

Emilie Du Châtelet, *Foundations of Physics*, 1740.

Translated by Katherine Brading *et al.*¹ at the University of Notre Dame and Duke University. Footnotes are ours except where otherwise indicated.

Du Châtelet's marginal notes are placed in **{bold}** in the closest appropriate place in the text. Please see the French original for the position of each note in the margin alongside the paragraph. Figures are available in the original text, and online via the BNF.

Chapter 3. Of Essence, Attributes and Modes

32. Since I will be obliged to employ the terms *essence*, *modes*, and *attributes* often in this Work, and since it is quite common for those who utter them to have very different ideas of their meaning, I think that it will not be useless to define these ideas, and to teach you what you should understand by these words; for very important truths in Physics depend upon the true notions of essence and attribute.

33. That which is impossible cannot exist, for one calls impossible that which implies contradiction. Now if what implies contradiction could exist, one thing could both be, and not be at the same time: which is demonstrated as false for all people.

34. All that is possible can exist, for given that a thing contains nothing that is contradictory, one can imagine nothing that opposes the possibility of its existence. The possibility of things depends, therefore, on the non-contradiction of their determinations; and when a thing contains nothing that is contradictory, this alone suffices for its possibility. A triangle, for example, can be drawn because it is not at all contradictory that three lines may be joined at their ends and enclose a space; thus, whether or not in fact we draw a triangle, the triangle remains equally possible. The drawing executes that which was already possible, but it adds nothing new. This brings to light the need to distinguish, as I have done above, between actual and possible. All that is possible is not actual, although all that is actual is possible. Thus, there must be an external cause for actuality (that is to say, for existence) which is the complement of possibility. Without actuality a Being would remain eternally in the realm of the *possibilia* (if I may express myself in this way), and would never come into existence.

¹ Aaron Wells, John Hanson, Penelope Brading.

35. {Definition of that which we call a Being.} Therefore one calls a *Being* that which can exist, and whose determinations do not imply any contradiction, whether this Being exists, or whether it is only possible. For we often speak of past or future Beings, and as a result give the name *Being* to all that is possible, whether it exists or not. But we call a *Being of reason*, or *chimera*, that which implies contradiction and can never exist, that is to say, that which is impossible.

36. {Beings have variable and constant determinations.} When we consider the Beings that surround us, we notice in them both variable and constant determinations: a rock, for example, is sometimes hot and sometimes cold, but it is always hard, composed of parts, and heavy. The hardness, the heaviness, the divisibility are therefore the constant determinations of the Being that we call a rock; and the heat, the color, etc., are its variable determinations. Thus, the Pendulum Clock that is on this mantelpiece always has the same wheels, the same spring, etc., but the situation of the different parts amongst themselves varies at every moment while the clock is going. Similarly, the sides and the angles of a triangle remain constant, whether one inscribes the triangle within a circle, or circumscribes it around this circle, or drops a perpendicular from its apex to its base.

37. When one carefully considers the constant determinations, and compares them with each other, one notices that some depend so much on others that they could not subsist or even occur in the Being without the initial determinations, whereas the initial determinations do not depend on one another at all and do not mutually determine one another; they are only such that they can subsist together and be combined without destroying each other. **{What essence is, and in what it consists.}** One sees, for example, that three sides and three angles are equally the permanent and invariable determinations of a triangle; however, with more attention, one perceives that when two right lines are joined at their ends, they do not at all determine one another, and they can make an angle, or not make one; and they can make an angle of one size or another; but, once this angle and these two sides are determined, the other two angles and the third side are also determined; and one absolutely must make them the size that these initial determinations require, for every other way is impossible. Thus, the third side and the two other angles of a triangle depend on the initial two sides and the angle that they make.

38. When one wants to conceive how a Being is possible, it is not the variable determinations that one must consider, for these determinations, which subsist only sometimes, cannot number among those that constitute a Being, since this Being can subsist despite their variations.

