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First launched: September 2004

Last amended: July 2007

## Nature Itself

By G. W. Leibniz

### Or: The Inherent Force and Activity of Created Things - Confirming and Illustrating the Author's Dynamics

1. The celebrated Johann Christopher Sturm, who is distinguished in mathematics and physics, wrote a dissertation entitled *The Idol of Nature*; and this was challenged by Günther Christopher Schelhammer, an excellent and most accomplished physician of Kiel, in his book *Nature*. I recently received a copy of Sturm's published 'Defence' of his dissertation against this critic. The topic ·of Nature· is one that I too have thought about, and there was an exchange of views in letters that passed between myself and the distinguished author of the dissertation, an exchange which he recently mentioned in a respectful way, publishing several of our letters in his *Elective Physics*.

That made me all the more willing to think attentively about this topic, which is an inherently important one; and I thought I should present with some clarity both my own view and the entire issue, doing this in terms of principles of mine which I have already made known on several occasions. Sturm's 'Defence' seems to provide a good opportunity for doing this, since we can take him to have set out the most important points in a compact form. But I shan't enter otherwise into his controversy with Schelhammer.

2. I want to ask two main questions ·of which the first will be discussed through seven sections, the second being posed at the start of section 9·. The first question is: What constitutes the *nature* that we ordinarily say things have? If we can approach this in terms not only of what Nature *is* but also of what it *is not*, I can start by saying that there is *not* any such thing as the soul of the universe. I also agree that those everyday wonders which lead us to say (quite rightly) that the work of Nature is the work of intelligence should *not* be ascribed to *created* intelligences with levels of wisdom and power suitable for those results. Rather, the whole of Nature is *God's artifact*, so to speak, and his 'art' goes so far that each natural machine - ·each organism, that is· - consists of infinitely many ·smaller· organisms, a state of affairs requiring infinite wisdom and power on the part of its creator and ruler. (It is not widely recognized, but it is true, that what really distinguishes the natural from the artificial is the fact that *every organism contains other organisms*.)

And so I think that various theories about the world's being infused by wise, knowing forces - by Hippocrates, Avicenna, Scaliger, Henry More and others - are partly impossible and partly unnecessary. All that is needed, I maintain, is for the machine of things to have been constructed with such wisdom that those everyday wonders come about through its own workings, and chiefly (I think) through organisms' unfolding themselves in accordance with some pre-arranged plan. So I agree with Sturm in rejecting these supposed wise, created natures which

are supposed to produce and govern the mechanisms of bodies. But I don't think it follows from this, nor do I think it reasonable, that we should deny that there is any created, active force inherent in things.

[We are about to meet the word 'principle' in a sense that it - and its Latin and French equivalents - had in Leibniz's day but don't colloquially have now. It is the sense of 'source'; a 'principle of x' in this sense is a source of action or energy or the like that produces x or makes x happen.]

3. So much for what *is not* the case. Now let us examine more directly what this Nature *is*, the Nature that Aristotle called the *principle of motion and rest*. (A not-inappropriate phrase, though he takes it rather broadly, apparently meaning by *motion* not only change of place but any kind of change, and by *rest* not only staying in one place but any kind of staying-the-same. Incidentally, his definition of *motion*, though more obscure than it ought to be, is not as silly as it seems to those who take him to be defining only change of place. But I digress.) Robert Boyle, a distinguished man who is experienced in the careful observation of Nature, wrote a little book *On Nature Itself*, whose main point was, if I remember rightly, that we should take Nature to be just the mechanism of bodies. We can agree with this, taken broadly, but two misunderstandings should be headed off. One is that we must distinguish the most general principles of mechanism from the specific applications of them; because to explain what happens we must bring in the specific as well as the general. Thus, for example, in explaining a clock, it is not enough to say that it is driven by a mechanical principle, unless you specify whether it is driven by a weight or by a spring. The second point is this: I have already said a number of times that mechanism itself has its origin not in material principles [same sense as explained above] and mathematical reasons alone, but in some higher and (so to speak) metaphysical source. I think that this will help to prevent the mechanical explanation of natural things from being carried to the extreme of implying - to the detriment of piety - that matter can stand by itself and that mechanism requires no intelligence or spiritual substance.

