

in accord with the first rule of motion, or with the principle of continuity, for in always diminishing the inequality of the bodies, the effect that is a result of the inequality must always approach that which is a result of their inequality (§. 16.), so that always diminishing the size of the largest body, its speed toward C must also diminish and finally become null when a certain proportion between B and C has been reached, beyond which point the inequality having completely vanished, the effect produced by the inequality of the two bodies will begin. That is to say, that then the movement of the greater body B will begin in an opposite direction, and the bodies will rebound with the same speed, according to the first law of M. Descartes. Thus, the second law cannot obtain since, according to this second law, although one may diminish the size of B and make it approach C so that the difference might be almost unassignable, the results will nonetheless remain very different and not be at all similar, which is totally contrary to the law of continuity. For when the inequality disappears, the effect creates a great jump, since the movement of body B changes direction all at once, passing through all the intermediary stages at one jump, while only an imperceptible change happens in the size of this body, which is nonetheless the cause of the great change that happens in the direction of its movement: thus the effect is greater than the cause. It can be seen by this example how important it is to pay attention to this law of continuity and in this way to imitate nature, which never transgresses this law in any of its operations.

CHAPTER TWO

Of the existence of God

THE STUDY OF PHYSICS LEADS US TO KNOWLEDGE OF A GOD.

§. 18. The study of nature raises us to the knowledge of a supreme Being; this great truth is, if possible, even more necessary for good physics than for ethics, and it must be the foundation and the conclusion of all the research we make in this science.

PRÉCIS OF THE PROOFS OF THIS GREAT TRUTH.⁵⁹

So, I believe that it is indispensable to begin by placing before you a précis of the proofs of this important truth, by which you will be able to judge its self-evidence for yourself.

59. Du Châtelet proceeds to give a combination of Cartesian and Leibnizian proofs of the existence of God.

§.19.1. Something exists, since I exist.

2. Since something exists, something must have existed from all eternity, otherwise nothingness, which is but a negation, would have produced all that exists, which is a contradiction in terms, for that is saying a thing has been produced, and yet not acknowledging any cause for its existence.

3. The Being that has existed from all eternity must exist necessarily and not owe its existence to any cause. For if it had received its existence from another Being, that other Being would have caused its own existence, and then, it is he of whom I am speaking, and it is God, or else he would owe his existence to another. It is easily seen, when ascending thus to infinity, that it is necessary to arrive at a necessary Being that exists by its own volition, or else admit that there is an infinite chain of Beings which, all together, will not have any external cause for their existence (since all Beings belong in this infinite chain) and that, each in particular, will have no internal cause, since none exists by its own volition, and they owe their existence to one another in an infinite gradation. Thus, it is supposing a chain of Beings that separately have been produced by one cause, and which all together have been produced by nothing, which is a contradiction in terms. So there is a Being that necessarily exists, since it implies contradiction that such a Being does not exist.

4. All that is around us is born and dies successively; nothing enjoys a necessary state, everything is successive, and we succeed one another. So there is only contingency in all the beings that surround us, this is to say, that the contrary is equally possible and does not imply contradiction (for this is what distinguishes a contingent being from a necessary being).⁶⁰

5. All that exists has a sufficient reason for its existence. The sufficient reason for the existence of a being must be within it, or outside it. Now the reason for the existence of a contingent being cannot be within it, for if it carried the sufficient reason for its own existence, it would be impossible for it not to exist, which is contradictory to the definition of a contingent being. So the sufficient reason for the existence of a contingent being must necessarily be outside of it, since it cannot have it within itself.

6. This sufficient reason cannot be found in another contingent being, nor in a succession of such beings, since the same question will always arise at the end of this chain, however it may be extended. So it must come to a necessary Being that contains the sufficient reason for the existence of all contingent beings, and of its own, and this Being is God.

60. Du Châtelet explains the distinction between *necessary* and *contingent* in chapter 1, §.7.

The attributes of God

HE IS ETERNAL.

§.20. The attributes of this supreme Being follow from the necessity for its existence.

