetites, also excite some movement in our nerves which by their means pass to the brain; and in addition to the fact that these diverse movements of the brain cause diverse perceptions to become evident to our soul, they can also without it cause the spirits to take their course towards certain muscles rather than towards others, and thus to move our limbs, which I shall prove here by one example only. If someone quickly thrusts his hand against our eyes as if to strike us, even though we know him to be our friend, that he only does it in fun, and that he will take great care not to hurt us, we have all the same trouble in preventing ourselves from closing them; and this shows that it is not by the intervention of our soul that they close, seeing that it is against our will, which is its only, or at least its principal activity; but it is because the machine of our body is so formed that the movement of this hand towards our eyes excites another movement in our brain, which conducts the animal spirits into the muscles which cause the eyelids to close.

ARTICLE XIV.

That the diversity which exists between the animal spirits may also cause a diversity in the course they take.

The other cause which serves to conduct the animal spirits differently into the muscles, is the unequal agitation of these spirits and the diversity of their parts. For when some of their parts are more coarse and more agitated than others, they pass further forward in a straight line into the cavities and pores of the brain, and by this means are conducted into other muscles than those they would enter if they had less force.

ARTICLE XV.

The causes of their diversity.

And this inequality may proceed from the diverse matters of which they are composed, as we see in the case of those who have drunk much wine — that the vapours of this wine entering quickly into the blood, rise from the heart to the brain, where they become converted into animal spirits, which, being stronger and more abundant than those ordinarily there, are capable of moving the body in many strange fashions. This inequality of spirits may also proceed from diverse dispositions of the heart, liver, stomach, spleen, and all other parts which contribute to their production; for we must here notice principally certain little nerves inserted in the base of the heart, which serve to enlarge and diminish the entrances of its cavities, whereby the blood dilating there more or less forcibly, produces spirits disposed in diverse ways. We must also notice that although the blood which enters the heart comes there from all other parts of the body, it nevertheless often happens that it is more forcibly driven from some parts than from others, because the nerves and muscles which lead to these particular parts press or agitate it to a greater extent; and that, according to the diversity of the parts from which it conies the most, it dilates variously in the heart and then produces spirits which have different qualities. Thus, for example, that which comes from the lower part of the liver where is the gall, dilates in another fashion in the heart than that which comes from the spleen, and this one again differently from what comes from the veins of the arms or legs, and this finally quite otherwise than the juice of the food when, having newly issued from the stomach and bowels, it at once passes by the liver to the heart.

ARTICLE XVI.

How all the members may be moved by the objects of the senses and by the animal spirits without the aid of the soul.

We must finally remark that the machine of our body is so formed that all the changes undergone by the movement of the spirits may cause them to open certain pores in the brain more than others, and reciprocally that when some one of the pores is opened more or less than usual (to however small a degree it may be) by the action of the nerves which are employed by the

senses, that changes something in the movement of the spirits and causes them to be conducted into the muscles which serve to move the body in the way in which it is usually moved when such an action takes place. In this way all the movements which we make without our will contributing thereto (as frequently happens when we breathe, walk, eat, and in fact perform all those actions which are common to us and to the brutes), only depend on the conformation of our members, and on the course which the spirits, excited by the heat of the heart, follow naturally in the brain, nerves, and muscles, just as the movements of a watch are produced simply by the strength of the springs and the form of the wheels.

ARTICLE XVII.

What the functions of the soul are.

After having thus considered all the functions which pertain to the body alone, it is easy to recognise that there is nothing in us which we ought to attribute to our soul excepting our thoughts, which are mainly of two sorts, the one being the actions of the soul, and the other its passions. Those which I call its actions are all our desires, because we find by experience that they proceed directly from our soul, and appear to depend on it alone: while, on the other hand, we may usually term one's passions all those kinds of perception or forms of knowledge which are found in us, because it is often not our soul which makes them what they are, and because it always receives them from the things which are represented by them.

ARTICLE XVIII.

Of the Will.

Our desires, again, are of two sorts, of which the one consists of the actions of the soul which terminate in the soul itself, as when we desire to love God, or generally speaking, apply our thoughts to some object which is not material; and the other of the actions which terminate in our body, as when from the simple fact that we have the desire to take a walk, it follows that our legs move and that we walk.

ARTICLE XIX.

Of the Perceptions.

Our perceptions are also of two sorts, and the one have the soul as a cause and the other the body. Those which have the soul as a cause are the perceptions of our desires, and of all the imaginations or other thoughts which depend on them. For it is certain that we cannot desire anything without perceiving by the same means that we desire it; and, although in regard to our soul it is an action to desire something, we may say that it is also one of its passions to perceive that it desires. Yet because this perception and this will are really one and the same thing, the more noble always supplies the denomination, and thus we are not in the habit of calling it a passion, but only an action.

ARTICLE XX.

Of the imaginations and other thoughts which are formed by the soul.

When our soul applies itself to imagine something which does not exist, as when it represents to itself an enchanted palace or a chimera, and also when it applies itself to consider something which is only intelligible and not imaginable, e g to consider its own nature, the perceptions which it has of these things depend principally on the act of will which causes it to perceive them. That is why we usually consider them as actions rather than passions.

ARTICLE XXI.

Of the imaginations which have the body only as a cause.

Amongst the perceptions which are caused by the body, the most part depend on the nerves; but there are also some which do not depend on them, and which we name imaginations, such as those of which I have just spoken, from which they yet differ inasmuch as our will has no part in forming them; and this brings it to pass that they cannot be placed in the number of the actions of the soul. And they only proceed from the fact that the spirits being agitated in diverse ways and meeting with traces of diverse preceding impressions which have been effected in the brain, take their course there fortuitously by certain pores rather than by others. Such are the illusions of our dreams, and also the day-dreams which we often have when

awake, and when our thought wanders aimlessly without applying itself to anything of its own accord. But, although some of these imaginations are the passions of the soul, taking this word in its most correct and perfect significance, and since they may all be thus termed if we take it in a more general significance, yet, because they have not a cause of so notable and determinate a description as the perceptions which the soul receives by the intermission of the nerves, and because they appear to be only a shadow and a picture, we must, before we can distinguish them very well, consider the difference prevailing among these others.

ARTICLE XXII.

Of the difference which exists among the other perceptions.

All the perceptions which I have not yet explained come to the soul by the intermission of the nerves, and there is between them this difference, that we relate them in the one case to objects outside which strike our senses, in the other to our soul.

ARTICLE XXIII.

Of the perceptions which we relate to objects which are without us.

Those which we relate to the things which are without us, to wit to the objects of our senses, are caused, at least when our opinion is not false, by these objects which, exciting certain movements in the organs of the external senses, excite them also in the brain by the intermission of the nerves, which cause the soul to perceive them. Thus when we see the light of a torch, and hear the sound of a bell, this sound and this light are two different actions which, simply by the fact that they excite two different movements in certain of our nerves, and by these means in the brain, give two different sensations to the soul, which sensations we relate to the subjects which we suppose to be their causes in such a way that we think we see the torch itself and hear the bell, and do not perceive just the movements which proceed from them.

ARTICLE XXIV.

Of the perceptions which we relate to our body.

The perceptions which we relate to our body, or to some of its parts, are those which we have of hunger, thirst, and other natural appetites, to which we may unite pain, heat, and the other affections which we perceive as though they were in our members, and not as in objects which are outside us; we may thus perceive at the same time and by the intermission of the same nerves, the cold of our hand and the heat of the flame to which it approaches; or, on the other hand, the heat of the hand and the cold of the air to which it is exposed, without there being any difference between the actions which cause us to feel the heat or the cold which is in our hand, and those which make us perceive that which is without us, excepting that from the one of these actions following upon the other, we judge that the first is already in us, and what supervenes is not so yet, but is in the object which causes it.

ARTICLE XXV.

Of the perceptions which we relate to our soul.

The perceptions which we relate solely to the soul are those whose effects we feel as though they were in the soul itself, and as to which we do not usually know any proximate cause to which we may relate them: such are the feelings of joy, anger, and other such sensations, which are sometimes excited in us by the objects which move our nerves and sometimes also by other causes. But, although all our perceptions, both those which we relate to objects which are outside us, and those which we relate to the diverse affections of our body, are truly passions in respect of our soul, when we use this word in its most general significance, yet we are in the habit of restricting it to the signification of those alone which are related to soul itself; and it is only these last which I have here undertaken to explain under the name of the passions of the soul.

ARTICLE XXVI.

That the imaginations which only depend on the fortuitous movements of the spirits, may be passions just as truly as the perceptions which depend on the nerves.

It remains for us to notice here that all the same things which the soul perceives by the intermission of the nerves, may also be represented by the fortuitous course of the animal spirits, without there being any other difference excepting that the impressions which come into the brain by the nerves are usually more lively or definite than those excited there by the spirits, which caused me to say in Article XXI that the former resemble the shadow or picture of the latter. We must also notice that it sometimes happens that this picture is so similar to the thing which it represents that we may be mistaken therein regarding the perceptions which relate to objects which are outside us, or at least those which relate to certain parts of our body, but that we cannot be so deceived regarding the passions, inasmuch as they are so close to, and so entirely within our soul, that it is impossible for it to feel them without their being actually such as it feels them to be. Thus often when we sleep, and sometimes even when we are awake, we imagine certain things so forcibly, that we think we see them before us, or feel them in our body, although they do not exist at all; but although we may be asleep, or dream, we cannot feel sad or moved by any other passion without its being very true that the soul actually has this passion within it.

ARTICLE XXVII.

The definition of the passions of the soul.

After having considered in what the passions of the soul differ from all its other thoughts, it seems to me that we may define them generally as the perceptions, feelings, or emotions of the soul which we relate specially to it, and which are caused, maintained, and fortified by some movement of the spirits.

ARTICLE XXVIII.

Explanation of the first part of this definition.

We may call them perceptions when we make use of this word generally to signify all the thoughts which are not actions of the soul, or desires, but not when the term is used only to signify clear cognition; for experience shows us that those who are the most agitated by their passions, are not those who

know them best; and that they are of the number of perceptions which the close alliance which exists between the soul and the body, renders confused and obscure. We may also call them feelings because they are received into the soul in the same way as are the objects of our outside senses, and are not otherwise known by it; but we can yet more accurately call them emotions of the soul, not only because the name may be attributed to all the changes which occur in it — that is, in all the diverse thoughts which come to it, but more especially because of all the kinds of thought which it may have, there are no others which so powerfully agitate and disturb it as do these passions.

ARTICLE XXIX.

Explanation of the second part.

I add that they particularly relate to the soul, in order to distinguish them from the other feelings which are related, the one to outside objects such as scents, sounds, and colours; the others to our body such as hunger, thirst, and pain. I also add that they are caused, maintained, and fortified by some movement of the spirits, in order to distinguish them from our desires, which we may call emotions of the soul which relate to it, but which are caused by itself; and also in order to explain their ultimate and most proximate cause, which plainly distinguishes them from the other feelings.

ARTICLE XXX.

That the soul is united to all the portions of the body conjointly.

But in order to understand all these things more perfectly, we must know that the soul is really joined to the whole body, and that we cannot, properly speaking, say that it exists in any one of its parts to the exclusion of the others, because it is one and in some manner indivisible, owing to the disposition of its organs, which are so related to one another that when any one of them is removed, that renders the whole body defective; and because it is of a nature which has no relation to extension, nor dimensions, nor other properties of the matter of which the body is composed, but only to the whole conglomerate of its organs, as appears from the fact that we could not in any way conceive of the half or the third of a soul, nor of the space it

occupies, and because it does not become smaller owing to the cutting off of some portion of the body, but separates itself from it entirely when the union of its assembled organs is dissolved.

ARTICLE XXXI.

That there is a small gland in the brain in which the soul exercises its functions more particularly than in the other parts.

It is likewise necessary to know that although the soul is joined to the whole body, there is yet in that a certain part in which it exercises its functions more particularly than in all the others; and it is usually believed that this part is the brain, or possibly the heart: the brain, because it is with it that the organs of sense are connected, and the heart because it is apparently in it that we experience the passions. But, in examining the matter with care, it seems as though I had clearly ascertained that the part of the body in which the soul exercises its functions immediately is in nowise the heart, nor the whole of the brain, but merely the most inward of all its parts, to wit, a certain very small gland which is situated in the middle of its substance and so suspended above the duct whereby the animal spirits in its anterior cavities have communication with those in the posterior, that the slightest movements which take place in it may alter very greatly the course of these spirits; and reciprocally that the smallest changes which occur in the course of the spirits may do much to change the movements of this gland.

ARTICLE XXXII.

How we know that this gland is the main seat of the soul.

The reason which persuades me that the soul cannot have any other seat in all the body than this gland wherein to exercise its functions immediately, is that I reflect that the other parts of our brain are all of them double, just as we have two eyes, two hands, two ears, and finally all the organs of our outside senses are double; and inasmuch as we have but one solitary and simple thought of one particular thing at one and the same moment, it must necessarily be the case that there must somewhere be a place where the two images which come to us by the two eyes, where the two other impressions which proceed from a single object by means of the double organs of the

other senses, can unite before arriving at the soul, in order that they may not represent to it two objects instead of one. And it is easy to apprehend how these images or other impressions might unite in this gland by the intermission of the spirits which fill the cavities of the brain; but there is no other place in the body where they can be thus united unless they are so in this gland.

ARTICLE XXXIII.

That the seat of the passions is not in the heart.

As to the opinion of those who think that the soul receives its passions in the heart, it is not of much consideration, for it is only founded on the fact that the passions cause us to feel some change taking place there; and it is easy to see that this change is not felt in the heart excepting through the medium of a small nerve which descends from the brain towards it, just as pain is felt as in the foot by means of the nerves of the foot, and the stars are perceived as in the heavens by means of their light and of the optic nerves: so that it is not more necessary that our soul should exercise its functions immediately in the heart, in order to feel its passions there, than it is necessary for the soul to be in the heavens in order to see the stars there.

ARTICLE XXXIV.

How the soul and the body act on one another.

Let us then conceive here that the soul has its principal seat in the little gland which exists in the middle of the brain, from whence it radiates forth through all the remainder of the body by means of the animal spirits, nerves, and even the blood, which, participating in the impressions of the spirits, can carry them by the arteries into all the members. And recollecting what has been said above about the machine of our body, i.e. that the little filaments of our nerves are so distributed in all its parts, that on the occasion of the diverse movements which are there excited by sensible objects, they open in diverse ways the pores of the brain, which causes the animal spirits contained in these cavities to enter in diverse ways into the muscles, by which means they can move the members in all the different ways in which they are capable of being moved; and also that all the other causes which

are capable of moving the spirits in diverse ways suffice to conduct them into diverse muscles; let us here add that the small gland which is the main seat of the soul is so suspended between the cavities which contain the spirits that it can be moved by them in as many different ways as there are sensible diversities in the object, but that it may also be moved in diverse ways by the soul, whose nature is such that it receives in itself as many diverse impressions, that is to say, that it possesses as many diverse perceptions as there are diverse movements in this gland. Reciprocally, likewise, the machine of the body is so formed that from the simple fact that this gland is diversely moved by the soul, or by such other cause, whatever it is, it thrusts the spirits which surround it towards the pores of the brain, which conduct them by the nerves into the muscles, by which means it causes them to move the limbs.

ARTICLE XXXV.

Example of the mode in which the impressions of the objects unite in the gland which is in the middle of the brain.

Thus, for example, if we see some animal approach us, the light reflected from its body depicts two images of it, one in each of our eyes, and these two images form two others, by means of the optic nerves, in the interior surface of the brain which faces its cavities; then from there, by means of the animal spirits with which its cavities are filled, these images so radiate towards the little gland which is surrounded by these spirits, that the movement which forms each point of one of the images tends towards the same point of the gland towards which tends the movement which forms the point of the other image, which represents the same part of this animal. By this means the two images which are in the brain form but one upon the gland, which, acting immediately upon the soul, causes it to see the form of this animal.

ARTICLE XXXVI.

Example of the way in which the passions are excited in the soul.

And, besides that, if this figure is very strange and frightful — that is, if it has a close relationship with the things which have been formerly hurtful to

the body, that excites the passion of apprehension in the soul and then that of courage, or else that of fear and consternation according to the particular temperament of the body or the strength of the soul, and according as we have to begin with been secured by defence or by flight against the hurtful things to which the present impression is related. For in certain persons that disposes the brain in such a way that the spirits reflected from the image thus formed on the gland, proceed thence to take their places partly in the nerves which serve to turn the back and dispose the legs for flight, and partly in those which so increase or diminish the orifices of the heart, or at least which so agitate the other parts from whence the blood is sent to it, that this blood being there rarefied in a different manner from usual, sends to the brain the spirits which are adapted for the maintenance and strengthening of the passion of fear, i.e. which are adapted to the holding open, or at least reopening, of the pores of the brain which conduct them into the same nerves. For from the fact alone that these spirits enter into these pores, they excite a particular movement in this gland which is instituted by nature in order to cause the soul to be sensible of this passion; and because these pores are principally in relation with the little nerves which serve to contract or enlarge the orifices of the heart, that causes the soul to be sensible of it for the most part as in the heart.

ARTICLE XXXVII.

How it seems as though they are all caused by some movement of the spirits.

And because the same occurs in all the other passions, to wit, that they arc principally caused by the spirits which are contained in the cavities of the brain, inasmuch as they take their course towards the nerves which serve to enlarge or contract the orifices of the heart, or to drive in various ways to it the blood which is in the other parts, or, in whatever other fashion it may be, to carry on the same passion, we may from this clearly understand why I have placed in my definition of them above, that they are caused by some particular movement of the animal spirits.

ARTICLE XXXVIII.

Example of the movements of the body which accompany the passions and do not depend on the soul.

For the rest, in the same way as the course which these spirits take towards the nerves of the heart suffices to give the movement to the gland by which fear is placed in the soul, so, too, by the simple fact that certain spirits at the same time proceed towards the nerves which serve to move the legs in order to take flight, they cause another movement in the same gland, by means of which the soul is sensible of and perceives this flight, which in this way may be excited in the body by the disposition of the organs alone, and without the soul's contributing thereto.

ARTICLE XXXIX.

How one and the same cause may excite different passions in different men.

The same impression which a terrifying object makes on the gland, and which causes fear in certain men, may excite in others courage and confidence; the reason of this is that all brains are not constituted in the same way, and that the same movement of the gland which in some excites fear, in others causes the spirits to enter into the pores of the brain which conduct them partly into the nerves which serve to move the hands for purposes of selfdefence, and partly into those which agitate and drive the blood towards the heart in the manner requisite to produce the spirits proper for the continuance of this defence, and to retain the desire of it.

ARTICLE XL.

The principal effect of the passions.

For it is requisite to notice that the principal effect of all the passions in men is that they incite and dispose their soul to desire those things fur which they prepare their body, so that the feeling of fear incites it to desire to fly, that of courage to desire to fight, and so on.

ARTICLE XLI.

Thu power of the soul in regard to the body.

But the will is so free in its nature, that it can never he constrained; and of the two sorts of thoughts which I have distinguished in the soul (of which the first are its actions, i.e. its desires, the others its passions, taking this word in its most general significance, which comprises all kinds of perceptions), the former are absolutely in its power, and can only be indirectly changed by the body, while on the other hand the latter depend absolutely on the actions which govern and direct them, and they can only indirectly be altered by the soul, excepting when it is itself their cause. And the whole action of the soul consists in this, that solely because it desires something, it causes the little gland to which it is closely united to move in the way requisite to produce the effect which relates to this desire.

ARTICLE XLII.

How ice find in the memory the things which we desire to remember.

Thus when the soul desires to recollect something, this desire causes the gland, by inclining successively to different sides, to thrust the spirits towards different parts of the brain until they come across that part where the traces left there by the object which we wish to recollect are found; for these traces are none other than the fact that the pores of the brain, by which the spirits have formerly followed their course because of the presence of this object, have by that means acquired a greater facility than the others in being once more opened by the animal spirits which come towards them in the same way. Thus these spirits in coming in contact with these pores, enter into them more easily than into the others, by which means they excite a special movement in the gland which represents the same object to the soul, and causes it to know that it is this which it desired to remember.

ARTICLE XLIII.

How the soul can imagine, be attentive, and move the body.

Thus when we desire to imagine something we have never seen, this desire has the power of causing the gland to move in the manner requisite to drive the spirits towards the pores of the brain by the opening of which pores this particular thing may be represented; thus when we wish to apply our attention for some time to the consideration of one particular object, this

desire holds the gland for the time being inclined to the same side. Thus, finally, when we desire to walk or to move our body in some special way, this desire causes the gland to thrust the spirits towards the muscles which serve to bring about this result.

ARTICLE XLIV.

That each desire is naturally united to some movement of the gland; but that, by intentional effort or by custom, it may be united, to others.

At the same time it is not always the desire to excite in us some movement, or bring about some result which is able so to excite it, for this changes according as nature or custom have diversely united each movement of the gland to each particular thought. Thus, for example, if we wish to adjust our eyes so that they may look at an object very far off, this desire causes their pupils to enlarge; and if we wish to set them to look at an object very near, this desire causes them to contract; but if we think only of enlarging the pupil of the eye we may have the desire indeed, but we cannot for all that enlarge it, because nature has not joined the movement of the gland which serves to thrust forth the spirits towards the optic nerve, in the manner requisite for enlarging or diminishing the pupil, with the desire to enlarge or diminish it, but with that of looking at objects which are far away or near. And when in speaking we think only of the sense of what we desire to say, that causes us to move the tongue and lips much more quickly and much better than if we thought of moving them in all the many ways requisite to utter the same words, inasmuch as the custom which we have acquired in learning to speak, caused us to join the action of the soul (which, by the intermission of the gland can move the tongue and lips), with the significance of words which follow these movements, rather than with the movements themselves.

ARTICLE XLV.

What is the power of the soul in reference to its passions.

Our passions cannot likewise be directly excited or removed by the action of our will, but they can be so indirectly by the representation of things which are usually united to the passions which we desire to have, and which

are contrary to those which we desire to set aside. Thus, in order to excite courage in oneself and remove fear, it is not sufficient to have the will to do so, but we must also apply ourselves to consider the reasons, the objects or examples which persuade us that the peril is not great: that there is always more security in defence than in flight; that we should have the glory and joy of having vanquished, while we could expect nothing but regret and shame for having fled, and so on.

ARTICLE XLVI.

The reason which prevents the soul from being able wholly to control its passion.

And there is a special reason which prevents the soul from being-able at once to change or arrest its passions, which has caused me to say in defining them that they are not only caused, but are also maintained and strengthened by some particular movement of the spirits. This reason is that they are nearly all accompanied by some commotion which takes place in the heart, and in consequence also in the whole of the blood and the animal spirits, so that until this commotion has subsided, they remain present to our thought in the same manner as sensible objects are present there while they act upon the organs of our senses. And as the soul, in rendering itself very attentive to some other thing, may prevent itself from hearing a slight noise or feeling a slight pain, but cannot prevent itself in the same way from hearing thunder or feeling the fire which burns the hand, it may similarly easily get the better of the lesser passions, but not the most violent and strongest, excepting after the commotion of the blood and spirits is appeased. The most that the will can do while this commotion is in its full strength is not to yield to its effects and to restrain many of the movements to which it disposes the body. For example, if anger causes us to lift our hand to strike, the will can usually hold it back; if fear incites our legs to flee, the will can arrest them, and so on in other similar cases.

ARTICLE XLVII.

In what the strife consists which we imagine to exist between the lower and higher part of the soul.

And it is only in the repugnance which exists between the movements which the body by its animal spirits, and the soul by its will, tend to excite in the gland at the same time, that all the strife which we are in the habit of conceiving to exist between the inferior part of the soul, which we call the sensuous, and the superior which is rational, or as we may say, between the natural appetites and the will, consists. For there is within us but one soul, and this soul has not in itself any diversity of parts; the same part that is subject to sense impressions is rational, and all the soul's appetites are acts of will. The error which has been committed in making it play the part of various personages, usually in opposition one to another, only proceeds from the fact that we have not properly distinguished its functions from those of the body, to which alone we must attribute every thing which can be observed in us that is opposed to our reason; so that there is here no strife, excepting that the small gland which exists in the middle of the brain, being-capable of being thrust to one side by the soul, and to the other by the animal spirits, which are mere bodies, as I have said above, it often happens that these two impulses are contrary, and that the stronger prevents the other from taking effect. We may, however, distinguish two sorts of movement excited by the animal spirits in the gland — the one sort represents to the soul the objects which move the senses, or the impressions which are met with in the brain, and makes no attempt to affect its will; the others do make an effort to do so — i.e. those which cause the passions or the movements of the body which accompany the passions. And as to the first, although they often hinder the actions of the soul, or else are hindered by them, yet, because they are not directly contrary to them, we do not notice any strife between them. We only notice the strife between the latter and the acts of will which conflict with them: e g between the effort with which the spirits impel the gland in order to cause a desire for something in the soul, and that with which the soul repels it again by the desire which it has to avoid the very same thing. And what causes this strife to come into evidence for the most part is that the will, not having the power to excite the passions directly, as has just been said, is constrained to use its best endeavours, and to apply itself to consider successively several things as to which, though it happens that one has the power to change for a moment the course taken by the spirits, it may come to pass that that which succeeds does not have it, and that they immediately afterwards revert to that same course because the disposition which has before held its place in the nerves, heart, and blood

has not changed, and thus it comes about that the soul feels itself almost at the same time impelled to desire and

ARTICLE XLVIII.

How we recognise the struggle or infirmity of souls, and what is lacking in those that are most feeble.

And it is by success in these combats that each individual can discover the strength or the weakness of his soul; for those in whom by nature the will can most easily conquer the passions and arrest the movements of the body which accompany them, without doubt possess the strongest souls. But there are those people who cannot bring their strength to the test, because they never cause their will to do battle with its proper arms, but only with those which furnish it with certain passions in order to resist certain others. That which I call its proper arms consists of the firm and determinate judgments respecting the knowledge of good and evil, in pursuance of which it has resolved to conduct the actions of its life; and the most feeble souls of all are those whose will does not thus determine itself to follow certain judgments, but allows itself continually to be carried away by present passions, which, being frequently contrary to one another, draw the will first to one side, then to the other, and, by employing it in striving against itself, place the soul in the most deplorable possible condition. Thus when fear represents death as an extreme evil, and one which can only be avoided by flight, ambition on the other hand sets forth the infamy of this flight as an evil worse than death. These two passions agitate the will in diverse ways; and in first obeying one and then the other, it is in continual opposition to itself, and thus renders the soul enslaved and unhappy.

ARTICLE XLIX.

That the strength of the soul does not suffice without the knowledge of the truth.

It is true that there are very few men so weak and irresolute that they desire nothing except what their passion dictates to them. The most part have determinate judgments, in pursuance of which they regulate a part of their actions; and although often their judgments are false or even founded on

certain passions by which the will formerly allowed itself to be vanquished or led astray, yet, because it continues to follow them when the passion which has caused them is absent, they may be considered as its proper arms, and we may reflect that souls are stronger or weaker by reason of the fact that they are able to follow these judgments more or less closely, and resist the present passions which are contrary to them. Yet there is a great difference between the resolutions which proceed from a false opinion, and those which are founded only on the knowledge of the truth, inasmuch as if we follow the latter we are assured that we shall never regret nor repent it, whereas we do so always when we have followed the first-mentioned, and hence discovered our error in doing so.

ARTICLE L.

That there is no soul so feeble that it cannot, if well directed, acquire an absolute power over its passions.

And it is useful here to know that, as has already been said above, although each movement of the gland seems to have been joined by nature to each one of our thoughts from the beginning of our life, we may at the same time join them to others by means of custom, as experience shows us in the case of words which excite movements in the gland, which, so far as the institution of nature is concerned, do not represent to the soul more than their sound when they are uttered by the voice, or the form of their letters when they are written, and which, nevertheless, by the custom which has been acquired in thinking of what they signify when their sound has been heard or their letters have been seen, usually make this signification to be understood rather than the form of their letters or the sound of their syllables. It is also useful to know that although the movements both of the gland and of the spirits of the brain, which represent certain objects to the soul, are naturally joined to those which excite in it certain passions, they can at the same time be separated from these by custom, and joined to others which are very different; and also that this custom can be acquired by a solitary action, and does not require long usage. Thus when we unexpectedly meet with something very foul in food that we are eating with relish, the surprise that this event gives us may so change the disposition of our brain, that we can no longer see any such food without horror, while we

formerly ate it with pleasure. And the same thing is to be noticed in brutes, for although they have no reason, nor perhaps any thought, all the movements of the spirits and of the gland which excite the passions in us, are none the less in them, and in them serve in maintaining and strengthening not, as in our case, the passions, but the movements of the nerves and muscles which usually accompany them. So when a dog sees a partridge he is naturally disposed to run towards it, and when he hears a gun fired, this sound naturally incites him to flight. But nevertheless setters are usually so trained that the sight of a partridge causes them to stop, and the sound which they afterwards hear when a shot is fired over them, causes them to run up to us. And these things are useful in inciting each one of us to study to regard our passions; for since we can with a little industry change the movement of the brain in animals deprived of reason, it is evident that we can do so yet more in the case of men, and that even those who have the feeblest souls can acquire a very absolute dominion over all their passions if sufficient industry is applied in training and guiding them.

PART SECOND. OF THE NUMBER AND ORDER OF THE PASSIONS AND AN EXPOSITION OF THE SIX PRIMITIVE PASSIONS.

ARTICLE LI.

What are the first causes of the passions.

We know from what has been said above that the ultimate and most proximate cause of the passions of the soul is none other than the agitation with which the spirits move the little gland which is in the middle of the brain. But that does not suffice to distinguish one from another; it is necessary to investigate their sources, and to examine their first causes: and, although they may sometimes be caused by the action of the soul which determines itself to conceive of this or that object, and also simply by the temperament of the body or by the impressions which are fortuitously met with in the brain, as happens when we feel sad or joyous without being able to give a reason, it yet appears by what has been said, that in all cases the same passions can also be excited by the objects which move the senses, and that these objects are their most ordinary and principal causes; from which it follows that in order to find them all, it is sufficient to consider all the effects of these objects.

ARTICLE LII.

What is their mode of operation and how they may be enumerated.

I notice besides, that the objects which move the senses do not excite diverse passions in us because of all the diversities which are in them, but only because of the diverse ways in which they may harm or help us, or in general be of some importance to us; and that the customary mode of action of all the passions is simply this, that they dispose the soul to desire those things which nature tells us are of use, and to persist in this desire, and also bring about that same agitation of spirits which customarily causes them to dispose the body to the movement which serves for the carrying into effect of these things; that is why, in order to enumerate them, we must merely

examine in their order in how many diverse ways which are significant for us, our senses can be moved by their objects; and I shall here make an enumeration of all the principal passions according to the order in which they may thus be found.

THE ORDER AND ENUMERATION OF THE PASSIONS.

ARTICLE LIII.

Wonder.

When the first encounter with some object surprises us, and we judge it to be new or very different from what we formerly knew, or from what we supposed that it ought to be, that causes us to wonder and be surprised; and because that may happen before we in any way know whether this object is agreeable to us or is not so, it appears to me that wonder is the first of all the passions; and it has no opposite, because if the object which presents itself has nothing in it that surprises us, we are in nowise moved regarding it, and we consider it without passion.

ARTICLE LIV.

Esteem and disdain, generosity or pride and humility or poorspiritedness.

To wonder is united esteem or disdain according as it is at the greatness of an object or its smallness that we wonder. And we may thus esteem or despise ourselves, from which come the passions, and then the habitudes, of magnanimity or pride, and of humility or poor-spirit.

ARTICLE LV.

Veneration and disdain.

But when we esteem or think little of other objects which we consider as free causes capable of doing good or evil, from esteem proceeds veneration and from simple absence of esteem, disdain.

ARTICLE LVI.

Love and hatred.

