find this system. M. Leibniz gave this much thought; he had ideas on this, which he unfortunately never communicated to anyone, but even if it could be invented, it seems that there are some unknowns for which no *equation* could ever be found. Metaphysics contains two types of things: the first, that which all people who make good use of their mind, can know; and the second, which is the most extensive, that which they will never know.[46]

Several truths of physics, metaphysics, and geometry are obviously interconnected. Metaphysics is the summit of the edifice; this summit is so elevated that our image of it often is a little blurred. This is why I thought I should begin by bringing it closer to you, so that, no cloud obscuring your mind, you might be able to have a clear and unassailable view of the truths in which I want to instruct you.[47]

CHAPTER ONE: *OF THE PRINCIPLES OF OUR KNOWLEDGE*

I

ON WHAT OUR KNOWLEDGE IS FOUNDED.

All aspects of our knowledge are born from each other and are founded on certain principles whose truth is known without even reflecting on it, because they are self-evident.

Some truths immediately depend on these first principles, and are derived from them as a result of a small number of conclusions only. In that case the mind easily perceives the sequence that has led to them; but it is easy to lose sight of this sequence in the search for truths that can only be reached by a great number of conclusions drawn one from another. There are a thousand examples of this in geometry; it is very easy, for example, to see that the diameter of a circle divides it into two equal parts, because only one conclusion is needed to pass from the nature of the circle to this property. But it is not so easily seen that the square of the ordinate BM is equal to the rectangle of line AB by line BC, although this property results from the

46. This sentence reflects an interchange late in the 1730s between Voltaire and Frederick of Prussia, in which Voltaire made this distinction. See D1376, Voltaire to Frederick of Prussia (15 October 1737) *Oeuvres complètes*, v. 88, 381.

47. Natural philosophers commonly offered a visual representation of the constituent parts of "Knowledge." Du Châtelet certainly knew of Descartes' Tree of Knowledge from his *Principles*, in which metaphysics forms the roots, physics the trunk, and the other sciences (mechanics, medicine, morals), the branches.

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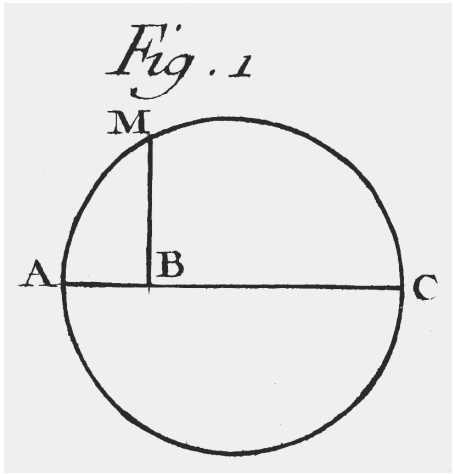

nature of the circle just as in the former case;[48] because there must be several intermediary conclusions before arriving at this last property of a circle. So, it is very important to be attentive to principles, and the manner in which truths result from them, if one does not want to go astray.

II

WHAT A PRINCIPLE IS.

The word *principle* has been much abused; the Scholastics who could demonstrate nothing chose unintelligible words for their principles.[49] Descartes, who sensed how much this manner of reasoning kept men away from the truth, began by establishing that one must only reason from clear ideas; but he pushed this principle too far: for he allowed a lively, internal sense of clarity and evidence to serve as the basis of our reasonings.

ABUSE OF THIS WORD BY M. DESCARTES.

In following this principle, this philosopher made a mistake about the essence of bodies that, according to him, consisted only of extension.[50] He be-

48. *Ordinate* means one of the points of a coordinate, in this case connecting the diameter AC to the exterior of the circle. See figure 1, $BM^2 = AB \times BC$.

49. The *Scholastics*, or *Schoolmen*, for Du Châtelet were catchall words for the thirteenth-century theologians such as St. Thomas Aquinas (1225–1274), who endeavored to reconcile reason and faith for the Catholic Church. In philosophy and physics, they used Aristotle's method of logic, syllogistics, and made his writings part of church dogma.