Thus, it is eternal, that is to say, it had no beginning and it will never have an end, for if the necessary Being had begun, it would have had to act before being, in order to produce itself, which is absurd, or something must have produced it, which is contrary to the definition of the necessary Being.

It cannot have an end, because the sufficient reason for its existence residing in itself, it can never abandon it; furthermore, what is contrary to a necessary thing implies contradiction and is consequently impossible. So it is impossible for the necessary Being to cease existing, just as it is impossible for 3 times 3 to make 8.

IMMUTABLE.

It is immutable, for if it changed, it would no longer be what it was, and consequently it could not have existed necessarily. Moreover, each successive state must have its sufficient reason in a preceding state, that one in another, and so on. Now, as in the necessary Being one would never reach the last state, since that Being never began, any successive state would be without sufficient reason, if it were susceptible to succession; thus, there cannot be change or succession in a necessary Being.

SIMPLE.

It follows clearly from what has just been said that the necessary Being cannot be a compound Being, which only exists as far as its parts are linked, and which can be destroyed by the dissociation of these same parts, and consequently the Being existing by its own volition is a simple Being.

NEITHER THE WORLD NOR OUR SOUL CAN BE A NECESSARY BEING.⁶¹

§.21. The world we see cannot be the necessary Being, for it is composed of parts and there is a continual succession in it, which is absolutely contradictory to the attributes I have just shown belong to a necessary Being.

By the same reasoning, neither matter nor the elements of matter can be the necessary Being.

61. Du Châtelet is using *soul* in the Cartesian sense of a thing separate from the body, having the properties of mind.

Nor can our soul be this necessary Being, for its perceptions, changing continually, it is in perpetual variation, but the necessary Being cannot vary. So our soul is not the necessary Being.

So the Being existing of its own volition is a Being different from the world we see, from the matter of which this world consists, from the elements which make up this matter, and from our soul; and it contains in itself the sufficient reason for its existence and of all the beings who exist.

THE NECESSARY BEING, THIS IS TO SAY, GOD, MUST BE UNIQUE.

§.22. It is easy to see by all that has been said that there can be only one necessary Being, for if there were two Beings that existed necessarily and independently of each other, each could exist alone, and consequently neither the one nor the other would exist necessarily.

§.23. It is evident that all that is possible does not exist, and that an infinity of things that could happen do not happen at all. Alexander, for example, instead of destroying the Empire of the Persians, could turn his armies against the peoples of the occident [west], or live peaceably in his kingdom. In a word, he could take an infinity of courses of action different from the one he took, which would have given rise to an infinity of combinations that were then possible and that would have produced events all different from those that occurred. This applies to the events contained in novels. They could happen if another succession of things took place; these are the stories of a possible world that lacks actuality, for each succession of things constitutes a world differing from all others by the events specific to it. Thus one can conceive of a succession of causes leading to the events in *Zaïde*, or those in the *Queen of Navarre*, for these events are possible, and they only lack actuality.⁶² Similarly, one can conceive of possible universes, with other stars and other planets; and, as the different relationships of these universes can be combined in an infinity of ways, there are an infinity of possible worlds, only one of which actually exists.

When nothing had yet been produced, and none of these possible worlds existed, they all equally had the potential to come into existence; and they waited, so to speak, until an external force chose them, and made them actual. For what does not exist can only contribute to its existence ideally; that is to say, insofar as it contains certain determinations that the rest

62. *Zaïde* (1671) was a novel by Marie-Madeleine Pioche de la Vergne (1634–93), Countess de La Fayette. “Queen of Navarre” suggests *The Heptaméron* by Marguerite de Navarre (1492–1549), first published in 1558.

do not contain, and that can lead an Intelligent Being to choose it in order to give it existence.

There must be a sufficient reason for the actuality of the world we see, since an infinity of other worlds were possible. This reason can only be found in the differences that distinguish this world from all other worlds. This means, then, that the necessary Being must have envisaged all the possible worlds, considered their diverse arrangements and their differences, so as to be able to determine afterward to give actuality to the one that pleased him most.

GOD IS AN INTELLIGENT BEING.

