Relative motion and absolute motion

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# FOREWORD

*The essay we are about to read is a fragment of a more considerable work; this work, which will study* the formation of Copernicus' system*, will be published later; to our historical essay on relative and absolute motion, we have left the form it will have in the complete work.*

# I. - IT BELONGS TO METAPHYSICS TO FIX THE MEANING OF THESE WORDS: THE EARTH IS IMMOBILE, THE EARTH TURNS.

In the 14th century, the Parisian School of Terminology was unanimously in favor of Ptolemy's astronomical system; under its influence, the School of Vienna composed the treatises that spread and completed the knowledge of this system. It is time to examine the arguments by which the *Parisians* claim to establish the hypotheses on which this system is based, and, in particular, the most essential of all, the rest of the Earth at the center of the World.

But before we can report the reasons alleged in favor of these propositions: The Earth is immobile, the Sky revolves around the Earth, we must examine the meaning attributed to them by those who formulate them; and the preliminary question which thus imposes itself on our examination is, in Natural Philosophy, one of the most delicate that there is.

6] The testimony of the senses, however attentive we may suppose them to be, and experience, however ingenious we may imagine it to be, can never decide that a body is at rest or in motion. Our means of observation enable us to recognize that two bodies, disposed one with respect to the other in a certain manner, at a certain instant, are otherwise disposed at another instant; they can recognize that the mutual position of the two bodies varies with time; they can perceive the relative motion of these two bodies. But none of our senses allows us to decide that it is the first body that moves while the second remains at rest, or that the second alone changes its position, or that both bodies move at the same time.

Thus astronomical observations can tell us, with greater precision every day, the position that the stars occupy at each moment in relation to the various parts of the Earth; they determine more and more the relative movement of the constellations and of our globe; but to prove that Heaven rotates around the immobile Earth, or that the Earth is animated by a rotational movement within a fixed Heaven, or even that Heaven and Earth both move, that they cannot, they will never be able to do.

For those who do not want to formulate any proposition whose meaning is not derived from observation, for those who do not want to examine any problem if experience cannot sanction its solution, this question: Is it the Earth that moves, is it the Sky that turns, is only a collection of words, devoid of any meaning.

Now, this question, the wisest of humans have been discussing it for millennia; the answers they have proposed to give it are numerous and diverse; unless, therefore, we suppose that all the philosophers of Nature have been unreasonable since Pythagoras, we must admit that they attributed a meaning to these words: the Earth is immobile, the Earth rotates; and as the teachings of experience are powerless to fix this meaning, it is necessary to believe that they determined it by considerations where everything was not derived from external perception [7]; these considerations, where reason had necessarily put something that it did not hold from the senses, deserve properly the name of metaphysics.

We must therefore investigate the metaphysical thoughts by which the astronomers have made the discussions on the rest and the movement of the Earth something more than a quarrel of words. This investigation is not easy; these thoughts, indeed, it is very difficult to conceive them in a perfectly precise way, to express them with a complete clarity; many have suspected them rather than perceived them; under confused and ambiguous formulas, they have left us the care to guess them.

This is what we are going to do; from the writings of Aristotle to the treatises that shortly preceded the work of Copernicus, we are going to investigate what the physicists meant when they denied or affirmed the motion of the Earth.

# II. - THE MOVEMENT OF THE SKY AND THE REST OF THE EARTH ACCORDING TO ARISTOTLE

At the starting point of the intellectual evolution that we want to trace we find, it goes without saying, the theories developed by Aristotle; it is therefore these theories that we must examine in the first place.

The text which is going to hold our attention at first was undoubtedly attached only by a rather loose link, in the thought of the Stagirite, to the question which must occupy us; but the commentators tightened this link to the point of making it indissoluble.

This is found in the second book of the Treatise *On Heaven and the World*[[1]](#footnote-2).

Aristotle wonders why, instead of a single Heaven, [8] animated by a single rotational movement, the World presents us with several heavens that move in different ways.

The Sky, he says, does not lie in a single movement, because any body animated by a rotational movement necessarily turns around a fixed center; and, on the other hand, if a sphere is animated by a rotational movement, there is no part of this sphere which remains absolutely fixed. »

The first proposition formulated by Aristotle cannot be doubted: in a sphere animated by a rotational movement, the center is fixed. Between this proposition and the one that follows it, the logical continuity is visibly interrupted; we must substitute a thought that the Stagirite implies; and this thought, well made to disconcert our modern intelligences, can only be this one: What is immobile, it is not a simple point, the center; it must be a portion of matter of a certain extent, it must be a body.

This intermediary restored, the continuation of the Stagirite's reasonings proceeds smoothly.

At the center of the celestial sphere animated by a rotational motion, there must be a motionless body; now, if this sphere were a rigid mass, animated entirely by the same rotational motion, none of its parts, no matter how small, would remain motionless; it is therefore necessary that a discontinuity separate the motionless central body from the rest of the sphere which rotates around it.

Will this immobile central body be formed of the same substance as Heaven? If so, then the heavenly substance can naturally remain at rest in the center of the world.

But among the axioms of Peripatetic Mechanics is this one[[2]](#footnote-3): If a body can, without any violence, remain motionless in a certain place, which is then its natural place, when placed outside this place, it will move towards it by natural motion.

Susceptible of remaining naturally at rest at the center of the World, the celestial substance would naturally move towards this center when it was far from it; the natural movement would be that centripetal movement which characterizes the serious bodies; but, on the contrary, Aristotle admitted that the natural movement of Heaven was a uniform rotational movement.

This immobile central body, whose existence the revolution of Heaven supposes, cannot be formed by the celestial substance; it is necessarily composed of another substance endowed with gravity. "It is therefore necessary that the Earth exists, it is this body which remains immobile in the center. For the moment, we shall suppose this immobility; it will be demonstrated later. »

Such is the reasoning by which, from the movement of Heaven, Aristotle thinks to deduce the existence of the Earth and its immobility at the center of the World; this reasoning, moreover, is not given by the Philosopher as fully satisfactory, since it announces other proofs of the rest of the Earth.

To unravel the chain of this argument, we had to forge a link which was missing; is the intermediary that we have proposed to re-establish the one that the Stagirite had implied? We would be allowed to doubt it if we did not have, to establish our conviction, the testimony of one of the most penetrating interpreters of Aristotle, Simplicius.

Simplicius, commenting on the text we are dealing with, writes [[3]](#footnote-4)this:

"If one were to claim that it is around its own center that Heaven moves, one would seem to be asserting something impossible; the center, in fact, is nothing other than the tern of a body; it cannot remain immobile when the body of which it is the end is moving; the center has no existence by itself; since the center cannot be immobile, Heaven cannot turn around it. »

Not only does Simplicius interpret Aristotle's thought in this way, but he tells us that this interpretation was also that of Alexander of Aphrodisia and Nicholas of Damascus; we are therefore allowed to believe that these reflections, strange as they may seem, are in conformity with the intentions of the Stagirite.

10] The passage from Simplicius that we have just quoted is preceded by these words: "Every body animated by a rotational movement has, at its center, a motionless body around which it rotates. It is, in fact, a universally true proposition: Whenever a body moves by local motion, there is necessarily something fixed towards which or around which this body moves; this is demonstrated in the book *On the Motion of Animals*. »

This appeal to the theories set forth in the book *On the Movement of Animals was* not, moreover, imagined by Simplicius; he tells us that Alexander of Aphrodisia also invoked these theories to prove that the movement of Heaven requires a central immobile body.

The commentaries of the *De Caelo* of Aristotle that Alexander had composed are today lost; those of Simplicius were preserved to us; those and these are placed, in time, the *Paraphrases of* Themistius.

We no longer have the text of the *Paraphrase* on the *De Caelo* which Themistius had written; but this *Paraphrase* had been translated into Arabic, probably from a Syriac version; from Arabic it was transcribed into Hebrew; finally, in the sixteenth century, a Jewish doctor from Spoleto, Moses Alatino, put the Hebrew version into Latin[[4]](#footnote-5).

Now, in imitation of Alexander, from whom he often drew inspiration, Themistius supports the immobility of the Earth with reasons borrowed from the treatise *On the movement of animals*.

It is necessary," he says[[5]](#footnote-6), "that the life of Heaven, which is its rotational movement, be perpetual. But all rotation and, in general, all movement, is done on something that remains absolutely immobile. Indeed, in what we have said about the movement of animals, we have seen that what remains at rest and immobile cannot be part of what moves on this fixed term. If, in fact, a part of the [11] moving Heaven remained at rest, the natural motion of the heavenly substance would be directed toward that part which remains at rest; the motion of Heaven would then be a rectilinear motion toward that term, and not a circular motion around that term. »

The three most famous Greek commentators of Aristotle agree on this statement: When the Stagirite demonstrates, in his Perˆ Oùranoà, that the movement of Heaven requires the existence of an immobile Earth, he implicitly supports his deduction with the principles set out in the book *On the movement of animals*. The example of Alexander, Themistius and Simplicius was followed, in the Middle Ages, first by Averroes, then by a crowd of commentators.

Nothing could be less justified, however, than this comparison between the theory, exposed in *De Caelo*, that we have just analyzed and the propositions that we find in the book *On the movement of animals*.

The author of this book - many think that it is not Aristotle - establishes, first of all, this first truth: For an animal to be able to move a part of its body, it is necessary that another part of this body remains fixed and serves as a support for the organs which move the first. But," he adds, "it is not enough for the animal to find a part within itself that is immobile; it must also find something outside itself that remains fixed and at rest. And this is a proposition well worthy of the attention of scholars; it applies not only to the movement of animals, but also to the movement and transport by impulse of every kind of body; in the same way, indeed, there must be something immobile wherever a body must be moved. »

What Aristotle or the author, whoever he may be, intends to affirm is the necessity of a fixed support on which the organ that must push the body to move is supported. The example chosen leaves no doubt in this respect: a man in a boat may make all the efforts he wants on the sides of the boat, but he will not set it in motion; if he is on the immobile shore, it will be enough for him to lightly push the edge or the mast to shake the boat.

12] Between this necessity of a fulcrum for the motor that must move a body and the necessity, asserted by Aristotle, of a fixed mass at the center of a body animated by a rotational movement, we cannot reasonably admit the connection that Alexander, Themistius and Simplicius thought they recognized. The very next part of the book *On the Motion of Animals,* moreover, makes the slightest trace of this relationship disappear. The author speaks at length about the immobility of the Earth and the movement of Heaven; but it is to refute the error of those who would like to attribute the movement of Heaven to a motor taking its fixed point of support from the Earth. If the motion of Heaven requires the existence of an immobile Earth, it is not certainly by virtue of the general principle laid down in the treatise *On the Motion of Animals*; the author of this treatise would be opposed to the argument which, from this principle, would draw this consequence; Alexander, Themistius and Simplicius have surely misunderstood the thought of this author.

If we take them well, then, the propositions formulated in the treatise *On the movement of animals* have nothing to do with the question we are dealing with; it was nevertheless appropriate to mention them because commentators will often invoke them in the examination of this question.

On the contrary, we will penetrate to the very heart of our subject by analyzing the theories that Aristotle develops at the beginning of the fourth of his *Physics*. The nature of *place is the* object of these theories.

What is the place of a body? After having exposed and discussed the various answers that philosophers have proposed to this question, Aristotle stops[[6]](#footnote-7) at this one: "The place of a body cannot be anything other than the part immediately contiguous to this body of the environment that surrounds it. 'An£gch tÕn tÒpon œinai... tÕ pšraj toà perišcontoj sèmatoj. "Is a solid body, for example, immersed in water? The place of this solid body is the water that is immediately adjacent to it.

If we hold firmly to this definition, what will be the local motion by virtue of which, at various instants of time, a body is in different places? It will consist in the fact that the mobile will be enveloped by certain bodies at a certain instant, and by other bodies at another instant; according to the definition given by Descartes[[7]](#footnote-8), it will be "the transport of a part of the matter or of a body from the vicinity of those which immediately touch it... into the vicinity of some others". A body immersed in water will be in motion if the water that bathes it changes from one instant to the next.

This consequence, logically deduced from the definition of place that he first gave, Aristotle refuses to admit. A ship is at anchor in a river; the water that bathes this ship flows and renews itself unceasingly; according to the preceding definition, the place of the ship changes from one moment to the next; we must therefore declare that this ship moves by local motion; but, on the contrary, we affirm that this ship is immobile, that it does not change its place.

The place is therefore no longer the water that immediately touches the walls of the ship; this water, in fact, is mobile while "essentially the place must be immobile. BoÚletai d/¢cinhtoj enai Ð tÒpoj". This is the difference between the *place* and the *vessel*; "just as the vessel is a mobile place, the place is an immobile vessel: œsti d/ésper tÕ ¢gge'on tÒpoj metaforhtÒj, oÛtw caˆ Ð tÒpoj ¢gge'on ¢metac...nhton"

Immobility is one of the first characteristics that Aristotle attributes to place. Simplicius tells us [[8]](#footnote-9)that Theophrastus and Eudemus included this proposition among their axioms: the place is immobile; and he shares their sentiment.

The water of the river is not, therefore, the place of the vessel which is at anchor in that river or which is sailing in it, for that water is not immobile. It is the whole river that should be called [14] the place of that vessel, for the whole river is still. »

What Aristotle understands here by river as a whole, are the banks and the bed of the river; it is thus that Alexander of Aphrodisia interprets the thought of the Stagirite, and Simplicius, who reports[[9]](#footnote-10) the feeling of Alexander, subscribes to this feeling whose accuracy is not in doubt.

The place of a body is therefore no longer, under any circumstances, the part immediately contiguous to this body of the matter which surrounds it; if this matter is in motion, we must look further for the place of the body; we must move away from this body until we reach something immobile which surrounds it on all sides, it and the mobile bodies with which it is surrounded; and the very first parts of this immobile enclosure will form the place of the body which we are considering, as well as all the bodies contained in this enclosure: "TÕ toà perišcontoj pšraj ¢c...nhton prîton, toàt/œstin Ð tÒpoj. "Thus, the banks and the bed of the river are the place of both the water that flows on this bed and between these banks, and the ship that floats on this water.

It is indeed a change of definition that Aristotle has just made undergo to the word "place": the new definition that he gives deviates, much more than the first one, from the meaning that this word has in the current language; under a form that is perhaps a little shrouded, but which nevertheless shines through, the Philosopher teaches now that the place is the fixed term that allows to judge the rest of a body or its movement; he wants, moreover, that this place envelops on all sides the body that is housed there.

The continuation of the speech of Aristotle confirms, besides, the interpretation that we sleep to his words.

Among the bodies which surround us and which the four elements form by their various mixtures, there is none which does not move or which cannot move; where then will we find the immobile vessel which is the place of these bodies? This fixed wall is formed of two surfaces: one, bounding [15] downwards the whole of the mobile elements, it is the center of the World; the other, bounding this same whole upwards, it is the surface which limits inferiorly the last celestial sphere, it is the concavity of the lunar orbit; "It is to these fixed terms that we shall relate the movements of the elements and mixtures; the serious bodies will move towards the first and the light bodies towards the second.

This exhibition calls for some remarks.

When Aristotle speaks of the center of the World, he does not mean a simple point, but a central immobile body; the analysis of a passage of *De Coelo* has shown us that the Stagirite conceived the fixity of the center of the World only by incorporating this point into a mass deprived of movement.

The lower limit of the lunar orbit seems unsuitable to serve as a place for certain bodies; the lunar orbit, in fact, is not immobile; the Philosopher attributes to it a rotational movement around the center of the World; but the sphere which ends this orbit internally moves in such a way that it continuously coincides with ; If we only want to locate the ascent of light bodies, the descent of heavy bodies, it can, in spite of its revolution, play the same role as an immobile place; it would become unsuitable for this role if we wanted to consider the rotational movements of which the elements and the mixtures could be animated; in this circumstance, Aristotle does not seem to have thought of these movements

We should not, moreover, demand from Aristotle's discourse a sequence of rigorous logic; by wanting, by all means, to put this sequence in it, we would distort and torture its meaning. Rather, we must recognize that the Stagirite, faced with a question whose difficulty is extreme, multiplies his attempts to solve it ; but the assaults by which he tries to penetrate to a so jealously defended truth do not all lead to the same side.

We have seen him give a definition of place; this definition, he was soon forced to abandon it to adopt a second one, the consequences of which have unfolded before us; it is to the first that he now returns, in order not to depart from it again in the course of the considerations he is going to expose to us; these considerations would not be understood if we took the word place in the second of the two meanings it has received.

"When outside a body there are other bodies which enclose it, this first body is in a place; if, on the contrary, there are no bodies around it, it is not in a place. »

The isolated body, which no other body surrounds, is not in any place; therefore it cannot move by local motion; these very words have no meaning for it.

It cannot move as a whole, since, taken as a whole, it is not in any place; but each of its parts is surrounded by other parts; so that it is in a place; consequently, it can move, and this body, immobile in its totality, is composed of mobile parts.

These reflections apply immediately to the Universe.

According to the constant teaching of Aristotle, the World is limited; the spherical surface which encloses the orbit of the fixed stars, the eighth celestial orbit, marks its boundary. Outside this sphere[[10]](#footnote-11), there is no portion of matter. Is there a vacuum? No more"; the word *void* designates a place which does not contain a body, but which could contain one - and no body can be found beyond the last sphere. Beyond this sphere, therefore, there is *no place*.

"The Universe[[11]](#footnote-12) is not *somewhere*; for a thing to be *somewhere*, it is necessary not only that this thing has an existence of its own, but also that there exists, outside of it, another thing, within which it is contained. Outside the Universe, outside the Whole, there is nothing. »

The Universe is not *somewhere*, it has no place; it cannot therefore be animated by any local movement; better still, to formulate exactly the conclusion which follows from these reasonings of Aristotle, we should express ourselves in these terms: These two propositions, the Universe moves, the Universe remains fixed, are equally meaningless.

If one cannot speak of the movement of the Universe, because the Universe has no place, the various parts of the Universe each have a place; they can therefore move some upwards, others downwards, others still in a circle.

However, among the parts of the universe, there is one about which a difficult question arises; this part is the eighth orb, the sky of the fixed stars.

"The eighth heaven, taken as a whole, is not somewhere; it is not in any place, for no body contains it. "It seems, therefore, that any statement concerning the local motion of the eighth heaven should be proscribed as meaningless. Now, the Astronomy of the homocentric spheres, which the Philosopher teaches, attributes to the eighth orb a motion of uniform rotation about the center of the World. Is there not a flagrant contradiction in the doctrine of the Stagirite?

This contradiction is only apparent, according to Aristotle: "The various parts of the eighth orb are in one place in a certain way; for the various parts of a ring contain each other; the upper orb therefore moves with a rotational motion, and it can only move in this way. - T¦ g¦r mÒria ™n tÒpJ pîj p£nta. 'Ep' të cÚclJ g¦r perišcei ¥llo ¥llo. DiÕ cine'tai mn cÚclJ mÒnon tÕ ¥nw. »

So concise is the form with which Aristotle covers his thought that any translation is necessarily a paraphrase; that, at least, the one we have given is not a betrayal, we will ask Simplicius to assure us. Here is what the penetrating interpreter of the Stagirite writes[[12]](#footnote-13):

"Heaven can move with a rotational motion; circular motion, in fact, can be appropriate to a body that does not move from one place to another, although its parts [18] are animated by local motion. To a body which rotates on itself, one can attribute a place of a certain kind; as its parts touch each other, they play the role of a place for each other, but this place is a place particular to the parts; it is not the place of the whole; The Universe has no place, since, outside of it, there is no body which is contiguous to it; it could thus move neither upward, nor downward; the Universe will thus be able to change of place in its whole, but it will be able to turn on itself. »

Moreover, Simplicius tells us [[13]](#footnote-14)that Alexander of Aphrodisia interpreted Aristotle's thought in the same way.

The various parts of the eighth orb are in a place in a certain way, ™n topJ pîj, Aristotle tells us; this special way in which they are housed, he attributes to it a particular qualifier: the eighth heaven is in a place by accident, cat¦ sumbebhcÒj. But this particular place of each of the parts of the eighth orb, which constitutes for this orb an accidental place, appears to be quite different from the immobile place that Aristotle had defined in one part of his exposition. "If each of the parts of the supreme orb serves as a place for another part, when these parts are in motion, as well as the surfaces by which they touch each other, how then could one claim that the place still remains motionless?

It is clear that the considerations developed by Aristotle about the motion of the eighth sphere proceed from a definition of the place, the one he had first given, while the axiom of the immobility of the place had led him to adopt another definition; his theory is thus broken into two incompatible parts; the commentators will try to give it the logical unity it lacks.

# III. - THE GREEK PHILOSOPHERS AND THE IMMOBILITY OF PLACE.

19] The problems that Aristotle discussed concerning the nature and the immobility of the place have solicited the meditations of many Greek philosophers. Among these thinkers, there are some whose works have come down to us; there are also many whose writings have been lost: sometimes, however, we can get at least an idea of their doctrines, thanks to the precious commentaries of Simplicius; this author, indeed, not content with exposing and discussing the theories of the philosophers who preceded him, takes care, most often, to report verbatim certain essential passages of the books they had composed.

The chronological order would not be appropriate here; we will rather try to bring closer to each other the philosophers who supported, on the subject of the place, similar doctrines.

Here are, initially, those which remain attached to the concept of the place such as Aristotle defined it; those are limited to commenting the thought of the Stagirite; they make him undergo only modifications of detail; with the number of these faithful peripateticians, we must place Alexander of Aphrodisia, who lived in the 2nd century after Jesus-Christ, and Themistius, who taught in the 4th century.

The commentaries with which Alexander of Aphrodisia had enriched Aristotle's *Physics* are now lost; we know them only by the extracts and discussions of Simplicius.

The difficulties relating to the place of the eighth sphere and its movement seem to have particularly occupied Alexander.

Alexander knows[[14]](#footnote-15) Aristotle's opinion that [20] the parts of the eighth orb are in a *certain* place*;* "when the various parts of a sphere are driven in a rotational movement, each of them is enclosed between the others; each part is housed between the one that precedes it and the one that follows it, so that it is contained by them; so that this sphere can be animated by a rotational movement, but not by any other movement, either upwards or downwards.

The philosopher of Aphrodisia does not seem to have appreciated this opinion of the Stagirite; transporting to the eighth heaven what Aristotle had said about the universe as a whole, he seems to have denied that this heaven was in any way, either by itself or by accident.

Moreover, according to Alexander, the fact that the eighth heaven is not in any place does not prevent it from being animated by a rotational motion; indeed, by this motion, a spherical body does not change its location; the rotational motion is therefore not a local motion; it can be suitable for a body even if this body is not housed in any way.

Simplicius has no difficulty in showing that Alexander is in flagrant contradiction with Aristotle. In all circumstances, Aristotle treats rotational motion as local motion. And in what other class of motion could he classify it? Could he make it a dilation or a contraction, an alteration, a generation or a corruption?

More fortunate than the commentaries of Alexander of Aphrodisia on the *Physics* of Aristotle, the *Paraphrase* of this same *Physics that* Themistius composed has come down to us[[15]](#footnote-16); we can therefore check and complete the indications that Simplicius has given us about this *Paraphrase*.

21] Aristotle's doctrines on the subject of place are very clearly and faithfully expounded by Themistius; he deviates only in one point from the teaching of the Stagirite.

We have seen Aristotle declare that the orb of the fixed stars, taken as a whole, was in no place; that its parts, however, were in a place *in a certain way* (pîj); this way he qualifies by saying that the eighth heaven is in a place *by accident* (cat¦ sumbebhcÒj). We have also seen in what he makes this particular localization of the parts of the eighth heaven consist; this heaven can be decomposed into rings, and each segment of a ring confines to the preceding segment and to the following segment which are its place in *a certain way*.

For Themistius, as for Aristotle, the sky of the fixed stars is a place in a *certain way* and *by accident*[[16]](#footnote-17); but this special location, the disciple imagines it differently than the master.

The universe," says Themistius, "is in one place, but by accident. The whole, indeed, is in its parts; it cannot be separated from its parts; but the parts of the Universe are not all in one place, for they are not all surrounded on all sides by other bodies. The last orb, the one called the orb of the fixed stars, which encloses and contains all the others, is not in one place, to put it simply; it is only housed in relation to the bodies it envelops. This orb touches the orb of Saturn, so that the latter contains it in a certain way; but externally, the eighth orb lacks any place. The parts of the last orb are housed in the same way as the whole orb... They are not housed by themselves; if they are housed, it can only be by accident, and even then not in an absolute way. It is the last orb as a whole that is absolutely in a place by accident; just as its whole is in [a] [[17]](#footnote-18)place by accident, so the parts into which it can be divided are accidentally housed; this orb is housed only with respect to the [22] bodies it contains; so it is with respect to its parts. »

Most of the bodies of the Universe are housed *simpliciter*, because each of them touches other bodies by the whole surface that limits it; each of the celestial orbs, for example, confines to another celestial orb by its external surface; by its internal surface, it touches either an inferior orb, or the igneous element; Only the last orb is an exception; it is not lodged *simpliciter*, because the sphere which limits it externally does not confine to any body; nor is it absolutely deprived of place, as would be the case with an entirely isolated body, because its internal face touches the orb of Saturn; it is lodged *per accidens*.

Such is the thought of Themistius about the appropriate location of the eighth heaven; quite different from the thought of Aristotle, it will have more influence than the latter on the Peripateticists of Islam and Christianity.

The difficulties that the peripatetic theory of the place met when it dealt with the eighth heaven contributed greatly to favor other doctrines; these were numerous in the Hellenic Philosophy.

The place is the empty space; this statement characterizes a whole set of doctrines on the nature of the place. These doctrines are linked to the philosophy of Democritus and Epicurus; but the link that unites them to this philosophy has gradually weakened until it is broken. The Epicurean school admitted the actual existence of the void; the philosophers whose system will solicit our attention do not believe that the void can ever be endowed with actual existence; always the empty space which, in their opinion, deserves the name of place, is occupied by some body.

This system is, Simplicius tells us[[18]](#footnote-19), the one adopted by a good number of Platonists; among those who advocate it, he believes he can also include Straton of Lampsach; but it is only after Simplicius that this doctrine found its most ardent defender in the person of John Philopon.

John Philopon, also known as John the Grammarian or John the Christian, is one of the last representatives of Greek philosophy; [23] according to a tradition, which is doubtful, he died in Alexandria around 660, after having tried, but in vain, to save the precious library; he left us commentaries on various works of Aristotle and, in particular, on the first four books of *Physics*.

The commentaries on Aristotle's *Physics* composed by John Philopon are sometimes interspersed with *digressions* in which the author systematically exposes his personal doctrines; thus the theory of place is the object of a similar digression[[19]](#footnote-20) that we will briefly analyze.

John the Grammarian attacks very strongly the peripatetic theory by means of arguments of which several are borrowed from Simplicius.

Aristotle teaches that, to find the place of a body, one must move away from this body until one reaches a stationary enclosure that surrounds this body on all sides; the very first parts of this enclosure form the place sought. Applying this definition to the moving bodies that surround us, Aristotle assigns to them the surface of the immobile central body and the concavity of the orb of the Moon. "But if one claims[[20]](#footnote-21) that the surface which limits the Sky inferiorly plays the role of place with respect to us, one must observe that this surface is not immobile; a determined part of the concavity of the Sky does not always touch the same part of the bodies which it contains, even if these bodies remain immobile; Indeed, the celestial bodies move unceasingly; if therefore there is nothing immobile, except the Earth, it is impossible to find an immobile place for the bodies which surround us, and that even if these bodies did not move. »

The argument that John Philopon has just opposed to Aristotle is [24] borrowed from Simplicius[[21]](#footnote-22); the latter even foresees an objection and refutes it; it could be claimed that the rotation of the orb of the Moon does not prevent the immobility of the surface which ends it internally; "but if the orb itself is in motion, its terminal part cannot be immobile". "If, then, Aristotle holds that the place is immobile, either he says an inaccurate thing by claiming that the inner boundary of Heaven, which touches the moving elements, is the place of these bodies; or, if he does not want this statement to be inaccurate, he must admit that Heaven is immobile, so that the end of it is immobile... Now, he assures in all circumstances that Heaven is moving, which, moreover, is evident. »

This would be enough to reject the definition of the place that Aristotle proposed; but nothing is more appropriate to highlight the defects of this definition than the discussions of the commentators about the place of the eighth sphere: "The interpreters of the Philosopher's thought [[22]](#footnote-23)have tried to explain how the sphere of the fixed stars can move by local motion even though it is not in any place; but they have confused everything without succeeding in saying anything intelligible, clear and capable of persuading. They cannot deny that the sphere of the fixed stars moves by local motion; they cannot say of what other motion it would be animated if not by this one; and, on the other hand, they are unable to assign the nature of the place in which it moves. As if they were playing a game of toton, they give sometimes one explanation, sometimes another; and their chatter has no other effect than to destroy and overturn the hypotheses and axioms that Aristotle posits and postulates at the beginning of his deductions. Aristotle wanted to conceal under the obscurity of his language and the mystery of his opinion the weakness and fragility of his reasons; he has thereby given to those who propose to study this subject the desire and the power to use his arguments in one direction as well as in the opposite direction. »

25] Let us see, in fact, how the commentators have explained the location and movement of the eighth sphere.

There are some for whom the parts of this sphere that follow each other play the role of a place in relation to each other. Simplicius had already wondered how the immobility of such a place within the moving sphere could be safeguarded. The Grammarian poses [[23]](#footnote-24)a question that is no less perplexing: "If the locus of each of the parts of the sphere is formed by the parts that surround it, what is the part that changes its locus when the eighth orb moves? For finally this orb does not break, so that the contiguous parts remain invariably linked together during the movement of Heaven. »

Others, such as Themistius, want the eighth heaven to be housed by the orb of Saturn, whose concave face touches the convex face. Then[[24]](#footnote-25), by a real vicious circle that Simplicius had already pointed out[[25]](#footnote-26), they claim that the orb of Saturn is the place of the eighth sphere at the same time that this sphere is the place of the sky of Saturn.

This discussion shows that Aristotle has not found the true definition of place; Philopon in turn claims to give a satisfactory formula.

The place is the space with its three dimensions[[26]](#footnote-27); this space must be entirely separated by the thought from the bodies which occupy it; it must be regarded as an incorporeal volume extended in length, width and depth; so that the place is identical to the vacuum.

This does not mean that emptiness can ever exist in act[[27]](#footnote-28); that there can be a volume that no body occupies; although reason distinguishes it from any body, regards it as essentially incorporeal, nevertheless it is always filled by some body. "The place and the body which is in this place [26] form one of those pairs of things which are indissolubly linked, so that one of these things cannot be without the other; pure reason distinguishes the place from the body, but the place can never, without a body, be in act. »

In the same way, reason distinguishes matter from form; however, matter can never exist in act unless it is united to a certain form.

This space, distinct from any body, and empty by itself, remains absolutely immobile[[28]](#footnote-29) in its whole, and in each of its parts; a determined part of space can successively receive different bodies which, in turn, find their place there, but it always remains the same part of space, it does not move.

As soon as a moving body leaves a certain place[[29]](#footnote-30), another body comes to occupy that same place, for it must never remain without a body. In the same way, as soon as a form is corrupted in matter, another form is induced in it, so that at no time does matter remain naked and stripped of all form. John the Grammarian thus establishes a perfect parallelism between the local movement and the movement of alteration; the place and the body housed, play, during the first movement, the role that matter and form play during the second.

Philopon is not without foreseeing that the Peripatetians will raise objections against his doctrine; these objections, he endeavors to ruin them in advance.

Here's one[[30]](#footnote-31) that looks formidable:

This three-dimensional space, which is regarded as the place of bodies, is infinite; how can this be, since it cannot exist without bodies and the whole of the bodies form a finite mass?

The Grammarian is astonished that one can attribute the least importance to this objection. Just as the intellect conceives of space in three dimensions, so can it, according to him, conceive of an abstract surface which bounds this space in such a way that it has just the right size to contain the material universe.

Another difficulty preoccupies the Peripateticians. To each element, to each mixture must correspond a natural place, where this body remains in rest when it is there, towards which it is carried if it is distant from it; it is thus that the low ones go downwards, that the light bodies tend upwards. "But how, in this space endowed with only three dimensions[[31]](#footnote-32), can we determine, distinguish and place the top and the bottom? Where shall we place the supreme place? How far will we extend it? Where shall we place the lowest place? Moreover, the place must be endowed with a certain natural power, for both heavy and light bodies desire their own places; each of them moves towards its own particular place by a natural inclination and impulse; but this space, which is empty by itself, can have no power; why should some bodies move towards a certain region of this emptiness and some other bodies towards another region? »

Philopon solves this difficulty[[32]](#footnote-33) more happily perhaps than he solved the first one: "Although each body tends to its natural place, it is ridiculous to claim that the place has by itself any force or power... Each thing simply desires to carry out the order assigned to it by the Creator... Then, in fact, it realizes its essence to the highest degree, it possesses its maximum of being, it reaches its perfection. So the place does not exert any force, which carries the bodies to their natural places; it is the bodies themselves that want to keep the order that suits them. »

Without any doubt, John Philopon is right to declare ridiculous the opinion according to which the vacuum would act on the bodies to lead this body to such region of space, this other body to such other region; to support such a doctrine, it would be not only to materialize the space, but also to attribute to the vacuum an inconceivable heterogeneity.

This strange opinion had however been supported, in the first half of the fifth century of our era, by Syrianus. The theory that Syrianus professed about the place was set out in commentaries to the tenth dialogue of Plato's *Laws*; this work is now lost, but Simplicius has preserved for us[[33]](#footnote-34) a succinct summary of the passages that interest us.

For Syrianus, the place is identical to the three-dimensional space, susceptible of divisions; the Soul of the World deposits there seminal reasons, the forms of the intelligible World illuminate it, and, by this, its various regions acquire the power to attract or to retain a body or another; this one becomes the natural place of the fire, that one the natural place of the earth.

Syrianus had Proclus as his disciple. What Proclus said about the place, Simplicius tells us [[34]](#footnote-35)by a textual quotation from the neo-Platonic author.

"The place," says Proclus, "is an immobile, continuous body, free of matter. »

What does Proclus mean when he says that the place is *a body free of matter*? The rest of his speech will tell us: "It is a body much less material than all the others, much less than the matter of which the moving bodies are formed. Now, among the bodies that move, light is the simplest, for fire is the least corporeal of the elements, and light is emitted by fire; light is therefore the purest of all bodies; hence, it is light that is the place. »

"We must, therefore, imagine two spheres: one is formed only of light, the other of a crowd of various bodies; these two spheres have exactly the same volume; we will fix the first one in such a way that it does not rotate around its center; we will make the second one coincide with the first one, but, at the same time, we will impart to it a rotational motion; We shall then see the whole World moving within the light, which will remain immobile; as for the Universe, it remains immobile as a whole, which [29] resembles the place, but each of its parts moves, which is different from the place. »

This light, which is the immobile place of bodies, Proclus identifies it with the immutable One by which all things were created. We will not insist on this comparison, which would take us far from the object of our study.

We will limit ourselves to observing that the doctrine of Proclus differs in reality much less than it seems from the theory according to which place is identical to space. Those who - like John Philopon - support this last theory certainly proclaim that the place considered by them is absolutely incorporeal, that it does not exist by itself, that abstraction alone distinguishes it from the housed body; but then, when they declare that the place is immobile, that is to say, that in a place which remains the same, different bodies follow one another, it is clear that they look at the place as something which can subsist while there is no permanence of the housed body; Therefore, it is certain that, in spite of their denials, they make of the place a certain substance whose existence does not depend on that of the bodies, but is only simultaneous to it; without their will, the place that they consider is transformed into a certain matter that compenetrates the mobile bodies. This unconscious materialization of the place becomes quite visible when John Philopon admits that what he calls space can be bounded by a surface identical to the surface which circumscribes the whole of the bodies; the thought of the Grammarian comes here, against his will, to join exactly that of Proclus.

Let us come to the theory of place that the philosopher Damascius developed in the first half of the sixth century of our era. Simplicius, who was a disciple of Damascius, gives us[[35]](#footnote-36) a very complete exposition of this theory; we even find, in the comments of the pupil, textual quotations of the treatise Perˆ tÒpou composed by the master.

The starting point of Damascius' theory is this: Every body has an attribute, inseparable from it, which is its [30] *position*, qšsij. The master of Simplicius does not seem to have defined this attribute; he rather endeavored to distinguish its various species.

According to him, there are two *positions* of a body: one is the position of the body *itself*, or, as we would say today, the *disposition* of its various parts; the other is the position of the body in the universe.

Among the proper positions of the body, there is one which, more than any other, suits its nature; its various parts are then arranged in the manner best adapted to the perfection of the form. In the same way, among the positions of the body in the Universe, there is one which is the best possible; it is, for this body, the *natural position*.

Place is not position (qšsij); it is distinct from it as time is distinct from motion; according to Aristotle, time is the numerical measure (¢riqmoj )of motion; similarly, according to Damascius, place is the set of geometrical measures (mštron) that serve to fix position. Here is how Simplicius formulates[[36]](#footnote-37) the principle of his master's theory: "It seems, then, that place is the measure of the position of bodies that are placed, just as time is said to be the number that measures the movement of bodies that move. 'Eoice mn oâ Ð tÒpos mštron e‡nai tÁj tîn ceimenîn qšsewj, é Ð crÒnoj ¢riqmoj lšgetai tÁj tîn xinoumšnwn cin "sewj.

To translate the word mštron, used by Damascius and Simplicius, we have said: geometrical measure; we are sure to have thus rendered in an exact way the thought of Damascius, because in a passage of his book, quoted[[37]](#footnote-38) by his disciple, we read that the measure suitable to determine the place also determines the size.

According to Damascius, therefore, the place is a set of geometrical measurements; but this set of magnitudes accessible to the geometer's procedures serves only to describe, to determine an attribute of the body, the *position*; this attribute is essentially distinct from the place, which is only its measurement; the nature of this attribute is inaccessible to the methods of Geometry.

Simplicius develops[[38]](#footnote-39) the theory of place that Damascius posed; he compares it to Aristotle's theory, in order to show how it avoids or overcomes the obstacles that were in the way of the Stagirite.

According to the doctrine of Damascius, the universe is in one place as well as its various parts.

If there exists for each of the parts of the Universe a *position* better than any other, there also exists, for the whole Universe, a *disposition* which surpasses all the others in perfection; and this good disposition of the Universe is precisely that which results from the good position of each of its parts, so that the Universe has its *natural disposition* when each of the bodies which compose it is in its *natural position*.

The geometrical measures that determine the natural position of each of the parts determine by the same token the natural disposition of the whole; the *natural place of* the various bodies that compose the Universe is, by the same token, the *natural place* of the Universe.

A body is not always in its natural position; it can be in an adventitious position, and while the first is immutable, the second can change from one moment to the next; at the same time that the position changes, the place, which is the measure of it, also changes, so that the body moves by local motion.

But what we have just said about one body can be repeated about all bodies, that is, about the Universe. If the natural disposition of the Universe is unique, the adventitious dispositions it can take are innumerable; the disposition of the Universe at this moment is different from the one it will present in an hour; the whole Universe is therefore capable of local motion as are its various parts, and the local motion of the World is only the whole of the local motions of the bodies which compose it.

32] According to the theories which differ from the doctrine of Damascius and Simplicius, the place is separable from the body which is housed there; when a set of bodies moves, the same place successively receives different bodies. The same proposition can no longer be formulated, at least without precautions, by those who admit the opinion of Damascius and his disciple. The position of a body cannot be separated from that body. When a body moves, it takes a different position in a second instant from that which it occupied in the first instant; but it would be incorrect to say that its first position remains in the second instant and that it has then become the position of another body; position is not something that a body can give up to another body. When a body in motion comes to occupy a new position, its former position simply ceases to exist; in the same way, if a body changes from black to white, at the moment when it has become white, its blackness has simply ceased to be; it has not persisted to become the blackness of another body.

I am moving in the air; it is not necessary to believe that a part of the air is going to abandon the place it occupied and that I am going to take the place left by this mass of air. "The places[[39]](#footnote-40) are not preserved to be occupied successively by us, during our displacements, when we leave from here to go there. What remains is the totality of the surrounding environment. In the actual place of this air, there is a part whose geometrical measure is able to become my measure in a next instant; and in the same way, on the condition that I move, I am in power of a position whose geometrical determination coincides with the measure of the position currently occupied by this part of the ambient medium. By this I can, in a forthcoming instant, conform to this measure, and the determination of my own position, which is my place, can be given by this same measure. Then something which is at present part of the place of the air will serve to measure my own configuration and to fix my position [33] relative to the whole air. - OÙd g¦r ™pˆ ¹mîn ™n taij metast£sesin o† tÒpoi sèzontai, Ótan œnqen ™ce'se metaba...nomen : ¢ll/ h ÐlÕthj ™stˆn ¹ swzomšnh toà perišcontoj: kaˆ Ð ™ce...nhj tÒpoj, dunamenoj kaˆ aâqij kat£ ti morÒj summštrwj 'cein prÕj tÕ ™mÕn di£sthma : ésper kaˆ ™gw ka...toi metast¦j, dÚnamei Ómwj 'cw t¾n prÕj tÕ morÒj ™ce'no tÁj ÐlÒthtoj kaˆ tÕn ¢forismÒn tÁj ™mÁj qšsewj, toÚtesti tÕn tÒpon, ‡scein kat/™ce'non, Ótan Ð toà Ólou ¢erÒj tÒpoj kat£ to ˜autoà t¾n ºm¾n di£stasin met "sV, kaˆ xunt£xV me tÍ toà ¢eerÒj ÐlÒthti. »

According to doctrines other than those of Damascius, movement required the existence of a fixed term; for celestial bodies to move, for example, it was necessary that there be either a motionless body or a motionless space; nothing similar in the theory of which Simplicius was the defender. "Although one identifies[[40]](#footnote-41) the place neither with a fixed body, nor with an immobile space, nothing prevents the celestial bodies from moving. - "Wste k©n mhdn ¢k...nhton proupoteqÁ sîma À di£sthma Ð tÒpoj, oÙdn kolÚetai kat¦ tÒpon t¦ oÙr£nia kine'qai. »

The *position of* a body can change, in fact, without any other body keeping an invariable position, so that local motion does not imply the immobility of any body. Where it becomes necessary to possess an immobile term is when we want this change of position to become perceptible to us as a result of the change of certain geometrical magnitudes; that there is no fixed body, this puts no obstacle to the intrinsic possibility of local motion, but it prevents us from recognizing and determining the changes of place that correspond to this motion. "The sky would continue to rotate in the same way even if there were no east, no west, no meridian; but we would have no way of recognizing its various positions. 'Ei oân m "th ¢natol¾, m "te mesour£nhma, kinhq¾setai mn Ðmo...wj Ð 'OuranÒj, ¹me'j d tîn diafÒriwn qšsewn tekm "ria oÙc 'xomen. »

It is not that the doctrine of Damascius and Simplicius does not recognize a fixed place; the best disposition that [34] can affect the Universe is something determined and unchangeable; the same is true of the measure, of the geometric definition of this position, that is, of the *natural place of the* Universe.

