And thus, by simple enumeration, it is concluded that no phenomena of nature have been omitted by me in this treatise. For nothing is to be numbered among the phenomena of nature, except what is perceived by the senses. However, apart from size, figure, and motion, the varieties of which I have explained as they are in each body, nothing located outside us is observed except light, color, odor, taste, sound, and tactile qualities; which I have now demonstrated are nothing in the objects other than, or at least are perceived by us as nothing other than, certain dispositions of size, figure, and motion of bodies. Thus, there is nothing visible or perceptible in this world that I have not explained.

- Descartes, Principles of Philosophy, (Book III, Article 199)

09-P2) René Descartes, “Principles of Philosophy” (1644)¹

PART III: Of the Visible Universe

15. That various hypotheses may be used to explain the phenomena of the Planets. Just as a man at sea in calm weather and looking at several other fairly distant vessels, which seem to him to be changing position, is frequently unable to say whether the change is caused by the movement of the vessel on which he is or by that of the other vessels: when, from our situation, we observe the course of the Planets and their various positions, even careful observation does not always bring sufficient

understanding to enable us to determine, from what we see, to which bodies we ought properly to attribute the cause of these changes. And since these changes are very unequal and complicated, it is not easy to explain them, unless we choose one of the various ways in which they can be understood, in accordance with which we then suppose these changes to occur. To this end, Astronomers have devised three different hypotheses or suppositions; which they have merely attempted to make capable of explaining all the phenomena, without considering whether they conformed to the truth.²

16. That Ptolemy’s hypothesis is not in conformity with appearances.

Ptolemy devised the first of these; but, as it is already commonly rejected by all Philosophers, because it is contrary to several recent observations (especially to the changes in light, similar to those which occur on the Moon, which we observe on Venus), I shall not speak further of it here.³

17. That those of Copernicus and Tycho do not differ if considered only as hypotheses.

The second is that of Copernicus and the third that of Tycho Brahe; considered purely as hypotheses, these two explain the phenomena equally well, and there is not much difference between them. Nevertheless, that of Copernicus is somewhat simpler and clearer; so that Tycho’s only reason for altering it was that he was attempting not merely a hypothetical explanation but an account of how he thought this matter really was.⁴

18. That Tycho in words attributes less motion to the Earth than does Copernicus, but

² This is, of course not true. It may refer to Osiander’s unapproved Preface to Copernicus’ De Revolutionibus . . . in which it is suggested that the Earth’s motion is to be treated as a fiction, useful for calculating planetary positions. Ptolemy, Copernicus, Tycho, Kepler, and Galileo, however, all insisted that his system did conform to the truth.—after Millers, See 3.2 Copernicus, “Revolutions”, pp. 000 “For it is the job of the astronomer to use painstaking and skilled observation . . . “

³ See [illustration on phases of Venus??]
that in fact he attributes more.
Seeing that Copernicus had not hesitated to attribute motion to the Earth; Tycho, to whom this opinion seemed not only absurd in Physics but contrary to the common sense of men, tried to correct it. However, because he did not give sufficient consideration to the true nature of motion, he asserted only verbally that the Earth was at rest and in fact granted it more motion than had his predecessor.

19. That I deny the motion of the Earth more carefully than Copernicus and more truthfully than Tycho.
That is why, although I do not differ at all from these two except on this one point, I shall deny the movement of the Earth more carefully than Copernicus and more truly than Tycho. I shall set forth here the hypothesis which seems to me the simplest and most useful of all; both for understanding the phenomena and for inquiring into their natural causes. And yet I give warning that I do not intend it to be accepted as entirely in conformity with the truth, but only as an hypothesis or supposition which may be false.5

20. That we must suppose the fixed Stars to be a very great distance from Saturn.
First, because we do not yet know with certainty what distance separates the fixed Stars from the Earth, and because it is impossible to imagine them so far away that this is contrary to the phenomena, let us not be content to merely place them beyond Saturn, where all Astronomers agree that they are, but let us take the liberty of supposing them to be as far beyond Saturn as will serve our purpose. For if we tried to judge their altitude by comparison with the distances between the bodies which we see on the Earth, that which is already conceded to them would be as unbelievable as a distance very much greater. If, on the other hand, we consider the omnipotence of God who