And all the preceding passions may be excited in us without our in any way perceiving if the object which causes them is good or evil. But when a matter is presented as relatively to us good, i.e. as agreeable to us, that causes us to have love for it, and when it is represented as evil or hurtful to us, that excites hatred in us.

ARTICLE LVII.

Desire.

From the same consideration of good and evil all the other passions originate; but in order to place them in order I make distinctions as to time, and considering that they lead us to regard much more the future than the present or the past, I commence with desire. For not only when we desire to acquire a good which we do not yet have, or avoid an evil which we judge may occur; but also when we only anticipate the conservation of a good or absence of an evil, which is as far as this passion may extend, it is evident that it ever regards the future.

ARTICLE LVIII.

Hope, fear, jealousy, confidence and despair.

It suffices to reflect that the acquisition of a good or removal of an evil is possible in order to be incited to desire it. But when besides that we consider whether there is much or little prospect that we shall obtain what we desire, that which represents to us that there is much probability of this excites in us hope, and that which represents to us that there is little, excites fear, of which jealousy is a species. When hope is excessive it changes its nature and is called confidence or assurance. Just as on the other hand extreme fear becomes despair.

ARTICLE LIX.

Irresolution, courage, bravery, emulation, cowardice, and terror.

And we can thus hope and fear although the issue of what we expect in no way depends on us; but when it is represented to us as dependent there may

be a difficulty in the selection of the means or in carrying them into execution. From the first proceeds the irresolution which disposes us to deliberate and take council. To the latter courage or bravery is opposed, of which emulation is a species. And cowardice is contrary to courage, as fear or terror is to bravery.

ARTICLE LX.

Remorse.

And if one is moved to act before irresolution has passed away, that causes remorse of conscience to arise, which does not concern the time to come like the preceding passions, but the present or the past.

ARTICLE LXI.

Joy and sadness.

And the consideration of the present good excites joy in us, and that of evil, sadness, when it is a good or an evil which is represented as belonging to us.

ARTICLE LXII.

Mockery, envy, pity.

But when it is represented to us as pertaining to other men, we may esteem them either as worthy or unworthy of it; and when we esteem them worthy, that does not excite in us any other passion but joy, inasmuch as it is some satisfaction to us to see that things happen as they should. There is only this difference, that the joy that comes from what is good is serious, while what comes from evil is accompanied by laughter and mockery. But if we esteem them unworthy of it, the good excites envy and the evil pity, which are species of sadness. And we must notice that the same passions which relate to present good or evil things may often likewise be related to those which are to come, since our belief that they will come represents them as if they were present.

ARTICLE LXIII.

Self-satisfaction and repentance.

We may also consider the cause of the good or evil, present as well as past. And the good which has been done by ourselves gives us an internal satisfaction which is the sweetest of all the passions; while the evil excites repentance, which is the most bitter.

ARTICLE LXIV.

Favour and gratitude.

But the good which has been done by others causes us to regard them with favour although it is not to us that it has been done, and if it is to us, we join to the favour gratitude.

ARTICLE LXV.

Indignation and anger.

In the same way the evil done by others and not having any relation to us, only causes us to be indignant with them; and when it is so related it likewise arouses anger.

ARTICLE LXVI.

Pride and shame.

Further, the good which is or has been in us, being referred to the opinion which others may have of it, excites a feeling of glory or pride in us, and the evil, shame.

ARTICLE LXVII.

Disgust, regret, and gaiety.

And sometimes the duration of the good brings about tedium or disgust, while that of evil diminishes sadness. And finally from past good, regret

proceeds, and this is a species of sadness; and from past evil comes gaiety, which is a species of joy.

ARTICLE LXVIII.

Why this enumeration of the passions is different from that which is commonly received.

Here we have the order which seems to me to be the best for the enumeration of the passions. In this I know well that I am parting company with all those who have written on this subject before, but it is not without great reason that I do so. For these derive their enumeration from the fact that they distinguish in the sensitive part of the soul two appetites which they name the *concupiscent* and *irascible* respectively. And because in the soul I recognise no distinction of parts, as I have said above, this seems to me to signify nothing but that it has two faculties, the one of desire, and the other of anger, and because in the same way it has the faculties of wondering, loving, hoping, fearing, and thus of receiving in itself every other passion, or else bringing about actions to which these passions urge it, I do not see why they have desired to refer them all to concupiscence or anger. And besides their enumeration does not comprehend all the principal passions, as I believe this one does. I speak only of the principal, because we may further distinguish many other more particular ones, and their number is indefinite.

ARTICLE LXIX.

That there are only six primitive passions.

But the number of those which are simple and primitive is not very large. For, in making a review of all those which I have enumerated, we may easily notice that there are but six which are such, i.e. wonder, love, hatred, desire, joy and sadness; and that all the others are composed of some of these six, or are species of them. That is why, in order that their multitude may not embarrass my readers, I shall here treat the six primitive passions separately; and afterwards I shall show in what way all the others derive from them their origin.

ARTICLE LXX.

Of wonder; its definition and cause.

Wonder is a sudden surprise of the soul which causes it to apply itself to consider with attention the objects which seem to it rare and extraordinary. It is thus primarily caused by the impression we have in the brain which represents the object as rare, and as consequently worthy of much consideration; then afterwards by the movement of the spirits, which are disposed by this impression to tend with great force towards the part of the brain where it is, in order to fortify and conserve it there; as they are also disposed by it to pass thence into the muscles which serve to retain the organs of the senses in the same situation in which they are, so that it is still maintained by them, if it is by them that it has been formed.

ARTICLE LXXI.

That in this passion no change occurs in the heart or in the blood.

And this passion has this particular characteristic, that in it we do not notice that it is accompanied by any change which occurs in

ARTICLE LXXII.

In what the strength of wonder consists.

That does not prevent its having much strength because of the surprise, i.e. the sudden and unexpected arrival of this impression which changes the movement of the spirits, which surprise is proper and peculiar to this passion; so that when surprise is met with in other passions as it is usually met with in almost all, thus increasing them, what happens is that wonder is united to them. And the strength depends on two things, i.e. on the novelty, and on the fact that the movement which it causes possesses its entire strength from its commencement. For it is certain that such a movement has more effect than those which, being feeble to begin with, and only increasing little by little, can easily be turned aside. It is likewise certain that the objects of sense which are new, affect the brain in certain parts in which it is not usually affected, and that the fact that these parts are more

tender or less firm than those which a frequent agitation has solidified, increases the effect of the movements which they there excite. And we shall not find this incredible if we consider that it is a similar reason which brings it about that, the soles of our feet being accustomed to a contact which is rough enough owing to the weight of the body which they bear, we feel this contact but little when we walk, while another much slighter and more gentle touch, when they are tickled, is almost insupportable because it is unusual to us.

ARTICLE LXXIII.

What astonishment is.

And this surprise has so much power in causing the spirits which are in the cavities of the brain to take their way from thence to the place where is the impression of the object which we wonder at, that it sometimes thrusts them all there, and causes them to be so much occupied in preserving this impression that there are none which pass from thence into the muscles, nor even which in any way turn themselves away from the tracks which they originally pursued in the brain: and this causes the whole body to remain as immobile as a statue, and prevents our perceiving more of the object than the first face which is presented, or consequently of acquiring a more particular knowledge of it. That is what we commonly call being astonished, and astonishment is an excess of wonder which can never be otherwise than bad.

ARTICLE LXXIV.

The end which the passions serve, and to what they are detrimental.

And it is easy to understand from what has been said above, that the utility of all the passions consists alone in their fortifying and perpetuating in the soul thoughts which it is good it should preserve, and which without that might easily be effaced from it. And again, all the harm which they can cause consists in the fact that they fortify and conserve these thoughts more than necessary, or that they fortify and conserve others on which it is not good to dwell.

ARTICLE LXXV.

In what wonder particularly consists.

And we may say more particularly of wonder that it is useful, inasmuch as it causes us to learn and retain in our memory things of which we were formerly ignorant; for we shall only wonder at that which appears rare and extraordinary to us, and nothing can so appear excepting because we have been ignorant of it, or also because it is different from the things which we have known; for it is this difference which causes it to be called extraordinary. Now although a thing which was unknown to us, presents itself anew to our understanding or our senses, we do not for all that retain it in our memory, unless the idea which we have of it is strengthened in our brain by some passion or else by the application of our understanding which our will determines to a particular attention and reflection. And the other passions may serve to make us remark things which seem good or evil; but we have only wonder for those which appear but seldom. We also see that those who have no natural inclination towards this passion are usually very ignorant.

ARTICLE LXXVI.

In what it may do harm, and how we may make good its deficiency and correct its excess.

But it much more frequently occurs that we wonder too much, and that we are astonished in perceiving things which deserve little or no consideration, than that we wonder too little. And this may entirely prevent or pervert the use of the reason. That is why, although it is good to be born with some inclination towards this passion, because that disposes us for the acquisition of the sciences, we must at the same time afterwards try to free ourselves from it as much as possible. For it is easy to supplement its defects by special reflection and attention which our will can always oblige our understanding to give on these occasions when we judge that the matter which presents itself is worth the trouble. But there is no other remedy to prevent our wondering to excess than that of acquiring a knowledge of various matters and exercising ourselves in the consideration of all those which may appear the most rare and strange.

ARTICLE LXXVII.

That it is neither the most stupid nor the most clever who are most carried away by wonder.

For the rest, although it is only those who are dull and stupid who are in nowise impelled by their nature to wonder, that is not to say that those who are best supplied with wits are always those who are most disposed to it. As a matter of fact it is principally those who, although they have a fairly good supply of common sense, have at the same time no high opinion as to their sufficiency.

ARTICLE LXXVIII.

That its excess may pass into a matter of habit when we fail to correct it.

And although this passion seems to diminish with use, because the more we meet with rare things which we wonder at, the more we accustom ourselves to cease to wonder at them, and to think that all those which may afterwards present themselves are common, still, when it is excessive, and causes us to arrest our attention solely on the first image of the objects which are presented, without acquiring any other knowledge of them, it leaves behind it a custom which disposes the soul in the same way to pause over all the other objects which present themselves, provided that they appear to it to be ever so little new. And this is what causes the continuance of the malady of those who suffer from a blind curiosity — that is, who seek out things that are rare solely to wonder at them, and not for the purpose of really knowing them: for little by little they become so given over to wonder, that things of no importance are no less capable of arresting their attention than those whose investigation is more useful.

ARTICLE LXXIX.

The definition of love and hate.

Love is an emotion of the soul caused by the movement of the spirits which incites it to join itself willingly to objects which appear to it to be agreeable. And hatred is an emotion caused by the spirits which incite the soul to

desire to be separated from the objects which present themselves to it as hurtful. I say that these emotions are caused by the spirits in order to distinguish love and hate, which are passions and depend on the body, both from the judgments which also induce the soul by its free will to unite itself with the things which it esteems to be good, and to separate itself from those it holds to be evil, and from the emotions which these judgments excite of themselves in the soul.

ARTICLE LXXX.

What it is to join or separate oneself by ones free will.

For the rest, by the word will I do not here intend to talk of desire, which is a passion apart, and one which relates to the future, but of the consent by which we consider ourselves from this time forward as united with what we love, so that we imagine a whole of which we conceive ourselves as only constituting one part, while the thing loved constitutes another part. In the case of hatred, on the other hand, we consider ourselves only and as a whole, entirely separated from the matter for which we possess an aversion.

ARTICLE LXXXI.

Of the distinction usually made between the love belonging to concupiscence and that of benevolence.

And two sorts of love are usually distinguished, the one of which is named the love of benevolence, that is to say the love which incites us to wish well to what we love; the other is named the love of concupiscence, that is to say the love that causes us to desire the thing that is loved. But it appears to me that this distinction concerns the effects of love alone, and not its essence; for as soon as we are willingly joined to some object, of whatever nature it may he, we have for it a feeling of benevolence, i.e. we also join to it willingly the things which we believe to be agreeable to it: and this is one of the principal effects of love. And if we judge that it is a desirable thing to possess it, or to be associated with it in some other manner than through the will, we desire it: and this is likewise one of the most ordinary effects of love.

ARTICLE LXXXII.

How very different passions agree, inasmuch as they participate in love.

There is also no need to distinguish as many kinds of love as there are diverse objects which we may love; for, to take an example, although the passions which an ambitious man has for glory, a miser for money, a drunkard for wine, a brutal man for a woman whom he desires to violate, a man of honour for his friend or mistress, and a good father for his children, may be very different, still, inasmuch as they participate in love, they are similar. But the four first only have love for the possession of the objects to which their passion relates, and do not have any for the objects themselves, for which they only have desire mingled with other particular passions. But the love which a good father has for his children is so pure that he desires to have nothing from them, and does not wish to possess them otherwise than he does, nor to be united with them more closely than he already is. For, considering them as replicas of himself, he seeks their good as his own, or even with greater care, because, in setting before himself that he or they form a whole of which he is not the best part, he often prefers their interests to his, and does not fear losing himself in order to save them. The affection which honourable men have for their friends is of this nature even though it is rarely so perfect; and that which they have for their mistress participates largely in it, but it also participates a little in the others.

ARTICLE LXXXIII.

Of the difference which exists between simple affection, friendship, and devotion.

We may, it seems to me, find differences in love according to the esteem which we bear to the object loved as compared with oneself: for when we esteem the object of love less than ourselves, we have only a simple affection for it; when we esteem it equally with ourselves, that is called friendship; and when we esteem it more, the passion which we have may be called devotion. Thus we may have affection for a flower, a bird, a horse; but unless we have a very ill-regulated mind, we can have friendship for men alone. And they are so truly the object of this passion, that there is no man so imperfect that we cannot have for him a very perfect friendship, when we are loved by him, and when we have a truly noble and generous

soul, in accordance with what will be afterwards explained in Articles CLIV and CLVI. As to the meaning of devotion, its principal object is no doubt the supreme Divinity to whom we cannot fail to be devoted when we know Him as we should; but we may also have devotion for our prince, country, town, and even for a particular man, when we esteem him much more than ourselves. Now the difference which exists between these three sorts of love is shown principally by their effects; for inasmuch as in all of them we consider ourselves as joined and united to the thing loved, we are always ready to abandon the lesser portion of the whole into which we both enter, in order to preserve the other portion. This brings it to pass that in simple affection we always prefer ourselves to the object loved; and, on the other hand, in devotion the thing loved is so much preferred to the self, that we do not fear death in order to preserve it. We have frequently seen examples of this in the case of those who have exposed themselves to a certain death in the defence of their prince or their town, and in some cases even for the private persons to whom they were devoted.

ARTICLE LXXXIV.

That there are not as many kinds of hate as of love.

For the rest, although hatred is directly opposed to love, we do not always divide it into so many species because we do not to the same extent notice the difference which exists between the evils from which we are separated by our will, as we do that which exists between the good things to which we are joined.

ARTICLE LXXXV.

Of delight and revulsion.

And I only find one distinct characteristic of any note which is alike in both. It consists in the fact that the objects both of love and hatred may be represented to the soul by the external senses, or else by the internal, and by its own reason: for we commonly denominate good or evil that which our interior senses or our reason make us judge to be agreeable or the contrary to our nature; but we term beautiful or ugly that which is so represented to us by our outward senses, principally by that of sight, which alone is more considered than the others; hence two sorts of love originate, i.e. that which

we have for good things, and that which we have for beautiful things, to which we may give the name of attraction or delight in order not to confound it with the other, nor yet with desire, to which we often attribute the name of love. And from thence also, two kinds of hatred in the same way take their rise, the one of which relates to evil things, the other to ugly things; and this last may be called horror or aversion in order to distinguish it. But what is most remarkable here is that these passions of delight and detestation or horror are usually more violent than the other sorts of love or hate, because what comes to the soul by the senses touches it more forcibly than what is represented to it by its reason, and that even though these first passions have usually less truth; so that of all the passions it is these which deceive the most, and against which we should guard ourselves most carefully.

ARTICLE LXXXVI.

The definition of Desire.

The passion of desire is an agitation of the soul caused by the spirits which dispose it to wish for the future the things which it represents to itself as agreeable. Thus we do not only desire the presence of the absent good, but also the conservation of the present, and further, the absence of evil, both of that which we already have, and of that which we believe we might experience in time to come.

ARTICLE LXXXVII.

That it is a passion which has no opposite.

I know very well that usually in the Schools the passion which makes for the search after the good which alone is called desire is opposed to that which makes for the avoidance of evil, which is called aversion. But inasmuch as there is no good whose privation is not an evil, nor any evil considered in a positive sense, whose privation is not a good, and that in investigating riches, for example, we necessarily shun poverty, in fleeing from sickness we make for health, and so on with other things, it seems to me that it is always an identical movement which makes for the search after good, and at the same time for the avoidance of the evil which is contrary to it. I merely remark this difference in it, that the desire which we have when we make for some good is accompanied by love, and then by hope and joy;

while the same desire, when it tends to remove itself from evil contrary to this good, is accompanied by hate, fear and sadness; which is the cause of our judging it to be contrary to itself. But if we wish to consider it when at the same time it relates equally to some good with the view of seeking it, and to an opposed evil in order to avoid it, we may very clearly see that it is but one passion which brings about both the one and the other.

ARTICLE LXXXVIII.

Its different species.

There would be more reason in distinguishing desire into as many different species as there are different objects sought after; since, for example, curiosity, which is none other than a desire for knowledge, differs much from desire for glory, and this again from desire for vengeance, and so on in the case of other objects. But it is here sufficient to know that there are as many species of the passions as there are of love and hatred, and that the most important and strongest are those which take their rise from the emotions of delight and revulsion.

ARTICLE LXXXIX.

The desire which springs from revulsion.

Now, although it is only one and the same desire which makes for the search after a good and the escape from an evil which is contrary to it, as has been said, the desire which originates from delight cannot fail to be very different from that which springs from revulsion; for this delight and revulsion which are truly contrary to one another, are not the good and the evil which serve as objects for those desires, but only two emotions of the soul, which dispose it to seek after two very different things. That is, revulsion is instituted by nature to represent to the soul a sudden and unexpected death, so that although it is sometimes but the touch of a grub, or the sound of a trembling leaf, or one’s own shadow, which causes us to be seized with horror, we at once feel as much emotion as though a very evident peril of death offered itself to the senses; and this is what suddenly produces the agitation which causes the soul to employ all its forces in

order to avoid an evil so present; and it is this kind of desire which we commonly call avoidance and aversion.

ARTICLE XC.

That which springs from delight.

On the other hand, delight is specially instituted by nature to represent the enjoyment of that which gives pleasure as the greatest of all the good things which pertain to man, which causes us to desire this enjoyment very ardently. It is true that there are various sorts of delight and that the desires which take their origin in these diverse varieties are not all equally powerful. For, to take an example, the beauty of flowers incites us only to look at them, and that of fruits to eat them. But the principal one is that which proceeds from the perfections which we imagine in a person whom we think may become another self; for with the difference of sex which nature has placed in men, as in the animals without reason, it has also placed certain impressions in the brain which bring it to pass that at a certain age, and in a certain time, they consider themselves defective, and as though they were but the half of a whole, of which an individual of the other sex should be the other half. In this way the acquisition of this half is confusedly represented by nature as the greatest of all imaginable goods. And although we see many persons of this other sex, we do not for all that desire several at the same time, inasmuch as nature does not cause us to imagine that we have need of more than one half. But when we observe something in one which is more agreeable than what we at the same time observe in others, that determines the soul to feel only for the first all the inclination which nature gives it to seek for the good which that nature represents to it as the greatest that can be possessed; and this inclination or desire which thus springs from delight more usually receives the name of love than the passion of love which has above been described. It has likewise stranger effects and it is what provides the principal material for the writers of romances and for poets.

ARTICLE XCI.

The definition of Joy.

Joy is an agreeable emotion of the soul in which consists the enjoyment that the soul possesses in the good which the impressions of the brain represent to it as it own. I say that it is in this emotion that the enjoyment of the good consists; for as a matter of fact the soul receives no other fruits from all the good things that it possesses; and while it has no joy in these, it may be said that it does not enjoy them more than if it did not possess them at all. I add also that it is of the good which the impressions of the brain represent to it as its own, in order not to confound this joy, which is a passion, with the joy that is purely intellectual, and which comes into the soul by the action of the soul alone, and which we may call an agreeable emotion excited in it, in which the enjoyment consists which it has in the good which its understanding represents to it as its own. It is true that while the soul is united to the body this intellectual joy can hardly fail to be accompanied by that which is a passion; for as soon as our understanding perceives that we possess some good thing, even although this good may be so different from all that pertains to body that it is not in the least capable of being imagined, imagination does not fail immediately to make some impression in the brain from which proceeds the movement of the spirits which excites the passion of joy.

ARTICLE XCII.

The definition of Sadness.

Sadness is a disagreeable languor in which consists the discomfort and unrest which the soul receives from evil, or from the defect which the impressions of the brain set before it as pertaining to it. And there also is an intellectual sadness which is not passion, but which hardly ever fails to be accompanied by it.

ARTICLE XCIII.

The causes of these two passions.

But when intellectual joy or sadness thus excites that which is a passion their cause is evident enough; and we see from their definitions that joy proceeds from the belief that we have of possessing some good, and sadness from the belief that we have of possessing some evil or defect. It often,

however, happens that we feel sad or joyful without being thus able distinctly to observe the good or evil which are the causes of it; e g when this good or this evil form their impressions in the brain without the intermission of the soul, sometimes because they only pertain to the body, and sometimes, too, although they pertain to the soul, because it does not consider them as good and evil, but under some other form the impression of which is joined to that of good and of evil in the brain.

ARTICLE XCIV.

How these passions are excited by things good and evil which only concern the body, and in what pleasurable stimulation and pain consists.

Thus when we are in full health and the weather is more serene than usual, we feel a gaiety within us which proceeds from no function of the understanding, but only from the impressions which the movement of the spirits causes in the brain; and we never feel sad in the same way except when the body is indisposed, even although we do not know that it is so. Thus the titillation of the senses is so nearly followed by joy, and pain by sadness, that the greater part of mankind does not distinguish the two. And yet they differ so much that pains may sometimes be suffered with joy, or pleasurable sensations received which cause displeasure. But the cause which brings it to pass that in a general way joy follows pleasurable sensation, is the fact that all that we call pleasurable sensation or agreeable sentiment is simply due to the fact that the objects of sense excite some movement in the nerves which would be capable of harming them had they not strength sufficient to resist the movement, or were the body not well disposed; and this produces in the brain an impression which, being instituted by nature to give evidence to this good disposition and this strength, represents that to the soul as a good pertaining to it, inasmuch as it is united to body and thus excites in it joy. It is almost the same reason which brings it about that we naturally take pleasure in being moved by all sorts of passions, even by sadness and hatred, when these passions are only caused by the strange adventures which we see represented in a theatre, or by other similar means which, not being able to harm us in any way, seem pleasurably to excite our soul in affecting it. And the cause which brings it to pass that pain usually produces sadness, is that the feeling which we call

pain always proceeds from some action which is so violent that it hurts our nerves; in this way, being instituted by nature to signify to the soul the injury which the body receives by this action, and its weakness in not being able to resist it, it represents both to it as evils, which are always disagreeable to it, excepting when they bring about certain good results which it esteems more than these.

ARTICLE XCV.

How they may also be excited by the things good and evil which the soul does not notice even although they belong to it, such as the pleasure taken in encountering risk or in the recollection of a past evil.

Thus the pleasure which young people often take in undertaking difficult tasks and in exposing themselves to great perils, even although they hope for no profit or glory by doing so, proceeds in their case from the fact that the reflection which they make that what they undertake is difficult, makes an impression in their brain which, being united to that which they might form were they to think that it is a good thing to feel sufficiently courageous, happy, skilful, or strong to dare to risk themselves to such an extent, is the cause of their taking pleasure in so-doing. And the happiness which old people have when they recollect the evils which they have suffered, proceeds from the fact that they represent to themselves that it is a good thing to survive in spite of them all.

ARTICLE XCVI.

The movements of the blood and the spirits to which the five preceding passions are due.

The five passions which I have here commenced to explain are so united or opposed the one to the other, that it is easier to consider them all together than to treat each of them separately, as wonder has been treated; and their cause is not, as is that of the latter, in the brain alone, but also in the heart, the spleen, the liver, and in all the other portions of the body in as far as they serve for the production of the blood and consequently of the spirits. For, although all the veins conduct the blood which they contain towards the heart, yet it sometimes happens that the blood of certain of them is

driven there with greater strength than that of others; it also happens that the openings by which it enters into the heart, or else those by which it issues out, are more enlarged or contracted on one occasion than on the other.

ARTICLE XCVII.

The chief experiences that furnish us with the knowledge of these movements in Love.

Now in considering the various alterations which experience causes us to observe in our body while our soul is agitated by various passions, I notice in love that when it occurs alone, that is, when it is unaccompanied by any strong joy, desire, or sadness, the beating of the pulse is equal and much fuller and stronger than is usually the case, that we feel a gentle heat in the breast, and that the digestion of food is accomplished very quickly in the stomach. In this way this passion is useful to health.

ARTICLE XCVIII.

In Hatred.

I notice, on the other hand, that in hatred the pulse is unequal, feebler, and often quicker; that we have fits of cold interspersed with a severe and biting heat in the breast difficult to describe; that the stomach ceases to fulfil its functions and is inclined to vomit and reject the food that has been eaten, or at least to corrupt them and convert them into evil humours.

ARTICLE XCIX.

In Joy.

In joy, that the pulse is equal and quicker than usual, but that it is not so strong or full as in love, and that we feel an agreeable heat which is not only in the breast, but also spreads throughout all the other exterior parts of the body with the blood which we see present there in abundance; and yet that we sometimes lose our appetite because the digestion is not so active as usual.

ARTICLE C.

In Sadness.

In sadness, that the pulse is feeble and slow, and that we feel as it were constrictions round the heart which press upon it, and icy chills which congeal it and communicate their cold to the rest of the body; and that nevertheless we continue in certain cases to have a good appetite and to feel that the stomach does not fail to do its duty, provided that there is no hatred mingled with the sadness.

ARTICLE CI.

In Desire.

I finally notice this peculiarity about desire, that it agitates the heart more violently than any of the other passions, and furnishes more spirits to the brain, which, passing from thence into the muscles, render all the senses more acute, and all the parts of the body more mobile.

ARTICLE CII.

The movement of the blood and spirits in Love.

These observations, and many others which would be too lengthy to transcribe, have caused me to judge that when the understanding represents to itself some object of love, the impression which this reflection makes in the brain leads the animal spirits, by the nerves of the sixth part, towards the muscles which are around the intestines and stomach in the manner requisite to cause the juice of the food, which converts itself into new blood, to pass quickly towards the heart without stopping in the liver; and that being driven thither with more strength than any that is in the other parts of the body, it enters in greater abundance and excites there a stronger heat because it is coarser than that which has already been several times rarefied in passing and repassing through the heart. And this causes the spirits also to be sent to the brain, whose parts are coarser and more agitated than usual. And these spirits, fortifying the impression which the first thought of the agreeable object there makes, oblige the soul to pause over this reflection; and it is in this that the passion of love consists.

ARTICLE CIII.

In Hatred.

In hatred, on the other hand, the first thought of the object which brings about aversion so conducts the animal spirits which are in the brain towards the muscles of the stomach and intestines, that they prevent the juice of the food from mingling with the blood by closing up all the openings by which it usually flows there; and it also conducts them in such a way toward the little nerves of the spleen and of the lower portion of the liver, where is the receptacle of the bile, that the portions of the blood which are usually thrown back towards these parts issue from them and flow with that which is in the branches of the vena cava towards the heart; and this causes many inequalities in its heat, insomuch that the blood which comes from the spleen hardly heats and rarefies itself at all, while on the contrary that which comes from the lower part of the liver, where the gall always is, enflames and dilates very quickly. In consequence of this the animal spirits which go to the brain also have very unequal parts and very extraordinary movements, from whence it comes about that they strengthen the ideas of hatred which are found to be already imprinted there, and dispose the soul to reflections which are full of sharpness and bitterness.

ARTICLE CIV.

In Joy.

In joy it is not so much the nerves of the spleen, the liver, or the stomach, or the intestines, which are active, as those which are in the whole of the rest of the body, and particularly that which is round the orifices of the heart, which, opening and enlarging these orifices, supplies the means whereby the blood which the other nerves drive from the veins to the heart may enter there and issue forth in a larger quantity than usual. And because the blood which then enters the heart has already passed and repassed there several times, having come from the arteries to the veins, it dilates very easily and produces spirits whose parts, being very equal and subtle, are proper for the formation and fortification of the impressions of the brain which give to the soul thoughts which are gay and peaceful.

ARTICLE CV.

In Sadness.

In sadness, on the contrary, the openings of the heart are much contracted by the small nerve which surrounds them, and the blood of the veins is in nowise agitated, which brings it to pass that very little of it goes towards the heart and yet the passages by which the juice of the food flows from the stomach and the intestines towards the liver remain open, which causes the appetite not to diminish at all, excepting when hatred, which is often united to sadness, closes them.

ARTICLE CVI.

In Desire.

Finally, to the passion of desire the following fact is proper, namely, that the wish which we have to obtain some good, or to avoid some evil, promptly sends the animal spirits from the brain to all the portions of the body which may be of service in the actions requisite for this effect, and particularly to the heart and the parts which furnish it with most blood, so that in receiving greater abundance than usual, it sends a greater quantity of spirits towards the brain, both in order to maintain and fortify there the idea of this wish, and to pass from thence into all the organs of the senses and all the muscles which may be employed in obtaining that which we desire.

ARTICLE CVII.

What is the cause of its movements in Love.

And I deduce the reasons for all this from what has been said above, that there is a connection between our soul and our body such that when we have once joined some corporeal action with some thought, the one of the two never after presents itself to us without the other presenting itself at the same time. We see in the case of those who have in illness taken some concoction with great aversion, that they can neither drink nor eat afterwards any thing approaching it in taste without the same aversion coming back to them; and similarly they cannot think of the aversion in

which the medicines are held, without the same taste coming back to them in thought. For it seems to me that the earliest passions that our soul had had when first it was joined to our body must be due to the fact that sometimes the blood or other juice which entered into the heart was a more suitable nutriment than usual for the maintenance there of heat, which is the principle of life, and that was the cause of the soul uniting itself to this nutriment of its own free will, that is to say liking it, and at the same time the animal spirits flowed from the brain to the muscles which might press or agitate the parts from which it had come to the heart, in order to cause them to send it yet more; and these parts were the stomach and the intestines, the agitation of which increases our appetite, or else the liver and lung likewise, which the muscles of the diaphragm may compress. That is why this same movement of animal spirits has always since accompanied the passion of love.

ARTICLE CVIII.

In Hatred.

Sometimes, on the other hand, there comes to the heart some juice of a foreign nature which was not qualified to maintain heat, or which even was capable of extinguishing it, and this was the reason that the spirits which rose from the heart to the brain excited in the soul the passion of hatred; and at the same time also these spirits went from the brain to the nerves which were able to drive the blood of the spleen and of the small veins of the liver towards the heart in order to prevent this hurtful juice from entering therein; and further they went towards these nerves which could drive back this juice to the intestines and stomach, or sometimes likewise oblige the stomach to vomit: and from this it results that these same movements usually accompany the passion of hatred. And our eye shows us that there are in the liver numbers of veins or ducts of sufficient width by which the juice of the food could pass from the portal vein into the vena cava and from thence to the heart without delaying at all in the liver. But there is also an infinitude of others that are smaller, where it might stop, and which always contains blood in reserve as does the spleen also; which blood being coarser than that which is in the other portions of the body is capable of

serving better as nourishment to the fire which is in the heart, when the stomach and intestines fail to supply it with nutriment.

ARTICLE CIX.

In Joy.