4. The foundation of the laws of Nature provides one notable example of this. This foundation is not to be found, as has usually been thought, in the conservation of the same quantity of *motion*, but rather in the conservation of the same quantity of *active power* - and indeed of the same quantity of *motive action*, something that is far different from what the Cartesians understand as quantity of motion. (Conservation of motive action, I discovered, happens for a most beautiful reason.) And when two clearly first-rate mathematicians argued with me about this matter, partly in private letters and partly in public, one came completely over to my side, and the other, after long and careful thought, reached the point of abandoning all his objections and candidly confessed that he had no response to one of my arguments.

So I was very surprised when Sturm, explaining the laws of motion in the part of his *Elective Physics* that has been published, took for granted the common view of them, as if there could be no objection to it (though he does acknowledge that this view rests not on demonstration but only on a certain plausibility, something he repeats in his 'Defence'). Perhaps he was writing before my work came out, and then either didn't have time to revise what he had written or didn't think of doing so - especially as he believed that the laws of motion are arbitrary, a view that strikes me as not altogether coherent. For I believe that when God established the laws that are observed in Nature, he took into account principles of wisdom and reasons of order. And I think that this makes it clear that the consideration of final causes - that is, of *purpose* or *intent* - not only advances virtue and piety in ethics and natural theology, but also helps us to find

and lay bare hidden truths in physics itself. (I pointed this out once, giving an example from the laws of optics, and the famous Molyneux later accepted it in his *Dioptrics*.)

In treating final causes in his *Elective Physics*, Sturm listed my view as one of the theories about this; but I wish he had examined it at length in his discussion, for he would surely have taken the opportunity to say many excellent things about the argument - things remarkable for their fruitfulness and also beneficial for piety.

5. But now we must consider what Sturm himself says about the notion of *Nature* in his 'Defence', and what still seems to be lacking in what he says. In several places he grants •that the motions now taking place happen by virtue of the *eternal law* that God once set up, a law he then calls a volition and a *command*; and •that there is no need for a new divine command or volition, let alone a new effort or work (section 3). And Sturm rejects the view - which he says was wrongly attributed to him by his opponent - that God moves a thing as a woodcutter moves an axe, or as a miller controls a mill by holding back the water and then diverting it onto the wheel.

But this leaves something unexplained. The question is: did that previous volition or command or laying down of a divine law bestow a mere *extrinsic denomination* on things? ·I mean: is •that command's only bearing on •a stone's falling at time T the sheer fact that *God earlier commanded that this stone fall at T*? If that is the whole story, then God's order made no difference to the stone in itself, and merely gave it a purely relational property - the property of having-been-commanded-by-God-to-fall-at-T - which I call an 'extrinsic denomination'. Or did it rather make some kind of enduring impression on the thing itself - perhaps one of which the thing is not conscious - from which its doings and undergoings follow? That would be what Schelhammer aptly describes as subjecting the thing to an 'inherent law', ·a law that the thing carries with it as part of its intrinsic nature'. The former alternative seems to be the doctrine of the authors of the system of occasional causes, especially that of the very acute Malebranche, while the latter is the usual view, and, I believe, the true one.

6. Here is why. That past command does not *now* exist, so it can't bring anything about *now* unless back then it left behind some continuing effect which still endures and now operates. Anyone who thinks otherwise, I maintain, gives up all clear explanations of things: if something could be brought about *here and now* by a cause that is not here or not now, without an intermediary, then anything could just as well be said to follow from anything else. So it won't do just to say that when God created things in the beginning he willed that they should develop according to a certain definite law, if we suppose his will to have been so ineffective that things were not affected by it and it had no lasting effect on them.

And in any case it contradicts the notion of pure and absolute divine power and will to suppose that God might *will* and yet *not produce or change anything* by doing so, to suppose that he is always acting but never leaves any work or accomplishment behind. There must be some connection, whether immediate or through some intermediary, between cause and effect. And so: if the divine words 'Let the earth be fruitful and let the animals multiply' had not made any change in created things, if things had just the same dispositions after that command as they would have had if no command had been given, it follows that either •nothing now obeys that command or •the command was effective at the time when it was given and had to be perpetually renewed in the future - which the learned author rightly rejects. But if on the other hand the law God laid down left some trace of itself impressed on things - if his command made things become capable of fulfilling the intention of the command - *then* we can say that a certain efficacy has been placed

in things - a form or a force, what we usually call a 'nature' - through which the series of phenomena follow in accordance with the dictates of the original command.

