

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

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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 8. Of the Nature of Bodies**

**137.** Descartes, Father Malebranche, and all their followers held that the essence of Body consists in extension; they believed that in order to make a Body only extension in length, width, and depth were necessary. Here is how they reasoned. The essence of a thing is that which we recognize as first in this thing, that which is inseparable from it and upon which depend all the properties suited to it. (37). Thus, in order to discover in what the essence of Matter consists, we must examine what are the properties that are contained in the idea we have of Matter, such as fluidity, hardness, motion, rest, extension, shape, divisibility, etc., and consider then which of all these attributes are those that are inseparable from it. Now fluidity, softness, motion, and rest, being able to be separated from Matter (since there are several Bodies that are without hardness, or without fluidity, or without softness, some that are not in motion in any perceptible way, and others that are never at rest), it follows that all these attributes, being in no way inseparable from Matter, are in no way essential.

**{Four principal attributes of bodies}** But there remain four attributes that we conceive of as inseparable from Matter, which are shape, divisibility, impenetrability, and extension. In order to know which of these four attributes is the one that we must take as the essence of Matter, it is therefore necessary to examine which is the one that does not presuppose any others, and which must be found first in the Being. Hence we easily recognize that shape, divisibility, and impenetrability presuppose extension, and that extension does not presuppose anything; but that once extension is given, shape, impenetrability, and divisibility are given as well. Therefore, these Philosophers continue, it must be concluded that extension is the essence of Bodies, since all its other properties depend upon extension. **{Descartes and Father Malebranche believed that the essence of Body consists in extension.}**

**138. {And they removed all activity from creatures.}** This definition of the essence of a Body drove them necessarily to remove all force and all activity from creatures; for however we reflect upon extension, limiting it in whatever ways we would like, or arranging its parts in every way possible, we do not at all see how there can arise from it a force and an internal principle of action. For since Matter is, according to this definition, a solely passive substance, it can never become active by any possible modification. However, as experience proves that Bodies act and are endowed with an activity, the

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Cartesians had recourse to the will of God in order to explain this active force. Thus, according to them, it is not the creatures that act, it is God himself who immediately moves a Body on the occasion of another;<sup>2</sup> and this action follows a particular law that was prescribed in the beginning, and is never violated except in miracles; for we call a *miracle* an effect that cannot be explained at all by the laws of motion and by the essence of Bodies. Thus, secondary causes do indeed seem to have some efficacy in this system, but in reality they have none. God does everything by his immediate concurrence: the creatures are the occasions, but never the causes; they can receive, but they can never act, nor produce.

**139. {But this opinion is found to be false once one admits the principle of sufficient reason.}** This whole chain of consequences and of demonstrations of the Cartesians soon falls by the principle of sufficient reason; for if the essence of Body consists simply in extension, and with no internal differences in the parts of Matter that really distinguish them, then Matter is homogeneous, and any one of its parts does not differ from another except in its position, as the Cartesians themselves admit. Now, we saw (§12) that the principle of sufficient reason does not allow Matter in the Universe that is homogeneous and not distinguished by internal qualities. Thus the essence of Body cannot consist in simple extension since it is necessary, in order to satisfy the principle of sufficient reason, to grant an original difference in the parts of Matter that would be as essential to Matter as extension itself.

**{One must add to extension active and passive force in order to have an accurate idea [une idée juste] of the essence of Body.}** There must, therefore, be something in Matter from which this internal difference originates; but this difference cannot have an origin other than the internal force, or force tending toward motion, that is in all Matter, and that, diversifying to infinity, puts a real difference between all the parts of Matter, such that it is impossible to put one in the place of another, because there are no two parts with the same force and the same motion, and consequently the same form. This is because all forms presuppose motion, and, as a consequence, force. Force is therefore as necessary to the essence of Body as extension; for we could not admit a single portion of Matter without motion, since any portion of Matter, however how small it may be, would be composed of similar parts if all of its parts were at a perfect rest. But this is what cannot be, by the principle of sufficient reason (§12).

