

LETTER TO JACOB THOMASIUS

April 20/30, 1669*

Jacob Thomasius had been one of the more influential of Leibniz's teachers at Leipzig. Though he seems to have lectured only on rhetoric while Leibniz was in the university, he supervised his first dissertation, De principio individui; and the letters which Leibniz wrote to him after leaving Leipzig show the high respect which the pupil had for his master.

Leibniz's intention of reconciling the ancient and the new philosophy appeared early in his thought. This letter contains an effort to show Aristotle consistent with the modern philosophers rather than with the Scholastics. It was evoked by his comment on Thomasius' Origines historicae philosophiae et ecclesiasticae, the second edition of which appeared in 1669 and was for long one of the most accurate histories of ancient philosophy.

Leibniz thought well enough of this letter to have it printed at the end of his preface to the Nizolius edition in 1670 (No. 8), in which related matters were discussed. The letter is here translated in the form in which Thomasius received it, with the exception of certain obscure passages which even he apparently could not understand.¹ At these points substitutions have been made from the version of 1670.

[G., I, 15-27; IV, 162-74]

The 'foretaste' of a history of philosophy which you have written has set all our mouths to watering more than I can tell you, for it shows clearly how great a difference there is between a mere enumeration of names and such profound reasons as you give for the interconnections between doctrines. You know that I am no flatterer. But wherever I hear people who understand these matters speak of your essay, they are unanimous in saying that there is no one from whom we can better hope for the entire history of philosophy than from you. Most of the others are skilled rather in antiquity than in science and have given us lives rather than doctrines. You will give us the history of philosophy, not of philosophers. Joseph Glanvill's history of the growth of the sciences since Aristotle is said to be in press in England.² But I believe that in general he will trace only the mathematics, mechanics, and physics of the more noteworthy periods and so detract nothing from you. I wish, indeed, that you would produce both a style and a method [*stilum filumque*] for this new age and warn our unseasoned youth that it is wrong to give our moderns credit either for everything or for nothing. Baghemini is not the only one whom you ought to criticize³; there are Patricius, Telesius, Campanella, Bodin, Nizolius, Fracastori, Cardan, Galileo, Bacon, Gassendi, Hobbes, Descartes, Basso, Digby, Sennert, Sperling, Derodon, Deusing, and many other names among whom the mantle of philosophy is torn apart. It will be play for you, but fruitful for the public, to remind the world of them.

Who would disagree with your estimate of Baghemini?⁴ There is no elegance in his hypotheses, no consistency in his reasoning, but only utterly monstrous opinions.

Unless he has something useful to say in specific physical observations, certainly he had better remain silent. It seems to me that the parents of his opinion that God is primary matter are Scaliger, Sennert, and Sperling – for he professes also to be a disciple of the latter – who affirm that forms are produced, not from the passive power of matter, but from the active power of an efficient cause. From this they conclude that God produces creatures rather from his own active power than from the objective and, so to speak, passive power of nothing. In their opinion, therefore, God produces things out of himself and is thus the primary matter of things. But you will judge more correctly on this subject.

I agree with you completely in regard to Descartes and Clauberg, that the disciple is clearer than the master. But on the other hand, I should venture to say that hardly any of the Cartesians have added anything to the discoveries of their master. Certainly Clauberg, Raey, Spinoza, Clerselier, Heerbord, Tobias Andreae, and Henry Regius have published only paraphrases of their leader. However, I am calling Cartesians only those who follow the principles of Descartes; such great men as Bacon, Gassendi, Hobbes, Digby, and Cornelius van Hogelande⁵, who are commonly confused with the Cartesians, are definitely to be excluded from their number, since they were either equals or even superiors of Descartes in age and in ability. As to myself I confess that I am anything but a Cartesian. I maintain the rule which is common to all these renovators of philosophy, that only magnitude, figure, and motion are to be used in explaining corporeal properties. Descartes himself, I hold, merely proposed this rule of method, for when it came to actual issues, he completely abandoned his strict method and jumped abruptly into certain amazing hypotheses. Vossius rightly criticizes him for this in his book on light.