Nor can one posit, in order to conceive this Being, the constant determinations that follow and are themselves determined by other determinations that precede them. For one wants to know here how the Being is possible, and what makes it possible. One must therefore assemble determinations of this Being that do not conflict with one another, and that do not follow necessarily from other antecedent determinations (as, for example, two of the sides and the subtended angle in a triangle; for since the third side and the two other angles are not possible unless the two sides and the angle made from them are posited, one must posit the two sides and this angle prior to the third side and the other two angles). Thus, the primordial determinations are those which constitute the essence of a Being.

Since a Being becomes possible by its essence, when one wants to know the possibility of a Being one must know its essence, that is to say, the way in which this Being can come about: thus, the essence is the first thing that one is able to conceive in a Being; and no Being could subsist without essence.

39. {The attributes or properties arise from the essence.} All that is deduced from the essence belongs constantly to the Being, and it is this that we call *attribute* or *property*. Nothing that conflicts with the essence of a Being, that is to say, with the primordial and essential determinations, could be found in that Being, but all that is not contradictory to these determinations can be found in it, although it is not always found there; and this is the origin of attributes, and of variable properties, or modes. For example, it conflicts with the essence of a triangle for it to have four sides, because the essence of a triangle excludes the fourth side; but it does not conflict at all with this essence for the triangle to be divided in two by a line taken from the apex to the base.

All that is found in a Being must therefore relate to the essential and primordial properties, or to the attributes, or to the modes. Thus, the essential and primordial properties, or the essence of a triangle, are two sides and the subtended angle; its attributes are one side and two angles; and its modes are to be inscribed, circumscribed, etc.

40. The primordial properties and the attributes are constantly in the Being and never leave it. But the modes can either be in it or not, and it is only their possibility that is necessary and invariable.

41. There is no primitive and intrinsic reason why the essential determinations of a Being are found in this Being. For, these determinations being that which one is first able to conceive in the Being, one can there conceive some other prior thing on which the first determinations

themselves depend. Thus, for example, there is a first and internal reason why the equilateral triangle has its three angles equal; but there is no reason at all why its three sides are equal. For these three equal sides are what one takes for demonstrating the equality of the three angles: for a triangle is determinable in several ways; it can be equilateral, or scalene; but it is I who determines it to be equilateral, in making its three sides equal. **{Difference between essential determinations and attributes.}** There are essential determinations of a Being, like the givens in a problem, that are simply possible determinations that neither contradict nor cancel each other; and that, by their combination, give rise to some new determination that one must look for. If these first determinations, that we call the *determinants*, had an intrinsic reason why they are together, the problem would be over-determined; **{Plate 1. Fig. 5, number 2}** to find, for example, the fourth side L of a trapezoid, one would give more determinations than are needed for the solution to the problem in giving the three sides A , B , and C and the three angles o , u , and r , since the three sides A , B , C with the two angles o and u suffice to determine all that is proper to this trapezoid; and the third angle r being itself already determined by these givens, it must not be listed among these determinants. For these givens do not have any intrinsic determinations, and their magnitude can vary, and be such that he who poses the problem decides accordingly; but the angle r is determined by the three sides A , B , C , and the two angles o and u and its magnitude cannot vary.

42. It is evident from this that the properties or attributes have their sufficient reason in the essential determinations; for since once these essentials are posited the properties also are, one can understand by the nature of these essential determinations why the attributes or properties are as they are, rather than otherwise. **{Fig. 5, number 2}** Thus, one sees that the magnitude of the angles r and s and of side L of the trapezoid A , B , C , L , follow from the magnitude of the three other sides, and from the two other angles that are the essential determinations of the trapezoid A , B , C and that are its essence; and as these essential determinants vary, the attributes or properties necessarily vary also: they are the unknowns of a problem that must have their sufficient reason in the givens, since without this it would be impossible to solve the problem and determine them.