**140.** The first thing that we understand about Bodies is that they are Beings composed of several parts. Thus, the properties of a composed Being must be suited to them; now there cannot arise changes in the composite except with respect to its shape, its size, the situation of its parts and the location of all: and consequently all the changes of Bodies must reduce themselves to these things. But as none of these changes can be made without motion, all change must be caused by the motion of Matter, or from that which is extended. Thus, all Bodies, all portions of Matter are Machines; for we give the name *Machine* to a composite in which the changes are by virtue of its composition and by means of motion.

**141. {There is no matter without force, nor force without matter}** The extension that results from the composition is therefore not the only property that is suited to Bodies; the power to act must also be

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<sup>2</sup> i.e. on the occasion of another body's apparent action.

added. Thus, the force that is the principle of action finds itself spread throughout all Matter, and there cannot be any Matter without motive force, nor a motive force without Matter, just as some Ancients recognized so well.

**142.** Reason shows us and experience confirms for us another property of Bodies, that of resistance, or passive force; for in reasoning from the active force that is in Bodies, we do not see what it would act upon if Bodies did not have resistance, since there would then be no sufficient reason for their action.

**{Passive force was necessary so that the movement was carried out with sufficient reason.}** On the other hand, everyday experience confirms that when we want to set a Body in motion that seems to us to be at rest, we cannot achieve this without an effort that overcomes the resistance of this heavy and sluggish Body, set in motion only by a continuous action. This Body therefore has a force by which it resists any motion that we want to impart to it.

Kepler expressed this resistant force in a significant way by the words *vis inertia*, force of *inertia*. Without this force, none of the laws of motion could subsist, and all motions would be without sufficient reason. For were we to admit that Matter was without resistance, or force of inertia, there would be no proportion between cause and effect; and we could not judge why, if a Body has a given quantity of motion and a given mass, it required a given force to communicate this motion to it. For the largest Body and the smallest could be moved by the same force with the same ease and the same speed if they were both without inertia: the slightest force would suffice to give the greatest motion to this tenuous (and, so to speak, void) extension; and to stop it when it is in the greatest motion, no more than an infinitely small effort would be required.

There would be no determined truth in the changes that happen in Bodies if Matter was without inertia, since these changes could be just as they are or something completely different, without our being able to give any reason. But this is entirely contrary to the principle of sufficient reason, according to which the effects must be proportional to the causes.

But this proportion between cause and effect is always found in the action of Bodies on one another, once we admit resistance into extension: for then double the extension, offering double the resistance, requires double the force to impress upon it the same motion; and we can say in general that the forces are like the masses when the speeds are equal. Thus, if we want motion to occur with sufficient reason, that is to say, for it to be possible, we must admit in Bodies this resistant force, or passive force, without which we could never determine which force would be necessary for a given effect.

**143. {Extension conjoined to the force of inertia is what we call Matter.}** Extension combined with the force of inertia is what we call *Matter*: for ordinarily we consider Matter as a heavy mass and without action; and we call extension Matter, insofar as we regard it as something passive.

**144. {But this is improperly [so called], for one must conjoin motive force, which is the sufficient reason for the actuality of the movement.}** But the idea of Matter conceived in this manner is still incomplete; for none of the changes to which Matter is susceptible could happen or could become actual by extension and force of inertia alone. Motive force must therefore be attached to it: that which contains

the sufficient reason for the actuality of the changes in Bodies. And we saw that this motive force is inseparable from Matter, because the principle of sufficient reason does not admit any similar Matter in the Universe.

**145. {All that happens in Bodies can be deduced from extension and from the active and passive force.}** All the changes that happen in Bodies can be explained by these three principles, *extension*, *resisting force*, and *active force*. For in that it is extended, the Body has a size, a shape, and a situation. Thus we can understand through the property of extension what changes are possible in Bodies, since we can thereby understand what changes and what limits they can receive in their shape and their situation. Now all these changes can become actual by the motive force that is the principle of motion; through the motive force we understand how changes that were possible in the Body, in virtue of its extension, become actual. But none of these changes being more necessary than another, since Body through its extension and its force is equally susceptible to them all, there must be a reason why such changes happen, whereas others that were also possible, through extension and through motive force, do not; and this reason is found in the force of inertia or resisting force. Thus, through extension, the motive force and the force of inertia, we can understand why certain changes are possible in Bodies, how they become actual, and why some take place rather than others, and at one time rather than another. Consequently, it can be said that these three principles are sufficient, and that the nature of Bodies consists in them. **{And it is in these three principles that their essence consists.}**

**146.** We see from this that the Philosophers who would like to admit into Philosophy only mechanical principles, and who claim that all natural effects must be explained mechanically, are right; for the possibility of an effect must be proven by the shape, the size, and the situation of the composite, and its actuality by the motion. And whoever reasons in this way proceeds in their reasonings as the nature of things requires.