50. By *extension* she means the size and shape of a body in space.

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lieved that in extension, he had a clear and distinct idea of a body, without troubling to prove the possibility of this idea that we will soon see to be very incomplete, since to it must be added the concepts of the force of inertia, and of the *force vive* (active force). This method, moreover, would only serve to perpetuate disputes, for among those with opposing views, each has this lively and internal sense of what it is they put forward. Thus, no one has to yield, since the evidence is equal on the two sides. So, one must substitute demonstrations for the illusions of our imagination, and not admit anything as truth, except what results incontestably from first principles that no one can call into question, and reject as false all that is contrary to these principles, or to the truths that one has established with them, whatever the imagination might say.

ONE MUST DISTRUST ONE'S IMAGINATION AND ONLY YIELD TO EVIDENCE.

§.3. A little attention to the manner in which one proceeds in science, where certainty is carried to its highest point, will suffice to make one aware of the utility of this method of reasoning. For instance, there is scarcely a clearer idea than that of the possibility of an equilateral triangle, and that the two sides of a triangle, taken together, are much longer than the third. Yet Euclid, this strict reasoner, was not content to appeal just to a lively and internal sense that we have of these truths, but he demonstrated them rigorously, showing what must be done in order to construct an equilateral triangle, and that it implies contradiction to say that two sides of a triangle, taken together, are not greater than the third.

ON THE PRINCIPLE OF CONTRADICTION.

§.4. *Contradiction* is that which simultaneously affirms and denies the same thing; this principle is the first axiom, on which all truths are founded. Everyone readily agrees on this, and it would even be impossible to deny it without lying to one's conscience; for we sense that we cannot force our minds to admit that a thing simultaneously is and is not, and that we cannot *not* have an idea while having it, nor see a white body as if it were black while we see it as white. Even the Pyrrhonists, who claimed to doubt everything, never denied this principle; they effectively denied that reality existed, but they never doubted that they had an idea while they had it in their minds.[51]

51. The Pyrrhonists were followers of the third century BCE Greek philosopher, Pyrrho. They became synonymous with the idea of complete skepticism.

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IT IS THE FOUNDATION OF ALL CERTAINTY.

This axiom is the foundation of all certainty in human knowledge. For, if one once granted that something may exist and not exist at the same time, there would no longer be any truth, even in numbers, and every thing could be, or not be, according to the fantasy of each person, thus 2 and 2 could equally make 4 or 6, or both sums at the same time.

DEFINITION OF THE POSSIBLE AND THE IMPOSSIBLE.

§.5. It follows from this that the impossible is that which implies contradiction; and the possible does not imply it at all. Several philosophers give another definition of the possible and of the impossible, and regard as impossible that which does not give a clear and distinct idea, and as possible that which one can conceive, and which corresponds to a clear idea. This definition if well explained could be accepted, but it is necessary to be very careful that this definition does not induce us to take erroneous and deceptive notions for clear ones. For, it sometimes happens that we form deceptive ideas for ourselves that may appear evident for lack of attention, and because we have an idea of each term in particular, although it is impossible to have any idea of the sentence born from their combination.

EXAMPLES OF DECEPTIVE IDEAS.

Thus, at first one will believe that one understands what is meant by a triangle, if one defines it as *a figure enclosed between two straight lines*, and one thinks that one is speaking of a regular body, when speaking of a body with nine equal sides, because one understands all of the terms that enter into these propositions. Yet, it implies contradiction to say that two straight lines enclose a space and make a figure, and you have seen in geometry that it is impossible for a body to have nine sides, equal and alike.

There is yet another example of these deceptive ideas in the most rapid movement of a wheel, which M. Leibniz used to argue against the Cartesians; for it is easy to show that the most rapid movement is impossible to measure, since in extending any spoke this movement becomes more rapid to infinity. One sees, by these examples, that it is quite possible to believe that one has a clear idea of a thing of which we really have no idea.

So it is absolutely necessary, in order to preserve oneself from error, to verify one's ideas, to demonstrate their reality and not to admit any as incontestable, unless confirmed by experiment or by demonstration, which includes nothing false, or chimerical.

§.6. A very important rule results from the definition of the impossible that I have just given you; it is that when we advance that a thing is impos-

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sible, we are required to show that the same thing is simultaneously asserted and denied, or that it is contrary to a truth already demonstrated. This rule would avoid a great many disputes, if it were followed, for it would at once remove doubt from propositions, and expose the inadequacy of the proofs of those who treat as impossible all that does not conform to their opinions.