Hence I do not hesitate to say that I approve of more things in Aristotle's books on physics⁶ than in the meditations of Descartes; so far am I from being a Cartesian! In fact, I venture to add that the whole of Aristotle's eight books can be accepted without injury to the reformed philosophy. This by itself meets your arguments about the irreconcilability of Aristotle and the moderns. For the most part Aristotle's reasoning about matter, form, privation, nature, place, infinity, time, and motion is certain and demonstrated, almost the only exception being what he said about the impossibility of a vacuum and of motion in a vacuum. For to me it seems that neither a vacuum nor a plenum is necessary; the nature of things can be explained in either way. Gilbert, Gassendi, and Guericke argue for a vacuum; Descartes, Digby, Thomas White, and Clerke in his book on the plenitude of the world, for a plenum; Thomas Hobbes and Robert Boyle for the possibility of either. I admit that the rarefaction of things is difficult to explain without a vacuum, though it is possible.⁷ I have recently seen a book by Jean Baptiste du Hamel, a learned Frenchman, on the agreement of the old philosophy and the new, which was published lately in Paris. In it he brilliantly explains the hypotheses of some of the best-known ancient and recent thinkers and often criticizes them with discernment. He also says a good bit about the divisions of opinion concerning the vacuum.

For the rest, scarcely any sane man will question the many other arguments of Aristotle in his eight books on physics and in the whole of his metaphysics, logic, and ethics. Who would disagree, for instance, with his theory of substantial form as that by which the substance of one body differs from that of another? Nothing is more true than his view of primary matter. The one question is whether Aristotle's abstract

theories of matter, form, and change can be explained by magnitude, figure, and motion. This the Scholastics deny and the philosophical reformers affirm. The latter opinion seems to me to be not only the more true but also the more consistent with Aristotle. Let me discuss each briefly.

First, about Aristotle. The Scholastics have strangely perverted his meaning; no one knows this better than you, distinguished Sir, who were the first to bring many errors of this kind to light. Since not only you acknowledge this, but also Soner and Dreier in metaphysics, Viotti, Zabarella, and Jung in logic, and Jason Denores, Piccart, Conring, Felden, Durr, and many others in civil law; why, I ask, shall we not expect the same or even worse in physics, where aid must be sought from the senses, from experience, and from mathematics — instruments which the Scholastics, shut up in their monasteries, lacked almost entirely? It is therefore probable enough that they were wrong in physical matters; what if I show that it is even more, namely, certain? This can be done in two ways. It can be shown either that the reformed philosophy can be reconciled with Aristotle's and does not conflict with it or in addition, that the one not only can but must be explained through the other, nay, that the very views which the moderns are putting forth so pompously are derived from Aristotelian principles. The former way establishes the possibility of their being reconciled; the latter, the necessity. But if the reconciliation is shown to be possible, it is by that fact also accomplished. Even if the interpretations of both Scholastics and moderns were possible, the clearer and more intelligible of two possible hypotheses must always be chosen, and without any doubt this is the hypothesis of the moderns, which conceives no incorporeal entities within bodies but assumes nothing beyond magnitude, figure, and motion. I cannot better show this possibility of reconciling the two than by asking for any principle of Aristotle which cannot be explained by magnitude, figure, and motion.

Primary matter is mass itself, in which there is nothing but extension and antityp or impenetrability.⁸ It has extension from the space which it fills. The very nature of matter consists in its being something solid and impenetrable and therefore mobile when something else strikes it, and it must give way to the other. Now this continuous mass, which fills the world while all its parts are at rest, is primary matter, from which all things are produced by motion and into which they are reduced through rest. There is no diversity in it but only homogeneity, except through motion. Hence all the knots of the Scholastics are already untied. First, they ask about its entitative actuality prior to all form. The reply must be that it is a being prior to all form, since it has its own existence. For whatever is in some space exists, and this cannot be denied of mass itself, even if it entirely lacks motion and discontinuity. But the essence of matter or the very form of corporeity consists in antityp or impenetrability. Matter has quantity too, though this is indefinite, or indeterminate as the Averroists call it. For being continuous, it is not cut into parts and therefore does not actually have boundaries. But it does have extension or quantity. Everything fits together wonderfully, not as concerns the extrinsic limits of the world or the mass as a whole, but as concerns the intrinsic limits of its parts.

Let us pass from matter to form in good order [*per dispositiones*]. Here too everything agrees remarkably if we assume that form is nothing but figure. For since figure is the boundary of a body, a boundary is needed to introduce figure into bodies. But a discontinuity of parts is necessary in order to have a variety of boundaries arising in matter. For by the very fact that parts are discontinuous, each one will have separate