The distinct representation of things constitutes understanding. Now the necessary Being who must have envisaged all the possible worlds before creating this one is therefore an intelligent Being, whose understanding is infinite, for all the possible worlds contain all the possible arrangements of all things possible. Thus, this Being we call God is an intelligent Being who sees not only all that actually happens but all that could happen in any possible combination of possible things; for all that is possible enters into the worlds that he contemplates never-endingly, and that are acted out, so to speak, before him.

AND HIS INTELLIGENCE IS INFINITELY BEYOND OURS.

§.24. As succession is an imperfection attached to the finite, there is no succession in the perceptions of God, who envisages at once all the worlds possible with all their possible changes; and as there are in our ideas an infinity of confused things, which we do not distinguish because of their multiplicity, the ideas that God has of things being infinitely distinct, they are infinitely different from ours, as would be, more or less, the idea that we have of the Moon in relation to the one a man who had lived a long time on that planet would have of it. The way in which God sees and envisages all possible things is, thus, incomprehensible to us. Thus we cannot form for ourselves a distinct idea of Divine understanding; it is like creation, among the things impossible for us to comprehend and deny. Let us always remember, when we wish to comprehend God's understanding, this child St. Augustine saw on the seashore who tried to put the ocean into a hazelnut shell; and this will give us some faint idea of the presumption of a being whose understanding is finite, and who wants to form a clear idea of the understanding of the Creator.⁶³

63. The story of St. Augustine of Hippo (354–430), the child, and the nutshell have no basis in fact. However, it was the most popular representation of this Doctor of the Christian Church

HE IS FREE.

§.25. The choice that God made among all possible worlds of the world we see is a proof of his liberty, for having given actuality to a succession of things that contributed nothing of its own power to its existence, there is no reason preventing him from giving existence to other possible successions in the same category with regard to the possibility of actualization. So he chose the succession of things that constitute this universe to make it actual, because this succession pleased him most: He was the absolute master of his choice. The necessary Being is thus a free Being, for to act following the choice of one's own will is to be free.⁶⁴

INFINITELY WISE.

§.26. But the choice he made of this world he did not make for no reason, for supreme intelligence will not behave without intelligence. Now since we judge here on Earth that a being is more or less intelligent according to whether he decides by reasons more or less sufficient, God, being the most perfect of all beings, none of his actions can be without a sufficient reason. So he had his own reason for determining to create a world, and this reason is the satisfaction he found in imparting a portion of his perfections, and the reason that determined him to give actuality to this world rather than to any other was the greater perfection he found in this one. But this reason is not outside of God, nor antecedent to him; he finds it in himself, it is part of his intelligence. For all the possible worlds being sequences of coexisting and successive things, these successions possess different degrees of perfection, according to whether they are more or less well linked and whether they tend more or less harmoniously to a general end. Now the contemplation of perfection is the source of pleasure in intelligent beings, for what has the most perfection pleases more, and a reasonable being only desires things in proportion to the perfections he notes in them. But as our understanding is limited, and we are liable to be wrong in the judgments we make, we often mistake an apparent perfection for a real perfection. In contrast, God, seeing things with an infinite understanding, cannot be deceived

in medieval European manuscripts. Augustine, puzzling over the possibility of the Trinity while walking at the seashore, questioned a child who was patiently filling a hole in the sand with water from the sea, nutshell by nutshell. Told by the saint that he would never complete the task, the child announced that he would complete his task before the man would ever understand the nature of three persons in one God. Augustine interpreted this answer as a sign from God. See James J. O'Donnell, *Augustine: A New Biography* (New York: HarperPerennial, 2006), 287–88. I am grateful to my colleague, the biblical scholar Edwin Yamauchi, for this reference.

64. Du Châtelet also made this her definition of human free will in her essay "On Liberty," which probably was originally intended for the *Foundations* but now exists only in manuscript.

by appearances, nor choose the bad because he failed to recognize the best; thus, he distinguishes among all possible worlds the best and the most perfect, and this greater perfection is the sufficient reason for the preference he gave to this world over all the other possible worlds. Thus the necessary Being is infinitely wise, for only a Being whose wisdom is infinite is able to choose what is most perfect.