**147. {These three principles do not depend upon one another.}** These three principles, that is to say *extension*, *passive force*, and *motive force*, do not depend at all upon each other; for these are the essentials of Body, and we saw that the essentials do not mutually determine each other, but that each is able to subsist with the others without destroying one another. Thus, active force and passive force do not arise from extension, and these two forces neither follow one from the other, nor are they the origin of the property we call extension.

It is easy to see that active force results neither from extension, nor from the force of inertia; for neither figure, nor size, nor combination of parts could produce a tendency to motion, a force, or a certain degree of speed, as the Cartesians understood very well. Neither can the force of inertia be the cause of the active force which it resists. Thus, we must admit active force in bodies as a principle very different from extension and from resistance, and which is not derivative. We can say the same thing about the force of inertia and about extension, so the three properties do not depend at all upon one another.

**148.**

Since active force depends neither on extension nor on the inertia of matter, we must represent it as a separate Being that endures and subsists by itself, and that gives Being and perfection to matter, which without it would be chaos and a homogeneous mass that could not exist.

**{Why active force must seem to us to be a substance.}** Active force must seem to be a substance because it has Modes; speed, for example, is one of them. For active force consists of a continuous tendency to change location, and it is by this tendency that the moving body becomes capable of traversing a certain Space in a certain time. Now this capacity to traverse a certain space in a certain time is what we call speed; speed is therefore attached to active force as it is to its subject. But this speed can change; yet only Modes can change in a subject; therefore speed is a Mode of active force, and the modification of the force consists in the variation of the speed.

We call the internal state of a Being the determinations of its internal changes, that is to say, the changes that can happen within it, such as, for example, the internal state of my Watch depending on the positioning of the wheels with respect to one another; but its external state is determined by the relations it obtains with other Beings, such as being placed on the table, on the mantelpiece, etc. Thus, the motive force being susceptible to all sorts of degrees of speed, its internal state is determined by the speed, and thus this state is susceptible to different degrees at different times, because a given speed determines it. From this it follows that speed is a limitation of motive force. **{Speed and direction are Modes of motive force.}** We can also say that the external state of the motive force depends on the direction of the speed; for the direction adds nothing new to the speed and to the force, it produces no effect other than to make the moving body obtain different relations with coexisting Bodies. Therefore the external state of the motive force depends upon the determination of the direction.

**149.** We ordinarily regard motive force as resulting from matter modified by speed, but this notion of motive force is absolutely false; for the possibility of the Modes in a subject must come either from the preceding objects, or from the antecedent Modes of this subject (§44). Now, if speed was a Mode of matter, and if it resulted from exterior Bodies, it would be necessary to find the reason for this in these exterior Bodies that are themselves material; thus, the same question would return. This reason cannot be because of the antecedent Modes of extension either; for extension by itself, joined to the force of inertia and without motive force, does not have any actual Modes, it has only possible Modes that the force makes actual. Therefore, were we to admit that speed is a mode of matter, this would be to recognize in a subject Modes to which it is unsuited, and which it is unable to receive.

Moreover, all Modes are limits of their subject; (§43) now, speed cannot be the limit of matter, because in limiting extension and the force of inertia, only shape and rest can result: speed therefore cannot be a Mode of matter.

In any case, in the notion of matter and of inertia, which contains nothing but several existing things external to one another, united in one and capable of resisting, we do not find any sufficient reason for the actuality of speed. It is therefore necessary to look for it elsewhere, and we will find it in force: motive force must therefore be conceived of as a substance, since it can receive modifications from speed, and since it endures; for we cannot doubt that motive force endures, and it is easy even to prove that the quantity of it remains always the same in the Universe. For, since matter never perishes, and cannot exist

without force, it is necessary that the quantity of force remains the same. Since the quantity of matter to which it is inseparably attached does not diminish at all, motive force must therefore appear to us a durable and modifiable subject, that is to say, a substance different from matter, and which receives limits from speed just as extension does from shape.