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4 See 3.2 Copernicus, “Revolutions”, pp. 000 and 3.3 Tycho, “Recent Phenomena”, pp. 000 above.
5 Descartes published his work after the trial and recantation of Galileo in 1633.
created them, the greatest distance of which we can conceive is no less credible than a smaller one. And I shall show further on that neither the phenomena of the Planets nor indeed those of the Comets can be satisfactorily explained unless we suppose that there is a very great distance between the fixed Stars and the sphere of Saturn. [. . . ]

23. That the fixed Stars do not all turn on the same sphere, but that each one has a vast space around it, empty of other fixed Stars.
In addition, we must notice here that, while the Sun and the fixed Stars resemble each other as far as their situation is concerned, they are not all situated on the circumference of a single sphere, as some suppose; because the Sun cannot be with them on that circumference. Rather, just as the Sun is surrounded by a vast space in which there is no fixed Star, so also each fixed Star must be very distant from all others, and some of these Stars must be more distant from us and from the Sun than others are. So that, if S, for example, is the Sun, and F, f, Y, L, D, etc. will be fixed Stars, and we will understand that numerous others exist, above, below, and beyond the plane of this figure, scattered throughout all the dimensions of space.
24. That the heavens are fluid.
Third, it must be thought that the matter of the heaven, like that which forms the Sun and the fixed Stars, is fluid. This is an opinion which is now commonly held by all Astronomers, because they see that otherwise it is almost impossible to give a
satisfactory explanation of the phenomena of the Planets.\(^6\)

25. That the heavens carry with them all the bodies which they contain.
But it seems to me that many who seek to attribute to the heaven the property of fluidity are mistaken in imagining it to be an entirely empty space, which not only offers no resistance to the motion of other bodies, but also lacks the force to move them and carry them along with it. For in addition to the fact that such a void cannot exist in nature, there is a factor which all fluids have in common: the reason that they do not offer so much resistance to the motions of other bodies is not that they contain less matter, but that they also have motion of their particles in themselves. And since this motion can be easily determined in any direction, if it has been determined in some single direction, then a fluid will necessarily, by the force of this motion, carry with it all the bodies which it contains and which are not prevented from following it by some external cause, even though these bodies may be entirely at rest, and hard and solid; as manifestly follows from what has been said above about the nature of fluid bodies.

26. That the Earth is at rest in its heaven which nevertheless carries it along.
Fourth, since we see that the Earth is not supported by columns or suspended in the air by means of cables but is surrounded on all sides by a very fluid heaven, let us assume that it is at rest and has no innate tendency to motion, since we see no such propensity in it. However, we must not at the same time assume that this prevents it from being carried along by the current of that heaven or from following the motion of the heaven without however moving itself: in the same way as a vessel, which is neither driven by the wind or by oars, nor restrained by anchors, remains at rest in the middle of the ocean; although it may perhaps be imperceptibly carried along by the ebb and flow of this great mass of water.

\(^6\) Presumably, Descartes has in mind here the fact that comets [intersect the orbits of the planets.—after Millers. See 3.3 Tycho, "Recent Phenomena", pp. 000 above.
27. That the same is to be believed of all the Planets.
And just as the other Planets resemble the Earth in being opaque and reflecting the rays of the Sun, we have reason to believe that they also resemble it in remaining at rest, each in its own part of the heaven, and that the variation we observe in their position results solely from the motion of the matter of the heaven which contains them.