The natural place of the Universe thus remains immobile even if all the bodies of the World are in motion; it is apt, therefore, to play the role in view of which Aristotle claimed the immobility of the place; it provides the reference point to which one can relate the actual positions of all the mobile bodies, the immutable term which allows to discern the movements.

Such is the doctrine of Damascius, completed by the reflections of Simplicius. The considerations that we reported last contain, in our opinion, what makes it better than Aristotle's theory.

According to the Stagirite, the very possibility of local motion is subordinated to the actual and concrete existence of a motionless body, which is the locus of moving bodies.

According to Damascius and Simplicius, the existence of local motion does not presuppose the immobility of any body; only the geometrical description of this motion must be related to a fixed reference point; but this reference point, which is the natural location of the Universe, is not realized in a current manner by any concrete body; the various bodies which compose the Universe do not have their natural disposition at present; the immutable term to which the movements are related is not a sensible and palpable body; it is an ideal being that, only, the physical Science defines and determines.

# IV. - THE ARAB COMMENTATORS OF ARISTOTLE; AVERROES

We should not expect to find in the Arab philosophers the depth and originality of thought of a Damascius or a Simplicius. On the subject of the nature of the place and its immobility, they limit themselves, or almost limit themselves, to commenting on the doctrines of Aristotle by helping themselves, in a more or less happy way, to the reflections of Alexander of Aphrodisia and of Themistius. They hardly mention the theory of John Philopon except to reject it summarily. As for the theory that Damascius had formulated, that Simplicius had developed, they do not seem to have cared about it.

In his booklet *On the five essences*, that is, on matter, form, place, motion and time, Jacob ibn Ishak el-Kindi repeats[[41]](#footnote-42), on the subject of the nature of place, some aphorisms borrowed from Aristotle; El-Kindi admits, like the Stagirite, that the place is separable from the body and that it remains immobile; the place is not destroyed when one removes the body; the air comes in the place where one made the vacuum, the water fills the place which the air has just left.

"The place is defined[[42]](#footnote-43) in Avicenna as in El-Kindi", that is to say, ultimately as in Aristotle. In his treatise entitled *The Fountains of Wisdom*, Avicenna says: "The place of the body is the surface surrounded by what surrounds the body and in which the body is located. "Elsewhere, in the *Nadjât*, he writes: "The place is the limit of the container which touches the limit of the content; this is the real place. The virtual place of a body is the body that surrounds the one being considered. »

This definition of place necessarily leads Avicenna to the obstacle that Aristotle had encountered; by virtue of this definition, the last heaven has no place; how then can it move? Averroes has preserved for us the answer that Ibn-Sinâ (Avicenna) gave to this embarrassing question[[43]](#footnote-44).

According to Ibn-Sinâ, the revolution of a sphere on itself is not the transport of a place in another; it is a movement on the spot; for a body to be animated by such a movement on the spot, it is not necessary that it is in a place; the eighth heaven, therefore, is in a place neither by itself, nor by accident; it can however turn on itself.

36] Averroes has no difficulty in exposing Avicenna's error; the sphere which turns on itself can be divided into tabs, and each of these tabs, in the course of the movement, passes ceaselessly from one place to another.

The problem of the location of the eighth orbit, so embarrassing for the peripateticists, was the occasion for Avempace (Ibn Badjnâ) to develop a curious theory. Averroes, who tells us about [[44]](#footnote-45)this theory, thinks that Avempace got it from Al-Farabi, who had himself imagined it to refute John Philopon.

This theory, in any case, bears, very clearly, the mark of the influence of Themistius. Themistius, as we know, conceived the location of the eighth orbit in a completely different way than the location of the other bodies of the Universe. Each of these has for its place the body that surrounds it; the eighth sphere, on the contrary, has for its place the body that is contained within it, that is to say, the orb of Saturn.

This opposition, slightly transformed, is the starting point of the doctrine that Avempace develops.

In this question of place, it is necessary to clearly distinguish, according to him, two categories of bodies.

On the one hand, are the elements subject to generation and corruption, whose natural motion is a rectilinear, centripetal or centrifugal motion. On the other hand, are the celestial spheres, eternal bodies whose natural motion is one of uniform rotation.

The straight line is not, like the circle, a line completed in itself, from which nothing can be subtracted, to which nothing can be added; it can be shortened or extended. Therefore, in order to limit the movement of a generable and corruptible element, it is necessary to enclose it within an enclosure. This is why bodies with a natural rectilinear motion, that is, elements and their mixtures, must be enclosed *from the outside*; the place of one of these bodies is the part, immediately contiguous to this body, of the enclosure that contains it.

The celestial spheres have no need to be housed in this way; they are no longer housed from the *outside*, but *from the inside*; each of them has for its locus the convex surface of the body which it encloses in its interior and around which it revolves. In this respect, there is no distinction to be made between the supreme heaven and the other orbits. All celestial orbs have a locus by essence, not by accident, and for all of them this locus is defined in the same way.

As for the Universe, its way of being housed consists in the fact that each of its parts has a place.

Such is the theory of Ibn Badjnâ (Avempace). Averroes has no difficulty in proving that it is not in conformity with Aristotle's thought; but would the Stagirite have accepted the comments that Averroes is going to develop about them as expressions of his own ideas?

In some passages of the fourth book of the *Physics*, Aristotle seems to identify the place with the immobile body which is the term in relation to which one can recognize and determine the movements of other bodies. This identification, still confused and almost latent in the writings of the Philosopher, clearly asserts itself in those of the Commentator.

When Aristotle, for example, has just affirmed the immobility of the place, Averroes immediately adds[[45]](#footnote-46): "The place is immobile by essence; the place, in fact, is that towards which a thing moves or that in which it rests. If something were to move towards a term that would itself be in motion, that thing would move in vain. »

The principle that serves as a starting point for such a theory is, obviously, the following proposition: The local motion of any body presupposes the existence of some concrete immobile body from which or around which the first body moves. Whenever Averroes formulates this principle, he invokes[[46]](#footnote-47) the authority of the book *On the Motion of Animals* attributed to Aristotle; in this he imitates what Alexander of Aphrodisia, Themistius and Simplicius had done before him; we have seen, however, how much the meaning of the proposition formulated in the *Treatise on the Motion of Animals* differed from the one attributed to it by all these commentators.

Alexander, Themistius, Simplicius, had used this principle, diverted from its true meaning, to support the conclusion stated by Aristotle: The rotation of the Sky requires the existence of a central immobile body. Averroes makes the same use of it[[47]](#footnote-48).

Aristotle's conclusion seems, moreover, all the more important to Averroes since it serves as an argument against Ptolemy's system of eccentrics. It is in order to reject this system that he repeats this proposition[[48]](#footnote-49): "A body that moves circularly must move around a fixed center. "It is also the Almagestus that is referred to in the following passage[[49]](#footnote-50): "It is absolutely impossible that there are epicycles. A body that moves circularly necessarily moves in such a way that the center of the Universe is the center of its motion. If the center of its revolution were not the center of the Universe, there would have to be a center outside the Universe; there would have to be a second Earth outside this Earth, and this is impossible according to the principles of Physics. The same can be said of the eccentric, whose existence Ptolemy assumes. If the celestial movements admitted several centers, there would be several serious bodies outside this Earth. »

The impossibility of Ptolemy's system is thus linked by Averroes to the principle that he claims is derived from *De motibus animalium*: Every body in motion presupposes the existence of a body at rest. But the consequences of this principle are not exhausted; Ibn Roschd will still deduce from it a solution of the difficulties relative to the place of the eighth sphere.

After recalling what Alexander, Themistius, [39] John Philopon, Avicenna, and Avempace have said about this "great question", the Commentator adds[[50]](#footnote-51): "Here is what must be stated on this subject: Every body which moves by its own motion, *per se* [and not *per accidens*, by virtue of the motion of another body to which it adheres], requires a motionless body with respect to which it moves; this is asserted by Aristotle himself in the treatise *On the Motion of Animals*. Without doubt, this immobile term constitutes the proper place (*per se)* of the moving body when it contains this body within itself; on the contrary, when it does not contain within itself all the parts of the moving body, this immobile term is the place *by accident* of the moving body; this is what happens for celestial bodies. We see, then, that for a body to move *per se*, it is not necessary that it be in a place *per se*. »

In this way, the supreme orbit has a place[[51]](#footnote-52), but a place *by accident*, namely the immobile central body that its rotation requires.

# V. - ALBERT THE GREAT

On the subject of the nature of motion and place, Albert the Great said nothing really original[[52]](#footnote-53); he merely commented on Aristotle and Averroes.

Averroes did not give a commentary on the treatise *On the Movement of Animals*; Albert the Great, on the contrary, left two paraphrases of this work.

In one of these paraphrases, he shows himself [[53]](#footnote-54)faithfully attached [40] to the meaning of the propositions formulated by the Greek author. He admits that apart from a moving body, there must be a fixed body; but this fixed body is not required as a term to which the motion can be compared; it is needed as a support, a backing, on which the mover can lean while it produces its effort. This truth is made clear by the very examples that are invoked in *De motibus animalium*. In imitation of this treatise, moreover, Albert proves that the immobility of the Earth is not destined to offer a point of support to the motor that produces the celestial revolutions.

The second paraphrase, much freer than the first one, expresses itself in ambiguous terms about the fixed body that all progressive movement supposes; it would not take much effort to ask these terms in the sense of the principle that Alexander of Aphrodisia, Themistius, Simplicius and Averroes thought they were reading in the treatise *On the movement of animals*.

Albert first notices [[54]](#footnote-55)that any mobile part of the body of an animal in movement leans on another part of this same body; if this second part is not fixed, it has in its turn a support, and so on; from close to close, we arrive at a part of the body which is fixed.

In all motion, we can reason in the same way; as the series of moving bodies cannot be extended to infinity, we necessarily arrive at this conclusion: All progressive motion presupposes a motionless body. "When the compass moves, it moves by virtue of its form, by virtue of its compass configuration, which give it existence and specify it. But, at the same time, during all its movement, one of its parts remains attached to a certain immobile center; it is around this immobile center that the moving compass draws a circle. »

This example, taken from the movement of the compass, hardly calls our attention to the necessity of supporting on a fixed support the motor that sets a body in motion; it seems much more appropriate to point out to him the immobility of the central body that allows us to observe a rotation.

This last idea is the one which undoubtedly presented itself to the mind of the readers of Albert the Great. Pierre d'Auvergne is our guarantee. An eminent master of the University of Paris, and rector of that university at the end of the 13th century, Peter of Auvergne was one of the most immediate and illustrious disciples of Albert the Great and of Saint Thomas Aquinas. In his commentary on the treatise *De motibus animalium*, he presents[[55]](#footnote-56) the following considerations, in which the influence of the Bishop of Regensburg has left a visible trace:

"Just as Heaven could not move if there were not a fixed and immovable thing, so the movement of an animal requires that there exist outside this animal an immovable support on which it can lean in order to move... But let us understand well that the reason for which an immovable foreign body is necessary, is not quite the same for Heaven and for the animal. However, there is a reason common to both cases. Indeed, for a body to be in motion, there must be another body in relation to which the one that is moving is disposed in a different way at this moment than it was before; this second body is immobile, or at least, if it moves, it differs from the first in the form or speed of its motion; if it moves, then either the series of mobiles must be prolonged ad infinitum, or we must finally arrive at a completely immobile end. This reason is common to the animal and to Heaven. But there is another reason which is special [42] to the animal. To move, in fact, the animal must push and pull..."

That Peter of Auvergne, moreover, had exactly grasped the thought that haunted the mind of Albert the Great at the moment when he cited the example of the movement of the compass, we shall have the proof, because we shall find this thought in various other writings of the Bishop of Regensburg.

We first meet her in her treatise on Heaven[[56]](#footnote-57).

As Aristotle had done, Albert searches for the reason why the whole celestial sphere does not move with a single motion; in the course of this search, always guided by the example of the Philosopher and the Commentator, he writes these lines:

"Let us take as our starting point the conditions required for circular motion. According to what is demonstrated in the book *On the Motion of Animals*, let us say that no body can move in a circle unless it moves on another fixed and immobile body; if the latter body were to move, the former would not be able to describe a circle that remained always in the same place; the virtue of the immobile body adds to the virtue of the mobile body at least this fixity of the circular trajectory. For none of the parts of the orbit that completes its revolution remains stable, fixed, and deprived of motion. The poles seem immobile, but they move in their place, without passing from one place to another, nor from one place to another. In the same way, it is evident that the body that moves in a circle is not of the same nature as the body fixed in its center. "If it were of this nature, in fact, it would have its natural place at the center, and its various parts would descend there, which they do not do. "If, therefore, every body moved in a circle must move on a fixed and stable thing, there must be a fixed and immobile body at the center of the universe, and this body can only be the Earth. »

The existence and fixity of the Earth are thus required by the very rotation of the celestial orbs.

43] As for the multiple movements of the heavens, Albert, a faithful peripatetic, assigns to them as their objects the generation and death of corruptible things that are found in the region of the elements.

Three things contribute to this generation and corruption: first, the perpetuity of existence; second, the continual opposition of birth and death; third, the variety of forms and species generated. Of these three things, the first is dependent on the diurnal movement; the second is due to the revolutions accomplished according to the ecliptic, revolutions which make the Sun and the other generating stars rise or fall in turn; the third is caused by the peculiarities of the course of the planets, which sometimes bring these stars closer to each other, and sometimes separate them.

The necessary existence of a motionless body at the center of an orb animated by a revolution is still invoked by Albert in his *Physics*.

After paraphrasing[[57]](#footnote-58) what Aristotle said about the nature and immobility of place, the Bishop of Regensburg addresses[[58]](#footnote-59) the debated question of place and motion of the eighth sphere.

The question had already solicited the attention of some scholastics of Christianity. Gilbert de la Porrée (1070-1154) had touched on it in his *Book of the Six Principles*[[59]](#footnote-60).

It is while dealing with the *Ubi* category that Maître Gilbert de la Porrée is led to write the following lines[[60]](#footnote-61):

"All contentment (*contentio*) is derived from the end of the celestial sphere, for there is nothing beyond that end. But for it there can be no place, for there is nothing beyond it, and, as has been said in the foregoing, such a place must surround the body housed. Suppose, indeed, that this extremity is in a place; we shall have to admit at once that there [44] exists beyond it something else, and that the place of the extremity resides in this something else. But there is nothing beyond this end. Therefore, this end is not in a place. To pronounce on this question is unusual and occult, and, moreover, exceeds what falls under the senses. »

What does the *Author of the six principles* mean by the[[61]](#footnote-62)*end of* the sphere? It may be the supreme orbit or a spherical layer, more or less thick, which borders on the ultimate surface of the World. Therefore, there is nothing in what Gilbert de la Porrée says that is not very correctly peripatetic.

The Bishop of Regensburg interprets the doctrine of the *Author of the six principles* in a way that seems to us to be absolutely inaccurate*;* he reduces it to this statement: "The place of the eighth sphere is the outer surface of this sphere, which moves within this surface. »

Such a theory indignant Albert the Great: "Planum est Porretanum mentiri! "he cried. A body could, according to this doctrine, be a place while no body would surround it; the place would be the surface of the housed body and not the ultimate surface of the surrounding body; so many assertions that are absolutely repugnant to the Peripatetic Physics.

On the subject of the "great question" of the place of the supreme orb, Albert's avowed aim is to expose, by making it clearer, the solution of Averroes, which he adopts.

"Averroes says that the first mobile is in a place *by accident*, while its motion is *by itself*, not by accident. This orbit is said to have a place because its center is in a place, and that *by itself;* the orbit then is in a place, but *by accident*. Aristotle, in fact, in his book, *On the Local Movements of Animals*, declared that all motion proceeds from a motionless body. The motion of the eighth sphere must therefore proceed from something that is immobile. This something will be in a place *by itself*: so that the orb will be in a place *by accident*. »

By invoking the principle that, following the example of Alexander, Themistius, Simplicius and Averroes, he claims to have taken from the treatise *De motibus animalium*, Albert the Great subjected it to a discussion that his predecessors had not subjected him to. According to him, this principle is not appropriate when it comes to studying the natural movements of the serious or light elements. It must be restricted to the movements produced by a soul, like the movements of animals, or by an intelligence, like the movements of stars. This discussion reveals the deep distortion that commentators have made to the thoughts expressed in the *De motibus animalium*. The author of this treatise, in fact, taught that the mover of the heavens does not need a fixed support, because it is pure intelligence.

The eighth sphere does not move *secundum subjectum*, that is, according to its total mass; taken as a whole, this mass keeps an invariable position. It moves according to its form, that is to say, according to the relative position that its various parts have in relation to the immobile body that occupies the center; this form, indeed, this relative position, changes from one instant to the next.

This is the solution proposed by Averroes: The first mobile is in a place in that it is around its place, and this place is the convex surface of the immobile body which is at its center. In the Commentator's writings, "this solution seems subtle, because it is presented in obscure terms; these terms must be understood according to the explanation that has just been given".

But an objection can be made to this explanation. For Heaven to be animated by a rotational movement, it is necessary that the Earth remain immobile, containing the center of this movement: such is the proposition on which the whole previous deduction depends. Doesn't this proposition affirm that the immobility of the Earth is the cause of the motion of the eighth sphere? Now, for a Peripatetic, such an assertion would be unacceptable; it is from the first motor that the supreme orbit draws its motion; the immobility of the Earth is the effect, not the cause, of the celestial motion.

To this objection, Albert the Great replies as follows: [46] The movement of the supreme orb can be considered from two distinct points of view; it can be seen as the movement of the first mover; it can also be studied as a revolution accomplished in situ. If we consider this movement from the first point of view, it derives from the first mover, which presides over the eighth heaven, and not from the central body. If we consider it, on the contrary, from the second point of view, the rotation of the last orbit comes from the immobility of the central body. »

Although Albert the Great was a faithful disciple of Averroes in these matters, he did not follow the Commentator's path to the end. Since any rotation presupposes a body whose immobility fixes its center, Ibn Roschd had declared that the epicycles and eccentrics imagined by Ptolemy were physical impossibilities. While keeping the principle formulated by Averroes, Albert the Great refused to admit the consequence; he only saved Ptolemy's system at the cost of an illogicality.

# VI. - SAINT THOMAS OF AQUINAS

The influence of Aristotle and Averroes are the only ones that can be perceived in the doctrine adopted by Albert the Great. The theory of place and local movement developed by Saint Thomas Aquinas bears the mark of other influences. One recognizes there, initially, certain thoughts of Themistius. We also glimpse, albeit more vaguely, certain analogies with the theory proposed by Damascius and completed by Simplicius. These analogies will become stronger and more precise in the teaching of several of the successors of St Thomas, to such an extent that, in the Scotian School, the doctrine of Damascius and Simplicius will eventually triumph over that of Aristotle.

The rotation of Heaven requires the immobility of the Earth. In expounding this theory of the Stagirite, Saint Thomas shows himself to be a more scrupulous commentator than his predecessors; he does not invoke [47] in any way the propositions which are formulated in *De motibus animalium*[[62]](#footnote-63).

"In the center of a body that moves circularly, something must remain motionless. It is obvious, in fact, that all circular motion takes place around a fixed center. Now, this center must be found in a fixed body, for what we call center is not something that subsists in itself; it is an accident belonging to a corporeal thing; this center can only be the center of a certain body. »

"This fixed body must be a part of the World... But it cannot be a part of the moving orb, that is, of the heavenly body. That which is at the center is eternally immobile, just as Heaven moves eternally... Now, that which is naturally immobile at the center is the Earth... If, then, Heaven rotates by an eternal revolution, the Earth must exist. »

The influence of Simplicius, whom Thomas Aquinas quotes at the end of this same lesson, is evident in the considerations by which it is proved that a motionless center cannot exist elsewhere than in a motionless body.

The rotation of the last celestial sphere presupposes the existence of an immobile central body; must we, with the Commentator, say that this immobile pivot constitutes the place of the supreme orbit and that this orbit is in a link *by accident*, because the central pivot is in a place by itself? St. Thomas cannot accept [[63]](#footnote-64)this interpretation of the words by accident, kat¦ sumbebhkÒj, by which the Stagirite qualifies the place of the last heavenly sphere. "Aristotle does not say that a body is in a place *by accident* when another body, which is absolutely foreign to it, is in a place. It therefore seems to me ridiculous to claim that the last sphere is accidentally in a place by the mere fact that its center is in a place. Therefore I prefer to agree with the opinion of [48] Themistius, that the last sphere is in a place by its parts.

In support of this opinion of Themistius, Saint Thomas Aquinas develops considerations which deserve to be reproduced in full; we will hardly recognize in them the influence of the Greek paraphraste, but that of Aristotle himself; we will also recognize in them the trace of the theory of Avempace which the Angelic Doctor has, moreover, reported before that of Averroes.

"One is concerned with place only in view of movement; movement brings place into focus because various bodies follow one another in the same place. Place is therefore not necessary to the very existence of the body; but it is necessary to every body that moves by local motion. Therefore, to every body that moves by local motion, one must assign a place; and in this operation, one must be guided by the consideration of the succession of diverse bodies in the same place.

"Let us first consider bodies that move in a rectilinear fashion. It is then obvious that the two bodies that follow one another in the same place, follow one another in their entirety; a whole body leaves the place that it occupied and another body enters the same place in its entirety. Therefore, for a body to move in a rectilinear motion, it is necessary that it be in one place by its entire mass.

"Let us now consider a movement of revolution. For reason, the body which turns, taken as a whole, is successively in various places; but the subject itself does not change place; this subject is always in the same place; it is only by thought that the place changes... The parts of the mobile, on the contrary, change place; and this change does not exist only for reason; it takes place for the subject of each part. What is considered in a movement of revolution, therefore, is not the succession in the same place of diverse bodies taken as a whole; it is only the succession in the same place of the various parts of the same body. Hence, to a body animated by a motion of rotation, it is not necessary to attribute a [49] place of totality; it is sufficient to attribute a place to the parts of this body. »

"... It is therefore much more appropriate to say that the eighth sphere is in a place by its intrinsic parts, than to claim that it is there by a central body completely foreign to its own substance. This agrees much better, moreover, with the opinion of Aristotle. »

Let us come to the general doctrine of Saint Thomas concerning the nature and the immobility of the place.

We have seen that Aristotle, in dealing with this question, had successively adopted two mutually incompatible definitions of place. He had named, first of all, the *place of a body* the part of the surrounding matter which is immediately contiguous to this body; but the place thus defined is not immobile; in order to ensure its immobility, Aristotle then declared that the place of a body was the first immobile surface surrounding this body.

To avoid this change of definition, which constitutes a serious fault of logic, has been the main object of the efforts of several commentators of the School. For this purpose, they have, in general, distinguished two meanings of the word place: in the first of these meanings the place is mobile; in the second, it is immobile.

Such a distinction is already indicated, so briefly that clarity suffers, in the extremely concise *Summa* that Robert Grosse-Teste, bishop of Lincoln, composed on the Physics of Aristotle.

Robert Grosseteste remarks[[64]](#footnote-65) that the place of a body is an accident of this body, so that it must move with this body. To the difficulty thus raised, he devotes this single sentence: "Materially[[65]](#footnote-66), the place is mobile; formally, it is immobile. "The Bishop of Lincoln does not tell us what the *material place* consists of or what the *formal* place consists of.

The reading of the reflections of Saint Thomas [[66]](#footnote-67)will teach us this.

First of all, we can name the *place of a body* the part, immediately contiguous to this body, of the matter which surrounds it. This place, insofar as it is formed of such or such matter, is mobile: the body considered was surrounded by such air or such water; a little later, the air or the water which surround it could change.

Beside the place thus understood, which is mobile, we must consider another place; this last one is bounded by the same extreme parts of the surrounding bodies which serve to delimit the first one; but it consists in a certain relation between these ultimate parts of the surrounding bodies and the whole of the celestial sphere: it determines the order or the situation of the body which these parts contain in relation to the whole of Heaven or in relation to the immobile Universe; this place is the *rational place* (*ratio loci*)[[67]](#footnote-68) .

"The ultimate part of the container, insofar as it is formed of this or that matter, is not immobile. But insofar as one considers the situation it occupies in the totality of Heaven, it does not move; the body which comes to form this renewed ultimate part, compared to the whole of Heaven, has the same relative situation as the body which previously formed it and which has passed away. »

The [[68]](#footnote-69)immobile *rational place* is a fixed relation to the whole of Heaven; this whole itself is determined by the central body and the poles; so that one could define the *rational place*: the situation in relation to the central body and the poles. "The *rational place* of any container thus comes from the first of containers, the first of dwellings, namely from Heaven. »

Here is an example, suggested by Aristotle's own text, which clearly shows how any *ratio loci* is derived, in the last analysis, from the consideration of the supreme orbit. In the domain of the grave or light elements, the differences of places downward or upward are determined by comparison with the center of the World and the concave surface of the Moon's orbit. Now, we have seen how the fixity of the central body was required by the rotational movement of the supreme orb. "As for the concave surface which, on our side, ends the whole of the circularly mobile celestial orbs, it is true that it is animated by a movement of revolution; however, it remains immutable, in that it is always at the same distance from us", i.e. from the immobile center.

"This is the way in which we must understand that the extreme parts of natural bodies form the place of another body; they form it by virtue of the relative position, the order, the situation that they present in relation to the whole of the celestial body; this one, in fact, is the container par excellence, the principle of all conservation and of all housing - *primum continens, et conservans, et locans*. »

This is how St. Thomas expresses himself in a pamphlet *On the Nature of Place*[[69]](#footnote-70). The same sentence was already found in his *Commentaries on Aristotle's Physics*; only one word was missing, which we read here, the word *conservans*. The presence of this word in the passage we have just quoted is not something accidental and of little importance; it bears the mark of the theories which distinguish the pamphlet *On the nature of place* from the *Commentary on Physics*; and these theories deserve that we stop for a moment; they bear in germ, indeed, several of the doctrines which Duns Scotus and his disciples would profess.

The place of a body is the extreme part of the container (*ultimum continentis*); what difference is there, then, between the place and the surface of the container? The surface is the limit of the container considered in an intrinsic way to this body; it becomes the place when we consider it in an extrinsic way, no longer as the limit of the containing body to which it belongs, but as the limit of the contained body that it surrounds. The surface of the container and the place are materially the same thing, namely the extremity of the container; the characters that differentiate them are purely formal.

This formal character, extrinsic to the container, by which the extreme part of the container becomes the place of the contained body, does not only consist in enveloping this body; it also implies a certain ability to preserve this body; the place does not only contain, it preserves.

This conserving virtue of the place explains why its reason (*ratio loci*), from which its permanence derives, consists in the situation it occupies in relation to Heaven; indeed, among bodies susceptible of generation and corruption, no matter can be endowed with the property of conserving another portion of matter, if it does not hold it from Heaven; and this virtue or this influence that it receives from Heaven depends on its distance from this body and its situation in relation to it. This is why, with any container, the *rational place*[[70]](#footnote-71)is obtained by comparison with the supreme orbit which is, therefore, the *primum locans*, the body which accommodates all the others.

The opuscule of saint Thomas *On the nature of the place* ends with an article thus entitled: In which way the last sphere is found in a place.

On this question, Thomas Aquinas first reproduces the solution he had given in his *Commentary on Aristotle's Physics*. To this solution he addresses an objection which he had also formulated in that *Commentary:* Actual existence and motion are appropriate to the whole and not to its parts; now, the way in which a body must be in a place depends on the way in which it is in motion; it is therefore necessary that a body be in a place by its whole and not by its parts.

This objection was answered in the *Commentary* as follows: The parts of the supreme orbit do not exist in act, but they exist in power; in the same way, they are not actually in a place, but they are there in power; if one distinguishes a part from the rest of the orbit, it will be found [53] in the totality of this orbit as if in a place; thus, the last sphere is found in an accidental place by its parts, which are themselves housed in power; this manner of being in a place suffices for the motion of revolution.

Not only does St. Thomas find this answer conclusive, but it seems to him to show a harmonious gradation among beings.

Outside the supreme orbit there are, according to Aristotle's teaching, only substances devoid of place and essentially immobile. Within the eighth sphere are bodies, each of which is in one place in its entirety and in a current manner; these bodies move or can move by the total transport of their substance from one place to another. Between these two kinds of beings is the supreme sphere; this one is not in a place according to its totality, but by its parts; these parts themselves do not have an actual place, but a potential link; so this orb cannot experience any overall displacement; the movement of revolution is the only one that suits it.

The answer that this view suggested to him, St. Thomas repeats in his opuscule; but, undoubtedly, it no longer seems to him capable of removing the objection that had provoked it, because, immediately, he follows it with this sentence: "If we want to keep the part of truth that this opinion contains, we must say that the last heaven is not in a place purely and simply, but that it is there by accident, in that it surrounds its place. »

So here we have, by a singular reversal of thought, Saint Thomas Aquinas rallying to the theory of Averroes, which he had qualified as ridiculous!

In support of this theory, the Angelic Doctor develops considerations where the influence of Avempace - an influence which he admits moreover - is marked even better than it was marked in his first doctrine.

Every body that is naturally at rest is in a certain place; indeed, for it to be naturally at rest, it must be surrounded by bodies that suit its nature; having a container, it has a place.

54] On the other hand, it can happen that a body in natural motion has no place; in this respect, a distinction is necessary.

There are bodies whose natural movement has the object of maintaining their existence and increasing their perfection. These bodies move towards the bodies that suit their nature and that will offer them a natural place, because they are currently surrounded by bodies that are repugnant to their nature; therefore, when these bodies move, they are in a container, hence in a place.

Other bodies do not move in view of their existence or their perfection; they are moved by an intelligence, and their movement has as its object the development of the causality of the first Cause; these bodies are the celestial orbs; for them to move, it is not necessary that they be surrounded by bodies contrary to their nature, nor that they aspire to a container in conformity with Pure nature; they do not need a place.

In other words, the place, as we have seen, does not only contain the body that is housed; it also has a preserving effect on it. Perishable elements and compounds need to be preserved; they need a place. Celestial bodies are imperishable; they do not need to be preserved; they do not need a place.

A difficulty arises here. What has just been said is true not only of the supreme sphere, but of all the celestial orbs; none of them needs a place; yet, except for the last orb, all have a container and, therefore, are in a place.

We can indeed say that the lower orbs are in a place, but on condition that we do not give these words the meaning we give them when we are talking about corruptible elements and their combinations. The place of the latter bodies not only contains them, but also preserves them; the place of the lower orbs contains them without preserving them.

# VII. - GILLES DE ROME

55. That the proper and mobile place of a body can be called a *material place*, that the name of *formal place* is appropriate to the [[71]](#footnote-72)immobile *rational place*, St. Thomas does not say; but we can easily conclude from a comparison he uses: "In the same way," he says, "a fire remains identical in form, although the burning of part of the wood and the addition of new wood cause it to vary in matter[[72]](#footnote-73). »

If Saint Thomas Aquinas did not use the terms: *material place*, *formal place*, already employed by Robert Grosse-Teste, Gilles Colonna, known as Gilles of Rome, does not hesitate to introduce them into his philosophical language; on the subject of the difficult problem of the immobility of place, he takes up[[73]](#footnote-74) the aphorism of the Bishop of Lincoln: *Locus est immobilis formaliter, mobilis vero materialiter*.

The example he uses to explain his thought is the same one that Aristotle had already considered; it is the example of a ship at anchor in running water; materially, the water which bathes this ship and which is the place of it is incessantly renewed; formally, we say that this ship remains in the same place, because the mobile and changing water which bathes it keeps the same situation with respect to the immobile banks of the river.

The immobile place is not, therefore, as Aristotle wanted, the fixed enclosure within which the vessel is contained; it is not the banks and the bed of the river; [56] it is a fixed disposition of the vessel in relation to a term which is itself immobile.

What is this immobile term to which the situation that constitutes the formal place must be related? This immobile term is the Universe.

The various parts of the Universe are mobile, but the Universe itself is immobile as a whole, *secundum substantiam*. The situation that constitutes the formal place, whose permanence is the immobility of the place, is the position in relation to the whole Universe. "Let us suppose that a man stands motionless on the surface of the Earth; that the breath of the wind carries away all the air that surrounds him; we shall not say that he has changed his place, although he is now immersed in an air quite different from the one in which he was just now; we shall say that he has remained in the same place, because he has kept the same situation with respect to the Universe. »

The immobility of the Universe *secundum substantiam* entails the immobility of the center of the World; for this center to change, the World would have to undergo an overall displacement. Moreover, by speaking of an immobile center, Gilles of Rome obviously intends, like all his predecessors, from Aristotle to Saint Thomas Aquinas, to speak not of a point, but of a fixed central body. A little further on[[74]](#footnote-75), to designate the invariable pivot of the celestial revolutions, he says indifferently: the center, or: the Earth. The fixity of this central body entails the fixity of the spherical surface which bounds the Universe and also of the surfaces which delimit each of the celestial orbs, because each of these spheres has an invariable radius; the fixity of the poles, in its turn, results from this immobility of the central body and of the ultimate surface of the World.

Instead of defining the formal location of a body as the situation of this body in relation to the Universe, we can say that it is the position that this body occupies in relation to the center and the poles of the World. But the first definition is preferable to the second, since the fixity of the central body and the poles derives itself from the fixity of the Universe.

57] Let us summarize this doctrine[[75]](#footnote-76): "The material place of a body is the surface of the body which contains the former; what is formal in this same place is its situation in relation to the Universe, for the very position of the Universe is absolutely immobile... Taken from the formal point of view, the place is mobile neither by itself nor by accident; from the material point of view, the place of a body is not mobile by itself but it is mobile by accident", because the ambient bodies which form this place can move.

In all the general theory which we have just reported, Giles of Rome did nothing more than follow the thought of Saint Thomas Aquinas; he modified it on one point only: he affirmed that the *ratio loci* was what the place contains in a formal sense; still the Angelic Doctor had, as it were, implied this thought. Gilles separated himself from this master when it came to answering this famous question: What is the place of the last celestial sphere? In the solution of this problem, the Angelic Doctor, at least in his *Commentary on Physics*, held for Aristotle against Averroes; Gilles Colonna holds for Averroes against Aristotle.

Against the system of Averroes, he recalls[[76]](#footnote-77), first of all, the Thomistic objection:

"Is it by its center that Heaven is in one place? It seems that it is not. The center, in fact, seems entirely extrinsic to Heaven; it seems to have nothing of the essence of Heaven; therefore, it would be ridiculous to claim that Heaven is in one place because its center is in one place. »

Here is the answer to this objection; the Commentator's thought is formulated with rare clarity:

"All motion proceeds in relation to a stationary object. We could never imagine a motion if we did not imagine a fixed term with respect to which we could affirm that such and such a body moves. Moreover, the rational place[[77]](#footnote-78) (*ratio loci*) is conceived as something immobile; we could therefore never imagine a local motion if we did not conceive an immobile object to which the rational place is related [58]. Now, in order to fix a sphere, we must first fix its center, so that the immobility of the sphere is derived mainly from the immobility of the center. In the same way, we judge the motion of the sphere by comparison with the center. It is therefore by the consideration of its center that one must fix the place of this sphere. »

Let us further specify these considerations: "The last heaven is, at the same time, all at rest and all in motion. »

"It is entirely at rest, because, taken as a whole (*secundum substantiam*), it never changes its place; and this results from the continual immobility of its center.

"On the other hand, the last orb moves as a whole, in that its disposition is constantly changing. The Earth, in fact, which remains at rest in the center of Heaven, is not always seen in the same way from one region of that Heaven.

"The immobility of Heaven as well as its movement is judged by the consideration of the central body. Now, one only inquires about the place in order to be able to judge the rest and the movement. Therefore, one cannot seek the place of Heaven except in the consideration of its center. »

The ideas and the very language of Saint Thomas are called upon here to help the Averroist solution which the Angelic Doctor had rejected; Gilles also uses these ideas and this language to refute[[78]](#footnote-79) the solution of Aristotle to which his glorious predecessor had rallied.

Let us compare, in fact, Averroes' solution, as it has just been exposed, to Aristotle's solution; the advantages of the first will make the disadvantages of the second burst out.

"The movement of Heaven incessantly modifies the situation of the parts of Heaven in relation to the parts of the central body; the part of Heaven which was formerly facing such and such a part of the Earth now looks, by the effect of the movement of Heaven, at another part of the Earth. The whole of Heaven thus looks at the whole of the Earth, but it does not look at it unceasingly in the same way; at the same time, the various parts of Heaven do not remain unceasingly opposite the same parts of the Earth. If, then, we compare Heaven with the central body and the parts of Heaven with the parts of the central body, we shall find that the whole of Heaven moves by changing its own disposition within its place, and that each of these parts experiences a displacement of the whole, *secundum substantiam*. »

Let us now suppose that, according to Aristotle's theory, "we compare the parts of Heaven with each other.

"Heaven is continuous. Its movement does not alter the disposition of its various parts within the whole. If, therefore, it is from this disposition that we derive the definition of the place of Heaven, it will follow that in its movement, Heaven undergoes no change of place.

"The various parts of Heaven do not experience any change in the position that each of them occupies in relation to the others; two celestial parts that are united at a certain moment remain always united; if therefore it is to this connection of the parts that we address ourselves to assign a place to Heaven, not only does Heaven, taken as a whole, not change its place, but the movement of Heaven does not change the place of the various celestial parts. »

Let us conclude: If one were to admit the hypothesis which delighted the assent of Saint Thomas Aquinas, "Heaven would move neither in totality, nor in parts, nor by transport of substance, nor by change of disposition".

# VIII. - JEAN DUNS SCOT

On the subject of place and motion, Averroes, Albert the Great, St. Thomas Aquinas, Gilles of Rome, have proposed theories which, in many of their parts, differ greatly from one another. All these theories, however, agree in proclaiming the truth of the same statement: The supreme orbit has no other movement than a rotational one; its fixed center belongs to an absolutely immobile body, and this body is the Earth.

The presence of this assertion in all these theories, the preponderance of the role it plays in them, appears even more clearly if we try to strip each of them of what distinguishes it from the others, leaving only what they have in common. Here, in fact, is what is reduced to what is identical in these theories:

It is impossible to conceive of any local motion, if one does not imagine a reference frame, fixed by definition, in relation to which bodies are said to be in motion or at rest according to whether their position, compared to this fixed term, changes or not with time.

This invariable term is a concrete body, existing of a current existence.

In particular, the revolution of a celestial orb requires that its fixed center be incorporated into an entirely immobile mass.

This body is the Earth which remains perpetually motionless at the center of the World.

These propositions are the support and like the backbone of all the doctrines that Arab or Christian Scholasticism has issued, up to now, on the subject of place and motion; if these propositions are denied, all these doctrines collapse, dragging with them the entire Physics of the School.

Among the consequences to which these propositions lead, here are some to which the School and, particularly, the University of Paris will contradict as well by their astronomers as by their theologians.

One of these consequences was formulated by Averroes: If all celestial circulation necessarily occurs around an immobile central body, Ptolemy's astronomical system is inadmissible; one would have to imagine an earth at the center of the eccentric of each planet; one would have to put another at the center of any epicycle.

Now, at the beginning of the fourteenth century, Ptolemy's astronomical system reigned unchallenged over the Franciscans, who were influenced by Duns Scotus, and over the masters of the Faculty of Arts in Paris. Without doubt, the ingenious arrangement [61] of orbits devised by Bernard of Verdun has removed most of the objections that Averroes had raised against this system. There remains one standing, however, and it is precisely the one we have just recalled. Among the three orbs that Veinard de Verdun attributes to each planet, there is one, the intermediate orb, which describes a revolution around a simple geometrical point that no immobile mass incorporates. If one wants to put the astronomical theory of the *Almagest* out of dispute, one must renounce this axiom: The rotation of a celestial orbit requires that an immobile Earth occupy the center of this orbit.

According to the doctrines which have just been exposed, the immobility of the Earth at the center of the World is necessary not only of physical necessity, but of logical necessity; to deny it would be to deprive of meaning all notion of place and movement, it would be to proclaim an absurdity.

To affirm the immobility of the Earth at the center of the World is to affirm the immobility of the universe *secundum substantiam*. The various parts of the Universe may well exchange between themselves the places they occupy, so that the World is mobile *secundum dispositionem*; but the Universe cannot undergo any overall displacement; it remains enclosed in a sphere which is invariable, because the center is absolutely fixed. To speak of an overall displacement of the universe would be to speak of a logical impossibility. The omnipotence of God itself could produce this displacement, which implies contradiction.

Now, here is that Christian orthodoxy is irritated by the innumerable obstacles that, in the name of logic, Peripatetism and Averroism claim to impose on the divine Almighty; it intends to break these obstacles. In 1277, at the request of Pope John XXI, the bishop of Paris, Étienne Tempier, convened an assembly of doctors at the Sorbonne "and other prudent men". Without pity, these theologians condemned all the propositions[[79]](#footnote-80) in which God was denied the power to perform [62] an act, under the pretext that this act was in contradiction with the *Physics* of Aristotle and Averroes.

Among the errors condemned, there is one[[80]](#footnote-81) which is formulated in these terms: "*Quod Deus non possit movere Caelum motu recto. Et ratio est quia tunc relinqueret vacuum*. »

In order to deny God the power to impose on the Universe a general displacement, the author here condemned invoked a reason that a Peripatetic would not have admitted; outside the World, according to the Philosopher, there is no place, hence no void. But what the doctors of Sorbonne had censured was the proposition itself, not the reason invoked in its favor; supported by more exactly peripatetic arguments, it would undoubtedly not have met with more indulgence from them.

Although the dogmatic value of Stephen Tempier's decisions was contested from the beginning, the influence of the condemnations carried by the doctors in Sorbonne was very great in the University of Paris, and in the English and German Universities to which it gave the word of order. Moreover, those who contested the validity of the condemnation we have just reported would not have dared to maintain that the Assembly of 1277 had formulated a nonsense; they had to admit, against the very clear feeling of Aristotle, that one can attribute to the Universe an overall movement without however uttering words that mean nothing.

Thus Astronomy and Theology joined their efforts to force the philosophers to take again on new expenses the theory of the place and the local movement.

The new doctrine, raised on the ruins of the peripatetic theory, was to recall, by the majority of its features, the doctrine of Damascius and Simplicius; the Franciscan School was to be the principal worker of the edifice which it was a question of building.

It was John Duns Scotus who laid the first stone.

He did not give an overall account of his ideas on place and motion; he gave them here and there, incidentally, in connection with theological discussions; this peculiarity would suffice [63] to make it difficult to grasp them fully; their extreme subtlety does not make this task any less arduous; let us try, however, to come to terms with them.

The study of place is, for Duns Scotus, the study of a relation between two terms, the body contained, the body containing.