It has also sometimes happened in the beginning of our life that the blood contained in the veins was a nourishment sufficiently well suited to maintain the heat of the heart, and that they contained it in such a quantity that there was no need to derive any nourishment from elsewhere. And this has excited in the soul the passion of joy, and has at the same time caused the orifices of the heart to be more open than usual; it has also brought it to pass that the animal spirits (flowing abundantly from the brain, not alone into the nerves which serve for opening these orifices, but also generally speaking into all the others which drive the blood of the veins to the heart) prevent any fresh blood from coming from the liver, spleen, intestines and stomach. That is why these same movements accompany joy.

ARTICLE CX.

In Sadness.

Sometimes on the contrary it has happened that the body has lack of nourishment, and it is this that must give the soul its first experience of sadness — that sadness at least which is as yet free from intermixture with hatred. The same reason has also caused the orifices of the heart to be contracted, because they receive only a small quantity of blood; and a sufficiently notable proportion of the blood from the spleen is present because it is so to speak the ultimate reservoir which serves to furnish blood to the heart when enough does not come to it from elsewhere. That is why the movements of the spirits and of the nerves which serve to contract thus the cavities of the heart and to conduct there the blood of the spleen, invariably accompany sadness.

ARTICLE CXI.

Of Desire.

To conclude, all the first desires which the soul can have had when it was newly joined to the body have been desires of receiving the things that were suitable to it, and of repelling those which were hurtful; and it has been to bring about these same effects that the spirits have henceforth commenced to produce movements in all the muscles and all the organs of the senses, in every method in which they can move them. And this is the cause that now, when the soul desires something, the whole body becomes more agile and more disposed towards movement than it customarily is apart from desire. And when it further happens that the body is so disposed, that renders the desires of the soul stronger and more ardent.

ARTICLE CXII.

The external signs of these Passions.

That which I have set down here makes sufficiently clear the cause of the differences in the pulse and of all the other properties which I have above attributed to these passions, without there being any necessity for me to pause in order to explain them further. But because I have only remarked in each that which may be observed to accompany it when it is alone, and which serves for a knowledge of the movements of the blood and the spirits which produce them, it still remains for me to treat of the several exterior signs which usually accompany them, and which are much better observed when several are mingled with one another as they usually are, than when they are separated. The principal of these signs are the actions of the eyes and face, changes of colour, tremors, languor, swooning, laughter, tears, groans and sighs.

ARTICLE CXIII.

Of the actions of the Eyes and Face.

There is no passion that is not evidenced by some particular action of the eyes. And that is so manifest in certain emotions that even the stupidest servants can remark by the eye of their master if he is or is not angry with them. But although these actions of the eyes are easily perceived, and that which they signify is known, it is not, for all that, easy to describe them, since each is composed of many changes which take place in the movement

and shape of the eye which are so unique and so slight that we cannot perceive each one separately, although the result of their conjunction is very easily observed. We may say almost the same of the actions of the face which also accompany the passions, for although they are of greater extent than those of the eyes, it is at the same time hard to distinguish them; and they are so little different that there are men who present almost the same mien when they weep as when they laugh. It is true that there are some which are remarkable enough, as are the seams in the forehead which come in anger, and certain movements of nose and lips in indignation and scorn; but they do not so much appear to be natural as voluntary. And generally speaking all actions, whether of face or eyes, may be changed by the soul when, desiring to hide a passion, it vigorously calls up the image of a contrary one: so that we may make use of these actions as well in dissimulating our passions as in evidencing them.

ARTICLE CXIV.

Of changes of Colour.

We cannot so easily prevent ourselves from flushing or becoming pale when some passion disposes us to do so, because these changes do not depend on the nerves and muscles, as do the preceding, and because they proceed more immediately from the heart, which may be called the source of the passions, inasmuch as it prepares the blood and the spirits for producing them. It is, however, certain that the colour of the face only proceeds from the blood which, continually flowing from the heart by the arteries into all the veins, and from all the veins into the heart, produces more or less colour in the face, according as it to a larger or less extent fills the small veins which are towards its surface.

ARTICLE CXV.

How Joy causes us to flush.

Joy thus makes the colour more vivid and more ruddy, because in opening the sluices of the heart it causes the blood to flow more quickly in all the veins, and because, becoming warmer and more subtle, it moderately

distends all the parts of the face, and thus gives it a more cheerful and lively expression.

ARTICLE CXVI.

How Sadness causes paleness.

Sadness, on the contrary, in contracting the orifices of the heart, causes the blood to flow more slowly in the veins, and, becoming colder and thicker, the blood requires less space there, so that, retreating into those that are widest and which are nearest to the heart, it leaves the more remote; and since the most conspicuous of these are in the face, this causes it to become pale and sunk, more especially when the sadness is great, or when it supervenes quickly, as we see in sudden fright when the surprise increases the action which constricts the heart.

ARTICLE CXVII.

How we often flush though we are sad.

But it often happens that we do not become pale in sadness, but on the contrary become red, which must be attributed to other passions which unite themselves to sadness, to wit, possibly desire, and sometimes also hatred. These passions, heating or agitating the blood which proceeds from the liver, intestines and other interior parts, drive it towards the heart, and from thence by the great artery to the veins of the face, without the sadness which closes more or less the orifices of the heart being able to prevent it, excepting when it is an extreme sadness. But although it be only moderate, it easily prevents the blood thus come into the veins of the face from descending towards the heart, while love, desire, or hatred, force into it other portions of the blood coming from the internal parts. That is why this blood, being arrested around the face, renders it red and even redder than during joy, because the colour of the blood appears so much the more as it flows less quickly, and also because it can thus better collect in the veins of the face than when the orifices of the heart are more open. This is principally seen in shame, which is made up of self-love and a pressing desire to avoid present disgrace which causes the blood of the interior parts to come towards the heart and then from thence by the arteries to the face,

and there is also present a moderate amount of sadness which prevents this blood from returning to the heart. The same thing usually appears when we weep, for, as I shall afterwards maintain, it is love joined to sadness which most frequently causes tears; and the same thing is evidenced in anger, where frequently a prompt desire for vengeance is mingled with love, hatred and sadness.

ARTICLE CXVIII.

Of Tremors.

Tremors have two different causes; the one is that sometimes too little of the spirits in the brain passes into the nerves, and the other is that sometimes there comes too much to permit of the exact closing of the small passages of the muscle, which, in pursuance of what has been said in Article XI, ought to be closed in order to determine the movements of the members. The first cause is evidenced in sadness and fear, as also when we tremble with cold; for these passions may, just as well as the coldness of the air, so thicken the blood that it does not furnish enough spirits to the brain to permit of the despatch of some of them into the nerves. The other cause often appears in those who ardently desire something, and in those who are strongly moved by prayer, as also in those who are drunken. For these two passions, as well as wine, sometimes cause so many animal spirits to proceed to the brain that they cannot be conducted in a properly regulated way from thence to the muscles.

ARTICLE CXIX.

Of Languor.

Languor is a tendency to relax and be motionless, and this is experienced in all the members; like tremors, it proceeds from the fact that sufficient animal spirits do not go into the nerves, but in a different way. For the cause of tremors is that there are not sufficient spirits in the brain in order to carry out the determinations of the gland when it drives them towards some muscle, while langour proceeds from the fact that the gland does not determine them to go towards any particular muscle more than to others.

ARTICLE CXX.

How it is caused by love and by desire.

And the passion which most usually causes this effect is love joined to the desire for a thing whose acquisition is not imagined to be at the time possible; for love so occupies the soul in considering the object loved that it employs all the spirits which are in the brain in representing to it its image, and it checks all the movements of the glands which do not contribute to this result. And we must notice regarding desire that the property which I have attributed to it of rendering the body the more mobile, only belongs to it when we imagine the object desired to be such that we can from this time forth do something which serves towards its acquisition. For if we imagine, on the other hand, that it is impossible at this time to do anything which is useful for that end, all the agitation of desire remains in the brain, without in any way passing into the nerves; and, being entirely employed in there strengthening the idea of the desired object, it leaves the rest of the body languid.

ARTICLE CXXI.

That it may also be caused by other passions.

It is true that hatred, sadness, and even joy, may also cause some languor when they are very violent, because they occupy the soul entirely in considering their object, principally when the desire of a thing to whose acquisition we cannot contribute anything at the present time is united to it. But because we pause much longer over the consideration of the objects to which we ally ourselves by our own free-will than those which we dissociate therefrom, and than any others, and as languor does not rest on a sudden surprise but requires some time in its formation, it is to be met with much more in love than in all the other passions.

ARTICLE CXXII.

Of Swooning.

A swoon is not far removed from death, for death results when the fire which is in our heart is extinguished altogether, and we only fall into a faint when it is stifled in such a way that there still remain some traces of heat which may afterwards rekindle it. There are, however, several indispositions of the body which cause us thus to fall into a faint, but amongst the passions it is only extreme joy which we observe as having the power to do so. And the manner in which I believe it to bring about this effect is that, by opening the orifices of the heart to an unusual extent, the blood of the veins enters so suddenly, and in so large a quantity, that it cannot be rarefied there by the heat promptly enough to raise the little membranes which close the entrances of these veins, and thus it quenches the fire which it usually maintains when it only enters the heart in moderation.

ARTICLE CXXIII.

Why grief does not cause us to swoon.

It would seem that a great grief falling on us suddenly ought so to close the orifices of the heart as to be able also to extinguish its fire, but nevertheless we do not observe that to happen, or if it does happen it is very rarely the case. From this I argue that the reason is that there can scarcely be so little blood in the heart as to be insufficient to maintain heat when its orifices are almost closed.

ARTICLE CXXIV.

Of Laughter.

Laughter consists in the fact that the blood, which proceeds from the right orifice in the heart by the arterial vein, inflating the lungs suddenly and repeatedly, causes the air which they contain to be constrained to pass out from them with an impetus by the windpipe, where it forms an inarticulate and explosive utterance; and the lungs in expanding equally with the air as it rushes out, set in motion all the muscles of the diaphragm from the chest to the neck, by which means they cause motion in the facial muscles, which have a certain connection with them. And it is just this action of the face with this inarticulate and explosive voice that we call laughter.

R. H.

ARTICLE CXXV.

Why it does not accompany the greatest joys.

But although it seems as though laughter were one of the principal signs of joy, nevertheless joy cannot cause it except when it is moderate and has some wonder or hate mingled with it. For we find by experience that when we are extraordinarily joyous the subject of this joy never causes us to burst into laughter, and we cannot even be so easily induced to do so by some other cause as when we are sad. And the reason of this is that in great joys the lung is always so full of blood that it cannot be further inflated by repeated gushes.

ARTICLE CXXVI.

What are its principal causes.

And I can only observe two causes which make the lung thus inflate suddenly. The first is the surprise of admiration or wonder, which, being united to joy, may open the orifices of the heart so quickly that a great abundance of blood suddenly entering on its right side by the *vena cava*, rarefies there, and, passing from thence by the arterial vein, inflates the lung. The other is the admixture of some liquor which increases the rarefaction of the blood, and I can find nothing which could do that but the most liquid part of that which proceeds from the spleen, which part of the blood being driven to the heart by some slight emotion of hatred, assisted by the surprise of wonder, and mingling itself there with the blood which proceeds from the other parts of the body which joy causes to enter there in abundance, may cause this blood to dilate there much more than usual. We observe the same thing in many other liquids which, when on the fire, suddenly dilate when we throw a little vinegar into the vessel where they are; for the most liquid portion of the blood which comes from the spleen is in nature similar to vinegar. Experience also causes us to see that in all the possible occurrences which can produce this explosive laughter which proceeds from the lung, there is always some little element of hatred, or at least of wonder. And those whose spleen is not in a very healthy condition

are subject to being not alone more sad, but also at intervals more gay and more disposed to laughter than the others, inasmuch as the spleen sends two sorts of blood to the heart, the one thick and coarse, which causes sadness, the other very fluid and subtle, which causes joy. And often, after having laughed much, we feel ourselves naturally inclined to sadness because the more fluid portion of the blood of the spleen being exhausted, the other, more coarse, follows it towards the heart.

ARTICLE CXXVII.

Its cause in indignation.

As to the laughter which sometimes accompanies indignation, it is usually artificial and feigned; but when it is natural, it appears to proceed from the joy that we have in observing the fact that we cannot be hurt by the evil at which we are indignant, and, along with that, from the fact that we find ourselves surprised by the novelty or by the unexpected encountering of this evil. In this way joy, hatred and wonder contribute to it. At the same time I would fain believe that it may also be produced without any joy, by the movement of aversion alone, which sends blood from the spleen to the heart, where it is rarefied and driven from thence to the lung; and this it easily inflates when it finds it almost empty. And speaking generally, all that can suddenly inflate the lung in this way causes the outward action laughter, excepting when sadness changes it into that of groans, and the cries which accompany tears. In reference to which Vives writes of himself regarding a time when he had been long without eating, that the first pieces of food which he placed in his mouth caused him to laugh; and this might proceed from the fact that his lung, emptied of blood by lack of nourishment, was promptly inflated b*y* the first juice which passed from his stomach to his heart, and which the mere imagination of eating could conduct there, even before the arrival of the food he was eating.

ARTICLE CXXVIII.

Of the origin of Tears.

As laughter is never caused by the greatest joys, so tears do not proceed from an extreme sadness but only from that which is moderate and

accompanied or followed by some feeling of love or likewise of joy. And in order to understand their origin properly, we must remark that although a mass of vapours continually escapes from all the portions of our body, there are at the same time none from which so much issues as the eyes, because of the size of the optic nerves and the multitude of little arteries by which the vapours reach them; and as the sweat is simply composed of vapours which, issuing from the other parts of the body, are converted into water on their surface, so tears are formed from the vapours which issue from the eyes.

ARTICLE CXXIX.

Of the manner in which vapours change into water.

Now, as I have said in the Meteors, in explaining the manner in which the vapours of the air are converted into rain, that this proceeds from the fact that they are less agitated or more abundant than usual, so I believe that when those that issue from the body are much less agitated than usual, although they are not so abundant, they do not any the less convert themselves into water, which causes the cold sweats which sometimes come from weakness when we are ill. And I believe that when they are much more abundant, provided that they are not also more agitated, they also convert themselves into water, which is the cause of the sweat which comes when we perform a certain amount of exercise. But then the eyes do not perspire, because during the exercise of the body, since the greater part of the animal spirits go into the muscles which serve to move it, less goes by the optic nerve to the eyes. And it is one and the same matter which forms blood when found in the veins or arteries, and spirits, when it is in the brain, nerves, or muscles, and vapours when it issues forth in the form of air, and finally sweat or tears when it condenses into water on the surface of the body or the eyes.

ARTICLE CXXX.

How that which causes pain in the eye excites it to tears.

And I can only observe two causes which make the vapours which issue from the eyes change into tears. The first is when the figure of the pores by

which they pass is changed by some accident or other; for that, retarding the movement of these vapours and changing their order, may cause them to be converted into water. Thus the falling into the eyes of the tiniest mite suffices to draw some tears from them, because in exciting pain in them it changes the disposition of their pores in such a manner that when some become more contracted, the small portion of the vapours pass by less quickly; and instead of their issuing forth as before at equal distances the one from the other, and thus remaining separate, they come into contact with one another, because the order of these pores is put out, and by this means they join one another and thus become converted into tears.

ARTICLE CXXXI.

How we weep owing to sadness.

The other cause is sadness followed by love or joy, or generally speaking by some cause which makes the heart to drive forth much blood through the arteries. Sadness is requisite in weeping, because by chilling all the blood, it contracts the pores of the eyes; but since in proportion as it contracts them, it also diminishes the quantity of the vapours which they should allow to pass, that does not suffice to produce tears if the quantity of these vapours is not at the same time increased by some other cause. And there is nothing which increases it more than the blood which is sent to the heart in the passion of love; we see likewise that those who are sad do not continually shed tears, but only at intervals, when they make some new reflection on the objects of their affection.

ARTICLE CXXXII.

Of the groans which accompany tears.

And then the lungs are also sometimes inflated suddenly by the abundance of the blood which enters them, and which drives out from them the air which they contained, which, issuing by the windpipe, begets the groans and cries which usually accompany tears. And these cries are as a rule shriller than those which accompany laughter, although they are produced almost in the same way. The reason of this is that the nerves which serve to enlarge or contract the organs of the voice in order to make it louder or

sharper, being united to those which open the orifices of the heart in joy, and contract them in sadness, cause these organs to enlarge or contract at the same time.

ARTICLE CXXXIII.

Why children and old people easily weep.

Children and old people are more disposed to weep than those of middle age, but for different reasons. Old people often weep from affection and joy; for these two passions united together send much blood to the heart and hence much vapour to the eyes; and the agitation of these vapours is so much retarded by the coldness of their bodily disposition, that they easily convert themselves into tears, even although no sadness has preceded. And if some old people also weep very easily from vexation, it is not so much the temperament of their body as that of their mind that disposes them to do so; and it only happens to those who are so feeble that they allow themselves to be entirely overcome by small causes of sorrow, fear or pity. The same occurs with children who never cry with joy, but much more frequently owing to sadness, even when it is not accompanied with love; for they have always enough blood to produce much vapour, the movement of which, being retarded by sadness, is converted into tears.

ARTICLE CXXXIV.

Why some children become pale instead of crying.

At the same time there are some who become pale instead of weeping, when they are angry, which may demonstrate in them an extraordinary judgment and courage, that is to say, when it proceeds from their considering the greatness of the evil and preparing themselves for a stout resistance, in the same way as do older people. But more usually it is a mark of an evil disposition, at least when it proceeds from a tendency towards hatred or fear, for these are passions which diminish the material of tears. And, on the contrary, we see that those who weep very easily are inclined to love and pity.

ARTICLE CXXXV.

Of Sighs.

The cause of sighing is very different from that of tears, even though like the latter it presupposes sadness. For, our tendency to weep when the lungs are full of blood is replaced by a tendency to sigh when they are almost empty, and when some imagination of hope or joy opens the orifices of the venous artery which sadness had contracted; because then the small amount of blood which remains in the lungs, suddenly falling into the left side of the heart by this venous artery and being driven thence by the desire of arriving at this joy, which agitates all the muscles of the diaphragm and chest at the same time, the air is promptly driven through the mouth into the lungs, in order there to fill the place left by this blood; and that is what we call sighing.

ARTICLE CXXXVI.

From whence proceed the effects of the passions which are peculiar to certain men.

For the rest, in order in a few words to supply all that can be added regarding the diverse effects or diverse causes of the passions, I shall content myself with repeating the principle on which all that I have written about them rests, *i.e.* that there is a connection between our soul and our body of such a nature that when we have once connected some corporeal action with some thought, the one of the two does not present itself to us afterwards without the other presenting itself also; and that it is not always the same actions which are connected with the same thoughts. For that suffices to provide a reason for the whole of that which each of us can observe as peculiar to himself or to others regarding this matter, and which has not been here explained. And, for example, it is easy to reflect that the strange aversions of certain people which prevent their being able to endure the scent of roses or the presence of a cat, or things of that sort, only proceed from the fact that at the beginning of their lives they have suffered much unpleasantness through some such objects, or else have shared in the feelings of their mother who has so suffered before they were born. For it is certain that there is a relation between all the movements of the mother and those of the child in her womb, inasmuch as what is harmful to the one is

hurtful to the other. And the scent of roses may have caused a severe headache to a child while still in the cradle, or a cat may have terrified him without anyone having been aware of it, or of any memory remaining of it afterwards, although the idea of aversion which he then had for these loses or for this cat remain imprinted on his brain to the end of his life.

ARTICLE CXXXVII.

Of the function of the five passions here explained inasfar as they relate to the body.

After having given definitions of love, of hatred, of desire, of joy, and of sadness, and having treated of all the corporeal movements, which cause or accompany them, we only have here to consider their function. And regarding this it must be observed that, in accordance with the institutions of nature they all relate to body, and are only bestowed on the soul in so far as it is united to body, In this way their natural use is to incite the soul to consent and contribute to the actions which may serve to maintain the body, or to render it in some manner more perfect. And from this point of view sadness and joy are the two foremost that are employed. For those things that are hurtful to the body are immediately made known to the soul only by the feeling of pain which it experiences, and which first of all produces in it the passion of sadness, then the hatred of what causes this pain, and, in the third place, the desire to rid oneself of it. Similarly, likewise, the soul is only immediately notified of things useful to the body by some sort of pleasant stimulation which causes joy within it, then causes the love of that which is believed to be its cause to arise, and finally brings about the desire to acquire what is capable of causing a continuance of that joy, or else causes us to rejoice again in the future after a similar sensation. And this shows us that they are all five very useful relatively to the body, and even that sadness in some way ranks higher and is more essential than joy, and hatred than love, because it is of more importance to repel the things which injure and may destroy, than to acquire those which add some perfection without which we may subsist.

ARTICLE CXXXVIII.

Of their faults and the means of correcting them.

But, although this use of the passions is the most natural which they can have, and though all the animals devoid of reason direct their lives simply by bodily movements similar to those which in our case usually follow these passions, and to which they incite our soul to consent, it is nevertheless not always good, inasmuch as there are many things hurtful to the body which cause no sadness at the first, or which even produce joy, and others which are useful to it although at first they are distasteful. And, in addition to that, they almost always cause the good things, as well as the evil, to seem much greater and more important than they are; so that they incite us to seek after the one and flee from the others with more ardour and care than is desirable, just as we also see that the brutes are often deceived by baits, and that, in order to evade small evils, they precipitate themselves into greater evils. That is why we should make use of experience and reason in order to distinguish good from evil, and to recognize their just value, so that we may not take the one for the other, or rush into anything too violently.

ARTICLE CXXXIX.

Of the function of the same passions inasfar as they pertain to the soul, and to begin withy of love.

This would be sufficient if we had in us body only, or did it form the better part of us, but inasmuch as it is only the lesser part, we should chiefly consider the passions in so far as they pertain to the soul, with respect to which love and hatred proceed from knowledge and precede joy and sadness, excepting when these last two hold the place of the knowledge of which they are species. And when this knowledge is true, that is to say when the things which it constrains us to love are truly good, and those which it constrains us to hate are truly evil, love is incomparably better than hatred; it can never be too great, and it never fails to produce joy. I assert that this love is extremely good, because, uniting to us what is truly good, it in so far adds perfection to us. I also assert that it cannot be too great, for all that which the most excessive love can do is to unite us so perfectly to these good things, that the love which we have in particular for ourselves, places no distinction therein; this I believe can never be bad. And it is necessarily

followed by joy, because it represents to us what we love as a good which pertains to us.

ARTICLE CXL.

Of Hatred.

Hatred, on the contrary, cannot be so small that it does not hurt; and it is never devoid of sadness. I assert that it cannot be too small because we are not incited to any action by the hatred of evil to which we cannot be yet more stimulated by the love of good to which it is opposed, at least when this good and this evil are sufficiently known. For I confess that the hatred of evil which pain alone calls forth, is necessary in respect to body; but I speak here only of that which proceeds from a clearer knowledge, and I only relate it to the soul. I assert also that it is never without sadness, because evil, being merely a privation, cannot be conceived without some real subject in which it subsists; and there is nothing real which has not some goodness in it, and so the hatred which removes us from some evil, by the same means removes us from the good to which it is united, and the privation of this good being represented to our soul as a defect which pertains to it, excites sadness therein. For example, the hatred which removes from us the evil habits of someone, by the same means removes us from his company in which we might independently of that find some good of which we are vexed at being deprived. And similarly in all the other hatreds we may observe some element of sadness.

ARTICLE CXLI.

Of Desire, Joy, and Sadness.

As to desire, it is evident that, when it proceeds from a true knowledge, it cannot be bad, provided that it is not excessive, and that this knowledge rules it. It is also evident that joy cannot fail to be good, nor sadness to be bad when we view them in their relation to the soul, because it is in the latter that consists all the inconveniences and embarrassments which the soul obtains from evil, and in the former that consists all the enjoyment of good which pertains to it. And thus, if we had no body, I should venture to say that we could not too greatly abandon ourselves to love, joy, nor too

much avoid hatred and sadness; but the corporeal movements which accompany them may all be hurtful to health when they are very violent, and, on the contrary, be useful to it when they are only moderate.

ARTICLE CXLII.

Of Joy and Love, compared with Sadness and Hatred.

For the rest, since hatred and sadness should be rejected by the soul, even when they proceed from a true knowledge, this should with greater reason be the case when they proceed from some false opinion. But people may doubt whether love and joy are good or not, when they are thus established on a bad foundation; and it appears to me that if they are only considered precisely as they are in themselves in reference to the soul, it may be said that, although joy is less solid, and love less advantageous, than when they have a better foundation, they do not cease to be preferable to sadness and hatred equally badly founded. In this way, in the vicissitudes of life where we cannot avoid the risk of being deceived, we always do much better to incline towards the passions which make for good, rather than towards those which relate to evil, even if it be only to avoid it; and even a false joy is often of more value than a sadness whose cause is true. But I dare not say the same of love in respect of hate; for when hatred is just, it only removes us from the subject which contains the evil from which it is good to be separated, while the love which is unjust unites us to things which may hurt, or at least which do not deserve to be so much considered by us as they are, which demeans and degrades its.

ARTICLE CXLIII.

Of the same passions inasmuch as they relate to Desire.

And we must be very careful to remark that what I have just said of these four passions takes place only when they are considered precisely in themselves, and do not incite us to any action. For in so far as they excite in us desire by means of which they regulate our habits, it is certain that all those whose cause is false may harm, and that on the contrary all those whose cause is just may be of use, and, even when they are equally badly founded, joy is usually more hurtful than sadness, since the latter, by

providing restraint and fear, disposes in a certain degree to prudence, while the other makes those who abandon themselves to it rash and imprudent.

ARTICLE CXLIV.

Of Desires whose accomplishment depends only on us.

But because these passions can only bring us to any kind of action by the intervention of the desire which they excite, it is this desire particularly which we should be careful to regulate, and it is in this that the principal use of morality consists. And, as I have just said that desire is always good when it follows a true knowledge, so it cannot fail to be bad when it is founded on some error. And it seems to me that the error which we most ordinarily commit in respect to desires is that of not sufficiently distinguishing the things which entirely depend on us from those which do not so depend. For as to those which only depend on us, *i.e.* on our free will, it is sufficient to know that they are good, not to have it in our power to desire them with too much ardour, because it is following after virtue to perform good actions which depend on ourselves, and it is certain that we cannot have a too ardent desire for virtue. Besides which, since that which we in this way desire is incapable of failing to succeed with us, as it is on ourselves alone that it depends, we shall always receive from it all the satisfaction that we have expected from it. But the fault which is usually committed in this is never in desiring too much, but only in desiring too little; and the sovereign remedy against that is to free the mind as much as possible from all kinds of other less useful desires, and then to try to know very clearly and to consider with attention the goodness of that which is to be desired.

ARTICLE CXLV.

Of those Desires which depend only on other things, and what is the meaning of chance.

As to the things which in nowise depend on us, good as they may be, we should never desire them with passion, not only because they may not happen and thus may vex us so much the more in proportion to the strength of our desire for them, but principally because, in occupying our thought,

they turn us away from applying our affection to other things, the acquisition of which depends on us. And there are two general remedies for these vain desires: the first is generosity, of which I shall speak later: the second is that we ought frequently to cause ourselves to reflect on divine Providence and represent to ourselves that it is impossible that anything should happen in any other way than as it has been determined by this Providence from all eternity. In this way it is, so to speak, a fatality or an immutable necessity, which must be opposed to chance, in order to destroy it by treating it as a chimera which only proceeds from the error of our understanding. For we can desire nothing but that which we hold to be in some manner possible, and we can only hold to be possible those things that do not depend on us, in so far as we reflect that they depend on chance, *i.e.* that we judge that they may happen, and that similar things have formerly happened. And this opinion is founded only on the fact that we do not know all the facts that contribute to each effect; for when a thing that we have judged to depend on chance does not come to pass, that shows that some one of the causes that were necessary in order to produce it has failed, and in consequence that it was absolutely impossible, and that no such thing has ever happened — that is, a thing in the production of which a similar cause was also lacking — so that if we had not been ignorant of that beforehand, we should not have ever judged it possible, nor consequently have desired it.

ARTICLE CXLVI.

Of those that depend on us and on others.

We must, then, entirely set aside the vulgar opinion that there is outside of us a Fortune which causes things to happen or not to happen in accordance with its pleasure, and we must recognize that all is conducted by divine Providence, whose eternal decree is so infallible and immutable, that, excepting the things that this same decree has willed to leave dependent on our free will, we ought to reflect that in relation to us nothing happens which is not necessary, and so to speak decreed by fate, and that thus we cannot without error desire that it should happen otherwise. But because the greater part of our desires extends to things which do not depend entirely on us, nor entirely on others, we ought to distinguish exactly in them what

depends only on us, in order to extend our desire to that alone; and as to what remains, although we ought in this to hold success to be absolutely decreed by fate and immutable, in order that our desire may not occupy itself therewith, we should not omit to consider the reasons which make it more or less to be hoped for, in order that they may serve to regulate our actions. Thus, to take an example, if we have business in some particular place to which we may go by two different roads, the one of which is usually much safer than the other, although the decree of Providence is perhaps such that, if we go by the road which we judge to be safest, we shall not escape being-robbed by so doing, while, on the other hand, we might pass by the other without danger, we should not for all that be indifferent as to which one we choose, nor rest on the immutable fatality of the said decree. But reason desires us to choose the road which is usually most safe, and our desire should be accomplished in respect to that when we have followed it, whatever evil may thus befall us, because this evil, having been relatively to us inevitable, we have had no reason to expect exemption from it, but merely claim to have done the best that our understanding has been able to point out, as I suppose to have been the case. And it is certain that when we exercise ourselves in thus distinguishing fatality from fortune, we easily accustom ourselves so to regulate our desires, that, in as far as their accomplishment depends only on us, they may always provide us with complete satisfaction.

ARTICLE CXLVII.

Of the interior emotions of the soul.

I shall only add here a consideration which, it seems to me, we shall find of much service in preventing us from suffering any inconvenience from the passions; and that is that our good and our harm depend mainly on the interior emotions which are only excited in the soul by the soul itself, in which respect they differ from its passions, which always depend on some movement of the spirits. And, although these emotions of the soul are frequently united to the passions which are similar to them, they may likewise often be met with along with others, and even take their origin from those which are contrary to them. For example, when a husband laments his dead wife whom (as sometimes happens) he would be sorry to

see brought to life again, it may be that his heart is oppressed by the sadness that the appurtenances of woe and the absence of one to whose conversation he was used excite in him; and it may be that some remnants of love or pity which present themselves to his imagination draw sincere tears from his eyes, notwithstanding that he yet feels a secret joy in the inmost parts of his heart, the emotion of which possesses so much power that the sadness and the tears which accompany it can do nothing to diminish its force. And when we read of strange adventures in a book, or see them represented in a theatre, which sometimes excite sadness in us, sometimes joy, or love, or hatred, and generally speaking all the passions, according to the diversity of the objects which are offered to our imagination; but along with that we have pleasure in feeling them excited in us, and this pleasure is an intellectual joy which may as easily take its origin from sadness as from any of the other passions.

ARTICLE CXLVIII.

That the exercise of virtue is a sovereign remedy against the passions.

And, inasmuch as these inward emotions touch us most nearly, and in consequence have much more power over us than the passions from which they differ, and which are met with in conjunction with them, it is certain that, provided our soul is always possessed of something to content itself with inwardly, none of the troubles that come from elsewhere have any power to harm it, but rather serve to increase its joy, inasmuch as, seeing that it cannot be harmed by them, it is made sensible of its perfection. And in order that our soul may thus have something with which to be content, it has no need but to follow exactly after virtue. For whoever has lived in such a way that his conscience cannot reproach him for ever having failed to perform those things which he has judged to be the best (which is what I here call following after virtue) receives from this a satisfaction which is so powerful in rendering him happy that the most violent efforts of the passions never have sufficient power to disturb the tranquillity of his soul.