§.27. It is in this infinite wisdom of the Creator that final causes, a principle so fruitful in physics, which some philosophers have tried to banish from it very inappropriately, originate; all indicates a design and it is to be blind, or to want to be, not to perceive that the Creator has intended, in the least of his works, purposes that he always achieves and that Nature unceasingly works to carry out. Thus, this universe is not in chaos, it is not a disordered mass without harmony and without connection, as some ranters would persuade us; but all its parts are arranged with infinite wisdom, and none could be transplanted or removed without harming the perfection of the whole.

In studying nature, one discovers some part of the intentions and the art of the Creator in the construction of this universe. Thus Virgil was right to say *Felix qui potuit, rerum cognoscere causas*,⁶⁵ since the knowledge of causes raises us to the level of the Creator and allows us to enter into the mystery of his designs by showing us the admirable order that prevails in the universe and the relationships of its different parts, which are not just necessary relationships of position, such as being above and below; but relationships of a design, of which everything carries the imprint. And the more the world ages, the further men take their discoveries, and the more one finds a design marked in the fabric of the world and of the least of its parts.

THIS WORLD IS THE BEST OF THE POSSIBLE WORLDS.

§.28. So this world is the best of the possible worlds, the one where the greatest variety exists with the greatest order, and where the largest number of effects is produced by the simplest laws. It is the universe that occupies the top of the pyramid,^{*66} and that has nothing above it, but a real infinity below it which decreases in perfection and that consequently did not deserve to be chosen by an infinitely wise Being.

65. "Happy is he who understands the cause of things," from the Roman poet Virgil's *Georgics* (29 BCE), 2.490.

66. Du Châtelet contributed the following note: "M. Leibniz continuing in his *Théodicée* the Dialogue between Boethius and Valla, introduces the Priest of Apollo, who wants to know the origin of the misfortunes of Sextus Tarquinius, and who seeks this origin in the Palace of the destinies, a pyramid consisting of all the possible worlds, in which this one, in which Tarquinius committed the crimes that led to Roman liberty, occupied the top."

THE IMPERFECTIONS OF THE PARTS CONTRIBUTE TO THE PERFECTION OF ALL IN THIS UNIVERSE.

All the objections drawn from the evils prevalent in this world vanish by this principle.⁶⁷ God allows them in the universe insofar as they enter into the best succession of possible things and from which they could not be removed without removing some perfections from the whole; for all the universe is tied together, the least event is caused by an infinity of others that preceded it, and an infinity of others are caused by it, and will arise from it. Therefore, an event should not be judged apart from and outside of the relationship and succession of things; but it must be judged in relation to the entire universe, and by the effects it produces in all places and at all times. For to want to judge by an apparent evil the perfection of the universe is to judge an entire painting by a single stroke of the brush, and it is a chimera to imagine that all imperfections may be removed and everything stay the same or become more perfect. The imperfection in the part often contributes to the perfection of the whole; for when many rules must be obeyed at once to reach a general perfection, the rules often contradict and generate unavoidable exceptions from which arise imperfections in the part, which nonetheless contribute to the most perfect whole that may be brought about.⁶⁸ The human eye, for instance, could not see the least parts of an object without losing sight of the whole; we would see a few points very distinctly if our eyes were microscopes, but in so doing we would lose the whole. Therefore, our sight must be less distinct to be proportionate to our needs, since distinguishing the least parts and a total view of the whole cannot be combined; for it is more useful to us to see the entire object than to distinguish all its points one after the other. Thus it is a chimera to believe that the eye of man would have been more perfect if it had distinguished the least parts of things, since, on the contrary, such an ability would have been almost useless to us.

The general will of God undoubtedly goes to the good and to the perfection of each thing in particular; but his consequent will, which is the result of all his previous acts of will, and which alone can be made actual, goes to the good and the greatest perfection of the whole, to which the perfection of the parts must yield.

It is true that we cannot see all of this grand tableau of the universe, nor show in detail how the perfection of the whole results from the apparent imperfections we believe we see in some parts, for this would require en-

67. Here Du Châtelet deals with the ultimate metaphysical and theological contradiction: the problem of a perfect Creator creating the imperfect, the ultimate Good creating evil.