One should be just as cautious when maintaining that a thing is possible; for one must be in a position to show that the idea is free of contradiction. Without this condition our ideas are only more or less probable opinions, in which there is no certainty.

§.7. The principle of contradiction has always been used in philosophy. Aristotle, and after him all philosophers used it, and Descartes used it in his philosophy to prove that we exist. For it is certain that this one who doubted that he existed would have in the fact of his very doubt a proof of his existence, since it implies contradiction that one might have an idea whatever it be, and consequently a doubt, while at the same time not being in existence.

THE PRINCIPLE OF CONTRADICTION IS THE FOUNDATION OF ALL NECESSARY TRUTHS.

This principle suffices for all necessary truths, that is to say, for the truths which can only be determined in a single way, for this is what is meant by the term *necessary*. But when contingent truths are concerned, that is to say, when a thing can exist in various ways, none of its determinations is more necessary than another, then another principle becomes necessary, because that of contradiction no longer applies. Thus, the Ancients, who did not know this second principle of our knowledge, were wrong on the most important points of philosophy.

OF THE PRINCIPLE OF SUFFICIENT REASON.

§.8. The principle on which all contingent truths depend, and which is neither less fundamental nor less universal than that of contradiction, is *the principle of sufficient reason*. All men naturally follow it; for no one decides to do one thing rather than another without a sufficient reason that shows that this thing is preferable to the other.

IT IS FUNDAMENTAL TO ALL THE CONTINGENT TRUTHS.

When asking someone to account for his actions, we persist with our own question until we obtain a reason that satisfies us, and in all cases we feel that we cannot force our mind to accept something without a sufficient reason,

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that is to say, without a reason that makes us understand why this thing is what it is, rather than something completely different.

ABSURDITIES THAT RESULT FROM THE NEGATION OF THIS PRINCIPLE.

If we tried to deny this great principle, we would fall into strange contradictions. For as soon as one accepts that something may happen without sufficient reason, one cannot be sure of anything, for example, that a thing is the same as it was a moment before, since this thing could change at any moment into another of a different kind; thus truths, for us, would only exist for an instant.

For example, I declare that all is still in my room in the state in which I left it, because I am certain that no one has entered since I left; but if the principle of sufficient reason does not apply, my certainty becomes a chimera, since everything could have been thrown into confusion in my room, without anyone having entered who was able to turn it upside down.

Without this principle there would not be identical things, for two things are identical when one can substitute one for the other without any change to the properties which are being considered. This definition is accepted by everyone. Thus, for example, if I have a ball made out of stone, and a ball of lead, and I am able to put the one in the place of the other in the basin of a pair of scales without the balance changing, I say that the weight of these balls is *identical*, that it is the same, and that they are identical in terms of weight. Yet something could happen without a sufficient reason, and I would be unable to state that the weight of the balls is identical at the very instant when I find that it is identical; since a change could happen for no reason at all, happen in one and not the other; and, consequently, their weights would no longer be identical, which is contrary to the definition.

Without the principle of sufficient reason, one would no longer be able to say that this universe, whose parts are so interconnected, could only be produced by a supreme wisdom, for if there can be effects without sufficient reason, all might have been produced by accident, that is to say, by nothing.

THIS PRINCIPLE IS THE ONLY THING THAT CAUSES US TO DIFFERENTIATE WAKING FROM SLEEPING.

What sometimes happens in dreaming gives us the idea of a fabulous world, where all events could happen without sufficient reason.

I dream that I am in my room, busy writing; all of a sudden my chair changes into a winged horse, and I find myself in an instant a hundred leagues from the place where I was with people who have been dead for a

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long time, etc. All of this cannot happen in this world, since there would not be sufficient reason for all these effects; for when I leave my room, I can say how and why I leave it, and I do not go from one place to another without passing through intermediary places. Yet all these chimeras would be equally possible if effects could exist without sufficient reason; it is this principle that distinguishes dreaming from waking and the real world from the fabulous world that is depicted in fairy tales. Thus, those who deny the principle of sufficient reason are the inhabitants of a fabulous world that does not exist, but in the real world, all must happen according to this principle.[52]

In geometry where all truths are necessary, only the principle of contradiction is used. In a triangle, for example, the sum of the angles can only be determined in a single manner, and they absolutely must be equal to the sum of two right angles. But when it is possible for a thing to be in several states, I cannot be sure that it is in one state rather than another, unless I do give a reason for that which I affirm. Thus, for example, I can be sitting, lying down, or standing, all these determinations of my situation are equally possible, but when I am standing, there must be a sufficient reason why I am standing and not sitting or lying down.