PART THIRD. OF PARTICULAR PASSIONS.

ARTICLE CXLIX.

Of Esteem and Disdain.

After having explained the six primitive passions which are so to speak the genera of which all the others are species, I shall here observe succinctly what in particular there is in each of these others, and I shall keep to the same order in which I have before enumerated them. The two first are esteem and disdain; for although their names usually signify only passionless opinions on our part as to the value of a particular thing, still, at the same time, because there often arises from these opinions passions to which we have not given particular names, it seems to me that such may be attributed to them. And esteem, in so far as it is a passion, is an inclination which the soul possesses to represent to itself the value of the thing esteemed, which inclination is caused by a particular movement of the animal spirits conducted into the brain in such a way that they there fortify the impression which serve for this end. The passion of disdain, on the contrary, is an inclination possessed by the soul to consider the baseness or smallness of that which it disdains, caused by the movement of the spirits which fortify the idea of this smallness.

ARTICLE CL.

That these two passions are only species of wonder or admiration.

These two passions are thus only species of wonder; for when we do not wonder at the greatness or smallness of an object, we do not make more or less of it than reason tells us that we ought to do in its regard, so that we then esteem or disdain it without passion.

And, although often the esteem is excited in us by love, and the disdain by hate, that is not universally so, and only proceeds from the fact that we are more or less inclined to consider the greatness or smallness of an object because of our having more or less affection for it.

ARTICLE CLI.

That we may esteem or disdain ourselves.

Now these two passions may generally speaking relate to all sorts of objects; but they are chiefly remarkable when we relate them to ourselves, i.e. when it is our own merit that we esteem or despise. And the movement of the spirits which causes them is then so manifest, that it even changes the mien, the gestures, the gait, and generally speaking all the actions of those who have a better or a worse opinion of themselves than usual.

ARTICLE CLII.

For what reasons we may esteem ourselves.

And because one of the principal parts of wisdom is to know in what way and for what cause each person ought to esteem or despise himself, I shall here try to place on record my opinion on the matter. I only remark in us one thing which might give us good reason to esteem ourselves, to wit, the use of our free will, and the empire which we possess over our wishes. Because it is for those actions alone which depend on this free will that we may with reason be praised or blamed; and this in a certain measure renders us like God in making us masters of ourselves, provided that we do not through remissness lose the rights which He gives us.

ARTICLE CLIII.

In what Generosity consists.

Thus I think that true generosity which causes a man to esteem himself as highly as he legitimately can, consists alone partly in the fact that he knows that there is nothing that truly pertains to him but this free disposition of his will, and that there is no reason why he should be praised or blamed unless it is because he uses it well or ill; and partly in the fact that he is sensible in himself of a firm and constant resolution to use it well, that is to say, never to fail of his own will to undertake and execute all the things which he judges to be the best — which is to follow perfectly after virtue.

ARTICLE CLIV.

That Generosity prevents our despising others.

Those who have this knowledge and feeling about themselves easily persuade themselves that every other man can also have them in his own case, because there is nothing in this that depends on another. That is why they never despise anyone; and, although they often see that others commit faults which make their feebleness apparent, they are at the same time more inclined to excuse than to blame them, and to believe that it is rather by lack of knowledge than by lack of good-will that they commit them. And, as they do not think of themselves as being much inferior to those who have more goods or honours, or even who have more mental gifts, more knowledge, more beauty, or, generally speaking, who surpass them in some other perfections, they do not at the same time esteem themselves much above those whom they surpass, because all these things seem to them to be of very small account as compared with the good-will for which alone they esteem themselves, and which they also suppose to exist, or at least to be capable of, existing in all other men.

ARTICLE CLV.

In what consists a virtuous humility.

The most high-minded are thus usually the most humble; and virtuous humility simply consists in the fact that the reflection which we make on the infirmity of our nature and on the faults which we may formerly have committed, or are capable of committing, which are not less than those which may be committed by others, is the reason that we do not prefer ourselves to any one else, and that we think that others, having their free-will as well as we, can likewise use it as well as we.

ARTICLE CLVI.

What are the properties of generosity, and how it serves as a remedy against the disorders of the passions.

Those who are generous in this way are naturally impelled to do great things and at the same time to undertake nothing of which they do not feel themselves capable. And because they do not hold anything more important than to do good to other men and to disdain their individual interests, they

are for this reason always perfectly courteous, affable and obliging towards everyone. And along with that, they are entirely masters of their passions, particularly of the desires, of jealousy and envy, because there is nothing the acquisition of which does not depend on them, which they think of sufficient worth to merit being much sought after; they are likewise free of hatred to other men because they hold all in esteem; and of fear, because the confidence which they have in their virtue assures them; and finally of anger, because, esteeming very little all those things that depend on others, they never give so much advantage to their enemies as to recognise that they are harmed by them.

ARTICLE CLVII.

Of Pride.

All those who form a good opinion of themselves for some other reason, whatever it may be, have not a true generosity, but merely a pride which is always very vicious, although it is all the more so, the more the cause for which we esteem ourselves is unjust. And the most unjust cause of all is when we are proud without any reason, that is to say, without our thinking so far as this goes that there is in us any merit for which we ought to be esteemed, simply taking the view that merit is not taken into consideration at all, and that as glory is regarded as nothing but usurpation, those who ascribe most of it to themselves really possess the greatest amount of it. This vice is so unreasonable and absurd, that I should scarcely have believed that there were men who could allow themselves to give way to it, if no one were ever unjustly praised; but flattery is everywhere so common that there is no man so defective that he does not often see himself esteemed for things that do not merit any praise, or even that merit blame; and this gives occasion to the most ignorant and stupid to fall into this species of pride.

ARTICLE CLVIII.

That its effects are contrary to those of generosity.

But whatever may be the reason for which we esteem ourselves, if it is other than the will which we feel in ourselves always to make good use of

our free-will, from which I have stated that generosity proceeds, it always produces a very reprehensible pride, which is so different from this true generosity that it has effects entirely contrary to it. For all those other gifts such as cleverness, beauty, riches, honours, &c usually being esteemed so much the more highly as they are found in the smaller number of persons, and being even for the most part of such a nature that they cannot be communicated to many persons, that causes the proud to try to depreciate all other men, and, being slaves to their desires, they have a soul incessantly agitated by hatred, envy, jealousy or anger.

ARTICLE CLIX.

Of vicious humility.

As to abjectness or a vicious humility, it consists principally in the fact that men are feeble or have a lack of resolution, and that, as though they had not the entire use of their free-will, they cannot prevent themselves doing things of which they know that they will afterwards repent; it also consists in their considering that they cannot subsist by themselves nor do without many things the acquisition of which depends on others. It is thus directly opposed to noble-mindedness, and it often happens that those who have the most abject minds are the most arrogant and haughty, just as the most noble-minded are the most modest and humble. But while it is the case that those whose minds are strong and noble do not change in disposition in respect of the prosperity or adversity that comes to them, those whose minds are feeble and abject are led simply by Fortune, and prosperity does not puff them up less than adversity makes them humble. Frequently we even observe that they abase themselves with every mark of shame in the presence of those from whom they expect some profit or fear some ill, and, at the same time, that they insolently place themselves above those from whom they neither hope nor fear anything.

ARTICLE CLX.

What is the movement of the animal spirits in these passions.

For the rest, it is easy to recognise that pride and poor spirit are not only vices, but also passions, because the emotions attached to them readily

appear outwardly in those who are suddenly puffed up or cast down by some new occasion that produces them; but we may doubt whether generosity and humility, which are virtues, may likewise be passions, because their movements appear to be less, and because it seems that virtue has not so much in common with passion as has vice. At the same time I see no reason preventing the same movement of the spirits which serves to strengthen a thought when it has a foundation which is bad, from also fortifying it when it has one which is just. And, since pride and generosity consist only in the good opinion which we have of ourselves, and only differ inasmuch as this opinion is unjust in the one case and just in the other, it appears to me that we may relate them to one and the same passion, which is excited by a movement composed of the passions of wonder, of joy and of love, both of that which we have for ourselves, and of that which we have for the thing which causes us to hold ourselves in estimation. On the other hand, the movement which excites humility, whether virtuous or vicious, is composed of the passions of wonder, sadness, and of the love which we have for ourselves, mingled with the hatred which we have for the faults which cause us to disdain ourselves. And the whole difference which I observe in these movements is that the passion of wonder has two properties — the first being that surprise renders it strong from its commencement, and the other that it is equal in its continuance, i.e. that the spirits continue to move according to the same tenor in the brain. Of these properties the first is met with much more in pride and poor spiritedness than in generosity and virtuous humility; and, on the other hand, the second is better seen in the latter than in the other two. The reason of this is that vice usually proceeds from ignorance, and that it is those who know themselves the least who are the most subject to become proud and to humiliate themselves more than they ought to do; because all that happens to them anew surprises them, and brings it to pass that in attributing it to themselves they wonder at themselves, and esteem or despise themselves according as they judge that what happens to them is to their advantage or is not so. But because often after a thing which has made them proud, another follows which humiliates them, the movement of their passions is variable. There is, on the contrary, nothing in generosity which is not consistent with virtuous humility or anything else which might change them, and this causes their movements to be firm, constant, and always very similar to themselves. But they are not due so much to surprise because those who

esteem themselves in this way are sufficiently aware what are the causes which make them esteem themselves; at the same time we may say that these things are so wonderful (i.e. the power of making use of one's freewill, which causes us to value ourselves, and the infirmities of the subject in whom this power rests, which cause us not to place too high a regard on ourselves) that on every occasion on which we present them to ourselves anew, they always supply a new cause for wonder.

ARTICLE CLXI.

How Generosity may be acquired.

And it must be observed that what we commonly name virtues are habitudes in the soul, which dispose it to certain thoughts in such a way that they are different from these thoughts, but can produce them, and reciprocally can be produced by them. It must also be observed that these thoughts may be produced by the soul alone, but that it often happens that some movement of the spirits fortifies them, and that then they are actions of virtue, and at the same time passions of the soul. Thus, while there is no virtue to which it appears as though good native qualities contribute so much as to that which causes us only to esteem ourselves at a just value, and as it is easy to believe that all the souls that God places in human bodies are not equally noble and strong (which is the reason for my having called this virtue generosity, following the usage of our language, rather than magnanimity, following the usage of the Schools where it is not much known) it is yet certain that good instruction serves much in correcting the faults of birth, and that, if we frequently occupy ourselves in the consideration of what freewill is, and how great are the advantages which proceed from a firm resolution to make a good use of it, as also, on the other hand, how vain and useless are all the cares which exercise the ambitions, we may excite in ourselves the passion, and then acquire the virtue of generosity, which, being so to speak the key of all other virtues, and a general remedy for all the disorders of the passions, it appears to me that this consideration is well worthy of notice.

ARTICLE CLXII.

Of Veneration.

Veneration, or respect, is an inclination of the soul not only to esteem the object which it reveres, but also to submit itself thereto with some fear, in order to try to render it favourably inclined. In this way we possess veneration only for free causes which we judge to be capable of doing good or evil to us, without our knowing which of the two they may do. For we have love and devotion rather than a simple veneration for those from whom we expect nothing but good, and we have hatred for those from whom we expect only evil. And, if we do not believe that the cause of this good or evil is free, we do not submit ourselves to it in order to render it favourable to us. Thus when the pagans had veneration for woods, fountains, or mountains, it was not properly speaking these dead things which they revered, but the divinities which they believed to preside over these. And the movement of the animal spirits which excites veneration is composed of that which excites wonder and that which excites fear, of which I shall speak later.

ARTICLE CLXIII.

Of Disdain.

At the same time what I call disdain is the inclination which the soul has to despise a free cause, in judging that, although in its nature it is capable of doing good or evil, it is nevertheless so much below us that to us it can do neither. And the movement of the spirits which excites it is composed of those which excite wonder and security or assurance.

ARTICLE CLXIV.

Of the functions of these two passions.

And it is the noble-mindedness and feebleness of soul or poor spirit, which determine the good and the evil employment of these two passions; for the more noble and generous our soul is, the more inclination we have to render to each man what pertains to him; and thus we have not only a very profound humility in regard to God, but we also render without any repugnance all the honour and respect which is due to each man according to the rank and authority which he has in the world, and we disdain nothing but vices. Those who have a low and feeble mind, on the contrary, are

subject to sin by excess, sometimes inasmuch as they revere and fear things which are worthy of disdain alone, and sometimes inasmuch as they insolently despise those which most merit reverence; and they often pass very quickly from extreme impiety to superstition, and then from superstition to impiety, so that there is no vice nor disorder of the mind of which they are not capable.

ARTICLE CLXV.

Of Hope and Fear.

Hope is a disposition of the soul to persuade itself that what it desires will come to pass: and this is caused by a particular movement of the spirits, i.e. by that of joy and that of desire mingled together; and fear is another disposition of the soul which persuades it that the thing hoped for will not come to pass; and it must be observed that, although these two passions are contrary, we can nevertheless have them both at the same time, that is to say, when we represent to ourselves different reasons at the same time, some of which cause us to judge that the accomplishment of desire is easy, while the others make it seem difficult.

ARTICLE CLXVI.

Of Confidence and Despair.

And no one of these passions ever accompanies desire without its giving place in some way to the other; for when hope is so strong that it entirely drives away fear, it changes its nature and is called security or confidence; and when we are assured that what we desire will come to pass, though we continue to desire that it shall come to pass, we nevertheless cease to be agitated by the passion of desire, which made its accomplishment be regarded with anxiety. In the same way, when fear is so extreme that it removes all place for hope, it converts itself into despair; and this despair, representing the matter as impossible, entirely extinguishes desire, which only relates to things that are possible.

ARTICLE CLXVII.

Of Jealousy.

Jealousy is a species of fear which is related to the desire we have to preserve to ourselves the possession of some thing; and it does not so much proceed from the strength of the reasons that suggest the possibility of our losing that good, as from the high estimation in which we hold it, and which is the cause of our examining even the minutest subjects of suspicion, and taking them to be very considerable reasons for anxiety.

ARTICLE CLXVIII.

In how far this passion is right.

And because we ought to have more care in preserving these good possessions that are very great than those which are less, this passion may be just and right in some circumstances. Thus, for example, a captain who is defending a position of great importance has the right to be jealous of it, that is to say, to be mistrustful of all the means by which it might be surprised; and a good woman is not blamed for being jealous of her honour, that is, when she is not only guarding herself against acting wrongly, but also avoiding even the slightest reason for scandal.

ARTICLE CLXIX.

In what it is blameworthy.

But we scorn a miser when he is jealous of his treasure, that is, when he gloats over it, and desires never to be away from it in case he is robbed of it; for money is not worthy of being guarded with so much care. And we despise a man who is jealous of his wife, because it shows that he does not love her in the right way, and that he has a bad opinion of himself or of her. I repeat that he does not love her in the right way, since if he had a true love for her, he would not have any inclination to distrust her; but it is not properly speaking she whom he loves, but just the good which he conceives as consisting in having sole possession of her, and he would not fear to lose this good did he not judge himself to be unworthy of it, or else conceive that his wife is unfaithful. For the rest this passion only relates to suspicions and

distrust, since it is not properly speaking being jealous to try to avoid some evil when we have just cause for fearing it.

ARTICLE CLXX.

Of Irresolution.

Irresolution is likewise a species of fear, which, holding the soul so to speak in a state of suspension between the many actions which it may perform, is the cause for its executing none, and thus for its having time for choosing before deciding, and this function is truly of a certain value. But when it lasts longer than it ought to do, and causes the time requisite for action to be employed in deliberation, it is very bad. And I assert that it is a species of fear, notwithstanding that it may happen, when we have a choice of several things the excellence of which seems to be very equal, that we remain uncertain and irresolute without our having for all that any fear; for this kind of irresolution proceeds only from the object presented, and not from any movement of the animal spirits; that is why this is not a passion unless it be that the fear we have of choosing wrongly augments our uncertainty. But this fear is so common and so strong in some people that often, although they have nothing to choose, and see only one thing which they may take or leave, it keeps them back and causes them to stop futilely and seek for something else; and then it is an excess of irresolution which proceeds from a too great desire to do right and from a feebleness of understanding, which, having no clear and distinct conceptions, simply has many confused ones. That is why the remedy against this excess is to accustom oneself to form certain and determinate judgments concerning all things that present themselves, and to believe that we always do our duty when we do what we judge to be best, although we may possibly judge very badly.

ARTICLE CLXXI.

Of Courage and Bravery.

Courage, when it is a passion and not a custom or natural inclination, is a certain heat or agitation which disposes the soul forcibly to bend itself powerfully to the execution of the things which it desires to do, of whatever

nature they may be; and bravery is a species of courage which disposes the soul to the execution of the things that are the most dangerous.

ARTICLE CLXXII.

Of Emulation.

And emulation is also a species of courage, but in another sense; for we may consider courage as a *genus* which divides into as many species as there are different objects, and into as many others as it has causes; in the first aspect bravery is a species, and in the second, emulation. And this last is none other than a heat which disposes the soul to undertake things which it hopes to be able on its own account to succeed in, because it sees them succeed with others; and thus it is a species of courage of which the external cause is example. I repeat the external cause, because it must ever have in addition to that an inward cause, which consists in the fact that the body is so constituted that desire and hope have more power in causing a quantity of blood to pass to the heart than has fear or despair to prevent it.

ARTICLE CLXXIII.

How Bravery depends on hope.

For it must be remarked that although the object of bravery is difficulty, from which there usually follows fear, or even despair, so that it is in matters the most dangerous and desperate that we employ most bravery or courage, it is yet essential that we should hope, or even that we should be assured, that the end which is proposed will succeed, in order to oppose with vigour the difficulties that we meet with. But this end is different from this object of bravery; for we could not be assured of and hopeless of the same thing at the same time. Thus when the Decii threw themselves against their enemies and rushed to certain death, the object of their bravery was the difficulty of preserving their life during this action, for which difficulty they had only despair, for they were certain of perishing; but their end was to animate their soldiers by their example, and to cause them to win the victory, for which they had hope; or again their end also was to obtain after their death a glory of which they were assured.

ARTICLE CLXXIV.

Of Cowardice and Fear.

Cowardice is directly opposed to courage, and it is a languor or coldness which prevents the soul from proceeding to the execution of things which it would do were it exempt from this passion; and fear or terror, which is contrary to bravery, is not only a coldness, but also a perturbation and astonishment of the soul, which takes from it the power of resisting the evils which it thinks lie at hand.

ARTICLE CLXXV.

Of the uses of Cowardice.

And, although I cannot persuade myself that nature has given to men any passion which is always vicious and has no good and praiseworthy use, I have yet much trouble in guessing what end these two can serve. It merely seems to me that cowardice has some use when it exempts us from taking the pains which we might be incited to take by probable reasons, if other more certain reasons, which have caused them to be judged useless, had not excited this passion; for besides the fact that it exempts the soul from these pains, it is secondly useful also for the body, inasmuch as, in restraining the movement of the spirits, it prevents us from dissipating our forces. But usually it is very hurtful, because it turns away the will from useful actions; and because it only proceeds from the fact that we have not enough hope or desire, we only need to augment within us these two passions in order to correct it.

ARTICLE CLXXVI.

Of the uses of Fear.

As to the significance of fear or terror, I do not see that it can ever be praiseworthy or useful; it likewise is not a special passion, but merely an excess of cowardice, astonishment and fear, which is always vicious, just as bravery is an excess of courage which is always good, provided that the end proposed is good; and because the principal cause of fear is surprise, there

is nothing better for getting rid of it than to use premeditation and to prepare oneself for all eventualities, the fear of which may cause it.

ARTICLE CLXXVII.

Of Remorse.

Remorse of conscience is a species of sadness which comes from the doubt which we have that a thing which we are doing or have done is good; and it necessarily presupposes doubt. For if we were entirely assured that what we are doing was bad, we should abstain from doing it, inasmuch as the will only tends towards things which have some appearance of goodness; and if we were assured that what we have already done was bad, we should experience repentance for it, not simply remorse. And the use of this passion is to make us examine whether that of which we doubt is good or not, or to prevent our doing it another time so long as we are not certain that it is good. But because it presupposes evil, the better part would he never to have occasion to feel it; and we may prevent it by the same means as those whereby we may exempt ourselves from irresolution.

ARTICLE CLXXVIII.

Of Scorn.

Derision or scorn is a sort of joy mingled with hatred, which proceeds from our perceiving some small evil in a person whom we consider to be deserving of it; we have hatred for this evil, we have joy in seeing it in him who is deserving of it; and when that comes upon us unexpectedly, the surprise of wonder is the cause of our bursting into laughter, in accordance with what has been said above of the nature of laughter. But this evil must be small, for if it is great we cannot believe that he who has it is deserving of it, unless when we are of a very evil nature or bear much hatred towards him.

ARTICLE CLXXIX.

Why the least perfect are usually most given to mockery.

And we notice that people with very obvious defects such as those who are lame, blind of an eye, hunched-backed, or who have received some public insult, are specially given to mockery; for, desiring to see all others held in as low estimation as themselves, they are truly rejoiced at the evils which befall them, and they hold them deserving of these.

ARTICLE CLXXX.

Of the function of ridicule.

As regards the modest bantering which is useful in reproving vices by making them appear ridiculous, so long as we do not laugh at them ourselves or bear any hatred towards the individuals concerned, it is not a passion, but a quality pertaining to the well disposed man which gives evidence of the gaiety of his temper and the tranquillity of his soul, which are characteristic marks of virtue; it often also shows the ingenuity of his mind in knowing how to present an agreeable appearance to the things which he ridicules.

ARTICLE CLXXXI.

Of the junction of laughter in ridicule.

And it is not wrong to laugh when we hear the jests of another; these jests may even be such that it would be difficult not to laugh at them; but when we ourselves jest, it is more fitting to abstain from laughter, in order not to seem to be surprised by the things that are said, nor to wonder at the ingenuity we show in inventing them. And that makes those who hear them all the more surprised.

ARTICLE CLXXXII.

Of Envy.

What we usually call envy is a vice which consists in a perversion of nature which causes certain people to be annoyed with the good which they see coming to others, but I here use the word to signify a passion which is not always vicious. Envy, then, in so far as it is a passion, is a kind of sadness mingled with hatred, which proceeds from our seeing good coming to those

whom we consider unworthy of it; and we cannot think this with any reason excepting in relation to the good things of fortune. For as regards those of the soul, or even of the body, inasmuch as we possess them from birth, it is sufficient so far as worthiness is concerned that we have received them from God before being capable of committing any evil.

ARTICLE CLXXXIII.

How it may be either just or unjust.

But when fortune sends good things to some one who is truly unworthy of them, and envy is only excited in us because, naturally loving justice, we are vexed that it is not observed in the distribution of these good things, our sentiments may be excusable, more especially when the good which we envy in others is of such a kind that it may be converted into evil in their hands, as when it is some charge or office in whose exercise they may comport themselves ill. When we desire the same good for ourselves and are prevented from having it because others who are less worthy possess it, this passion is rendered more violent; and it does not cease to be excusable provided that the hatred which it contains relates solely to the bad distribution of the good which we envy, and not to the persons who possess it or distribute it. But there are few who are sufficiently generous and just not to bear hatred to those who get the better of them in the acquisition of a good which is not communicable to many, and which they had desired for themselves, although those who acquired it are as worthy or even more so. And what is usually most envied is glory; for although the glory of others does not prevent our being able to aspire to it, it yet renders access to it more difficult, and heightens the price we must pay for it.

ARTICLE CLXXXIV.

From whence it comes that the envious are subject to have a leaden complexion.

For the rest, there is no vice which so detracts from the happiness of men as that of envy; for, in addition to the fact that those who are tainted with it distress themselves, they also disturb to the utmost of their power the pleasure of others; and usually they have a leaden hue, that is to say, one of

mingled yellow and black like battered blood, whence envy is in Latin called *livor*, which accords very well with what has been said above regarding the movements of the blood in sadness and hatred. For the former causes the yellow bile which proceeds from the lower portion of the liver, and the black which proceeds from the spleen, to expand from the heart by the arteries into all the veins, and the latter causes the blood in the veins to have less heat, and to flow more slowly than usual, which suffices to render the colour livid. But because the bile, yellow as well as black, may also be sent into the veins by many other causes, and because envy does not send them there in sufficiently great quantity to change the shade of the colour, except when it is great and of long duration, we must not think that all those in whom we observe this colour are inclined thereto.

ARTICLE CLXXXV.

Of Pity.

Pity is a species of sadness, mingled with love or good-will towards those whom we see suffering some evil of which we consider them undeserving. It is thus contrary to envy by reason of its object, and to scorn because it considers its objects in another way.

ARTICLE CLXXXVI.

Those who are the most given to pity.

Those who feel themselves very feeble and subject to the adversities of fortune appear to be more disposed to this passion than others, because they represent the evil of others as possibly occurring to themselves; and then they are moved to pity more by the love that they bear to themselves than by that which they bear to others.

ARTICLE CLXXXVII.

How the most noble-minded are touched by this passion.

Nevertheless those who are most generous and strongest in mind, inasmuch as they fear no ill for themselves and hold themselves to be beyond the

powers of fortune, are not exempt from compassion when they see the infirmity of other men and hear their plaints; for it is a part of generosity to wish well to one and all. But the sadness of this pity is no longer bitter, and, like that caused by the tragic actions which we see represented in a theatre, it is more external and in the senses than in the interior of the soul, which has yet the satisfaction of thinking that it does its duty in compassionating the afflicted. And there is this difference here that while the ordinary man has compassion on those who lament their lot because he thinks that the evils from which they suffer are very vexatious, the principal object of the pity of the greatest men is the weakness of those whom they see bemoaning their fate, because they do not consider that any accident which might possibly happen would be so great an ill as is the cowardice of those who cannot endure it with constancy; and although they hate vices, they do not for all that hate those whom they see subject to them, but only pity them.

ARTICLE CLXXXVIII.

Who are those who are not touched by it.

But it is only the evilly disposed and envious, who naturally hate all men, or those who are so brutal and blinded by good fortune, or rendered so desperate by evil fortune that they do not consider that any evil can happen to them, who are insensible to pity.

ARTICLE CLXXXIX.

Why this passion moves us to weep.

For the rest we weep very easily in this passion because love, sending much blood towards the heart, causes many vapours to issue from the eyes, and the coldness of sadness, retarding the agitation of these vapours, causes them to change into tears, in accordance with what has been said above.

ARTICLE CXC.

Of Self-Satisfaction.

The satisfaction which those who pursue virtue constantly have, is a habitude of their soul which is called tranquillity and repose of conscience; but that which is newly acquired, when we have just done some action which we think good, is a passion, i.e. a species of joy which I consider to be the sweetest of all joys, because its cause depends only on ourselves. At the same time when this cause is not just, i.e. when the actions from which we derive much satisfaction are not of great importance or are even vicious, it is absurd, and only serves to produce pride and an impertinent arrogance; and this we observe particularly in those who, believing themselves to be pious, are merely bigoted and given over to superstitions. That is to say they are those who, under the pretence that they go frequently to church, that they recite many prayers, that they wear their hair short, that they fast, that they give alms, think themselves to be absolutely perfect, and imagine themselves to be such close friends of God that they can do nothing to displease Him, and that all that their passion presents is well-directed zeal, although it sometimes guides them into the greatest crimes that can be committed by men, such as the betrayal of towns, the assassination of princes, the extermination of entire peoples, for the sole reason that they do not follow *their* opinions.

ARTICLE CXCI.

Of Repentance.

Repentance is directly opposed to self-satisfaction and is a species of sadness which comes from our believing ourselves to have committed some evil action; and it is very bitter because its cause proceeds from ourselves alone, though this does not prevent its being very useful when it is the case that the action of which we repent is evil, and when we have a certain knowledge of it, because it incites us to do better another time. But it often happens that feeble minds repent of the things they have done without knowing assuredly that they are evil; they only persuade themselves because they fear it is so, and if they had done the opposite, they would have repented in the same way; and this is an imperfection in them deserving of pity. The remedies for this fault are the same as those which serve to remove irresolution.

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ARTICLE CXCII.

Of Favour.

Favour is, properly speaking, a desire to see good coming to some one for whom one has good will: but here I make use of this word to signify this will inasmuch as it is excited in us by some good action on the part of him for whom we have it. For we are naturally impelled to love those who do the things which we esteem to he good, even though no good comes to us by so doing. In this sense favour is a species of love, not of desire, although the desire to see good come to him whom one favours always accompanies it; and it is usually united to pity because the tribulations which we see falling upon the unfortunate are the cause of our reflecting all the more on their merits.

ARTICLE CXCIII.

Of Gratitude.

Gratitude is also a species of love excited in us by some action on the part of him for whom we have it, by which also we believe that he has done us some good or at least had that intention. It has thus the same content as favour, and so much the more in that it is founded on an action which affects us, and of which we have the desire to make a return. That is why it has much more strength, especially in the minds of those who are, to however small a degree, noble and generous.

ARTICLE CXCIV.

Of Ingratitude.

As to ingratitude it is not a passion, for nature has not placed in us any movement of the spirits which excites it; it is merely a vice directly opposed to gratitude, inasmuch as the former is always virtuous and one of the principal bonds that bind together human society. That is why this vice is found only in men who are brutal and very arrogant, and who think that all things are their due; or in stupid people, who never reflect on the benefits that they receive; or feeble and abject persons who, being sensible of their

infirmity and need, basely seek the help of others, and after they have received it, hate their benefactors because, not having the will to render them the like, or despairing to be able to do so, and imagining that every one is as mercenary as they, and that no good thing is accomplished without the hope of recompense, the think they have deceived them.

ARTICLE CXCV.

Of Indignation.

Indignation is a species of hatred or aversion which we have by nature against those who do some evil of whatever sort it be and it is often mingled with envy or pity, but yet it has a *very* different object. For we are indignant only with those who dc good or evil to persons who are undeserving of it; but we are envious of those who receive this good, and we pity those who receive the evil. It is true that it is in some ways doing evil to possess a good of which we are not worthy *[digne];* and this may be the reason why Aristotle and his successors, supposing envy to be always a vice, have termed by the name indignation that passion which is not vicious.

ARTICLE CXCVI.

Why it is sometimes united to pity, and sometimes to scorn.

It is likewise in some way receiving evil to do evil, from whence it comes that some unite pity to their indignation, and others scorn, according as they are disposed to good will or evil towards those whom they observe committing faults; and it is thus that the laughter of Democritus and the tears of Heraclitus have proceeded from the same cause.

ARTICLE CXCVII.

That it is often accompanied by wonder and is not incompatible with joy.

Indignation is often likewise accompanied by wonder; for we usually suppose that all things will be done in the manner we judge they ought to be done, that is, in the way we esteem to be good; that is why, when it happens otherwise, it surprises us, and we wonder at it. It is also not incompatible

with joy, although it is more usually united to sadness; for when the evil as to which we are indignant cannot hurt us, and we consider that we would not desire to do the same, that gives us some pleasure; and it is possibly one of the causes of the laughter which sometimes accompanies this passion.

ARTICLE CXCVIII.

Of its Use.

For the rest, indignation is noticed much more in those who wish to appear virtuous than in those who really are so; for, although those who love virtue cannot without aversion see the vices of others, they do not become impassioned excepting against those that are greatest and most extraordinary. It is being ill-tempered and fretful to have much indignation for things of slight importance; it is being unjust, to have it for things not blameworthy at all; and it is being impertinent and absurd not to restrict this passion to the actions of men and to extend them to the works of God or nature, as do those who, never being content with their condition or fortune, dare to find subject for criticism in the conduct of the world and in the secrets of Providence.

ARTICLE CXCIX.

Of Anger.