**150.** Extension is one of the essential properties of matter. It is certain that matter endures, since experience shows us that extension subsists in the dissolution of composites; the mind must therefore conceive matter as an enduring subject. But, since matter can receive diverse shapes while having the same extension, we must also conceive of it as a modifiable subject. Now, since every subject that endures and that can receive Modes is a substance, we must conceive matter, that is to say, extension joined to the force of inertia, as a substance, even though it draws its substantiality from simple Beings, as you have seen (§134).

**151.** It seems at first very strange to compose Bodies from two substances such as extension and active force, and to admit a species of action from an immaterial substance, such as active force, on matter; but since on the one hand the Phenomena show the substantiality of active force, just as for matter, and on the other hand, there are insurmountable difficulties opposing this, we must conclude that neither matter nor active force are truly substances. Rather, it is necessary to go back further and search for their source in something prior, from which we may be able to show why active force and matter must seem to be substances and different substances. This research will lead us to the Elements that are the common force of them both.

**152. {Neither Extension nor force are truly substances.}** Matter and active force, which seem to us to be substances, are not really substances; in the same way as we have seen (§134) that extension is not a substance, but an aggregate, a composite of substances. It is the same with active force and with passive force; they are only Phenomena that result from the confusion<sup>3</sup> that reigns in our organs and in our perceptions.

**153. {These are some Phenomena that result from the confusion of realities.}** The colors and all the perceptible qualities can clarify what I mean by this confusion, from which originate the Phenomena that our senses perceive; this degree of confusion and imperfection of our organs is necessary for us to see the objects in the way that we perceive them. A Being more perfect than us would have completely different ideas, and would see things completely differently than us; and in order for it to be able to see the same things as we do, and receive the same impressions, it would have to strip itself of the faculty of distinct perception; for the distinction of parts, and the Phenomena that result from their confusion, and that originate from the ensemble, are incompatible. This is why a statue that is made to be placed at a great height seems hideous and rough when we see it up close, and not from the viewpoint for which it was intended, because we form a distinct idea of all the features that together lead to how it looks, and this is

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<sup>3</sup> Compare Descartes, for whom distinct perception contrasts with confused perception.

so because these features are too large for us to be able to confuse them, up to a certain distance, the point where they have to be to create an agreeable image

It is for this same reason that the Choristers of the opera do not give the same pleasure to those who are in the wings as to those who are in the Boxes; for when we are very close to the Choristers' Voices, we distinguish each one individually and we lose the beauty made by the ensemble.

The way in which Painters make their colors, and especially the way in which white is composed, provides us with another palpable example of this truth: for blue and yellow mixed together give us green, but this Phenomenon that was only an appearance disappears when we use a Microscope, which allows us to see distinctly that which we saw confusedly; for the Phenomenon of green exists only through this confusion, and there is in reality only the particles of blue and yellow placed next to one another. Similarly the color white is nothing but a phenomenon that originates from the confusion, made on our retina, of all the primary colors; the prism makes this Phenomenon disappear. Thus, a Being with natural prisms for eyes would not have any more idea of white than a deaf person has of sound. We see that as our vision becomes more distinct, so the Phenomena that we take for realities disappear; and we easily sense that this increasing distinction and this decreasing confusion could have almost infinite degrees, if our organs were capable of it; and that all the Phenomena that fall under our senses, and that we take for realities for want of distinguishing what produces them, would disappear one after the other. In the system of Mr. Leibnitz this gradation would lead us all the way to simple Beings or to Monads, which according to him are the origin of all that we see and the only real substances that exist.

**154.** It is therefore certain that there is nothing in Nature like the colors and the objects that result from their combinations, nor like the tastes, the sounds, and all the sensible qualities; and that all things exist only in so far as Beings exist who, in confounding the realities they could not discern, bring into existence in themselves these images that are only Phenomena; for we understand by Phenomenon *images or appearances that originate from the confusion of several realities*. And it is infinitely important to make a distinction between the image, that originates in us from the confusion of an infinity of things that we do not distinguish, and the reality of these things; for this is often very different, and it is in paying attention to this distinction that we are able to penetrate to the origin of the Phenomena.