43. {That which we call modes.} Modes are the limitation of the subject of which they are the modes: everything that is not in conflict with the essential determinations, even though the essential determinations do not determine them, is a *mode*. **{Their possibility but not their actuality arises from the essence.}** Thus, one can understand through these essential determinations, why a mode is possible, but not why it becomes actual. For if the essential determinations contained the reason for the actuality of the modes, the modes would become

attributes, since it would be impossible for them not to be found in the Being.

44. Thus the simple possibility of modes finds its sufficient reason in the essence; but their actuality depends either on other antecedent modes, or on exterior Beings, or on both at the same time.

Neither can the attributes contain the reason for the actuality of the modes, for that which is based in the attributes is originally based in the essence, upon which the attributes depend; and thus the actual modes would be necessary and immutable like the attributes themselves, if the reason for their actuality was found in the attributes. Now, since this reason can be found neither in the essence nor in the attributes of a Being: if it is found in the Being itself, it must be based in the antecedent modes (for a Being has only its essence, its attributes, and its modes); if it is not in the Being itself, it must be found in exterior Beings; and if only one part of this reason is found in the Being, the rest must be found in the exterior Beings. This is so that the reason for the actuality of the modes becomes sufficient.

An example will clarify all of this. The given position of the parts of a Clock, for example, does not depend on its essence, for it can change; the possibility of this position derives solely from the essence: but its actuality comes from the preceding position; and if an external agent made the wheels of this Clock turn, the actuality of the new position that these parts would acquire would depend in part on this external Being, which applies its force to make the wheels move, and in part on the preceding position, in which it found the wheels of this Clock before making them turn.

The movements of the human Body can also serve as an example; for all the movements that I can make with my arm are possible through my essence; but the actuality of any movement, depends in part on the exterior objects that are determining me, and in part on the previous situation of my arm.

45. Since the essence consists in the assemblage of several non-conflicting determinations to make a single Being, one sees that the possibility of the actual essences is necessary, and that it implies a contradiction to say that there has been a time when an essence that is at present possible has been impossible, because this would require that one thing can be possible and impossible at the same time. **{These essences are necessary.}** The essence of a triangle, for example, consists in there being nothing conflicting in three given lines, of which two taken together are longer than the third, enclosing a space, and one can never conceive that this becomes impossible, without admitting that the same determinations could be self-conflicting and not self-conflicting at the same time.

46. {They are invariable like numbers.} In the same way that essences are possible for all eternity, they are invariable. For, if in the place of one of the determinations that constitute the essence of a Being, one substitutes another determination that can subsist with the others (for without that, this substitution of determination could not take place), one will have a new Being; but the first will not have been changed due to this, either in its possibility or in its essence. Thus, for example, if in the place of one of the sides of a triangle, one puts two others, one neither destroys nor changes due to this the essence of the triangle; but one makes a four-sided Figure, that is to say, a Being of a new kind.

Thus, the Scholastics were right to say that essences are like Numbers: nothing is more accurate than this comparison, that is even a kind of demonstration that clarifies marvelously this doctrine of essences; for, to make a number, one combines some units, the combination of which is not necessary, but only possible. Now, if you remove one of these units, or if you add one to them, you will have another number; thus nothing can be removed, nor added to a number, *salvo Numero*, without the destruction of this number. It is the same with essences; some determinations that are not necessarily together, but that are not in conflict with one another, constitute the essence; and whether you remove one from or add one to it, the essence is no longer the same, it is no longer the same Being; but from it originates the essence of another Being very different from the first.