The idea of *place* [[81]](#footnote-82)includes first of all that of a surface; but this surface would not be enough to constitute the place; it is necessary to join to it the consideration of the matter which forms the container; the surface alone, apart from this consideration, could not be regarded as delimiting a place; this need to have regard, not only to the limiting surface, but also to the surrounding matter, when it is a question of defining the place, is marked by the expression *ultimum continentis by* means of which the Peripatetians gave this definition.

But a body can only be a container with respect to a contained body; the place therefore has a counterpart[[82]](#footnote-83). The place corresponds to the action of housing, *locare* ; the counterpart corresponds to the passion opposed to this action, to the fact of being housed, *locari*. This counterpart says place, Duns Scotus designates it by the outfit ubi; he borrows the definition of this term from the Author of the *Six Principles*: " *Ubi* est circumscriptio corporis a circumscriptione loci procedens. »

This Author of the *Six Principles*, from whom Duns Scotus borrows the notion of ubi which from then on will play a great role in the theory of place, is none other than Gilbert de la Porrée[[83]](#footnote-84) , born in Poitiers in 1076, and appointed in 1142 bishop of his native city, where he died in 1154. His *Liber sex principiorum* was, in the Middle Ages, closely linked to Aristotle's *Organon.* In it, [64] we find[[84]](#footnote-85) the definition of ubi quoted by Duns Scotus; it is followed by the essential remark that the place is an attribute of the body containing and the ubi an attribute of the body contained.

The relation we have to study is thus a relation between two terms: one of these terms, the place, is intrinsic to the body containing and extrinsic to the body contained; the other, the ubi, is intrinsic to the content and extrinsic to the container[[85]](#footnote-86).

In addition to place and ubi, Duns Scotus considers [[86]](#footnote-87)a third element which he calls *positio*; this word can be translated into French as *disposition*. The parts of a body are, within the whole body, arranged in a certain order; when this body is in a certain place, when it has its ubi, its various parts occupy various parts of the place; the disposition indicates this order in which the parts of the body are found in relation to the various parts of the place or of the surrounding body. The disposition is a set of quantitative data, of geometrical elements that specify the ubi of the body. Damascius and Simplicius had also considered it.

With these preliminaries in place, Duns Scotus can tackle the difficult question of the immobility of place. Let us examine successively various cases.

Let us imagine, first[[87]](#footnote-88) of all, that the containing bodies remain the same while the body contained by them changes. Can we say that the place remains and that different bodies successively come to occupy the same place?

Such an assertion would seem to contradict what has been said above. The place is a relation between the container and the content; if one changes one of the two terms, the relation changes; even if the container would remain invariable, one cannot say that the place remains the mime if the container does not remain the same.

65] To this, Duns Scotus replies that the place is not the whole relation which exists between the container and the content; it is, in this relation, what concerns the container; as for the content, it appears in it only in a general way and not in a particular way; to define the link which such containing bodies form, it is true that we must consider a contained body; but there is no need to designate it in a special way, to say whether it is such and such a body. Let us therefore change the contained body without changing the containing bodies; we will have, it is true, modified the relation between the containing and the contained; but in this relation, we will not have changed that by which it constitutes the place. When the contained body moves alone, without changing the containing bodies, the place remains unchanged.

Let us now take a second case[[88]](#footnote-89): The contained body does not move, but the containing bodies are constantly renewed. So it is, according to the example chosen by Aristotle, for a ship at anchor in the course of a river. Shall we say that the place of this ship does not change?

Here, the answer cannot be doubted. For the Peripateticians, the place of a body is an absolute attribute of the surrounding bodies; for Duns Scotus, it is a relative attribute of these same bodies; it consists in a relation of these bodies to the contained body. For both, it is an accident of the containing bodies. Now, no accident can remain if the subject where this accident is found is replaced by another subject. It is therefore not possible for the place of a body to remain one and the same when the surrounding matter is renewed, even if the body in question remains immobile.

For a body or a set of bodies to be in an unchanging place, the enclosure containing it would have to be composed of bodies incapable of any movement; Aristotle, moreover, had seen very well that an unchanging place could not be obtained in any other way. But where in the Universe can we find the invariable bodies [66] that would compose such an enclosure? They do not exist.

In despair, some philosophers go back to the limits of the World to find this immutable enclosure; they believe to find it in the spherical surface which limits the Universe: undoubtedly, they say, the celestial orb of which it is the extremity moves, and, therefore, this surface is variable: but as limit of the universe, it is invariable, because the Universe, taken as a whole, is immobile. We recognize the opinion that Albert the Great falsely attributed to Gilbert de la Porrée.

This reason is worthless. This spherical surface cannot limit the Universe unless it limits, first of all, one of its parts: if this part changes from one moment to the next, the surface that limits it also changes from one moment to the next, and therefore, as the limit of the Universe, it cannot remain identical to itself.

From then on, it is necessary to give up finding anywhere this enclosure incapable of movement which, alone, would constitute an immutable place: always, the matter which surrounds a body is susceptible to experience some local movement.

When this surrounding matter, the subject of the accident that we call place, becomes animated by local motion, the place of the fixed body that this matter contains changes incessantly. Not that this place is animated by local motion; it is not susceptible of that motion. But, at each instant, the place of the body perishes, is corrupted, and a new place is generated. Unable to move locally, the place is susceptible to generation and corruption.

However, it is commonly said that the body in question remains in the same place all the time. What do we mean by this? According to what we have just said, this body is really in a certain place at a certain moment, and in another place at another moment. To each of these two really distinct places corresponds a rational place[[89]](#footnote-90) (*ratio loci*) and, in truth, these two rational places are also distinct; but they are *equivalent from the point of view of local motion*. It is this equivalence that we intend to recall by saying that the link of an immobile body remains invariable even when the surrounding bodies are in motion.

67] What is this rational place[[90]](#footnote-91), this *ratio loci*? When two such relations are numerically distinct, but specifically identical, they correspond to two distinct but equivalent places; a body that occupies successively these two places does not move locally. When two rational places have between them not only a numerical difference, but also a specific difference, the places to which they correspond are no longer equivalent; the body which occupies successively these two places moves by local motion.

When a body moves, it is commonly said that a second body comes to occupy the place that the first leaves; this is not correct, however, if the surrounding bodies also move; the place of the second body is by no means identical to the place of the first; the place of this one perished while the place of that one was generated: but the second rational place [[91]](#footnote-92)lost by the first body, numerically distinct from the rational place [[92]](#footnote-93)gained by the second, is specifically identical to it, so that the place that is generated is equivalent to the place that perishes; from the point of view of equivalence, one can say that the place is incorruptible.

According to this theory, when a body moves by local motion, chasing before it the body whose place it takes, we can distinguish four changes in these two bodies[[93]](#footnote-94): two of these changes occur in the body that is chased, and two in the body that occurs; each of these changes taking place between two terms, eight different terms can be enumerated.

Let us consider, for example, the body that drives out the other. A first change has as its initial term (*a quo*) the primitive ubi of the body, and as its final term (*ad quem*) the deprivation of this ubi; this first change is the loss of the primitive ubi. The second change has as its initial term the privation of the new ubi, and as its final term this new ubi; this second change is the acquisition of the new ubi.

68] Two very similar changes take place in the expelled body.

All this theory of Duns Scotus on the immobility of the place does no more than develop what Saint Thomas had indicated, particularly in his opuscule *De natura loci*; however, between the doctrine of the Angelic Doctor and that of the Subtle Doctor, it is appropriate to note a divergence to which the Scotists will attach great importance; when an immobile body is immersed in a variable medium, Thomas Aquinas attributes to it a [[94]](#footnote-95)unique rational place, and Giles of Rome, in an analogous manner, considers as invariable the formal place of this body; It is an opinion that Duns Scotus condemns with force; for him, from one moment to another, this body is in different rational places; numerically distinct, the successive *rationes loci* are only equivalent between them; it is the influence of Damascius and Simplicius that we perceive here, very clearly, in the doctrine of the Subtle Doctor.

The distinction between lodging and being lodged, between place and ubi, is the foundation of the explanation of the movement of the last celestial sphere.

The last celestial sphere is not contained by any body[[95]](#footnote-96); it is not in one place; it has no ubi; how then can it move by local motion? Perhaps one will claim that the last celestial sphere is immobile; one would not be much further ahead in the solution of this difficulty; to say that the last sphere is immobile would be to affirm that it does not move by the local motion of which it is capable; but of what local motion would it be capable if it is not in any place?

According to Duns Scotus, the solution to this difficulty lies in a distinction.

The local motion of bodies other than the supreme orb consists in the continual destruction of a certain ubi which is replaced by another ubi; the body ceases to *be housed* in a certain way and is then housed in another way. The same is not true of the last orbit; its manner of *being housed* does not change; it is never housed; what changes from moment to moment is the manner in which it *houses* the body that is contained; the other bodies move *secundum locari*; it moves *secundum locare*.

According to Duns Scotus, this is the meaning to be attributed to Averroes' famous proposition: the last heaven is in one place by its center.

To these considerations the Subtle Doctor gives the following conclusion: "Just as Heaven can rotate even though no body contains it, so it could rotate even though it contained no body; it could still rotate, for example, if it were formed of a single sphere, homogeneous in all its extent; the motion of rotation, taken in itself, is therefore a certain form which flows ceaselessly (*forma fluens*); and this form can exist by itself, without the need to consider it in relation to another body, either containing or contained; it is a purely absolute form. »

This conclusion, which posits the absolute character of motion, formally contradicts everything the School had heard taught up to that point; it would certainly have deserved some explanation; this explanation, Duns Scotus refuses us; he presents this surprising assertion as a kind of enigma: "Seek an answer, he says; *quaere responsionem*. »

# IX. - THE SCOTIAN SCHOOL. - JEAN THE CANON.

The sometimes concordant, more often divergent, impulses of Thomism and Scotism determined in the School, during the first third of the 14th century, a lively and disordered intellectual agitation. The problem of the place and its immobility, for example, is the object of numerous and varied attempts at solution; it lends itself to debates of which we can get an idea by reading the *Questions sur la Physique* de Jean le Chanoine.

70] John Marbles[[96]](#footnote-97), nicknamed John the Canon, was an Englishman and Franciscan; after having followed the teachings of John Duns Scotus at Oxford, after having taken the doctorate in the University of that city and having taught Theology there, he came to Paris, where, around 1320, his lessons were in great favor; theologian, philosopher, jurist, he composed commentaries on Aristotle and on the Master of the Sentences; of his writings, only one seems to have been printed, but it was printed many times; this writing is a collection of questions on the Physics of Aristotle[[97]](#footnote-98).

These *Questions* are precious for the history of Philosophy; John the Canon reports there the opinions of several of his contemporaries whose works remained in manuscript or are even lost today.

At the beginning of the 14th century, certain theories of the place were very clearly inspired by the ideas of Saint Thomas Aquinas; such is the one that John the Canon attributes[[98]](#footnote-99) to a certain Thomas the Englishman[[99]](#footnote-100).

According to Thomas the Englishman, the place of a body immersed in the air is, as Aristotle says, the whole of the parts of the air which are immediately contiguous to that body. Insofar as they are parts of the air, they are mobile like the air to which they belong; but it does not follow that the place of the body is mobile. It is not because it is air that the part of the air adjacent to the body constitutes the place of that body; it is because it is in a certain order with respect to the center and poles of the world, or else with respect to the intelligence which moves the first mobile, an intelligence which is immutable. According to [71] this theory, the location of a motionless body does not change when the surrounding matter moves.

Except for the rather strange idea of asking the intelligence which moves the supreme sky for the fixed term which serves to determine the immobility of the place, this theory is purely Thomistic. A convinced Scotist, John the Canon rejected it. I cannot understand, he says, the role which it allots to the poles; there is nothing immobile in the Sky; the poles cannot thus be immobile; if they are mobile, how will they serve to fix the immobility of the place? The same can be said, he adds, of the center and of intelligence. »

In this passage, John the Canon condemns the hypothesis of immobile poles in the same terms in which Averroes had condemned it[[100]](#footnote-101): "the poles are immobile in the geometrical sense, but not in reality; in a celestial orb, no substance can exist in a current manner unless it is in motion; now, so that an indivisible point can be said to be in motion, - motion by accident moreover, - it is necessary that it is found in a body in motion; so that it can be said to be immobile, it is necessary that it is found in a motionless body. "We recognize the principle by virtue of which, from the immobility of the center of a celestial orbit, Aristotle and the Commentator concluded the existence of an immobile central body.

Pierre Aureoli, born in Verberie-sur-Oise, became master of Theology in 1318, minister of the Franciscans of Aquitaine in 1319, archbishop of Aix on February 27, 1321; he died in his archiepiscopal city before January 23, 1322. In his commentaries on the second book of the *Sentences*, *Doctor Facundus* (as Peter Aureoli was called) developed a theory of place of which John the Canon gives us a summary[[101]](#footnote-102).

The place of a body," said Aureoli, "is nothing other than the determined position that the body occupies here or there. "Let us suppose, in fact, that it is enough to place a thing so that [72] the body to which it refers occupies a given place in the universe; that it is enough to change it so that the place of this body is changed; this thing, certainly, will be formally identical to the place of the body. Now, if we place a body in the same position several times, it will be in the same place; if, on the contrary, we change the position of the body without modifying the matter that surrounds it, if we transport it, for example, with the vase that contains it, it will change its place. The place of a body is therefore nothing else than the position or the situation of this body in the Universe.

This definition makes the difficulties concerning the movement of the supreme orbit vanish. The supreme orbit, which no body surrounds, is not in any place in the sense that Aristotle gives to this word; it has no ubi, according to the language of Gilbert de la Porrée and Duns Scotus; but it has a position, a situation; now, the local motion does not consist in a change of ubi, but in a change of situation; nothing prevents the last sphere from moving by local motion.

This theory, one recognizes it without difficulty, is a return to the ideas emitted by Damascius and by Simplicius; the *positio* or the *situs* of which Peter Aureoli makes the essence of the place is identical to the qšsij of the two Greek philosophers.

This *positio* differs, on the contrary, from the one by which Saint Thomas defines the rational place[[102]](#footnote-103) (*ratio loci*) and which Gilles of Rome identifies with the formal place. The position that these two authors consider is that of the parts of the container that immediately touch the contained body; the position of which Peter Aureoli speaks is, on the contrary, that of the contained body itself. Although the two positions are fixed by means of the same geometrical quantities, so that the mathematician does not distinguish one from the other, they are nevertheless very different in the eyes of the physicist. In the reasoning of Thomas Aquinas and Gilles de Rome[[103]](#footnote-104), position is an attribute of the container; in the theory of Peter Aureoli, it is an attribute of the content.

73] This is where John the Canon seizes upon this theory to condemn it. Like Aristotle and like all his faithful followers, he wants the place to inform the container and not the content; the place of a body cannot therefore be the position of this body.

Jean Marbres judged severely the attempt of Pierre Aureoli; he is hardly more indulgent for the doctrine of Gilles de Rome, whose author he designates, rather disdainfully, by these words alone: "a certain doctor".

The formal place defined by Gilles de Rome is an attribute of the parts of the container which touch the content; the accident cannot remain when the subject in which it exists is changed; the formal place could not thus, in spite of Gilles de Rome, remain immutable while the matter which contains the body is renewed.

The argument that John the Canon opposes here, in particular, to Gilles Colonna had been objected by Duns Scotus to all those who maintain the absolute immobility of place.

If the Scotists were in agreement in condemning the theories of St. Thomas Aquinas, Peter Aureoli or Giles of Rome, they were less in agreement when it came to interpreting the subtle doctrines of their master.

They all recognize that the surface is the matter and support of the place, but that the place is not simply identical with the surface; they all want the place to be a certain actual entity having its foundation in the surface that separates the container from the content. "But what is the nature of this entity? It is today, says Jean Marbres[[104]](#footnote-105), doubtful thing for many philosophers. »

Some hold more or less verbatim to the opinion explicitly expressed by Duns Scotus: this entity which is added to the surface to constitute the place, is the action by which the container circumscribes the content, or a relation deriving from this action. This action which constitutes the place is opposed to the passive operation which, according to the definition of the Author of the *Six Principles*, constitutes the ubi. To better mark this opposition, [74] John the Canon goes so far as to name[[105]](#footnote-106) ubi *passivum* the ubi considered by Gilbert de la Poirée and by Duns Scotus, whereas he proposes to give the name ubi *activum* to the place. The local motion of most bodies is then a motion whose two terms belong to the species of the ubi passive, while the terms of the motion of the supreme orbit fall into the category of the ubi active.

Others[[106]](#footnote-107) do not believe that the operation by which the container circumscribes the content is this entity which constitutes the place; it is, they believe, only an attribute of it. As for the very essence of this entity, it remains unknown to us.

There are still other difficulties that provoke debate within the Scotian School.

Duns Scotus agrees with all the philosophers who preceded him in denying the place any capacity for local motion; however, does he not admit that the concavity of the orb of the Moon is the place of fire, and does not the orb of the Moon move? This difficulty has certainly solicited the attention of most Peripateticians, but it does not seem to have received a satisfactory solution.

A Franciscan contemporary of John the Canon, Francis of the March, so named, it seems, because he was born in Ascoli, in the March of Ancona, undertook to resolve this objection.

According to François de la Marche [[107]](#footnote-108), the place is not necessarily free of all local motion. But when it is a term of the motion of a certain body housed by it, it must possess the immobility that opposes this particular local motion. Thus, to serve as a place for fire, the orb of the moon need not be absolutely immobile; but it is destined to serve as a term for the rectilinear motion of fire; it is necessary and sufficient that it possess the immobility opposite to this rectilinear motion; this immobility in no way excludes the possibility of a rotation about the center of the World.

The answer of François de la Marche, valid for the objection drawn from the motion of the orb of the Moon, is not valid for [75] other similar objections; thus the supreme orbit is regarded as the place of the inferior orbits; and yet, like the latter, it moves with a motion of revolution.

On this subject, John the Canon proposes a distinction which is by no means a solution; this distinction is borrowed, moreover, from the pamphlet *On the nature of place which is* attributed to Thomas Aquinas; it is as follows There are perfect places which not only surround the body housed, but also support it by the pressures they exert on it; these places are completely immobile or, at least, have the immobility opposed to the local movement of the body they circumscribe. There are, on the other hand, imperfect places which circumscribe the contained body without supporting it: of this number are the places of the celestial orbs, because these orbs do not need any support to remain in their place; these places can dispense with the condition formulated by François de la Marche.

In imitation of Simplicius, in imitation of his Master Duns Scotus, John Marbles [[108]](#footnote-109)fully admits that the place can be generated and perish.

A stake is driven into the bed of a river; the water that bathes this stake flows continuously. At a certain moment, the volume filled by the wood of the stake is surrounded by certain parts of the water; these parts form, at this moment, the proper place of the stake. A little later, these same parts are found downstream of the pile; they no longer circumscribe any foreign body; they have become contiguous to each other: they are no longer the place of anything; the place they formed has perished. Meanwhile, other parts of the flowing water have come to surround the immobile pole; in them, a place that did not exist before has come into existence.

These two places are really distinct, although they have the same disposition in relation to the center of the World and its poles, which makes them equivalent. And let us not pretend that these two places are only the same formal place; it has already been said: Where the subject varies, the attribute cannot remain identical to itself.

But against such a doctrine, "the crowd will cry out; [76] for no one would dare to claim that this house changes place because the wind blows... Let us not worry about the crowd when reason is against it; in this matter, the crowd has little competence. Let us not stop at the opinion of those who claim that a body remains in the same place when the container changes: this is an idea of very old people - *imagination vetutorum*. »

# X. - GUILLAUME D'OCCAM

An Englishman like John the Canon, a Franciscan like him, a disciple of Duns Scotus, William of Occam shone, like him, at the University of Paris, around the year 1320. Among the numerous works written by the one whom the terminalists of the School of Paris hailed with the title of Venerable Initiator, *Venerabilis Inceptor*, is a treatise on Physics[[109]](#footnote-110); the four books into which this treatise is divided correspond substantially to the first four books of Aristotle's *Physics.*

One cannot read the *Summulae in libros Physicorum* of William of Occam without recognizing that they are posterior to the *Quaestiones* of John the Canon. Very often, the arguments of the *Venerabilis Inceptor* have for goal to refute or to correct the opinions exposed by John Marbles. This influence of the faithful disciple of Duns Scotus is particularly easy to recognize in the last four chapters of the fourth book of the *Summulae*, chapters which aim at elucidating the nature of place and its immobility.

Moreover, the Occamist theory of place has very great analogies with the Scotian theory; it retains several of its essential doctrines; however, between the two theories there are divergences which it is important to point out.

First of all, Occam clearly separates himself from Duns Scotus concerning the very nature of place.

For the Subtle Doctor, place is a certain entity whose foundation lies in the surface of contact between the container and the content; this surface of contact is the matter of this entity, which has as its form a certain active relationship between the container and the content. Duns Scotus defined the place several times by similar considerations, and John the Canon has told us what efforts were made in the Scotch School to deepen this definition.

But everything, in this definition, is repugnant to the philosophy of William of Occam.

John Duns Scotus could, without illogic, declare that the surface of contact of the container and the contents was the support, the subject of this entity which, according to him, constituted the place; he did not hesitate, indeed, to attribute to the surface a certain reality, to look at it known the seat of certain physical properties, of the color, for example[[110]](#footnote-111).

William of Occam, on the other hand, persistently asserted[[111]](#footnote-112) that in the notions of point, line, surface, there is nothing real, nothing positive; only volume, the three-dimensional magnitude, extended in length, width and depth, can be realized. The surface is a pure negation, the negation that the volume of a body extends beyond a certain term; in the same way, the line is the negation that the extent of a surface crosses a certain border, the point, the negation that a line extends beyond a certain boundary.

The limit surface of the container having by itself no reality, this surface cannot be the matter of a certain entity which would constitute the place.

Moreover, the *Venerabilis Inceptor* could not admit such an entity without going against his most powerful tendencies; to suppress as much as possible the entities that Scotism multiplied in profusion, such was the very principle of the method he advocated.

In accordance with this principle, Occam takes back[[112]](#footnote-113) for the place the very definition of Aristotle by giving it back its first simplicity, by ridding it of any parasitic addition: The place, it is the part of the containing body which immediately touches the contained body.

But it must be understood that this part is a body, extended in length, width and depth. Within the containing body, we can draw a closed surface that completely surrounds the cavity filled by the contained body; this surface divides the containing body into two other bodies, one of which, nested in the other, encloses the contained body in its turn. This part of the container which is nested in the other part constitutes the place of the contained body.

By a similar operation, we can again separate this place into two enclosures nested one inside the other; the one of these enclosures that is inside the other will now be the place of the contained body.

One can proceed indefinitely in the same way; one will give for place to the contained body a thinner and thinner layer borrowed from the containing body; each of these places will be a part of the preceding place; each of them will be a body, and not a simple surface.

One sees that the modern mathematical language would make it possible to express with a great exactitude the opinion that Occam professes on the subject of the place: The place, one would say, is an infinitely thin layer borrowed from the containing body and everywhere contiguous to the contained body.

Separated from the Scotian system on the subject of the essence of place, the Occamist system is further separated from it on the subject of the immobility of this same place.

For Duns Scotus, the place was a certain entity; this entity could be born or perish; the place was therefore declared capable of generation and corruption. "In so far as it regards the place [79] of a cop as replaced by another place, when the surrounding matter moves by local motion, this opinion is true, says Occam[[113]](#footnote-114): but in so far as it admits the corruption of the place as a result of this local motion, it is erroneous; it proceeds from this false imagination that the place is a certain relation really distinct from the containing body. »

This same false imagination dictates to Duns Scotus another erroneous proposition, namely that the place is incapable of local movement: the place is a body; it is therefore itself in a place and can move.

It can even move in two ways:

Place of a body, it can move to become place of another body: if, for example, a stake plunged in the current of a river is immediately followed by a stone, the water which, at a certain moment, touches the wood and forms the place of it, comes, a moment later, to touch and house the stone.

The place of a body can also move not to become the place of another body, but simply to find itself in another place, without housing any foreign body after having bathed the stone, the parts of the water that this stone separated from each other come closer and join: they are no longer link, but they are in one place.

Firmly attached to the first definition of place that Aristotle gave, Occam is logically led to this consequence : place is mobile.

Naturally, he rejects the theory of Gilles de Rome, whose essential passages he reproduces verbatim[[114]](#footnote-115).

The order and situation in the Universe that Gilles de Rome calls the *formal place is* the order and situation of the container and not of the content: if it were otherwise, one would contradict Aristotle, for whom the link must be attributed to the containing body and not to the contained body. Once this principle has been established, which rules out Pierre Aureoli's theory, how can the formal place remain immobile, while the container, which is the material place, moves?

80] When the contained body does not move, its distance from the fixed parts of the universe does not change; but it is not this distance that constitutes the formal place: to constitute this place, it is necessary to consider the distance from the fixed landmarks of the parts of the container that surround the content; and these parts can move even when the contained body does not move.

Incidentally, like John the Canon, and in the same terms as him, Occam attacks this immobility of the center and the poles of the World to which Saint Thomas Aquinas wanted to attach the immobility of the place.

"What is said about the immobility of the poles and the center proceeds from a false imagination, namely that there are, in the Sky, immobile poles and, in the Earth, an immobile center. This is impossible. When the subject is animated by local motion, if the attribute remains numerically one, it moves by local motion. But the subject of the accident that are the poles, that is, the substance of Heaven, moves by local motion; either the poles will therefore be incessantly replaced by other poles numerically distinct from the first, or they will be in motion. »

"Perhaps it will be said that the pole, which is an indivisible point, is not a part of Heaven, for Heaven is a continuum, and continua are not composed of indivisibles. »

"But if the pole exists, and if it is not a part of Heaven, then it is some corporeal or incorporeal substance. If it is corporeal, it is divisible and not indivisible. If it is incorporeal, it is of an intellectual nature, and one arrives at the ridiculous conclusion that the pole of Heaven is an intelligence. »

Neither the material nor the formal place is therefore immobile; the only immobility that the place possesses is immobility *by equivalence*, such as defined by Duns Scotus and John the Canon. William of Occam attributes the greatest importance to this notion of immobility by equivalence; he believes that it expresses in an explicit way what Aristotle and the Commentator thought implicitly; it seems to him suitable to interpret all that they said about the immobility of the place.

81] Occam even thinks that he can derive from the notion of equivalent places the solution of difficulties which, obviously, this notion is not sufficient to remove.

Some Scholastics wanted to find in the ultimate surface of the universe the unchanging marker required by the immobility of the place; Duns Scotus condemned their error; according to the *Venerabilis Inceptor*, their way of seeing can be taken up again on condition that the identity they attribute to this surface is interpreted as a simple equivalence. "By this we can explain what is meant by saying that the whole of Heaven is the place of a body; for when this body remains at rest, each of its parts is always at an equal distance from Heaven; at all times the distance of a part of the body from the ultimate parts of Heaven is always measured by the same magnitude... It is for this reason that a body is said to be at rest on the Earth in spite of the movement of the air or of Heaven... It does not matter whether Heaven is moving or not, as long as it is not animated by a translational motion. In this way, we can just as easily explain the rest of this body and the constancy of its distance from Heaven, whether Heaven is moving or not; we can explain it as easily as if there were immobile poles, as some physicists want; the immobility of the poles therefore does nothing to the question. »

Occam's inadvertence is too obvious to be worth emphasizing: it is clear that everything he said about a motionless body could just as well be repeated about a body that rotates around the center of the World. However erroneous it may be, his argument is nonetheless interesting in one respect; this argument is based on the assumption that Heaven is animated only by a rotational movement and not by a translational movement. This hypothesis is formulated repeatedly and insistently by the *Venerabilis Inceptor.* "He repeats, after Gilles de Rome, that the center of the world can only be used to recognize the immobility and the identity by equivalence of a place, on one condition: it is that this same immobility can be concluded first of all from the absence of any movement of translation in the Sky; it is because the Sky has no overall movement neither on one side, nor on the other, that the center of the World is said to be immobile by equivalence. »

82] For a disciple of Aristotle or Averroes, it would be idle to formulate the hypothesis that Heaven has no translational motion, for the contrary supposition would be an absurdity. Obviously, it is no longer so for Gilles of Rome or for William of Occam; to attribute to the celestial spheres and to their center a translational motion would no longer seem to them to be nonsense; to deny it to them is a postulate that it is necessary to formulate explicitly. Here, as in many other cases[[115]](#footnote-116), the philosophy of the *Venerabilis Inceptor* comes to the aid of the doctrines that the theologians of the Sorbonne wanted to defend under the presidency of Étienne Tempier: *Philosophia ancilla Theologiae*.

In the edifice erected by Aristotle and the Commentator, we have just recognized a first crack, an indication of impending ruin; we are going to discover a second one, wider and deeper.

The passage from the *Summulae* that we have just quoted continues in these terms: "The center of the World is said to be immobile by equivalence, but in reality it is mobile, although the Earth never experiences a general movement. Notice that the places designated by the words up, down, are marked by comparison with the center. For this distinction of places into high places and low places, it does not matter the immobility of an indivisible center that some physicists imagine... It only matters that the center is not animated by a translational motion. »

Thus the center of the world is the geometrical point which is at equal distance from all the parts of the celestial surface; provided that Heaven has no other movement than a rotational one, we are assured that it is always identical to itself *by equivalence,* even if the body within which it is realized at each moment is mobile. The Earth does not undergo any overall displacement; it could experience some; some contemporaries of William of Occam maintain that it turns on itself [83] in twenty-four hours: Others attribute to it small incessant movements to which Albert of Saxony will soon give great importance; according to these physicists, the part of the Earth which contains the center of the world changes from instant to instant; in reality, this center moves, but the new center is, with respect to the celestial sphere, in a position equivalent to that which the old one occupied; the center of the World remains the same by equivalence.

Neither Aristotle nor Averroes would have been satisfied with this immobility by equivalence for the center of the World; according to them, the revolutions of the celestial bodies supposed a center which was really immobile, and for this point to remain really immobile, it was necessary that it was in a body deprived of any movement: thus, the rotation of the Sky required the existence of an absolutely fixed Earth.

This argument, which Occam is careful to recall, becomes null and void as soon as an immobility by equivalence is sufficient for the center of the revolutions of the celestial orbits. The head of the Terminalist School recognized that his theory entailed this consequence, which he formulates in these terms:

"The celestial body moves around the Earth, which remains at rest in the center of the world; however, let us be clear that we could suppose the Earth to be in motion and that the center of the world would still remain immobile, whereas Heaven would no longer move, in fact, around an immobile body; It would nevertheless continue to move; it behaves in such a way that if there were a motionless body at its center, its various parts would constantly approach or move away from the parts of this motionless body. »

The *Summulae* end with this reflection: they could hardly contain any more important one.

Occam takes up the proposition that Duns Scotus had formulated in a somewhat enigmatic form. For Heaven to accomplish its revolution, it is not necessary that the changing positions of its parts be compared to a motionless body endowed with an actual existence. The *Venerabilis Inceptor is* not satisfied with merely formulating this proposition; he also indicates the principle which explains it and which [84] erases its paradoxical character: For this movement of Heaven to be possible, it is sufficient that we can conceive of a fixed reference point in relation to which the position of Heaven changes from one moment to the next. The immobile term without which we cannot conceive local motion does not need to be a concrete and actual body, as Aristotle and Averroes wanted; it is enough that it is an ideal body, according to what Damascius and Simplicius had once stated.

# XI. - WALTER BURLEY

One could not expressly attach Walter Burley to any School; he inaugurates this broad eclecticism which, in the fourteenth century, prints a special stamp on the Terminalists of the University of Paris. To build his theory called "place[[116]](#footnote-117)", he draws his inspiration from Duns Scotus as well as from Saint Thomas Aquinas and Gilles of Rome, from William of Occam as well as from John the Canon and Peter Aureoli; from each one he borrows some thought; to all of them he addresses certain criticisms. His defects, as well as his qualities, are due to his eclecticism: he sometimes lacks this dogmatic clearness and this logical rigor which a less open and less welcoming mind would perhaps have possessed.

How should we understand the Aristotelian definition of place: *ultimum continentis?* Should we admit, with Occam, that the place is the containing body itself or a certain volume included in this containing body? Burley refuses to do so[[117]](#footnote-118). By Occam's own admission, if we admit this definition, we can attribute to a body an infinite number of different places; in the thickness of the layer which envelops the body housed, we can cut out a second layer which also envelops it; in the thickness of the second, we can cut out a third, and so on indefinitely; in Occam's sense, each of these envelops is a place of the body, like the one into which it was cut out, like the one which will be cut out of it.

Moreover, Walter Burley does not have, against any reality attributed to the surface, the repugnance of the *Venerabilis Inceptor*, if he admits that a body is necessarily extended in all dimensions, he thinks, with Duns Scotus, that an accident of this body can very well be attributed to the surface only, without affecting in any way the depth of it; to the formula by which the Peripateticians define the place: *ultimum continentis*; he thus does not hesitate to allot this direction: the surface of the container.

As these words indicate, the place is not simply the surface; it results from the union of two elements, the surface first, and the action of containing (*continentia)* second; this opinion of Burley is in conformity with that of Duns Scotus.

Very consistent also with the doctrine of Duns Scotus is the distinction[[118]](#footnote-119) between the place and the ubi; the ubi is the effect produced in the housed body by that containing action which, united to the surface of the surrounding body, constitutes the place; in an immediate and intrinsic way, it is not the place, but the ubi which is the term of the local movement.

After clarifying the definition of place, Burley addresses the crucial question: Is place still?

Among the answers which have been given to this question and which he will examine, the first is that proposed by Gilles de Rome[[119]](#footnote-120): In the place, we must distinguish between matter and form; matter, which is the surface of the body containing it, moves at the same time as this body; form, on the contrary, remains immobile when the body contained does not move, [86] because it is the distance of this same surface from the supreme orbit, or even from the poles and the center of the World.

"Others" - it is St. Thomas Aquinas to whom Burley now refers - "others say, and this amounts to much the same thing, that the ultimate part of the container has no *ratio loci*, except in virtue of the order and position it occupies in relation to the celestial sphere. »

To these theories, Walter Burley objects to the reasons that John the Canon and William of Occam have already opposed to them; he also raises a new argument against them:

"Let us imagine that a body remains immobile in the middle of the air, for example, and let us suppose that the divine power imposes on the whole of Heaven and on the whole of the elements a rectilinear movement towards the East; the part of the Universe which was to the West of the body moves closer to it; the part which was towards the East moves away from it; one of the poles of the World becomes closer to this body and the other less close[[120]](#footnote-121); the distance of this body from the center of the World has become smaller or greater than it was. Now, as this body has remained immobile, it must have remained in the same place, and consequently the place of this body must have remained invariable. However, the situation of this place in the Universe, its distance to the poles and to the center, did not remain identical; this situation, this distance to the poles and to the center, are therefore not the formal element of the place. »

To claim that God can give the Universe an overall movement was, for the Peripatetic Philosophy, to assert an absurdity. The condemnation made in 1277 by the theologians of the Sorbonne accustomed the minds to consider this same proposition as a truth. We have also seen Gilles de Rome insinuate and Guillaume d'Occam affirm that any theory of the place where the center of the Universe is considered as immobile must explicitly indicate this postulate. Walter Burley shows us how, in fact, the refusal of this postulate would render absurd the doctrines by which Saint Thomas Aquinas and Giles of Rome tried to save the immobility of the place.

These doctrines sin by the very basis. According to Walter Burley[[121]](#footnote-122), one cannot distinguish between matter and form in place. The place is a simple form, similar to any accidental form such as whiteness, heat, cold.

Duns Scotus, John the Canon, William of Occam, have reduced the immobility of the place to an immobility by equivalence; Walter Burley knows this theory and explains it in these terms[[122]](#footnote-123): "Suppose that I remain here, in this Sorbonne house, and that a great wind comes to blow around me in such a way as to constantly renew the air around me; if, however, I remain at rest, it is certain that I remain at a distance of invariable magnitude from the whole of Heaven, from the center of the World, or from any other immovable body; for example, there are at every moment as many leagues between England and myself as there were before. Therefore, the place in which I am does not remain the same numerically; but this place remains the same by equivalence with respect to the distance to immobile things; it is equivalent to a single place when it comes to producing or locating a movement. Thus, when the lodged body remains motionless, either its place remains numerically the same, or it is replaced by a place equivalent by its distance to other motionless objects, equivalent also for any local motion that begins or continues. »

Walter Burley declares that he will postpone the examination of the meaning to be attributed to this theory to another circumstance, and he returns to[[123]](#footnote-124) the question of the actual immobility of the place.

Nothing is mobile of itself but bodies; Walter Burley, who refused to look at William of Occam as a body, also refused him this proposition: the place is mobile of itself (*per se)*. On the other hand, he grants him that the place is mobile [88] by accident, i.e. as a result of the movement of certain bodies; the place of a body is the surface of the matter which surrounds this body; it therefore moves when this matter moves.

This proposition leads to consequences that scandalize. A body can change place without moving, it can move while keeping the same place. This scandal comes from a confusion[[124]](#footnote-125). One looks at the place as the term of the local motion; this is not so; the local motion is not a change of place, but a change of ubi. It is also perfectly true that a body cannot change its ubi without moving, that it cannot move while keeping the same ubi; but the same ubi can correspond to different places and the same place to different ubi.

This theory, perfectly in conformity with the thought of Duns Scotus and his most faithful disciples, such as John the Canon, singularly serves the eclecticism of Walter Burley; the substitution of the ubi for the locus comes very happily to put back in favor of the systems which he had said to condemn[[125]](#footnote-126).

Of this number are the systems that St. Thomas Aquinas and Giles of Rome have combined and which suppose the *ratio loci* or the formal place to be immutable.

The rational place[[126]](#footnote-127) of Saint Thomas Aquinas, the formal place of Gilles de Rome, change by the fact that the container moves, whereas the content would remain immobile; and that because the situation relative to the Universe, which constitutes this *ratio loci*, this formal place, is an attribute not of the contained body, but of the surrounding matter, and that an attribute cannot remain immutable when the subject which it affects varies.

But Walter Burley proposes a modification to this theory which seems to him to make it acceptable; it consists in saying "that the order that the housed body presents in relation to the supreme orb, to the poles and to the center of the World, that its distance to these same landmarks, is the formal element not of the place, but of the ubi; or better still that this order and this distance are the ubi itself... It is true, it is said, that the ubi is caused by the place; but [89] it is not necessary for the ubi to vary every time the place changes; a new place causes a new ubi only if this new place corresponds to a new order and a new situation in relation to the whole of Heaven and to the immobile poles[[127]](#footnote-128) . »

This definition, which identifies the ubi of a body with the distance of this body from other motionless bodies, is fully consistent with the one that assigns to local motion not the place, but the ubi: "One should not say: Every body moves by local motion which, from one instant to the next, behaves differently with respect to the place. We must say: Any body moves with local motion which, from one instant to the next, behaves differently with respect to a second body deprived of local motion. Any body, therefore, whose distance to a body devoid of local motion changes from one instant to another, becoming greater or smaller, is a body that moves by local motion. »

The transformation that Burley makes to the theories of Saint Thomas and Gilles Colonna is far from being entirely new; already Peter Aureoli had proposed to attribute to the housed body the characters that, under the name of *ratio loci* or formal place, his predecessors had attributed to the surrounding matter; but to this attribute of the housed body, he had kept the name of place, whereas the Peripateticists all agree to put the place in the container. Burley adopts in his system the reform proposed by Pierre Aureoli; but he is careful to leave to the word *place* its peripatetic meaning; what Aureoli defined under the name of place, he identifies it with the ubi considered by the Author of the *Six Principles* and by the Scotists.

After having exposed the theory of the permanence of place by equivalence, Burley had postponed the discussion and interpretation of this theory. If we compare what he said then with what he has just said about ubi, we will easily recognize that we now have the right meaning, the "*bonum intellectum"* of these words: two equivalent places. Two equivalent places are obviously two specifically [90] distinct places, but which, in the lodged body, cause the same ubi.

Thus the eclecticism of Burley, which, already, had made concur in the formation of a single doctrine the various attempts of Saint Thomas Aquinas, of Gilles de Rome and of Peter Aureoli, manages to join to this doctrine the theory of the equivalent places, formulated by Duns Scotus, by John the Canon and by William of Occam.

We will see Burley follow further in the footsteps of Doctor Subtle and the *Venerabilis Inceptor*.

According to the definition given by Burley, the ubi of a body is the position of this body in relation to other immobile bodies; local motion, which is a change of ubi, is a change of the situation that the mobile body occupies in relation to fixed bodies. "All motion presupposes a motionless body[[128]](#footnote-129), as is said in the book *On the Movements of Animals*. Indeed, for a body to move, it must be, at each instant, otherwise than it was before; for this, there must be an immobile reference point in relation to which it behaves, at each instant, otherwise than it did before. For this, it is necessary that this reference point is absolutely immobile, or that it possesses the rest opposite to the movement of the mobile, either that it does not participate in anything in this movement, or that it participates in it, but with a lesser speed. If a man were heading towards Saint-Denis, and another were following him on the same road with exactly the same speed, the relative position of these two men would not change. »

From a similar observation, François de la Marche had concluded that a body could serve as a place for another even if it were not immobile; it was sufficient, according to him, that it possessed the immobility opposed to the movement that the body housed by it could take, a movement for which it must serve as a reference point. Burley restricts[[129]](#footnote-130) the scope of this proposition; he does not apply it to the place in general, but only to the natural place: "The concavity of the lunar orbit is the natural place of the fire, and yet this orbit moves; but its motion is not the natural motion by which the fire moves towards its concavity. It is said, it is true, that a motion whose goal is itself in motion is an idle motion. I reply that if a body were moving towards a goal which was also moving in the same direction as the body and with the same speed, this movement would be idle; indeed, the mobile would never be able to reach the goal; and this is the meaning that must be attributed to the words of the Commentator. But this movement would no longer be idle if the goal did not move in the same direction as the mobile, or did not move with the same speed; so it is when the fire moves towards the concavity of the lunar orbit. When, therefore, the Philosopher wants the natural place to be immobile, it can be understood that this place must not move by the natural motion by which the body it is to house tends towards it. »

This does not mean that the reference frame used to define the ubi of a body and to determine its local motion is not required to be absolutely motionless. What is true of the natural place and the natural motion is not necessarily true of the ubi and the local motion. "Bodies are assigned[[130]](#footnote-131) a natural place in view of their natural rest rather than in view of their local motion. "Without exception, when Burley defines the ubi of a body, when he determines the local motion, he assumes that this definition, that this determination, is made by comparison with an absolutely immobile reference frame.

Is this fixed point of reference necessarily a concrete body, existing in a current existence, or is it sufficient that it can be conceived without being realized? That this last opinion is that of Walter Burley, we cannot doubt; indeed, on the subject of the place and the movement of the last celestial sphere, he fully admits[[131]](#footnote-132) the opinion of William of Occam.