ARCHIMEDES FIRST USED THIS PRINCIPLE IN MECHANICS.[53]

Archimedes, in passing from geometry to mechanics, recognized the need for sufficient reason; for, wanting to demonstrate that a pair of scales with arms of equal length loaded with equal weights would rest in equilibrium, he showed that in this equality of the arms and weights, the scales must stay at rest, because there was not sufficient reason why one of the arms should tilt rather than the other.

BUT IT IS M. LEIBNIZ WHO MADE EVIDENT ALL THE EXTENSION AND USEFULNESS OF IT.

M. Leibniz, who was very attentive to the sources of our reasoning, took this principle, developed it, and was the first who stated it clearly, and who introduced it into the sciences.

It must be acknowledged that one could not have rendered the sciences a greater service, for the source of the majority of false reasoning is forget-

52. This categorical statement is very provocative, as French and English natural philosophers rejected this Leibnizian principle. It is the principle that Voltaire later ridiculed in his tale of *Candide* (1759). Nineteenth- and early twentieth-century scientists used it as described here by Du Châtelet as a fundamental premise of their work, the presumption that there is a particular demonstrable cause of any given phenomenon.

53. Archimedes was the Greek mathematician of the third century BCE.

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ting sufficient reason; and you will soon see that this principle is the only thread that could guide us in these labyrinths of error the human mind has built for itself in order to have the pleasure of going astray.

So we should accept nothing that violates this fundamental axiom; it keeps a tight rein on the imagination, which often falls into error as soon as it is not restrained by the rules of strict reasoning.

DIFFERENCE BETWEEN THE POSSIBLE AND THE ACTUAL.

§.9. It is necessary to distinguish between the possible and the actual. You have seen before that all that does not imply contradiction is possible, but is not actual. It is possible, for example, that this square table might become round, but this will perhaps never happen. Thus, all that exists being necessarily possible, one can conclude possibility from existence, but not existence from possibility.

So in order that a thing might be, it is not sufficient for it to be possible; this possibility must also be actualized, and this is called *existence*. Now a thing cannot come to exist without a sufficient reason, by which an intelligent being might understand why this thing becomes actual, having been possible before. Thus, a cause must contain not only the principle of the actuality of the thing of which it is the cause but also the sufficient reason for this thing, that is to say, what makes it possible for an intelligent being to understand why this thing exists. For any man who makes use of his reason must not be content with knowing that a thing is possible and that it exists, but he must also know the reason why it exists. If he does not see this reason, as often happens when things are too complicated, he must at least be certain that one could not demonstrate that the thing in question cannot have sufficient reason for its existence. Thus, in all that exists there must be something making it possible to understand why something that exists could exist; this is what is called *sufficient reason*.

THE PRINCIPLE OF SUFFICIENT REASON BANISHES FROM PHILOSOPHY ALL THE REASONING OF SCHOLASTICISM.

§.10. This principle banishes from philosophy all the reasonings of Scholasticism; for the Scholastics accepted that nothing happens without a cause, but they would allege as causes *plastic natures*, *vegetative souls*, and other meaningless words. But once it has been established that a cause is good only insofar as it satisfies the principle of sufficient reason, that is to say, insofar as it contains something making it possible to show how and why an effect can happen, then it becomes impossible to substitute these grand words for ideas.

For instance, when it is explained why plants appear, grow, and last,

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and that the cause advanced for these effects is a vegetative soul found in all plants, a cause of these effects is indeed advanced;[54] but it is a cause that is not admissible at all, because it contains nothing that helps us to understand how the vegetation of which I seek the cause operates. For assuming the existence of this vegetative soul does not promote understanding of why the plant that I am considering has a particular structure rather than any other, nor how this soul can give shape to a mechanism such as that of this plant.

IT IS THE FOUNDATION OF MORALS.