Anger is also a species of hatred or aversion which we have towards those who have done some evil to or have tried to injure not any chance person but more particularly ourselves. Thus it has the same content as indignation, and all the more so in that it is founded on an action which affects us, and for which we desire to avenge ourselves, for this desire almost always accompanies it; and it is directly opposed to gratitude, as indignation is to favour. But it is incomparably more violent than these three other passions, because the desire to repel harmful things and to revenge oneself, is the most persistent of all desires. It is desire, united to self-love, which furnishes to anger the agitation of the blood that courage and bravery can cause; and hatred brings it to pass that it is mainly the bilious blood coming from the spleen and the small veins of the liver that experiences this agitation and enters into the heart, where, because of its abundance and of

the nature of the bile with which it is mingled, it excites a heat which is more severe and ardent than is that which may be excited by love or by joy.

ARTICLE CC.

Why those whom it makes flush are less to be feared than those whom it makes blanch.

And the external signs of this passion are different according to the difference of personal temperaments and the diversity of the other passions which compose it or unite themselves with it. We thus see people who become pale or who tremble when they become angry, and we see others who become flushed or who even weep; and we usually judge that the anger of those who grow pale is more to be feared than the anger of those who become red. And the reason of this is that when we do not desire to, or are unable to revenge ourselves otherwise than by our expression and words, we employ all our heat and all our strength from the commencement of our emotion, and this is the reason that we become red; besides which sometimes the regret and self-pity that we have, since we cannot avenge ourselves otherwise, is the reason why we weep. And, on the other hand, those who hold themselves in and make up their minds to a greater vengeance, become sad from thinking themselves obliged to behave so by the action which angers them; and they are sometimes also afraid by reason of the evils which may follow on the resolution which they have taken, which renders them pale, cold and trembling to begin with. But when they afterwards come to execute their vengeance, they become warm again in proportion as they had been cold to begin with, just as we notice that fevers which commence with chill usually become the most severe.

ARTICLE CCI.

That there are two sorts of anger, and that those who have the most goodness are most subject to the former.

This shows us that we can distinguish two kinds of anger: the one which is very hasty and manifests itself very much on the surface, but which yet has little effect and can be easily appeased; the other which does not show itself so much to begin with, but which all the more powerfully gnaws the heart

and has more dangerous effects. Those who have much goodness and much love are most subject to the first, for it does not proceed from a profound hatred, but from an instant aversion, which surprises them, because, being impelled to imagine that all things should go in the way which they judge to be best, so soon as it happens otherwise, they wonder and frequently are displeased, even although the matter does not affect them personally, because, having much affection, they interest themselves for those whom they love in the same way as for themselves. Thus what would only be cause for indignation in the case of another, is for them a cause of anger; and because the inclination which they have to love causes them to have much heat and much blood in their heart, the aversion which surprises them cannot send there bile in so small a quantity that it does not cause at first a great commotion in this blood. But this commotion does not last, because the strength of the surprise does not continue, and because, as soon as they perceive that the subject which has vexed them ought not to affect them so much, they repent of it.

ARTICLE CCII.

That it Is weak and base spirits which most permit themselves to give way to the latter.

The other kind of anger in which hatred and sadness predominate, is not so apparent at first if it be not perhaps that it causes the face to grow pale; but its strength is little by little increased by the agitation of an ardent desire to avenge oneself excited in the blood, which, being mingled with the bile which is sent towards the heart from the lower part of the liver and spleen, excites there a very keen and ardent heat. And as it is the most generous souls who have most gratitude, it is those who have most pride, and who are most base and infirm, who most allow themselves to be carried away by this kind of anger; for the injuries appear so much the greater as pride causes us to esteem ourselves more, and likewise the more we esteem the good things which they remove; which last we value so much the more, as our soul is the more feeble and base, because they depend on others.

ARTICLE CCIII.

That noble-mindedness serves as a remedy against its excesses.

For the rest, although this passion is useful in giving us strength in repelling injuries, there is yet no passion an excess of which we should more carefully avoid, because, in disturbing our judgment, they often cause us to commit faults of which we have afterwards to repent, and they even sometimes prevent our repelling these injuries as well as we might have done had we suffered less emotion. But as there is nothing which makes it excessive so much as pride, so I think that noble spirit is the best remedy which can be found against its excesses, because, causing us to esteem very little all the good things which may be taken away, and on the other hand to esteem highly the liberty and absolute dominion over self that we cease to have when we allow ourselves to be offended by some one, it brings it to pass that we have nothing but disdain, or at the most indignation, for those injuries which others are wont to resent angrily.

ARTICLE CCIV.

Of Glory.

What I here call by the name glory is a species of joy founded on self-love, which proceeds from the belief or hope we have of being praised by certain others. It is thus different from the internal satisfaction that comes from our belief that we have performed some good action; for we are sometimes praised for things which we do not believe to be good, and blamed for those we believe to be better. But both are species of self-esteem as well as species of joy; for seeing that we are esteemed by others is a reason for esteeming ourselves.

ARTICLE CCV.

Of Shame.

Shame, on the contrary, is a species of sadness, also founded on self-love, which proceeds from the apprehension or the fear which we possess of being blamed; besides that it is a species of modesty or humility and mistrust of self. For when we esteem ourselves so highly that we cannot imagine ourselves to be disdained by any, we cannot easily be ashamed.

ARTICLE CCVI.

Of the uses of these two passions.

Glory and shame have the same functions in so far as they incite us to virtue, the one by hope, and the other by fear. It is only necessary to inform one's judgment as to what is truly worthy of being blamed or praised in order that we may not be ashamed of doing well or make our vices a source of vanity, as happens in the case of many. But it is not good to rid oneself entirely of these passions as the Cynics used to do; for although common people judge very ill, yet because we cannot live without others and it is important to us to be esteemed by them, we ought frequently to follow their opinions rather than ours respecting the external aspect of our actions.

ARTICLE CCVII.

Of Impudence.

Impudence or effrontery, which is a disdain of shame and frequently of glory also, is not a passion, because there is not in us any special movement of the spirits which excites it; but it is a vice opposed to shame and also to glory, inasmuch as both are good, just as ingratitude is opposed to gratitude and cruelty to pity. And the principal cause of effrontery proceeds from a man's having frequently received great affronts; for there is no one who does not in his youth imagine that praise is a good, and infamy an evil, much more important to life than it is found by experience to be, when, on receiving some signal affronts, he sees himself to be entirely deprived of honour and disdained by all men. That is why such men become shameless who, only estimating good or evil by their bodily well-being, see that after these affronts they flourish just as much as before or even sometimes much more, because they are free from many trammels imposed upon them by honour, and because they discover that if the loss of their goods is united to their disgrace, charitable people are always found who give to them.

ARTICLE CCVIII.

Of Disgust.

Disgust is a species of sadness which proceeds from the same cause as that from which joy earlier proceeded. For we are so constituted that the greater

part of the things as to which we rejoice are only good in our regard for a time, and afterwards become tiresome. This is specially true in respect of eating and drinking which are useful only so long as we have an appetite, and are hurtful when we have it no longer; and because they then cease to be agreeable to the taste this passion is termed disgust.

ARTICLE CCIX.

Of Regret.

Regret is also a kind of sadness which has a particular bitterness inasmuch as it is always united to a certain despair and to the memory of the pleasure which gave us joy, for we regret nothing but the good things regarding which we rejoiced and which are so lost that we have no hope of recovering them at the time and in the guise in which we regret them.

ARTICLE CCX.

Of Cheerfulness.

Finally, what I call cheerfulness is a species of joy in which there is this peculiarity, that its sweetness is increased by the recollection of the evils which we have suffered, and of which we are relieved, in the same way as we feel freed of some heavy burden which we have for a long time borne on our shoulders. And I observe nothing very remarkable in these three passions, nor have I placed them here but in order to follow the enumeration which I made above; yet it seems to me that this enumeration has been useful in order to show that we have omitted none which were worthy of particular consideration.

ARTICLE CCXI.

A general remedy against the Passions.

And now that we are acquainted with them all, we have much less reason to fear them than we formerly had. For we see that they are all good in their nature and that we have nothing to avoid but their evil uses or their excesses, against which the remedies which I explained might suffice, if

each one of us took sufficient heed to practise them. But because I have placed amongst these remedies the forethought and diligence whereby we can correct our natural faults in exercising ourselves in separating within us the movements of the blood and spirits from the thoughts to which they are usually united. I confess that there are few people who are sufficiently prepared in this way to meet all the accidents of life, and that these movements excited in the blood by the objects of the passions follow so promptly from these single impressions that are made in the brain and from the disposition of the organs, although the soul contributes in no wise to them, that there is no human wisdom capable of resisting them when sufficient preparation is not made for doing so. Thus many people cannot prevent themselves from laughing on being tickled, even though they have no pleasure in it; for the impression of joy and surprise which caused them formerly to laugh for the same reason, being once more awakened in their imagination, causes their lung to be suddenly inflated in spite of themselves by the blood which the heart sends to it. In this way those who are naturally much carried away by their disposition towards emotions of joy or pity, or fear or anger, cannot prevent themselves from fainting, weeping, or trembling, or from having their blood agitated just as though they had a fever, when their imagination is violently affected by the object of some one of these passions. But what we can always do on such occasions, and what I think I can here put forward as the most general remedy and that most easy to practise against all excesses of the passions, is that, when we feel our blood to be thus agitated, we should be warned of the fact, and recollect that all that presents itself before the imagination tends to delude the soul and causes the reasons which serve to urge it to accomplish the object of its passion to appear much stronger than they are, and those which serve to dissuade it to be much weaker. And when the passions urge us only towards things the execution of which necessitates some delay, we ought to abstain from pronouncing any judgment on the spot, and to divert ourselves by other thoughts until time and rest shall have entirely calmed the emotion which is in the blood. And finally, when it incites us to actions regarding which it is requisite that an immediate resolution should be taken, the will must make it its main business to consider and follow up the reasons which are contrary to those set up by the passions, although they appear to be less strong; just as when we are suddenly attacked by some enemy, the occasion does not permit of our taking time to deliberate. But it seems to me that

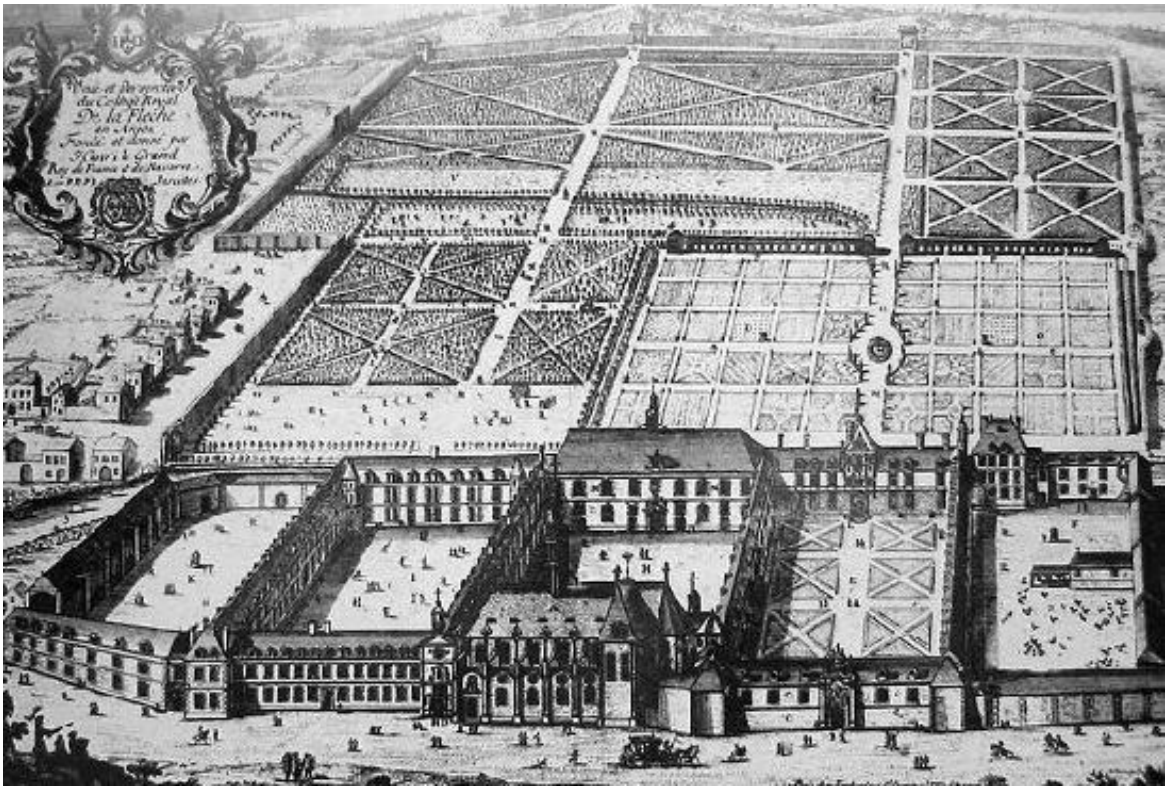
what those who are accustomed to reflect on their actions can always do when they feel themselves to be seized with fear, is to try to turn their thoughts away from the consideration of danger by representing to themselves the reasons which prove that there is much more certainty and honour in resistance than in flight. And on the other hand, when they feel that the desire of vengeance and anger incites them to run thoughtlessly towards those who attack them, they will recollect that it is imprudence to lose their lives when they can without dishonour save themselves, and that, if the match is very unequal, it is better to beat an honourable retreat or ask quarter, than to expose oneself doggedly to certain death.

ARTICLE CCXII.

That it is on them alone that all the good and evil of this life depends.

For the rest, the soul may have pleasures of its own, but as to those which are common to it and the body, they depend entirely on the passions, so that the men whom they can most move are capable of partaking most of enjoyment in this life. It is true that such men may also find most bitterness when they do not know how to employ them well, or fortune is contrary to them. But the principal use of prudence or self-control is that it teaches us to be masters of our passions, and to so control and guide them that the evils which they cause are quite bearable, and that we even derive joy from them all.

The Biographies



Engraving of the Prytanée, eighteenth century — in 1607, Descartes entered the Jesuit Collège Royal Henry-Le-Grand at La Flèche, where he was introduced to mathematics and physics, including Galileo's work.



Portrait of Descartes after Frans Hals, 1648

RENÉ DESCARTES by William Wallace

From 1911 Encyclopædia Britannica, Volume 8

RENÉ DESCARTES (1596-1650), French philosopher, was born at La Haye, in Touraine, midway between Tours and Poitiers, on the 31st of March 1596, and died at Stockholm on the 11th of February 1650. The house where he was born is still shown, and a *métairie* about 3 m. off retains the name of Les Cartes. His family on both sides was of Poitevin descent. Joachim Descartes, his father, having purchased a commission as counsellor in the parlement of Rennes, introduced the family into that demi-noblesse of the robe which, between the bourgeoisie and the high nobility, maintained a lofty rank in French society. He had three children, a son who afterwards succeeded to his father in the parlement, a daughter who married a M. du Crevis, and René, after whose birth the mother died.

Descartes, known as Du Perron, from a small estate destined for his inheritance, soon showed an inquisitive mind. From 1604 to 1612 he studied at the school of La Flêche, *Early years.* which Henry IV. had lately founded and endowed for the Jesuits. He enjoyed exceptional privileges; his feeble health excused him from the morning duties, and thus early he acquired the habit of reflection in bed, which clung to him throughout life. Even then he had begun to distrust the authority of tradition and his teachers. Two years before he left school he was selected as one of the twenty-four who went forth to receive the heart of Henry IV. as it was borne to its resting-place at La Flêche. At the age of sixteen he went home to his father, who was now settled at Rennes, and had married again. During the winter of 1612 he completed his preparations for the world by lessons in horsemanship and fencing; and then started as his own master to taste the pleasures of Parisian life. Fortunately he went to no perilous lengths; the worst we hear of is a passion for gaming. Here, too, he made the acquaintance of Claude Mydorge, one of the foremost mathematicians of France, and renewed an early intimacy with Marin Mersenne (*q.v.*), now Father Mersenne, of the order of Minim friars. The withdrawal of Mersenne in 1614 to a post in the provinces was the signal for Descartes to abandon

social life and shut himself up for nearly two years in a secluded house of the faubourg St Germain. Accident betrayed the secret of his retirement; he was compelled to leave his mathematical investigations, and to take part in entertainments, where the only thing that chimed in with his theorizing reveries was the music. French politics were at that time characterized by violence and intrigue to such an extent that Paris was no fit place for a student, and there was little honourable prospect for a soldier. Accordingly, in May 1617, Descartes set out for the Netherlands and took service in the army of Prince Maurice of Orange. At Breda he enlisted as a volunteer, and the first and only pay which he accepted he kept as a curiosity through life. There was a lull in the war, and the Netherlands was distracted by the quarrels of Gomarists and Arminians. During the leisure thus arising, Descartes one day had his attention drawn to a placard in the Dutch tongue; as the language, of which he never became perfectly master, was then strange to him, he asked a bystander to interpret it into either French or Latin. The stranger, Isaac Beeckman, principal of the college of Dort, offered to do so into Latin, if the inquirer would bring him a solution of the problem, — for the advertisement was one of those challenges which the mathematicians of the age were accustomed to throw down to all comers, daring them to discover a geometrical mystery known as they fancied to themselves alone. Descartes promised and fulfilled; and a friendship grew up between him and Beeckman — broken only by the dishonesty of the latter, who in later years took credit for the novelty contained in a small essay on music (*Compendium Musicae*) which Descartes wrote at this period and entrusted to Beeckman.

After spending two years in Holland as a soldier in a period of peace, Descartes, in July 1619, attracted by the news of the impending struggle between the house of Austria and the Protestant princes, consequent upon the election of the palatine of the Rhine to the kingdom of Bohemia, set out for upper Germany, and volunteered into the Bavarian service. The winter of 1619, spent in quarters at Neuburg on the Danube, was the critical period in his life. Here, in his warm room (*dans un poêle*), he indulged those meditations which afterwards led to the *Discourse of Method*. It was here that, on the eve of St Martin’s day, he “was filled with enthusiasm, and discovered the foundations of a marvellous science.” He retired to rest with anxious thoughts of his future career, which haunted him through the night in three dreams that left a deep impression on his mind. The date of his

philosophical conversion is thus fixed to a day. But as yet he had only glimpses of a logical method which should invigorate the syllogism by the co-operation of ancient geometry and modern algebra. For during the year that elapsed before he left Swabia (and whilst he sojourned at Neuburg and Ulm), and amidst his geometrical studies, he would fain have gathered some knowledge of the mystical wisdom attributed to the Rosicrucians; but the Invisibles, as they called themselves, kept their secret. He was present at the battle of Weisser Berg (near Prague), where the hopes of the elector palatine were blasted (November 8, 1620), passed the winter with the army in southern Bohemia, and next year served in Hungary under Karl Bonaventura de Longueval, Graf von Buquoy or Boucquoi (1571-1621). On the death of this general Descartes quitted the imperial service, and in July 1621 began a peaceful tour through Moravia, the borders of Poland, Pomerania, Brandenburg, Holstein and Friesland, from which he reappeared in February 1622 in Belgium, and betook himself directly to his father's home at Rennes in Brittany.

At Rennes Descartes found little to interest him; and, after he had visited the maternal estate of which his father now put him in possession, he went to Paris, where he found the Rosicrucians the topic of the hour, and heard himself credited with partnership in their secrets. A short visit to Brittany enabled him, with his father's consent, to arrange for the sale of his property in Poitou. The proceeds were invested in such a way at Paris as to bring him in a yearly income of between 6000 and 7000 francs (equal now to more than £500). Towards the end of the year Descartes was on his way to Italy. The natural phenomena of Switzerland, and the political complications in the Valtellina, where the Catholic inhabitants had thrown off the yoke of the Grisons and called in the Papal and Spanish troops to their assistance, delayed him some time; but he reached Venice in time to see the ceremony of the doge's wedlock with the Adriatic. After paying his vows at Loretto, he came to Rome, which was then on the eve of a year of jubilee — an occasion which Descartes seized to observe the variety of men and manners which the city then embraced within its walls. In the spring of 1625 he returned home by Mont Cenis, observing the avalanches, instead of, as his relatives hoped, securing a post in the French army in Piedmont.

For an instant Descartes seems to have concurred in the plan of purchasing a post at Châtellerault, but he gave up the idea, and settled in Paris (June 1625), in the quarter where he had sought seclusion before. By

this time he had ceased to devote himself to pure mathematics, and in company with his friends Mersenne and Mydorge was deeply interested in the theory of the refraction of light, and in the practical work of grinding glasses of the best shape suitable for optical instruments. But all the while he was engaged with reflections on the nature of man, of the soul and of God, and for a while he remained invisible even to his most familiar friends. But their importunity made a hermitage in Paris impossible; a graceless friend even surprised the philosopher in bed at eleven in the morning meditating and taking notes. In disgust, Descartes started for the west to take part in the siege of La Rochelle, and entered the city with the troops (October 1628). A meeting at which he was present after his return to Paris decided his vocation. He had expressed an opinion that the true art of memory was not to be gained by technical devices, but by a philosophical apprehension of things; and the cardinal de Berulle, the founder of the Congregation of the Oratory, was so struck by the tone of the remarks as to impress upon the speaker the duty of spending his life in the examination of truth. Descartes accepted the philosophic mission, and in the spring of 1629 he settled in Holland. His financial affairs he had entrusted to the care of the abbé Picot, and as his literary and scientific representative he adopted Mersenne.

Till 1649 Descartes lived in Holland. Thrice only did he revisit France — in 1644, 1647 and 1648. The first of these occasions was in order to settle family affairs after the death of his father in 1640. The second brief visit, in 1647, partly on literary, partly on family business, was signalized by the award of a pension of 3000 francs, obtained from the royal bounty by Cardinal Mazarin. The last visit in 1648 was less fortunate. A royal order summoned him to France for new honours — an additional pension and a permanent post — for his fame had by this time gone abroad, and it was the age when princes sought to attract genius and learning to their courts. But when Descartes arrived, he found Paris rent asunder by the civil war of the Fronde. He paid the costs of his royal parchment, and left without a word of reproach. The only other occasions on which he was out of the Netherlands were in 1630, when he made a flying visit to England to observe for himself some alleged magnetic phenomena, and in 1634, when he took an excursion to Denmark.

During his residence in Holland he lived at thirteen different places, and changed his abode twenty-four times. In the choice of these spots two

motives seem to have influenced him — the neighbourhood of a university or college, and the amenities of the situation. Among these towns were Franeker in Friesland, Harderwyk, Deventer, Utrecht, Leiden, Amersfoort, Amsterdam, Leeuwarden in Friesland. His favourite residences were Endegeest, Egmond op den Hoef and Egmond the Abbey (west of Zaandam).

The time thus spent seems to have been on the whole happy, even allowing for warm discussions with the mathematicians and metaphysicians of France, and for harassing controversies in the Netherlands. Friendly agents — chiefly Catholic priests — were the intermediaries who forwarded his correspondence from Dort, Haarlem, Amsterdam and Leiden to his proper address, which he kept completely secret; and Father Mersenne sent him objections and questions. His health, which in his youth had been bad, improved. “I sleep here ten hours every night,” he writes from Amsterdam, “and no care ever shortens my slumber.” “I take my walk every day through the confusion of a great multitude with as much freedom and quiet as you could find in your rural avenues.” At his first coming to Franeker he arranged to get a cook acquainted with French cookery; but, to prevent misunderstanding, it may be added that his diet was mainly vegetarian, and that he rarely drank wine. New friends gathered round him who took a keen interest in his researches. Once only do we find him taking an interest in the affairs of his neighbours, — to ask pardon from the government for a homicide. He continued the profession of his religion. Sometimes from curiosity he went to the ministrations of anabaptists, to hear the preaching of peasants and artisans. He carried few books to Holland with him, but a Bible and the *Summa* of Thomas Aquinas were amongst them. One of the recommendations of Egmond the Abbey was the free exercise there allowed to the Catholic religion. At Franeker his house was a small château, “separated by a moat from the rest of the town, where the mass could be said in safety.” And one motive in favour of accepting an invitation to England lay in the alleged leanings of Charles I. to the older church.

The best account of Descartes’s mental history during his life in Holland is contained in his letters, which extend over the whole period, and are particularly frequent in the latter half. The majority of them are addressed to Mersenne, and deal with problems of physics, musical theory (in which he took a special interest), and mathematics. Several letters between 1643 and 1649 are addressed to the princess Elizabeth, the eldest daughter of the

ejected elector palatine, who lived at The Hague, where her mother maintained the semblance of a royal court. The princess was obliged to quit Holland, but kept up a philosophical correspondence with Descartes. It is to her that the *Principles of Philosophy* were dedicated; and in her alone, according to Descartes, were united those generally separated talents for metaphysics and for mathematics which are so characteristically co-operative in the Cartesian system. Two Dutch friends, Constantijn Huygens (von Zuylichem), father of the more celebrated Huygens, and Hoogheland, figure amongst the correspondents, not to mention various savants, professors and churchmen (particularly Jesuits).

His residence in the Netherlands fell in the most prosperous and brilliant days of the Dutch state, under the stadtholdership of Frederick Henry (1625-1647). Abroad its navigators monopolized the commerce of the world, and explored unknown seas; at home the Dutch school of painting reached its acme in Rembrandt (1607-1669); and the philological reputation of the country was sustained by Grotius, Vossius and the elder Heinsius. And yet, though Rembrandt's "Nightwatch" is dated the very year after the publication of the *Meditations*, not a word in Descartes breathes of any work of art or historical learning. The contempt of aesthetics and erudition is characteristic of the most typical members of what is known as the Cartesian school, especially Malebranche. Descartes was not in any strict sense a reader. His wisdom grew mainly out of his own reflections and experiments. The story of his disgust when he found that Queen Christina devoted some time every day to the study of Greek under the tuition of Vossius is at least true in substance. It gives no evidence of science, he remarks, to possess a tolerable knowledge of the Roman tongue, such as once was possessed by the populace of Rome. In all his travels he studied only the phenomena of nature and human life. He was a spectator rather than an actor on the stage of the world. He entered the army, merely because the position gave a vantage-ground from which to make his observations. In the political interests which these contests involved he took no part; his favourite disciple, the princess Elizabeth, was the daughter of the banished king, against whom he had served in Bohemia; and Queen Christina, his second royal follower, was the daughter of Gustavus Adolphus.

Thus Descartes is a type of that spirit of science to which erudition and all the heritage of the past seem but elegant trifling. The science of

Descartes was physics in all its branches, but especially as applied to physiology. Science, he says, may be compared to a tree; metaphysics is the root, physics is the trunk, and the three chief branches are mechanics, medicine and morals, — the three applications of our knowledge to the outward world, to the human body, and to the conduct of life.

Such then was the work that Descartes had in view in Holland. His residence was generally divided into two parts — one his workshop for science, the other his reception-room for society. “Here are my books,” he is reported to have told a visitor, as he pointed to the animals he had dissected. He worked hard at his book on refraction, and dissected the heads of animals in order to explain imagination and memory, which he considered physical processes. But he was not a laborious student. “I can say with truth,” he writes to the princess Elizabeth, “that the principle which I have always observed in my studies, and which I believe has helped me most to gain what knowledge I have, has been never to spend beyond a very few hours daily in thoughts which occupy the imagination, and a very few hours yearly in those which occupy the understanding, and to give all the rest of my time to the relaxation of the senses and the repose of the mind.” But his expectations from the study of anatomy and physiology went a long way. “The conservation of health,” he writes in 1646, “has always been the principal end of my studies.” In 1629 he asks Mersenne to take care of himself “till I find out if there is any means of getting a medical theory based on infallible demonstrations, which is what I am now inquiring.” Astronomical inquiries in connexion with optics, meteorological phenomena, and, in a word, the whole field of natural laws, excited his desire to explain them. His own observation, and the reports of Mersenne, furnished his data. Of Bacon’s demand for observation and collection of facts he is an imitator; and he wishes (in a letter of 1632) that “some one would undertake to give a history of celestial phenomena after the method of Bacon, and describe the sky exactly as it appears at present, without introducing a single hypothesis.”

He had several writings in hand during the early years of his residence in Holland, but the main work of this period was a physical doctrine of the universe which he termed *The World*. Shortly after his arrival he writes to Mersenne that it will probably be finished in 1633, but meanwhile asks him not to disclose the secret to his Parisian friends. Already anxieties appear as to the theological verdict upon two of his fundamental views — the

infinitude of the universe, and the earth's rotation round the sun. But towards the end of year 1633 we find him writing as follows:— "I had intended sending you my *World* as a New Year's gift, and a fortnight ago I was still minded to send you a fragment of the work, if the whole of it could not be transcribed in time. But I have just been at Leyden and Amsterdam to ask after Galileo's cosmical system as I imagined I had heard of its being printed last year in Italy. I was told that it had been printed, but that every copy had been at the same time burnt at Rome, and that Galileo had been himself condemned to some penalty." He has also seen a copy of Galileo's condemnation at Liége (September 20, 1633), with the words "although he professes that the [Copernican] theory was only adopted by him as a hypothesis." His friend Beeckman lent him a copy of Galileo's work, which he glanced through in his usual manner with other men's books; he found it good, and "failing more in the points where it follows received opinions than where it diverges from them." The consequence of these reports of the hostility of the church led him to abandon all thoughts of publishing. *The World* was consigned to his desk; and although doctrines in all essential respects the same constitute the physical portion of his *Principia*, it was not till after the death of Descartes that fragments of the work, including *Le Monde*, or a treatise on light, and the physiological tracts *L'Homme* and *La Formation du fœtus*, were given to the world by his admirer Claude Clerselier (1614-1684) in 1664. Descartes was not disposed to be a martyr; he had a sincere respect for the church, and had no wish to begin an open conflict with established doctrines.

In 1636 Descartes had resolved to publish some specimens of the fruits of his method, and some general observations on its nature which, under an appearance of simplicity, might sow the good seed of more adequate ideas on the world and man. "I should be glad," he says, when talking of a publisher, "if the whole book were printed in good type, on good paper, and I should like to have at least 200 copies for distribution. The book will contain four essays, all in French, with the general title of 'Project of a Universal science, capable of raising our nature to its highest perfection; also Dioptrics, Meteors and Geometry, wherein the most curious matters which the author could select as a proof of the universal science which he proposes are explained in such a way that even the unlearned may understand them.'" The work appeared anonymously at Leiden (published by Jean Maire) in 1637, under the modest title of *Essais philosophiques*;

and the project of a universal science becomes the *Discours de la méthode pour bien conduire sa raison et chercher la vérité dans les sciences*. In 1644 it appeared in a Latin version, revised by Descartes, as *Specimina philosophica*. A work so widely circulated by the author naturally attracted attention, but in France it was principally the mathematicians who took it up, and their criticisms were more pungent than complimentary. Fermat, Roberval and Desargues took exception in their various ways to the methods employed in the geometry, and to the demonstrations of the laws of refraction given in the Dioptrics and Meteors. The dispute on the latter point between Fermat and Descartes was continued, even after the philosopher's death, as late as 1662. In the youthful Dutch universities the effect of the essays was greater.

The first public teacher of Cartesian views was Henri Renery, a Belgian, who at Deventer and afterwards at Utrecht had introduced the new philosophy which he had learned *Spread of Cartesianism.* from personal intercourse with Descartes. Renery only survived five years at Utrecht, and it was reserved for Heinrich Regius (van Roy) — who in 1638 had been appointed to the new chair of botany and theoretical medicine at Utrecht, and who visited Descartes at Egmond in order more thoroughly to learn his views — to throw down the gauntlet to the adherents of the old methods. With more eloquence than judgment, he propounded theses bringing into relief the points in which the new doctrines clashed with the old. The attack was opened by Gisbert Voët, foremost among the orthodox theological professors and clergy of Utrecht. In 1639 he published a series of arguments against atheism, in which the Cartesian views were not obscurely indicated as perilous for the faith, though no name was mentioned. Next year he persuaded the magistracy to issue an order forbidding Regius to travel beyond the received doctrine. The magisterial views seem to have prevailed in the professoriate, which formally in March 1642 expressed its disapprobation of the new philosophy as well as of its expositors. As yet Descartes was not directly attacked. Voët now issued, under the name of Martin Schoock, one of his pupils, a pamphlet with the title of *Methodus novae philosophiae Renati Descartes*, in which atheism and infidelity were openly declared to be the effect of the new teaching. Descartes replied to Voët directly in a letter, published at Amsterdam in 1643. He was summoned before the magistrates of Utrecht to defend himself against charges of irreligion and slander. What might have happened we cannot tell;

but Descartes threw himself on the protection of the French ambassador and the prince of Orange, and the city magistrates, from whom he vainly demanded satisfaction in a dignified letter, were snubbed by their superiors. About the same time (April 1645) Schoock was summoned before the university of Groningen, of which he was a member, and forthwith disavowed the more abusive passages in his book. So did the effects of the *odium theologicum*, for the meanwhile at least, die away.