28. That the Earth, properly speaking, is not moved, nor are any of the Planets; although they are carried along by the heaven.
And it is important to remember here what was said earlier concerning the nature of movement; i.e., that (if we are speaking properly and in accordance with the truth of the matter) it is only the transference of a body from the vicinity of those bodies which are immediately contiguous to it, and considered to be at rest, into the vicinity of others. However, in common usage, all action by which any body travels from one place to another is often also called movement; and in this sense of the term it can be said that the same thing is simultaneously moved and not moved, according to the way we diversely determine its location. From this it follows that no movement, in the strict sense, is found in the Earth or even in the other Planets; because they are not transported from the vicinity of the parts of the heaven immediately contiguous to them, inasmuch as we consider these parts of the heaven to be at rest. For, to be thus transported, they would have to be simultaneously separated from all the contiguous parts of the heaven, which does not happen. However, because the matter of the heaven is fluid, sometimes some of its particles, and sometimes others, move away from the Planet to which they are contiguous, and this by a movement which must be attributed solely to them and not to the Planet: in the same way as the partial transferences of water and air which occur on the Earth’s surface are usually attributed, not to the Earth, but to those portions of water and air which are transported.
29. And that no motion is to be attributed to the Earth, even if we use motion’ improperly, according to common usage; but that it would then correctly be said that the other Planets are moved.

And if one takes ‘motion’ in the popular sense, one can quite well say that all the other Planets are moved, even the Sun and the fixed Stars; but it is very improper to speak of the Earth in this way. For the common people determine the location of the Stars by certain points on the Earth which they consider to be motionless, and believe that the Stars are moved when they leave the locations thus determined: this is convenient for everyday life and therefore reasonable. Indeed, in our childhood, we all believed that the Earth was flat and not spherical; and that the top, the bottom, and the four cardinal points of the world, namely, the North, the South, the East, and the West; were always and everywhere the same. We accordingly indicated by means of those points, which are fixed only in our minds, the locations of other bodies. But if a Philosopher, (professing to search for truth and having observed that the Earth is a globe floating in a fluid heaven whose parts are extremely mobile and that the fixed Stars always maintain the same position in relation to one another) were to consider these Stars as motionless and attempt to use them to determine the location of the Earth, and were to conclude from this that the Earth moves; he would be in error and speaking in a manner contrary to reason. For ‘location’ in its true and philosophical sense must be determined by the bodies immediately contiguous to that which is said to be moved, and not by those which are extremely distant; as are the fixed Stars in relation to the Earth. And if one interprets it according to common usage, one has no reason to believe that the Stars, rather than the Earth, are motionless (unless one imagines that there are no other bodies beyond the Stars from which the Stars can be separated and in relation to which one could say that they move and the Earth remains at rest; in the same sense as one claims to be able to say that the Earth moves in relation to the fixed Stars). But this is contrary to reason, since the nature of our intellect is such that it perceives no limits to the universe and since, consequently, anyone who takes careful notice of the greatness
of God and the weakness of our perception will judge that it is much more appropriate to believe that perhaps, beyond all the fixed Stars which we see, there are other bodies in relation to which we would have to say that the Earth is at rest and all the Stars move together, than to suppose the Creator’s power so imperfect that none such could exist, as must be the belief of those who state in this way that the Earth moves. However, if, in spite of this, conforming to common usage, we seem further on to attribute some motion to the Earth, it will have to be remembered that we are speaking improperly, in the way in which it is sometimes possible to say, of passengers who lie sleeping in a ship, that they nevertheless go from Calais to Dover, because the vessel takes them there.

30. That all the Planets are carried around the Sun by the heaven.
Now that we have, by this reasoning, removed any possible doubts about the motion of the Earth, let us assume that the matter of the heaven, in which the Planets are situated, unceasingly revolves, like a vortex having the Sun as its center, and that those of its parts which are close to the Sun move more quickly than those further away; and that all the Planets (among which we shall from now on include the Earth) always remain suspended among the same parts of this heavenly matter. For by that alone, and without any other devices, all their phenomena are very easily understood. Thus, if some straws or other light bodies are floating in the eddy of a river, where the water doubles back on itself and forms a vortex as it swirls: we can see that it carries them along and makes them move in circles with it. Further, we can often see that some of these straws rotate about their own centers, and that those which are closer to the center of the vortex which contains them complete their circle more rapidly than those which are further away from it. Finally, we see that, although these whirlpools always attempt a circular motion, they practically never describe perfect circles, but sometimes become too great in width or in length, so that all the parts of the circumference which they describe are not equidistant from the center. Thus we can easily imagine that all the same things happen to the Planets; and this is all we need to explain all their
remaining phenomena.