§.11. The principle of sufficient reason is also the foundation of the rules and customs founded only on what is called *propriety*. For the same men may follow different customs, they may determine their actions in many ways; and when one chooses to prefer those which are most reasonable over others, the action becomes good and could not be condemned; but the action is said to be unreasonable as soon as there are sufficient reasons for not committing it, and it is certainly on these same principles that one custom may be judged better than another, that is to say, when it has more reason on its side.

OF THE PRINCIPLE OF INDISCERNIBLES. HOW SUFFICIENT REASON FOLLOWS FROM THIS

§.12. From this great axiom of sufficient reason is born another that M. Leibniz calls *the principle of indiscernibles*. This principle banishes from the universe all similar matter, for if there could be two pieces of matter absolutely similar and identical, so that one might be put in the place of the other without it causing the slightest change (this is what is meant by entirely identical) there would be no sufficient reason why, for instance, one of these particles was placed on the Moon and the other on the Earth, since changing them and placing the one which is on the Moon on the Earth, and the one which is on the Earth on the Moon, all things would remain the same.

IT BANISHES ALL SIMILAR MATERIAL FROM THE UNIVERSE.

So one is obliged to recognize that the least particles of matter are discernible, or that each is infinitely different from all others, and that it could not be used in a place other than the one it occupies without disturbing the whole universe. Thus, each particle of matter is meant to have the effect that it produces, and from this, diversity is born, which is found between two grains of sand just as between our globe and that of Saturn, this diver-

54. This is an idea from Aristotle.

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sity reveals to us that the wisdom of the Creator is no less admirable in the tiniest being than in the biggest.

The infinite diversity that reigns in nature is evident to us as far as our organs can sense. M. Leibniz, who advanced this truth first, had the pleasure of seeing it confirmed by the very eyes of those who denied it, on a walk with Madame the Electress of Hanover, in the garden of the Heurenausen.[55] For this philosopher, having stated that two entirely similar leaves could never be found in the almost innumerable quantity of those which surrounded them, several of the courtiers fruitlessly spent part of the day in this search, and could never find two leaves that did not have perceivable differences, even to the naked eye.

There are other objects that their smallness makes us see as alike, because we see them confusedly, but microscopes discover their differences for us. Thus experiments, which are not necessary for the truth of this principle, confirm it again.

OF THE LAW OF CONTINUITY.

§.13. From the axiom of sufficient reason there follows yet another principle, called *the law of continuity*, it is again to M. Leibniz that we are indebted for this principle, which is one of the most fruitful in physics. It is he who teaches us that nothing happens at one jump in nature, and a being does not pass from one state to another without passing through all the different states that one can conceive of between them.

The principle of sufficient reason is easily found in that truth, for each state in which a being finds itself must have its sufficient reason why this being is in this state rather than in any other, and this reason can only be found in the preceding state. Therefore this antecedent state contained something which gave birth to the current state that followed it, so that these two states are so completely interconnected it is impossible to put another state between the two. For if there was a state possible between the current state and that which immediately preceded it, the nature of the being would have left the first state without yet being determined by the second to abandon the first. Thus, there would be no sufficient reason why it should pass to this state rather than to any other possible state. Thus no being passes from one state to another without passing through the intermediate states, in the same way as one does not go from one city to another without traveling along the road between the two.

55. Leibniz told this story often, about Sophie, Electress of Hanover (1630–1714), and their walk in her garden at Herrenhausen (Du Châtelet spelled it incorrectly), probably around 1685.