boundaries, since Aristotle defines the continuum as things whose limits are one [$\delta\delta\tau\alpha\epsilon\sigma\chi\alpha\tau\alpha\epsilon\delta\tau\alpha$].⁹ But discontinuity can be introduced into the formerly continuous mass in two ways – first, in such a way that contiguity is at the same time destroyed, when the parts are so pulled apart from each other that a vacuum is left; or in such a way that contiguity remains. This happens when the parts are left together but moved in different directions. For example, two spheres, one included in the other, can be moved in different directions and yet remain contiguous, though they cease to be continuous. This makes it clear that, if mass were created discontinuous or separated by emptiness in the beginning, there would at once be certain concrete forms of matter. But, if it is continuous in the beginning, forms must necessarily arise through motion. (I am not now speaking of the annihilation of certain parts to secure a vacuum in matter, since this is supernatural.) For division comes from motion, the bounding of parts comes from division, their figures come from this bounding, and forms from figures; therefore, forms come from motion. From this it is clear that every arrangement into a form is motion, and the vexatious problem of the origin of forms is answered. The distinguished Herman Conring could only answer to this problem, in a special dissertation, that forms arise from nothing.¹⁰ We shall say that they arise from the power of matter, not by producing something new, but merely by taking away something old and causing boundaries through a division of parts, just as anyone who makes a column does nothing but remove the superfluous parts. What is left after the rest has been removed takes on, by this very fact, the figure which we call a column. For all the figures or forms which are contained in the mass lack only determination and actual separation from the others which adhere to them. If this explanation is adopted, all the arguments advanced against the origin of forms from the power of matter itself become child's play and trifles.

It now remains for us to come to change. Changes are commonly and rightly classed as generation, corruption, increase, decrease, alteration, and change of place or motion.¹¹ Modern thinkers believe that these can all be explained by local motion alone. In the first place, the matter is obvious in the case of increase and decrease, for change of quantity occurs in a whole when a part changes its place and is either added or taken away. We need only to explain generation, corruption, and alteration through motion. I observe in advance that numerically the same change may be the generation of one being and the alteration of another; for example, since we know that putrefaction consists in little worms invisible to the naked eye, any putrid infection is an alteration of man, a generation of the worm. Hooke shows similarly in his *Micrographia* that iron rust is a minute forest which has sprung up; to rust is therefore an alteration of iron but a generation of little bushes. Moreover, generation and corruption, as well as alteration, can be explained by a subtle motion of parts. For example, since white is what reflects the most light and black is what reflects the least, those things whose surfaces contain many small mirrors will be white. This is why foaming water is white, for it consists of innumerable little bubbles, and each bubble is a mirror, while before, the water as a whole was but one mirror – just as there are as many mirrors as there are fragments when a glass mirror is broken. This is also why pounded glass is whiter than when it is intact. Similarly, water broken into distinct mirrors by bubbles therefore becomes white, and this is also the reason why snow is whiter than ice, and ice than water. For it is false that snow is condensed water; it is rather rarefied and therefore is lighter than water and occupies more space. The sophism of Anaxa-

goras about black snow is to be refuted in this way. Such considerations make it clear that colors arise solely from a change of figure and position in a surface. If we had space, it would be easy to explain light, heat, and all qualities in the same way.

Now if qualities are changed by motion alone, substance will also be changed by that very fact, for a thing ceases to be if all, or even some, of the qualities requisite to it are changed. For example, if you remove either light or heat, you destroy fire. And you accomplish both by stopping motion. This is why a covered fire will die for lack of the air which feeds it, not to speak of the fact that an essence differs from its qualities only in relation to sense. Just so, the same city presents one aspect if you look down upon it from a tower placed in its midst; this is as if you intuit the essence itself. The city appears otherwise if you approach it from without, which is as if you perceive the qualities of a body. And just as the external aspect of a city varies as you approach it differently, from the west or from the east, the qualities of a body vary with the variety of our sense organs.¹² From this it is evident that all changes can be explained by motion.

It is no objection that generation occurs in an instant while motion involves succession, for generation is not motion but the end of motion; the motion is already finished at that instant, for a certain figure is produced or generated at the very last instant of motion, as a circle is produced in the final moment of a revolving motion. This also makes clear why the substantial form consists in something indivisible and cannot be increased or decreased. For neither can a figure be increased or decreased. Even if one circle is greater than another, one circle is not more circle than another, for the essence of a circle consists in the equality of all lines drawn from its center to its circumference. But equality itself consists in an indivisible; nothing can be more or less equal. Nor should the objection be made that figure and magnitude are accidents, for they are not always accidents. Fluidity may, for example, be an accident of lead, for lead flows only in fire, but it belongs to the essence of mercury. Now the cause of fluidity is undoubtedly the free curved figure of parts, whether they be spherical, cylindrical, oval, or spheroid. Therefore the curved figure of its subtle parts is an accident of lead, but essential to mercury. The reason for this is that all metals arise from mercury fixed by salts, while the nature of salts consists in rectilinear shapes adapted to rest. Thus if we dissolve salts in water and let them crystallize freely, some crystals appear as tetrahedrons, others as hexahedrons, octahedrons, etc., as chemists know, but none appears round or curvilinear. Hence the salts are the cause of fixity, and the acid salts mixed with the smallest parts of mercury in the bowels of the earth impede the freedom of the curvilinear parts by inserting themselves between them and produce metal. But in fire the metal returns to the nature of mercury, for fire, inserting itself between the smallest parts, frees the curvilinear particles of mercury from the plane-sided salts; hence metal flows in the fire. So there is obviously almost nothing in Aristotle's physics which cannot be readily explained and made clear through the reformed philosophy.