In the *Discourse of Method* Descartes had sketched the main points in his new views, with a mental autobiography which might explain their origin, and with some suggestions *Discourse of Method, and Meditations.* as to their applications. His second great work,. *Meditations on the First Philosophy*, which had been begun soon after his settlement in the Netherlands, expounded in more detail the foundations of his system, laying especial emphasis on the priority of mind to body, and on the absolute and ultimate dependence of mind as well as body on the existence of God. In 1640 a copy of the work in manuscript was despatched to Paris, and Mersenne was requested to lay it before as many thinkers and scholars as he deemed desirable, with a view to getting their views upon its argument and doctrine. Descartes soon had a formidable list of objections to reply to. Accordingly, when the work was published at Paris in August 1641, under the title of *Meditationes de prima philosophia ubi de Dei existentia et animae immortalitate* (though it was in fact not the *immortality* but the *immateriality* of the mind, or, as the second edition described it, *animae humanae a corpore distinctio*, which was maintained), the title went on to describe the larger part of the book as containing various objections of learned men, with the replies of the author. These objections in the first edition are arranged under six heads: the first came from Caterus, a theologian of Louvain; the second and sixth are anonymous criticisms from various hands; whilst the third, fourth and fifth belong respectively to Hobbes, Arnauld and Gassendi. In the second edition appeared the seventh — objections from Père Bourdin, a Jesuit teacher of mathematics in Paris; and subsequently another set of objections, known as those of *Hyperaspistes*, was included in the collection of Descartes’s letters. The anonymous objections are very much the statement of common-sense against philosophy; those of Caterus criticize the Cartesian argument from the traditional theology of the church; those of Arnauld are an appreciative inquiry into the bearings and consequences of the meditations for religion

and morality; while those of Hobbes (*q.v.*) and Gassendi — both somewhat senior to Descartes and with a dogmatic system of their own already formed — are a keen assault upon the spiritualism of the Cartesian position from a generally "sensational" standpoint. The criticisms of the last two are the criticisms of a hostile school of thought; those of Arnauld are the difficulties of a possible disciple.

In 1644 the third great work of Descartes, the *Principia philosophiae*, appeared at Amsterdam. Passing briefly over the conclusions arrived at in the *Meditations*, it deals *The Principia.* in its second, third and fourth parts with the general principles of physical science, especially the laws of motion, with the theory of vortices, and with the phenomena of heat, light, gravity, magnetism, electricity, &c., upon the earth. This work exhibits some curious marks of caution. Undoubtedly, says Descartes, the world was in the beginning created in all its perfection. "But yet as it is best, if we wish to understand the nature of plants or of men, to consider how they may by degrees proceed from seeds, rather than how they were created by God in the beginning of the world, so, if we can excogitate some extremely simple and comprehensible principles, out of which, as if they were seeds, we can prove that stars, and earth and all this visible scene could have originated, although we know full well that they never did originate in such a way, we shall in that way expound their nature far better than if we merely described them as they exist at present." The Copernican theory is rejected in name, but retained in substance. The earth, or other planet, does not actually move round the sun; yet it is carried round the sun in the subtle matter of the great vortex, where it lies in equilibrium, — carried like the passenger in a boat, who may cross the sea and yet not rise from his berth.

In 1647 the difficulties that had arisen at Utrecht were repeated on a smaller scale at Leiden. There the Cartesian innovations had found a patron in Adrian Heerebord, and were openly discussed in theses and lectures. The theological professors took the alarm at passages in the *Meditations*; an attempt to prove the existence of God savoured, as they thought, of atheism and heresy. When Descartes complained to the authorities of this unfair treatment, the only reply was an order by which all mention of the name of Cartesianism, whether favourable or adverse, was forbidden in the university. This was scarcely what Descartes wanted, and again he had to apply to the prince of Orange, whereupon the theologians were asked to behave with civility, and the name of Descartes was no longer proscribed.

But other annoyances were not wanting from unfaithful disciples and unsympathetic critics. The *Instantiae* of Gassendi appeared at Amsterdam in 1644 as a reply to the reply which Descartes had published of his previous objections; and the publication by Heinrich Regius of his work on physical philosophy (*Fundamenta physices*, 1646) gave the world to understand that he had ceased to be a thorough adherent of the philosophy which he had so enthusiastically adopted.

It was about 1648 that Descartes lost his friends Mersenne and Mydorge by death. The place of Mersenne as his Parisian representative was in the main taken by Claude Clerselier (the French translator of the Objections and Responses), whom he had become acquainted with in Paris. Through Clerselier he came to know Pierre Chanut, who in 1645 was sent as French ambassador to the court of Sweden. Queen Christina was not yet twenty, and took a lively if a somewhat whimsical interest in literary and philosophical culture. Through Chanut, with whom she was on terms of familiarity, she came to hear of Descartes, and a correspondence which the latter nominally carried on with the ambassador was in reality intended for the eyes of the queen. The correspondence took an ethical tone. It began with a long letter on love in all its aspects (February 1647), a topic suggested by Chanut, who had been discussing it with the queen; and this was soon followed by another to Christina herself on the chief good. An essay on the passions of the mind (*Passions de l'âme*), which had been written originally for the princess Elizabeth, in development of some ethical views suggested by the *De vita beata* of Seneca, was enclosed at the same time for Chanut. It was a draft of the work published in 1650 under the same title. Philosophy, particularly that of Descartes, was becoming a fashionable *divertissement* for the queen and her courtiers, and it was felt that the presence of the sage himself was necessary to complete the good work of education. An invitation to the Swedish court was urged upon Descartes, and after much hesitation accepted; a vessel of the royal navy was ordered to wait upon him, and in September 1649 he left Egmond for the north.

The position on which he entered at Stockholm was unsuited for a man who wished to be his own master. The young queen wanted Descartes to draw up a code for a proposed *Death.* academy of the sciences, and to give her an hour of philosophic instruction every morning at five. She had already determined to create him a noble, and begun to look out an estate in

the lately annexed possessions of Sweden on the Pomeranian coast. But these things were not to be. His friend Chanut fell dangerously ill; and Descartes, who devoted himself to attend in the sick-room, was obliged to issue from it every morning in the chill northern air of January, and spend an hour in the palace library. The ambassador recovered, but Descartes fell a victim to the same disease, inflammation of the lungs. The last time he saw the queen was on the 1st of February 1650, when he handed to her the statutes he had drawn up for the proposed academy. On the 11th of February he died. The queen wished to bury him at the feet of the Swedish kings, and to raise a costly mausoleum in his honour; but these plans were overruled, and a plain monument in the Catholic cemetery was all that marked the place of his rest. Sixteen years after his death the French treasurer d'Alibert made arrangements for the conveyance of the ashes to his native land; and in 1667 they were interred in the church of Ste Geneviève du Mont, the modern Pantheon. In 1819, after being temporarily deposited in a stone sarcophagus in the court of the Louvre during the Revolutionary epoch, they were transferred to St Germain-des-Près, where they now repose between Montfaucon and Mabillon. A monument was raised to his memory at Stockholm by Gustavus III.; and a modern statue has been erected to him at Tours, with an inscription on the pedestal: "Je pense, donc je suis."

Descartes never married, and had little of the amorous in his temperament. He has alluded to a childish fancy for a young girl with a slight obliquity of vision; but he only mentions it *à propos* of the consequent weakness which led him to associate such a defect with beauty. In person he was small, with large head, projecting brow, prominent nose, and eyes wide apart, with black hair coming down almost to his eyebrows. His voice was feeble. He usually dressed in black, with unobtrusive propriety.

Philosophy. — The end of all study, says Descartes, in one of his earliest writings, ought to be to guide the mind to form true and sound judgments on every thing that may be presented to it. The sciences in their totality are but the intelligence of man; and all the details of knowledge have no value save as they strengthen the understanding. The mind is not for the sake of knowledge, but knowledge for the sake of the mind. This is the reassertion of a principle which the middle ages had lost sight of — that knowledge, if it is to have any value, must be intelligence, and not erudition.

But how is intelligence, as opposed to erudition, possible? The answer to that question is the method of Descartes. That idea of a method grew up with his study of geometry *Mathematics.* and arithmetic, — the only branches of knowledge which he would allow to be "made sciences." But they did not satisfy his demand for intelligence. "I found in them," he says, "different propositions on numbers of which, after a calculation, I perceived the truth; as for the figures, I had, so to speak, many truths put before my eyes, and many others concluded from them by analogy; but it did not seem to me that they told my mind with sufficient clearness why the things were as I was shown, and by what means their discovery was attained." The mathematics of which he thus speaks included the geometry of the ancients, as it had been handed down to the modern world, and arithmetic with the developments it had received in the direction of algebra. The ancient geometry, as we know it, is a wonderful monument of ingenuity — a series of *tours de force*, in which each problem to all appearance stands alone, and, if solved, is solved by methods and principles peculiar to itself. Here and there particular curves, for example, had been obliged to yield the secret of their tangent; but the ancient geometers apparently had no consciousness of the general bearings of the methods which they so successfully applied. Each problem was something unique; the elements of transition from one to another were wanting; and the next step which mathematics had to make was to find some method of reducing, for instance, all curves to a common notation. When that was found, the solution of one problem would immediately entail the solution of all others which belonged to the same series as itself.

The arithmetical half of mathematics, which had been gradually growing into algebra, and had decidedly established itself as such in the *Ad logisticen speciosam notae priores* of François Vieta (1540-1603), supplied to some extent the means of generalizing geometry. And the algebraists or arithmeticians of the 16th century, such as Luca Pacioli (Lucas de Borgo), Geronimo or Girolamo Cardano (1501-1576), and Niccola Tartaglia (1506-1559), had used geometrical constructions to throw light on the solution of particular equations. But progress was made difficult, in consequence of the clumsy and irregular nomenclature employed. With Descartes the use of exponents as now employed for denoting the powers of a quantity becomes systematic; and without some such step by which the homogeneity of successive powers is at once recognized, the binomial theorem could

scarcely have been detected. The restriction of the early letters of the alphabet to known, and of the late letters to unknown, quantities is also his work. In this and other details he crowns and completes, in a form henceforth to be dominant for the language of algebra, the work of numerous obscure predecessors, such as Étienne de la Roche, Michael Stifel or Stiefel (1487-1567), and others.

Having thus perfected the instrument, his next step was to apply it in such a way as to bring uniformity of method into the isolated and independent operations of geometry. “I had no intention,” he says in the *Method*, “of attempting to master all the particular sciences commonly called mathematics; but as I observed that, with all differences in their objects, they agreed in considering merely the various relations or proportions subsisting among these objects, I thought it best for my purpose to consider these relations in the most general form possible, without referring them to any objects in particular except such as would most facilitate the knowledge of them. Perceiving further, that in order to understand these relations I should sometimes have to consider them one by one, and sometimes only to bear them in mind or embrace them in the aggregate, I thought that, in order the better to consider them individually, I should view them as subsisting between straight lines, than which I could find no objects more simple, or capable of being more distinctly represented to my imagination and senses; and on the other hand that, in order to retain them in the memory or embrace an aggregate of many, I should express them by certain characters, the briefest possible.” Such is the basis of the algebraical or modern analytical geometry. The problem of the curves is solved by their reduction to a problem of straight lines; and the locus of any point is determined by its distance from two given straight lines — the axes of co-ordinates. Thus Descartes gave to modern geometry that abstract and general character in which consists its superiority to the geometry of the ancients. In another question connected with this, the problem of drawing tangents to any curve, Descartes was drawn into a controversy with Pierre (de) Fermat (1601-1663), Gilles Persone de Roberval (1602-1675), and Girard Desargues (1593-1661). Fermat and Descartes agreed in regarding the tangent to a curve as a secant of that curve with the two points of intersection coinciding, while Roberval regarded it as the direction of the composite movement by which the curve can be described. Both these methods, differing from that now employed, are interesting as preliminary

steps towards the method of fluxions and the differential calculus. In pure algebra Descartes expounded and illustrated the general methods of solving equations up to those of the fourth degree (and believed that his method could go beyond), stated the law which connects the positive and negative roots of an equation with the changes of sign in the consecutive terms, and introduced the method of indeterminate coefficients for the solution of equations. These innovations have been attributed on inadequate evidence to other algebraists, *e.g.* William Oughtred (1575-1660) and Thomas Harriot (1560-1621).

The *Geometry* of Descartes, unlike the other parts of his essays, is not easy reading. It dashes at once into the middle of the subjects with the examination of a problem which had baffled the ancients, and seems as if it were tossed at the heads of the French geometers as a challenge. An edition of it appeared subsequently, with notes by his friend Florimond de Beaune (1601-1652), calculated to smooth the difficulties of the work. All along mathematics was regarded by Descartes rather as the envelope than the foundation of his method; and the "universal mathematical science" which he sought after was only the prelude of a universal science of all-embracing character.

The method of Descartes rests upon the proposition that all the objects of our knowledge fall into series, of which the members are more or less known by means of one another. In *Descartes' method.* every such series or group there is a dominant element, simple and irresoluble, the standard on which the rest of the series depends, and hence, so far as that group or series is concerned, absolute. The other members of the group are relative and dependent, and only to be understood as in various degrees subordinate to the primitive conception. The characteristic by which we recognize the fundamental element in a series is its intuitive or self-evident character; it is given by "the evident conception of a healthy and attentive mind so clear and distinct that no doubt is left." Having discovered this prime or absolute member of the group, we proceed to consider the degrees in which the other members enter into relation with it. Here deduction comes into play to show the dependence of one term upon the others; and, in the case of a long chain of intervening links, the problem for intelligence is so to enunciate every element, and so to repeat the connexion that we may finally grasp all the links of the chain in one. In this way we, as it were, bring the causal or primal term and its remotest dependent immediately together, and raise a

derivative knowledge into one which is primary and intuitive. Such are the four points of Cartesian method: — (1) Truth requires a clear and distinct conception of its object, excluding all doubt; (2) the objects of knowledge naturally fall into series or groups; (3) in these groups investigation must begin with a simple and indecomposable element, and pass from it to the more complex and relative elements; (4) an exhaustive and immediate grasp of the relations and interconnexion of these elements is necessary for knowledge in the fullest sense of that word.

"There is no question," he says in anticipation of Locke and Kant, "more important to solve than that of knowing what human knowledge is and how far it extends." "This is a question which ought to be asked at least once in their lives by all who seriously wish to gain wisdom. The inquirer will find that the first thing to know is intellect, because on it depends the knowledge of all other things. Examining next what immediately follows the knowledge of pure intellect, he will pass in review all the other means of knowledge, and will find that they are two (or three), the imagination and the senses (and the memory). He will therefore devote all his care to examine and distinguish these three means of knowledge; and seeing that truth and error can, properly speaking, be only in the intellect, and that the two other modes of knowledge are only occasions, he will carefully avoid whatever can lead him astray." This separation of intellect from sense, imagination and memory is the cardinal precept of the Cartesian logic; it marks off clear and distinct (*i.e.* adequate and vivid) from obscure, fragmentary and incoherent conceptions.

The *Discourse of Method* and the *Meditations* apply what the *Rules for the Direction of the Mind* had regarded in particular instances to our conceptions of the world as a whole. *Fundamental principles of philosophy.* They propose, that is, to find a simple and indecomposable point, or absolute element, which gives to the world and thought their order and systematization. The grandeur of this attempt is perhaps unequalled in the annals of philosophy. The three main steps in the argument are the veracity of our thought when that thought is true to itself, the inevitable uprising of thought from its fragmentary aspects in our habitual consciousness to the infinite and perfect existence which God is, and the ultimate reduction of the material universe to extension and local movement. There are the central dogmas of logic, metaphysics and physics, from which start the subsequent inquiries of Locke, Leibnitz and Newton. They are also the

direct antitheses to the scepticism of Montaigne and Pascal, to the materialism of Gassendi and Hobbes, and to the superstitious anthropomorphism which defaced the reawakening sciences of nature. Descartes laid down the lines on which modern philosophy and science were to build. But himself no trained metaphysician, and unsusceptible to the lessons of history, he gives but fragments of a system which are held together, not by their intrinsic consistency, but by the vigour of his personal conviction transcending the weaknesses and collisions of his several arguments. “All my opinions,” he says, “are so conjoined, and depend so closely upon one another, that it would be impossible to appropriate one without knowing them all.” Yet every disciple of Cartesianism seems to disprove the dictum by his example.

The very moment when we begin to think, says Descartes, when we cease to be merely receptive, when we draw back and fix our attention on any point whatever of our belief, — that moment doubt begins. If we even stop for an instant to ask ourselves how a word ought to be spelled, the deeper we ponder that one word by itself the more hopeless grows the hesitation. The doubts thus awakened must not be stifled, but pressed systematically on to the point, if such a point there be, where doubt confutes itself. The doubt as to the details is natural; it is no less natural to have recourse to authority to silence the doubt. The remedy proposed by Descartes is (while not neglecting our duties to others, ourselves and God) to let doubt range unchecked through the whole fabric of our customary convictions. One by one they refuse to render any reasonable account of themselves; each seems a mere chance, and the whole tends to elude us like a mirage which some malignant power creates for our illusion. Attacked in detail, they vanish one after another into as many teasing spectra of uncertainty. We are seeking from them what they cannot give. But when we have done our worst in unsettling them, we come to an ultimate point in the fact that it is *we* who are doubting, *we* who are thinking. We may doubt that we have hands or feet, that we sleep or wake, and that there is a world of material things around us; but we cannot *Cogito ergo sum.* doubt that we are doubting. We are certain that we are thinking, and in so far as we are thinking we are. *Je pense, donc je suis.* In other words, the criterion of truth is a clear and distinct conception, excluding all possibility of doubt.

The fundamental point thus established is the veracity of consciousness when it does not go beyond itself, or does not postulate something which is

external to itself. At this point Gassendi arrested Descartes and addressed his objections to him as pure intelligence, — *O mens!* But even this *mens*, or mind, is but a point — we have found no guarantee as yet for its continuous existence. The analysis must be carried deeper, if we are to gain any further conclusions.

Amongst the elements of our thought there are some which we can make and unmake at our pleasure; there are others which come and go without our wish; there is also a third class which is of the very essence of our thinking, and which dominates our conceptions. We find that all our ideas of limits, sorrows and weaknesses presuppose an infinite, perfect and ever-blessed something beyond them and including them, — that all our ideas, in all their series, converge to one central idea, in which they find their explanation. The formal fact of thinking is what constitutes our being; but this thought leads us back, when we consider its concrete contents, to the necessary pre-supposition on which our ideas depend, the permanent cause on which they and we as conscious beings depend. We have therefore the idea of an infinite, perfect and all-powerful being — an idea which cannot be the creation of ourselves, and must be given by some being who really possesses all that we in idea attribute to him. Such a being he identifies with God. But the ordinary idea of God can scarcely be identified with such a conception. “The majority of men,” he says himself, “do not think of God as an infinite and incomprehensible being, and as the sole author from whom all things depend; they go no further than the letters of his name.” *Nature of God.* “The vulgar almost imagine him as a finite thing.” The God of Descartes is not merely the creator of the material universe; he is also the father of all truth in the intellectual world. “The metaphysical truths,” he says, “styled eternal have been established by God, and, like the rest of his creatures, depend entirely upon him. To say that these truths are independent of him is to speak of God as a Jupiter or a Saturn, — to subject him to Styx and the Fates.” The laws of thought, the truths of number, are the decrees of God. The expression is anthropomorphic, no less than the dogma of material creation; but it is an attempt to affirm the unity of the intellectual and the material world. Descartes establishes a philosophic monotheism, — by which the medieval polytheism of substantial forms, essences and eternal truths fades away before God, who is the ruler of the intellectual world no less than of the kingdom of nature and of grace.

To attach a clear and definite meaning to the Cartesian doctrine of God, to show how much of it comes from the Christian theology and how much from the logic of idealism, how far the conception of a personal being as creator and preserver mingles with the pantheistic conception of an infinite and perfect something which is all in all, would be to go beyond Descartes and to ask for a solution of difficulties of which he was scarcely aware. It seems impossible to deny that the tendency of his principles and his arguments is mainly in the line of a metaphysical absolute, as the necessary completion and foundation of all being and knowledge. Through the truthfulness of that God as the author of all truth he derives a guarantee for our perceptions in so far as these are clear and distinct. And it is in guaranteeing the veracity of our clear and distinct conceptions that the value of his deduction of God seems in his own estimate to rest. All conceptions which do not possess these two attributes — of being vivid in themselves and discriminated from all others — cannot be true. But the larger part of our conceptions are in such a predicament. We think of things not in the abstract elements of the things themselves, but in connexion with, and in language which presupposes, other things. Our idea of body, *e.g.*, involves colour and weight, and yet when we try to think carefully, and without assuming anything, we find that we cannot attach any distinct idea to these terms when applied to body. In truth therefore these attributes do not belong to body at all; and if we go on in the same way testing the received qualities of matter, we shall find that in the last resort we understand nothing by it but extension, with the secondary and derivative characters of divisibility and mobility.

But it would again be useless to ask how extension as the characteristic attribute of matter is related to mind which thinks, and how God is to be regarded in reference to extension. The force of the universe is swept up and gathered in God, who communicates motion to the parts of extension, and sustains that motion from moment to moment; and in the same way the force of mind has really been concentrated in God. Every moment one expects to find Descartes saying with Hobbes that man’s thought has created God, or with Spinoza and Malebranche that it is God who really thinks in the apparent thought of man. After all, the metaphysical theology of Descartes, however essential in his own eyes, serves chiefly as the ground for constructing his theory of man and of the universe. His fundamental hypothesis relegates to God all forces in their ultimate origin.

Hence the world is left open for the free play of mechanics and geometry. The disturbing conditions of will, life and organic forces are eliminated from the problem; he starts with the clear and distinct idea of extension, figured and moved, and thence by mathematical laws he gives a hypothetical explanation of all things. Such explanation of physical phenomena is the main problem of Descartes, and it goes on encroaching upon territories once supposed proper to the mind. Descartes began with the certainty that we are thinking beings; that region remains untouched; but up to its very borders the mechanical explanation of nature reigns unchecked.

The physical theory, in its earlier form in *The World*, and later in the *Principles of Philosophy* (which the present account follows), rests upon the metaphysical conclusions of the *Physical theory. Meditations*. It proposes to set forth the genesis of the existing universe from principles which can be plainly understood, and according to the acknowledged laws of the transmission of movement. The idea of force is one of those obscure conceptions which originate in an obscure region, in the sense of muscular power. The true physical conception is motion, the ultimate ground of which is to be sought in God’s infinite power. Accordingly the quantity of movement in the universe, like its mover, can neither increase nor diminish. The only circumstance which physics has to consider is the transference of movement from one particle to another, and the change of its direction. Man himself cannot increase the sum of motion; he can only alter its direction. The whole conception of force may disappear from a theory of the universe; and we can adopt a geometrical definition of motion as the shifting of one body from the neighbourhood of those bodies which immediately touch it, and which are assumed to be at rest, to the neighbourhood of other bodies. Motion, in short, is strictly locomotion, and nothing else.

Descartes has laid down three laws of nature, and seven secondary laws regarding impact. The latter are to a large extent incorrect. The first law affirms that every body, so far as it is altogether unaffected by extraneous causes, always perseveres in the same state of motion or of rest; and the second law that simple or elementary motion is always in a straight line. These doctrines of inertia, and of the composite character of curvilinear motion, were scarcely apprehended even by Kepler or Galileo; but they follow naturally from the geometrical analysis of Descartes.

Extended body has no limits to its extent, though the power of God has divided it in lines discriminating its parts in endless ways. The infinite

universe is infinitely full of matter. Empty space, as distinguished from material extension, is a fictitious abstraction. There is no such thing really as a vacuum, any more than there are atoms or ultimate indivisible particles. In both these doctrines of *à priori* science Descartes has not been subverted, but, if anything, corroborated by the results of experimental physics; for the so-called atoms of chemical theory already presuppose, from the Cartesian point of view, certain aggregations of the primitive particles of matter. Descartes regards matter as uniform in character throughout the universe; he anticipates, as it were, from his own transcendental ground, the revelations of spectrum analysis as applied to the sun and stars. We have then to think of a full universe of matter (and matter = extension) divided and figured with endless variety, and set (and kept) in motion by God; and any sort of division, figure and motion will serve the purposes of our supposition as well as another. “Scarcely any supposition,” he says, “can be made from which the same result, though possibly with greater difficulty, might not be deduced by the same laws of nature; for since, in virtue of these laws, matter successively assumes all the forms of which it is capable, if we consider these forms in order, we shall at one point or other reach the existing form of the world, so that no error need here be feared from a false supposition.” As the movement of one particle in a closely-packed universe is only possible if all other parts move simultaneously, so that the last in the series steps into the place of the first; and as the figure and division of the particles varies in each point in the universe, there will inevitably at the same instant result throughout the universe an innumerable host of more or less circular movements, and of vortices or whirlpools of material particles varying in size and velocity. Taking for convenience a limited *Theory of vortices.* portion of the universe, we observe that in consequence of the circular movement, the particles of matter have their corners pared off by rubbing against each other; and two species of matter thus arise, — one consisting of small globules which continue their circular motion with a (centrifugal) tendency to fly off from the centre as they swing round the axis of rotation, while the other, consisting of the fine dust — the filings and parings of the original particles — gradually becoming finer and finer, and losing its velocity, tends (centripetally) to accumulate in the centre of the vortex, which has been gradually left free by the receding particles of globular matter. This finer matter which collects in the centre of each vortex is the *first* matter of Descartes — it constitutes the sun or star. The spherical

particles are the *second* matter of Descartes, and their tendency to propel one another from the centre in straight lines towards the circumference of each vortex is what gives rise to the phenomenon of light radiating from the central star. This second matter is atmosphere or firmament, which envelops and revolves around the central accumulation of first matter.

A third form of matter is produced from the original particles. As the small filings produced by friction seek to pass through the interstices between the rapidly revolving spherical particles in the vortex, they are detained and become twisted and channelled in their passage, and when they reach the edge of the inner ocean of solar dust they settle upon it as the froth and foam produced by the agitation of water gathers upon its surface. These form what we term spots in the sun. In some cases they come and go, or dissolve into an aether round the sun; but in other cases they gradually increase until they form a dense crust round the central nucleus. In course of time the star, with its expansive force diminished, suffers encroachments from the neighbouring vortices, and at length they catch it up. If the velocity of the decaying star be greater than that of any part of the vortex which has swept it up, it will ere long pass out of the range of that vortex, and continue its movement from one to another. Such a star is a comet. But in other cases the encrusted star settles in that portion of the revolving vortex which has a velocity equivalent to its own, and so continues to revolve in the vortex, wrapped in its own firmament. Such a reduced and impoverished star is a planet; and the several planets of our solar system are the several vortices which from time to time have been swept up by the central sun-vortex. The same considerations serve to explain the moon and other satellites. They too were once vortices, swallowed up by some other, which at a later day fell a victim to the sweep of our sun.

Such in mere outline is the celebrated theory of *vortices,* which for about twenty years after its promulgation reigned supreme in science, and for much longer time opposed a tenacious resistance to rival doctrines. It is one of the grandest hypotheses which ever have been formed to account by mechanical processes for the movements of the universe. While chemistry rests in the acceptance of ultimate heterogeneous elements, the vortex-theory assumed uniform matter through the universe, and reduced cosmical physics to the same principles as regulate terrestrial phenomena. It ended the old Aristotelian distinction between the sphere beneath the moon and the starry spaces beyond. It banished the spirits and genii, to which even

Kepler had assigned the guardianship of the planetary movements; and, if it supposes the globular particles of the envelope to be the active force in carrying the earth round the sun, we may remember that Newton himself assumed an aether for somewhat similar purposes. The great argument on which the Cartesians founded their opposition to the Newtonian doctrine was that attraction was an occult quality, not wholly intelligible by the aid of mere mechanics. The Newtonian theory is an analysis of the elementary movements which in their combination determine the planetary orbits, and gives the formula of the proportions according to which they act. But the Cartesian theory, like the later speculations of Kant and Laplace, proposes to give a hypothetical explanation of the circumstances and motions which in the normal course of things led to the state of things required by the law of attraction. In the judgment of D'Alembert the Cartesian theory was the best that the observations of the age admitted; and "its explanation of gravity was one of the most ingenious hypotheses which philosophy ever imagined." That the explanation fails in detail is undoubted: it does not account for the ellipticity of the planets; it would place the sun, not in one focus, but in the centre of the ellipse; and it would make gravity directed towards the centre only under the equator. But these defects need not blind us to the fact that this hypothesis made the mathematical progress of Hooke, Borelli and Newton much more easy and certain. Descartes professedly assumed a simplicity in the phenomena which they did not present. But such a hypothetical simplicity is the necessary step for solving the more complex problems of nature. The danger lies not in forming such hypotheses, but in regarding them as final, or as more than an attempt to throw light upon our observation of the phenomena. In doing what he did, Descartes actually exemplified that reduction of the processes of nature to mere transposition of the particles of matter, which in different ways was a leading idea in the minds of Bacon, Hobbes and Gassendi. The defects of Descartes lie rather in his apparently imperfect apprehension of the principle of movements uniformly accelerated which his contemporary Galileo had illustrated and insisted upon, and in the indistinctness which attaches to his views of the transmission of motion in cases of impact. It should be added that the modern theory of vortex-atoms (Lord Kelvin's) to explain the constitution of matter has but slight analogy with Cartesian doctrine, and finds a parallel, if anywhere, in a modification of that doctrine by Malebranche.

Besides the last two parts of the *Principles of Philosophy*, the physical writings of Descartes include the *Dioptrics* and *Meteors*, as well as passages in the letters. His optical investigations are perhaps the subject in which he most contributed to the progress of science; and the lucidity of exposition which marks his *Dioptrics* stands conspicuous even amid the generally luminous *Optical theories.* style of his works. Its object is a practical one, to determine by scientific considerations the shape of lens best adapted to improve the capabilities of the telescope, which had been invented not long before. The conclusions at which he arrives have not been so useful as he imagined, in consequence of the mechanical difficulties. But the investigation by which he reaches them has the merit of first prominently publishing and establishing the law of the refraction of light. Attempts have been made, principally founded on some remarks of Huygens, to show that Descartes had learned the principles of refraction from the manuscript of a treatise by Willebrord Snell, but the facts are uncertain; and, so far as Descartes founds his optics on any one, it is probably on the researches of Kepler. In any case the discovery is to some extent his own, for his proof of the law is founded upon the theory that light is the propagation of the aether in straight lines from the sun or luminous body to the eye (see Light). Thus he approximates to the wave theory of light, though he supposed that the transmission of light was instantaneous. The chief of his other contributions to optics was the explanation of the rainbow — an explanation far from complete, since the unequal refrangibility of the rays of light was yet undiscovered — but a decided advance upon his predecessors, notably on the *De radiis visus et lucis* (1611) of Marc-Antonio de Dominis, archbishop of Spalato.