7. This inherent force can be clearly understood, but it can't be explained through the imagination, that is, in terms of sizes, shapes, colours or the like; and of course it *ought* not to be explained in that way, any more than the nature of the soul should be. For force is one of the things that are grasped not by the imagination but by the understanding. So when Sturm asks for an 'imaginable' way in which an inherent law could work in bodies that were ignorant of it, I charitably interpret him to mean that he wants an *intelligible* way for this to happen; for of course he wouldn't ask us to picture sounds or to hear colours, and those requests would be absurd in the same kind of way as is the demand for an account of force in terms that engage the imagination.

Anyway, if we were entitled to reject anything we couldn't explain, then Sturm would be committed to something that he complains is wrongly attributed to him, namely, preferring to hold that everything is moved by divine power alone rather than admit something called a 'nature', the nature of which he does not know. Indeed, this line of thought could be equally well relied on by Hobbes and others who hold that •bodies are the only things that exist, because they have convinced themselves that •bodies are the only things that can be clearly explained, which for them means that only bodies can be clearly explained through the imagination.

But they are thoroughly refuted by the fact that there is a *power of acting* in things, a power that is not derived from anything that can be imagined. And simply to absorb this force into a command of God's - a command given just once in the past, having no effect on things and leaving no traces of itself in them - is so far from making the matter easier to grasp that it is more like abandoning the role of the philosopher altogether and cutting the Gordian knot with a sword. But a clearer and more accurate explanation of active force than has yet been given can be derived from my *dynamics*, which gives an account of the laws of Nature and of motion - an account which is true and in conformity with how things are.

8. But if some defender of the new philosophy, which attributes *inertia* and *inactivity* to things, went so far as to deprive God's commands of all lasting effects and all efficacy in the future, and didn't mind requiring God to keep working all the time (which Sturm wisely disavows), it would be for him to decide how worthy of God he thinks this is. Also, quite apart from his bad theology, this materialist would also be open to criticism unless he could explain how it is that *things themselves* can endure through time although *their attributes* (what we call their 'nature') cannot. For it is reasonable that just as •the word *fiat* [Latin for 'let there be'] leaves something behind, namely the persisting thing itself, so •the equally wonderful word 'blessing' should leave something behind it *in* things, namely a fruitfulness, an impulse to produce actions and to have effects - an impulse from which a result follows if nothing prevents it.

To this I can add something that I have already explained elsewhere, even if I haven't yet made it perfectly clear to everyone, namely, that *the very substance of things consists in a force for acting and being acted upon*. This implies that the only reason there can be *things that last through time* is that the divine power impresses on them some *force that lasts through time*. In the absence of such enduring force, no created substance - no soul - would remain the same thing for any length of time, and thus nothing would be kept in existence by God. Everything would be reduced to mere transitory or evanescent states of one permanent divine substance - reduced to mere ghosts, one might say. Or, to put the same thing in other words: *Nature itself*, or the substance of all things, would be *God*. This is a doctrine of ill repute that an able though

irreligious writer [Spinoza] has introduced to the world, or at least revived. If bodily things contained nothing but matter, it would indeed be true to say that they consist in a *flow*, having nothing substantial about them, as the Platonists once correctly recognized.

9. Of the two questions that I mentioned at the start of section 2, the second is this: Is there any *energeia* in created things (which Sturm seems to deny)? That is, can created things properly and truly be said to *act*? Once we understand that the •inherent nature of things is the same as their •force of acting and being acted on, this question reduces to the first one. For where there is action there must be a force for acting, and conversely where there is such a force there must be at least the possibility of action, because a power that can never be exercised is empty. Still, action and power are different things - one momentary, the other persisting - so we should consider them separately. For a start, let us consider action.