These examples, moreover, have occurred to me spontaneously while writing this; others are collecting many more throughout the whole of natural philosophy. I have no fear that you will ascribe what I have said to my following too closely the accounts and authority of Raey.¹³ I had thought this way long before I had even heard of Raey. I have read him, of course, but in such a way that I now scarcely recall what he said. Nor is he the first or the only one to reconcile Aristotle with modern philosophy. Scaliger seems to me to have paved the way, and in our own times Kenelm Digby and

his follower Thomas White – the former in a book on the immortality of the soul, the latter in his peripatetic institutions – have dealt explicitly with the same thing, long before Raey. Abdias Trew and particularly Erhard Weigel are in harmony with them.¹⁴

So far it has been shown only that the two positions can be reconciled; it still remains to show that they ought to be. For what does Aristotle discuss, in the eight books of the *Physics*, besides figure, magnitude, motion, place, and time? If the nature of body in general can be explained in terms of these, then the nature of a particular body must be explained in terms of a particular figure, a particular magnitude, etc. In fact, he himself says in the *Physics*, Book iii, Section 24, that all natural science concerns magnitude (with which figure is, of course, associated), motion, and time. He also says, repeatedly, that the subject of physics is movable bodies and that natural science deals with matter and motion. He does, it is true, make the heavens the cause of all that takes place in the sublunar realm. But the heavens, he says, act on the inferior realms only through motion. Moreover, motion produces only motion or the limits of motion, which are magnitude and figure, and from these result position, distance, number, etc. Everything in nature must therefore be explained through these. This same Aristotle says frequently, as for instance, in the *Physics*, Book i, Section 69, that the relation of bronze to the statue is the same as that of matter to form.

For the rest, I have proved that figure is a substance, or rather that space is a substance and figure something *substantive*, because all science deals with substance, and it cannot be denied that geometry is a science. You have replied that you can produce a passage in which Aristotle denies that geometry is a science more quickly than I can produce one in which he affirms that it is. I have no doubt, distinguished Sir, that there are certain passages in Aristotle which can be stretched or twisted to this end. Yet I think that these are outweighed by countless other admissions of his. For what occurs more frequently in all the books of the *Analytics* than examples from geometry? He seems to have intended geometric demonstrations to serve as patterns for the rest, so to speak. Now it would be absurd to make the less noble a pattern for the more noble. The Scholastics, in fact, thought so meanly of mathematics at first that they made every effort to exclude it from the number of the perfect sciences, chiefly on the ground that it does not always demonstrate from causes. But, if we consider the matter more accurately, it will be seen that it does demonstrate from causes. For it demonstrates figures from motion; from the motion of a point a line arises, from the motion of a line a surface, from the motion of a surface a body. The rectangle is generated by the motion of one straight line along another, the circle by the motion of a straight line around an unmoved point, etc. Thus the constructions of figures are motions, and the properties of figures, being demonstrated from their constructions, therefore come from motion, and hence, a priori, from a cause. Geometry is thus a true science, and, Aristotle not to the contrary, its subject, which is space, is a substance.

Nor is it so absurd that geometry should deal with the substantial form of bodies. For note the passage in Aristotle's *Metaphysics*, Book xiii, Section 3, in which he says expressly that geometry disregards material, final, and efficient cause; this being assumed, it follows that it deals either with substantial or with accidental form. But it does not deal with accidental form, since the real definition of an accidental form involves a subject in which it inheres, or matter. But Aristotle says that geometry disregards matter. Therefore geometry deals with substantial form. So there occurs to me, as I write this, a beautiful harmony among the sciences; namely, that under careful

examination it appears that theology or metaphysics deals with the efficient cause of things, or mind; moral philosophy, whether ethics or law (for as I learned from you, these are one and the same science), deals with the final cause of things, or the good; mathematics (I mean pure mathematics, for the rest is a part of physics) deals with the form or idea of things, or figure; physics deals with the matter of things and the unique affection resulting from the combination of matter with the other causes, or motion. For mind supplies motion to matter in order to achieve a good and pleasing figure and state of things for itself. Matter in itself is devoid of motion. Mind is the principle of all motion, as Aristotle rightly saw.