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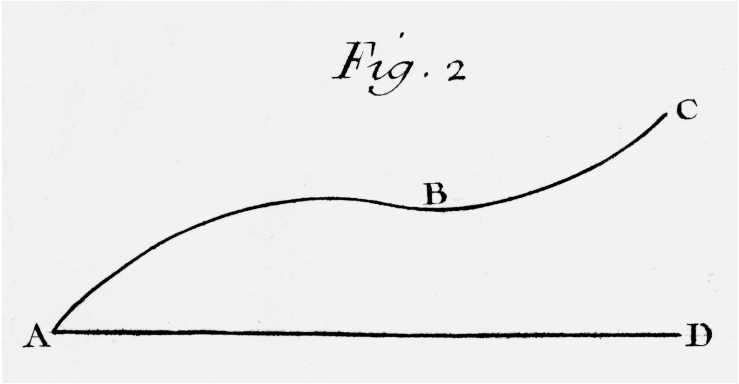
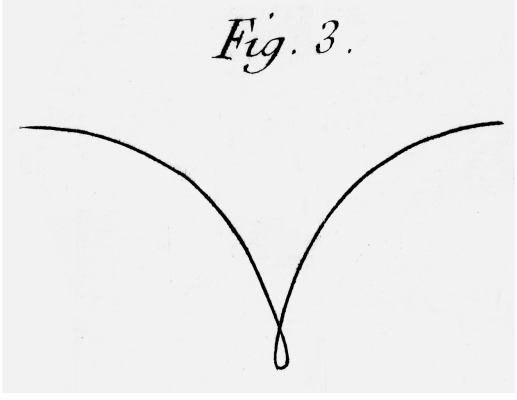


EXAMPLES OF THIS LAW IN GEOMETRY.

In geometry where everything happens in the greatest order, it can be seen that this rule is observed with an extreme exactitude, for all the changes which occur in lines that are one, that is to say in a line that is the same, or in those which together make up one and one whole only, all these changes, I say, exist after the figure has passed through all the possible changes that lead to the state it acquires. Thus, a line that is concave toward an axis, as line AB toward axis AD, does not become convex without passing through all the states between concavity and convexity, and through all the degrees that can lead from one to the other; thus concavity begins to diminish by infinitely small degrees up to point B, where the line is neither concave, nor convex, a point that is called the point of inflection. At this point the concavity ends and the convexity begins, and at this point B an infinitely small line parallel to axis AD forms; beyond this point B, the convexity begins and increases by infinitely small degrees, as mathematicians know.



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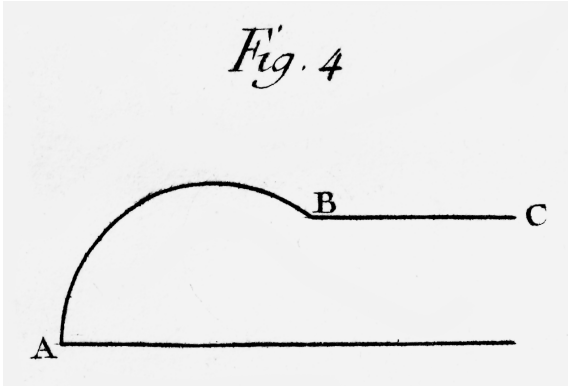

The points of retrogression found in many curves and that might appear to violate this law of continuity—because the line appears to end at this point and retrogress quickly in a contrary direction—do not, however, violate it at all; for it can be shown that at these points of retrogression nodes are formed as in figure 3,[56] in which it is clearly seen that the law of continuity is followed, for these nodes being diminished to infinity, in the end take the form of a perceivable point.

The law of continuity is not found in mixed figures, of which one cannot say that they form a true whole, because they have not been produced by the same law but are composed of several pieces, as if one added to the arc of a circle AB a straight line BC in order to make a single figure ABC. These figures violate the law of continuity, because the law by which one describes a circle AB ends at B and contains nothing in it that might give birth to line BC, but at point B another law begins, according to which line BC is described, and this second law bears no relationship to the first, which described circle AB.

The same thing happens in nature as in geometry, and it was not without reason that Plato called the Creator, *the eternal Geometrician*.[57] Thus, there are no angles properly speaking in nature, no inflexion nor abrupt retrogressions; but there are gradations in everything, and all prepares well in advance for changes that must be experienced, and goes by slight changes to the state it must be in. Thus a ray of light that is reflected on a mirror does not suddenly retrogress, and does not make an acute angle at the point of

56. *Nodes* had more than its specific astronomical meaning in the eighteenth century. It was a general term that could also be synonymous with a small loop, or knot.

57. Du Châtelet studied the dialogues of Plato (429–347 BCE), the Greek philosopher, during her time at Cirey.

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reflection; but it passes to the new direction that it takes on being reflected through a small arc that leads it imperceptibly and through all the possible degrees between the two extreme points of incidence and reflection.