If Descartes had contented himself with thus explaining the phenomena of gravity, heat, magnetism, light and similar forces by means of the molecular movements of his vortices, even such a theory would have excited admiration. But he did not stop short in the region of what is usually termed physics. Chemistry and biology are alike swallowed up in the one science of physics, and reduced to a problem of mechanism. This theory, he believed, would afford an explanation of every phenomenon whatever, and in nearly every department of knowledge he has given specimens of its power. But the most remarkable and daring application of the theory was to account for the phenomena of organic life, especially in animals and man. “If we possessed a thorough knowledge,” he says, “of all the parts of the

seed of any species of animal (*e.g.* man), we could from that alone, by reasons entirely mathematical and certain, deduce the whole figure and conformation of each of its members, and, conversely, if we knew several peculiarities of this conformation, we could from these deduce the nature of its seed." The organism in this way is regarded as a machine, constructed from the particles of the seed, which in virtue of the laws of motion have arranged themselves (always under the governing power of God) in the particular animal shape in which we see them. The doctrine of the circulation of the blood, which Descartes adopted from Harvey, supplied additional arguments in favour of his mechanical theory, and he probably did much to popularize the discovery. A fire without light, compared to the heat which gathers in a haystack when the hay has been stored before it was properly dry — heat, in short, as an agitation of the particles — is the motive cause of the contraction and dilatations of the heart. Those finer particles of the blood which become extremely rarefied during this process pass off in two directions — one portion, and the least important in the theory, to the organs of generation, the other portion to the cavities of the brain. There not merely do they serve to nourish the organ, they also give rise to a fine ethereal flame or wind through the action of the brain upon them, and thus form the so-called "animal" spirits. From the brain these spirits are conveyed through the body by means of the nerves, regarded by Descartes as tubular vessels, resembling the pipes conveying the water of a spring to act upon the mechanical appliances in an artificial fountain. The nerves conduct the animal spirits to act upon the muscles, and in their turn convey the impressions of the organs to the brain.

Man and the animals as thus described are compared to automata, and termed machines. The vegetative and sensitive souls which the Aristotelians had introduced to break the leap between inanimate matter and man are ruthlessly swept away; only one soul, the rational, remains, and that is restricted to man. *Automatism.* One hypothesis supplants the various principles of life; the rule of absolute mechanism is as complete in the animal as in the cosmos. Reason and thought, the essential quality of the soul, do not belong to the brutes; there is an impassable gulf fixed between man and the lower animals. The only sure sign of reason is the power of language — *i.e.* of giving expression to general ideas; and language in that sense is not found save in man. The cries of animals are but the working of the curiously-contrived machine, in which, when one portion is touched in a

certain way, the wheels and springs concealed in the interior perform their work, and, it may be, a note supposed to express joy or pain is evolved; but there is no consciousness or feeling. “The animals act naturally and by springs, like a watch.” “The greatest of all the prejudices we have retained from our infancy is that of believing that the beasts think.” If the beasts can properly be said to see at all, “they see as we do when our mind is distracted and keenly applied elsewhere; the images of outward objects paint themselves on the retina, and possibly even the impressions made in the optic nerves determine our limbs to different movements, but we feel nothing of it all, and move as if we were automata.” The sentience of the animal to the lash of his tyrant is not other than the sensitivity of the plant to the influences of light and heat. It is not much comfort to learn further from Descartes that “he denies life to no animal, but makes it consist in the mere heat of the heart. Nor does he deny them feeling in so far as it depends on the bodily organs.”

Descartes, with an unusual fondness for the letter of Scripture, quotes oftener than once in support of this monstrous doctrine. the dictum, “the blood is the life”; and he remarks, with some sarcasm possibly, that it is a comfortable theory for the eaters of animal flesh. And the doctrine found acceptance among some whom it enabled to get rid of the difficulties raised by Montaigne and those who allowed more difference between animal and animal than between the higher animals and man. It also encouraged vivisection — a practice common with Descartes himself. The recluses of Port Royal seized it eagerly, discussed automatism, dissected living animals in order to show to a morbid curiosity the circulation of the blood, were careless of the cries of tortured dogs, and finally embalmed the doctrine in a syllogism of their logic, — No matter thinks; every soul of beast is matter: therefore no soul of beast thinks.

But whilst all the organic processes in man go on mechanically, and though by reflex action he may repel attack unconsciously, still the first affirmation of the system was that man was essentially a thinking being; and, while we retain this original dictum, it must not be supposed that the mind is a mere spectator, or like the boatman in the boat. Of course a unity of nature *Relation of mind and body.* is impossible between mind and body so described. And yet there is a unity of composition, a unity so close that the compound is “really one and in a sense indivisible.” You cannot in the actual man cut soul and body asunder; they interpenetrate in every member.

But there is one point in the human frame — a point midway in the brain, single and free, which may in a special sense be called the seat of the mind. This is the so-called conarion, or pineal gland, where in a minimized point the mind on one hand and the vital spirits on the other meet and communicate. In that gland the mystery of creation is concentrated; thought meets extension and directs it; extension moves towards thought and is perceived. Two clear and distinct ideas, it seems, produce an absolute mystery. Mind, driven from the field of extension, erects its last fortress in the pineal gland. In such a state of despair and destitution there is no hope for spiritualism, save in God; and Clauberg, Geulincx and Malebranche all take refuge under the shadow of his wings to escape the tyranny of extended matter.

In the psychology of Descartes there are two fundamental modes of thought, — perception and volition. “It seems to me,” he says, “that in receiving such and such an idea the mind is passive, and that it is active only in volition; that its *Psychology.* ideas are put in it partly by the objects which touch the senses, partly by the impressions in the brain, and partly also by the dispositions which have preceded in the mind itself and by the movements of its will.” The will, therefore, as being more originative, has more to do with true or false judgments than the understanding. Unfortunately, Descartes is too lordly a philosopher to explain distinctly what either understanding or will may mean. But we gather that in two directions our reason is bound up with bodily conditions, which make or mar it, according as the will, or central energy of thought, is true to itself or not. In the range of perception, intellect is subjected to the material conditions of sense, memory and imagination; and in infancy, when the will has allowed itself to assent precipitately to the conjunctions presented to it by these material processes, thought has become filled with obscure ideas. In the moral sphere the passions or emotions (which Descartes reduces to the six primitive forms of admiration, love, hatred, desire, joy and sadness) are the perceptions or sentiments of the mind, caused and maintained by some movement of the vital spirits, but specially referring to the mind only. The presentation of some object of dread, for example, to the eye has or may have a double effect. On one hand the animal spirits “reflected” from the image formed on the pineal gland proceed through the nervous tubes to make the muscles turn the back and lift the feet, so as to escape the cause of the terror. Such is the reflex and mechanical movement independent of the

mind. But, on the other hand, the vital spirits cause a movement in the gland by which the mind perceives the affection of the organs, learns that something is to be loved or hated, admired or shunned. Such perceptions dispose the mind to pursue what nature dictates as useful. But the estimate of goods and evils which they give is indistinct and unsatisfactory. The office of reason is to give a true and distinct appreciation of the values of goods and evils; or firm and determinate judgments touching the knowledge of good and evil are our proper arms against the influence of the passions. We are free, therefore, through knowledge: *ex magna luce in intellectu sequitur magna propensio in voluntate*, and *omnis peccans est ignorans*. "If we clearly see that what we are doing is wrong, it would be impossible for us to sin, so long as we saw it in that light." Thus the highest liberty, as distinguished from mere indifference, proceeds from clear and distinct knowledge, and such knowledge can only be attained by firmness and resolution, *i.e.* by the continued exercise of the will. Thus in the perfection of man, as in the nature of God, will and intellect must be united. For thought, will is as necessary as understanding. And innate ideas therefore are mere capacities or tendencies, — possibilities which apart from the will to think may be regarded as nothing at all.

The Cartesian School. — The philosophy of Descartes fought its first battles and gained its first triumphs in the country of his adoption. In his lifetime his views had been taught in Utrecht and Leiden. In the universities of the Netherlands and of lower Germany, as yet free from the conservatism of the old-established seats of learning, the new system gained an easy victory over Aristotelianism, and, as it was adapted for lectures and examinations, soon became almost as scholastic as the doctrines it had supplanted. At Leiden, Utrecht, Groningen, Franeker, Breda, Nimeguen, Harderwyk, Duisburg and Herborn, and at the Catholic university of Louvain, Cartesianism was warmly expounded and defended in seats of learning, of which many are now left desolate, and by adherents whose writings have for the most part long lost interest for any but the antiquary.

The Cartesianism of Holland was a child of the universities, and its literature is mainly composed of commentaries upon the original texts, of theses discussed in the schools, *Holland.* and of systematic expositions of Cartesian philosophy for the benefit of the student. Three names stand out in this Cartesian professoriate, — Wittich, Clauberg and Geulincx. Christoph Wittich (1625-1687), professor at Duisburg and Leiden, is a

representative of the moderate followers who professed to reconcile the doctrines of their school with the faith of Christendom and to refute the theology of Spinoza. Johann Clauberg (*q.v.*) commented clause by clause upon the *Meditations* of Descartes; but he specially claims notice for his work *De corporis et animae in homine conjunctione*, where he maintains that the bodily movements are merely procatarctic causes (*i.e.* antecedents, but not strictly causes) of the mental action, and sacrifices the independence of man to the omnipotence of God. The same tendency is still more pronounced in Arnold Geulincx (*q.v.*). With him the reciprocal action of mind and body is altogether denied; they resemble two clocks, so made by the artificer as to strike the same hour together. The mind can act only upon itself; beyond that limit, the power of God must intervene to make any seeming interaction possible between body and soul. Such are the half-hearted attempts at consistency in Cartesian thought, which eventually culminate in the pantheism of Spinoza (see Cartesianism).

Descartes occasionally had not scrupled to interpret the Scriptures according to his own tenets, while still maintaining, when their letter contradicted him, that the Bible was not meant to teach the sciences. Similar tendencies are found amongst his followers. Whilst Protestant opponents put him in the list of atheists like Vanini, and the Catholics held him as dangerous as Luther or Calvin, there were zealous adherents who ventured to prove the theory of vortices in harmony with the book of Genesis. It was this rationalistic treatment of the sacred writings which helped to confound the Cartesians with the allegorical school of John Cocceius, as their liberal doctrines in theology justified the vulgar identification of them with the heresies of Socinian and Arminian. The chief names in this advanced theology connected with Cartesian doctrines are Ludwig Meyer, the friend and editor of Spinoza, author of a work termed *Philosophia scripturae interpres* (1666); Balthasar Bekker, whose *World Bewitched* helped to discredit the superstitious fancies about the devil; and Spinoza, whose *Tractatus theologico-politicus* is in some respects the classical type of rational criticism up to the present day. Against this work and the *Ethics* of Spinoza the orthodox Cartesians (who were in the majority), no less than sceptical hangers-on like Bayle, raised an all but universal howl of reprobation, scarcely broken for about a century.

In France Cartesianism won society and literature before it penetrated into the universities. Clerselier (the friend of Descartes and his literary

executor), his son-in-law *France.* Rohault (who achieved that relationship through his Cartesianism), and others, opened their houses for readings to which the intellectual world of Paris — its learned professors not more than the courtiers and the fair sex, — flocked to hear the new doctrines explained, and possibly discuss their value. Grand seigneurs, like the prince of Condé, the duc de Nevers and the marquis de Vardes, were glad to vary the monotony of their feudal castles by listening to the eloquent rehearsals of Malebranche or Regis. And the salons of Mme de Sévigné, of her daughter Mme de Grignan, and of the duchesse de Maine for a while gave the questions of philosophy a place among the topics of polite society, and furnished to Molière the occasion of his *Femmes savantes*. The Château of the duc de Luynes, the translator of the *Meditations*, was the home of a Cartesian club, that discussed the questions of automatism and of the composition of the sun from filings and parings, and rivalled Port Royal in its vivisections. The cardinal de Retz in his leisurely age at Commercy found amusement in presiding at disputations between the more moderate Cartesians and Don Robert Desgabets, who interpreted Descartes in an original way of his own. Though rejected by the Jesuits, who found peripatetic formulae a faithful weapon against the enemies of the church, Cartesianism was warmly adopted by the Oratory, which saw in Descartes something of St Augustine, by Port Royal, which discovered a connexion between the new system and Jansenism, and by some amongst the Benedictines and the order of Ste Geneviève.

The popularity which Cartesianism thus gained in the social and literary circles of the capital was largely increased by the labours of Pierre-Sylvain Regis (1632-1707). On his visit to Toulouse in 1665, with a mission from the Cartesian chiefs, his lectures excited boundless interest; ladies threw themselves with zeal and ability into the study of philosophy; and Regis himself was made the guest of the civic corporation. In 1671 scarcely less enthusiasm was roused in Montpellier; and in 1680 he opened a course of lectures at Paris, with such acceptance that hearers had to take their seats in advance. Regis, by removing the paradoxes and adjusting the metaphysics to the popular powers of apprehension, made Cartesianism popular, and reduced it to a regular system.

But a check was at hand. Descartes, in his correspondence with the Jesuits, had shown an almost cringing eagerness to have their powerful organization on his side. Especially he had written to Père Mesland, one of

the order, to show how the Catholic doctrine of the eucharist might be made compatible with his theories of matter. But his undue haste to arrange matters with the church only served to compromise him more deeply. Unwise admirers and malicious opponents exaggerated the theological bearings of his system in this detail; and the efforts of the Jesuits succeeded in getting the works of Descartes, in November 1663, placed upon the index of prohibited books, — *donec corrigantur*. Thereupon the power of church and state enforced by positive enactments the passive resistance of old institutions to the novel theories. In 1667, the oration at the interment was forbidden by royal order. In 1669, when the chair of philosophy at the Collège Royal fell vacant, one of the four selected candidates had to sustain a thesis against "the pretended new philosophy of Descartes." In 1671 the archbishop of Paris, by the king's order, summoned the heads of the university to his presence, and enjoined them to take stricter measures against philosophical novelties dangerous to the faith. In 1673 a decree of the parlement against Cartesian and other unlicensed theories was on the point of being issued, and was only checked in time by the appearance of a burlesque mandamus against the intruder Reason, composed by Boileau and some of his brother-poets. Yet in 1675 the university of Angers was empowered to repress all Cartesian teaching within its domain, and actually appointed a commission charged to look for such heresies in the theses and the students' note-books of the college of Anjou belonging to the Oratory. In 1677 the university of Caen adopted not less stringent measures against Cartesianism. And so great was the influence of the Jesuits, that the congregation of St Maur, the canons of Ste Geneviève, and the Oratory laid their official ban on the obnoxious doctrines. From the real or fancied *rapprochements* between Cartesianism and Jansenism, it became for a while impolitic, if not dangerous, to avow too loudly a preference for Cartesian theories. Regis was constrained to hold back for ten years his *System of Philosophy*; and when it did appear, in 1690, the name of Descartes was absent from the title-page. There were other obstacles besides the mild persecutions of the church. Pascal and other members of Port Royal openly expressed their doubts about the place allowed to God in the system; the adherents of Gassendi met it by resuscitating atoms; and the Aristotelians maintained their substantial forms as of old; the Jesuits argued against the arguments for the being of God, and against the theory of innate ideas; whilst Pierre Daniel Huet (1630-1721), bishop of Avranches, once a

Cartesian himself, made a vigorous onslaught on the contempt in which his former comrades held literature and history, and enlarged on the vanity of all human aspirations after rational truth.

The greatest and most original of the French Cartesians was Malebranche (*q.v.*). His *Recherche de la vérité*, in 1674, was the baptism of the system into a theistic religion which borrowed its imagery from Augustine; it brought into prominence the metaphysical base which Louis Delaforge, Jacques Rohault and Regis had neither cared for nor understood. But this doctrine was a criticism and a divergence, no less than a consequence, from the principles in Descartes; and it brought upon Malebranche the opposition, not merely of the Cartesian physicists, but also of Arnauld, Fénelon and Bossuet, who found, or hoped to find, in the *Meditations*, as properly understood, an ally for theology. Popular enthusiasm, however, was with Malebranche, as twenty years before it had been with Descartes; he was the fashion of the day; and his disciples rapidly increased both in France and abroad.

In 1705 Cartesianism was still subject to prohibitions from the authorities; but in a project of new statutes, drawn up for the faculty of arts at Paris in 1720, the *Method* and *Meditations* of Descartes were placed beside the *Organon* and the *Metaphysics* of Aristotle as text-books for philosophical study. And before 1725, readings, both public and private, were given from Cartesian texts in some of the Parisian colleges. But when this happened, Cartesianism was no longer either interesting or dangerous; its theories, taught as ascertained and verified truths, were as worthless as the systematic verbiage which preceded them. Already antiquated, it could not resist the wit and raillery with which Voltaire, in his *Lettres sur les Anglais* (1728), brought against it the principles and results of Locke and Newton. The old Cartesians, Jean Jacques Dortous de Mairan (1678-1771) and especially Fontenelle, with his *Théorie des tourbillons* (1752), struggled in vain to refute Newton by styling attraction an occult quality. Fortunately the Cartesian method had already done its service, even where the theories were rejected. The Port Royalists, Pierre Nicole (1625-1695) and Antoine Arnauld (1612-1694), had applied it to grammar and logic; Jean Domat or Daumat (1625-1696) and Henri François Daugesseau (1668-1751) to jurisprudence; Fontenelle, Charles Perrault (1628-1703) and Jean Terrasson (1670-1750) to literary criticism, and a worthier estimate of modern literature. Though it never ceased to influence individual thinkers, it

had handed on to Condillac its popularity with the masses. A Latin abridgment of philosophy, dated 1784, tells us that the innate ideas of Descartes are founded on no arguments, and are now universally abandoned. The ghost of innate ideas seems to be all that it had left.

In Germany a few Cartesian lecturers taught at Leipzig and Halle, but the system took no root, any more than in Switzerland, where it had a brief reign at Geneva after 1669. In *Germany.* Italy the effects were more permanent. What is termed the iatro-mechanical school of medicine, with G. A. Borelli (1608-1679) as its most notable name, entered in a way on the mechanical study of anatomy suggested by Descartes, but was probably much more dependent upon the positive researches of Galileo. At Naples there grew up a Cartesian school, of which the best known members are Michel Angelo Fardella (1650-1708) and Cardinal Gerdil (1718-1802), both of whom, however, attached themselves to the characteristic views of Malebranche.

In England Cartesianism took but slight hold. Henry More, who had given it a modified sympathy in the lifetime of the author, became its opponent in later years; and *England.* Cudworth differed from it in most essential points. Antony Legrand, from Douai, attempted to introduce it into Oxford, but failed. He is the author of several works, amongst others a system of Cartesian philosophy, where a chapter on “Angels” revives the methods of the schoolmen. His chief opponent was Samuel Parker (1640-1688), bishop of Oxford, who, in his attack on the irreligious novelties of the Cartesian, treats Descartes as a fellow-criminal in infidelity with Hobbes and Gassendi. Rohault’s version of the Cartesian physics was translated into English; and Malebranche found an ardent follower in John Norris (1667-1711). Of Cartesianism towards the close of the 17th century the only remnants were an overgrown theory of vortices, which received its death-blow from Newton, and a dubious phraseology anent innate ideas, which found a witty executioner in Locke.

For an account of the metaphysical doctrines of Descartes, in their connexions with Malebranche and Spinoza, see Cartesianism.

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Tannery (1897 foll.). These include his so-called posthumous works. *The Rules for the Direction of the Mind*, *The Search for Truth by the Light of Nature*, and other unimportant fragments, published (in Latin) in 1701. In 1859-1860 Foucher de Careil published in two parts some unedited writings of Descartes from copies taken by Leibnitz from the original papers. Six editions of the *Opera philosophica* appeared at Amsterdam between 1650 and 1678; a two-volume edition at Leipzig in 1843; there are also French editions, *Œuvres philosophiques*, by A. Garnier, 3 vols. (1834-1835), and L. Aimé-Martin (1838) and *Œuvres morales et philosophiques* by Aimé-Martin with an introduction on life and works by Amedée Prévost (Paris, 1855); *Œuvres choisies* (1850) by Jules Simon. A complete French edition of the collected works was begun in the Romance Library (1907 foll.). German translations by J. H. von Kirchmann under the title *Philosophische Werke* (with biography, &c., Berlin, 1868; 2nd ed., 1882-1891), by Kuno Fischer, *Die Hauptschriften zur Grundlegung seiner Philosophie* (1863), with introduction by Ludwig Fischer (1892). There are also numerous editions and translations of separate works, especially the *Method*, in French, German, Italian, Spanish and Hungarian. There are English translations by J. Veitch, *Method, Meditations and Selections from the Principles* (1850-1853; 11th ed., 1897; New York, 1899); by H. A. P. Torrey (New York, 1892).

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BRIEF BIOGRAPHY: RENÉ DESCARTES by Clodius Piat

From Catholic Encyclopedia 1913, Volume 4

Renatus Cartesius, philosopher and scientist, born at La Haye France, 31 March, 1596; died at Stockholm, Sweden, 11 February 1650. He studied at the Jesuit college of La Flèche, one of the most famous schools of the time. In 1613 he went to Paris, where he formed a lasting friendship with Father Mersenne, O. F. M., and made the acquaintance of the mathematician Mydorge. He afterwards enlisted in the armies of Maurice of Nassau, and of the Duke of Bavaria. On 10 November, 1619, he felt a strong impulse to set aside the prejudices of his childhood and of his environment, and to devote his life to the restoration of human knowledge, which was then in a state of decadence; and for him this mission took on quite a mystical character. He had a dream which he interpreted as a revelation, and he became convinced that "it was the Spirit of Truth that willed to open for him all the treasures of knowledge". After much journeying in Brittany, Poitou, Switzerland, and Italy, he returned to Paris in 1625. There he remained for two years during which it was his fortune to meet Cardinal Bérulle who encouraged him in his scientific vocation. But as Paris offered neither the peace nor the independence his work demanded, he set out in 1629 for Holland, and there in the midst of a commercial people he enjoyed the advantage of living as quietly as in a desert. From this retreat he gave to the world his "Discours de la méthode" (1637), "Méditations" (1641), "Principes" (1644), and "Passions"(l649). "Le Monde" had been completed in 1633, but the condemnation of Galileo frightened Descartes who preferred to avoid all collision with ecclesiastical authority. He deferred the publication of this clever work without, however, losing hope of eventually bringing it out. In 1649, yielding to the entreaties of Queen Christina, he went to Sweden, and died at Stockholm of inflammation of the lungs.

Descartes' work is important rather because of its quality than of its quantity. Let us see first of all wherein his method is new. He observed, as Bacon had already done before him, that there is no question on which men agree. "There is nothing", he says "so evident or so certain that it may not

be controverted. Whence then this widespread and deep-rooted anarchy? From the fact that our inquiries are haphazard" (Règles pour la direction de l'esprit, 4e Règle). The first problem, then, is to discover a scientific method. How is success in this difficult task to be assured? To begin with, we must cease to rely on authority; and for two principal reasons. "In whom can we trust" when "there is hardly a statement made by one man, of which the opposite is not loudly supported by some other?" And even "if all were agreed, the knowledge of their teaching would not suffice us." "Had we by rote all the arguments of Plato and Aristotle, we should not be any the more philosophers unless we were able to bring to bear on any given question a solid judgment of our own. We should have indeed learned history but not mastered a science" (3e Règle) Philosophy presupposes the understanding of problems — and consequently its method cannot be external, it must be essentially immanent. The true method is to seek for reasonable evidence and the norm of such evidence is to be found in the science of mathematics (Discours de la méthode, 2e partie). "It is not that arithmetic and geometry are the only sciences to be learned, but that he who would progress on the road to truth must not delay over any object about which he cannot have a certainty equal to that given by arithmetical and geometrical demonstrations" (2e Règle).

Is everything, then, capable of being known in this way, and consequently can human knowledge become the complete counterpart of reality? Descartes says so over and over again; it is his controlling idea; and he endeavours to prove it both from the nature of our thought and from the universal connexion of things. The mind is equally intelligent however diverse the objects it considers; and those objects because of their perfect enchainment are always equally intelligible. There is, therefore, no question "so far removed from us as to be beyond our reach or so deeply hidden that we cannot discover it", provided only that we persevere and follow the right method (Disc. de la méth. 2e partie; 4e Règle). Such is the rationalism of Descartes, surpassing even that of Plato, in which under the name of "the Infinite" three-fourths of reality remains for ever unknowable. How then is this mathematical evidence to be obtained. Two methods, dangerous at once and sterile, must be avoided. We cannot build on the experience of our senses; "for they are often deceptive", and consequently need a control which they have not in themselves. Bacon was misled on this point (2e Règle). Neither can we adopt the syllogistic method; for this is not, as was

formerly thought, a means of discovery. It is simply a process in which, two terms being given, we find by means of a third that the former two are linked together, i. e. that they have some common characteristic. Now if they have this common characteristic it is useless to search for it with any light other than their own. Let them pass under direct scrutiny; let their natures be studied, and in time the common trait will reveal itself. This is the mind's straight road to discovery, passing on from one idea to another without the aid of a third. The syllogism is of no use until the discovery has been made; it simply serves the purpose of exposition (14e Règle). There are but two ways leading to mathematical evidence: intuition and deduction (3e Règle). Intuition "is the conception formed by an attentive mind so clear and distinct that it admits of no doubt: or what amounts to the same thing, it is the clear conception of a sound and attentive mind, the product of unaided reason" (3e Règle). Intuition is not, therefore, perception by the senses — it is an act of the understanding brought to bear on an idea. The senses do not supply the object but merely the occasion. A movement, for instance, awakens in us the idea of motion, and it is that idea we must regard as the object of intuition. In very simple matters intuition acts quickly; thus "everyone can know intuitively that he exists; that a triangle is terminated by three angles, neither more nor less, and that a globe has but one surface" (3e Règle; 12e Règle; Rép. aux deux objections). In the case of objects more or less complex, intuition proceeds by way of analysis. Since it deals with ideas, and ideas are but one aspect of thought, everything must be reduced to clear and distinct elements, to ultimate or "indecomposable" parts. These ultimate parts must be inspected one after another, until the object is exhausted, "by passing from those that are easily known to those that are less easily known" (6e Règle). In the long run everything will be spread out in full light.

Deduction is the process in which by a continuous movement of thought we draw from a thing that we certainly know the conclusions that of necessity flow from it. This procedure may be carried on in two ways. "If, for instance, after various calculations I discover the relation between the quantities A and B, between B and C, between C and D, and lastly between D and E, I do not yet know the relation between A and E"; but I can infer it by retracting the several steps of the series. This is the first form of deduction (7e Règle). There is a second form in which, the connecting links of the series being too numerous to enter the mental field of vision all at

once, we are content to draw conclusions from the general impression we have of the series (7e Règle). Deduction is an intellectual process, but it differs from intuition by bringing in memory as a factor. And this is noteworthy in view of the important role that memory plays in the Cartesian explanation of certitude, and the desperate effort he makes to defend this procedure. From the conspicuous place that reason holds in the Cartesian method, one might infer that there was no room for experience. Nothing could be less true. For Descartes, as for Bacon, the one purpose of science is utility. He also expects from it a continual betterment of the conditions of human life, and his hopes in that direction go very far, as, for instance, when he says of medicine that in the end it would procure us the boon of immortality (Disc. de la méth. 6e partie). And as he who wills the end wills the means also, Descartes accepts in its entirety the experimental part of the Baconian method (letter to Mersenne, 1631), and acts accordingly. He put himself in touch with all the experimental work of his day (letter, April, 1632), urged others to take up research (letter to Mersenne, 1632), and carried on experiments of his own that covered a wide range of subjects: the weight of air (letter, 2 June, 1631), the laws of sound and light (letter, 1633); the essential differences between oils, spirits, eaux-de-vie, common waters, aquafortis, and salts. He dissected the heads of various animals to show the workings of memory and imagination (cf. letters to Mersenne, 1633 April, 1637; 13 November, 1639; 4 January, 1643, ed. Cousin, Paris, 1826). There was hardly a fact that escaped this apologist of Reason nor anything into whose hidden nature he did not inquire; even the “Chasse de Pan” he followed with his accustomed ardour.

But if the mind, moving as it does in the realm of intelligible objects, have a power of intuition sufficient to master them all, why these researches? Are they not a hindrance rather than a help? Let deduction but go on to the end, and it must assuredly attain that exhaustive knowledge which is the goal of investigation, but such is not the case. Experiment helps reasoning in more ways than one. It supplies the fact that calls forth in our intelligence the idea of the problem to be solved. That idea once aroused, the intelligence takes hold of it, and may produce many others, according to the nature of which experience and reason play reciprocal, yet different, roles. The idea of a problem may be so simple as to allow a mathematical deduction of the properties of the object in question and nothing more. In this case experiment is called in only by way of

illustration, as happens, for instance, in the study of the laws of motion. (Cf. Principes, 2e partie.) But again the idea of a problem may be so complex as to suggest various hypotheses, since principles as a rule are so fruitful that we can draw from them more than we see in the world around us. We must then choose from among the hypotheses presented by the intellect that which corresponds most nearly to the facts: and experiment is our only resource. It acts as a sort of guide to rational deduction. It sets up, so to say, a number of sign-posts which point out, at the cross-roads of logic the right direction to the world of facts. Finally, we may be confronted with two or more hypotheses equally applicable to the known facts, observations must then be multiplied until we discover some peculiarity which determines our choice: and thus experiment becomes a real means of verification (Principes, 4e partie.) In every case experiment is, as it were, the matter, while calculation becomes the form. In the physical world there is nothing but motion and extension, nothing but quantity. Everything can be reduced to numerical proportions, and this reduction is the final object of science. To understand means to know in terms of mathematics. When this final stage is reached, intelligence and experience unite in closest bonds: the intellect setting its seal on experience and endowing it with intelligibility.

Such is the method of Descartes. There remains to be seen what use he makes of it. Recourse must be had to provisional doubt as the only means of distinguishing the true from the false in the labyrinth of contradictory opinions which are held in the schools and in the world at large. We must needs imitate those builders who, in order to erect a lofty structure, begin by digging deep, so that the foundations may be laid on the rock and solid ground (Remarques sur les 7es objections, ed. Charpentier, Paris; cf. Disc. de la m´thode, 3e partie.) And this provisional doubt goes very deep indeed. We may reject the evidence of the senses for they are deceptive, “and it is but the part of prudence never to trust absolutely what has once deceived us” (1re Méditation). We may even question whether there be “any earth or sky or other extended body”; for, supposing that nothing of the sort exist, I can still have the impression of their existence as I had before; this is plain from the phenomena of madness and dreams. What is more, the very simplest and clearest truths are not free from suspicion.” How do I know that God has not so arranged it that I am deceived each time I add two and three together, or number the sides of a square, or form some judgment still more simple, if indeed anything more simple can be imagined” (3e

Méditation). What then remains intact? One thing only, the fact of my thought itself. But if I think it is because I exist, for from the one to the other of these terms we pass by simple inspection — *Cogito, ergo sum*: Behold the long-sought rock on which the edifice of knowledge must be built (Disc. de la méth., 4e partie, 2e Méd.). But how is this to be done? how are we to make our way out of the abyss into which we have descended? By analysing the basic fact, i. e. the content of our thought. I observe that, since my thought gropes amid doubt, I must be imperfect: and this idea calls forth this other, viz. of a being that is not imperfect, and therefore is perfect and infinite (Disc. de la méth., 4e partie.) Let us consider this other idea. It must necessarily include existence otherwise something would be wanting to it; it would not be perfect or infinite. Therefore, God exists, and "I know no less clearly and distinctly that an actual and eternal existence belongs to His nature than I know that whatever I can demonstrate of any figure or number belongs truly to the nature of that figure or number " (Disc. de la méth., 4e partie; 5e Médit.; Rép. aux premières obj.).