The supreme Heaven is in one place *per accidens*, and that by its [92] center, which is in the immobile Earth. "If someone says to me: Heaven would still be in one place, as it is now, if the Earth were moving, I will grant it. If this objection is made: Heaven can only be in one place by its center if the central body is immobile, I reply that Heaven is in one place by its center, either if the central body remains at rest or if it moves. Heaven, in fact, behaves in such a way that the situation of each of its parts in relation to the parts of the central body would change from one moment to the next if there were a motionless central body. In fact, the central body by which Heaven is in one place [namely, the Earth], is an immobile body; but if one were to suppose that this central body were to move, Heaven would still be in one place by its center; because, in this case again, Heaven's manner of being would be such that if the central body were immobile, the disposition of Heaven's parts in relation to the parts of this latter central body would be changeable from one moment to the next. »

To this, Burley adds a not very logical reflection: "If the Earth moved with the same speed as the Sky, one could still say that the Sky would be in a place by the indivisible center of the whole Universe; because, with respect to this center, the various parts of the Sky would behave differently from one moment to the next. »

Moreover, Walter Burley does not seem to have always followed rigorously and to its last consequences the theory whose principles he posed.

The Universe," said Duns Scotus, "could rotate even if it contained no body; it could still rotate, for example, if it were formed of a single sphere, homogeneous in all its extent; the motion of rotation, taken in itself, is therefore a certain *forma fluens*; and this form can exist by itself, without the need to consider it in relation to another body, either containing or contained; it is a purely absolute form. Look for an answer. »

The question posed by the Subtle Doctor seemed to lose its enigmatic character thanks to the theory of William of Occam, a theory that Burley adopted. And yet, far from [93] seeing in this doctrine the solution of the enigma, Burley seems singularly intrigued by it:

"God, he says[[132]](#footnote-133), created a discontinuous World, made up of distinct parts; it is by virtue of this discontinuity that each of the parts of the World is in a particular place; but God could just as well have created a World that was continuous in all its parts; he could have created only an absolutely homogeneous sphere. Let us imagine, then, that at the moment of creation, God, instead of creating this Universe, had created an absolutely homogeneous sphere. Every body is in a place; this spherical body would therefore be in a place. It would not be in a place by its parts; none of its parts would be housed, because the place is a container separated from the content, and in this continuous body there would be no separation. Therefore, this body would have to be in a vacuum. Those who believe in the creation of the World are therefore obliged to admit the void.

"This can be answered in the following way: Those who speak in the name of faith maintain that God could have created such a perfectly continuous spherical body occupying all the space that our Universe occupies. Speaking then as physicists, they are bound to recognize that such a body cannot be housed either in parts or in the terminal region of a containing body, since no body would exist outside of it; they would simply conclude that it is not necessary for a body to be in one place.

"But will it be said that God could move such a World, either by a movement of rotation or of translation, by transporting it to another place? Every local motion requires a place... If, then, one imagined that such a continuous body existed and that there was nothing outside this body, God could not give it a translational motion unless he created at the same time a place towards which he would move it; God could not move this body by a rotational motion, or else it would have to be admitted that the rotational motion that he would impart to it is not a local motion, but a motion relative to the situation. »

94] All these difficulties, as Albert de Saxe will soon show us, can be dissipated with the help of the very principles of which Walter Burley is a supporter. Let us leave these doubts aside, then, and return to the author's own theory, in order to emphasize its essential characteristics.

The doctrine that Walter Burley has formulated concerning place and local movement is a synthesis in which the various attempts of the most eminent doctors of Scholasticism have come together. Let us stop for a moment to contemplate this synthesis, and let us try to mark its dominant characters.

Aristotle had defined the place of a body by this formula: The ultimate part of the container. He had wanted to impose immobility on this place, so that it could serve as a term of comparison in the determination of local motion. However, the immobility of the place was visibly incompatible with the first definition; hence the necessity to modify this definition. This indispensable modification, the Stagirite had accomplished it only in an implicit form and, so to speak, in a surreptitious way; hence, equivocations in the use of the word "place"; hence, illogicalities in the theory of place and local motion.

This splitting of the notion of place, which the Philosopher had practiced reluctantly and as if on the sly, is clearly affirmed in the theory of which Walter Burley exposes to us the more or less completed form.

In this theory, the place keeps the definition that Aristotle had first given it; but to the place thus defined, immobility is not granted; one refuses to use this place in the description of local motion.

The fixed element that serves to identify the movement is not the place, it is the ubi of the mobile. The ubi of a body is the position of this body in relation to other fixed bodies. These fixed bodies, moreover, which serve as terms of comparison for the definition of the ubi and the determination of the local motion, do not need to be real and concrete bodies; it is enough that they are conceived by reason.

If the place that Walter Burley considers is indeed such as it first presented itself to Aristotle's thought, the ubi that he [95] conceives is identical in every way to the qšsij of Damascius and Simplicius. In the synthesis of which Burley has traced the plan, the doctrine of these two philosophers is harmoniously united with that of the Stagirite.

# XII. - JOHN OF JANDUN

Part of the theory constituted by Averroes, the doctrine which deals with the place, its immobility, its relationship with local movement, was gradually modified by the thinkers of the Middle Ages; the Thomistic School first, then the Scotian School, and finally the Terminalist School, gradually gave it a form in which the primitive peripatetic background hardly shows. It is the same, moreover, for a crowd of other questions; a slow but continuous work constitutes little by little this teaching, very distant sometimes from the commentaries of Averroes, and even from the thought of Aristotle, that one names in the Middle Ages the *Parisian Philosophy*.

However, in Paris itself, some masters tried to keep the tradition of Averroes intact, whom they considered to be the faithful repository of Aristotelian wisdom. In the first part of the 14th century, the most illustrious of these masters was Jean de Jandun.

John of Jandun is not unaware of what St. Thomas, Giles of Rome and Duns Scotus have written on the subject of the place; he even adopts certain parts of it, but it is to embed them in an exposition which recalls as closely as possible that of the Commentator.

John of Jandun gives his theory of the place in several questions which he wrote on the *Physics* of Aristotle, on the *De Caelo et Mundo*, on the treatise *On the movement of animals*. It would not be without interest to know the date on which these various questions were composed; we could, indeed, with more certainty, follow the progressive progression of the thought of the famous Averroist, and also recognize the influence that this thought may have exerted on the opinions of his contemporaries or that it may have suffered from them. Here, in this respect, is an indication:

When John of Jandun, in the course of his questions on the *De Caelo*, quotes Saint Thomas Aquinas, he calls him[[133]](#footnote-134): frater Thomas; when he discusses the doctrines of the same doctor in his questions on *Physics*, he calls him[[134]](#footnote-135): sanctus Thomas; now, it was in 1323 that John XXII canonized Thomas Aquinas; we can therefore conclude that the first of these two writings was composed before 1323, and the second one after that date.

The reading of the questions on the book *On the Movement of Animals*, and even on the whole collection of Aristotle's *Parva naturalia*, in which this book is included, has not provided us with any information of the same nature. We can however make a remark: When in his questions on the *De Caelo*, John of Jandun examines [[135]](#footnote-136)this problem, to which Averroes and his successors attached great importance: Is the existence of the Earth necessitated by the movement of the Sky, he treats it with extreme conciseness; he limits himself, as it were, to formulating propositions, and, for the demonstration of these propositions, he refers several times to the book *On the movement of animals*; it seems that these references are not only aimed at Aristotle's text, but also at the questions which John of Jandun has joined to it ; several of these questions, indeed, have for object to discuss in great detail the problem which the single question on the *De Caelo* exposes so summarily ; this one seems to be only a summary of those. If this hypothesis were founded, we would have to admit that the *Quaestiones de motibus animalium* are the oldest among those we will have to study.

In any case, it is probable that the various questions *on the movement of animals*, on the *De Caelo*, on *Physics*, whose doctrine is very homogeneous, were written at times [97] not very far apart, starting around the year 1323. At this time, it is at the University of Paris that the famous Averroist developed his teaching; we see, indeed, that in 1316[[136]](#footnote-137), he was master of arts at the University of Paris and canon of Senlis; On November 11, 1323[[137]](#footnote-138), he finished in Senlis his book *De laudibus Parisius*, so rich in useful teachings for the historian; he was still in Paris in 1324[[138]](#footnote-139), and it is only around 1326 that his quarrels with Pope John XXII forced him to seek refuge with Louis of Bavaria. Later he taught at the University of Padua[[139]](#footnote-140).

Between certain opinions which Walter Burley has indicated about the place and those which we are going to meet in the *Questions* of John of Jandun, the resemblance is sometimes striking; certain sentences of one of the two authors are found almost verbatim in the other; from one to the other, there was certainly a transmission of certain thoughts.

But in what sense did this transmission occur? Was it Walter Burley who alluded to the doctrines of John of Jandun? Was it John of Jandun who was inspired by the reflections of Walter Burley? Between these two suppositions, it does not seem to us that the choice results from absolutely determining motives. We would rather lean towards the first hypothesis; it is tenable, because Walter Burley, appointed canon of Evreux in 1342[[140]](#footnote-141), was still living in 1343; his commentaries on Aristotle's *Physics* can thus be posterior to the questions of John of Jandun.

The Averroist master defines the place[[141]](#footnote-142) as Aristotle did: the place of a body is the ultimate part of the matter which contains this body. But by this ultimate part we must not understand (this was, as we have seen, Occam's opinion) a certain [98] volume of the containing body, bordering on the contained body; the place has length and width, but it has no depth; from the material and quantitative point of view, it is a simple surface.

It resides in the containing body and not in the contained body; in this respect, it must be distinguished from the ubi; the ubi, whose definition John of Jandun, like Duns Scotus, borrows from the Author of the *Six Principles*, is the essential and intrinsic term of the local movement; the place is not its term, or else it is its term only in an extrinsic and mediate way, through the intermediary of the ubi of which it is the cause.

Is the place merely surface? To this question Jandun answers[[142]](#footnote-143) by borrowing from Saint Thomas Aquinas the opinion he expounded in his opuscule *De natura loci*.

Of this opinion, however, he discusses and rejects the first part; he is not satisfied that one distinguishes the place from the surface of the containing body by saying: "The surface is the limit of the containing body considered in an intrinsic way to this body: the place is this same limit of the containing body, considered in an extrinsic way, as a limit of the contained body. »

But if this distinction seems insufficient to him, he fully accepts, on the other hand, the considerations that Saint Thomas has added to it. The place is not only the ultimate surface of the container; it is also a virtue, suitable for preserving the content, with which this surface is endowed and which it takes from Heaven. There are thus two elements to be considered in the place: first, the surface, which is in a way the material element and which takes its place in the category of quantity; second, the virtue proper to the preservation of the content, which plays the role of a formal element and which must be placed in the category of quality.

After having analyzed the nature of the place, Jandun studies its immobility[[143]](#footnote-144); in what sense can we say that the place is immobile?

Two theories, which tried to safeguard the immobility of the place, solicit Jandun's attention: one is that of Saint Thomas, who attributes mobility to the material place and immobility to the *ratio loci*; the other is that of Giles of Rome, who attributes to the place an immobile matter and a mobile form; the canon of Senlis also rejects these two theories, to which he opposes exactly the arguments that the Scotists and William of Occam objected to.

The place, concludes Jandun, is not mobile by itself, because it is not a body; but it is mobile by accident; attribute of the ambient matter, it is mobile with this matter. This conclusion is also that of Burley, who has, we believe, borrowed it from the Averroist master.

The questions of this one, moreover, do not make any allusion either to the theory of immobility *by equivalence which* developed Duns Scotus, his disciples and William of Occam, nor to the theory of Burley, more recent perhaps, which substitutes for the immobility of the place the immobility of the ubi.

What then is the meaning that can be attributed to this proposition: The place is immobile? Jandun indicates two.

First of all, we can say that the place of a body is immobile because the movement of this body does not necessarily entail the movement of the place. Thus the banks and the bed of a river are the immobile place of a ship floating on the waters of this river, because the ship can move without these banks and this bed changing place. In the same way, we can say that the concavity of the lunar orbit is the place of the fire; if a part of the fire moves downwards, it is not necessary that the portion of the lunar orbit which contained this fire follows it in its descent, and this although this orbit moves itself, but with another movement.

This example leads to the second meaning that Jandun attributes to the immobility of the place: When a body moves towards a certain place and this place is the term where it should naturally be at rest, this place is not animated by the same movement as the mobile body.

Jandun insists on this point that the second meaning of the word immobile relates only to the natural place, while the first can be understood as referring to the place in general. If we are to believe Jean le Chanoine, François de La Marche had expressed similar opinions, but always understood them as referring to the place in general. Walter Burley, on the other hand, who seems here again to have been inspired by John of Jandun, sets forth similar considerations only by restricting them to the natural place.

The famous problem of the place of the ultimate orbit holds Jandun for a long time[[144]](#footnote-145); he reviews the various opinions which were emitted on this subject, and he discusses them minutely. Against the theory proposed by Saint Thomas in his commentary to the *Physics* of Aristotle, he takes up the arguments of Gilles of Rome. At the same time that he rejects this theory, he refutes the objection which the Angelic Doctor had put forward against the solution of Averroes; the central body is, it is true, by its substance, foreign to the supreme sphere; but it is not entirely extrinsic to it, because it is contained by it.

Among the answers which have been given to the difficult question which Jandun examines, there are two which seem to him to be defensible: one is that which has been formulated by Avempace, taking up, according to Averroes, the opinion of Al-Farabi; the other is that of the Commentator himself. Between these two answers, the canon of Senlis defends himself from choosing in an exclusive way; it seems, however, that he leans towards that of Averroes; he applies himself to dissipate the doubts which it could suggest.

Among the difficulties which are likely to give rise to such doubts, there is one which Thomas Aquinas had already examined in his opuscule *De natura loci*: "A beginner," says Jandun, "could be stopped by the following doubt: If the supreme orb is in one place by its center,... the same is true, and for the same reason, of the other orbs; ... each orb is thus housed *per accidens*; but, if we except the supreme orb, each orb is also housed *per se*, for another body surrounds and contains it. The same body would thus be at the same time in a place *per se* and in a place *per accidens*. "Thomas Aquinas, in his opuscule, did not hesitate to consider this conclusion as logically deduced and acceptable. The opinion of John of Jandun seems more hesitant: "Perhaps," he says, "there is [101] no inconvenience in this being so, provided that the body housed is, on the one hand, in a place *per se* and, on the other hand, in a place *per accidens*, in relation to various bodies; if it were in relation to the same body, and in the same way, it would be impossible. »

This difficulty is not the only one that Jandun examines; but the others, as he points out, have to do with problems which are examined in the treatise *On Heaven* and in the book *On the Movement of Animals*. Let us therefore have recourse to the questions on this last book, because Jandun examined there in great detail the relation which unites, according to the peripatetic teaching, the fixity of the Earth to the movement of Heaven.

For an animal to progress, must there be a fixed body outside of it?

"The reason why the movement of Heaven requires a fixed body outside of Heaven also proves that the movement of the animal requires an immobile term; and even, according to the Philosopher, it is more powerful in the latter case.

"Here is the reason common to the movement of Heaven and to the movement of animals: to move is to behave now in a different way than before; therefore, there must be a reference point in relation to which the way of being of the mobile changes from one moment to the next. But what moves, moves in geometric space (*super magnitudinem*); therefore, there must exist in geometric space an object in relation to which the situation of the mobile changes with time. Now, if we say that the mobile behaves differently, in relation to a certain object, at different times of duration, it is because this object is immobile. This object, in fact, can only be mobile or immobile. If it is immobile, the proposition is acquired. If it is mobile, we would have an infinite succession of mobiles, which is impossible.

"If this volume, which is to serve as a reference point, were to move entirely with the same motion as the mobile, in the same way, in the same direction, with the same speed, the mobile's way of being would not change from one moment to the next. Thus, in order for a body to move, there must exist outside it a motionless body, or at least a body that does not move with the same motion and speed. »

The canon of Senlis develops these same considerations three[[145]](#footnote-146) times; they reproduce moreover almost verbatim what Pierre d'Auvergne had written in commenting on the same work.

The purpose of these considerations is to firmly establish the peripatetic axiom: All motion presupposes the existence of a fixed reference frame. John of Jandun invokes, moreover, this axiom in several other writings[[146]](#footnote-147).

This axiom, Albert the Great, did not admit its generality; he wanted to restrict it to movements caused by an intelligence (such as the movements of the heavens) or by a soul (such as the movements of animals); natural movements, the fall of the grave, the ascent of light bodies, did not seem to him to require the existence of a fixed term of comparison.

John of Jandun, on the other hand, supports the universality of the principle formulated by Alexander, by Themistius, by Simplicius and by Averroes; the natural movements of serious or light bodies are no exception. "To this question[[147]](#footnote-148): Does a grave body require the existence of a fixed body towards which it moves? I answer: Yes. Both light and heavy bodies move in order to reach rest; all natural motion is ordered to this object that the mobile rests in its own place. If there were no end to the movement, this movement, which could not reach its end, would be a vain movement, or else the movement of light or heavy bodies would continue ad infinitum; both of these suppositions are naturally impossible. Now, it is clear that if the place towards which a body moves were in motion, and not at rest, it would be in vain that the body moved towards this place... It is therefore manifest that the place which serves as the end of natural motion must be immobile. Therefore, every inanimate body that moves requires the existence of an immobile term towards which it moves. »

"But perhaps you will still have doubts about this proposition: The place which serves as the end of natural movement must remain immobile. It seems, indeed, that this proposition is false; the first heaven is the natural place of the lower elements, and yet it moves; the same could be said of fire, and of air, and of water. It must be understood that the place must either be absolutely immobile, or at least free from the movement by which the body moves towards it, a movement in relation to which it plays the role of natural place. Although the first heaven is constantly moving with a circular motion, it is free from any centripetal or centrifugal motion, which allows it to be the place of the grave and light bodies and to serve as a term for their movements. »

Jean le Chanoine attributed these same considerations, and almost in the same terms, to François de la Marche; we have read them in the *Questions sue la Physique* which Jean de Jandun probably wrote after his *Quaestiones de motibus animalium* ; we read them also in the commentaries of Walter Burley, who had probably borrowed them from the canon of Senlis; here, they are presented close to the reflections which seem to have been the first source; we want to speak about the reflections consigned by Pierre d'Auvergne in his commentary to *De motibus animalium*.

The axiom which Jandun proclaims to be necessary for any movement applies in particular to the movement of Heaven. It is therefore necessary for Heaven to have an immobile reference point to which it can be compared when we speak of its movement[[148]](#footnote-149).

To say that it is immobile is to say that, by nature, it could move; but nothing is susceptible of movement except a body.

This body cannot be formed of celestial matter; no part of it can be immobile. It cannot be outside of Heaven, for outside of Heaven there is no body. It is therefore surrounded by Heaven.

"This fixed body is the Earth, in relation to which Heaven in motion behaves differently at different times. Considered in its totality, Heaven changes in relation to the Earth as to its disposition, but not as to its whole; as to the parts of Heaven, each of them experiences, in relation to the Earth, both a change of disposition and a displacement of the whole. Such is the opinion supported by the Commentator in the fourth book of the *Physics*. »

This opinion of Averroes, John of Jandun analyses it more completely than any of his predecessors. Here, in fact, is how he takes up[[149]](#footnote-150) point by point all the preceding argumentation, summarizing with a rare precision the peripatetic tradition which ran from Aristotle to Averroes:

In the first place, "Heaven moves with a uniform and perpetual motion..."

"Secondly, I say that this movement requires the fixity of a certain bodily object. To move, indeed, is to behave now in a different way than before. But if there were no corporeal object that was fixed in relation to Heaven, one could not say that Heaven behaves differently now than it did before... To behave differently, indeed, can only be by comparison with something fixed, for it is by comparison with uniformity that all diversity is recognized. Therefore, there must be a fixed object with respect to which we can say that Heaven behaves differently now than it did before. And this something is necessarily a body; in relation to an indivisible one, in fact, [105] Heaven would always behave in the same matter, and not in a way that varies from one moment to the next. It is therefore required that this object be a body. »

"In the third place, I say that this fixed landmark does not belong to Heaven... It must be foreign to Heaven and be what is called the center of the World. »

"But, you may ask, what is this center of the world? One could understand by it a point such as all the lines led from this point to the circumference of the Sky would be equal between them; it is not this point which one intends to designate when one speaks about the object which remains fixed compared to the Sky. One can, by another interpretation, understand that this word of center designates all the Earth;... it is the whole Earth that plays the role of center with respect to Heaven and its movement; the Earth is like a point with respect to Heaven; it is not, however, a mathematical point; it is a body endowed with a certain volume; and this is necessary, as has been said above; if the Earth were not a body of a certain extent, it could not be said that, with respect to it, Heaven behaves in various ways at various times, because, with respect to an indivisible, its situation would always be the same. »

This last remark, to which Jandun returns insistently, was worth making; inadvertently, no doubt, Burley thought[[150]](#footnote-151) that one could speak of the change in the situation of Heaven in relation to an indivisible center.

The canon of Senlis describes[[151]](#footnote-152) with great precision this change in the disposition of Heaven in relation to the Earth:

Heaven," he says, "can be both the first of the fixed bodies and the first mobile. But a body can be mobile in two ways: It can be mobile according to its substance (*secundum subjectum*) or only according to its form (*secundum formam*). A body is said to be mobile according to its substance when it undergoes an overall displacement from one place to another... It is mobile according to its form when it experiences only a change of disposition. Let us consider Heaven, which does not change its location with respect to Earth;... at two different moments, it is clear that Heaven is not disposed in the same way with respect to Earth... Let us divide Heaven by means of an infinite number of meridians and let us also divide Earth by means of an infinite number of meridians; to the first meridian of Earth let us correspond the first meridian of Heaven, to the second the second, and so on. A moment later, each of the meridians of Heaven looks at another meridian of the Earth. Heaven is thus immobile in substance, for its total mass never moves from one place to another; but it is mobile in form, that is, in disposition, for its situation in relation to the Earth, around which it moves, changes from one moment to the next. It is therefore in different senses that Heaven is said to be the first of the mobile and the first of the fixed bodies. »

John of Jandun thus resolves an apparent antinomy which is raised by the theory of the movement of Heaven; other similar antinomies are offered to the one who ponders this theory.

Among these antinomies, the most serious is this one, which already attracted the attention of Albert the Great: According to the preceding doctrines, it is the Earth which constitutes the place of Heaven, and the movement of Heaven could not occur if the Earth were not immobile; it seems therefore that the existence and immobility of the Earth are causes of the fixed position occupied by Heaven and of the movement which animates it[[152]](#footnote-153). Is it not impossible that the cause is less noble than the effect?

Also it is not the position of the Earth that fixes the position of Heaven, nor the immobility of the Earth that produces the movement of Heaven.

It is the position occupied by Heaven that determines the location of the center of the World; it is Heaven that gives the various parts of the Earth the gravity by which they move towards the center of the Universe. It is therefore the position of Heaven that determines the position of the Earth. "If one were to move Heaven, by the same token one would move the Earth. »

The immobility of the Earth is the effect, not the cause, of the [107] movement of Heaven. "According to Aristotle, it is because of the movement of Heaven that all the parts of the Earth tend to the center... We can therefore reason as follows: The Earth is immobile by the effect of gravity; but Heaven is the cause of gravity; Heaven is therefore the cause of the Earth's immobility. »

This doctrine fits well with the principle that Aristotle formulated[[153]](#footnote-154) in the first book of the Meteors, and which dominates all the Astronomy and Astrology of the Middle Ages: The world of the elements is governed by the movements of the celestial bodies; any virtue that is encountered in this world derives from these movements.

From this principle follows a corollary universally accepted by Peripatetic Philosophy: In the world of the elements, every generation and every corruption of a new being or of a new quality is dependent on the changes of aspect of Heaven.

This proposal is used as a starting point by John of Jandun in the new argumentation[[154]](#footnote-155) by which his *Quaestiones in libros de Caelo* pretend to link the immobility of the Earth to the mobility of Heaven.

The generations and corruptions that occur in the region of the elements require that there be an object in relation to which the disposition of Heaven changes from moment to moment, that is, that there be in the concavity of Heaven an immobile central body. The movement of Heaven thus requires the immobility of the wandering in order to put into this movement the diversity that the generation of the lower beings and, particularly, of the animals requires.

This argument revives an objection that seemed to have been dispelled; it seems, in fact, that the generation of inferior beings and, consequently, the immobility of the Earth, are the final cause of the movement of Heaven; what is less noble in the Universe would be proposed as the object of the movement of the most noble body.

108] This conclusion is not [[155]](#footnote-156)absolutely repugnant to John of Jandun. Undoubtedly, the generation and preservation of beings which subsist in the region of the elements is not the direct and principal final cause of celestial movements, but it can be admitted that it is the final cause in an indirect and secondary way.

The immobility of the Earth is not the cause of the movement of Heaven; it is no less a necessary condition[[156]](#footnote-157).

Therefore, it is absolutely impossible for the Earth to move or to deviate from the center of the World[[157]](#footnote-158).

In order for Heaven to accomplish its uniform revolution, the Earth must remain motionless in its center. If the Earth were to move, Heaven would have to stop; if it were to be driven out of its place, Heaven would either have to move too, or its movement would have to end.

Now, these two hypotheses are impossible. Heaven, which, strictly speaking, is not in one place, cannot undergo any overall displacement. Nor can it interrupt its rotational movement; if it ceased to rotate, it would cease to exist, and its motor would also cease to exist. These propositions are one of the essential parts of the Averroist doctrine, and here is how John of Jandun summarizes their justification:

"If objects are ordered to a certain end, these objects cease to exist as soon as this end is missing. »

"Now the Heavenly Engine and Heaven itself are ordered to the movement of Heaven, and this is how: The purpose of the heavenly Engine is to spread its goodness among beings. But it cannot spread its goodness without the intermediary of motion; for by itself the first Mover could only exert a uniform influence; in order that it may exert a variable influence, it must be assisted by some object whose manner of being changes from moment to moment; Heaven, thanks to its motion, supplies it with this object. Thus the heavenly Engine cannot spread its goodness among beings without the intermediary of Heaven, whose manner of being must, for this purpose, change from moment to moment; and Heaven's manner of being changes from moment to moment only because of the motion of this body; it is therefore quite correct to say that the heavenly Engine and Heaven itself are ordered with a view to motion, which is their end. »

"Therefore, if the movement were to fail, Heaven and its Engine would cease to exist,... which is impossible. »

God, who is this first Mover, this Mover of Heaven, could not therefore move the Earth: the consequences which would follow from this movement, and which we have just highlighted, are contradictory.

In all this argumentation, there is almost no proposition which is not among those of which the doctors of the Sorbonne, under the presidency of Stephen Tempier, did rigorous justice. By the condemnations which they carried in 1277, the theologians of the Sorbonne are found to have cleared the way for the system of Copernicus; how, indeed, could this system have been proposed if the philosophers, siding with the opinion of John of Jandun, had regarded the movement of the Earth as a logical absurdity, challenging even the omnipotence of God?

# XIII. - ALBERT OF SAXONY

From St. Thomas Aquinas to Walter Burley, a slow and continuous evolution turned the masters of Scholasticism away from the theory of place that Averroes had formulated, and brought them to a doctrine that closely recalls that of Damascius and Simplicius.

This evolution was interrupted by a sudden and complete return to Averroism, attempted by the most brilliant of the Commentator's fourteenth-century supporters, John of Jandun.

The system of Jean de Jandun clashed head-on with the opinions that were then favored by the University of Paris.

The arguments that served to build this system used, as axioms, various propositions borrowed from the philosophy of Averroes, and most of these propositions were among those that the Assembly of the Doctors in Sorbonne had formally condemned in 1277.

On the other hand, the corollaries of this system were to conclude that it was impossible for a celestial orb to move in a rotational motion that did not have a stationary body at its center; according to these corollaries, the motion of an epicycle or an eccentric became inconceivable; It is by a true illogic that John of Jandun kept his confidence in Ptolemy's system; if he had been consistent with his own principles, he would have, like his master Averroes, rejected the astronomy of the Almagest to rally to the theory of homocentric spheres.

To fight the reborn Averroism; to call the doctrines of Physics to the rescue of the theological decisions formulated by the Sorbonne; to safeguard the threatened system of Ptolemy; with this aim, to revive the tradition of Duns Scotus, Occam, Burley, that Jandun had broken; such will be the work of the Terminalist School of Paris and, in particular, of its most brilliant representative in the middle of the XIVth century, Albert of Saxony

Like John of Jandun, like Walter Burley, Albert of Saxony defines[[158]](#footnote-159) the place of a body: the surface by which the container touches this body; but he does not give this formula the meaning that Jandun and Burley attribute to it: "Those who look at the surface as an indivisible reality added to the body take this proposition at face value. "Albert of Saxony is not one of those who follow the opinion of Duns Scotus in this way; he ranks himself, on this subject, among the faithful disciples of Occam; he refuses to consider the various magnitudes which the geometer considers, line, surface, volume, as realities distinct from the body: "It is a sin[[159]](#footnote-160) to account for things by invoking a greater number of realities, when we can account for them by means of a lesser number; now, if we suppose that magnitude is not a reality distinct from the extended body, we invoke a lesser number of entities than if we made this magnitude and this body two distinct realities, and yet we explain all things equally well. »

Albert de Saxe's opinion on this subject was common to all the Terminalists of the Parisian School. His illustrious contemporary Nicole Oresme published a treatise[[160]](#footnote-161), as yet unpublished, in which he deals with the measurement and geometric representation of all kinds of quantities and qualities. In this treatise, Nicole Oresme insists several times [[161]](#footnote-162)on the principle: The point, the line, the surface, do not exist in reality; they are abstractions that one imagines in order to know the measures of things; but if one wants to attribute to these indivisibles a physical reality and to consider them as endowed with quality, one runs up against contradictions.

When Albert de Saxe defines the place as the surface of the container, he does not take this formula literall[[162]](#footnote-163); in reality the place is a body; if he substitutes the word surface for the word body, it is in order to mark that the container is a place by the fact that it touches the content, and that this contact is established only according to the two dimensions of a surface, without the depth playing any role there.

112] The place being in reality a body, a part of the containing body, we can attribute to the same body a series of different places, each of which is contained in the preceding one. Occam had formulated this proposition, which follows from his definition of place, and Burley had argued against it. Albert de Saxe fully sides with William of Occam; here is the statement he gives[[163]](#footnote-164):

"To one and the same contained body correspond an infinite number of places properly so called. The orb of the Moon, in fact, is the proper place of all the lower bodies. Now, it is clear that this orb has a certain thickness. Let us divide this orb into two halves by a sphere which is concentric to it; one of these two halves will be immediately adjacent to the fire and the other will not; the first of these two halves will still be the place of the whole of the inferior beings, for it contains this whole and nothing else. The first of these two halves will still be the place of the whole of the lower beings, because it contains this whole and nothing else. The half of this half will likewise be the place of this whole, and so on ad infinitum... The reasoning that we have just made about the lunar orb can be repeated about the proper place of any body. »

It is a sin, says Albert of Saxony following the *Venerabilis Inceptor*, to multiply beings without necessity. He will not therefore make of the place an entity added to the surface. He will agree to say[[164]](#footnote-165) that the place is like a passion of which the surface of the container is the subject, but by that, he will only understand that the word place comprises a more particular designation than the word surface; in addition to what the word surface marks, the word place indicates that this surface contains some other body; from the point of view of reality, the place, the surface and the body are one and the same thing.

Albert has fully admitted the definition of the place that William of Occam had posed; it follows that he must also admit the opinions of the *Venerabilis Inceptor* concerning the immobility of the place.

113. The place is a body; the place is therefore mobile[[165]](#footnote-166), in spite of the assertions of the Commentator and his supporters.

This movement of the place does not necessarily result from the movement of the contained body. The contained body can experience a rotational movement without the locus changing; "the wine can rotate in the pint even though the pint remains at rest"; but this is true only of the rotational movement; if the contained body experiences a translational movement, the locus of this body necessarily moves; "if a stone falls into the water, the walls of water that formed its locus come, at every moment, to join behind it".

The place moves when the containing body moves; it does not follow that the contained body moves at the same time; "otherwise, the towers of Notre-Dame would move unceasingly, because the air which surrounds them changes at each moment".

But this is the movement of the material place; can we not, with Gilles de Rome, say that the formal place of the towers of Notre-Dame does not vary, because this formal place is constituted by the distance of these towers from the celestial orbit or from some other fixed body, and that this distance always remains the same?

It is not true that the distance of a motionless body to the celestial orb or to another motionless body always remains the same. The Terminalists do not admit that a mathematical quantity, considered in isolation, has any reality; the distance of two bodies is nothing apart from the bodies that lie between the first two; when these intermediate bodies change, it does not remain the same distance, it becomes another distance. "The towers of Notre Dame have been immobile for a long time; and yet, during all this time, their distance from the orb of the Moon has not remained the same; the intermediate bodies, in fact, have changed: the air and the fire that lie between these towers and the lunar orbit are constantly moving; now the distance is nothing other than the intermediate bodies between the two distant bodies. »

114] Between two immobile bodies, the distance does not always remain the same, but it remains the same *by equivalence*; at two different times, the distances of these two bodies are numerically distinct; but they are equivalent to each other; the geometer attributes to them the same measure.

It is in this sense that it is appropriate to modify the definition of the formal place that Gilles de Rome had given: "One names *formal place* the distance of the body housed to the lunar orbit or to the objects of this World which remain immobile;... when one speaks of distance to the orbit or to the immobile bodies, one wants to say that the same place always corresponds to an equal distance, and a distance of different magnitude to another place; one regards a distance as remaining the same by equivalence, and not in the numerical sense. " - "... One can say then that a body remains motionless when it remains in the same place, by hearing the word place in the formal sense, and by taking the words: *the same* not literally, but as an *equivalent* signifier... In this sense, I can say that I am at this moment at the same place as at the beginning of the lesson, because the distance between the lunar orbit and me has an equal length to that which it had then, and that it is the same of the distance between one of you and me. »

Here is Albert of Saxony now grappling with the problem that Averroes called a great question: Is the last sphere in one place?

Inspired by Occam's definition of place, Albert's answer is formulated even more clearly than that of the *Venerabilis Inceptor*; the desire to dispel certain doubts which had embarrassed Walter Burley certainly contributes to the precision of this answer.

The ultimate sphere, the ninth sphere, according to the unanimous opinion of astronomers at the time, has no place[[166]](#footnote-167), since it has no container. It has no place either by itself, taken as a whole, or by its parts[[167]](#footnote-168), contrary to what so many authors have maintained, from Aristotle and Themistius to St. Thomas Aquinas. Can we, at least, say with the Commentator that the supreme orbit is in one place by accident, namely by its center? Even if the Commentator's opinion can be understood in a correct sense, as we shall soon see, the expressions he uses are improper[[168]](#footnote-169); strictly speaking, the ninth sphere has no place, even by accident.

The Scotists such as John the Canon refused the last orb any kind of place; but they granted it a ubi, ubi of a particular kind, moreover, to which they gave the name of active ubi; to the ninth sphere, deprived of place, will Albert also attribute a ubi?

Disciple of Occam, Albert of Saxony does not admit the existence of this entity which the Scotists designate by the name of ubi. According to the disciples of Scotus, "the predicate ubi designates a certain real relationship[[169]](#footnote-170), distinct from substance and quality; this relationship comes from the circumscription of the body contained by the place. In their opinion, for a body to be said to have an ubi, there must be a real relation distinct both from the place and from the body contained in it; the body contained would be the subject of this relation, which would be in the place, only as a relation... But this opinion is not correct... It unnecessarily superimposes a new reality on the place and the body contained... The terms of the predicament ubi are not to be regarded as things distinct from substance and quality. »

Therefore, if we say that a body has a ubi[[170]](#footnote-171), that it is somewhere (*alicubi*), we simply mean that it is above, or below, or beside, or around some other body; [116] in this sense, we can say that the ninth celestial sphere has a ubi, because it is true that it surrounds the other spheres and that it is above these spheres.

We can say that a body is in a place when there is a term of comparison such that we can recognize that this body is moving; it is in this sense that the Commentator could say that the Earth was the place of Heaven; it is indeed the position of Heaven in relation to the Earth that makes us know the movement of Heaven. "But this way of speaking is improper.

How can the last sphere, which has no place, move with local motion? This cannot be; therefore "the last sphere moves with a motion which is of the same kind as the local motion, but which is not however a local motion[[171]](#footnote-172)".

This motion, which is not local motion, but which is of the same kind as local motion, is that of which the Universe would be animated if the first Cause were to impart to it a translation[[172]](#footnote-173); for the Universe has no place, so that it is incapable of local motion. It is true[[173]](#footnote-174) that Aristotle and the Commentator would deny that the Universe can undergo a translation; but[[174]](#footnote-175) one of the articles decreed by the theologians of Paris maintains that God can move it in this way.

However, to demonstrate the impossibility of such a movement, don't we have this proposition, formulated in *De motibus animalium*, that every body that moves requires a fixed body outside itself? With infinite good sense, Albert of Saxony rejects[[175]](#footnote-176) the authority of this text which so many commentators had invoked before him: "In the *De motibus animalium*, [117] Aristotle speaks only of the progressive movement of animals; in its movement, every animal needs a fixed support... But Heaven has no need of such a support. »

But can't we demonstrate otherwise the impossibility of a translation of the Universe? "To move[[176]](#footnote-177) is to behave at each moment in a different way with respect to a fixed object. If there were no fixed object, it would seem that Heaven could not move. »

This argument, which Walter Burley accepted, is not convincing: "For a body to move, it is not necessary that, from one moment to the next, it behaves differently with respect to an extrinsic object; it is sufficient that it behaves differently in an intrinsic way. If God imposed a translational motion on the entire Universe, which one of the articles formulated in Paris declares to be possible, the Universe would not change from one instant to another with respect to an extrinsic object; but it would experience an intrinsic change; at each instant, in fact, there would be a new part of motion in it. »

One by one, we see the arguments by which, from the movement of the Sky, the Peripateticians and Averroists concluded to the necessity of an immobile Earth at the center of the World.

Moreover, the link that these arguments claimed to establish between the uniform rotation of a celestial orbit and the presence of a motionless body at the center of this orbit clearly does not exist: "According to the astronomers, the epicycle rotates around its own center; and yet, in this center, there is no motionless body; the spherical mass of the epicycle moves as a whole. "The Peripatetians and Averroists claimed to oppose Ptolemy's system with the proposition that they flattered themselves to have demonstrated; Ptolemy's system is now invoked to condemn this proposition.

It is therefore false to claim that the rotation of Heaven requires the presence, at the center of the World, of a motionless Earth in relation to which the position of Heaven can change from moment to moment [118]. "The Earth and Heaven could both move, and yet, although the Earth was not at rest, the position of Heaven in relation to the Earth would change from moment to moment. Only in the case that the Earth and Heaven would rotate in the same direction and with the same angular speed of rotation would the position of Heaven in relation to the Earth remain invariable. »

Among the arguments which, from the movement of Heaven, conclude to the rest of the Earth, there remains one to which Albert of Saxony declares to give his approval rather than to all the others; it is the argument proposed by John of Jandun: The generation and the corruption of the sublunary beings require that the situation of Heaven with respect to the Earth changes from moment to moment; then, since Heaven moves, it is necessary that the Earth remains motionless. But," adds Albert, "it is not necessary for this to remain immobile in an absolute manner; it is sufficient that it does not rotate in the same direction as Heaven and with the same angular speed of rotation. »

In no way, therefore, does the movement of Heaven require the immobility of the Earth; if the Earth is immobile, its rest must be proven by other reasons.

The peripatetic and Averroist theory that Albert has just rejected was coupled, in the Middle Ages, with another theory which was very similar to it and which claimed to supplant it.

Guided by certain passages of the Scriptures, a good number of theologians wanted, beyond the various mobile heavens that the astronomers had imagined, to pose a last immobile Heaven; Isidore of Seville, Bede the Venerable, Raban Maur, the Pseudo-Bede, Saint Anselm, Pierre Lombard, had admitted this supposition. In support of this theological opinion, many had sought physical reasons; Michael Scotus, William of Auvergne, Saint Bonaventure and Vincent of Beauvais had opened this way. Certain physicists, embarrassed by the "great question" of the place of the ninth sphere, thought to find the solution by resorting to this immobile tenth sphere; this "Empyrean", this "aqueous Heaven", enveloping the last orbit, provided it with a place; it was the fixed term to which the movements of the heavens could be related; it would establish fixity at the two poles around which all the other orbs turned.

It seems that this theory was already in use at the time of Saint Bonaventure and that some of his words[[177]](#footnote-178) allude to the role of universal place attributed to the Empyrean; he speaks of it, in fact, as an immobile orb "which is containing and not contained".

In any case, the doctrine in question is clearly formulated in the *Theory of the planets* that Campanus of Novara wrote at the request of Pope Urban IV[[178]](#footnote-179). Here are the terms in which the learned astronomer that this pope had taken for chaplain expresses himself:

"Beyond the convex surface of this ninth orb, is there something else, another sphere for example? This conclusion is not imposed by necessity of reason. But, instructed by faith, acquiescing with respect to the opinion of the holy doctors of the Church, we will confess that beyond this ninth heaven is the Empyrean, where the dwelling of the good spirits is. »

Is the Empyrean the tenth heaven, directly adjacent to the ninth orbit? Between this orbit and the Empyrean, is it necessary to place a watery sky, which would attribute to the supreme sky the eleventh rank? Campanus hesitates between these two parties. But it is with confidence that he formulates the following conclusion:

"Beyond the convex surface of the Empyrean there is nothing; it is the supreme limit of all corporeal things, the surface farthest from the common center of all spheres, that is, from the center of the Earth. That is why it is the general and common place of all things that are contained, for it contains all things, and nothing foreign contains it. "120] These last words: "*Omnia continens et a nullo alio contenta*" reproduce almost verbatim the formula used by Saint Bonaventure.

Already Duns Scotus, in his *Quaestiones quodlibetales*[[179]](#footnote-180), had laid bare the inanity of such a theory: "To say that the last sphere does not move would be to affirm that it does not move with the local motion of which it is capable; but of what local motion would it be capable if it is not in any place? The hypothesis of an immobile Empyrean recedes, without solving it, the difficulty relative to the place of the supreme orb; such is the natural corollary of the remark we have just borrowed from the Subtle Doctor.