47. {Attributes are incommunicable.} It follows furthermore from what was said about the foundation of the attributes that they are incommunicable: for having their sufficient reason in the essence, it is impossible to transport them elsewhere; and one can find in a subject only those attributes that flow from its essence. **{From where it follows that thought cannot be an attribute of matter.}** This ends the famous dispute among the Philosophers, as to whether God could have given thought to matter or not. For it follows necessarily from the Doctrine of essences, that there cannot be any properties in a subject except those that originate from its essence, that is to say, from the Combination of its essential and invariable determinations. All Philosophers avow that matter, *qua* matter, that is to say, as extended and impenetrable, cannot form a thought; but they say, *that God has perhaps given to matter the attribute of thought, even if it does not have it through its essence, and that thus, just as one does not know what it pleased God to do, one cannot know either whether that which thinks in us is matter or not.* **{Locke, Of Human Understanding.}** Since they avow that thought is not founded in the essence of matter, and that it is not an attribute of matter, neither can it have been communicated to matter, since by the Doctrine of essences, attributes are incommunicable, and they must all have their foundation

in the essence: it is therefore impossible for thought to be an attribute of matter.

48. I said in the preceding Chapter (§30) that God's understanding was the source of all that is possible, but as this matter is of ultimate importance in Physics, I think it is necessary to clarify it here.

{In which way Divine understanding is the source of all that is possible.} Divine understanding is the source of all that is possible, because all possible things with all their possible determinations are contained therein. But the essences of things (that is to say, the first determinations by the combination of which they become possible, and from which all their properties flow) have their foundation in the principle of contradiction: they are possible because it does not imply any contradiction that such or such determinations can be assembled in such or such a way. Thus the essence of a Circle consists in a Line of which all the points are equally distant from another point that we call the center; now it does not imply any contradiction that a Line can be turned around a fixed point to describe a Circle, and it is impossible to conceive that this has ever implied a contradiction. Thus, the essences of things are not arbitrary, and they do not depend upon God. For, if things were possible only because God wanted it that way, they would become impossible if he wanted it another way; that is to say, all would be possible and impossible at the same time, which is a contradiction in terms. Thus to say that essences do not depend upon God is to say simply that God cannot make them contradictory, which is not a negation of power. **{The essences, that is to say, the possibility of things, does not depend on the will of God.}**

{The opinion that the essences of things are arbitrary inevitably leads to absurdity.} If one agreed that the essences of things depended upon the will of God, yet another very palpable contradiction would follow; for given that God's understanding consists in the representation of the possible, if the possibility of things depended upon his will, one would have to say that God has been without understanding while his will was occupied in creating the possible. Yet there would not then have been any reason why he would have been able to decide to bestow possibility upon certain things rather than others, since he did not know them. Thus, it is as if one were saying that the understanding or the representation of things was in God before the understanding and the representation of things, which is a contradiction in terms.

49. Although the essence of things does not depend upon God, nevertheless it does not follow that there is anything outside of him; for the ideas that represent the possibility of things are essential to God, and his understanding contains everything that is possible, and everything that is not found there is impossible. Thus, Divine understanding is the eternal region of truths, and

the source of possibilities, in the same way that his will is the source of actuality and of existence.

{The actuality of things depends upon the will of God.} One must therefore say that the actuality of things depends upon the will of God. For having given existence to this World rather than to any other possible World, the World exists because God willed it, and another would exist if he had willed it otherwise. But the possibility of things has its source in the understanding of God, who necessarily conceived all that is possible from all eternity, but not in his will, which can only be determined as a consequence of what his understanding represents. Thus, one must not admit anything as true in Philosophy when one cannot give any reason for its possibility other than the will of God, for this will does not enable one to understand how a thing is possible. Thus, one cannot conceive how such a great man as Descartes was able to think that essences were arbitrary, since this opinion is entirely overthrown by the principle of contradiction, which he himself had posited at the beginning of his Philosophy.

50. {How one must judge which properties pertain to a Being.} Thus when it is a question of admitting some properties in a Being, one must see if this property follows from its essence, that is to say, from the primordial determinations that make it possible; for insofar as a Being is considered alone, one must show its intrinsic possibility by the principle of contradiction, and its external possibility, or its actuality, by the principle of sufficient reason, and from there deduce the attributes of this Being, and the modes to which it is susceptible. And when one considers this Being as placed in the order of things, and linked² with the other Beings that surround it, one must show how a Being depends upon its neighbor, and which causes gave actuality to the modes that were simply possible when the Being was considered as isolated and outside the order of things. It is in this way that God executed his will, and that one must seek to give reason to things in Philosophy.