68. Voltaire mocked this aspect of Leibniz's metaphysics in his tale of *Candide*.

visaging the entire universe and being able to compare it with all the other possible universes, which is an attribute of the Divinity (§.23). But our powerlessness in this respect cannot make us doubt that the supreme Intelligence has chosen the best world to which to give existence, for the necessary Being who is self-sufficient and who has no need for anything outside himself cannot have had other ends in the creation of this universe than to impart a portion of his perfections to his creatures, and to make a work worthy of himself, since he would have done something derogatory to himself and to his perfections if he had produced a world unworthy of his wisdom.

A consequence of the linkage between the parts and the whole is that all imperfection cannot be removed from man; man is a finite being, bounded and limited in all by his essence. How many evils happen to us because our understanding is limited, because we cannot know everything, understand everything, or be wherever our presence is necessary? But these are faculties the creature could not have without becoming a God; thus, the imperfections in the creature, a succession of his limitations, are necessary imperfections.⁶⁹

THE SUPREME BEING IS INFINITELY GOOD.

§.29. It follows from all I have just said that the supreme Being is infinitely good; for having determined to create a world to which to impart a portion of his infinite perfections, he determined to grant actuality to the best succession of possible things. He granted to each thing in particular as much essential perfection as it could receive; and by his wisdom he directed the evils that would be inevitable in this succession of things to the greater good.

AND INFINITELY POWERFUL. HIS UNDERSTANDING IS THE PRINCIPLE OF THE POSSIBILITY, AND HIS WILL, THE SOURCE OF THE ACTUALITY OF THINGS.

§.30. He is infinitely powerful; for God having, for all eternity, envisaged all that is possible, his understanding is the source of all possibility, and as nothing can ever become possible other than what God conceived of as such, and nothing being actual except what he was pleased to grant existence to, he is the principle of the possibility and the actuality of all that is actual and possible.

§.31. God is the absolute Master of this succession of things to which

69. Du Châtelet continued to think about the distinctions between God and man; she explored it fully in her *Examinations of the Bible*, and mentioned it again in the *Discourse on Happiness*, both of which she was working on in this same period, 1735–39.

he has granted existence. He can change it and annihilate it, but (as we have seen) a contingent being cannot give itself existence, nor can it conserve it for a moment by its own force. Thus the reason for continuous existence cannot lie in the creature, who can neither begin nor continue to be but by the will of the Creator, which it needs at all times to sustain itself in the actuality that he has given it.

CHAPTER FOUR

Of hypotheses

THE USEFULNESS OF PROBABILITIES IN PHYSICS.

§.53. The true causes of natural effects and of the phenomena we observe are often so far from the principles on which we can rely and the experiments we can make that one is obliged to be content with probable reasons to explain them. Thus, probabilities are not to be rejected in the sciences, not only because they are often of great practical use, but also because they clear the path that leads to the truth.

USE OF HYPOTHESIS.

§.54. There must be a beginning in all researches, and this beginning must almost always be a very imperfect, often unsuccessful attempt. There are unknown truths just as there are unknown countries to which one can only find the good route after having tried all the others. Thus, some must run the risk of losing their way in order to mark the good path for others; so it would be doing the sciences great injury, infinitely delaying their progress, to banish hypotheses as some modern philosophers have.

MISUSES OF HYPOTHESES BY THE DISCIPLES OF DESCARTES.

§.55. Descartes, who had established much of his philosophy on hypotheses, because it was almost impossible to do otherwise in his time, gave the whole learned world a taste for hypotheses; and it was not long before one fell into a taste for fictions. Thus, the books of philosophy, which should have been collections of truths, were filled with fables and reveries.

THE DISCIPLES OF M. NEWTON HAVE FALLEN INTO THE OPPOSITE EXCESS.

M. Newton, and above all his disciples, have fallen into the opposite excess: disgusted with suppositions and errors that they found filled books of philosophy, they rose up against hypotheses and tried to make them suspect