Like his master John Duns Scotus, John the Canon makes a brief but formal allusion to this theory[[180]](#footnote-181): "The question of the place of the first motive gives rise to difficulties among philosophers, but not among theologians; according to the philosophers, in fact, the first motive is not surrounded by any body, but it contains them all; according to faith, on the contrary, it is surrounded by the Empyrean. " Very judiciously, Jean Marbres adds: " But the difficulty which the philosophers meet to give a place to the first mobile, faith finds it when it is a question of attributing a place to Empyrean; indeed, although this sky does not move, God could move it; and however, during this movement, it would not be contained by any body. »

Albert of Saxony, who, [[181]](#footnote-182)like John the Canon, rejects the hypothesis of a tenth immobile heaven, gives us the reasons invoked by the supporters of this supposition: "Every body which moves by local motion must be by itself (*per se*) in a place; the last sphere being, by itself, in motion, must be in a place by itself; now, this would not be the case if there did not exist above it a motionless sphere which contained it; the place, in fact, is the ultimate part [121] of the containing body, and the place must be motionless; it is necessary, therefore, that beyond all the mobile spheres, there should exist a stationary sphere.

"Some physicists, it is true, try to solve the same difficulty in another way; they say that what assures a place for the supreme orb is its position in relation to the Earth. But this solution is worthless; in relation to the supreme orb, the Earth does not possess the properties appropriate to the place; it does not contain the body housed, it is not equal to it, etc. Moreover, the natural motion must be ordered to the place and to the nature of that place; yet in no way is the natural motion of Heaven determined by the Earth. »

"No body which, by itself, is mobile, has, in itself, its fixed support; it needs, outside of itself, an immobile body which provides it with this fixed support, as we see in the book *On the movement of animals*; but the celestial orbs cannot find in the Earth the principle which fixes them; it would rather be the opposite which would be true; it is necessary, therefore, among the celestial orbs, to place an immobile Heaven, from which all the others draw their fixity. »

These are the reasons given by the supporters of the new hypothesis to substitute it for the hypothesis of Aristotle and Averroes; but the arguments by which Albert of Saxony ruined the latter are just as strong to overturn the former. The first mobile moves on the spot, with a rotational movement, without its fixity needing any extrinsic support, whether this support is the Earth or the Empyrean; if it has no translational movement, it owes it "to its nature and to the will of God".

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# XIV. - THE SCHOOL OF PARIS: MARSILE D'INGHEN. GEORGES DE BRUXELLES. PIERRE D'AILLY. NICOLAS DE ORBELLIS. PIERRE TATARET

John of Jandun had proposed a theory of place and local movement which was a return to the Averroist doctrine; [122] he had tried to divert scholastic philosophy from the path where Saint Thomas Aquinas had started it, where Scotists and Occamists had, over and over again, made it progress. Condemned by Albert of Saxony, this attempt does not seem to have been successful in the University of Paris. Without concern for the opinion of the Averroists, the doctors of the house of Sorbonne and the masters of arts of the rue du Fouarre shared their favors between the scotian doctrine and the occamist doctrine.

These two doctrines had, moreover, a common part of great importance.

On the very nature of the place, the thought of the disciples of Duns Scotus was in opposition with that of the Terminalists.

For the former, the surface of the containing body was a reality distinct from this body itself; this reality served as a support, a subject to a certain entity which constituted the place. For the second, the surface had no reality independent of the body; the place was not an entity added to this surface, but an additional indication; in reality, the body, the surface and the place were only one and the same thing.

Deeply divided as regards the nature of place, the Scotists and the Occamists were united in the same doctrine when it came to specifying the role that place plays in local motion; on the subject of the immobility of place, of the location of the supreme orbit, of the relationship that the immobility of the Earth has to the movement of Heaven, they expressed the same thoughts in the same terms. Starting from two different and, so to speak, opposite metaphysics, they arrived at the same consequences in the field of Physics and Astronomy.

Among the masters of the University of Paris, some, on the subject of the theory of the place, adopted the Occamist doctrine, others the Scotist doctrine; some of them, and not the least, could hesitate between these two doctrines and give their assent sometimes to one and sometimes to the other; one of the most illustrious, at the end of the 14th century, Marsilio d'Inghen, was successively, in this question, a disciple of Occam, then of Duns Scotus

From Jean Marsile d'Inghen we have two writings on Physics.

123] A fashionable professor, whose listeners were too numerous for the classroom, Marsilio set out to write books which were true textbooks. These *Abridgments* - so he called them - dealt with the various parts of Peripatetic philosophy. Of these *Abridgments*, only one has come down to us; it is the one[[182]](#footnote-183) in which are exposed the "books of Physics such as they are usually taught in Paris". But, at the beginning of this writing, the author tells us that it forms the second volume of his *Abridgments*, of which the first volume has already been made public; and, in the course of the work, he quotes[[183]](#footnote-184) the *Abridgments* of the *De anima* and of the *Seconds Analytiques*.

Marsilio dedicated another work to the *Physics* of Aristotle; this one consists of a series of questions [[184]](#footnote-185)written on the model of the questions of Albert of Saxony, where Physics is treated "according to the method of the Nominalists".

That the *Abstract* and the *Questions* are indeed by the same author, [124] one cannot doubt it. On all the essential points, the same conclusions are supported by the same arguments and, very often, almost in the same terms. Certain nuances, however, distinguish these two works from each other. In both, Marsilio d'Inghen shows himself to be a disciple of the Parisian Terminalist School or, to put it more accurately, of Albert of Saxony. But, in the *Abrégé*, the fidelity of the disciple goes to the point of servility; his writing. often resembles an extract of the *Questions* composed by Albert of Saxony. In his *Questions*, on the contrary, Marsilio d'Inghen shows a greater independence; more often than not, the titles of the *Questions*, the order in which each one of them is treated, are borrowed from Albertutius; but the conclusions supported by the disciple are not always those of the master; those, sometimes, are directly opposed to them. It seems that the Abstract is the work of a beginner too timid to dare to change anything to the received teaching; the *Questions* reveal to us a more mature and more sure philosopher, who dares to propose new solutions or to take again those which his initiators had rejected.

What Marsilio d'Inghen says about the place, in his *Abridgement of Physics*, is nothing but a faithful summary of the doctrine of Albert of Saxony.

"The word: place[[185]](#footnote-186) can be taken in two ways, in the literal sense or in the vulgar sense. In the literal sense, the place is the internal surface of the containing body, immediately contiguous to the contained body. In the vulgar sense, the place designates the immobile object or the object moved by another movement which serves, as a term of comparison, to perceive that a certain body is in motion..."

"The place proper is not a surface without depth... Every surface has depth. It follows that any body has an infinite number of places properly so called; indeed, each surface layer cut out of the containing body and contiguous to the contained body constitutes such a place properly so called; now, there are an infinite number of such surface layers; one [125] may take the last third of the containing body, that which immediately touches the content, or the last quarter, or the last thousandth, and so on without end. »

This doctrine is indeed that of William of Occam and Albert of Saxony. Marsile d'Inghen, who adopts it in his *Abridgement of Physics*, rejects it in his *Questions*[[186]](#footnote-187):

"On this issue," he says, "there are two opinions. »

"The first opinion admits that the surface is not a real thing, indivisible in depth, which differs from the body; that the surface is the body itself which is considered and measured only in two dimensions. Those who admit this opinion say that the place is the body of the container considered in those of its parts which touch the content; when they define the place as being the ultimate term of the container, they mean the last part of the container on the side of the body contained. From this principle, they conclude that the same body has an infinite number of places; for the same contained body, in fact, the last third of the container is a place, and also the last quarter, and the last hundredth, and so on ad infinitum..."

"The second opinion admits that the surface is a real thing, indivisible in depth, having only length and width; it admits that the line and the surface are things distinct from the body. »

"I believe this second opinion to be truer than the first, for it is more in accord with what the mathematicians say, and also with what the Philosopher wrote in the sixth book of the *Physics*. It is therefore not necessary to suppose that the place is a body, but the surface of a body. »

This conclusion is consistent with the doctrines of Duns Scotus and Walter Burley.

Moreover, Marsilio of Inghen does not follow further the way traced by the Scotists; he does not make the place an entity superimposed on the surface of the containing body; strictly faithful to the teaching of Albert of Saxony, he admits that the place has, with [126] the surface, the same relationship as passion has with its subject; but he simply understands by this that the expression: *place* designates something more than the expression: *surface*, in that it implies the idea of containment with regard to the housed body.

We have just pointed out a discrepancy between the theory which the *Questions* set out and that which the *Abstract* summarizes; it is the only one that can be found between the passages which these two works devote to the place; it is also the only one which separates, on this subject, the teaching of Marsilio of Inghen from that of Albert of Saxony; Apart from this point, the agreement is perfect between these two teachings, so perfect that it would be idle to analyze here what the disciple repeats, after the master, in questions to which he has precisely given the titles and imposed the order that Albertutius had adopted for his own questions.

Let's just point out a precision added by Marsile to the proposals formulated by his predecessor.

Albert of Saxony has repeatedly stated that the movement of a body does not presuppose the concrete existence of an immobile extrinsic body; for the body to be in motion, it is sufficient that its manner of being undergoes an intrinsic change.

On the other hand, it is quite certain that we cannot imagine this change, except as a change of position with respect to a certain term of comparison considered as immobile. The opinion supported by Albert de Saxe consists therefore in affirming that this term of comparison does not need to exist in a current and concrete way, that an abstract existence is enough. But this opinion does not deny that all motion presupposes the possibility of conceiving an ideal term of comparison to which our reason relates the positions of the mobile. Albert de Saxe had neglected to give, on this subject, the indications that William of Occam and Walter Burley had already provided.

Marsilio d'lnghen takes up these indications with more insistence than his predecessors: "A body is said to move by local motion," he writes[[187]](#footnote-188), "when it changes from moment to moment its overall position or that of its parts with respect to another immobile body, or at least when it behaves in such a way that it would change its position with respect to an immobile body, if one existed. »

Marsilio, moreover, well understood the importance of this restriction, for he formulates it a second time[[188]](#footnote-189), almost in the same terms: "For a body to be able to move with local motion, it is not necessary that it be in one place; it is enough that it has, at each instant, a different position from the one it had before, this position being related to a motionless object ; or, at least, this body would behave differently, from one instant to another, in relation to a motionless object, if there were such an object; I say this for the case where we suppose that the whole Universe moves either by a translational motion or by a rotational motion. »

One cannot therefore conceive of the local motion of a body without conceiving of a fixed reference point to which one relates the position of this body at each instant; but, in order for the motion in question to be realized, it is not necessary that the term of comparison, immobile, exist in a current and concrete manner. This fundamental principle, laid down in antiquity by Simplicius, was taken up again in the 14th century by the most famous Parisian Terminalists, by William of Occam, by Walter Burley, by Albert of Saxony, by Marsilio of Inghen.

However, in this same School of Paris, there are philosophers who do not want to renounce the opinion of Averroes; they think that any real local movement requires a fixed term of comparison whose existence is not purely ideal, which is realized in a current and concrete way in one of the bodies of the Universe.

Among these there are some, like John of Jandun, who remain faithful to the Commentator's doctrine to the end and who attribute to the Earth this role of fixed reference point of all these local movements. There are others who place this immobile term in the Empyrean imagined by certain theologians. We have seen St. Bonaventure and Campano de Novara formulate this hypothesis; we have heard John the Canon mention this theory and point out its illusory nature; we have also heard Albert of Saxony explain it in detail and refute it.

Marsilio d'Inghen makes a brief mention of this hypothesis[[189]](#footnote-190) when he examines whether the last celestial sphere is in one place: "There is an opinion according to which there would be no last sphere; beyond the eighth sphere, or the ninth if one counts nine, there would be an infinite immobile sphere. "Undoubtedly, Marsilio did not attach much value to this opinion, because after having mentioned it, he neglects to discuss it and to say what he thinks of it.

Georges de Bruxelles is hardly known except for a commentary on the *Summulae logicales* of Pedro Juliani (*Petrus Hispanus*), a commentary which had, at the beginning of printing, a rather large number of editions. It is known that he taught in Paris around the year 1420, and his doctrines are, in general, very respectful of those that Albert of Saxony had professed. He seems to be the real author of *Questions sur les Météores d'Aristote* which, since the 15th century, by an obvious error, were often attributed to Jean Buridan[[190]](#footnote-191).

In this work, the author, in imitation of Albert of Saxony, repeatedly studies the small movements that the Earth can experience and the slow displacements that result for the oceans and for dry land. To speak logically about these movements, he had to relate them to a fixed reference point, and this reference point could not be the Earth, whose movements he was proposing to analyze. He therefore takes as a fixed term a *real* or *possible* sky, which can be the Empyrean or any other sky; it is to this *caelum quiescens* that he constantly relates the position of the earth and the seas: "In order to avoid any quibble[[191]](#footnote-192) , as many parts of the earth can move or be generated, I make this hypothesis, which is true or merely possible (*pono ymaginationem possibilem vel veram*), namely, that there is a constantly motionless heaven, whether it be the Empyrean or another heaven..."

It is the use of this immobile sky, real or fictitious, which allows Georges de Bruxelles to formulate statements such as this one[[192]](#footnote-193): "If one admits that the Ocean constantly moves backwards on one side while it advances on the other, it is necessary to change unceasingly the position of the average meridian of the habitable earth with respect to the sky which one supposed immobile (*in ordine ad caelum ymaginatum quiescens*). »

Such a use of an immobile heaven, real or simply conceived, to which even the movements of the earth can be related, is very exactly in conformity with the principles laid down by the most eminent doctors of the nominalist school, by William of Occam, by Albert of Saxony, by Marsilio of Inghen. It cannot be confused with the opinion professed by Campano of Novara, opposed by Duns Scotus and John the Canon, treated with disdain by Albert and by Marsilio.

This opinion, which seems to have been rejected, in the 14th century, by the most authorized masters of the University of Paris, found, in the vicinity of the year 1400; a powerful defender; this defender was the *Eagle of France*, the bishop of Cambrai, cardinal Pierre d'Ailly.

In one[[193]](#footnote-194) of his *Fourteen questions on the Sphere of Sacro-Bosco*, which had such a great vogue and, on the teaching of Astronomy, such a powerful influence, Pierre d'Ailly wonders how many celestial orbs one should count:

"Beyond the mobile spheres, it is probably necessary to put an immobile sphere. There are several reasons for this. Here is the first one: First of all, we suppose that a body which moves by local motion changes its place either as a whole or by its parts... It follows that every body which moves by local motion is in a place, otherwise it could not change. Once these principles are established, we reason as follows: By hypothesis, every mobile sphere moves by local motion; therefore, according to the first principle, it changes place either as a whole or by its parts; therefore also, according to the second principle, it is in a place; hence, each of the mobile spheres must be in a place; it cannot be in a place by the sphere which is inferior to it, because the place must surround the body housed; each mobile sphere must therefore be housed by a sphere which is superior to it, so that beyond the mobile spheres, there must exist another sphere which remains in rest. »

This theory, which assigned for place to all the bodies of the World an absolutely fixed enclosure and containing all of them, seemed to be, moreover, the natural outcome of the Aristotelian tendencies; in the presentation that the Stagirite left us of his opinions on the movement and the place, one perceives at each moment a kind of embarrassment, from which are born obscurities and illogisms; and this embarrassment of the Philosopher comes from the impossibility in which he is, by the effect even of his astronomical doctrines, to meet at the limits of the World a rigid and absolutely fixed sphere.

In spite of the criticisms formulated by Jean le Chanoine and by Albert de Saxe against the hypothesis of an immobile Empyrean serving as a place for the supreme orbit, the great authority of Pierre d'Ailly and the vogue of the *Fourteen Questions* were going to give a renewed credit to this theological hypothesis, which was most often taken for an article of faith.

Nicolas *de Orbellis* or *Dorbellus* was a Franciscan; born in Angers, he taught at the University of Poitiers; he died in 1455.

We owe him a very concise manual in which the various philosophical writings of Aristotle are briefly explained and commented[[194]](#footnote-195).

The commentaries of Nicholas de Orbellis are composed [131] *secundum viam Doctoris Subtilis Scoti*. It is therefore not surprising that the theory of place[[195]](#footnote-196) which is developed therein is only a summary of the ideas scattered in the works of Duns Scotus. The professor of Poitiers insists, in particular, on this proposition: A motionless body, immersed in a mobile medium, changes unceasingly of place; but all these successive places are equivalent.

Concerning the place of the eighth sphere, although he only quotes Aristotle's opinion, he stops at Averroes', because he formulates his conclusion as follows: "One must assign a place to the sphere insofar as it is around something, around the middle or the center. One thus says well by declaring that the sky is in a place because its center is in a place ".

This conclusion does not contradict the opinions of Duns Scotus; however, it does not reflect them particularly clearly.

Nicolas de Orbellis adds this proposition: "It should be noted, however, that, according to faith, the first motive is in a place *per se*, because, beyond it, is the Empyrean sky, of which the philosophers have no knowledge: as for the Empyrean sky, it is not in a place, because, beyond it, there is nothing. »

This passage, too concise to be clear, seems to contain an adhesion to the theory of Campano de Novare and Pierre d'Ailly; the Empyrean is not in any place, but the author seems to admit that Heaven does not need to be housed, because it is immobile. If such is his thought, it falls under the blows of the very perceptive criticism of Duns Scotus, of which Nicolas de Orbellis shows himself here a very unfaithful disciple.

Pierre d'Ailly inaugurated the fifteenth century, in the first half of which Nicolas de Orbellis professed; it was towards the end of this same century that the Parisian Pierre Tataret composed his commentaries on the various writings of Aristotle[[196]](#footnote-197); Scholasticism was then in its decline; The manuals which claim to condense in a single volume all human wisdom are multiplying; but these manuals no longer contain anything but mediocre copies, dried-up abridgments of the books produced in the preceding centuries by the great thinkers of the School; it is in vain that one seeks in them original and fertile ideas.

Although Pierre Tataret, in many chapters of his work, is influenced by terminalist doctrines, he is above all a Scotist; he is, in particular, a Scotist when he develops the theory of place[[197]](#footnote-198); what he says about it is hardly more than a summary of the *Questions* of John the Canon.

Inspired by John the Canon, he distinguishes [[198]](#footnote-199)two senses. of the word: place. In the material sense (*pro per se denominato*), the link is the extreme surface of the containing body; in the formal sense (*pro per se significato*), the place is identical to the active ubi; it is a certain relation that has, to the housed body, the internal surface of the surrounding body.

He deviates, however, and probably inadvertently, from his model, when he declares that this active ubi is what is acquired by local motion; John Marbles, on the contrary, a faithful disciple of Duns Scotus, taught that the terms of local motion belonged to the category of passive ubi, an attribute of the housed body and not of the surrounding matter.

In the material sense[[199]](#footnote-200), the place, the surface of the containing body, is certainly mobile by accident. But the formal place, the *ratio loci*, is incapable of local movement, either by itself or by accident; on the other hand, this formal place is susceptible of generation and corruption; moreover, this formal place possesses immobility by equivalence. These propositions, by means of which Pierre Tataret summarizes his opinion on the immobility of place, are also the summary of what John the Canon taught on this subject.

133] Like Duns Scotus and all his followers, Tataret distinguishes [[200]](#footnote-201)two kinds of local motion: *ad locari* motion, which is that of most bodies, and *ad locare* motion, which is that of the supreme orb. One of the propositions he makes is noteworthy: "We do not say that a body moves, strictly speaking, by local motion, unless it approaches or moves away from an immobile object that we imagine or suppose. "Tataret therefore does not admit that this term of comparison should have a real and concrete existence. In this, his thought is in line with the common tradition of the Scotists and the Occamists.

When he comes to speak of the place of the supreme orb[[201]](#footnote-202), he is not only influenced by this tradition; he also seems to experience certain tendencies emanating from Pierre d'Ailly. Another thing is to speak of the supreme sphere according to the spirit of Aristotle, another thing is to speak of it according to truth and faith. Aristotle taught that the eighth sphere was the last one; but this is not correct, because beyond this sphere, theologians place three others; it is the eleventh one which they name the last sphere and the immobile sphere, and which they declare to be Paradise. According to the truth, the last sphere is in no place and is immobile; but if we mean the ultimate orbit in the sense in which Aristotle spoke of the eighth sphere, we may say that it is in a place, for it is fit to house other bodies, although it cannot itself be housed. »

Transmitted to Peter Tataret by Saint Bonaventure, by Campano de Novare, by Pierre d'Ailly, the hypothesis that makes a supreme immobile sphere the place of all bodies will be taken up by Copernicus.

# XV. - THE THEORY OF PLACE IN GERMAN UNIVERSITIES. CONRAD SUMMENHARD. GREGOIRE REISCH. FRÉDÉRIC SUNCZEL

134] At the end of the fifteenth century, a fairly large number of treatises on philosophy appeared in the German universities; but, in general, the teaching of these universities had not yet taken an original form. The masters who presided over the creation of these schools were often former students of the University of Paris; they brought with them, to Germanic lands, the doctrines and forms of exposition which were in vogue in Paris; and for many years, the lessons given in Heidelberg, Tubingen or Ingolstadt reproduced more or less those that could be heard at the Sorbonne or at Rue du Fouarre. Sorbonne or rue du Fouarre.

The Parisian masters who dealt with the theory of place divided their favors between the scotian doctrine and the terminalistic doctrine. We will not be surprised, therefore, to see the German masters rank themselves, on the subject of this same question, some among the disciples of Duns Scotus, others among the disciples of William of Occam and Albert of Saxony.

Conrad Summenhard, born in Calw in Würtemberg, had assisted the Count of Würtenberg, Eberhard V the Bearded, in the foundation of the University of Tubingen; this foundation was made in 1477. Rector of this university in 1483 and 1487, Summenhard died in 1501 in the convent of Schuttern.

In order to better mark, undoubtedly, his attachment to the party of the Ancients which, in the majority of the Germanic Universities, and particularly in Tubingue, fought against the *Moderns*[[202]](#footnote-203), (i.e. against the Terminalists, Summenhard gives to his treatise of Physics the form of a commentary to the writings of Albert the Great[[203]](#footnote-204).

135] When he expounds the theory of place[[204]](#footnote-205), Summenhard is clearly Scotistic; he even exaggerates the Master's tendency to multiply entities.

In analyzing the place, he finds four absolute realities and four relations. The four absolute realities are the contained body and its terminal surface, the containing body and its terminal surface. The terminal surface of the container is the subject of two relations; the first is the aptitude of this surface to house the contained body, the *locativitas*; the second, the *locatio*, consists in the fact that it houses it in an actual way. The terminal surface of the content is the seat of two analogous relations. Like Pierre Tataret, Summenhard distinguishes the locatio *pro per se denominato*, which is one of the four absolute realities listed above, namely the terminal surface of the container; and the locatio *pro per se significato*, which is one of the four relations, the one by which the surface of the container actually houses the content; he gives this relation the name of active ubi and reserves the name of passive ubi for the analogous relation which has as its subject the surface of the contained body. In the course of this analysis, he takes care to authorize himself of the opinions of Gilbert de la Porrée and Duns Scotus.

Moreover, he does not[[205]](#footnote-206) deal with the difficult question of the immobility of the place; he merely refers his reader to what the Subtle Doctor said about it.

In general, Summenhard affects to quote only very old authors. To this rule we have noted only two exceptions; one concerns the dissertation *Contra astrologos* composed by John Pico della Mirandola; the other[[206]](#footnote-207) is in favor of the *Margarita philosophica* of Gregory Reisch.

Gregory Reisch was, at the end of the 15th century and the beginning of the 16th century, prior of a Carthusian monastery near Fribourg; under the title: *Margarita philosophica, totius Philosophiae rationalis*, [136] *naturalis et moralis principia dialogice duodecim libris doctissime complectens*, he composed a kind of small scientific and philosophical encyclopedia, written in the form of dialogues. This work is dated, *ex Heidelbergo*, *III Kal. Januarii 1496* in a first edition which appeared without typographical indication of any kind[[207]](#footnote-208).

This little treatise, like most of the manuals that condensed in a small volume a great quantity of diverse knowledge, was extremely popular; from 1496 to 1583, it was printed a great number of times; in 1599, Jean-Paul Galluci still gave an Italian translation.

Although expressed with extreme conciseness, the opinions of Grégoire Reisch on the subject of the place are very close to those of Summenhard; more exactly, they are a very short summary of what one can read in the *Questions of* John the Canon.

To the ubi, which he defines[[208]](#footnote-209) as Gilbert de la Porrée, and which he qualifies as passive ubi, he adds the active ubi, such as Jean Marbres has characterized it.

He distinguishes between[[209]](#footnote-210) the material place, which is the extreme surface of the containing body, and the formal place, which is a relation of which the containing body is the foundation, and which has for term the contained body.

He teaches that a place can neither by itself nor by accident move by local motion, while it is susceptible of generation and corruption, as a result of the motion of its subject. "When a place is corrupted, the place which succeeds it [137] is identical to it, not in reality, but by equivalence. »

Such was indeed, in its essential features, the opinion of John the Canon.

With Summenhard, we had heard a convinced supporter of the Ancients; let us now listen to a disciple of the Moderns.

Founded in 1472, the University of Ingolstadt was five years older than the University of Tubingen; as in Tubingen, two professors of philosophy taught simultaneously in Ingolstadt, one the doctrines of the old Scholasticism, the other the newer doctrines of Terminalism[[210]](#footnote-211). Summenhard, in Tubingen, guarded the tradition of the old masters with such superstitious respect that among the authorities constantly invoked in his book, one would look in vain for the name of a Nominalist. At the same time, Frederick Sunczel was expounding Physics in Ingolstadt. In his *Questions*[[211]](#footnote-212), whose titles and disposition are often borrowed from Albert of Saxony, it is the pure doctrine of the Parisian Nominalists that is most often proposed to the reader. Frequently, the author quotes Marsile d'Inghen, whose pupil he had perhaps been and who was certainly, in Germany, the most powerful promoter of the terminalistic Philosophy.

Like Albert of Saxony and, no doubt, like most of the masters who taught in the rue du Fouarre in the 14th century, Sunczel is more concerned with Physics than with Metaphysics; the innumerable entities that the too subtle Scotism multiplies seem to him somewhat chimerical.

There are philosophers, he says[[212]](#footnote-213), who amplify at pleasure the material of relations and forms, they posit six entities [138] distinct from each other, three in the place and three in the body housed. In the place, there is first the surface or the entity of the surface; then the *locativitas*, by which the place can receive and contain the body; finally the active *locatio*, by which the place actually contains the housed body. In the housed body, there is first the entity of the housed body, that is, the content; then the *locabilitas*, which is the ability of this body to be contained or housed; finally the passive *locatio*, by which the body is actually contained and housed... But all these relations do not exist in reality; they are only in the minds of those who imagine them. Is the place a relation or not? Is a relation something or nothing? Did Aristotle mention ratios or not? These questions are objects of quarrel between metaphysicians, but not between naturalists nor between physicists. »

Sunczel is not much of a metaphysician; he is even too little. Most Scholastics have, before him, distinguished two elements combined together to constitute the place, a formal element and a material element; the professor of Ingolstadt also wants to consider a material place and a formal place; but how crude is the opposition he establishes[[213]](#footnote-214) between them! The material place is the containing body itself; the formal place is the surface by which the containing body borders on the contained body. "The concave surface of the orb of the Moon is the formal place of fire; the material place of this same fire is the orb of the Moon taken as a whole. »

After that, it is not surprising that Sunczel did not add any original solution to what the Scholastics had said about the difficult problems of the theory of place. Is the place mobile or immobile[[214]](#footnote-215)? Does the supreme orbit have a place, and what is it[[215]](#footnote-216)? These questions are simply the occasion, for the Ingolstadt nominalist, to summarize in a dry and empty form the theories of Albert of Saxony.

139] A weakened echo of the teaching of the Parisians, Sunczel's writing deviates from it only in one point, and in a very unfortunate way; still, the crude ideas of this author on the material place and the formal place are not personal to him, because we are going to read them in the *Summa totius philosophiae* of Paul of Venice.

# XVI. - THE PARISIAN INFLUENCE IN THE SCHOOL OF PADUA: PAUL NICOLETTI OF VENICE; GAETAN OF TIEGNE

"The intellectual movement of the north-east of Italy, Bologna, Ferrara, Venice, is entirely linked to that of Padua. The universities of Padua and Bologna are really one, at least for philosophical and medical education. It was the same professors who, almost every year, emigrated from one to the other to obtain an increase in salary. Padua, on the other hand, is only the Latin quarter of Venice; everything that was taught in Padua was printed in Venice. It is therefore well understood that, by *School of Padua,* we mean here all the philosophical development of northeastern Italy[[216]](#footnote-217) . »

In the 15th century, and even during a good part of the 16th century, the most widely read, most often copied and, later, most often printed philosophical work[[217]](#footnote-218) was, without doubt, the encyclopedia entitled *Summa totius philosophiae,* composed by the Augustinian monk Paul Nicoletti of Udine, nicknamed Paul of Venice.

In the Philosophy of Paul of Venice, the Averroïst tendencies [140] are mixed, in a strange way sometimes, with the influence exerted by the Terminalist School of Paris; from this union between such radically heterogeneous elements comes out a doctrine difficult to characterize; it marks itself, too often, only by its mediocrity and its absence of logic.

These defects are quite apparent in the theory of the place that Paul Nicoletti exposes; it is made of reported pieces which were provided by Simplicius, by Averroes, by Saint Thomas Aquinas, by the Terminalists; its incoherence lets suppose that the author had very badly understood the various opinions that he welded together.

Paul of Venice distinguishes[[218]](#footnote-219) the material place and the formal place; the material place of a body is the containing body; the formal place is the extreme surface of the container, the surface by which this one touches the content; we pointed out the coarseness of such a conception, by speaking about Frederic Sunczel, who adopted it.

In the place, moreover, Paul Nicoletti does not distinguish only the material place and the formal place; he considers also[[219]](#footnote-220) the efficient place and the final place.

"The efficient place, it is a conservative virtue of the contents which resides in the surface of the container; it is this virtue of which Gilbert de la Porrée speaks when he says: The place is principle of generation. "It is also of this virtue that it was question in the opuscule *De natura loci* attributed to Thomas of Aquinas.

As for the final place, it is nothing other than the natural place.

All these distinctions have to do with the place itself, but for Paul of Venice there is also an improperly called place, and the latter can also be material, formal, efficient or final.

These various kinds of improperly said places are related to each other, moreover, in a way that is sometimes quite unexpected; here, for example, are the definitions of the improperly said material, formal and final places: "The improperly said material place is a certain volume attributed to [141] an entity which does not occupy space; it is of such a place that the Philosopher speaks in the first book of the *De Caelo*, when he says that Heaven is the place of God. The formal place [improperly called] is the situation which orders the parts in relation to the place; it is of this place that Simplicius speaks, in his commentary on the Categories, when he says that the place, by its own character, is in the category of the situation; by the character of the place, he means the form of this place or the order of the parts in relation to each other... The final place is the situation which is acquired by the local movement; in other words, it is this relation of ubi which the Philosopher frequently speaks about when he says that the movement is made in view of the place and that the place is the term of the movement. »

In this strange bringing together of disparate notions, we recognize, mixed and confused, all the influences, that of Saint Thomas as well as that of Duns Scotus, that of Occam as well as those of Burley and Albert of Saxony.

The opinion of Paul of Venice about the place of the supreme orbit is hardly less confused[[220]](#footnote-221). The supreme orbit is found in a place in an accidental way and by its center. This proposition, which our author formulates, summarizes the teaching of Averroes. But, by center, Averroes meant an immobile central body, of finite dimensions, capable of serving as a term of comparison in the study of the movements of Heaven. What logic such a theory contained disappears in Paul of Venice's summary: the latter, in fact, understands by center an indivisible geometrical point. "Although Heaven is divisible, it is in an indivisible place. Just as permanent beings are in an instant, because their duration is measured by this instant, so Heaven is in an indivisible point, because its movement is known by this point. »

The pamphlet *De natura loci* attributed to St. Thomas admitted that the celestial spheres inside the supreme orb were housed in two ways; each of them was, like the supreme orb, in a place by its center; on the other hand, accidentally, each of them was housed by the superior orb [142] which contained it. Paul of Venice undoubtedly wanted to reproduce this theory; but he distorted it to the point of making it unrecognizable. Instead of applying it only to the lower spheres, he applies it to the whole set of celestial spheres; he then teaches that this set is housed, on the one hand, by its center and, on the other hand, because the orbit of Saturn, which is part of it, is contained within the orbit of the fixed stars.

Paul of Venice, in imitation of Albert of Saxony, rejects[[221]](#footnote-222) the authority of the text that is borrowed from *De motibus animalium* to maintain that any mobile body requires the existence of a fixed body; Aristotle, he says, was speaking only of the movement of progression which, indeed, requires a support. Moreover, if he rejects this authority, it is not to refute the argument which, from the movement of Heaven, concludes to the immobility of the Earth. The argument that he proposes to fight is the one by which Campanus and Pierre d'Ailly pretended to demonstrate the existence of a supreme immobile Heaven, place of all the mobile orbs.

The movement of Heaven requires the immobility of the Earth; Paul Nicoletti adopts this conclusion and, to establish it, he invokes the reason proposed by John of Jandun: the perpetuity of the generation and corruption of living beings, which presuppose constantly varying celestial influences. Albert of Saxony had shown that this reason, supposing it to be well-founded, required only a relative movement of Heaven with respect to the Earth, without learning anything about the movement or rest of the latter; of this remark, so obviously true, Paul Nicoletti has no interest.

The *Summa totius philosophiae* of Paul of Venice is a textbook; its defects are indeed those which characterize a crowd of textbooks, in all times and in all countries; formulas of various origins are juxtaposed there in an artificial order which does not hide at all the disparity and the incoherence; In order to be more concise and summarized, these formulas have been emptied of the thoughts that gave them life; rigid, [143] dry and flat, they easily pile up in the minds of those who think they have acquired ideas when they have learned words; and as these are legion, the books that are suitable for them are always sure to be very popular.

The *Summa totius philosophiae* is not the only writing in which Paul of Venice dealt with Aristotle's Physics and, particularly, with the notion of place. On the eight books of the *Physics* and on the commentaries with which Averroes had enriched them, he composed a detailed[[222]](#footnote-223) *Exposition* .

This exposition is, without question, the most voluminous of the commentaries to which the *Physica auscultatio* had given rise until then; it fills an enormous folio volume of 392 unnumbered leaves; these are covered, on two columns, with fine and tight gothic characters of which numerous ligatures still increase the condensation.

By a happy and too rare circumstance, the *Exposition* de Paul de Venise is dated; in the colophon of the work, the author tells us that he finished it in 1409, on June 30, the day of the commemoration of the apostle Saint Paul. Unfortunately, the *Summa totius philosophiae* is not dated, so that we do not know whether it is earlier or later than the *Expositio*; when we note disparities (and they are numerous) between the doctrines professed by these two works, we cannot say which of the two opposing opinions, in the mind of Paul Nicoletti, had triumphed over the other.

Besides, did Paul of Venice ever have, on any subject, a clear and fixed opinion of which one could properly affirm that it was his own? We have said, in studying the *Summa totius philosophiae*, that it seemed to be a collection of the most divergent opinions, in which one could hardly discover the expression of a doctrine proper to the author. We will have to repeat this judgment after we have read the *Expositio*. The most diverse influences are to be found in it, without it always being possible to say which is the one which brings about the assent of the Augustinian monk.

Among these influences, that of Averroes seems the most powerful[[223]](#footnote-224); it is marked from the title of the work, where Paul of Venice announces that he is going to expose not only Aristotle's writing on Physics, but also that of Averroes; the Commentator is thus placed at the same rank as the Philosopher.

The name most frequently quoted, after that of Averroes, in the *Exposition* of Paul Nicoletti, is the name of Gilles of Rome; this is not to surprise anyone who knows the veneration in which the Augustinians held their blessed brother. But the Aegian theses are constantly solicited by Paul of Venice in the sense of the thought of Averroës; when they contradict this thought too obviously for it to be possible to put them in agreement with it, our author does not hesitate to repudiate them in favor of the Averroës doctrine.

Walter Burley is hardly less often quoted than Gilles Colonna, but, almost always, he is quoted only to be refuted; the same is true of William of Occam and Marsilio of Inghen; as for Albert of Saxony, Paul of Venice knows his doctrines, which in general he tries to refute; but, like most scholastics, he is careful not to name the author.

The *Exposition* of Paul of Venice is a precious document touching the state of mind, in the School of Padua, at the beginning of the 15th century. It teaches us that the writings of the Parisian Terminalists were widely read in the Italian universities of that time, but that they were studied there especially with a view to melting their doctrines into those of the Commentator, even if it meant fighting their philosophy when it showed itself to be resistant to this absorption.

To justify these various remarks, it would be sufficient to follow [145] carefully what Paul of Venice says about the place.

As in his *Summa totius philosophiae*, he distinguishes [[224]](#footnote-225)eight acceptions of the word place; but these acceptions are not, here and there, classified and defined in the same way.

The word place means:

1° Of the body housing ;

2° Of the ultimate surface of the body housing ;

3° Of the origin of the place; thus, according to the Commentator, the center of the world is the place of Heaven; in the same sense, Gilbert de la Porrée says that the *simple place* is the origin of the *compound place*, understanding by *simple place* the position with respect to the center of the World, and by *compound place* the ultimate surface of the surrounding body[[225]](#footnote-226);

4° From the ubi which comes from the compound place;

5° From the ubi which comes from the simple place;

6° Of the conservative virtue of the place;

7° A space that attracts and keeps a certain number of objects; thus the square is the place of the market;

8° Of a space subject to a being which by itself occupies no place; thus it is said that Heaven is the place of God.

Paul of Venice is not unaware that other authors have tried to classify the various meanings of the word place in a way that is both simpler and more rational. Burley, for example, distinguishes between[[226]](#footnote-227) what the word *denominates* and what it *signifies*; what is *denominated* is simply the ultimate surface of the surrounding body; what is *signified* is the meeting of this surface and the action of containing (*continentia)*, which is a relationship between the housing body and the housed body.

Nicoletti rejects this theory; it is contrary to the thought that Aristotle expresses in his *Categories*; he opposes him this other solution: the place implies two things; the first, which it implies directly and which is the subject and the matter of it, it is the surface; the second, which it implies indirectly, and which is the act and the form of it, it is the act of containing.

Here Paul of Venice seems to remember both the teachings [146] of Giles of Rome and those of Duns Scotus; from the latter, he borrows the distinction, within the place, of a matter and a form; from the former, he must consider the surface of the container and the action of containing as two realities, of which the second is to the first as form is to matter.

We find a little further on[[227]](#footnote-228), about the immobility of the place, the theory of Gilles de Rome.

"Gilles states that place has two things to consider, the material place and the formal place. The material place is the surface of the containing body; the formal place is the order relative to the whole Universe or, in other words, the distance to the poles and the center of the World. The material place is mobile by accident; the formal place is mobile neither of itself nor by accident. »

Against this theory, Burley raised various arguments, which Nicoletti reproduces, among others this one: Whether by divine power or by thought, the whole World is moved in a straight line, except for a body contained in the air, which would be kept immobile; the immobility of this body should entail the permanence of its formal place; yet the distance of this body to the poles and to the center of the World, its position in relation to the whole Universe, have changed.

Paul de Venise thinks[[228]](#footnote-229) that one can turn against Burley the argument that this one opposes to Gilles Colonna: This immobile body should keep an invariable place; however the surrounding environment and, consequently, its ultimate surface would change.

This riposte could have embarrassed Aristotle and the Commentator, but one does not see in what it could embarrass Burley nor any of the Parisian Terminalists; for them, the immobility of a body does not require the persistence of the place of this body, but only the *equivalence of* the places which succeed one another; Paul of Venice undoubtedly forgets, at this moment, their doctrine, of which however he will soon give us an exposé.

In any case, Paul Nicoletti seeks to perfect the theory of Gilles de Rome. It is not to all places that we must [147] apply the definition of the formal place proposed by him, but only to a certain kind of place.

Gilbert de la Porrée, in his *Treatise on the Six Principles*, distinguished two kinds of places: the *simple place*, which is the center of the World, and the *compound place*, which is the ultimate surface of the surrounding body[[229]](#footnote-230); in the same way one must distinguish two ubi, the ubi which derives from the simple place, and the ubi which derives from the compound place; the first "is the situation of the whole World, co-extensive with the World," while the second "has for its subject the thing lodged; it has, in it, no extension; it resides in it in an invisible way."

It is difficult for us to believe that the two ubi considered here by Paul of Venice are without affinity in his mind with the two kinds of qšsij considered by Simplicius, one corresponding to the *situation of* the body in the whole World, the other to the *disposition* of the various parts of this body.

Movement, not movement *per accidens*, but movement per se, does not have as its object the acquisition of any ubi; the only ubi to which it relates is the ubi that derives from the simple place, that is the situation in relation to the poles and the center of the World; this alone cannot come to an object without some change taking place in that object itself. The other ubi, the one that originates from the ambient surface of the lodging body, is not the object of its own movement; it can change without any change in the lodging body, and by the only movement of the lodging body, because it is a relation of the lodging body to the lodging body.

One does not see how this distinction can protect the doctrine of Gilles de Rome from the attacks that Burley and the Parisian Terminalists have directed against it. If God were to move the World by a translational movement, leaving a single body immobile, there would be, for this body, a change in the ubi which follows from the simple place; and yet this body would be without movement. Paul of Venice finds nothing to reply to this, except that it would be a miraculous effect of divine power. In spite of the weakness of this answer, he holds the distinction of the *locus situalis* and the *locus superficicalis* to be very appropriate for resolving the difficulties, and we shall see him return to it soon.

Occam," says Nicoletti[[230]](#footnote-231), "exposing the definition of place given by the Philosopher, says that place is nothing other than the housing body insofar as one considers there the layers, contiguous to the housed body, which one can imagine in infinite number. "Our author objects to the *Venerabilis inceptor* that this definition contradicts Aristotle's theory in every respect; Occam knew this, by Jove, very well, and I imagine that it was not to engage him to change his mind!

In particular, Paul of Venice makes the not very new observation that, according to this definition, the place would be mobile. "To this, Burley answers that a house immobile within a moving air can be, from moment to moment, in numerically distinct places, but that it is always in the same place by equivalence. "Our author does not agree with this view. He returns to his distinction of two kinds of places: the place coming from the situation with respect to the whole Universe, which he named *locus situalis* and which he now names *relative place*; and, on the other hand, the place which consists in the surface of the surrounding body, the *locus superficialis*, which he now names *absolute* place. From moment to moment, the immobile house considered by Burley is in different *superficial* places, but its relative place remains numerically one.

But the doctrine of Paul of Venice always comes up against the same objection; the definition of the *relative place*, of the *locus situalis*, can only make sense if there is an absolutely fixed reference point; in the Averroist doctrine, a central body that is immobile in essence constitutes this reference point; as soon as one looks at the Earth as capable of being moved, at the whole World as capable of translational motion, the notion of *relative place*, as it has been defined, loses all meaning. The Parisian Terminalists admirably recognized the necessity of ridding the notion of local motion of the requirement of an immobile landmark [149] endowed with a concrete existence. Paul of Venice is too faithful an Averroist to follow an opinion so radically opposed to the teaching of the Commentator; so he constantly struggles with inextricable difficulties.