Here I confess to having some difficulty in expounding Sturm's views. For he denies that created things, really *act in and of themselves*; but then he goes on to acknowledge that they do *act*, because he somehow rejects the comparison between created things and an ax moved by a woodcutter. I can't confidently draw any conclusions from this; I don't find him explaining clearly enough just how far his view departs from the usual one, or explaining exactly what notion of *action* he has in mind. (That is no trivial task, as the debates of the metaphysicians show!) Insofar as I have made the notion of action clear to myself, I believe that the widely received philosophical doctrine that actions are actions of *things* follows from that notion and is grounded in it. And I think that this is so true that it also holds in the other direction: not only is everything that acts an individual substance, but also every individual substance acts continuously; and this includes bodies, which are never absolutely at rest.

10. But now let us consider a little more closely the view of those who deny true and proper action to created things. Robert Fludd, author of *The Mosaic Philosophy*, once denied it, and nowadays some Cartesians do so; these are the ones who think that •things don't act, but that •God is present in them and acts in accordance with what is appropriate for them; and who thus think that •things are not causes but *occasions*, and that •they receive effects but don't bring anything about or produce anything. [X is an 'occasion' of E's occurring if it doesn't cause E to occur but is what God *goes by* or *attends to* when *he* causes E to occur.] Although several Cartesians had proposed this doctrine, it was Malebranche who presented it most persuasively, bringing to it his characteristic sharpness of mind. But I can't see that anyone has given any good reason for it.

Indeed, if this 'occasionalist' view were extended so far as to eliminate even the *immanent actions* of substances, then it would be as far from reason as it could possibly be. [A substance's 'immanent actions' are ones in which it acts not upon other substances but upon itself; they are the actions through which the substance develops, unfolds, in its inner nature. It connects with *growth*: Leibniz will soon link acting 'immanently' with acting 'vitally'.] (Sturm rightly rejects the denial of immanent actions in his *Elective Physics*, illustrating how cautious he is.) For who would question that the mind thinks and wills, that we elicit *in* ourselves *from* ourselves many thoughts and volitions, and that we have a certain spontaneity? To question this would not only be to deny human liberty and to push the cause of evil back to God, but would also flout the testimony of our innermost experience and consciousness, testimony which makes us think that the things these Cartesians have transferred to God, without a semblance of a reason, are *ours*.

But if we attribute an inherent force to our mind, a force for producing immanent actions (that is, for acting immanently), then it is reasonable to suppose that the same force will be present in other souls or forms or (if you prefer) in the natures of substances other than human beings.

The alternative is to think that in the natural world as we know it only our minds are active, and that all power for acting *immanently* and (so to speak) *vitally* is accompanied by intellect and therefore belongs to human beings but not to all substances. There are no rational arguments for such a claim; it can't be defended except by distorting the truth. As for the actions of created things *upon one another*, that would be better dealt with elsewhere. In fact, I have already explained a part of it: the goings-on between substances or monads are not strictly speaking inter-actions at all, because they don't come from anything's flowing from one substance to another, but rather from a harmony between them which God set up in advance, so that each substance is adjusted to things outside it while following the internal force and laws of its own nature. The union of the soul with the body is another instance of this harmony.

**11.** That bodies are in themselves inert is true when it is properly understood, namely as meaning: given that a body is in some respect at rest at some time, it can't set itself in motion in that respect, and won't allow itself without resistance to be set in motion by another thing; any more than it can spontaneously change either its velocity or direction without resistance, or easily and without resistance allow another body to change them. And so it must be admitted that action and motion can't arise purely from extension - the geometrical aspect of bodies - and that on the contrary matter resists being moved through its *natural inertia* (Kepler's good phrase), so that it is not indifferent to motion and rest, as is commonly believed, but requires for its motion an active force in proportion to its size. This passive force of resisting involves impenetrability but not only that; and this force is where I locate the notion of *primary matter* or *bulk*, which is the same in all bodies and proportional to the body's size. And I show that from this there follow laws of motion far different from what would obtain if there were nothing to bodies and their matter but impenetrability and extension. [The label 'primary matter' is one of a pair; in section 12 we'll meet the other, namely 'secondary matter', which refers to what you and I call *matter* - real thick stuff out there in the world, equipped with a nature that is studied by physics. Leibniz's main uses of 'primary matter' come from Aristotle and the scholastics, and assume that any real thing consists of (primary) *matter* that has a certain *form*. The idea here is that the 'form' includes *all* the properties or qualities of the thing, and that the 'matter' is just *that which has the properties.*]