**155.** It is by these means that we can come to discover how the Phenomena of extension, of motive force, and of the force of inertia, result from the confusion of simple Beings. We have already seen how the Phenomenon of extension results from this; and so too, active force and passive force. For since each simple Being is continually in action, and this action having a relation or a harmony with the actions of all the simple Beings, all of these actions that conspire together must seem to the senses to be a single and unique action. Thus, it is impossible for us to be able to distinctly represent the motive force: we would conceive of it distinctly if we could represent in what way the force resides in a simple Being, to engender in the end, in the combination that all these Beings form by their aggregate, this motive force whose effects fall under our senses. Now, just as we cannot distinguish these Beings themselves from one another, we perceive in the force an infinity of things at the same time that we do not distinguish, and for this reason we confound them into a single thing, and we represent to ourselves only that which results

from this confusion, which is an image infinitely different from the realities therein. Thus, we see that the motive force, as we picture it to ourselves and as it falls under our senses, is nothing but a Phenomenon that originates in us only because we see from very far away the realities that constitute it; it is an appearance, just like extension.

**156.** Passive force or the force of inertia is also a Phenomenon, because we do not see distinctly the passive principle that is found in each Element, nor the manner by which the multiplication and the confusion of all their relative and conspiring resistances can result in the force of inertia of composites. The three properties that make the essence of Body are therefore Phenomena, but we can say that they are *Substantial Phenomena*, as Mr. Wolff calls them, that is to say Phenomena that seem substances to us, but that nevertheless are not; for there are no true substances except simple Beings. As we have seen in the preceding Chapter, the Elements must contain the origin of all that is found in the Bodies that they compose. Since action and resistance are found in Bodies, we must conclude from this that simple Beings have an active principle by which we are able to understand why the composites act, and a passive principle from which the passions, or the faculty of the composites to suffer, results.

**157.** Extension and force seem therefore to be very different substances, although they have the same origin, which is simple Beings: for the extension of matter comes from the aggregate of simple Beings, and the motive and resisting force manifests itself insofar as these aggregated Elements possess in themselves an active and resisting principle. Now, just as by mental abstraction we can very well conceive of the aggregate without paying attention to what is aggregated [ce qui est dans chaque agrégé], in the same way we can conceive of what is in each Element without paying attention to their aggregation. Thus, the two ideas of extension and of force must seem to us very different, and independent of one another, although neither one nor the other is substantial except in what it draws from the Elements, for this substantiality enters into each of these notions in a very different way.

**158.** There are two sorts of motive force; Mr. Leibnitz calls the force that is found in all Bodies, and the reason for which is in the elements, *primitive force*; and that which falls under our senses and originates in the collision of Bodies, from the conflict of all the primitive forces of the Elements, *derivative force*; this last force flows from the first, and is nothing but a Phenomenon, as I explained to you above (§155).

**159.** Because primitive force is the result of the internal determinations of the Elements, we are unable to explain it distinctly without knowing the determinations; but since we have not yet gone far enough in this matter to know these internal determinations of the Elements, we must content ourselves for the present with knowing that this force exists; now it is this primitive force that we regard as a durable and modifiable subject (§152) when we abstract the actual modifications of speed and direction that it receives.

**160.** Because primitive force is indifferent to all sorts of speeds and directions, we cannot use it to provide reason why in a given case a body has a particular speed, and why it moves in a certain direction, since it



could move in any other direction, and with any other speed. Thus, to provide reason for particular Phenomena, we cannot use primitive force; for we must never present distant reasons when immediate and nearby reasons are asked for, since this would be to return to the substantial forms of the Schools. But through general reasons, we can explain only the Phenomena in general, and when it comes to particular Phenomena we must turn to immediate reasons. It is therefore by means of derivative force, which arises from the collision of Bodies, that we can provide reason for the Phenomena that originate from motion, by the action of Bodies on one another, and by which primitive force is modified and limited when it receives a certain speed and a certain direction. Now, since the Body cannot give itself this speed and this direction, it must receive it by the collision of surrounding Bodies, and in this way the derivative force becomes distinctly explicable, because we can explain by the laws of motion why a Body having been impacted moves with one speed rather than a different one, that is to say, why the primitive force has been modified in this way in a given case.