According to Burley," he says, "since it is certain that the whole World and all its parts are constantly moving; that there is, on the other hand, no motionless body outside the World; it must be concluded that a body which moves with local motion is not necessarily bound to behave differently from one moment to the next, in relation to a certain motionless term. »

To this, our author replies that all local motion corresponds to a change of place, but that the motion which produces a certain change of place is not necessarily the motion of the body being housed; it may be a motion of the body housing. It is difficult to see any connection between this answer and the observation made by Walter Burley.

It is impossible to hold for the Averroist theory of place if one renounces this proposition: There exists at the center of the World a body whose immobility is certain and necessary. For having ignored this truth, Paul of Venice has already seen himself, on several occasions, hampered by illogicalities; these contradictions will become more flagrant when he will approach the great question of the place of the supreme orb.

To define the location of the ultimate sphere, Paul Nicoletti first expresses himself[[231]](#footnote-232) much as a Scotiste would:

"The ultimate sphere is in a certain ubi, and this ubi is generated by the fact that it surrounds its place; it is in the ubi that comes from the simple place and not in the ubi that comes from the compound place. »

This theory, which is clothed in forms of language borrowed either from Gilbert de la Porrée, or from the Scotists, or finally from Walter Burley, our author considers it as fully in conformity with the Averroist doctrine, which he formulates a little earlier in these terms[[232]](#footnote-233):

150] "The ultimate sphere is in one place in a certain way, the whole heaven in another way, and the heaven of the planets in a third way. The supreme sphere is only in one place by accident, and that by reason of its center; it is not in one place by itself; nor is it in one place through its parts. The whole heaven is in a place by accident, and that by reason of its center; it is also in a place by means of its parts, for it has various parts which accommodate one another. Finally, the heaven of the planets is housed in three distinct ways; it has a place by accident, by reason of its center; it has a place of its own, for it is contained in the concavity of the supreme sphere; finally, it is housed, through the intermediary of its parts, for it has parts that house each other. »

Not only does Paul of Venice consider his doctrine as conforming to that of Averroes, but he goes further. Thanks to the identity that he admits, following Giles of Rome, on the one hand, between the *locus superficialis* and the material place, on the other hand, between the *locus situalis* and the formal place; thanks to the confusion that he establishes between the *locus situalis* such as he defined it and the situation such as Avicenna considers it; thanks to another confusion in which he takes the *material place* and the *formal place* understood in the sense of Gilles de Rome as respectively identical to the place *per se* and the place *per accidens*, considered by Averroes; thanks, we say, to this series of word games, Paul Nicoletti believes he is in a position to re-establish the agreement between Avicenna's theory and Averroes' theory:

"Avicenna, he says[[233]](#footnote-234), claims that Heaven moves not around a place, but in a place, this place being, moreover, a *locus situalis* and not a *locus superficialis...* The Commentator, on the contrary, claims that Heaven moves by local movement, but that it moves around its place; by this, he understands the Earth; he distinguishes, for this purpose, between the place by accident or *formal place* and the place by itself or *material place*.

"To me, it seems that Heaven moves with local motion [151] in the way the Commentator defines and also in the way Avicenna indicates. »

Averroes, who had so strongly opposed Avicenna's theory, would certainly not have subscribed to this agreement. Would he have confirmed the concessions that Paul of Venice was to grant in his name? This seems very doubtful to us. Let us listen, in any case, to the following passage[[234]](#footnote-235); obviously, the person who wrote it had read Albert of Saxony and, especially, Simplicius.

"According to the Commentator, if the terrestrial element and the other elements moved circularly like Heaven, Heaven itself would no longer have any local motion. Its motion could no longer be either translational or rotational. According to the Commentator, indeed, any body which moves by a translational motion changes both its place *per se* and its place *per accidens*, its material place as well as its formal place; a body which moves by a rotational motion experiences a formal change, even though it does not move *secundum materiam* ; But if the Earth were to rotate, along with the other elements, Heaven would no longer have either a formal place or a material place; indeed, it would not move within a surface capable of enveloping it; nor would it move above a stationary surface on which it would be possible to draw circles that would make it possible to locate its movement.

"However, if the Earth turns in the opposite direction to Heaven, or if it turns in the same direction as Heaven, but more slowly, the Commentator would admit that Heaven moves by local motion. He would still grant it if the Earth accompanied Heaven in its movement, provided that one of the other elements remained motionless, or turned in the opposite direction, or in the same direction, but more slowly; in this case, indeed, Heaven could still describe its various circles above this element. »

No doubt the Commentator has insisted on this truth that no motion would be knowable to our experience if the [152] term to which the mobile tends were moving in the same direction and with the same speed as this mobile ; But he had thought too deeply about the relative character of the motion which our senses reveal to us to assert that Heaven is or is not in motion, to say what that motion is, before he was sure of an absolutely fixed term of comparison; and he wanted - and this was the fundamental principle of his doctrine - that this absolutely fixed term be a real and concrete body. He would therefore have rejected the propositions that Paul of Venice has just formulated.

On the other hand, without contradicting his axioms, he could have accepted this one:

"Even if all the elements were to move with Heaven, provided that it is agreed that [the supreme] Heaven has no local motion, the celestial spheres would have a local motion; indeed, as they do not all move in the same way, each lower sphere would describe a circle with respect to the concavity of the upper sphere, and the upper sphere would describe one with respect to the convexity of the lower sphere. However, if the Earth were in motion, it would be less easy to know the local motion of Heaven than it is when the Earth remains motionless: this is why the Philosopher says, in the second book *Of Heaven*, that if Heaven is in motion, the Earth must be at rest. »

The Philosopher, we believe, intended to say more than that. In any case, the Averroist theory of place would not be contradicted by the hypothesis that Paul of Venice has just examined, because, in this hypothesis, the supreme Heaven, deprived of all local motion, would provide the absolutely fixed term that all local motion requires, according to Averroes. This hypothesis, which takes the supreme orbit as the immobile place to which all celestial and terrestrial motions are related, is precisely the one adopted by Copernicus.

Paul of Venice, pushing his hypotheses further, addresses[[235]](#footnote-236) the question that Duns Scotus had formulated and following which he had pronounced his words: "Seek the answer - *quaere responsum*."

153] "Even if God were to annihilate the whole world except for the supreme sphere, this sphere would still be moving locally; not, without doubt, by movement relative to the *locus superficialis*, but by movement relative to the *locus situalis*; the part of Heaven which was on the right would come to the left, that which is to the east or to the south would come to the west or to the north, or vice versa; all this could not happen if Heaven were not animated by a movement consisting in a change of situation. »

To say that the part of Heaven which was on the right comes to the left, supposes that the movement of Heaven is contemplated by a being which has a right and a left, and which remains immobile; the proposition formulated by Paul Nicoletti has therefore sense only if there exists somewhere a fixed and extended term, where a right and a left, an east and a west, a northern end and a southern end can be marked. Where does our author take this fixed and extended term? Aristotle and Averroes wanted it to be the Earth; but, by hypothesis, the Earth is annihilated. Damascius, Simplicius and the Parisian Terminalists claim that it is an abstract body, a pure being of reason; it seems that Paul of Venice cannot avoid siding with them. However, he does not do anything about it. By a strange aberration, of which we have already noted the trace while analyzing the theories of the *Summa totius philosophiae*, this immobile term, by means of which one must be able to distinguish the left of the Sky from the right, the boreal zone from the southern zone, he reduces it to a simple indivisible point, to the mathematical center of the Universe! Burley, by inadvertence undoubtedly, had incidentally stated this error; Paul of Venice professes it clearly and with insistence; let us listen to him rather[[236]](#footnote-237):

"The supreme sphere is in an accidental place, and that by reason of its center... To this proposition, the following objection may be made: If the center were, like Heaven, animated by a rotational motion, the supreme sphere would be no less in a place, since it would move by local motion; but, in this case, it would no longer be housed by its center; therefore it [154] is not at present; the major and the consequence are obvious; as for the minor, it results from the fact that the ultimate sphere necessarily moves, according to the Commentator, around a motionless center.

"... To this objection, here is the appropriate answer: ... The World has two centers; it has a simple and indivisible mathematical center, and a natural center, which is the terrestrial element; even if one were to suppose that the natural center moves by a rotational motion, the mathematical center would not move for that reason; the motion of the supreme sphere would therefore still be a local motion; this sphere would still be housed by its center, not by its natural center undoubtedly, but by its mathematical center... However, the Philosopher would claim that the natural center cannot move by any motion, for in the book *On the Motion of Animals*, he declares that the gods all together could not move the Earth. »

"If the World were homogeneous, or if the Earth were animated by a rotational movement, the Earth could not be the place of the whole Heaven, nor of the supreme orb; it is the indivisible mathematical center which, alone, would constitute this place; if we say, in fact, that the Earth is the place of the elements and of the celestial bodies, it is because of its immobility, an immobility which it receives from the indivisible center of the World. »

*Quaere responsum*, said Duns Scotus; a poor answer, for sure, that of Nicoletti!

At least Paul of Venice was careful, in the passage we have just quoted, to point out the disagreement which exists between his opinion and that of Aristotle. In another place[[237]](#footnote-238), he goes further and claims to make the Philosopher himself responsible for his unacceptable doctrine.

The Commentator," he says, "makes this distinction: there are two centers of the World, the natural center and the mathematical center... By center, Aristotle can mean either one or the other of these two centers. If by *center* he means the natural center, then the whole of Heaven is constantly moving *secundum formam*, unceasingly describing a new circle around the center of the World; if he means by *center* the mathematical center, then it can still be admitted that Heaven is moving by formal motion; for just as it unceasingly describes a new straight line from the circumference to the center, so it unceasingly describes a new circle around the center of the World. "Here, Nicoletti strangely solicits, in favor of his theory of the place of Heaven, a comment of Averroes[[238]](#footnote-239) on a passage of Aristotle. The center of which Aristotle required the immobility so that the movement of the Sky was conceivable, it is, without any doubt, the natural center, the Earth.

In the reason of Paul of Venice, an incessant struggle is waged, with various alternatives, between the averroïst tendencies and the more modern tendencies of the School of Paris; sometimes the latter prevail, sometimes the former triumph in their turn.

Under the influence of the terminalist doctrines, Nicoletti renounces this axiom posed without question by Aristotle and by Averroes: there exists, at the center of the World, a body of finite extent, whose absolute immobility is necessary of logical necessity, and this body is the Earth. Our author does not consider as absurd, neither that the Earth can be animated by a rotation movement, nor that the whole Universe can experience a translation.

As soon as we give up positing in the World a concrete body, immobile by essence, which serves as a term of comparison to the local movements of the heavens and of the elements, Logic leaves only one way open, where it is necessary to engage; it is necessary to admit that all the local movements are defined by comparison to a certain abstract body, a body which the senses cannot perceive, but about which the theories of Physics can inform us: this is the way Damascius followed with his disciple Simplicius, which the Parisian Terminalists followed after them.

Paul of Venice does not want to follow to the end the path traced by the adversaries of Averroes; between these and the Commentator, he pretends to follow an intermediate direction; he thus ends up with a flagrant illogic; he proposes to relate local movements to a simple mathematical point, to the indivisible center of the World.

The struggle between the Peripatetism of Averroes and the Parisian Terminalism did not only continue in the understanding of Paul of Venice; during the whole of the fifteenth century, during a good part of the sixteenth century, it gave rise to discussions and quarrels which were fought out in the Universities of Padua and Bologna. Among the doctors who were involved in this struggle, there were a great number of them who held fiercely to the most intransigent Averroism; but there were also some who knew, when it was necessary, how to share in the doctrines of the University of Paris.

Of this number is Gaetan of Tiène. His thought, very often inspired by that of Paul of Venice, knows however how to avoid the illogical theory to which the Augustinian monk had been led by his not very clear-sighted eclecticism; it feels the need to align itself with the opinion on the place and the local movement which the Scotists and the Terminalists supported, and it clearly aligns itself with it.

Gaetan de Tiène, born in Vicenza in 1387, taught in Padua with great distinction from 1436 onwards; he died in that city in 1465.

Gaetan of Tiena composed commentaries on several of Aristotle's physical writings. His commentary on the *De Caelo et Mundo* will not attract our attention; it sets out the Stagirite's thought without adding anything worth noting, at least in regard to the questions which occupy us at the moment. On the other hand, we will study closely his commentary to the Physics; without doubt, the doctrines which are exposed there are, most of the time, the doctrines of the Parisian Terminalists, of Albert of Saxony and of Marsilio of Inghen, who are never quoted, while we note at each moment the name of Walter Burley, whose opinions the author fights willingly; But if the theories expounded by Gaetan de Tiène are hardly personal to him, at least he has grasped, much better than [157] Paul of Venice, the essential principles; and, sometimes, he sheds light on an idea more vividly than the inventor of that idea had done.

This is what we will have the opportunity to note when studying his theory of place.

Like Paul of Venice, Gaetan enumerates[[239]](#footnote-240) a great number of meanings that can be attributed to the word place, without deciding, moreover, to choose one of these meanings to make the definition of place. Among these various meanings, he points out this one: "The word place is taken in the following compound meaning: it means the situation (*situs*) counted from the center of the World and caused in the housed body; this situation consists in the fact that the body is at such a distance from the center of the World; it is classified in the category ubi; it is this situation which is the term of the local movement. "These lines summarize Walter Burley's opinion.

Occam had already remarked that one cannot take the center of the World as the proper reference point to define the place if one does not suppose beforehand that the World is deprived of any translational movement; this remark naturally extends to the ubi, and Gaetan applies it to him

"We can say that the ubi which has the center of the world as its principle is not the proper and intrinsic term of local motion. If something can happen to a body without this body experiencing any change in itself, this something cannot, according to the opinion expressed by Aristotle in the VIIth book of the Physics, be the term of a proper motion. Now, the ubi emanating from the center in the World can happen to an object without this object experiencing any change; let us suppose, indeed, that a body remained motionless while the universe would experience a translation movement; the center of the World would approach or move away from this body, so that this one, while remaining at rest, would change its ubi.

"To this it will be replied that the supposition in question could not be realized in a purely natural way; and what has been said of the ubi was said in the spirit of Aristotle, admitting therefore that the course of Nature was not disturbed. »

Even though a translation of the Universe is, in this passage, considered as miraculous, does Gaetan believe, in accordance with the decree of Stephen Tempier, that such a miracle is possible, or does he think, with the Averroists, that it could not be realized without absurdity? On this point, his opinion, we cannot doubt it, agrees with that of the theologians of the Sorbonne and the Terminalists of Paris; let us listen to the presentation of this opinion[[240]](#footnote-241):

"Burley claims that if the World were continuous, God could not give it a translational motion unless he created a new place that would serve as the end of this motion, God could not even give this World a revolutionary motion, because every local motion requires a place, and this World would not be in a place either as a whole or in its parts. We could not therefore attribute to it a movement of rotation, unless we claim that the movement of rotation is not a local movement, but a movement of situation (*situs*)...

"None of these statements is necessary. We may well admit that God imposes on the World a movement of translation without creating any new place; this movement would be neither upward nor downward; it would be of another kind. Nor is it true that the motion of rotation is not a local motion, but only a motion of situation... For a body to move by local motion, it is not necessary that it change its place as a whole or by its parts; it is sufficient that its situation varies; now, the World constantly changes its situation. »

This answer, it is obvious, is inspired by Albert of Saxony; Gaetan de Tiène, however, attenuates somewhat the rigor of the propositions formulated by Albert; he does not dare to recognize clearly, like the latter, that a translational motion imposed on the whole Universe would not be a local motion, but [159] only a motion of the same kind as the local motion; he limits himself to insinuating it :

"It follows[[241]](#footnote-242) from the above that one gives a worthless definition of local translational motion when one says, as is commonly done, that rectilinear translational motion consists in the fact that the mobile behaves at this moment, in relation to a certain fixed object, differently than it did before; in the case, in fact, where the whole World would experience a local translational motion, the definition would no longer be appropriate to the defined. »

Gaetan therefore rejects the definition of local movement commonly given by Averroist Peripateticists.

It is true that the criticism addressed to the definition of the rector of Heidelberg seems very fussy, and that it would have been very easy, it seems, to avoid it:

"Nor is it a good definition of motion to say that it consists in the mobile behaving differently, at different times, in relation to a fixed object, real or imaginary. "Let a body, in fact, move for a certain time, then stop in equilibrium; it behaves now differently than it did before, and yet it does not move.

"To define the local motion of translation, we will say that it consists of this: The mobile experiences, from one instant to the next, an intrinsic formal change with respect to a fixed real or imaginary reference point - *Dicendum est igitur quod moveri localiter motu recto est rem aliter se habere intrinsece formaliter quam prius respectu alicuijus fixi, veri vel imaginarii*. »

This definition, somewhat obscure perhaps in its conciseness, brings together the characteristics attributed to local motion, on the one hand, by Duns Scotus and by Albert of Saxony, and on the other hand, by William of Occam and by Marsilio of Inghen; The first, in fact, affirmed that local motion was a certain absolute change intrinsic to the mobile, a *forma fluens*, according to the expression of the Subtle Doctor; the second declared that it was expressed by a change of disposition with respect to a certain immobile term, whether this term was endowed with concrete existence or was purely ideal.

"The Commentator claims that every celestial sphere... determines[[242]](#footnote-243), by its very nature, the existence of a certain fixed body which is in its center, so that it moves around; this body is the place by accident of this sphere; it is the natural center of the World, or the Earth.

"But, on the contrary, even if the Earth were suppressed, the celestial spheres would continue their rotational motion. We see therefore that the revolutions of the celestial spheres do not require the existence of such a fixed body.

"Aristotle and the Commentator, it is true, would not admit the supposition which has just been formulated. In the first book *On Heaven*, Aristotle says that if Heaven moves, the Earth must be immobile.

"Others observe that Heaven is not only housed by its center, but also by the poles of the World, because it keeps an invariable situation with respect to these three immobile points. If, therefore, the center were removed, Heaven would still have a place by accident, the poles of the world, which would keep it in the same situation as before. But Heaven cannot move unless it moves around a fixed object; if the poles were annihilated, Heaven would cease to move.

"But this response is not natural. »

So which opinion should be supported? Gaetan does not say, probably because it is self-evident. It is the opinion which follows from the principles posed a moment ago, the opinion formulated by Duns Scotus, by William of Occam, by Albert of Saxony: The rotational motion of the celestial spheres is something intrinsic, something absolute, which would subsist even when no immobile central body would serve as a reference point for it; these spheres would then behave in such a way that if one were to conceive [161] a purely ideal immobile central body, their situation with respect to this body would change from moment to moment.

In Gaetan of Tiena, the doctrines of the Scotists and Terminalists found a wise interpreter; this interpreter was able to grasp certain essential ideas common to both, and to express them clearly.

# XVII. - THE REACTIONARY PHILOSOPHY OF THE SCHOOL OF PADUA. THE HUMANISTS. GIORGIO VALLA

Gaétan de Tiène was, without doubt, one of those minds which know how to discern the general direction in which scientific progress is moving, and how to attach themselves firmly to the propositions which mark out, as it were, that direction. Other minds, when they have to take sides in debated questions, readily allow themselves to be guided by a horror of novelties and by an exaggerated confidence in the opinion of the ancients; these are reactionary minds.

These spirits were numerous in Padua towards the end of the fifteenth century and the beginning of the sixteenth century, when that superstitious cult of the ancients, to which the name of the Renaissance was given, was flourishing.

While the humanists distanced themselves with horror from Aristotle and his commentators in order to reserve their favors for the philosophy of Plato or the Stoics, the Peripatetics repudiated any alliance with the Scholasticism of the last centuries; they hardly quoted the *Terminalists*, the *Parisians*, the *Moderniores*, the *Juniores,* except to combat them. Some of them considered null and void all the commentaries on the thought of the Stagirite which had succeeded that of Averroes; others, even more demanding, rejected any interpretation of the doctrine of the Philosopher if it had been produced after Alexander of Aphrodisia.

The Humanists did not feel attracted to the doctrines [162] of the Terminalists; they could not suffer the technical language which the latter used in the course of the complicated discussions in which their subtle dialectic and their meticulous logic were indulged; these fine minds suffered from the inelegance of the "style of Paris[[243]](#footnote-244)" However, it was to the Averroists that their attacks were addressed especially. In a language that Arabic words made even more barbaric than that of the Parisians, the Averroists asserted their sectarian intolerance and the narrowness of their intelligence, slave to the letter of the Commentator much more than to the spirit of Aristotle. The name Averroes thus became the symbol of all that offended the Humanists, of all that scandalized their dilettantism, their worship of Greek beauty and their search for elegant Latinity.

Here, for example, is Georgio Valla of Piacenza; he is a scholar who taught eloquence in Milan, in Pavia in 1470, in Venice in 1481; he is a Hellenist who translated many of Aristotle's works; he is a refined Latinist who annotated and edited the *Tusculanes*; moreover, he is an orthodox Christian; he is faithful to the teachings of the great doctors, of Albert, of Saint Thomas Aquinas, of Duns Scotus, of Gilles of Rome, whom he names with veneration; we will not be surprised to see in him a fierce opponent of the Averroist School. Let us listen to him speak of Aristotle and the Commentator[[244]](#footnote-245) :

"Those who look at things with a penetrating eye should not be surprised that Aristotle, hallucinated in this instance, professed similar errors; he gave a number of doctrines even inferior to this one; and in this respect, the Platonists reproached him for his ignorance and lack of rectitude in judgment. This is why he was left aside for a long time, lying under the rust; only Plato and only the Platonic doctrine were celebrated. But soon a barbarian emerged from the sludge, an absolutely stupid pig, [163] this Averroes with a stinking brain (*Aliquanto post Barbiarus quidam ineptissimus lurcho, putidique cerebri e luto effossus Averroes*); indulging in captious discussions, with the help of sophistry, he succeeded in presenting an Aristotle who was so Platonic that no philosopher is known to have been so. »

We can easily guess that Valla, when he deals with the nature of place, will be careful not to accept the unsatisfactory solution that Aristotle and his Commentator proposed to give to this difficult problem; we are not surprised that the solution imagined by Damascius and Simplicius has, for him, more appeal; and indeed, after having summarily exposed Aristotle's theory, he adds[[245]](#footnote-246):

"But if you consider the problem with more penetration, you see that place is the measure of the situation (*situs*) of bodies that are placed, just as time is the measure of the movement of things that move. But there are two kinds of situations, the essential situation and the adventitious situation, to which correspond two kinds of places, the natural place and the accidental link. Moreover, the essential situation is, itself, of two kinds. One consists, for each thing, in the proper order and arrangement of each of its parts, this thing being considered as a whole... The other consists in the position of this whole, considered as a part in view of a more general relation. For each part is a whole in itself; but it is called a part when considered in relation to the whole...; in the same way this whole becomes in its turn a part when it is related to something more universal; thus the Earth is, by itself, a whole; but it is called a part when related to the whole World. There are therefore also, for a body, two kinds of natural places. One consists in the relative disposition of the various parts of this body. The other, the *separate* natural place, is that which fate has assigned to each body in the structure of the World. Thus it is said that the place of [164] the Earth is the center of the Universe; if it were driven out of the place which surrounds the center of the Universe, the Earth, considered as part of the Universe, would no longer occupy its natural place; however, in its integrity, it would keep the mutual disposition of its various parts; if it were left to itself, it would move towards the center of the World, although the parts which compose it would keep an unchanging relation to each other...

"As for bodies animated by local motion, in what sense can we say that they are in a place, in what sense can we say that they are not? They are not in the separate place that is appropriate for them as parts of the universe, because they occupy this place only when they are at rest. But they are in the place that is assigned to other bodies, for example to air or water: it is this place that in a broad sense is called the place of the moved body; the place that is shared with other bodies becomes the place of the body that moves; in the local movement of a body, in fact, it happens that the situation of other bodies is changed; the air or water that forms the medium is divided by the coming of a more powerful mobile; the situation that the moved body takes is the natural situation of the parts of the air or the parts of the water. Thus, the mobile receives an adventitious place; what measures the situation, as it is situation says body mit, constitutes the accidental place of this body. A body which moves by local motion has therefore no place properly so called, except that which results from the mutual disposition of its parts; the place of which it changes unceasingly is not the place assigned to it, but the place assigned to the surrounding air or to the surrounding water... They are therefore right those who define the place: the measure of the position of the bodies moved."

We can easily recognize in this passage a brief exposition of the theory of Damascius and Simplicius. It even seems that Valla has highlighted, better than any other commentator, certain essential ideas of this theory; he shows clearly, in particular, how the place of bodies in motion is the set of geometrical measures which determine, as it were, the disturbance introduced by this motion in the natural situation of the various parts [165] of the World; so that this ideal disposition of the Universe, where each body would occupy the position which is naturally assigned to it, constitutes the fixed reference mark to which are compared the successive places of any body in motion.

Valla does not discuss the much debated question of the place of the ultimate sphere. For him, this question could not even be asked, because one must revoke in doubt all that the Peripateticians said about the limits of the World. Aristotle wants that time has neither beginning nor end, whereas the universal place must, according to him, be limited by a certain sphere: Valla brings out the strange opposition of these two doctrines. Taking up word for word the reasoning by which Aristotle wanted to prove that time could not admit of a boundary, he demonstrates[[246]](#footnote-247) that the World could not admit any more. "If we accept what you say to prove that time could not begin at such and such an instant in the future, we shall likewise prove that there is a body of infinite size. Let us suppose, indeed, that a body is bounded; outside its volume, there will be nothing; but, outside this body, there are differences of place; no difference of place where there is no place, and no place without a body; therefore, outside of everything, there is another body, and, outside of this body, again another body, and so on ad infinitum... Such arguments abound in Aristotle and in those who follow him; we can, in this way, answer these arguments once and for all. »

The Peripateticians, it is true, would stop Giorgio Valla from the beginning of his reasoning; outside the limits of the World, they do not admit the existence of any place. But our humanist does not accept their teaching on this subject. Aristotle," he says[[247]](#footnote-248), "assumes that outside the World there is neither void, nor time, nor anything else... Moreover, Cleomedes [[248]](#footnote-249)jokes Aristotle about the following reasoning, by which he proves that there is nothing outside the World: Since void is the space that a body can occupy, as there is no body outside the World, neither can void be found there. In such a way, says Cleomedes, that where there is no liquid, there can be no vessel either. »

After reporting this quip from Cleomedes, Valla continues with these dull words:

People will say to me: "What do you think is beyond the world? I must confess," I will reply, "that I know nothing about it. If Aristotle remembers going there, contemplating what can be found there, and then passing into this World, let him tell us, who are endowed with a more feeble memory, about it. However, here is what we will dare to affirm: Our spirit aspires to occupy a certain infinity; it always tends to a beyond; the human intelligence cannot be forced to remain enclosed within the limits of the World. But what about all this? Only He knows who has kept all things silent.

"That is why the doctrine in which they (the followers of Aristotle) slumber is not a philosophy, but a reckless and stubborn confidence in one's own opinion; he who does not see it does not see clearly; he is blind; worse than blind, he is paralyzed in his senses both external and internal and lies at the bottom of a grave. »

These invectives summarize the opinion that the Humanists professed concerning the Philosophy of Aristotle.

# XVIII. - THE REACTIONARY PHILOSOPHY OF THE SCHOOL OF PADUA (*continued)*. THE AVERROISTS. AGOSTINO NIFO.

With the Commentator, their master, the Averroists replied[[249]](#footnote-250): "Aristotle invented the three sciences, Logic, [167] Physics and Theology. No error could be discovered in his work until our days, that is, for fifteen hundred years. That such a disposition should be found in a single individual is more miraculous than natural to man. »

Averroes was, moreover, for his Paduan followers, the faithful depositary and the sagacious interpreter of the Philosopher's thought; the meditation of the Commentator's teachings was thus the only attitude that the modern thinker could take, reduced, according to a word that John of Jandun applied to himself, to being only the monkey of Aristotle and Averroes.

The statements escaping from the psittacism of the Averroist School would hardly deserve to stop us if there were not, even in this School, some spirits free enough to shake the yoke sometimes.

Among these independent Averroists, - independent sometimes to the point of cynical scepticism, - we will place Agostino Nifo. Nifo knows very well the opinions of the Terminalists and, in particular, of Albert of Saxony whom he names rather irreverently *Albertilla*; these opinions, he sometimes adopts them, but, more often, he fights against them to the profit of more ancient doctrines. Moreover, his great erudition serves him especially to change from one year to the next the School of which he makes himself the follower. In his youth, as a pupil of Niccolo Vernias of Chieti, he was an even more fervent Averroist than his master. Then, having become a Thomist, he struggled bitterly against the opinions of the Commentator, even if it meant embracing some of them again. His skepticism, which he displays with impudence, allows him to take pride in these perpetual variations.

These variations, we will have to see by following the opinions that Nifo has expressed about the place and the local movement.

Two sources exist where we must draw the knowledge of these opinions; one is a commentary to the *Physics* of Aristotle, the other a commentary to the *De Caelo* of the same author.

At the end of his commentary[[250]](#footnote-251) on Aristotle's *Physics*, Nifo tells us that he finished it in his campaign at Aviano, [168] on May 15, 1506. But this book is, in reality, made up of two works. Each text of the Stagirite gives rise to *Commentaria*, which are followed by *Recognitiones*; these were written some time after those; the author takes up again, corrects and, sometimes, changes completely the opinions which he had exposed in his older commentaries.

As for the exposition[[251]](#footnote-252) on the *De Caelo et Mundo*, it is more recent; the author tells us, at the end of it, that he put the finishing touches to it on October 15, 1514.

In his commentary on the *Physics*, Nifo distinguishes[[252]](#footnote-253), like Paul Nicoletti, the material place, the formal place, the efficient place, the final place; but of these four places he gives more subtle and refined definitions:

"The matter of the place, it is the body containing. The form of the place is the relation of this place to the whole of the Universe or, as John of Jandun wants, a certain celestial virtue. »

Nifo does not quote the author from whom he borrowed the first of these two definitions of the formal place; but we recognize him without difficulty; this author is Gilles of Rome.

It is still Gilles de Rome who follows about the immobility of the place:

"The commentators say that the place is immobile as a formal place. This formal place is the very order of the Universe; and this order is stable; it is therefore reasonable to say that the place is absolutely and simply immobile. »

Nifo is not unaware that the *Juniores* formulate various objections to this opinion of Giles of Rome; these objections he reduces to two main heads:

169] "In the first place, it is possible, or at least conceivable, that the whole of Heaven should undergo a translation in the direction of one of its parts, without the Earth undergoing any change; the order of the Earth in the Universe would be changed, although its location would not be.

"Moreover, the place is not a substance, but an accident attributed to the terminal surface of the container; now, this surface can change from moment to moment; the order of this surface in relation to the whole Universe changes at the same time, because the attribute necessarily changes when the subject is replaced by another subject. »

The objections are powerful; they have led the Scotists and Occamists to reject Gilles Colonna's opinion. The arguments by which Nifo claims to refute them seem unconvincing.

To the second, he answers that certain attributes can pass, without change, from one subject to another; light, in his opinion, is an example; by this, he contradicts the almost unanimous teaching of Scholasticism; according to this teaching, the propagation of light consists in the generation of an illumination within a body which was primitively dark and in the destruction of a similar quality within the body which was primitively illuminated.

The first objection forces Nifo to understand the relation of a body to the whole Universe in two different ways. On the one hand, we can consider the relation of this body to the natural Universe; this relation will change if we move the whole Universe while keeping the body immobile. We can, on the other hand, consider the relation of this same body to certain mathematically defined reference points, to certain imaginary poles for example; then, if the Universe moves, the real poles are changed, but the mathematically defined reference points, but the imaginary poles remain invariable.

To counter one of the objections formulated against Gilles de Rome's theory by the School of Paris, Nifo is forced to invoke one of the essential principles of this School, namely, that the fixed terms in relation to which we judge the rest and movement of bodies are not bodies that really exist in a concrete way, but purely conceived geometric beings.

The influence of the School of Paris can be felt several times in the course of the commentary we are analyzing. While rejecting Burley's theory, which confers immobility to the ubi and not to the place, while admitting with Gilles de Rome that, for the *natural* body in movement, it is the formal place which is immobile, Nifo expressed himself in the following way about the body in movement *taken in an absolute way*: "In this sense, the place is immobile according to reason, because each time one considers it, one finds that it is the same one, although it is other in reality. "By this, he attributed to the *ratio loci* not real immobility, but immobility *by equivalence*, so well defined by the Scotists and the Occamists.

In the *recognitio* that follows the commentary we have studied, Nifo regrets this concession to the *Juniores*. "In the commentaries, he says, we admitted this opinion. The place, in fact, can be considered from two points of view: either as the place of a body moved by an absolutely unspecified motion, or as the place of a body moved by a natural motion. We then said that the place considered from the first point of view was immobile by equivalence. Considered from the second point of view, the place was for us simply immobile, because it consisted of a ratio that remained numerically always the same. »

But in his *recognitio*, Nifo is not satisfied any more with these opinions; a principle seems to him now incontestable; it is that any consideration on the immobility of the place is subordinated to the possession of a certain fixed object: "Whatever the movement of which we want to speak, whatever the mobile of which the place preoccupies us, it does not seem that one can attribute immobility to this place if it is not in relation to something fixed. "And this something is no longer, without doubt, a geometrical term, endowed with a pure conceptual existence; although Nifo does not say it formally, it must be some concrete body. A little further on, moreover, he will teach that this fixed marker is formed by the center and by [171] the poles of the World; he will declare that the place is the meeting of the containing surface and of a relation, in itself immovable, to the center and to the immovable poles; this relation is the formal place, which is therefore immovable, whereas the material place moves unceasingly.

Rejecting what he had once borrowed from the Scotists and Occamists, Nifo takes up again in all its purity the doctrine of Gilles de Rome and, with it, the Averroist postulate on which it is based, the necessity of absolutely fixed concrete bodies to which all local motion is related.

The supreme orbit has an accidental place, and this place is the center of the World. This is what Averroes intended to teach in an absolutely clear way," says Nifo in his commentary[[253]](#footnote-254). And I, in my youth, defended the opinion of Averroës, and I assured that it expressed in an unquestionable way the thought of Aristotle. But today, after having read the Greek text of Aristotle and having examined it carefully, I affirm rather that this opinion is madness and that it does not reach at all the proposed goal. "It is thus with the theory of Themistius that the philosopher of Sessa is aligned, not without taking into account, in his commentary, the exposition of Saint Thomas Aquinas and the discussion of John of Jandun.

He is less severe for Averroes in the *recognitio* which follows his commentary; to this proposition: Heaven is housed by its center, he tries to give a meaning which seems acceptable to him; he succeeds in doing so by understanding by *Heaven* not the supreme orb, but the whole of all the celestial spheres, by *center* not the central terrestrial globe, but the mass of all the elements. Thus interpreted, indeed, this proposition agrees perfectly with the doctrine of Themistius; but, certainly, it no longer expresses the thought of the Commentator.

In 1506, Nifo joked about the youthful enthusiasm with which he had welcomed Averroes' theory, which he was soon to call madness; in 1514, he again joined the ranks of the supporters of this doctrine.

He fully admits with Aristotle that the movement of Heaven [172] requires the immobility of the Earth, and he asks himself this question[[254]](#footnote-255): On what grounds does this movement require this immobility? Here is the answer:

"The Heaven that moves requires the existence of a motionless body, and this in three different ways, as place, as matter, as form.

"As a place, first of all, because the motionless center is the place of Heaven, as Averroes says in comments 43 and 45 of the fourth book of the *Physics*.

"As matter, not as matter in which it is contained, nor as matter from which it is formed, but as matter around which it is arranged.

"As a form, finally, because in the definition of any moving thing is implied the existence of a fixed object. Indeed, any body is said to move when it behaves differently from moment to moment with respect to a thing that remains at rest; this fixed term is assumed, is conceived in the very definition of motion. Hence, mortal animals need a fixed body to move, and so does Heaven, though in a different way. Mortal animals need a fixed body both as a support for their instruments of locomotion and as an immobile reference point, required by the very definition of motion; Heaven needs a fixed body only because the definition of motion requires it...

"Albertilla protests against this exposition. Averroes has stated that the force of the conclusion to be proved is derived from the proposition in *De motibus animalium* that every body that moves requires a motionless body... Albertilla claims that this authority has nothing to do with the question, for Aristotle speaks there only of the motion of mortal animals... He says, moreover, that the epicycles move, although they have no body in them around which their revolution is accomplished.

"But these are frivolous replies. Aristotle asserts in an entirely general way that all motion requires a fixed object; he asserts this as much of the movements of Heaven as of the movements of mortal animals; the proof of this is that after formulating this proposition, he adds: All the gods and goddesses, uniting their forces, could not move the whole of the Earth... As for this little orb, this sort of eye which is called an epicycle, it is not a real body; we shall say elsewhere how we can, without having recourse to it, explain the phenomena. »

A bitter discussion, and even one marked by bad faith, of the theories of Albert of Saxony, a declaration against the system of Ptolemy, nothing is missing in this commentary that can make Nifo's return to the Averroïst doctrines more obvious.

# XIX. - NICOLAS COPERNICUS AND JOACHIM RHAETICUS.

Taken as a whole, the Averroist theory of locality and motion was not compatible with any astronomical system other than the system of homocentric spheres. Ptolemy's system could not be reconciled with a doctrine that required the concrete existence of a motionless body at the center of any celestial sphere animated by a rotational motion, and that wanted this body to be the Earth. For the supporters of such a doctrine, the eccentrics and the epicycles could only be the insane productions of a crazy imagination.

But the reasons which made them conceive such an opinion of the astronomical hypotheses admitted by the successors of Ptolemy were not less hostile to the assumptions of Copernicus; that the Sun was pulled, by an eccentric orbit to the Earth, or that the Earth described around the Sun a circle whose Sun did not occupy the center, the principles supported by Averroes were also condemned.

It was therefore necessary, in order for Copernicus to propose his new astronomical doctrine, that he reject the theory of place and motion maintained by the Commentator and his followers. 174] By persistently fighting against this theory, by discussing and ruining the arguments by which it claimed to be established, the Scotists and the Occamists found themselves having favored the advent of the new Astronomy.

In spite of the favor that Averroist Physics found in the Italian Universities at the time he visited them, Copernicus had necessarily to attach himself to the propositions that the Parisians had formulated about place and motion.

But how far was the reformer of Astronomy going to follow the path traced by the disciples of John Duns Scotus, William of Occam and Albert of Saxony?

He could certainly have followed this path to the end.

He would have denied, then, that the immobile reference point to which the physicist relates all the movements of the stars was a concrete body, really present in nature; he would have attributed to this fixed term a purely conceptual and abstract existence; then, once his astronomical system had been constructed, by the comparison of his theory with the facts, he would have endeavored to discover in Nature bodies, endowed with actual existence, which it would be permissible to regard as more or less immobile with respect to this reference point, fixed by definition; bodies that could provide a *practically* invariable term to which the observer would relate the sidereal motions that the theorist would consider as little different from the absolute motions, the only true objects of his reasoning.

This method is the one indicated by the most profound thinkers of the School; it must have seemed very difficult to understand and to follow to Copernicus' contemporaries, to those men of the Renaissance, in whom the faculty of conceiving abstract things had become strangely weakened. Centuries were to pass before physicists would recover the principles laid down by the Scotists and Occamists at the beginning of the fourteenth century, themselves following the tradition of Damascius and Simplicius.

Copernicus therefore did not follow entirely the indications given by most of the Parisian masters. Some of them had marked out a road less remote from the Averroist method and which did not require, of those who wished to follow it, such a sharp sense of abstraction. It was this latter road that was adopted by the great reformer.

Peter of Ailly had formulated in a clear way an opinion that Campanus of Novara and Saint Bonaventure had conceived before him, that John the Canon and Albert of Saxony had fought against: The absolutely fixed body which serves as a place for all the bodies of Nature, to which all local movements are related, is a concrete body; it is a celestial sphere which envelops in its bosom all the other orbs; it is the Empyrean of which many theologians believed they had to admit the existence in order to interpret certain passages of the Scripture

The party adopted by Pierre d'Ailly is also the one to which Copernicus will adhere; but it will be possible for him to concretize even more the principle admitted by the Bishop of Cambrai. It will not be necessary for him to attribute immobility to an orb whose existence can only be confirmed by the reasoning of the theologian and the philosopher, without it being possible for our senses to be sure of it. The ultimate sphere that he will take as the place of all the celestial or elementary bodies, as a reference point for all movements, is the sphere of the fixed stars. By attributing to the movements of the Earth all the phenomena that his predecessors explained by the movements of this eighth orbit and of the two unconstellated orbits with which they surrounded it, he conquered the right to immobilize the orbit of the fixed stars at the limits of the World.

If, moreover, some reader of John the Canon or Albert of Saxony were to ask Copernicus what is the place of this starry sphere, the place of other bodies, the Canon of Thorn would answer that it is its own place, that it contains itself.

This doctrine of the reformer of Astronomy is already apparent in the following passage[[255]](#footnote-256), inserted among the reasons for attributing diurnal motion to the Earth rather than to Heaven: [176] "I add that it seems rather absurd to attribute motion to the body that contains and accommodates, and not to the body contained and accommodated, which is the Earth. »

But Copernicus' opinion is most clearly expressed in these few sentences[[256]](#footnote-257):

"The first of all the celestial spheres, the supreme sphere, is the sphere of the fixed stars; it contains itself and all things; hence it is immobile; that is to say, it is the place of the Universe, the place to which the movement and position of all the other stars must be related. - *Prima et suprema omnium est stellarum fixarum sphaera, seipsam et omnia continens; ideoque immobilis; nempe Universi locus, ad quem motus et positio caeterorum omnium syderum conferatur*. »

The very terms that Copernicus applies to the orb of the fixed stars in this passage hardly differ from those used by St. Bonaventure and Campanus to speak of the Empyrean[[257]](#footnote-258). According to the Seraphic Doctor, in fact, the Empyrean "is containing and not contained". According to the chaplain of Urban IV, "it is the general and common place of all things that are contained, because it contains all things, and nothing foreign contains it".

Among the philosophical ideas that presided over the formation of Copernicus' astronomical theories, several appear, in the book *Of Revolutions*, only in an extremely concise form; this conciseness, sometimes, would leave the reader hesitating about the author's true thought. Almost always, in this case, the propositions that Copernicus wanted to formulate are found, clearer and more explicit, in the exposition of his doctrine that was given by his disciple Joachim Rhaeticus.

As early as 1540, Joachim Rhaeticus had the *Narratio prima de libris revolutionum Nicolai Copernici* printed, which he had addressed to Jean Schoner[[258]](#footnote-259).