It is the same with refraction. The ray of light does not break at the point that separates the medium it penetrates and that which it leaves behind, but it begins to inflect before having penetrated the new medium; and the beginning of its refraction is a small curve that separates the two straight lines it describes in traversing two heterogeneous and contiguous mediums.

THIS PRINCIPLE SERVES TO DEMONSTRATE THE LAWS OF MOTION.

§.14. By this law of continuity the true laws of motion can be found and demonstrated, for a body that moves in any direction whatever could not move in an opposite direction without passing from its first movement to rest through all of the intermediate degrees of retardation, in order to pass again, by imperceptible degrees of acceleration, from rest to a new movement that it must experience.

THE PRINCIPLE OF CONTINUITY PROVES THAT THERE ARE NO PERFECTLY HARD BODIES IN THE UNIVERSE.[58]

§.15. This law shows that there is not a perfectly hard body in nature, for in the collision of perfectly hard bodies this gradation could not take place because the hard bodies would pass all at once from rest to movement, and from movement in one direction to movement in an opposite direction. Thus, all bodies have a degree of elasticity that renders them capable of satisfying this law of continuity which nature never violates.

§.16. It follows from what I have just said that when the conditions that give birth to a property come to change to other conditions from which another property must be born, so that finally these conditions become the same or identical, the property which resulted from the initial conditions must change by the same gradation into the property that is a continuation of the later conditions into which the first happened to change.

Geometry furnishes an infinity of examples that confirm and clarify this rule. The ellipse and the parabola, for example, describe very different lines, but when one makes the determinations of an ellipse vary (which are the conditions that render an ellipse possible) in order to make them approach those of the parabola, the properties of the ellipse also vary continually and

58. In the eighteenth century and in subsequent science, it had to be presumed that there could be no completely hard bodies in nature. Bodies were presumed to be *elastic*, meaning that their shape would be affected by an impact with another body, but that this shape would be resumed after the impact.

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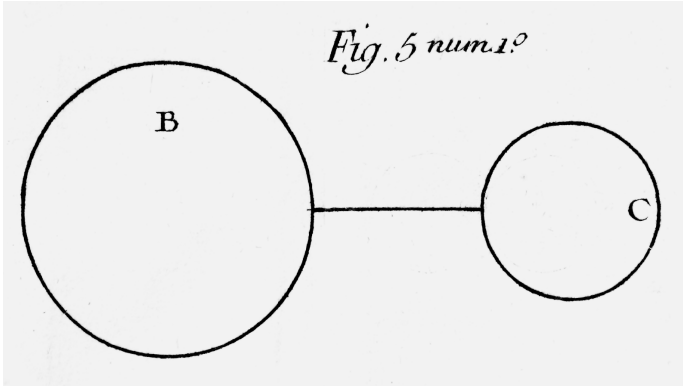

approach those of the parabola up to the point where finally the lines become the same. Thus, one of the foci of the ellipse remaining immobile, if the other moves away continually, the new ellipses that will be produced will continually become more like the parabola, and they finally will coincide with it, when the distance between the foci has become infinite. Thus, all the properties of the parabola will agree with those of an ellipse the foci of which will be infinitely distant, and the parabola can be considered as an ellipse whose foci are infinitely distant. By this same principle a decreasing movement finally becomes rest, and that ever-diminishing inequality turns into equality, so that rest may be considered as a very small movement, and equality as an infinitely small inequality. So, whenever this continuity of event does not obtain, it must be concluded that there are mistakes in the reasoning one has used.

DESCARTES' MISTAKE IN NOT HAVING PAID ATTENTION TO THIS LAW.

§.17. Descartes, for example, would have reformed his laws of motion had he paid attention to this law. He began by establishing as a first law that two equal bodies colliding with equal speeds must rebound with the same speed, and this is very true, for there being no reason why one of the two should continue in its path rather than the other, and these bodies being unable to penetrate each other or stay in repose, because the force of their equal speeds would be lost, which cannot happen, they must necessarily both rebound with the same speed with which they collided.

But M. Descartes' second law of motion and almost all the others are false, because they violate the principle of continuity. The second, for example, states that if two bodies B and C collide with equal speeds, but that body B is bigger than body C, then only body C will rebound and body B will continue on its path, both with the same speed that they had before the collision. This rule is denied by experience, and it is false because it is not

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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.

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