31. How the individual Planets are carried along.
Let us then suppose that S is the Sun, and that all the surrounding matter of the heaven turns in the same direction, namely from the West to the East via the South, or from A to C via B, assuming the North Pole to be elevated above the plane of this figure. As a result, the matter which surrounds Saturn takes almost thirty years to carry it completely around [its] circle; and that the matter which surrounds Jupiter carries it, together with the other little Planets which accompany it, all the way around [its] circle in twelve years. By the same means, Mars in two years, the Earth and the Moon in one year, Venus in eight months, and Mercury in three, complete the revolutions which are indicated by the circles marked respectively.
32. How the spots which are seen on the surface of the Sun are transported.
Let us also suppose that those opaque bodies which are visible on the surface of the Sun with the aid of a telescope, and which we call its spots; lie on its surface and take twenty-six days to complete their revolution.

33. How the Earth is also moved around its own center and the Moon around the Earth.
In addition, in the great vortex which forms a heaven [i.e., vortex] having the Sun at its...
center, there are other smaller ones which we can compare to those I have often seen in eddies of rivers where they all follow the current of the larger vortex which carries them, and move in the direction in which it moves. One of these vortices has Jupiter at its center, and moves with it the four satellites which revolve around Jupiter, at speeds so proportioned that the most distant of the four completes its revolution in about sixteen days, the next one in seven, the third in eighty-five hours and that closest to the center in forty-two hours; and thus, they revolve several times around shown above that there must necessarily be some part of matter which moves extremely quickly and is divided into an indefinite number of particles, so that all the circular and dissimilar motions which are in the world can occur without any rarefaction or void; and I think that no other kind of matter more suited to that effect can be found or imagined. [ . . . ]

133. Concerning the magnet [or loadstone]. A repetition of those of the things previously said which are necessary for an explanation of it.

So far, I have attempted to explain the natures, and also the principal powers and qualities, of air, water, Earth, and fire, which are commonly thought to be the elements of this globe which we inhabit, because these are the bodies most generally found there; it now remains for me to speak of the magnet. For inasmuch as its force is spread throughout this whole globe of the Earth, whose entire bulk is in fact a magnet; there is no doubt that this subject is relevant to a general consideration of the Earth. Accordingly, we shall now recall to mind those grooved particles of the first element, [. . . and] we shall think that there are many pores in the Earth’s intermediate region which are parallel to its axis, and through which the grooved particles coming from one pole freely proceed to the other. And these pores have been hollowed out to the measurement of these particles in such a way that those which accept the grooved particles coming from the South pole can in no way admit those which come from the North pole conversely, those which accept the Northern particles do not admit the
Southern ones: because of course these particles are twisted like the thread of a screw; some in one direction and the others in the opposite direction. Furthermore, [we shall remember that] the same particles can enter through only one end of these pores, and cannot return through the opposite one because of certain extremely tiny extremities of branches in the windings of these pores, which have been bent in that direction in which the grooved particles are accustomed to pass, and which spring back in the opposite direction in such a way as to prevent their return. As a result, after these grooved particles have traversed the whole intermediate Earth from one hemisphere to the other along straight lines, or lines equivalent to straight, parallel to its axis; they return through the surrounding aether to that same hemisphere through which they earlier entered the Earth; and thus flowing through the Earth again, form a kind of vortex. [ . . . ]
138. How these pores are made suitable to admitting the grooved particles coming from either direction.