Moreover, just as matter has a natural *inertia* that is opposed to *motion*, so too in a body itself, indeed in every substance, there is a natural *constancy* which is opposed to *change*. But this doctrine does not support - in fact it opposes - those who deny that things act. For, certain as it is that matter cannot begin motion of itself, it is equally certain that any body, considered on its own, retains any impetus that it has been given, and remains *constant* in its mobility; that is, it has a tendency to persevere in any series of changes which it has entered upon. (This has also been shown by admirable experiments on the communication of motion in collisions.) Now, since these activities and entelechies certainly can't be properties of primary matter or bulk, which is essentially passive (as Sturm has clearly acknowledged - we shall see how in section 12), we have to conclude that a *first entelechy* must be recognized in corporeal substance, a *first subject of activity*. It is a *primitive motive force* which is additional to extension (or what is purely geometrical) and bulk (or what is purely material); it is always active, but *how* it acts in collisions of bodies varies according to what effort [*conatus*] and impetus are involved. And this substantial principle is what is called *the soul* in living things and *the substantial form* in other things; and insofar as it together with matter constitutes a substance that is truly one, or is one *per se* [= *one* considered just in itself, in contrast to an aggregate or collection which we choose to treat as *one* - for example a chain or a flock of sheep], it makes up what I call a *monad*. I choose this term, with its implication that the items in question are the unitary things out of which everything is composed, because if

these true and real unities were eliminated, there would be only aggregates; indeed it would follow that there would be no true entities at all in bodies. For although there are atoms of *substance*, namely my monads, which count as atoms because they have no parts, there are no atoms of *bulk*, or smallest extensions, or ultimate elements, because a continuum is not made up out of points. In just the same way, there is no greatest bulk, no infinite extension, even though for each thing there is always something bigger. But there is a being that is the greatest in the intensity of its perfection, a being infinite in power. [The Latin for the contrast extension/intensity is *extensio/intensio*.]

**12.** I see, however, that in his ‘Defence’ Sturm has sought to attack the motive force inherent in bodies through certain arguments. ‘From numerous considerations’, he writes, ‘I shall here show that corporeal substance is indeed incapable of any *active* motive power,’ I don’t understand what a non-active motive power might be. He also says that he will use two parallel arguments, one from the nature of matter and body, the other from the nature of motion. I shall deal with one in this section and the other in section 13. The former comes down to this: that matter is in its nature and essentially a passive substance, and so it is no more possible for it to be given an active force than it is for God to will that a stone should, while remaining a stone, be alive and rational - which would make it a non-stone. Furthermore, all that we can suppose in a body are properties of matter, and a property of a thing that is essentially passive cannot make the thing active.

Sturm puts this last point well. But his argument can be countered on the basis of a philosophical position that is generally accepted and also true. I understand ‘matter’ as either secondary or primary. Secondary matter is indeed a complete substance, but it is not merely passive; primary matter is merely passive, but is not a complete substance - for it to be complete there must be added a soul or a form analogous to a soul, or a first entelechy, that is, a certain urging or primitive force of acting which itself is an inherent law that God has impressed onto the thing. I think this would be acceptable to the famous and ingenious man who recently defended the view that body is made up of matter and spirit. But in my present context ‘spirit’ is to be understood not as an intelligent being (as it usually is) but as a soul or a form analogous to a soul; and not as a mere property of a thing, but as something constitutive, substantial, enduring, what I usually call a *monad*, in which there is something like perception and appetite. This commonly accepted doctrine, which is consistent with the doctrine of the schoolmen (when that is properly understood), must first be refuted if Sturm’s argument is to succeed.