For to come to this problem, Aristotle seems nowhere to have imagined any substantial forms which would themselves be the cause of motion in bodies, as the Scholastics understood them.¹⁵ He does indeed define nature as the principle of motion and of rest and calls form and matter nature, though form more so than matter. But from this it does not follow, as the Scholastics contended, that form is a kind of immaterial being, though insensible in bodies, which spontaneously imparts motion to a body, for example, downward motion to a stone, without the help of an external thing. For form is indeed the cause and principle of motion, but not the primary one. No body moves unless it is moved from without, as Aristotle not only rightly says but demonstrates. For example, assume a sphere to be on a plane. If it is once at rest, it will not move by itself in all eternity, unless an external impulsion is added, for example, another body. In that case the other body is the cause of the impressed motion, while the sphere's figure or sphericity is the cause of the received motion, for if this sphericity had been absent, perhaps for this occasion only, the body would not give way so easily to the other one. This shows that the Scholastic concept does not follow from the Aristotelian definition of form. I admit therefore that form is the principle of motion within its own body, and that body is itself the principle of motion in another body. But the first principle of motion is the primary form, which is really abstracted from matter, namely mind, which is at the same time the efficient cause. Hence freedom and spontaneity belong only to minds. Therefore it is not absurd that of the substantial forms only mind should be designated as the first principle of motion, all the others receiving their motion from mind. And as I said, Aristotle regards it as certain that no body has a principle of motion within itself alone¹⁶, and it is by this argument that he ascends to the prime mover.

You make two answers to this objection. First, that this argument has no effect against Epicurus, who ascribes spontaneous downward motion to his atoms. I admit that the argument has no effect against him unless it be first proved to him that it is absurd and impossible for a body to receive motion from itself, a thing which Cicero has already done, if I am not mistaken, in his books on the nature of the gods, where he elegantly ridicules Epicurus for introducing something into his hypothesis in this way, without cause or reason. For there is¹⁷ no 'downward' in the nature of things, but only in relation to us, nor is there any reason why any body should move in one direction rather than another. So we shall easily reply to Epicurus when he denies that whatever moves is moved by something external to itself and vindicate the certainty which we seek for the existence of God.

Your second objection is that Aristotle seems to have reasoned not so much from the axiom that the principle of motion is outside the body which is moved but rather from another, that there is no infinite progression. But consider carefully, honored Sir,

whether he does not in fact need the combination of both. For unless it be admitted that whatever moves is moved from without, we shall obviously arrive at no progression at all, to say nothing of one to infinity. For your adversary will attack your very beginning and respond that any given body suffices to produce its own motion through its substantial form and that hence no mover is necessary, certainly not a prime mover. So the ladder would collapse at the very bottom step, its foundation, as it were, removed. Furthermore, Epicurus too admitted an infinite progression; so we must consider not so much what Epicurus did or did not admit but what can be demonstrated with certainty.¹⁸

Now that we have reconciled the reformed philosophy with Aristotle, it remains to show its truth per se in the same way that the Christian religion can be proved by reason and experience as well as from sacred scripture. It must be proved that there are no entities in the world except mind, space, matter, and motion. A thinking being, I call mind. Space is a primary extended being or a mathematical body, which contains nothing but three dimensions and is the universal locus of all things. Matter is a secondary extended being, or that which has, in addition to extension or mathematical body, also a physical body, that is, resistance, antitypy, solidity, the property of filling space, and impenetrability, which consists in its being constrained either to give way to another being of this kind which strikes it or to stop it. Motion therefore comes from this quality of impenetrability. So matter is a being which is in space or coextensive with space. Motion is change of space. But figure, magnitude, situation, number, etc., are not entities really distinct from space, matter, and motion but are merely properties brought about within space, matter, motion, and their parts by a supervening mind. I define figure as the limit of the extended; magnitude, as the number of parts in the extended. I define number as one and one and one, etc., or as unities. Situation reduces to figure, for it is a configuration of a plurality. Time is nothing but magnitude of motion. Since all magnitude is a number of parts, why should it be surprising that Aristotle defined time as the number of motion?