**161.** Philosophers have had great disputes on what we call *Nature*. Several have wanted to banish this word from Philosophy because, they said, we make an idol of it that we place next to God to explain the Phenomena. But, as we have seen that Bodies have a power to act and to suffer, and that they also have an active and passive force, since they act and indeed suffer, we can call, with the Ancients, this power to act and to suffer, along with the active and passive force, *Nature*. We must not reject this word or the use that we make of it when we say that *by the nature of bodies* all the changes that happen in them become explicable: for by the active power we see why an action can happen, and by the force why it becomes actual, and all the changes of Bodies must be explicable by these two principles.

When we talk of Nature in general, we understand an internal principle of changes that happen in the world; thus it is not at all a small God distinct from the world who takes care to govern this machine, it is only the motive force joined with other properties, that together compose the essence of Bodies. This motive force is the only principle of motion in the Universe, and it is through this force that we are able to understand why the possible changes become actual. Thus, it truly was a phantom, this *Nature* that Mr. Boyle wanted to destroy in his book *On Nature*, when he rejected what we call *Nature* because it seemed absurd to him to compose the world of two substances that penetrate each other, matter and nature. Thus, in saying that an effect is natural when it can be explained by the essence of the Being and by its nature, we mean by its construction and by its motion.

**162.** We can hardly flatter ourselves that we will discover anything through our research other than Physical qualities, shapes, motions, etc., through which we can reach the closest reason for some effects. For we must try, as far as possible, to explain the Phenomena mechanically, that is to say, by matter and motion. And when the possibility of this explanation surpasses our powers, we must admit our ignorance, and remember well that because the will of the Creator is the source of the actuality but not of the possibility of things, we do not advance any further in resorting to this will to explain the Phenomena, and that if in wanting to provide reason for the regular motion of the hand of a Watch, it is not enough for us

to say that it is because the Worker wanted it that way;<sup>4</sup> for apart from the will of the Worker, who put it together in a certain arrangement of the cogs and the wheels, this combination still had to be able to produce a Watch, that is to say, a Watch had to be possible.

Thus, in this great automaton of the Universe, the present state originates from the past, and will give rise to the state that follows, and all mechanical changes flow from the arrangement of the parts and from the rules of motion, and what does not flow from these principles does not exist at all.

**163.** When we say that we must try to provide reason for all natural effects through matter and motion, we do not mean that we are obliged to find this reason for all the Phenomena, nor to go back as far as the first reason for things; the feeble extent of our minds and the present state of the Sciences do not permit it. But we can stop at the Physical qualities, and make use of one Phenomenon or of several, of which we do not yet know the mechanical reasons (even though they have them), to provide reason for another Phenomenon that depends upon it. Thus, we make use of the elasticity of air, the fluidity of water, the heat of fire, which are Physical qualities for which we have not yet found the mechanical explanation (even though there is one), in order to provide reason for other properties that occur together in nature and that originate from a mixture of some of them, such as the rise of water in a pump which we explain by the elasticity of the air without being obliged to show the reason for this elasticity. For this is a new question, and even if this new question could not be resolved, this would not prevent us from being able to explain the rise of water by this elasticity. In the same way, when we provide reason for the effects of a Watch, we use mechanical principles when it is only a question of the arrangement and configuration of the parts; but when we go further, to the elasticity of the spring and to the matter that composes these parts, insofar as they are fusible, malleable, etc., we come to Physical qualities that depend in their turn upon other mechanical principles that we do not always truly perceive, and that we take as given for the purposes of the explanation. And even were we to know these principles, we ought not explain them, because their explanation would lead to other questions that are not those we are treating.

**164.** It is thus that we can, and that we must, make use of attraction as a Physical quality, for which the mechanical cause is unknown, to provide reason for other Phenomena that result from it. Thus, we can assert, for example, that the Sun attracts the Planets and other matter that surrounds them, since the Phenomena demonstrate it, provided that we do not make this attraction an inherent property of matter, and that we do not divert Philosophers from searching for the mechanical cause. For those who do not want to admit perpetual miracles into Philosophy must provide reason for these effects, by the essence of things and by motion, and all that is not explicable by these principles is not within the remit of Philosophy, which must occupy itself only with natural effects that we must conceive distinctly and explain intelligibly.

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<sup>4</sup> This sentence deviates from literal translation, in order to convey what we believe to be the intended meaning.