And it must be noted that these scrapings [of iron] cannot always be turned in the same directions as they are thus ascending; because they are angular and because they strike against diverse inequalities in the veins of the Earth. Also, when the grooved particles (which emerge violently from the interior Earth and seek paths for themselves throughout the whole exterior Earth) find the pores of these scrapings so situated that in order to produces the feeling of titillation or pain, but also that of light and sounds. For if anyone is struck in the eye in such a way that the vibration of the blow reaches the
retina, that alone will cause him to see very many sparks of flashing light which will not be outside the eye. And if someone stops up his ear with a finger, he will hear a certain tremulous murmur, which will result solely from the movement of the air trapped in the ear. Finally, we often notice that heat and other perceptible qualities, insofar as they are in objects, and also the forms of purely material things (as for example, the form of fire), arise from the local movement of certain bodies, and that these then themselves cause other local movements in other bodies. And we very well comprehend how the various sizes, figures, and movements of the particles of one body produce various local movements in another body. However, we cannot in any way comprehend how the same things (that is, size, figure, and movement) can produce something else of an entirely different nature from themselves, such as those substantial forms and real qualities which many Philosophers suppose to be in things; nor indeed how, subsequently, these qualities or forms can have the force to excite local movement in other bodies. Since this is so, and since we know it to be the nature of our soul that diverse local movements suffice to provoke in it all feelings; and since we know by experience that those various feelings are in fact aroused in it, and do not perceive that anything other than movements of this kind travels to the brain from the organs of the external senses: it must certainly be concluded regarding those things which, in external objects, we call by the names of light, color, odor, taste, sound, heat, cold, and of other tactile qualities, or else by the names of substantial forms; that we are not aware of their being anything other than various arrangements of the size, figure, and motions of the parts of these objects which make it possible for our nerves to move in various ways, and to excite in our soul all the various feelings which they produce there.\footnote{Cf. Galileo’s discussion of primary and secondary qualities, 4.9 Galileo, “The Assayer”, pp. 000 {“Now I say that whenever I conceive any material or corporeal substance ... “}}
been omitted by me in this treatise. For nothing is to be numbered among the phenomena of nature, except what is perceived by the senses. However, apart from size, figure, and motion, the varieties of which I have explained as they are in each body, nothing located outside us is observed except light, color, odor, taste, sound, and tactile qualities; which I have now demonstrated are nothing in the objects other than, or at least are perceived by us as nothing other than, certain dispositions of size, figure, and motion of bodies. Thus, there is nothing visible or perceptible in this world that I have not explained.

200. That I have used no principles in this treatise which are not accepted by all; and that this Philosophy is not new but extremely ancient and commonplace. However, I should also like it to be noted that I have here attempted to explain the entire nature of material things in such a way that I have used, for this purpose, absolutely no principle which was not accepted by Aristotle and by all other Philosophers of all periods: so that this Philosophy is not new, but the oldest and most commonplace of all. For of course I have considered the figures, motions, and sizes of bodies, and have examined, according to the laws of Mechanics (which are confirmed by certain and daily experiences), what ought to follow from the collision of these bodies. Yet who ever doubted that bodies are moved, and are moved variously according to their various sizes and figures; or that as a result of the collision of these bodies, the larger ones are divided into many smaller ones, and change their figures? We do not observe this through only one sense, but through several: through sight, touch, and hearing; and we also very distinctly imagine and clearly understand this. This cannot be said of the remaining qualities perceived by our senses, like colors, sounds, and the rest, which are perceived not by means of several senses, but only by means of individual ones: for their images in our minds are always confused, and we do not know what they may be.