Heretofore these terms have merely been explained, however, and the sense in which we are using them interpreted; nothing has been proved. Let us now show that we need no other things to explain the phenomena of the world and to determine their possible causes – indeed, that there cannot be other things. However, if we show that no other things are necessary besides mind, matter, space, and motion, this will itself make it clear that the hypotheses of those recent thinkers, who use only these to explain phenomena, are the better ones. For it is a defect in hypotheses to assume what is unnecessary. A reading of recent philosophers does in fact show sufficiently that everything in the world can be explained in these terms alone, and my exposition, above, of the possibility of reconciling Aristotle with them is thereby confirmed. It must also be noted that those hypotheses are better which are clearer. The human mind can in fact imagine nothing other than mind (when it thinks of itself), space, matter, motion, and the things which result from the relations of these terms to each other. Whatever more you add to them is only words which can be spoken and variously combined but not explained or understood. Who can imagine a being which partakes neither of extension nor of thought? So what need is there to assume incorporeal souls in beasts and plants, substantial forms for the metallic elements, without extension and thought?¹⁹ Campanella in his book *De sensu rerum et magia* and Marcus Marci on operative ideas were wrong but consistent with their own hypotheses, and

therefore more correct, in ascribing sense, knowledge, imagination, and will to the substantial forms of inanimate things. The occult philosophy of Agrippa is not unlike this; he assigns an angel to everything as its obstetrician, so to speak. Scaliger's discussion of the plastic power and its wisdom is also similar. Thus we return to as many little gods as there are substantial forms – to a heathen polytheism. In fact, all those who speak of these incorporeal substances of bodies cannot explain what they mean without a translation into terms of mind.²⁰ Hence they ascribe to them appetite, or²¹ a natural instinct from which natural knowledge arises. The result is such axioms as these: nature does nothing in vain; everything avoids its own destruction; nature strives for continuity; like enjoys like; matter desires a nobler form; and others of this kind, though there is in fact no wisdom in nature and no appetite; yet a beautiful order arises in it because it is the timepiece of God. From these considerations it is clear that the hypotheses of the reformed philosophy are superior to those of the Scholastics, in that they are not superfluous but on the contrary clear.

It remains to prove by more subtle reasoning, that in explaining the nature of bodies we cannot assume any other entities than those which I have named. This is done as follows. Everyone calls that a body which is endowed with some sensible quality. Many of these sensible qualities can be removed from the body in such a way that it remains a body nevertheless. For even if a body lacks color, odor, taste, it is still called a body. You will admit that air, for example, is a body, although it is transparent and frequently lacks color, taste, and odor. Similarly the air is a body even when it lacks sound. Therefore those qualities that can be seen, heard, tasted, and smelled may be rejected as not at all constituting the nature of a body. The problem is thus reduced to the tactile qualities. In fact, such primary qualities as heat, humidity, dryness, and cold can be absent individually; heat can be absent from water, humidity from earth, dryness from air, and cold from fire, yet each of these may be a body. That the other tactful qualities, for example, smoothness, lightness, tensity, etc., do not constitute the nature of a body is generally admitted, and appears from the very fact that they are called secondary and therefore arise from others which are constitutive, and also because there is not one of them which cannot be absent from a body. It remains therefore to seek some sensible quality which occurs in all bodies and only in bodies and by which men may distinguish body from nonbody, as if by a criterion. Beyond any doubt this is mass or antitypy, together with extension. For whatever men sense as extended, they do not at once call it a body, for they sometimes consider it a mere appearance or phantasm – thought it is in fact always a body and has antitypy, even when this quality may appear to our intellect only, not to our senses. But they do call a body what they not only see but also touch, that is, what they discover has antitypy, and they deny this name to whatever lacks antitypy. Whether learned or ignorant, therefore, men find that the nature of body consists in two things – extension and antitypy together. The former we derive from sight, the latter from touch, and by the combination of both senses we usually ascertain that things are not phantasms. To be extended, however, is nothing else but to be in space, and antitypy is the impossibility of being in the same space with another thing, but one or the other having to move or be at rest. The nature of body therefore evidently is constituted by extension and antitypy, since there is nothing in things without a cause, and nothing ought to be supposed in bodies whose cause cannot be discovered in their first or constitutive principles. But this cause cannot appear unless these principles are well defined. There-

fore we can assume nothing in bodies which does not follow from the definition of extension and antitypy. But from these concepts are derived only magnitude, figure, situation, number, mobility, etc. Motion itself is not derived from them. Hence there is no motion, strictly speaking, as a real entity in bodies. I have demonstrated, instead, that whatever moves is continuously created and that bodies are something at any instant in assignable motion, but that they are nothing at any time midway between the instants in motion – a view that has never been heard of until now but which is clearly necessary and will silence the atheists. Hence it is clear that the explanation of all qualities and changes must be found in magnitude, figure, motion, etc., and that heat, color, etc., are merely subtle motions and figures.