From this it also follows that he can’t be allowed his assumption that whatever is in corporeal substance is a property of matter. For, as is well known, according to the commonly accepted philosophy the bodies of living things contain souls which are certainly not properties of matter. Sturm seems to have settled on the opposite view, and to deny all true sensation, and all soul properly so-called, to brute animals; but he shouldn’t assume this opinion as a basis for demonstration before it itself is demonstrated. I hold the contrary view that it is not consistent with the order or the beauty or the reasonableness of things that there should be something living - that is, acting from within itself - in only a small portion of matter, when it would contribute to greater perfection for such things to be everywhere. And there is no reason why souls or things analogous to them should not be everywhere, even though dominant and consequently intelligent souls, like human souls, cannot be everywhere.

**13.** Sturm’s second argument, from a premise about motion, seems to me no more compelling. He says that a thing’s *moving* is merely its successively existing in different places. This is not entirely

satisfactory; it expresses what results from motion rather than its formal definition, as it is called. Still, let us go along with it for the moment. It doesn't rule out there being motive force. For at any moment in its motion, a body is not merely in a place that exactly fits it, but it also has an urge or tendency to change its place, so that its next state follows from the present one through the force of its nature. If this were not so, then a moving body would not differ in the least, *at any moment*, from a body at rest; and Sturm's position would entail that there is no clear basis for distinguishing one body from another, because in a plenum there is no way of distinguishing between masses that are uniform in themselves unless they are distinguished through motion. And it would also follow that absolutely nothing changes in bodies, and that everything would always remain the same. Here is why.

Sturm has eliminated active forces or impetus, and with them all other qualities and properties except 'existing in this place' and 'successively coming to exist in some other place'; so he ought to hold that *no portion of matter differs from other equal and congruent portions of matter*. In that case, if (as Sturm must hold) one momentary state of the corporeal world differs from another purely through the transposition of equal and congruent portions of matter which are in every way alike, then obviously this perpetual substitution of indistinguishables won't provide any way of distinguishing different momentary states of the world from one another. For the only thing that could be attributed to one portion of matter and not another would be merely *extrinsic* - it would concern what *will* happen, namely that the portion in question *will later* be in such and such another place. But in the present there is no difference. Indeed, there is not even a properly grounded difference between the present and the future, because we will never arrive at a time that we can distinguish from the present. This is because, assuming perfect uniformity in matter itself, we have no way to distinguish one place from another, or one portion of matter from another portion in the same place. It is also unavailing to turn to *shape* in addition to motion. For in a mass that is perfectly homogeneous, undivided, and full, no shape - that is, no boundary or distinction between different parts of the mass - can occur unless motion itself yields it. And motion does *not* yield it: if motion doesn't *contain* any mark for distinguishing anything, it can't *provide* any distinguishing mark for shape. Since everything that replaced something else would be perfectly like it, no observer - not even an omniscient one - would detect even the slightest sign that a change had occurred. It would be just as though there were no change or differentiation in bodies, and we could never explain the different appearances that our senses show to us. Here is an example of something similar.

Let us imagine two perfect and concentric spheres, exactly alike over-all and in every part, one enclosed in the other with not even the smallest gap between them. Now assume that the enclosed sphere either revolves or is at rest. Not even an angel (to go only as far up as angels and leave God out of it) could detect any difference between its states at different times, or have any evidence as to whether the enclosed sphere is at rest or revolves, and according to what law of motion. Indeed, the situation is even worse than that, because just as the lack of any difference prevents us from determining whether there is motion, the lack of a difference *and of a gap* prevents us from determining a boundary between the spheres.

Even if those who have not dug deeply enough into these matters may not have recognized this, it ought to be regarded as certain that such states of affairs are alien to the nature and order of things, and that *nowhere is there perfect similarity* (this is one of my important new axioms). It also follows from this that in Nature there are neither perfectly hard corpuscles, nor a perfectly

thin fluid, nor a universally diffused finely divided matter, nor ultimate elements of the kind some call 'primary and 'secondary'.

I think it is because Aristotle (who in my view is deeper than many think) saw some of this that he judged that there must be 'qualitative' alteration *in addition to* change of place, and that matter is not everywhere the same, or it would never alter. And in fact this dissimilarity or qualitative difference, and also alteration (Aristotle's *alloisis*, which he did not adequately explain), result from different degrees and directions of impulses, and thus from properties of the monads that things contain. From this we can see that there must be more to bodies than a mere homogeneous mass and movement of it from place to place - which would not 'really' change anything. Those who believe in atoms and vacuum do of course allow variety in matter, making some of it divisible and some indivisible, one place full and another empty. But atoms and vacuum should both be rejected (as I came to recognise when I grew up).