177. Now, when Rhaeticus explains the distribution of the Universe according to the doctrine of his master, he expresses himself in these terms[[259]](#footnote-260), which deserve to be reproduced verbatim:

"Principio non mediocribus laboribus superatis per hypothesim constituit orbem stellarum, quem octavum vulgo appellamus, ideo a Deo conditum, ut esset domicilium illud, quod suo complexu totam rerum naturam complecteretur, quare ut Universi locum fixum immobilemque condidisse. Et quoniam non percipitur motus, nisi per collationem ad aliquod fixum, sicut navigantes in mari, " quibus nec amplius ullae apparent terrae, coelum undique et urdiquo pontus ", tranquille a ventis mari nullum navis motum sentiunt, tametsi tanta ferantur celeritate, ut in hora etiam aliquot miliaria magna emetiantur : ideo Deum tot eum orbem, nostra quippe causa, insignivisse globulis stellantibus, ut penes eos, loco nimirum fixos, aliorum orbium et planetarum contentorum animadverteremus positus ac motus. »

It is impossible to express in a clearer and more formal way that the orb of the fixed stars is the immobile place of the whole Universe, that it is the term to which all movements are related; in a word, that it plays exactly the role attributed to the Empyrean by Campanus of Novara, by Saint Bonaventure, by Pierre d'Ailly and perhaps by Nicolas de Orbellis and by Pierre Tataret.

# XX. - A LOOK AT MODERN TIMES

From Aristotle to Copernicus, we have followed the evolution of the theories that have been proposed on the subject of place and local [178] motion; after antiquity had produced numerous and varied doctrines on this subject, we have seen these doctrines gradually divided into two groups.

One of these groups of doctrines is dominated by the Averroist system; this system imposes on the philosophers who admit it a narrow and rigid constraint; the immobility of the Earth at the center of a set of homocentric spheres, whose uniform revolutions must explain all the celestial appearances, is presented here as a logical dogma that one cannot deny without falling into absurdity and contradiction.

The other group of doctrines is the work, long taken up and perfected, of the Scotists and Occamists; one of its avowed aims is to give back to the omnipotence of God the right to move the whole Universe, a right which Averroism denies him; another of its objects is to defend the Astronomer of the Almagest from the accusation of illogic which the Commentator has raised against it. Now, by putting the teachings of Theology out of the clutches of an over-ambitious Physics, by claiming for Ptolemy's theory the right to develop freely, the Parisians who formulated and supported these doctrines made possible the formation of the Copernican theory.

The evolution that we have traced until the day when *The Six Books of the Revolutions of the Celestial Orbs* were published was not completed on that day. Without doubt, the adoption of Copernicus' Astronomy condemned for ever certain doctrines relating to place and local motion; the Averroist system, which held the motion of the Earth to be a logically contradictory hypothesis, disappeared without return. But most of the other assumptions that had been made in antiquity, that had been taken up again in the Middle Ages, reappeared for a third time in modern times, and philosophers discussed them again, trying to bring more clarity and precision to these difficult problems.

The history of these debates would be of the greatest interest; but, in order to retrace it, we would have to deviate, and very far, from the limits that we have assigned to this research. And yet, [179] it seems to us that this research would be incomplete if we did not quickly enumerate the systems that the last centuries have seen springing up on the subject of place and local motion, if we did not briefly point out the analogies that bring these systems closer to those we have described, and the disparities that keep them apart.

First, here is Descartes.

His theory of place and motion is, as we can easily recognize, only an attempt to accommodate Aristotle's theory to the fundamental principle of his Physics, namely that matter is identical to extent in length, width and depth.

All that is untenable in this doctrine, which makes local motion something absolutely inconceivable, appears clearly in the article[[260]](#footnote-261) where Descartes tries to define what *space or the interior place is*.

"Space, or the interior place, and the body which is included in this space are also different only by our thought. For, in fact, the same extent in length, width, and depth that constitutes space constitutes the body; and the difference between them consists only in the fact that we attribute to the body a particular extent, which we conceive to change place with it whenever it is transported, and that we attribute to space such a general and vague one, that after having removed from a certain space the body which occupied it we do not think that we have also transported the extent of this space, because it seems to us that the same extent always remains there while it is of the same size and the same figure, and that it has not changed its situation with regard to the bodies outside by which we determine it. »

For local motion to be conceivable, a body must be able to remain *the same* while successively occupying *different* parts of the expanse, and a part of the expanse must be able to remain *the same while* successively being occupied by *different* bodies. Descartes admits this and expresses it like everyone else. How then can he maintain [180] that the body does not really differ from the space it occupies?

This proposition, if he wanted to stick to it rigorously, would stop all his Physics at once; but it seems that he forgets it almost as soon as he has stated it, so that he speaks of bodies almost as the philosophers spoke of them, who did not confuse them with extent.

In particular, what he says about place and motion is very similar to what Aristotle said:

The words "place" and "space" do not signify anything[[261]](#footnote-262) that is really different from the body that we say is in some place, but only indicate its size, its shape, and how it is situated among other bodies. For in order to determine this situation, we must notice some other bodies which we consider to be immobile; but depending on whether those we consider in this way are diverse, we can say that the same thing at the same time changes place and does not change place. For example, if we consider a man sitting at the stern of a ship which the wind is carrying out of the harbor, and take care only of this ship, it will seem to us that this man does not change his place, because we see that he always remains in the same situation with respect to the parts of the ship on which he is; and if we take care of the neighboring lands, it will also seem to us that this man incessantly changes his place, because he is moving away from them, and approaching some others; If, in addition to that, we suppose that the earth turns on its axle, and that it makes precisely as much way from the sunset to the sunrise as this vessel makes from the sunrise to the sunset, it will seem to us again that the one who is at the stern does not change place, because we will determine this place by some immobile points that we will imagine to be in the sky. »

Following a similar analysis, Aristotle defined the place of a body: "The first immobile enclosure that one encounters in the vicinity of this body. - TÕ toà perišcontoj pšraj ¢c...nhton prîton, toàt/œstin Ð tÒpoj. »

181] "But," adds Descartes, "if we think that we cannot find in the whole Universe any point that is truly immobile, as we shall know from what follows that this can be demonstrated, we shall conclude that there is no place in the world where anything is firm and fixed except that we stop it in our mind. »

Like Aristotle, he cannot attribute a place to a body without looking for an immobile term in the Universe; but unlike the Stagirite who believes in the existence of this immobile term and thinks he has designated it, the French Philosopher affirms that this term does not exist; for him therefore, a body does not have an absolute place; it only ever has a relative place, depending on a convention by which it pleases us to declare that fixity will be attributed to such and such a body; but this convention, purely arbitrary, can be changed by a simple decree of our good pleasure; the same body can thus have as many different places as it will please us to attribute to it.

To say that there is no absolute place for a body is to say that there is no motion that is not relative. Descartes does not fail to do this[[262]](#footnote-263):

"Motion, as it is usually understood, is nothing other than the *action by which a body passes from one place to another*. And therefore, as we have already remarked that the same thing at the same time changes place and does not change place, so we can also say that at the same time it moves and does not move. For, for example, he who sits at the stern of a ship that the wind is blowing believes that he is moving when he only takes notice of the shore from which he has set sail, and considers it to be immobile; and he does not believe that he is moving when he only takes notice of the ship on which he is, because he does not change his situation with regard to his parts... "

"But if... we wish to know what motion is according to the truth, we shall say, in order to attribute to it a nature which is determined: that it is the transport of a part [182] of matter or of a body from the neighbourhood of those which immediately touch it, and which we consider to be at rest, into the neighbourhood of some others. "We may therefore attribute to the same body, at the same time, as many different movements as we please; we need only change as many times the body "which we consider to be at rest".

It is easy for us to characterize briefly this theory of place and motion proposed by Descartes; it is the theory of Aristotle and Averroes, but from which the Copernican revolution subtracted the immobile term, the tÕ ¢k...nhton prîton that this last theory required.

We will not linger here to expose the discussions provoked by the absolute relativity of place and motion; these discussions occupy an important place in the history of Cartesianism. We will limit ourselves to quoting some passages from the last proponent of the Cartesian theory of place and motion; in order to formulate this theory, Étienne Simon de Gamaches[[263]](#footnote-264) knew how to put in his speech a precision and a clearness that surpassed even those that Descartes had reached.

"Bodies that are said to be in motion and those that are said to be at rest always have the same relation to the *interior place* that they occupy; for this place is the very expanse that constitutes their nature. A body can therefore only have a definite state in relation to the other bodies which surround it, and which serve as its *external locus*, or, if you like, its physical locus... All I have to do, then, is to show that relative and reciprocal motion necessarily follows from this; but nothing is easier. 183] First of all, we see that the total mass of matter can be neither in motion nor in rest; for whoever says rest or motion says, as we agree, relation to something external; and what could be assumed beyond the expanse? But if the state of the mass of matter is not determined, neither is that of its parts: one is a necessary consequence of the other. It is true that each particular body, compared to each of those which surround it and which serve as its physical location, necessarily has different physical states, and that all at once; there is no body which cannot be said to be at the same time at rest and in motion, and to have all the directions and all the different degrees of speed determined in the order of nature. This is not all; for as bodies mutually serve as external locus, the determination of their state must also be mutual; thus when they change their distance relations, the motion is necessarily reciprocal, and can only be attributed to one rather than to the other by supposition..."

"We cannot, therefore, without being mistaken, judge the state of things in relation to any physical place whatsoever. Indeed, if a cannonball, in obeying the impression of the powder, ceased to follow that of the movement of the Earth, it is certain that the ball in this state would appear to us to be moving, and this because we would see it respond successively to different parts of a space which we would judge not to change place; But an astronomer would think differently than we do; accustomed to forming his physical location from the assembly of the fixed stars, he would judge the ball to be stationary, and would suppose that below it the surface of the earth would be hidden. Now, I say that his misunderstanding would be equal to ours; for what he would consider as fixed has no character of stability that distinguishes it from the place we occupy. We are not sure that all the stars are always in the same situation with respect to each other; but if they always kept the same distance from each other, I do not see that anything else could be concluded, except that they would be in the same situation as the parts of any solid body; their rest would be relative. Therefore, even if we take their assembly to be the physical location of all the bodies within reach of our senses, we shall always be entitled to regard this location as a particular body, capable of changing its state in relation to some other more extensive space, in which, if we so wish, we shall suppose it to be enclosed; for what limits can be given to the universe? Let us add to this that, whatever supposition we make, the state of no physical place can ever be determined; for if it is true, as I have already shown, that the total mass of matter is neither absolutely at rest nor absolutely in motion, we must agree that when all its parts are in perfect relative rest, the whole would not become any more suitable for forming a physical place on the state of which nothing could be decided..."

"In order not to deceive ourselves, we should look at the different parts of matter only as a pure intelligence would do, as a spectator of the whole universe, and which would not be attached to any physical place; it is that then, as nothing would serve as a fixed point, we would have no difficulty in conceiving that everything is respective in movement; I mean that we would judge, for example, that we could equally think that it is the earth that moves, or that it is the heavens that turn around the earth; any supposition, any hypothesis would seem to us to be equally founded... »

"Besides, suppositions that are only given for what they are are always useful; they relieve our imagination by fixing our ideas. Physical operations often require that we make them, and then it is to the simplest that we must attach ourselves. Thus, if I wanted to make experiments to justify the laws of motion, I would begin by supposing the earth to be at rest; for otherwise I could only have complicated motions, the examination of which would rather tire the mind than enlighten it. But if I wanted to establish the system of the world, I would do the opposite; I would suppose the Earth to be in motion; the mechanical play of the parts of the Universe would be easier to follow, and this supposition would even provide more uniformity. For as soon as the planets are made to move, why should any one of them be excluded? But with all this I would only be making suppositions, [185] and if I took the simplest ones, it would only be because I would find them more convenient; that is, nothing would oblige me absolutely to give them preference. »

When in 1277, the theologians presided over by Stephen Tempier had decreed that the center of the world could, without absurdity, be moved, anyone who wanted to reconcile with this decision the principles of the Averroist theory of place would have ended up with the system that Gamaches has just exposed with such logical rigor.

But it is not enough that a theory of motion be deduced in a perfectly exact manner from the principles it claims; it must also allow the construction of a Mechanics whose corollaries agree with the laws revealed by observation.

Gamaches had seen this point very well; he had seen very well that Descartes' system could not survive unless a Mechanics was built exclusively on the consideration of relative motion, a Mechanics whose laws kept the same form whatever body the physicist wanted to take as a motionless place; he tried to formulate this Mechanics; but his attempt was condemned in advance, and by the very principles of Cartesian Physics.

One of Descartes' main titles is to have clearly stated the first and fundamental law of all modern Dynamics, the law of inertia:

First," he says[[264]](#footnote-265), "I suppose that the motion which is once impressed on some body remains there perpetually, unless it is removed by some other cause, that is, *quod in vacuo semel incoepit moveri*, *semper et aequali celeritate movetur*. "In particular, and the proposition is expressly formulated in the *Principles of Philosophy*, a body at rest will never begin to move by itself.

Now, how could we adopt, or even state, such a law if we held as exact the Cartesian theory [186] of motion, which Gamaches has expounded with such complete rigor? How can we affirm that a body in a vacuum remains at rest or moves in a uniform rectilinear motion, since a suitable choice of physical location allows us to attribute to it indifferently all the motions that we may wish to conceive? The law of inertia can only be adopted by physicists who are determined to reject the Cartesian theory of place and motion, and to accept a completely different theory.

The Cartesian theory was a sort of transposition of the theory of Aristotle and Averroes; the one that Newton substitutes for it, the one by means of which he exposes the new Dynamics and the new Celestial Mechanics, is none other than the ancient doctrine of John Philopon.

Absolute space," he says[[265]](#footnote-266), "is, by nature, free from any relation to any external object whatsoever; it always remains similar to itself and immobile. Relative space is a certain measure, a certain mobile dimension of this absolute space; it is defined in a sensible way by means of its situation in relation to certain bodies; it is usually taken for the immobile space; it is thus that one determines the measure of the underground, aerial or celestial space, by means of the situation in relation to the Earth. Absolute space and relative space have the same figure and the same size, but they are not always numerically identical. Let the Earth, for example, move; the relative space that our air occupies, a space determined by comparison with the Earth, will always remain the same; but the part of absolute space through which this air passes will change from one moment to the next.

"Place is the part of space that the body occupies; it is absolute or relative like the space of which it is a part... Absolute motion is the transport of a body from one absolute place to another absolute place; relative motion is the passage from one relative place to another relative place. »

What Newton has written so far expresses nothing more than the doctrine of John Philopon. Now he is approaching a new question which no one before him had attempted to solve.

Absolute space does not fall under the senses; how then can we recognize whether a body always occupies the same part of this space, or whether it occupies a part that changes from moment to moment? In other words, how will we be able to discern whether this body is at absolute rest or in absolute motion? And how will we be able to decide that its absolute motion is this motion and not that one?

It is a very difficult thing," says Newton[[266]](#footnote-267), "to recognize the true motion of every body and to distinguish it from its apparent motion; for the various parts of that motionless space in which the true motions of bodies take place do not fall under the senses. The cause, however, is not entirely hopeless. One can; in order to judge it, draw an argument on the one hand from the apparent movements of the various bodies, which are the differences of the true movements, and on the other hand, from the forces which produce the true movements or which are produced by them. »

Let us suppose, for example, that two spheres, connected to each other by a wire, rotate with a uniform motion around an axis perpendicular to this wire; the link that unites these two spheres will experience a tension that is all the greater as the rotational motion is faster. This tension, generated by an absolute motion of rotation, would not exist if the rotation of the two spheres were purely relative and if the absolute state of these bodies were a state of rest.

Thus, in order to recognize whether the absolute motion of a group of bodies is indeed such a motion as one has imagined, one will first calculate the effects that such a motion, if it is absolute, must produce in this group of bodies; then, by the various procedures available to the experimenter, one will measure the actions that are actually exerted in it and will examine whether or not they agree with those whose existence and magnitude one has foreseen.

This method obviously presupposes that one possesses a mechanical theory suitable for calculating the effects which must occur in a system animated by a given motion and instruments capable of detecting and studying these effects; it is therefore subordinate to the postulates from which this theory derives and to the hypotheses which justify the use of these instruments; the confidence which one places in these postulates and hypotheses is the measure of the certainty which one is entitled to attribute to the information obtained by this method.

This method, whose legitimacy is based solely on the certainty attributed to Newtonian Dynamics, encounters, in the very principles of this Dynamics, an insurmountable boundary that limits its scope. According to these principles, the mechanical actions that manifest themselves within a system whose parts are all moving in the same invariable direction with the same constant velocity are identically the same as if this system remained motionless; it will therefore be impossible to decide whether the system is animated by a uniform translation or whether it is at absolute rest. More generally, the mechanical effects do not change at all within a system if, in place of the motion that animates this system, we substitute a second motion, obtained by composing the first one with a uniform translation of some kind; Newton's Mechanics will therefore never allow us to decide whether the absolute motion of the system is the first motion or the second.

Newton did not have occasion to formulate this truth explicitly; it does, however, come up in certain considerations which he develops and of which we shall say a word.

Let us suppose that a material system is formed of bodies whose various parts attract or repel each other according to any laws, while they are removed from any external action. The center of gravity of such a system remains immobile, or it moves in a rectilinear and uniform motion[[267]](#footnote-268).

But is this center of gravity stationary or does it move? If it is moving, in what direction is it moving, and with what speed? If we cannot compare the position of the system with any reference point considered as fixed, it will not be possible to obtain an answer to these questions by simply studying the mechanical actions that are exerted from within this system; indeed, according to Newtonian Dynamics, the laws of these actions do not depend in any way on the solution that we would like to give to the problem posed.

If, therefore, we neglect the actions that the stars exert on the stars closer to us, we can affirm that the center of gravity of the solar system is either an immobile point or a point that moves in a straight line with a constant speed[[268]](#footnote-269). But there will be no reason which, between these two propositions, imposes on us this choice rather than the other; and if we choose the second one, we will have no way of specifying it further.

Newton chooses, however, and here are the reasons that guide his choice:

All physicists, he notes[[269]](#footnote-270), have agreed that the center of the World was immobile. They were divided when it came to designating this center; some wanted it to be the center of the Earth, others that it was the center of the Sun. Of these contradictory suppositions, neither one nor the other can be adopted; neither the center of the Earth, nor the center of the Sun can be considered immobile by those who possess the true mathematical principles of natural philosophy. But there is nothing to prevent us from holding as true the proposition in which all the ancient physicists agreed, and from formulating this hypothesis[[270]](#footnote-271): The World has a center, and this center is immobile.

Moreover, as there is nothing to prevent us from admitting the immobility of the center of gravity of the solar system, Newton will assume that this point is the immobile center of the Universe[[271]](#footnote-272).

190] This hypothesis removes the indeterminacy left by Newtonian Dynamics in the study of the absolute motion of a body or a set of bodies.

The assumption that the Universe has a motionless center completes the already striking analogy between Newton's theory of place and motion and that of John Philopon.

This theory of Jean Philopon is the one adopted, in a more or less explicit way, by most of the great mechanics of the Newtonian School; no one has formulated it more clearly than Leonhard Euler[[272]](#footnote-273).

The inertia of a body," says Euler[[273]](#footnote-274), "is not regulated by the neighboring bodies; but it is quite certain that it is regulated by the idea of the place, which mathematicians consider as real and metaphysicians as imaginary. »

According to Mechanics, a body that is at rest at a certain moment and that no force is applied remains indefinitely in the same place. "It cannot be said that this principle of Mechanics is founded only on something that exists only in our imagination; and from this it must be concluded absolutely that the mathematical idea of place is not imaginary, but that there is something real in the world that corresponds to this idea. There is thus in the world, besides the bodies which constitute it, some reality which we represent to ourselves by the idea of the place... "

"The reality of space will be further established by the other principle of Mechanics, which contains the conservation of uniform motion in the same direction. For if space and place were only the relation of coexisting bodies, what would be the same direction? It would be very difficult to give an idea of this by the mere mutual relation of coexisting bodies, without including that of immobile space. For however much the bodies move and change their situation among themselves, this does not prevent us from retaining a fairly clear idea of a fixed direction which the bodies try to follow in their motion, in spite of all the changes that the other bodies undergo. Hence it is evident that the identity of direction, which is a very essential circumstance in the general principles of motion, cannot be explained absolutely by the relation of coexisting bodies. Therefore, there must be something else real, besides bodies, to which the idea of the same direction refers; and there is no doubt that it is space, whose reality we have just established[[274]](#footnote-275). »

In spite of the great authority of Newton and Euler, many minds could not subscribe to the theory of John Philopon; they were reluctant to attribute a reality to this immobile space which, however, was not a body; then, following the example of Averroes, they looked in nature for a concrete body absolutely immobile, to which one could relate the movements of all the other bodies; with Copernicus, they asked the whole of the stars to provide them with this fixed reference point.

Already Euler spoke out [[275]](#footnote-276)against this way of defining the place: "If they said that it was in relation to the fixed stars that the principle of inertia had to be explained, it would be very difficult to refute them... But... it would be a very strange proposition and contrary to many other dogmas of Metaphysics, to say that the fixed stars direct the bodies in their inertia. »

This proposition, which Euler declares "very strange and contrary to many other dogmas of Metaphysics", has however been formulated, nowadays, by Mr. Ernst Mach. "What is the[[276]](#footnote-277)influence of each mass, according to the law of inertia, on the direction and speed of the moving body? Our experiments do not provide us with an answer to this question. We only know that, as far as this influence is concerned, the nearest masses are negligible in comparison with the farthest masses. We could fully account for all the facts known to us by making the simple hypothesis that the various bodies exert this action with an intensity proportional to their mass and independent of their distance, or else proportional to their distance. We could adopt this other formula: As soon as bodies are far enough apart from each other to no longer exert any appreciable influence on their respective accelerations, their mutual distances vary in such a way as to maintain an invariable ratio. »

This curious hypothesis formulated by Mr. Ernst Mach does not solve the problem of place and absolute motion; it speaks of velocities and accelerations; it thus obliges us to ask ourselves what is the term, immobile by definition, to which these motions are related.

To say that this fixed reference point, that this place of all bodies is constituted by the whole of the stars, could be done at the time of Copernicus, when the stars were considered as forming a system of invariable figure, a solid configuration. From the day this hypothesis was abandoned, one was no longer allowed to take the grouping of stars as an immobile place, whose shape was likely to vary incessantly. However, as early as 1718, Bradley showed that the changes in position of the stars that had been called fixed were accessible to our means of observation; and before these proper movements of the stars could be observed, the theory of universal gravity had affirmed their reality. Perceptible or not, these movements deprive the system of stars of absolute rigidity; according to the remark already made by Gamaches, to take this system as a physical place of bodies, as an absolutely fixed mass by definition, would be to commit an absurdity.

To escape this absurdity, physicists who, like Averroes, demand a concrete body capable of serving as an absolutely fixed term of comparison, will no longer look for this term in the system of fixed stars; moreover, none of the bodies which fall under our senses is, more than the system of fixed stars, absolutely invariable in form; They will therefore have to admit that the rigorously undeformable body which they will agree [193] to treat as a rigorously fixed reference point, is a body inaccessible to direct observation, whose existence cannot be ascertained, but rather concluded, because, without it, the theory of place and motion could not be constituted; they will take up again a reasoning quite similar to the one by which a Pierre d'Ailly proved the existence of a rigid and immobile Empyrean.

In modern times, no one has followed this method more rigorously, no one has given a clearer and more precise exposition of it than Mr. Carl Neumann[[277]](#footnote-278).

This proposition of Galileo's, says Carl Neumann[[278]](#footnote-279), "A material point left to itself moves in a straight line, appears to us as a theorem without content, as a theorem which remains in the air and which, in order to become intelligible, requires a certain foundation. In the Universe, a particular body must be given to us, which can serve as a basis for our judgment, which is the object in relation to which all motions must be evaluated... We easily recognize that all the motions that occur in the Universe, and even that all conceivable motions, must be related to *one and the same* body. Where is this body? What reasons have we to attribute to a particular body such an extraordinary and dominating role? These are questions which, until now, have not been answered.

"We must therefore, as a first principle of the theory of Galileo and Newton, formulate this proposition: In an unknown region of the Universe, there exists an equally unknown body, which is an absolutely rigid body, a body whose figure and dimensions remain invariable in the course of time.

"Let me be allowed, in view of the brevity of the discourse, to name this body the *Alpha body*. From now on, it will be admitted that when we speak of the movement of a point, we do not mean its change of position with respect to the Earth or [194] with respect to the Sun, but its change of position with respect to the Alpha body.

"Considered from this point of view, Galileo's law becomes clearly intelligible; it presents itself to us as a second principle which consists of this: A material point left to itself moves in a straight line, that is, it describes a trajectory that is rectilinear with respect to the Alpha body...

"As a rule, great care is taken to ignore this Alpha body. One speaks of *absolute* space, of *absolute* motion; but one cannot see in these expressions anything but other words that express the same thing. Indeed, the character, the very essence of absolute motion consists - no one would dare to dispute it - in this: All changes of position must be related to one and the same object; this object is an object endowed with extent and invariable, which cannot, moreover, be the subject of any more detailed description. It is this object that I have designated as an unknown solid body and that I have named the Alpha body.

"Here a new question arises: Is this body endowed with a real and concrete existence, analogous to the existence of the Earth, the Sun and the other celestial bodies? To this question, we could, it seems, answer in these terms: The existence of the Alpha body can be the object of a supposition as legitimate, as certain as the hypothesis of the existence of the luminous ether or the electric fluid. »

Even though they all subscribe to this formula of Mr. Carl Neumann, physicists would not all agree on the nature and degree of existence that should be attributed to the Alpha body; all those, indeed, who base Optics on this hypothesis: There is a luminous ether, do not understand in the same sense the proposition that they formulate however in the same terms.

For some, the hypotheses of Physics consist in supposing that certain bodies actually exist or actually possess this or that property. For these physicists, to formulate this hypothesis: There exists a luminous ether, is to suppose that there is really in the World a body whose qualities are, at least approximately, those attributed to the ether; if it could be shown that such a body has no concrete existence, these physicists would hold the hypothesis of the ether to be false; then this hypothesis would have to be abandoned, and Optics would have to be based on other suppositions.

For physicists who attribute such a scope to the hypotheses of theoretical physics, to suppose that the existence of the Alpha body is of the same nature as the existence of the luminous ether, is to attribute to the Alpha body a real and concrete existence, outside our understanding, in the Universe outside of us.

These physicists may ask themselves where the Alpha body is and what its nature is. Of this number, for example, are those who describe the Alpha body as a fixed body, spread throughout space and compenetrated without resistance by the mobile bodies that fall under our senses. These physicists unite, so to speak, the theory of place proposed by Averroes with the one supported by John Philopon, Newton and Euler, and from this synthesis they compose a doctrine which reminds very closely that of Proclus.

Besides the physicists we have just mentioned, there are those who, when they formulate a physical hypothesis, do not intend to establish a concrete reality in the external world. For them, a physical theory is only a system of abstract propositions intended to summarize and classify experimental laws. The hypotheses they state are only intended to define the notions that will be used to build such a system. The luminous ether is not, for them, an impalpable body, inaccessible to the senses, but really existing in the external World; it is a pure conception of the mind, an arrangement of mathematical notions whose whole serves to link between them, to harmoniously order the numerous laws of Optics.

If a physicist of this school declares that he attributes to the Alpha body an existence of the same nature as to the luminous ether, it must not be concluded that he regards the Alpha body as real, as objective as are the Sun, the Earth and the Moon. He will only mean, in fact, that the Alpha body is a mathematical concept, a geometrically [196] defined solid which he needs to build in his mind his' mechanical theory. For him, therefore, the Alpha body, the fixed reference point to which all absolute movements are related, is not, as for the Averroists, a body endowed with real and objective existence; it is a simple abstract conception; and the opinion of this physicist joins that of Damascius and Simplicius, and also that of William of Occam, of Walter Burley, of Gaetan de Tiène, of the Parisian Terminalists of the Middle Ages.

Now, Mr. Carl Neumann belongs to this School of physicists for whom the hypotheses of theoretical Physics do not pose concrete realities in the external world; he has affirmed this with great clarity in the writing we are studying; he has made his own the famous proposition put by Osiander at the head of Copernicus' work: "*Neque enim necesse est hypotheses esse veras, imo ne verisimiles quidem, sed sufficit hoc unum si calculum observationibus congruentem exhibeant*. The hypotheses of Physics have no need to be true, nor even plausible; it is enough that the calculation draws consequences that agree with the observations[[279]](#footnote-280) . »

By assimilating the existence of the Alpha body to that of the luminous ether or of the electric fluid, Mr. Carl Neumann does not intend to attribute to this body an objective and concrete existence; the existence he intends to attribute to it is purely conceptual; he sees in it nothing more than an abstract notion necessary for the construction of a rational Mechanics whose corollaries will have to agree with the laws of the movements really observed.

Mr. Carl Neumann explains this with his usual clarity and precision:

When," he says[[280]](#footnote-281), "an investigation of pure Mathematics involves the simultaneous consideration of several variables, and one wishes to present to the intuition the mutual relations of these variables in such a way that it has an overall view of them, it is often convenient and sometimes necessary to introduce an auxiliary variable, and to make known the relation which unites each of the primitive variables to this auxiliary variable. Something analogous occurs in physical theories. In order to acquire an overall view of the dependence that exists between simultaneous phenomena, it is often useful to introduce a purely conceived phenomenon, a purely ideal substance, which plays, as it were, the role of an auxiliary principle; it is, so to speak, a central point, from which one can radiate, in different directions, towards the various phenomena that one wants to consider. The connection of these phenomena with each other is then constituted by the link that unites each of them to the central point. It is a role of this kind that the luminous ether plays in the theory of optical phenomena and the electric fluid in the theory of the phenomena of electricity; it is also an analogous role that the Alpha body plays in the general theory of motion. »

According to this way of seeing, there is no longer any reason to ask what the nature of the Alpha body is, in which part of the World it is located, what its size and shape are. This body is a pure geometrical concept, a simple trihedron of reference. Rational Mechanics, Celestial Mechanics or Physics will develop theories in which will appear motions that they will name absolute and that will be the motions related to this trihedron; but only the corollaries of these theories that have to do with the relative motions of the various bodies of the Universe will be able to be compared with the observed facts and will have to agree with them. We can therefore, following the thought of Mr. Carl Neumann, say that the absolutely fixed reference frame, that the Alpha body is a reference trihedron conceived in such a way that the consequences deduced from Galileo's and Newton's Mechanics agree with the observable relative motions, in all the circumstances where they can be compared with them. It can be said that this trihedron is chosen in such a way that the experimental laws of motion are represented by the theoretical Mechanics as simply and as accurately as possible. This is the definition to which many of the modern mechanics who have meditated on the theory of absolute and relative motion have come to a conclusion.

198] As early as 1852, F. Reech wrote[[281]](#footnote-282): "In fact, all the motions we are given to know must be considered as being only relative motions, and it will only be up to us, later on, to choose, among the infinite number of rectangular axes to which we will want to relate the motion of a system, those of these axes which will lead us to the simplest mechanical relations. »

In 1892, we wrote[[282]](#footnote-283):

"Experience allows us to see whether two parts of matter have moved in relation to each other, so that the notion of *relative motion* is an experimental notion; it is this notion that Kinematics deals with.

"But this notion is insufficient for the object we propose to treat. The hypotheses that we will have to state, the laws that we will have to formulate, will not only involve the relative movements of the different parts of the matter in relation to each other. They will involve the motions of the different parts of the matter in relation to a certain ideal reference trihedron, which we suppose to be drawn somewhere. It will often happen that propositions which concern the motions relative to this particular reference trihedron, and which we regard as correct, would become manifestly false if we assumed the motions relative to another reference trihedron, animated with respect to the first one by some motion.

"We will give to this particular trihedron, to which will be related all the movements of which we will speak, the name of *absolutely fixed trihedron*; a movement related to this particular trihedron will take the name of *absolute movement.*..

"We cannot judge in an indisputable way whether a given trihedron is or is not absolutely fixed; any judgment in this respect is subordinated to the belief in the legitimacy of some hypothesis. If we regard as correct a certain [199] hypothesis in which the consideration of absolute motions intervenes, and if this hypothesis, applied to motions relative to a certain trihedron, leads to inaccurate results, we shall declare that this trihedron is not absolutely fixed. But this conclusion is forced only in so far as we wish to preserve the hypothesis which has served as our criterion; we would be entitled to regard the trihedron in question as fixed, if we agreed to reject the hypothesis. »

In 1895, Mr. Paul Painlevé declared[[283]](#footnote-284): "We agree to call *absolute axes* any system of axes that satisfies the following conditions...". He then stated the law of inertia and the law of equality between action and reaction, and then added: "We admit that the existence of absolute axes is demonstrated by experience. »

Finally, on the subject of these coordinated axes which Rational Mechanics presupposes the adoption of, Mr. Jules Andrade expressed himself[[284]](#footnote-285) in more or less the same terms as Mr. Paul Painlevé.

We have pointed out the analogy between the theory of the Alpha body, proposed by M. Carl Neumann, and the theories of place expounded, in Hellenic times, by Damascius and by Simplicius, then, in our Western Middle Ages, by Occam and the Terminalists. It remains for us to compare these various theories with the doctrine of Kant.

Under this title: *First Metaphysical Principles of the Science of Nature* (*Metaphysische Anfangsgründe der Phänomenologie*), Kant published, in 1786, a writing devoted to the examination of the foundations of Mechanics[[285]](#footnote-286).

The impression that one feels when reading this writing is strange and painful; it seems that the Philosopher of Kœnigsberg glimpses beautiful and important truths; but he glimpses them through a thick fog which does not let him appreciate [200] clearly either the distance, or the contours; also he succeeds in seizing them only with the help of uncertain and awkward gropings.

We will try to define here what seems to us to be Kant's main thought; we hope that our efforts to make it clear have not caused it to undergo too deep and too essential modifications.

All observable motion is essentially relative; Kant first of all pronounces himself in favor of this proposition, with an assurance comparable to that of Descartes or Gamaches:

"Any motion, he says[[286]](#footnote-287), insofar as it is the object of a possible experience, can at will be considered either as the motion of a body in a space at rest, or on the contrary as a motion of the space in the opposite direction and with an equal speed, the body being at rest... In order for the motion of a body to become an object of experience, it is necessary that not only the body, but also the space in which it is moving, be objects of external experience, i.e. material. Thus, an absolute motion, i.e. referring to a non-material space, is not susceptible to be subjected to experience and, for us, is a nothingness (even if we would like to grant that the absolute space is, in itself, something)... When it comes to a given empirical space, however large it may be, since it is quite impossible to decide whether it is in motion or not in relation to an even larger capacity which would contain it, it must therefore be entirely indifferent with respect to experience and its consequences, whether I want to consider a body as in motion, or, on the contrary, the body as at rest and the space as moved with equal speed in the opposite direction. Moreover, since absolute space is a nothingness for all possible experience, it is also the same concept to say: a body moves with respect to such and such a space in such and such a direction and with such and such a speed - or to think of the body as at rest, and to attribute to space all these qualities, [201] but in the opposite direction. For any concept whose difference from another concept cannot be shown by any example is identical with the latter; it differs from it only by the connection we like to give it in the understanding.

"We are therefore not in a position to assign a fixed point for any experience, in relation to which we would determine what should be called absolute motion and rest; indeed, everything that is given to us in experience is material and, therefore, mobile, and can even be (since we do not know any extreme limit of possible experience in space) actually moved, without our being able to perceive this motion in any way. Now, in this motion of a body through empirical space, I can attribute one part of the given velocity to the body, and the other part to space, but in the opposite direction; any possible experience will be, so far as the consequences resulting from the composition of these two motions are concerned, entirely identical with an experience in which I would think the body animated by the total velocity as being alone in motion, or with one in which I would think the body as being at rest, but space as being moved with the same speed in the opposite direction. »

We find in this fragment a rigorous condemnation of the hypothesis of an absolute space, real though immaterial, hypothesis formulated by Newton and by Euler; we also find in it an affirmation of the Cartesian theory, according to which all conceivable motion is a relative motion, and this affirmation is as categorical, if not as clear, as that of Gamaches.

But we do not have here the complete expression of Kant's thought; what he has just formulated, he does not regard as absolutely true; he regards it only as true from the point of view of that part of Science which he calls *Phoronomy*, which we today call *Kinematics*, and which he defines[[287]](#footnote-288) "not as a pure theory of motion, but as a pure Mathematics of motion, in which matter is conceived of without any other property than mobility".

When Kant declared that certain motions were indistinguishable from each other by any experiment, he implied a qualifier attributed to this word experiment; he meant a purely phoronomic experiment; the proposition that he then considered as true, he would hold it to be false, on the contrary, if one wanted to hear it from an experiment of Mechanics, where "one considers the force that a moving matter has to communicate this motion to another matter[[288]](#footnote-289)".

From the point of view of mechanics, it is not true to say that one will arrive at absolutely the same experimental consequences, whether one considers a body as moving within an immobile space, or whether one considers this body as immobile and the space as moving with the same speed in the opposite direction: "For circular motion[[289]](#footnote-290), it is not in any way indifferent to consider the body (for example the Earth in its diurnal revolution) as moving, and the surrounding space (i.e. the starry sky) as motionless, or to consider the space as moved and the body as motionless.

"Any body animated by a circular motion[[290]](#footnote-291) manifests a driving force through its motion. Now, the motion of space differs from the motion of the body in that it is purely *phoronomic* and has no motive force. Consequently, the judgment by which one affirms that it is the body or that it is space that moves in an opposite direction is a *disjunctive* judgment; one member being posited, namely the motion of the body, the other member, namely the motion of space, is excluded. Thus, the circular motion of a body differs from the motion of space in that it is *real* motion; consequently, the motion of space... is a mere appearance.

« … Moreover, we can review the lin of Newton's scolie on the definitions he put at the head of his *Philosophiae naturalis principia mathematica*; it is shown that the circular motion of two bodies around a common center (consequently also the rotation of the Earth on its axis) even in empty space, i.e., without experience providing any possible comparison *with external space*, can nevertheless be known by experience; that, therefore, a motion, which is a change of external relations in space, can be given empirically, although this space is not itself empirically given and is not an object of experience. Now, this is a paradox that deserves to be explained. »

The explanation is simple. The experiment by which we can see that a certain material whole is animated by a real rotational motion, and this without having recourse to any external reference point, consists precisely in observing certain relative motions which occur within this whole and which would not occur there if its rotational motion were only apparent. "This motion[[291]](#footnote-292), although it is not a change of relation to empirical space, is not an absolute motion. It is a continuous change in the relations of matter to each other, but represented in absolute space; it is therefore in reality a relative motion, and for this reason it is even a true motion."

A true motion of a body or of a set of bodies is thus a motion which is expressed by certain relations between the various parts of the system, mutual attractions or repulsions, pressures or pulls of one on the other, mutual displacements, etc. Such a motion could exist even if there were absolutely no external body to which one could compare this system. One would imagine such a motion "if one wanted to represent the Universe as rotating around its axis[[292]](#footnote-293); this motion thus remains always intelligible; but as far as one can realize, one cannot conceive the advantage of admitting it.

204] According to Newtonian mechanics, a uniform translational motion imposed on a system does not generate any dynamic relation that does not also exist in the system if we consider this motion as apparent; such a motion can therefore only be observable if there exist outside the system certain foreign bodies capable of serving as terms of comparison and in relation to which this motion behaves as a relative motion; if these terms of comparison do not exist, in which case the motion in question would be truly absolute, this motion would be removed from any conceivable experimental observation; it would be non-existent.

"Thus, the only absolute[[293]](#footnote-294) motion would be the motion of a body that has no relation to any other matter. Only the rectilinear motion of the *whole universe*, that is, of the system of all matter, would be such a motion. For if outside of one matter there were another, even if separated from it by empty space, the motion would already be relative. This is why any demonstration of a law of motion which ends up saying that the contrary proposition would result in a rectilinear motion of the Universe, is an apodictic demonstration of the truth of this law, because it would result from the contrary proposition an absolute motion which is quite impossible. »

The motions that we say are true can therefore only be observed as causes of relative motions; but, on the other hand, we can only represent them to our reason in the form of absolute motions produced in absolute space. Absolute space is therefore the necessary foundation of our theory of motion.

"But how do we arrive[[294]](#footnote-295) at this strange concept and what is the basis for the need to use it?

"It cannot be an object of experience; for space without matter is not an object of perception, and yet it is a necessary concept of reason. It is therefore nothing more [205] than a mere *idea*. For in order for motion to be given, even if only as a phenomenon, there must be an empirical representation of a space with respect to which the mobile can change its relationship. But a space that is to be perceived will necessarily be material and therefore mobile itself, in accordance with the concept of a matter in general. Now, in order to conceive it as moving, it is sufficient to conceive it as contained in a space of greater capacity and to consider the latter as immobile. But we can repeat this operation for this one, with the help of an even larger space, and thus go on ad infinitum without ever arriving by experience at an immobile (or immaterial) space, from the point of view of which we could attribute to any matter the absolute rest or motion. On the contrary, the notion that we have of these determinations will have to be modified incessantly, according to whether we consider the mobile in its relation to one or to the other of these spaces. Since, therefore, the condition under which a thing is considered to be at rest or in motion is itself subject to other conditions in infinite relative space,... it is necessary to conceive a space in which relative space itself can be considered as in motion, but whose determination does not depend on any empirical space, and which, consequently, is not conditioned again; it is necessary, in other words, an absolute space, to which all relative motions can be related; everything that is empirical must be able to move in it, precisely so that in it all movement of material things passes for relative, for alternative and reciprocal between these things, and without ever passing for an absolute movement or rest; for one of the bodies being considered as in movement, the one in relation to which it moves is in any case represented as motionless. Absolute space is therefore necessary not as the concept of a real object, but as an idea which must serve as a rule for considering in it all motion as merely relative; therefore, all motion and all rest must be reduced to absolute space, if their phenomenon is to be transformed into a determinate experimental concept (which unites all phenomena). »

206] Under the complication and the envelopment of the formulas, it seems that Kant's deep thought about absolute space can nevertheless be grasped; the role that the Philosopher of Koenigsberg attributes to this absolute space does not seem to us to differ much from that which M. Carl Neumann was to attribute later, but in otherwise clear and precise terms, to the Alpha body; Kant's absolute space, like M. Neumann's Alpha body, is a pure concept, a term of reference, a concept that is not to be confused with the Alpha body. Carl Neumann was to attribute later, but in other clear and precise terms, to the Alpha body; Kant's absolute space, like Mr. Neumann's Alpha body, is a pure concept, a term of comparison deprived of any concrete reality, to which all movements are related; it is, basically, identical to the purely imaginary fixed body considered by Simplicius, then by Occam and by the Terminalists.

Kant's thought is, moreover, quite similar to that of the Terminalists; it admits, in fact, that there are true motions, which do not suppose any body of comparison outside the system in motion, and which consist in certain relations, in certain relations of the parts of the system to each other. Is this not the opinion we read in the writings of Master Albert of Saxony?