God, therefore, is known to us at the outset, the moment we take the trouble to look into the nature of our own minds; and this is enough to eliminate the hypothesis of an evil genius that would take pleasure in deceiving us; it is enough also to secure the validity of all our deductions, whatever be their length, for "I recognize that it is impossible that He should ever deceive me, since in all fraud and deceit there is a certain imperfection" (4e Méd.). Otherwise how would this idea of God be anything more than an idle fancy? It has immensity; it has infinity, and therefore it must of itself be capable of existing. Spinoza, and after him Hegel, will teach that the possible infolds, as it were, an essential tendency to existence, and that this tendency is greater in proportion as the possible is perfect. It is on this principle that they will build their vast synthetic systems. Descartes anticipates them and when closely pressed he replies just as do these later philosophers. (Rép. aux premières objections.) It is a fact worth noting with reference to the genesis of modern systems.

The presence in us of this idea of God must also be explained; and here we find a new ray of light. The objective reality of our ideas must have some cause, and this is readily found when there is question of secondary qualities; these may be illusory or they may result from the imperfection of our nature. The question also can be solved without too much difficulty

when it concerns primary qualities. May not these arise perchance from some depth of my own mental being that is beyond the control of my will? But such explanations are of no avail when we try to account for the idea of a being infinite and perfect. I myself am limited, finite; and from the finite, turn it about as we may, we can never derive the infinite the lesser never gives us the greater (3e Méd. cf. Princ., 7e partie). Considered from any and every point of view, the idea of God enlightens us as to His existence. Whatever the manner of our questioning it gives us always from the depth of its fulness the one reply, *Ego sum qui sum*. Since then the veracity of God Himself guarantees our faculties in their natural exercise, we may go forward in our inquiry; and the first question that meets us concerns the subject in which the process of thought takes place, i.e. the soul. Understanding, conceiving, doubting, affirming, denying, willing, refusing, imagining, feeling, desiring — these are the activities of what I call my soul. Now all these activities have one common quality: they cannot take place without thought or perception, without consciousness or knowledge. Thought then is the essential attribute of the soul. The soul is “a thing that thinks” (2e Méd., Princ., 1re partie) and it is nothing else. There is no substratum underlying and supporting its various states; its whole being issues in each of its activities; thought and soul are equivalent (12e Règle).

Is thought, then, always in some mode of activity? Descartes leans to the belief that it is. “I exist”, he says, “but for how long? Just as long as I am thinking; for perhaps if I should wholly cease to think, I should at the same time altogether cease to be” (2e Méd.). It is only with reluctance and under the pressure of objections that he concedes to the soul a simple *potentia* or power of thinking (5es Obj.); and, as may be easily seen, the concession is quite illogical. Thought, though in itself a unitary process, takes on different forms; it begins with confused ideas or perceptions which require the co-operation of the body; such are the feelings of pleasure and pain, sensations imagination, and local memory. Then the soul has clear and distinct ideas, which it begets and develops within itself as immanent activities. Under this head come the ideas of substance, duration, number, order extension, figure, motion, thought, intelligence, and will (6e Méd.; Princ., I).

These clear and distinct notions constitute of themselves the object of the understanding, and one may say that they are all involved in the idea of perfect being. Whether I understand, or pass judgment or reason, it is always that idea which I perceive and my understanding could have no

other object, seeing that its sphere of action is always the infinite, the eternal and the necessary. To advance in knowledge is to progress in the knowledge of God Himself. (Rep. aux 2es obj.) But thought has another dominant form, viz. freedom. For Descartes this function of the mind is a fact “of which reason can never convince us”, but one which “we experience in ourselves”, and this fact is so evident” that it may be considered one of the most generally known ideas” (Rep. aux 3es obj.; Rep. aux 5es obj.- Princ., 1re partie). Not only is this freedom a primordial and undeniable datum of consciousness: it is, in a way, infinite like God, “since there is no object to which it cannot turn”. (4e Méd.; Princ., 1re partie.) It does not creep round in a sort of semi-ignorance, as St. Thomas Aquinas holds, but it grows as the influencing motives become clearer; indifference is but its lowest stage (letter to Mersenne, 20 May, 1630). The part it plays in our lives is considerable: it enters into each of our judgments, and it is the formal cause of all our errors. It makes itself felt in every part of our organism, and through this it influences the external world. Nevertheless, the sum total of motion in the world is always constant; for while our wills may change the direction of movement they do not affect its quantity. (Letter to Regius.) Confronting the soul is the external world: but the soul does not see it as it really is. Heat, odour taste, light, sound, resistance, weight are qualities which we attribute to bodies but which are really in ourselves, since we only conceive them in relation to ourselves. In reality there is nothing in the physical world but motion and extension. Motion imitates as far as possible the immutability of God who is its first cause; hence its principal laws, viz. that the sum of motion in the world is always constant; that a body will continue in its actual state unless disturbed by some other body outside itself; that “once a body is in motion we have no reason for thinking its present velocity will ever cease provided it impinges on no other body which would slacken or destroy its motion”. All movement is primarily rectilinear (on this point Aristotle was mistaken). When two bodies moving in different directions collide, a change takes place in their directions, but “such change is always the least possible”. When two moving bodies impinge on each other, one cannot transmit any motion to the other without losing what it transmits (Princ., 2e partie). Extension is not infinite in duration but it is infinite in space. “It seems to me that one cannot prove or even conceive that there are limits to the matter of which the world is composed, for I find it is composed of nothing but

extension in length, breadth, and depth. So that whatever possesses these three dimensions is a portion of such matter": and however far back in imagination we push the limits of space we still find these three dimensions; they are bounded by no limits (letter to Chanut; letter to Marus). Extension is therefore one block, continuous from end to end; and this proves at the same time that there is no such thing as a vacuum, either in bodies or between them. Moreover extension is divisible *ad infinitum* since the divided particles, however small, are still extended. It is everywhere homogeneous, since it is made up of spatial dimensions only, and these of themselves give rise to no qualitative differences. And this brilliant idea suggested to Descartes many hypotheses that were to prove fruitful. In his view the matter of the earth and of the stars was the same; and spectrum analysis subsequently proved that he was correct. He held that the primordial state of the sun and planets was nebulous, that under the influence of a cooling process the heavenly bodies formed their crusts, and to changes in these crusts is due the variation in brilliance of the stars and the emergence of the continents on our earth. (Cf. Traité du Monde; Princ., 3e and 4e p.) It does not follow that the world is self-sufficient; but the finality, of which so much is said, leads to nothing. God gave matter a first impulse and the rest followed in the course of nature's laws. "Even if the chaos of the poets be granted, one could always show that, thanks to the laws of nature, this confusion would eventually work itself out to our present order"; the laws of nature being such that "matter is constrained to pass through all the forms of which it is capable".

The older Descartes grew, the more he busied himself with morals, and his aim was to end up with a treatise on ethics. As a matter of fact, we have his treatise on the passions, and a few brief disquisitions scattered among his letters to Chanut and to the Princess Elizabeth. The passions are perceptions generated and nurtured in the soul "through the medium of the nerves" (Passions, 1re partie, art. 3-22). The nerves are bundles of fine threads: these threads contain the animal spirits which are the subtlest parts of the blood: and they all meet at the pineal gland which is the seat of the soul. By means of this mechanism the thinking subject receives impressions from the world without, perceives them, and transforms them into passions (Pass., 1re p, art. 31). And though our organism thus contains the cause of our passions, it is not their subject either entirely or partially; on this point also Aristotle was mistaken. There are perceptions arising from the body

and localizing themselves in one or other portion of it — such as hunger, thirst, pain — but the passions are different. They originate in the body, but belong to the soul alone; they are purely psychological facts (Passions, 1re p., art.25). There are as many passions as there are ways in which objects capable of affecting our senses may be hurtful or profitable to us. The primary passions to which all others may be reduced are the six following:

- admiration or surprise, produced by an object as to which we are as yet ignorant whether it is useful or hurtful;
- love and hate, caused by the impression produced on our organs of sense by objects which are already known to us as beneficial or harmful;
- desire, which is but the love or the hate we bear an object considered as future;
- joy and sadness, which result from the presence of an object that is loved or hated (Passions, 2e partie, art. 52).

Perhaps on the whole St. Thomas and Bossuet will be found to have surpassed Descartes, by reducing all the passions to love. In the Cartesian teaching the passions are good in themselves, but they must be kept in subjection to the law of moral order. What this law is he does not clearly indicate; he gives only some scattered precepts in which one may discern a noble effort to build up a Stoico-Christian system of ethics. The foregoing account may perhaps give the impression that Descartes was a great savant rather than a great philosopher; but the significance of his scientific work should be properly understood. What remains of value is not so much his theories, but the impetus given by his genius, his method, his discoveries. His quantitative conception of the world is being gradually abandoned, and today men’s minds are turning to a philosophy of nature wherein quality plays a controlling part.

Clodius Piat.

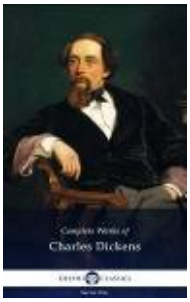
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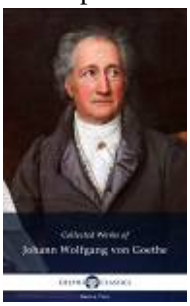
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J. W. von Goethe (English)
Jules Verne
L. Frank Baum
Lewis Carroll
Marcel Proust (English)
Nathaniel Hawthorne
Nikolai Gogol
O. Henry
Rudyard Kipling
Tobias Smollett
Victor Hugo
William Shakespeare



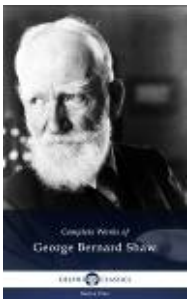
Series Three

Ambrose Bierce
Ann Radcliffe
Ben Jonson
Charles Lever
Émile Zola
Ford Madox Ford
Geoffrey Chaucer
George Gissing
George Orwell
Guy de Maupassant
H. P. Lovecraft
Henrik Ibsen
Henry David Thoreau
Henry Fielding
J. M. Barrie
James Fenimore Cooper
John Buchan
John Galsworthy
Jonathan Swift
Kate Chopin
Katherine Mansfield
L. M. Montgomery
Laurence Sterne
Mary Shelley
Sheridan Le Fanu
Washington Irving



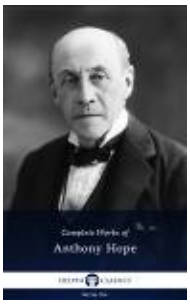
Series Four

Arnold Bennett
Arthur Machen
Beatrix Potter
Bret Harte
Captain Frederick Marryat
Charles Kingsley
Charles Reade
G. A. Henty
Edgar Rice Burroughs
Edgar Wallace
E. M. Forster
E. Nesbit
George Meredith
Harriet Beecher Stowe
Jerome K. Jerome
John Ruskin
Maria Edgeworth
M. E. Braddon
Miguel de Cervantes
M. R. James
R. M. Ballantyne
Robert E. Howard
Samuel Johnson
Stendhal
Stephen Crane
Zane Grey



Series Five

Algernon Blackwood
Anatole France
Beaumont and Fletcher
Charles Darwin
Edward Bulwer-Lytton
Edward Gibbon
E. F. Benson
Frances Hodgson Burnett
Friedrich Nietzsche
George Bernard Shaw
George MacDonald
Hilaire Belloc
John Bunyan
John Webster
Margaret Oliphant
Maxim Gorky
Oliver Goldsmith
Radclyffe Hall
Robert W. Chambers
Samuel Butler
Samuel Richardson
Sir Thomas Malory
Thomas Carlyle
William Harrison Ainsworth
William Dean Howells
William Morris



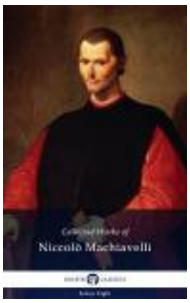
Series Six

Anthony Hope
Aphra Behn
Arthur Morrison
Baroness Emma Orczy
Captain Mayne Reid
Charlotte M. Yonge
Charlotte Perkins Gilman
E. W. Hornung
Ellen Wood
Frances Burney
Frank Norris
Frank R. Stockton
Hall Caine
Horace Walpole
One Thousand and One Nights
R. Austin Freeman
Rafael Sabatini
Saki
Samuel Pepys
Sir Issac Newton
Stanley J. Weyman
Thomas De Quincey
Thomas Middleton
Voltaire
William Hazlitt
William Hope Hodgson



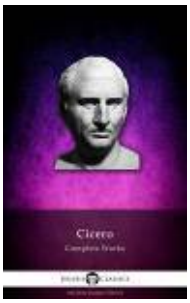
Series Seven

Adam Smith
Benjamin Disraeli
Confucius
David Hume
E. M. Delafield
E. Phillips Oppenheim
Edmund Burke
Ernest Hemingway
Frances Trollope
Galileo Galilei
Guy Boothby
Hans Christian Andersen
Ian Fleming
Immanuel Kant
Karl Marx
Kenneth Grahame
Lytton Strachey
Mary Wollstonecraft
Michel de Montaigne
René Descartes
Richard Marsh
Sax Rohmer
Sir Richard Burton
Talbot Mundy
Thomas Babington Macaulay
W. W. Jacobs



Series Eight

Anna Katharine Green
Arthur Schopenhauer
The Brothers Grimm
C. S. Lewis
Charles and Mary Lamb
Elizabeth von Arnim
Ernest Bramah
Francis Bacon
Gilbert and Sullivan
Grant Allen
Henryk Sienkiewicz
Hugh Walpole
Jean-Jacques Rousseau
John Locke
John Muir
Joseph Addison
Lafcadio Hearn
Lord Dunsany
Marie Corelli
Niccolò Machiavelli
Ouida
Richard Brinsley Sheridan
Sigmund Freud
Theodore Dreiser
Walter Pater
W. Somerset Maugham

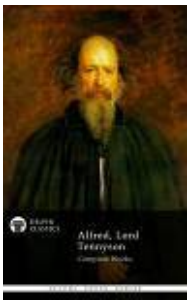


Ancient Classics

Achilles Tatius
Aeschylus
Ammianus Marcellinus
Apollodorus
Appian
Apuleius
Apollonius of Rhodes
Aristophanes
Aristotle
Arrian
Augustine
Aulus Gellius
Bede
Cassius Dio
Cato
Catullus
Cicero
Clement of Alexandria
Cornelius Nepos
Demosthenes
Diodorus Siculus
Diogenes Laërtius
Euripides
Frontius
Herodotus
Hesiod
Hippocrates
Homer

Horace
Isocrates
Josephus
Julius Caesar
Juvenal
Livy
Longus
Lucan
Lucian
Lucretius
Marcus Aurelius
Martial
Nonnus
Ovid
Pausanias
Petronius
Pindar
Plato
Plautus
Pliny the Elder
Pliny the Younger
Plotinus
Plutarch
Polybius
Procopius
Propertius
Ptolemy
Quintus Curtius Rufus
Quintus Smyrnaeus
Sallust
Sappho
Seneca the Younger
Septuagint
Sidonius
Sophocles
Statius
Strabo

Suetonius
Tacitus
Terence
Theocritus
Thucydides
Tibullus
Virgil
Xenophon

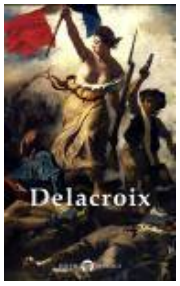


Delphi Poets Series

A. E. Housman
Alexander Pope
Alfred, Lord Tennyson
Algernon Charles Swinburne
Andrew Marvell
Beowulf
Charlotte Smith
Christina Rossetti
D. H Lawrence (poetry)
Dante Alighieri (English)
Dante Gabriel Rossetti
Delphi Poetry Anthology
Edgar Allan Poe (poetry)
Edmund Spenser
Edward Lear
Edward Thomas
Edwin Arlington Robinson
Ella Wheeler Wilcox
Elizabeth Barrett Browning

Emily Dickinson
Ezra Pound
Friedrich Schiller (English)
George Chapman
George Herbert
Gerard Manley Hopkins
Gertrude Stein
Hafez
Heinrich Heine
Henry Howard, Earl of Surrey
Henry Wadsworth Longfellow
Isaac Rosenberg
James Russell Lowell
Johan Ludvig Runeberg
John Clare
John Donne
John Dryden
John Keats
John Milton
John Wilmot, Earl of Rochester
Joseph Addison
Leigh Hunt
Lord Byron
Ludovico Ariosto
Luís de Camões
Matthew Arnold
Matthew Prior
Michael Drayton
Nikolai Nekrasov
Percy Bysshe Shelley
Petrarch
Ralph Waldo Emerson
Robert Browning
Robert Burns
Robert Frost
Robert Southey
Rumi

Rupert Brooke
Samuel Taylor Coleridge
Sir Philip Sidney
Sir Thomas Wyatt
Sir Walter Raleigh
Thomas Chatterton
Thomas Gray
Thomas Hardy (poetry)
Thomas Hood
Thomas Moore
Torquato Tasso
T. S. Eliot
W. B. Yeats
Walter Savage Landor
Walt Whitman
Wilfred Owen
William Blake
William Cowper
William Wordsworth



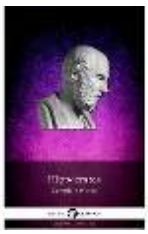
Masters of Art

Albrecht Dürer
Amedeo Modigliani
Artemisia Gentileschi
Camille Pissarro
Canaletto
Caravaggio
Caspar David Friedrich
Claude Lorrain

Claude Monet
Dante Gabriel Rossetti
Diego Velázquez
Edgar Degas
Édouard Manet
Edvard Munch
Eugène Delacroix
Francisco Goya
Giotto
Giovanni Bellini
Gustave Courbet
Gustav Klimt
J. M. W. Turner
Johannes Vermeer
John Constable
Leonardo da Vinci
Michelangelo
Paul Cézanne
Paul Gauguin
Paul Klee
Peter Paul Rubens
Piero della Francesca
Pierre-Auguste Renoir
Pieter Bruegel the Elder
Sandro Botticelli
Raphael
Rembrandt van Rijn
Thomas Gainsborough
Tintoretto
Titian
Vincent van Gogh
Wassily Kandinsky

Alphabetical List of Titles






A. E. Housman
Achilles Tatius
Adam Smith
Aeschylus
Albrecht Dürer
Alexander Pope
Alexander Pushkin
Alexandre Dumas (English)
Alfred, Lord Tennyson
Algernon Blackwood
Algernon Charles Swinburne
Ambrose Bierce
Amedeo Modigliani
Ammianus Marcellinus
Anatole France
Andrew Lang
Andrew Marvell
Ann Radcliffe
Anna Katharine Green
Anthony Hope
Anthony Trollope
Anton Chekhov
Aphra Behn
Apollodorus
Apollonius of Rhodes
Appian
Apuleius
Aristophanes

Aristotle
Arnold Bennett
Arrian
Artemisia Gentileschi
Arthur Machen
Arthur Morrison
Arthur Schopenhauer
Augustine
Aulus Gellius
Baroness Emma Orczy
Beatrix Potter
Beaumont and Fletcher
Bede
Ben Jonson
Benjamin Disraeli
Beowulf
Bram Stoker
Bret Harte
C. S. Lewis
Camille Pissarro
Canaletto
Captain Frederick Marryat
Captain Mayne Reid
Caravaggio
Caspar David Friedrich
Cassius Dio
Cato
Catullus
Charles and Mary Lamb
Charles Darwin
Charles Dickens
Charles Kingsley
Charles Lever
Charles Reade
Charlotte M. Yonge
Charlotte Perkins Gilman
Charlotte Smith

Christina Rossetti
Christopher Marlowe
Cicero
Claude Lorrain
Claude Monet
Clement of Alexandria
Confucius
Cornelius Nepos
D. H Lawrence (poetry)
D.H. Lawrence
Daniel Defoe
Dante Alighieri (English)
Dante Gabriel Rossetti
Dante Gabriel Rossetti
David Hume
Delphi Poetry Anthology
Demosthenes
Dickensiana Volume I
Diego Velázquez
Diodorus Siculus
Diogenes Laërtius
E. F. Benson
E. M. Delafield
E. M. Forster
E. Nesbit
E. Phillips Oppenheim
E. W. Hornung
Edgar Allan Poe
Edgar Allan Poe (poetry)
Edgar Degas
Edgar Rice Burroughs
Edgar Wallace
Edith Wharton
Edmund Burke
Edmund Spenser
Édouard Manet
Edvard Munch

Edward Bulwer-Lytton
Edward Gibbon
Edward Lear
Edward Thomas
Edwin Arlington Robinson
Elizabeth Barrett Browning
Elizabeth Gaskell
Elizabeth von Arnim
Ella Wheeler Wilcox
Ellen Wood
Émile Zola
Emily Dickinson
Ernest Bramah
Ernest Hemingway
Eugène Delacroix
Euripides
Ezra Pound
F. Scott Fitzgerald
Ford Madox Ford
Frances Burney
Frances Hodgson Burnett
Frances Trollope
Francis Bacon
Francisco Goya
Frank Norris
Frank R. Stockton
Friedrich Nietzsche
Friedrich Schiller (English)
Frontius
Fyodor Dostoyevsky
G. A. Henty
G. K. Chesterton
Galileo Galilei
Geoffrey Chaucer
George Bernard Shaw
George Chapman
George Eliot

George Gissing
George Herbert
George MacDonald
George Meredith
George Orwell
Gerard Manley Hopkins
Gertrude Stein
Gilbert and Sullivan
Giotto
Giovanni Bellini
Grant Allen
Gustav Klimt
Gustave Courbet
Gustave Flaubert (English)
Guy Boothby
Guy de Maupassant
H. G. Wells
H. P. Lovecraft
H. Rider Haggard
Hafez
Hall Caine
Hans Christian Andersen
Harriet Beecher Stowe
Heinrich Heine
Henrik Ibsen
Henry David Thoreau
Henry Fielding
Henry Howard, Earl of Surrey
Henry James
Henry Wadsworth Longfellow
Henryk Sienkiewicz
Herman Melville
Herodotus
Hesiod
Hilaire Belloc
Hippocrates
Homer

Honoré de Balzac (English)
Horace
Horace Walpole
Hugh Walpole
Ian Fleming
Immanuel Kant
Isaac Rosenberg
Isocrates
Ivan Turgenev
J. M. Barrie
J. M. W. Turner
J. W. von Goethe (English)
Jack London
James Fenimore Cooper
James Joyce
James Russell Lowell
Jane Austen
Jean-Jacques Rousseau
Jerome K. Jerome
Johan Ludvig Runeberg
Johannes Vermeer
John Buchan
John Bunyan
John Clare
John Constable
John Donne
John Dryden
John Galsworthy
John Keats
John Locke
John Milton
John Muir
John Ruskin
John Webster
John Wilmot, Earl of Rochester
Jonathan Swift
Joseph Addison

Joseph Addison
Joseph Conrad
Josephus
Jules Verne
Julius Caesar
Juvenal
Karl Marx
Kate Chopin
Katherine Mansfield
Kenneth Grahame
L. Frank Baum
L. M. Montgomery
Lafcadio Hearn
Laurence Sterne
Leigh Hunt
Leo Tolstoy
Leonardo da Vinci
Lewis Carroll
Livy
Longus
Lord Byron
Lord Dunsany
Louisa May Alcott
Lucan
Lucian
Lucretius
Ludovico Ariosto
Luís de Camões
Lytton Strachey
M. E. Braddon
M. R. James
Marcel Proust (English)
Marcus Aurelius
Margaret Oliphant
Maria Edgeworth
Marie Corelli
Mark Twain

Martial
Mary Shelley
Mary Wollstonecraft
Matthew Arnold
Matthew Prior
Maxim Gorky
Michael Drayton
Michel de Montaigne
Michelangelo
Miguel de Cervantes
Nathaniel Hawthorne
Niccolò Machiavelli
Nikolai Gogol
Nikolai Nekrasov
Nonnus
O. Henry
Oliver Goldsmith
One Thousand and One Nights
Oscar Wilde
Ouida
Ovid
Paul Cézanne
Paul Gauguin
Paul Klee
Pausanias
Percy Bysshe Shelley
Peter Paul Rubens
Petrarch
Petronius
Piero della Francesca
Pierre-Auguste Renoir
Pieter Bruegel the Elder
Pindar
Plato
Plautus
Pliny the Elder
Pliny the Younger

Plotinus
Plutarch
Polybius
Procopius
Propertius
Ptolemy
Quintus Curtius Rufus
Quintus Smyrnaeus
R. Austin Freeman
R. M. Ballantyne
Radclyffe Hall
Rafael Sabatini
Ralph Waldo Emerson
Raphael
Rembrandt van Rijn
René Descartes
Richard Brinsley Sheridan
Richard Marsh
Robert Browning
Robert Burns
Robert E. Howard
Robert Frost
Robert Louis Stevenson
Robert Southey
Robert W. Chambers
Rudyard Kipling
Rumi
Rupert Brooke
Saki
Sallust
Samuel Butler
Samuel Johnson
Samuel Pepys
Samuel Richardson
Samuel Taylor Coleridge
Sandro Botticelli
Sappho

Sax Rohmer
Seneca the Younger
Septuagint
Sheridan Le Fanu
Sidonius
Sigmund Freud
Sir Arthur Conan Doyle
Sir Issac Newton
Sir Philip Sidney
Sir Richard Burton
Sir Thomas Malory
Sir Thomas Wyatt
Sir Walter Raleigh
Sir Walter Scott
Sophocles
Stanley J. Weyman
Statius
Stendhal
Stephen Crane
Strabo
Suetonius
T. S. Eliot
Tacitus
Talbot Mundy
Terence
The Brontës
The Brothers Grimm
Theocritus
Theodore Dreiser
Thomas Babington Macaulay
Thomas Carlyle
Thomas Chatterton
Thomas De Quincey
Thomas Gainsborough
Thomas Gray
Thomas Hardy
Thomas Hardy (poetry)

Thomas Hood
Thomas Middleton
Thomas Moore
Thucydides
Tibullus
Tintoretto
Titian
Tobias Smollett
Torquato Tasso
Victor Hugo
Vincent van Gogh
Virgil
Virginia Woolf
Voltaire
W. B. Yeats
W. Somerset Maugham
W. W. Jacobs
Walt Whitman
Walter Pater
Walter Savage Landor
Washington Irving
Wassily Kandinsky
Wilfred Owen
Wilkie Collins
William Blake
William Cowper
William Dean Howells
William Harrison Ainsworth
William Hazlitt
William Hope Hodgson
William Makepeace Thackeray
William Morris
William Shakespeare
William Wordsworth
Xenophon
Zane Grey

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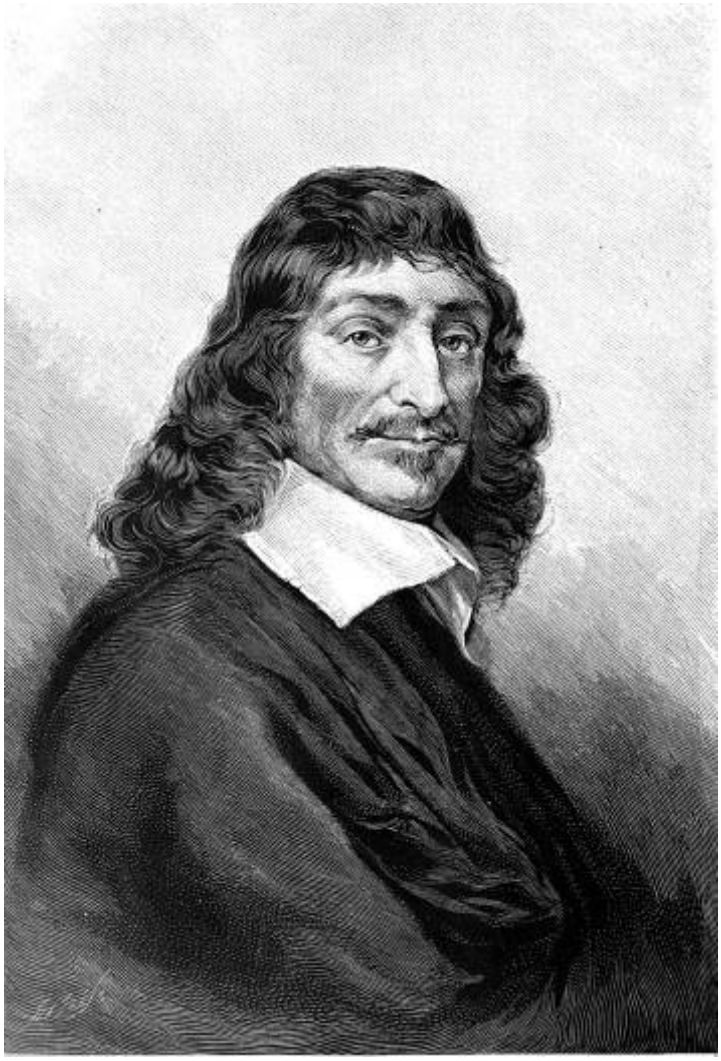
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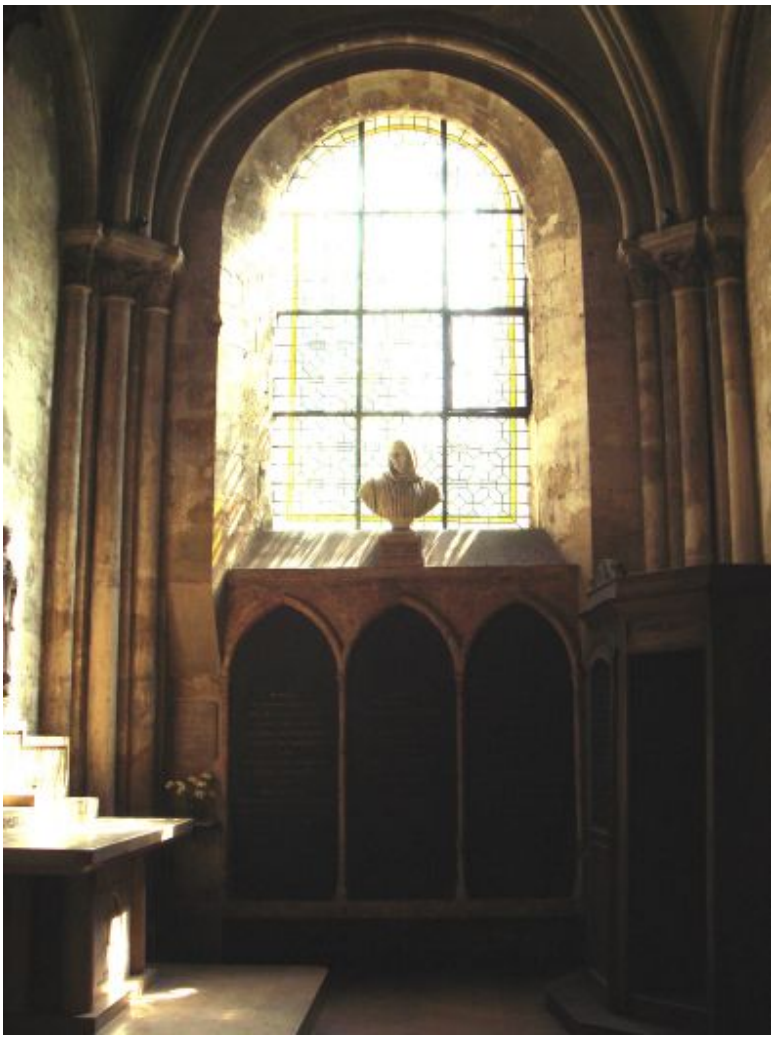
Sketch of Descartes from Popular Science Monthly Volume 37, 1890



Adolf Fredrik Church, a church in central Stockholm, Sweden — where Descartes was first buried in 1650, before his remains were removed to France.



The Benedictine Abbey of Saint-Germain-des-Prés, Paris — the burial place of Merovingian kings of Neustria. Descartes' final resting place.



Descartes' tomb

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