201. That imperceptible particles of bodies exist.
I also consider, in individual bodies, many particles which are not perceived by sense: which may not be approved by those who take their senses as the measure of the things they can know. Yet, if only he considers what is added each hour to those bodies which are gradually being increased, or what is removed from those which are being decreased; who can doubt that there are many bodies so tiny that we do not perceive them by our senses? A tree grows each day, but it cannot be understood to be made larger than it previously was unless it is likewise understood that some body is added to it. But who ever perceived by the senses those small bodies which in a single day are added to a growing tree? And, at least, those who know that quantity is indefinitely divisible will have to acknowledge that it must be possible for its parts to be made so small as to be unperceivable to any sense. And we certainly should not be surprised that we are unable to feel extremely minute bodies; since our nerves themselves (which must be moved by objects in order to create sensation) are not extremely tiny, but are like thin cords, composed of many particles smaller than themselves; and thus they cannot be moved by the most minute bodies. Nor do I think that anyone who is using his reason will be prepared to deny that it is far better to judge of things which occur in tiny bodies (which escape our senses solely because of their smallness) on the model of those which our senses perceive occurring in large bodies, than it is to devise I know not what new things, having no similarity with those things which are observed, in order to give an account of those things in tiny bodies. E.g., prime matter, substantial forms, and all that great array of qualities which many are accustomed to assuming; each of which is more difficult to know than the things men claim to explain by their means.

202. That the Philosophy of Democritus differs as much from ours as from the generally accepted one.8 Yet Democritus also imagined certain small bodies, having various figures, sizes, and movements, from the accumulation and collision of which all perceptible bodies arose;
however his method of philosophizing is commonly rejected by all. But no one has ever rejected it on account of the fact that it considers certain bodies which are so minute that they escape the senses, and which are said to have various sizes, figures, and movements; because no one can doubt that there are indeed many such bodies, as has just been shown. But it has been rejected, first, because it supposed those small bodies to be indivisible, for which reason I also reject it. Second, because it imagined that there was a void around these bodies, which I show cannot be. Third, because it attributed weight to these bodies, whereas I understand that there is no weight in any body considered in isolation, but only insofar as that body depends on the situation and movement of other bodies, and relates to them. And finally, because it did not show how individual things resulted solely from the encounters of small bodies, or if it showed this about some things, not all of its reasons were consistent with one another: at least as far as it is permissible to judge from those of his opinions which have been recorded. However, I leave it to others to judge whether those things which I have so far written about Philosophy are sufficiently coherent, and whether sufficient things can be deduced from them. And because consideration of figures, sizes, and motions was accepted by Aristotle, as well as by all the others; and because I reject everything else which Democritus assumed (as I on the whole reject everything assumed by the others); it is evident that this way of philosophizing has no more affinity with that of Democritus than with that of all the other sects.

203. How we know the figures and movements of imperceptible particles.
But I attribute determined figures, and sizes, and movements to the imperceptible particles of bodies, as if I had seen them; and yet I acknowledge that they are imperceptible. And on that account, some readers may perhaps ask how I therefore know what they are like, To which I reply: that I first generally considered, from the simplest and best known principles (the knowledge of which is imparted to our minds by

8 Cf. 4.4 Lucretius, “Nature of the Things”, pp. 000.
nature), what the principal differences in the sizes, figures, and situations of bodies which are imperceptible solely on account of their smallness could be, and what perceptible effects would follow from their various encounters. And next, when I noticed some similar effects in perceptible things, I judged that these things had been created by similar encounters of such imperceptible bodies; especially when it seemed that no other way of explaining these things could be devised. And, to this end, things made by human skill helped me not a little: for I know of no distinction between these things and natural bodies, except that the operations of things made by skill are, for the most part, performed by apparatus large enough to be easily perceived by the senses: for this is necessary so that they can be made by men. On the other hand, however, natural effects almost always depend on some devices so minute that they escape all senses. And there are absolutely no judgments (or rules in Mechanics which do not also pertain to Physics, of which Mechanics is a part or type: and it is as natural for a clock, composed of wheels of a certain kind, to indicate the hours, as for a tree, grown from a certain kind of seed, to produce the corresponding fruit. Accordingly, just as when those who are accustomed to considering automata know the use of some machine and see some of its parts, they easily conjecture from this how the other parts which they do not see are made: so, from the perceptible effects and parts of natural bodies, I have attempted to investigate the nature of their causes and of their imperceptible parts.9