As for the rest, I venture to assert that atheists, Socinians, naturalists, and skeptics can never be opposed successfully unless this philosophy is established. I believe this philosophy is a gift of God to this old world, to serve as the only plank, as it were, which pious and prudent men may use to escape the shipwreck of atheism which now threatens us.²² Though my acquaintance with learned men has been very slight and recent, I shudder when I think how many I have met who are at once brilliant thinkers and atheists. An unpublished book by Bodin is being circulated from hand to hand (and like Naudé, I wish that it would never be published); a most effective work, which he calls “the secret of sublime things”²³ and in which he is the professed enemy of the Christian religion. The dialogues of Vanini are child’s play compared to it. I have read it carefully, and I thank God with all my heart for instructing me in these philosophical defenses, by which I was able easily to turn back his shafts. I should be ungrateful, however, if I denied my debt to you for many of them. The efforts which the enlightened Spizel is once more exerting to eradicate atheism must be praised. I believe you have seen his letter about this argument, which was published at this book fair. Listen to an experience which I had in connection with him. In a period of leisure, but working in the confusion of an inn, I once wrote about two sheets in which I tried to demonstrate, more accurately than usual, the immortality of the soul and the existence of God. I sent these sheets to a friend who passed them on to the reverend Mr. Spener, a pastor in Frankfurt, with their authorship properly concealed. Spener sent them to Spizel, and Spizel recently attached them to the end of his letter to Anton Reiser on the eradication of atheism, with the title *Confession of Nature against Atheists*.²⁴ I do not disapprove, but I regret that the sketch was printed most incorrectly; the sorites particularly, in which I tried to prove the immortality of the soul, was thrown into great confusion by changing the beginnings of the lines. Spizel admitted that he did not know who the author was. I should appreciate a judgment about the reasoning in the demonstration. I do not seek praise but criticism, since it is in the interest of religion not to be defended perfunctorily. Meanwhile I have already penetrated much more deeply, I think, into both problems, for you will not read there what I have found out since about the perpetual creation involved in motion, and about the innermost nature of a thinking being or a mind.²⁵ ...

For the rest, distinguished Sir, I have discussed this whole matter with you at greater length, because I have no more learned and equitable judge of these things. Since you have thrown light into all the corners of ancient learning, and do not spurn the discoveries of the moderns when they are worthy, you alone of all men can best explain them and examine this. For you are right in holding that although new opinions may be offered and their truth most convincingly shown, we ought almost never to depart from

the generally accepted terms. If the Scholastics had done this, we would not be in difficulty now. Farewell, ornament of our land, and may you not only complete your lucidly developed theories but publish them. For many of them are both conceived and carried through with rare felicity of mind.

REFERENCES

* The double date at the head of many of Leibniz's letters is to be explained by the calendar reform then being carried out (cf. Introduction, note 1). Following the report of his astronomers, Pope Gregory XIII had directed that 10 days be dropped from the calendar. This was done at once in all Catholic countries, in 1600 in Scotland, in 1700 in the Protestant states of Germany (Leibniz himself helping to bring about the change), but not until 1752 in England. The earlier date is therefore 'old style' (in use in Protestant countries in general, though not in Germany after 1700), the latter 'new style', in Catholic countries. Leibniz was in this case in Catholic Mainz, Thomasius in Protestant Leipzig.

¹ See below, note 18.

² Joseph Glanvill's *Plus ultra, or the Progress and Advancement of Knowledge since the Days of Aristotle*, appeared in 1668. Leibniz in 1679 adopted the title tentatively for his encyclopedia.

³ In his preceding letter Thomasius had mentioned a certain Baghemini of Stettin, who had asked the theological and philosophical faculties for a criticism of his new philosophy (G., I, 14).

⁴ The 1670 version reads: "Who would disagree with your judgment on the opinion that considers God as the primary matter of the world?"

⁵ In the 1670 version Spinoza is removed from the list of Cartesians, and Galileo added to and van Hogelande removed from the non-Cartesians.

⁶ Leibniz uses the Greek title *περὶ φυσικῆς ἀκρόασεως*.

⁷ Guericke's demonstration of the vacuum had taken place in 1654 and was well known, though Leibniz, in corresponding with him in 1671, was still urging publication of his discovery.

⁸ Leibniz's term is *massa*; thus Mach (*The Science of Mechanics*, 5th ed., p. 366) is in error in saying that he used this term only in 1695 and "probably borrowed it from Newton". His use is not, of course, Newtonian, though both men vary in their use of the term, sometimes regarding it as synonymous with matter, sometimes using it as a specific measure of a physical property. Note, however, that Leibniz uses it to mean extension and antitypy or impenetrability; he has not yet adopted Kepler's and Galileo's definition of mass as essentially inertia (cf. E. Hoppe, *Geschichte der Physik*, Munich 1913, p. 61).