Sturm adds that it is God's will that enables matter to exist through different times, and asks: why not also attribute to God's will matter's existing here and now? I reply that this, like everything else that involves perfection, is certainly due to God. But 'the fact of' that first and universal cause conserving everything does not *take away* the natural subsistence of a thing coming into existence or its 'naturally' persevering in existence thereafter; rather, it *produces* that natural subsistence and persistence. And, in the same way, it does not take away the natural efficacy of a thing in motion or its 'natural' perseverance in acting once it has begun; rather, it supports that efficacy and action.

**14.** Many other things in Sturm's 'Defence' are problematic, such as his statement that when motion is transferred from one ball to another through several intermediate balls, the last one is moved by *the same force* as the first. It seems to me that 'on the contrary' it is moved with an *equivalent* force, but not by the *same* force. That is because - surprising as it may seem - when anything is pushed by the impact on it of a neighbouring body what sets it in motion is *its own force*, its elasticity. (I am not now discussing the cause of this elasticity, and I don't deny that it must be explained mechanically through the motion of a fluid flowing through bodies.) Also, his statement that a thing that can't set itself in motion can't keep itself in motion is truly astonishing! On the contrary: it is an established fact that while force is necessary for producing motion, once an impetus is given no new force is needed for the motion to continue; indeed, a force is needed to stop it. Conservation by a universal cause is not at issue here; as I have already said, if it took away the efficacy of things, it would also take away their existence.

**15.** From this we can see that the doctrine of *occasional causes* which some people defend can lead to dangerous consequences, though these are doubtless not intended by its very learned defenders. (The dangers would be averted if the doctrine were modified in certain ways; Sturm makes some of these changes, and seems poised to make others.) Far from increasing the glory of God by dethroning the idol of Nature, this doctrine seems to join Spinoza in making God be the very nature of things, reducing created things to mere *states or properties* of the one divine substance: for something that 'answers to occasionalism's account of created things, that is, something that •doesn't act, •has no active force, •has no distinguishing features, and finally •has within itself no reason or ground for staying in existence, can in no way be a *substance*. I am perfectly sure that Sturm, a man outstanding in both piety and intellect, is very far from such perversions. No doubt, then, he will either show clearly how on his doctrine some substance or even some change remains in things, or he will surrender to the truth.

16. I have many reasons to suspect that I haven't properly understood Sturm's views, nor he mine. Somewhere in his *Elective Physics* he acknowledges that a certain small *part of the divine power* can, and even in a way *should*, be understood as belonging to and attributed to things. (I suppose he means a certain expression, likeness, or immediate effect of the divine power, since that power itself certainly can't be divided into parts.) His words suggest that he means this in the sense in which we speak of the soul as 'a small part of the divine breath', in which case the disagreement between us vanishes. But I hesitate to attribute this view to him, because it occurs hardly anywhere else in his book, and I don't see him presenting anything that follows from it. On the contrary, I note that many things he says are hardly consistent with this view, and also that the 'Defence' leads in an entirely different direction. To be sure, when in certain letters Sturm first objected to my published views on inherent force, and I replied, he generously responded that we differ only verbally and not in doctrine. But when, having taken note of this, I raised a few other points, he immediately switched and cited many differences between us, which I acknowledge. Quite recently, however, he set these differences aside and again wrote that any differences between us are only verbal - to me a most gratifying conclusion. Therefore, on the occasion of this latest 'Defence', I have tried to set the matter out in such a way that we can at last get clear about our views and about their truth. For this distinguished gentleman has great insight, and also skill as an expositor; so we can expect that his work on this important issue will throw considerable light on it, and thus that my own labours will be useful in giving him an opportunity to consider some important aspects of the present matter that have been missed by previous authors, and to illuminate with his usual industry and power of judgment. I think I have supplemented these with new, deeper, and more broadly grounded axioms, from which there may some day arise a restored and corrected system of philosophy, midway between the formal and the material, a system that combines and preserves both.