204. That it suffices if I have explained what imperceptible things may be like, even if perhaps they are not so.

And although perhaps in this way it may be understood how all natural things could have been created, it should not therefore be concluded that they were in fact so created. For just as the same artisan can make two clocks which indicate the hours

9 Cf. Newton's rules for natural philosophy, 3.8 Newton, “Principia”, pp. 000 {“Rules for the Study of Natural Philosophy . . . “}
equally well and are exactly similar externally, but are internally composed of an entirely dissimilar combination of small wheels: so there is no doubt that the greatest Artificer of things could have made all those things which we see in many diverse ways. And indeed I most willingly concede this to be true, and will think that I have achieved enough if those things which I have written are only such that they correspond accurately to all the phenomena of nature, whether these effects are produced by the causes I have explained or by others. And indeed this will also suffice for the needs of everyday life, because Medicine and Mechanics, and all the other arts which can be perfected with the help of Physics, have as their goal only those effects which are perceptible and which accordingly ought to be numbered among the phenomena of nature. And if these desired phenomena are produced by considering the consequences of some causes thus imagined, although false; we shall do as well as if these were the true causes, since the result is assumed similar as far as the perceptible effects are concerned. And lest by chance anyone should believe that Aristotle ever achieved, or sought to achieve, anything more; he himself in the first book of the Meteorology at the beginning of Chapter 7, clearly asserts, concerning things which are not evident to the senses, that he thinks he is giving sufficient reasons and demonstrations if he only shows that these can be created as they are explained by him.

205. That those things which I have explained here do seem at least morally certain, however.

However, lest some injury to truth may occur here, it must be considered that there are things which are held to be morally certain, that is, [certain] to a degree which suffices for the needs of everyday life; although if compared to the absolute power of God, they are uncertain. Thus, for example, if someone wishes to read a message written in Latin letters, to which however their true meaning has not been given and if, upon conjecturing that wherever there is an A in the message, a B must be read, and a C
wherever there is a B, and that for each letter, the following one must be substituted; he finds that by this means certain Latin words are formed by these letters: he will not doubt that the true meaning of that message is contained in these words, even if he knows this solely by conjecture, and even though it may perhaps be the case that the person who wrote the message did not put the immediately following letters but some others in the place of the true ones, and thus concealed a different meaning in the message. It would however be so difficult for this to happen, especially if the message contains many words, that it does not seem credible. But those who notice how many things concerning the magnet, fire, and the fabric of the entire World have been deduced here from so few principles even though they may suppose that I adopted these principles only by chance and without reason, will perhaps still know that it could scarcely have occurred that so many things should be consistent with one another, if they were false.

206. That on the contrary they seem more than morally certain.

Besides, there are, even among natural things, some which we judge to be absolutely and more than morally certain; basing our judgment on the Metaphysical foundation that God is supremely good and by no means deceitful, and that, accordingly, the faculty which He gave us to distinguish the true from the false cannot err when we use it correctly and perceive something clearly with its help. Such are Mathematical demonstrations; such is the knowledge that material things exist; and such are all evident demonstrations which are made concerning material things. These reasonings of ours will perhaps be included among the number of these absolutely certain things by those who consider how they have been deduced in a continuous series from the first and simplest principles of human knowledge. Especially if they sufficiently understand that we can feel no external objects unless some local movement is excited by them in our nerves; and that such movement cannot be excited by the fixed stars, very far distant from here, unless some movement also occurs in these and in the whole
intermediate heaven: for once these things have been accepted, it will scarcely seem possible for all the rest, at least the more general things which I have written about the World and the Earth, to be understood otherwise than as I have explained them.

207. But that I submit all my opinions to the authority of the Church. Nevertheless, mindful of my insignificance, I affirm nothing: but submit all these things both to the authority of the Catholic Church and to the judgment of men wiser than I; nor would I wish anyone to believe anything except what he is convinced of by clear and irrefutable reason.