This single truth of the immutability of essences at a stroke banishes from Philosophy all precarious hypotheses, and all the monsters arising from the imagination of men, which have so held back the progress of the Sciences and of the human mind. Such are the primitive forces of the Scholastics that were to be found in matter with no reason other than the will of God. Such would be attraction if one wanted to make it an inherent property of matter. Such is, finally, as I said above (§47), the idea of the famous Locke on the possibility of thinking matter.

² We follow Bour and Zinsser's translation of "lié" as "linked" (see §130). Note that "lier" can be translated with a range of connotations, from weak to strong.

51. {Of Substance.} By this principle of the immutability of essences, one can explain what Substance is. Substance is something that the whole world talks about and for which no one has yet given a good definition.

{Definition of Substance by the Scholastics.} The Scholastics defined Substance, *Ens quod per se subsistit & sustinet accidentia*, that is to say, *a Being that subsists by itself & is the sustainer of accidents*. But when one wants to know what it is *to subsist by itself, to sustain accidents, and the way in which they are sustained*, one receives nothing in response but new words to define, and to which no distinct idea is attached.

Descartes did not get much further than the Scholastics on this subject, for he defined Substance, *a Being that exists such that it has no need of any other Being for its existence*. Now one sees well that this returns to the *per se subsistere* of the Scholastics, and that furthermore, if one takes this definition rigorously, the only true Substance will be God, since all Creatures subsist through him, and since he alone subsists through himself.

{Mr. Locke's idea on Substance.} Mr. Locke himself dwelt upon the imaginary notion of Substance, such as the senses and the imagination have given to the common people. He says **{Locke, Book II, ch. 23}**: *that Substance is nothing other than a subject that we do not know, and that we suppose to be the sustainer of the qualities whose existence we discover, and that we do not believe can subsist, sine re substante, without something that sustains them, and that we give to this sustainer the name Substance which, rendered clearly in French means, that which is beneath, or that which sustains*. One sees easily that this notion of Substance is entirely confused, as Mr. Locke himself admits, and that it is nothing other than a kind of comparison that has some resemblance to the true notion.

Other Philosophers have denied the distinction between Modes and Substances, believing that all that belongs to the Being was equally necessary, and that the Modes become the Substances, and that the Substances become the Accidents, depending upon how one thinks of them, thus confusing Grammatical nouns that are Substances by fiction with the true Substances of Nature. Thus, when I say *white*, I express a mode; but I make of it a Substance by fiction when I say *whiteness*, even though whiteness can never be a true Substance.

52. {The true notion of Substance.} We saw above (§36) that each Being has constant determinations that remain always the same while the Being subsists, and variable determinations that change while the others endure. We saw furthermore that the attributes flow necessarily from the essential determinations, as does the possibility of the modes, of which the actuality alone is variable (§§39 & 43). Now it follows from this, that the essential determinations are the sustainer of the Being, whence this *substratum*, which has so embarrassed

the Philosophers; for the essential determinations being removed, the attributes fall as though in ruins, just as do the modes, and so the Being no longer exists, it is no more.

{Every Being that endures and is modifiable is a Substance.} Thus, the essence is the source of the attributes and of the possibility of the modes; therefore it is like the support and the sustainer of all that can suit the Being; and one can define Substance, *that which conserves the essential determinations and the constant attributes, while the modes in it vary and succeed one another*, that is to say, a durable and modifiable subject: for insofar as it has an essence and properties that flow therefrom, it endures and continues to be the same, and insofar as its modes vary, it is modifiable. But a Being that is not at all modifiable is an accident, such as white, for example; for the least modification of this color changes it into another, and it cannot be modified without being changed.