The term *ἀντίτυνα* is a permanent favorite of Leibniz's. It was used for hardness by Plutarch and Sextus Empiricus.

⁹ *Metaphysics* 1068b; *Physics* 231a21f.

¹⁰ In a marginal note to the 1670 version Leibniz says, "Conring said the contrary." The letter to Conring, given in No. 18, alludes to this misunderstanding.

¹¹ For Aristotle's analysis of motion see *Physics* viii and *Metaphysics* xii.

¹² The figure of the city's perspectives is one of the most happy of Leibniz's figures; it is not usually recognized that the view from the tower represents an absolute essence. The distinction between the essence of a substance and its qualities, or between essence and modes, is basic in Leibniz's logic and metaphysics, supporting his use of an intentional logic and his doctrine of substance.

¹³ Jean de Raey (d. 1702) had tried to synthesize Aristotle and Descartes in his *Clavis philosophiae naturalis seu introductio ad naturae contemplationem Aristotelico-Cartesianam* (1654). Thomasius had implied (G., I, 12) that Leibniz was influenced by him.

¹⁴ The works referred to are Julius Caesar Scaliger, *Exotericarum exercitationum liber* (1537) (a criticism of Cardan); Kenelm Digby (1603-65), *Demonstratio immortalitatis animae ratio-*

nalis (1664); Thomas White (or Albus, Anglus, Candidus) (1582–1676), *Institutiones peripateticarum ad mentem summi clarissimique philosophi Kenelmi Equitis Digbaei* (1646); Erhard Weigel (1625–99), *Analysis Aristotelica Euclidea* (1658) (Weigel had been Leibniz's teacher at Jena and influenced his mathematical ideas greatly); Abdias Trew (1597–1669), *Directorium mathematicum* (1657). On Scaliger see below, p. 130, note 3.

¹⁵ In Leibniz's mature thought substantial forms are active principles, but he frequently says that he returned to them after a mechanistic period in which he had abandoned them. And he does not, like the Scholastics, ascribe them to inorganic bodies. Insofar as he substantializes form (i.e., figure) in this letter, it amounts to an extension of the concept of substance to include geometric form; this is therefore a rejection of the Scholastic usage, but not like his later theory. See also No. 5, III, and p. 120, note 18.

¹⁶ The sentence thus far is omitted in G., I, 23, but restored in the 1670 version (G., IV, 170).

¹⁷ Reading *esse* for *ese* (G., I, 23).

¹⁸ The following 15 lines in G., I, 23–24, were received by Thomasius himself in a corrupted form, as his marginal notations, according to Erd., indicate. They were omitted in the 1670 edition and are omitted here.

¹⁹ Following the version of 1670.

²⁰ This sentence is omitted entirely from G., I, 25. Leibniz's criticism of active principles in inorganic nature, here directed at the Scholastic theory of substantial forms, as well as against Thomas Campanella (1568–1639), *De sensu rerum et magia libros quattuor* (1620), and Marcus Marci of Kronland (1595–1667), *Philosophia vetus restituta* (1662), is continued throughout his later writings. Campanella, Marcus Marci, and Scaliger all advocated creative ideas or powers of some kind in nature.

²¹ Reading *vel* (1670) for *et* (1669).

²² In the 1670 version Leibniz completes the paragraph from this point as follows: "I have argued this matter in an extemporaneous sketch which I put in the hands of Theophilus Spizel. Though it did not deserve it, he sewed it, like a tattered patch on royal purple, to his recently published letter to Reiser on the eradication of atheism, with the title, *A Confession of Nature against Atheists*" (cf. No. 5, I).

²³ Jean Bodin's *Colloquium heptapleron de abditis rerum sublimium arcanis*, a dialogue on religious tolerance, was not published until 1857. Leibniz's wish was thus almost fulfilled. His later judgment on the work was more favorable (Guh. L., I, Notes, p. 14).

²⁴ See No. 5, I. Philipp Jacob Spener (1635–1705) was one of the founders of Pietism, a pastor in Frankfurt after 1666, where he founded the Collegia Pietatis in 1670. He was later famous as pastor of the Nicolaikirche in Berlin. Theophilus Spizel (1639–91) was a Lutheran clergyman and scholar.

²⁵ Leibniz's theory of 'continuous creation' here seems merely to mean the source of all motion in God and is therefore very similar to the Cartesian opinion which he later criticized (cf. to De Volder, No. 55, I). A short paragraph alluding to obscure current events is omitted.