We cannot leave Kant's theory without saying a word about a doctrine which seems to be inspired both by this theory and by the theory of Mr. Carl Neumann; we want to speak about the doctrine exposed by Mr. Heinrich Streintz[[295]](#footnote-296).

The starting point of the system adopted by M. Streintz is the proposition on which Kant insisted so strongly: The rotational motion is a true motion; indeed, when a body is animated by a rotational motion, we can ascertain it experimentally, without needing to have recourse to a comparison with a term, supposed to be fixed, external to this body. Having admitted this principle, let us suppose that we have, by experiment, recognized that a certain body is exempt from all rotational motion; let us name this body a *fundamental body*; to a system of axes related to this body, let us give the name of *fundamental coordinate axes*; we can then experimentally establish the following law, which will be the law of inertia: [207] With respect to a system of fundamental axes, a material point subtracted from all external action describes a rectilinear and uniform motion.

By this detour, it seems that Mechanics has been constructed in such a way that its first principles are experimental laws generalized by induction.

If we accept this conclusion, we would be seriously mistaken, we believe; we would be going through a vicious circle, letting ourselves be fooled by the double meaning that these words can take: demonstrate by experience.

What do we mean when we say that we can prove experimentally the truth of this proposition: Such a body, considered in isolation, and disregarding any fixed reference point to which it can be related, is not animated by any rotational movement? Do we mean experience as our faculty of perception can practice it, with the help of the five senses at its disposal, without the aid of any mechanical theory, functioning as it does in an ignorant person? In this case, experience cannot tell us whether the body considered is rotating or not. For our perception, simple and immediate, to be able to give us such information, it must absolutely possess a term considered fixed to which it can compare the body whose rotation we want to know or not.

How does one go about deciding by experiment whether a body is rotating or not, when one does not have a stationary reference point? One calculates, by the methods of Rational Dynamics, the mechanical effects which should occur within this body in the case where it would be animated by a rotational movement; then one observes experimentally that these foreseen effects do or do not manifest themselves.

But, from then on, it appears that this judgment: Such an isolated body is free of any rotational motion, presupposes the prior establishment of Dynamics. In order to recognize that a certain body is a fundamental body suitable for the establishment of the law of inertia, it is necessary to know rational Mechanics; but how could one develop rational Mechanics without first formulating the law of inertia? 208] As we have already said. Mr. Streintz's method puts us on the wheel.

# APPENDIX

We study in this appendix some texts, related to the theory of place and motion, which came to our knowledge during the printing of the present work, too late to be analyzed in the place that the chronological order would have assigned to them; the *bis* numbers assigned to the various paragraphs of this appendix designate the places they should have occupied in the work.

# IV bis. WILLIAM OF CONCHES

The in-folio edition, given in 1612, of the *Bedae Venerabilis Opera* attributes to Bede the Venerable a writing entitled Perˆ didaxšwn *sive IV libri de elementis Philosophiae*.

Under this title: *De Philosophia Mundi libri quatuor*, the same writing is attributed to Honoré d'Autun in volume XX (pp. 995 seq.) of the Maxima Bibliotheca Patrum published in Lyon.

Charles Jourdain[[296]](#footnote-297) and Haureau[[297]](#footnote-298) have demonstrated that the attribution of this work either to Bede the Venerable or to Honoré d'Autun was the result of an obvious error and that this work was most certainly composed by Guillaume de Conches.

We have noted a third erroneous attribution of this same writing.

In 1531, Henricpetri published in Basel, under the name of Guillaume, [209] abbot of Hirschau[[298]](#footnote-299), a pamphlet entitled *Institutiones philosophicae et astronomicae*, which all historians and bibliographers have continued to attribute to Guillaume d'Hirschau. Now, these *philosophical and astronomical Institutions* are identical to the treatise which was published under the names of Bede the Venerable and Honoré d'Autun, and which it is appropriate to restore to William of Conches.

We know that this William of Conches, born in Conches, Normandy, in 1080, died in 1150 according to Fabricius, and in 1154 according to Albéric de Trois-Fontaines. He had taught in Paris with great distinction.

A passage in the treatise of William of Conches deserves our attention. This passage, like almost everything else that the 12th century master wrote on Astronomy, reveals the influence of Macrobius' *Commentary on the Dream of Scipio.*

Are the stars, which, like the heavens themselves, are formed by the igneous element, in motion? Such is the first question properly astronomical that William of Conches examines[[299]](#footnote-300):

"Some say that they do not move, but are carried from east to west by the firmament in which they are fixed. Others say that they move by their own motion, for they are of an igneous nature and nothing can be sustained without motion within the ether or the celestial fluid; but they think that they move in place by turning on themselves. The third assert that they move by passing from one place to another, but that our eyes can in no way perceive their motion; they employ, in fact, such a lapse of time in traversing their various arcs that human life, which is short, is not sufficient to grasp even a brief portion of this so slow circulation. »

This allusion to the slow movement of the fixed stars is borrowed verbatim [210] from Macrobius, but the rest belongs to William:

"We agree with the view that the canvases move from one place to another; but that their movement is not perceptible, we propose another reason, which is as follows: All movement is recognized by means of a motionless body, or one that moves less rapidly. When something moves, if we see at the same time some immobile object, and if we notice that the first object approaches the second or passes it, we perceive the movement. But when something is moving without our seeing any immobile or less mobile object, the motion is not felt; this can be proved by considering the ship that moves forward in the open sea. The movement of the stars can therefore only be recognized by some immobile or less mobile object placed below the stars, never by what would be placed above. We recognize the movements of the planets by means of the signs [of the zodiac], because a planet is seen sometimes under one sign and sometimes under another. But above the stars there is nothing visible, so there is nothing that allows us to discern their movement. They therefore move, but they are called fixed because their motion cannot be felt, by virtue of the said reason. »

Certainly, William did not understand the thought that Macrobius expressed in terms too concise to be clear; he did not understand how astronomers could, above the sphere of fixed stars, conceive another sphere, purely ideal, animated only by diurnal motion, and relate to this sphere the slow motion of the stars.

But, in spite of this error, the assertions of Guillaume de Conches were worth reporting. They formulate as clearly as Averroes was going to do, the impossibility of perceiving a movement when there is no fixed term to which the moving body can be compared. But they distinguish clearly between the reality of a movement and the possibility of perceiving it; they admit that a body can move even though no fixed term would allow one to recognize that it is moving. This last truth was ignored by Averroes.

# VI bis. - ROGER BACON

In the various writings of Roger Bacon that have been printed up to this day, one finds almost nothing that concerns the theory of place; this is not the case if one consults the great work, which has remained in manuscript[[300]](#footnote-301), that Bacon had entitled *Communia naturalium*; in this treatise, there is a long study on place[[301]](#footnote-302).

This study differs from all the theories of place that the masters of Scholasticism gave before Bacon or that they will give after him. These theories aspire to understand all the properties of place under a single definition from which these various properties logically follow. Bacon does not try to reach such a unity; on the contrary, he declares that the word "place" is susceptible of several distinct meanings; these meanings, he counts five.

Among the five different meanings that language attributes to the word place, there is one that is the proper meaning (*secundum esse potissimum*); from this proper meaning, all the others derive by way of equivocation; they can be classified in such an order that from each of them to the next the equivocation is stronger and the distance to the proper meaning greater.

The study on the notion of place that Roger Bacon develops according to the plan we have just sketched has therefore nothing of a metaphysical theory; it resembles rather, and very closely, the analysis that a grammarian pursues when he wants, in a dictionary, to methodically classify the various meanings [212] of the same word; the spirit of the purest Nominalism guides, in this circumstance, the famous Franciscan.

To define the proper meaning of the word "place", Bacon uses[[302]](#footnote-303) this formula: the extremity of the housing body, *ultimum locantis*.

If the end of the housing body is considered in itself, as a term of the container, it is a surface; the name of surface is the one that really and properly suits it.

This surface is capable of containing a body inside it; when one focuses on this potential capacity, it is appropriate to call the surface a cavity (*concavum*).

But what makes the cavity does not yet make the place; for the cavity to begin to become a place, it must actually contain a body.

This actual content, moreover, is not enough to characterize the place taken in the proper sense; this proper sense (*secundum esse potissimum*) completes its definition by the consideration of two relations.

The first of these relationships is the relationship between the surface of the container and the volume it comprises and that the contained body occupies.

The second of these relations is the situation of the surface of the container relative to the terms of the World (*termini Mundi*). Bacon does not say what he means by this expression; but, from the various considerations he develops about the place, we can infer that the terms of the World are, for him, the center and the ultimate surface of the Universe; moreover, what he says about the center of the Universe only makes sense if we mean by these words a central body of finite dimensions, and by no means a simple geometrical point.

This relation to the terms of the World is one of the essential elements which define the place *secundum esse potissimum*; "indeed, as long as the housed body keeps the same relation to the terms of the World, it keeps the same place; when this relation changes, the body changes of place; this relation belongs therefore to the essence of the place".

213] This notion of place *secundum esse potissimum*, as Bacon defines it here, presents unquestionable analogies with the notion of place conceived by Saint Thomas Aquinas, and with that adopted by Giles of Rome.

The proper sense is not the only meaning that the word place receives; if we remove or alter one or the other of the elements that serve to define this proper sense, we will obtain[[303]](#footnote-304) a derived meaning to which the name of place will only be appropriate by equivocation.

The previous definition considers a single containing body that remains unchanged.

A body can be contained by several different materials which, moreover, do not change from one moment to the next; it can be immersed partly in water and partly in air; by a first equivocation, we will say that the extremities of water and air are the place of this body.

A body can be, at every moment, enveloped by one and the same matter; but this matter can change from one moment to the next; thus it is said, by equivocation, of an immobile tower that it remains in the same place, although the air within which it is located is constantly carried away by the wind.

The two previous equivocations can be joined together; a body can be, at each moment, contained by several different media, and one of these media or each of them can flow from one moment to the next; so it is with a stake stuck in the bed of a river and bathed by a constantly renewed water.

To these three derived meanings, the name of place is suitable only by equivocation; the proper meaning of the word place concerns a unique and invariable surface in time; here, we have considered successively several invariable surfaces, then a variable surface, finally several variable surfaces. But the equivocation is otherwise great when we speak of the place of the ultimate Heaven[[304]](#footnote-305).

The ultimate heaven has a place, for we say of its parts that they move with local motion, that they change [214] place, that such and such a part is in the east at such and such a time, in the west at such and such a time. Even if this heaven were immobile, it would still be in one place, for its various parts would be in local rest.

But no body surrounds the ultimate heaven, no body houses it; therefore, when we speak of the place of this heaven, we do not relate this place to any surface, simple or multiple, invariable or changeable By this place, we only mean to designate a certain relation of the ultimate heaven to the terms and center of the World.

"I say that this place is nothing other than a certain relation to the center and the terms of the World. When a star is at the end of a line led from the east to the center of the World, it is said that the place of this star is in the east; if the star is at the end of a line led from the west to the center of the World, it is said to be in the west; when it is at the end of another line coming from the center of the World, it is said to be in another place, because it has another relation to the terms of the World; the proposition is thus demonstrated. »

The word place does not imply here any relation of body containing to body contained, but only a relation to well determined terms of the World.

Bacon does not hesitate to assert that Aristotle took the word place in this derivative and equivocal sense when he said that place was immobile. "For a single place corresponds to a single relation to the terms of the World, while different places correspond to different relations. On the contrary, when he says that the place is *ultimum corporis continentis immobile*, Aristotle takes the word place *secundum esse potissimum*. »

Only among the masters of Scholasticism, Bacon clearly indicated that, to understand Aristotle, it was necessary to distinguish two meanings of the word place, the Philosopher having used, according to the circumstances, sometimes one of these meanings and sometimes the other.

To these considerations on the place of the supreme orb, Bacon joins the criticism of the opinions, different from his own, that various authors have expressed.

215] The first opinion that he refutes[[305]](#footnote-306) is the one that Albert the Great, quite unjustly moreover, attributes to Gilbert de la Porrée:

"It is not necessary to say, as many have done, that the continuous surface which ends the supreme sky can be considered as the place of this sky; this surface, in fact, is not separated from the body housed, it is an accident of it, whereas the place is an accident of the body containing it, since it is defined as the end of the body containing it. "Moreover, this convex surface moves exactly like the sky it ends; it must therefore have a place as this sky has one; "therefore, if we cannot obtain a place without supposing the existence of a containing body, this convex surface must have a container; consequently, either it will contain itself or it will be contained by some other surface; but these two alternatives are equally impossible.

Some," Bacon continues[[306]](#footnote-307), "want to impose the opinion of Averroes, according to which the center of the World is the place of the sky; but this opinion does not please me. »

Without doubt, indeed, the parts of heaven are in a place when they have a certain relation to the center of the World; when this relation changes, they are said to change place; this relation to the center of the World thus constitutes the place of these parts; but this relation is not the center of the World. It is therefore true to say that the place of heaven results from certain relations between the parts of that heaven and the center of the World; but it is false to claim that this place is the center of the World.

In spite of this divergence, of language perhaps more than of thought, between Averroës and Bacon, it seems that these two philosophers agree in this proposition: For the ultimate orb to be in a place, therefore, for it to be possible for it to move with local motion or to be in a state of rest which deprives it of all local motion, there must exist at the center of the Universe a concrete immobile body. Certainly, this fundamental axiom of Averroist philosophy is nowhere stated in the theory of place that Bacon developed, but it seems to be implied everywhere; if one were to deny that the famous Franciscan wanted to designate, under the name of *centrum mundi*, such a finite, immobile and concrete body, one would remove all intelligible meaning from many of his propositions.

Let us not forget to mention that Bacon somewhere formulated [[307]](#footnote-308)this proposition: "Heaven itself will one day stop, or at least it is possible that it will stop. "Whether this statement preceded or followed the similar statement made in 1277 by the theologians of Paris, we cannot say, for we do not know when the *Communia naturalium* was composed.

# VII bis. - RICHARD OF MIDDLETON

One of the first theologians in whom we can note the influence of Stephen Tempier's 1277 condemnation of the *Articuli Parisienses* is Richard of Middleton. Richard de Middleton died around the year 1300; he must therefore have written his questions on the *Books of the Sentences* while the decisions of the Sorbonne were still very recent.

Among the condemned articles was this one: "*Quod Deus non possit movere Caelum motu recto*. *Et ratio est quia tunc relinqueret vacuum*. "Also, Richard does not fail to examine this question[[308]](#footnote-309): "Can God give to the ultimate heaven a movement of translation? "In support of the reasons which justify an affirmative answer, he is careful to place this one: [217] "This article: God could not move heaven with a rectilinear motion, was excommunicated by Monseigneur Étienne, bishop of Paris and doctor in sacred Theology. »

God, says Richard of Middleton, could give the whole of Heaven a translational motion. No doubt, outside of the ultimate heaven, there is no place, no space, and no thing could, by any power, even the divine power, be moved by a movement of translation if there were not, outside of it, some space; but God could create a space outside the World.

Moreover, without having to create any space, God could move a part of the Sky with a rectilinear movement, to make descend, for example, a part of the Empyrean Sky to the Earth.

The thought that a rectilinear displacement of the World would lead to the production of emptiness does not frighten our Franciscan. God, he says, can produce emptiness; he could annihilate all the bodies that exist between Heaven and Earth, without moving either Heaven or Earth; once this is done, there would no longer be any distance between Heaven and Earth, because the distance between two bodies is constituted by the creatures that are interposed between them; But Heaven and Earth would not be joined to each other either, because without modifying them in any way, God could create bodies between Heaven and Earth, and therefore a distance; not being distant is therefore not the same thing for two bodies as being joined; there is no contradiction in asserting that they are neither distant nor joined, or, in other words, that the void exists between them.

Moreover, Richard de Middleton remarks that one would wrongly oppose the impossibility of emptiness to the possibility of a rectilinear displacement of the World; Heaven, indeed, is not in one place; a translation of Heaven would not produce emptiness.

Richard de Middleton presents us, on the subject which has just been examined, nothing which can hold the attention of the philosopher very strongly. But the passages which we have analyzed deserve to be noted by the historian of Philosophy. We see in them the decrees issued by Catholic Theology forcing physicists to resume the examination [218] of the propositions bequeathed to them by Peripatetism. From this criticism will emerge, in particular, a whole new theory of place and motion, a theory that Duns Scotus will inaugurate.

# IX bis. - ANTONIO D'ANDRÈS

Antonio d'Andrès was a contemporary of John the Canon and, like him, an immediate disciple of Duns Scotus. Among his many writings is a commentary on the book of the *Six Principles* of Gilbert de la Porrée[[309]](#footnote-310) .

This writing of Antonio d'Andrès is almost exclusively concerned with the study of categories; however, one of the questions devoted to the study of the ubi predicament deals with the famous problem which has as its object the place of the supreme orb.

Let us reproduce here what the faithful disciple of the Subtle Doctor [[310]](#footnote-311)says in this short question.

"The various philosophers and commentators have made different statements, because they wanted to save this proposition: The ultimate heaven has no place of its own, but, nevertheless, it is in a place in a certain way. Some authors, such as Averroes, said that the ultimate heaven was in a place according to its center; others, such as Themistius, that it was in a place by its parts; still others, that it was housed by its terminal surface. This question is more relevant to the fourth book of the *Physics*.

219] "Whatever the opinions of these philosophers may be, I hold that, strictly speaking, the ultimate heaven is not in any place, for the reason given by the Author of the *Six Principles*. For everything that is in one place is surrounded by some body that is outside the object that is housed, which is distinct and separate from it, as the fourth book of the *Physics* shows; but there is no body outside the ultimate heaven, otherwise it would no longer be the ultimate heaven.

"It should be noted here that the bodies of the Universe are ordered in relation to each other in such a way that they are locally containing and contained; earth is contained by water, water by air, air by fire, fire by the orb of the Moon, the orb of the Moon by another orb, and so on until the supreme orb. As, then, one can, without inconvenience, within the Universe, give a body, the earth, which is contained but which is the place of no other body and contains nothing, so one can, without inconvenience, give a body which acts as a place containing another body, but which is in no place and is not contained by any body; such is the supreme orb or ultimate heaven, whether this heaven is the first mobile, as the philosophers claim, or whether it is the immobile Empyrean heaven, according to the opinion of the theologians and according to the truth; in this Empyrean heaven is the place of the blessed; beyond it, there is no longer any place, movement, or time, as Aristotle says in the second book *Of Heaven and the World*. »

John the Canon, too, refused any place to the supreme orbit; but, faithful interpreter of the thought of Duns Scotus, he attributed to it an ubi; Antonio Andres does not say a word about this ubi. There is more; in the course of the three questions[[311]](#footnote-312) suggested to him by what Gilbert de la Porrée wrote about the predicate *Ubi*, Andres frequently repeats the word place; but not once does he pronounce the word ubi; it seems that, unlike the Subtle Doctor, his master, he does not attribute to the ubi any reality.

When Antonio d'Andrès, along with John the Canon, denies that the supreme sphere has a place in the proper sense of the word, he seems to be under the influence of Roger Bacon, an influence which was certainly very powerful in the Franciscan School of the fourteenth century; when he leaves out entirely the notion of ubi in order to attach himself only to the idea of place, he is preparing for the Parisian philosophy of Gregory of Rimini, John Buridan, and Albert of Saxony.

In the next paragraph we will have the opportunity to analyze another writing of Antonio d'Andrès; in this writing we will see him allude to the ubi; but even more than in this one, we will see him depart from the teaching of Duns Scotus and John the Canon.

In a third work[[312]](#footnote-313), on the contrary, Antonio d'Andrès expresses himself, on the subject of the immobility of the place, almost in the same terms as Jean Marbres.

"According to the Philosopher, says Andres[[313]](#footnote-314), the place is the ultimate part of the container; it is immobile and incorruptible. Some people explain the immobility of the place by saying that the material place is, it is true, immobile; but the formal place, which expresses the order to the various parts of the Universe, that is to say to the center and the circumference of the World, is immobile and incorruptible.

"I declare, in few words, that such a [formal] place is corruptible. "In favor of this proposition: The place is incapable of local movement, but it can be generated or destroyed, our author develops an argument quite similar to that of John the Canon. Then he continues in these terms:

"Further: I say that every place, in so far as it expresses a relation, is corruptible; but in so far as it designates the ultimate surface of the body containing it, it can be incorruptible. This is evident if we are speaking of the concave surfaces of the various heavens, for these surfaces are not susceptible of corruption; and yet, as they are movable, the relation which each of them has to the body accommodated is corrupted by the very effect of the motion [221] of that surface. Here I am not speaking of the Empyrean heaven which is immobile, for Aristotle did not know this heaven.

"I therefore say that the place is immobile, as the Philosopher wanted, in the sense that it possesses immobility opposed to local movement; moreover, it is incorruptible by equivalence... It is clear that it is incorruptible by equivalence; indeed, if the housed body moves, there is at once acquired a relationship between the place and the housed body that has been moved, quite similar to the relationship that the abandoned place presented. »

In a too concise and rather confused form, we recognize this notion of persistent place *by equivalence*, generated by the teaching of Damascius and Simplicius, and to which the Scotian School and the Nominalist School attributed an equal importance.

# IX ter. - JEAN DE BASSOLS

If the influence of Roger Bacon can sometimes be seen in the thoughts of Antonio d'Andrès, it is even more evident in the work of Jean de Bassols.

The Scottish Franciscan John of Bassols was, like John the Canon, like Antonio of Andres, an immediate disciple of Dues Scotus; he was even, it is said, his favorite disciple; the Subtle Doctor had nicknamed him *the Audience*, because, in his lessons, it was to him that he addressed his skilful arguments. In spite of this favor of the master, Jean de Bassols seems to have remained little known. He died in 1347, leaving a commentary on the *Books of the Sentences* which does not seem to have been widely read in the School. At the beginning of the 16th century, Oronce Fine found a handwritten copy, stained and torn, of this important work; he gave an edition of it, the only one, we believe, which was printed[[314]](#footnote-315).

222] John of Bassols often combats the opinions of Saint Thomas Aquinas; the terms he uses[[315]](#footnote-316) to designate "*dictus doctor Thomas*" seem to indicate that his questions were composed before the canonization of the Angelic Doctor, that is to say before the year 1323.

The favorite disciple of Duns Scotus seems frequently subjected, we said, to the influence of Roger Bacon; the opinions that this influence suggests to him seem, in more than one circumstance, to prepare the way for the nominalist theories of Occam. These remarks can be made by reading what our author wrote about the immobility of the place[[316]](#footnote-317).

The argument of John of Bassols is entirely directed against the theory of Gilles de Rome; he denies that the shape of the place of a body is the distance of this place from the center and the poles of the World and that this place remains immobile when the housed body does not move. Like John the Canon, John of Bassols admits that this distance is an attribute of the intermediate bodies between the housed body and the center of the World or its poles; like John the Canon, he admits that this distance and, consequently, the place of which it is the form, can be corrupted as a result of the corruption of the intermediate bodies; he admits, moreover, contrary to the opinion of John the Canon, that the local movement of these bodies entails as a consequence the local movement of the place. Only, around an immobile body, the places which follow one another have, one with respect to the other, a certain relation of equivalence (*aequipollentia*); [223] "the following place is equivalent to the preceding place from the point of view of local motion; each of them can be combined to the same third place and one will provide the same term as the other to the local motion directed towards this third place;... according to the same straight line coming from one or the other of these places and directed to the same third place, the local motion is the same. »

In relation to what will this equivalence be appreciated? John the Canon makes it consist of a similar disposition in relation to the center and the poles of the World; but in his argumentation against Gilles de Rome, he denied the immobility of this center and these poles, so that his theory seems to turn in a vicious circle.

John of Bassols breaks this circle. The real poles of the Sky, the real center of the World are bodies susceptible of movement; one cannot, in relation to these mobile marks, appreciate the real equivalence of two places or, if one prefers, the immobility of a place; but the immobility and the equivalence of which one speaks here are a purely fictitious immobility, an equivalence related to a center and to poles which exist only in the imagination of the geometer. "The mathematician, in fact, in view of the exposition of Science, and without claiming that it is so in reality, imagines a line led from one part of Heaven to another and passing through the center of the World, which is itself an imagined point; this line, terminating on both sides in Heaven, receives the name of axis of the World; Its extremities or, in other words, the points which terminate it are called poles, and they are simply points which one imagines in Heaven; it is in relation to such poles and to such a center that the place is said to be immobile, of an imaginary immobility and not of a real immobility; in reality, this place is corruptible and mobile, but the places which follow one another nevertheless keep a certain equivalence between them. »

When a body remains at rest, the place of this body is found, from certain reference points, at distances whose value always remains the same; these reference points have no reality and do not exist outside the imagination of the geometer; such is the opinion of Jean de Bassols concerning the immobility of the place; such is also, on the same subject, the essential proposition of the Occamist doctrine.

# XII bis. - GREGORY OF RIMINI.

By a happy and too rare circumstance, the commentaries to the first two books of *the Sentences* of Peter Lombard, composed by Gregory of Rimini, are dated; their author taught them in Paris in the year 1344[[317]](#footnote-318).

This work, clearly nominalistic, presents itself to us, very often, as a very sharp reaction against the scotian doctrines. This character is marked, in particular, with an extreme clearness, in what the author says about the place and the ubi.

According to the Scotists, the place is a certain entity intrinsic to the lodging body; the various disciples of the Subtle Doctor differ in their opinion as to the nature of this entity, but, except for Antonio d'Andrès, they all agree in admitting its existence; to this entity, an attribute of the lodging body, corresponds, within the lodged body, another entity, the ubi; which Duns Scotus and his disciples all define as did Gilbert de la Porrée.

This ubi, the real attribute that the place generates in the body housed, is the real term of the local movement; it is a certain ubi, and not a certain place, that is gained by the mobile during such a movement, while the same mobile leaves not another place, but another ubi.

225] Gregory of Rimini is opposed to this doctrine in every respect[[318]](#footnote-319).

"I pose," he says, "two conclusions:

"Here is the first: No thing, when it moves, acquires any reality, of the kind of permanent realities, distinct from that thing, and which is formally inherent to that thing when it is in a place.

"Here is the second: The ubi is not a reality distinct from the place and the body housed. »

That the ubi is nothing other than the place, Gregory of Rimini establishes it by considerations which must have seemed particularly strong to the Nominalists. "Every question, he says, which is made by means of interrogative terms which belong to the predicament ubi is a question which inquires about the place; every answer to a similar question, given by means of terms of this same category, answers about the place. These questions, in fact, have equivalent meanings: Where (ubi) is Socrates? And : In what place is Socrates ?... Likewise, if someone asks about Socrates : Where (ubi) is he ? he is given suitable answers by saying : He is in the church, he is in the school " ; and these answers designate the place where Socrates is.

"From these remarks it obviously follows that, according to Boethius' intention, ubi signifies the place; according to its true attribution, this predicament ubi does not designate a reality inherent in the subject, but a reality which is extrinsic to it, namely the place. »

In order to attribute to the ubi an intrinsic reality to the housed body, the Subtle Doctor and his disciples had used the definition of this predicament given by Gilbert de la Porrée. Gregory of Rimini does not hesitate to challenge this authority.

"The author of the *Six Principles*, he says, speaks in this little book in a figurative and very improper manner; also, many authors, who take his words literally, are deceived by them. Gilbert in no way intends to affirm that the ubi is [226] a reality, named circumscription, distinct from the place and the body lodged, and existing in the latter... He only wants, by these words, to indicate to what is properly attributed the predicate ubi. »

This ubi, which is not a reality distinct from the place, could not be what is acquired in the local movement. In support of this proposal as well as against the proposals which contradict it, Gregory of Rimini accumulates arguments:

"If every mobile that moves in a continuous manner "constantly acquires a new ubi by losing the previous ubi, as Duns Scotus claims," it would be moving at the same time with two distinct movements; Indeed, every body that moves by local motion, that passes from one place to another, gradually acquires a new place and moves according to the place; if, at the same time, it continually acquired a new ubi, it would also move according to the ubi; it would therefore move by two distinct motions. »

That local motion cannot have as its object the gradual acquisition of a new ubi, Gregory of Rimini establishes it again by invoking the authority of Gilbert de la Porrée: "The Author of the *Six Principles* says that the supreme sphere has no ubi, because no body circumscribes it; it is not true, therefore, that anything that moves by local motion acquires at each moment a reality such as would be the ubi. »

It is therefore the place, and not the ubi, which is the reality continually acquired and lost in the course of the local movement; but this proposal is linked to a debate of extreme magnitude and of which Gregory of Rimini was one of the principal parties.

To make the object and the importance of the process easily understood, let us take a certain movement as an example, and let us first choose a movement of alteration; let us consider a body that is heating up.

At each instant, this body is brought to a certain degree of heat. If we fix our attention on this instant, we distinguish two realities without which the heating movement would not occur; the first of these realities is the body, subject of the movement; the second is a quality, heat, brought to a certain intensity.

227. These realities are both of the kind of *permanent realities*, and here is what is meant by the "permanent": One could conceive, without contradiction, that the body would remain for a more or less long time as it is at the moment under consideration; one could also conceive that, during this time, this body would be endowed unceasingly with heat brought to the intensity that it reaches at the moment under consideration.

Moreover, it is clear that, in the body in motion, in the process of heating, the second of these realities, the quality, does not exist in a permanent state; at each moment, the subject leaves a certain intensity of heat to take on a different intensity of heat; although this quality is of the kind of permanent realities, the body possesses it only in a transitory manner or, as the masters of the School say, *partibiliter*.

Let us consider in the same way the local movement; let us fix our attention on one of the moments of the duration of this movement: Two realities appear to us: The mobile body, which is the *subject* of this movement, and the place of this body or the ubi which corresponds to this place. The first of these realities, the mobile body, is a *permanent reality*; the second is of the kind of permanent realities, because we can conceive that the body remains for a more or less long time in the considered place, that, during all this time, it keeps the same ubi.

Although the place and the ubi must be placed among the things which can remain without change for a certain time, among the *permanent realities*, it is not thus that the animated mobile, of local movement, possesses them; at each moment, it leaves a certain place, a certain ubi, to acquire a new place, a new ubi; it possesses this place, this ubi, in a transitory way, *partibiliter*.

According to this analysis, then, there are in every movement two realities; the body which is the *subject* of this movement, then what, in this movement, is lost and acquired, what is its *object*, its *term*; if the first reality is permanent, the second will be found in the subject only in transitory form, *partibiliter* ; but it is no less of the kind of permanent realities; instead of conceiving that each of its states, of its *mutatatum esse*, is immediately abandoned by the subject and replaced by another state, we could conceive that it remained for a certain time, within the subject, in any one of these states.

According to this analysis, movement appears to us as a sequence of states; each of these states is formed by the association of two realities, the subject and the disposition that the subject acquires or loses by the movement; these realities are both of the kind of permanent realities.

Does this analysis reveal to us what constitutes the very essence of motion? Some philosophers think so; others, on the contrary, claim that the idea that it puts in our reason is by no means the expression of the reality of motion.

According to the latter, the reality associated with the subject who moves is in no way of the kind of permanent realities; it would be absurd to admit that it can remain for a time, however short, in a subject devoid of movement; it is similar to time, of which one cannot conceive that it ceases to flow; it is essentially a *successive reality*, a *forma fluens*. When we seize one of the states that the mobile passes through in the course of its movement and we fix this state in a permanence of a certain duration; we replace this state by another state which is completely heterogeneous to it; the first one is the association of the subject with a purely successive reality; by substituting it with the second one, we annihilate this successive reality and we substitute it with a permanent reality. The movement is a *succession*; we substitute to it a *continuous series* of states of rest; between this *succession* and this *continuity*, there is radical heterogeneity, because there is radical heterogeneity between the march towards a disposition, towards a quality, towards a place, and the possession of this disposition, of this quality, of this place.

Between these two doctrines, which one should be chosen?

According to Averroes[[319]](#footnote-320), Aristotle sometimes followed one way of seeing, sometimes the other. In his *Physics*, he considers [229] motion as a *continuous series* of states, and each of these states as the association of the subject with a reality of the kind of permanent realities; each kind of motion is then classified in the same category as the form acquired in this motion by the subject. In the book of the *Categories, on the contrary,* the Stagirite considered movement as a succession; he did not place it in any of the categories in which the various kinds of permanent realities are classified; he made it a special predicament. "This latter way of considering motion," added the Commentator, "is more usual; but the former is more true. »

This opinion, which Averroes considers closer to the truth and which Aristotle embraced in his *Physics*, is adopted by Saint Thomas Aquinas when he comments on this work[[320]](#footnote-321).

In contrast to Averroes, Avicenna taught that movement is not a continuous series of states, but that it is essentially a succession; Alexander of Hales[[321]](#footnote-322) agreed with this view.

John [of] [[322]](#footnote-323)Duns Scotus, in his turn, fully agrees with the view that considers movement as the association of the subject and a successive reality, a *forma fluens*; we have heard him, in particular, insist on the proposition that local movement could occur without a change of place, without the acquisition of a new ubi, and this because it had its raison d'être in a certain successive form intrinsic to the mobile.

Faithful disciple of the Subtle Doctor, John the Canon adopts his doctrine on the nature of motion[[323]](#footnote-324). "Movement, he says, is essentially and really distinct from the term to which it tends... Indeed, no formally [230] successive entity can be identical with a formally permanent entity; yet movement is a formally successive entity and its term is a formally permanent entity... Movement is not the form to the acquisition of which it tends, nor the various parts of this form, which succeed one another... It is not simply the flow of the form (*fluxus formae*), for this flow is nothing other than the continuous series of the various states of this form arranged according to their order of succession in time..." Movement can therefore only be the *forma fluens* considered by Duns Scotus.

To these proposals, John the Canon adds others that are no less important[[324]](#footnote-325).

We have just compared two definitions of motion; one of these definitions considers motion as a continuous sequence of states, each of which can be considered separately and distinguished from the others; the other definition takes it as something that flows incessantly, where it is impossible to mark divisions, to seize a state to isolate it.

Now, "motion taken in its formal essence, that is, motion that continues without division (*quantum ad esse continuativum*), as the second definition indicates, is foreign to our mind... On the contrary, motion taken as a sequence of distinct states (*quantum ad esse discretum*), exists only through our mind; we mean by this that it does not possess this mode of existence that forms a sequence of distinct states, if it is not through our mind, that an operation of the mind alone poses it in this way of being, although this one has a *substratum* in the reality. »

Thus, according to John the Canon, real motion is constituted by a *forma fluens*; but this *esse continuativum*, which is the very essence of motion, cannot be grasped as it is by our reason; to understand motion, our reason is obliged to alter its essence; to the *forma fluens* it substitutes a continuous series of distinct realities, each of which is of the kind of permanent realities; to the *esse continuativum* [231] which motion possesses according to the nature of things, it substitutes an *esse discretum* which is nothing outside our reason, which corresponds to the true *esse continuativum* without being identical to it.

Let us add that John the Canon applies [[325]](#footnote-326)to time a theory quite similar to the one he has just applied to motion.

Isn't the whole philosophy of movement and time so brilliantly supported today by the Bergsonian School contained in these few lines of Jean le Chanoine?

If John the Canon fully admitted and clearly exposed the theory of movement that Duns Scotus had proposed, other disciples of the Subtle Doctor refused to follow this doctrine; among these, we must rank Antonio d'Andrès.

Antonio d'Andrès composed a treatise *On the three principles* [[326]](#footnote-327)of which the Aristotelian Metaphysics composes all things: the matter, the form and the privation; this *Treaty of the three principles* had, in the Middle Ages, a great fame.

At the beginning of this treatise, Antonio d'Andrés examines "whether mobility is the subject of Physical Science" and the examination of this question leads him to analyze the nature of motion.

The local movement is, formally, a relation; it is, indeed, a movement towards the ubi, and the ubi itself is formally a relation. The other movements are absolute forms; these movements, in fact, tend to the acquisition of substance, quantity or quality, which are, formally, some absolute things. "Now, I hold that motion does not really differ from the form to which it tends; this is what the Commentator explicitly affirms, in the third [232] book of the Physics, when he says: There are two opinions concerning motion; one, that it is the flow of form; the other, that it is the form itself which flows; the first is more widespread, he adds, but the second is closer to the truth[[327]](#footnote-328). »

By these declarations, which refuse to the *esse continuativum* of the movement any reality distinct from the *esse discretum*, Antonio d'Andrès rejects the scotian doctrine and clears the way for the nominalist theories.

It is clear, in fact, that the nominalist school cannot admit this *esse continuativum* of the movement, which remains inaccessible to our understanding; only the *esse discretum* will be able to survive in its eyes.

Against the Scotian doctrines, the Nominalists, as we have seen, found in Gregory of Rimini a vigorous defender.

The first conclusion we have to prove," says Gregory of Rimini[[328]](#footnote-329), "is that movement is not an entity distinct from all permanent entities.

"The second conclusion is that there is no entity outside the intelligence that is distinct from all permanent things and has the characteristics that our opponents attribute to change.

"When an object is in motion, it does not present us with three distinct things: In the first place, a thing that moves; in the second place, a thing that is acquired; in the third place, a thing distinct from each of the two preceding ones and distinct from their whole, a thing which, according to the opinion we have set forth, would be motion. There is a thing which the mobile acquires unceasingly; with respect to this thing, it is incompletely in act and it tends unceasingly to complete this act; it is this thing which is movement. »

Let us consider, for example, the movement of alteration. Within the subject of this movement, "there is a quality that is continually being made...; it is this quality that is alteration; alteration is therefore by no means a similar successive reality, distinct from the very quality that is being made".

Let us also consider local motion. "Whenever the following propositions are true about a certain body: This body may be at a certain instant in a place in which it was not immediately before, or in which its parts were not all present; immediately after this instant it will no longer be in this place, but will be in a place where it is not at this same instant; this body provided with a place will really be in local motion. But for these propositions to be formulated, it is not necessary to imagine a thing that is not included among the permanent realities. »

"All that moves by local movement, says again Gregory of Rimini, acquires unceasingly, in a transitory way (*partibiliter*) a certain permanent reality; indeed, all that moves thus moves from a place to another (and we take here the word place in the commonly received sense); one sees thus that all that moves by a local movement is a permanent thing; consequently, one does not have to pose a certain reality, distinct from any permanent reality, which would be the local movement. »

Thus the movement of alteration, it is the mime quality that the subject gradually acquires; the local movement, it is the place of which the mobile takes possession in a transitory way; it is still, according to the various expressions which Gregory of Rimini uses, the volume (*magnitudo*), variable from one moment to another, that this mobile comes successively to occupy, the space that it traverses in its continual change of place; it is illusory to attribute this local movement to a certain *forrna fluens* intrinsic to the mobile.

This objection is provided by the very argument that Duns Scotus had invoked when he had wanted to link local motion to a *forma fluens* intrinsic to the mobile: A body can move locally even though it is devoid of any place. Here is how Gregory explains this objection[[329]](#footnote-330):

"If there were, if there could be no local motion without a certain volume or a certain space being acquired by the mobile, it would follow that it would be impossible for a body to be moved locally without this body acquiring a certain space. Now, this consequence is false. It is certain, in fact, that God could annihilate all the bodies of the world other than the orb of the Moon; that he could, however, continue to exert on the intelligence which moves this orb an influence identical to that which it exerts at present; that this intelligence could continue to act on this orb, with a view to imparting to it a rotational movement exactly as it acts now. It is also certain that God could create a single full heaven, annihilate all other bodies, and make this heaven rotate as he is now making the first mobile rotate. This being so, it is clear that the orb of the Moon or that this full Heaven would move by local motion; there would, however, be no volume or permanent reality of any kind that it could acquire. »

If we admit the reality of such local movements, it seems impossible not to declare with Duns Scotus that the local movement consists in a certain *forma fluens* intrinsic to the mobile.

Also Gregory of Rimini does not hesitate to declare, just as clearly as Averroes would have done, that such movements are impossible: "Even if the intelligence were to apply its motive virtue to Heaven exactly as it applies it at present, it would not set Heaven in local motion and Heaven would not move; it would therefore not be correct to say that this intelligence moves Heaven or that Heaven moves with local motion. It would be strange for someone to conceive the contrary. Just as a subject cannot experience a movement according to quality [alteration movement] without acquiring or losing any quality, so it is impossible for a body to move according to place without acquiring any place, [235] without losing any place, without experiencing any kind of change relative to place. Now, any acquisition of place, any change relative to place, would be impossible if Heaven alone existed in nature and no other body existed. »

The theory of the local movement developed by Gregory of Rimini does not contradict only to the theory of Duns Scotus which attributes this movement to a purely successive reality, to a *forma fluens* intrinsic to the mobile; it contradicts also to the theory all affixed that William of Occam proposed.

Like Gregory of Rimini, William of Occam formally denies[[330]](#footnote-331) that movement is an entity not included among the permanent realities.

"For a body to move[[331]](#footnote-332), it is sufficient that, without interruption of time or rest, continuously and in a transitory manner (*partibiliter)*, the mobile acquires or loses something... For a body to whiten, it is sufficient that it continuously acquires new parts of whiteness; for it to move with local motion, it is sufficient that, continuously and without rest, it acquires one place after another, that, without truce, it is successively in different places... A body is therefore said to be moving continuously when, at each instant, it is true to say that this mobile is in a place where it was not before, or that it possesses something that it did not possess before, or that it no longer possesses something that it did possess. These propositions admitted and all other propositions discarded, the mobile is really moving; and yet no reality intervenes here which is not permanent, for the mobile is permanent and everything acquired by the mobile is permanent... There are therefore only permanent things here; but since these permanent things are not simultaneous, that they are acquired one after another, the mobile is really moving. »

"The meaning of this proposition[[332]](#footnote-333): Motion is successive, [236] is this: When a body moves, what it acquires or loses, it does not acquire simultaneously, but successively. Consequently, we must not imagine that motion is some successive reality, totally distinct from any permanent thing. »

In this condemnation, of the scotian doctrine, Occam agrees fully with Gregory of Rimini; he separates himself from it when he exposes his own theory.

"By local movement, he says[[333]](#footnote-334), the place alone is acquired and nothing else is acquired; that is why it is called local. When a body is in a place, according to the doctrine of the Philosopher, one must not imagine, as some do, that there is something within the body housed that is distinct from the place and that the place deposits in this body. For a body to be in a place, it is sufficient that the place be, that the body be, and that there be nothing intermediate between the place and the body. It is thus in vain that one would suppose the existence of such a thing deposited in the place by the body lodged.

"From the above, it is obvious that when a body moves in a rectilinear or mixed rectilinear and circular motion, a place is acquired at each instant, a place distinct from that which the mobile occupied before.

"When a body moves with a rotational movement, it remains constantly in the same place; but, at each instant, a different part of the place corresponds to the same part of the mobile and vice versa; consequently, the mobile, taken as a whole, remains always in the same place, so that this mobile, taken as a whole, does not acquire anything new; but each of the parts constantly acquires a new place, different from the place it occupied before.

"As for the supreme mobile, it is not contained by any other body; therefore, when it moves, neither its totality nor its various parts acquire anything new. However, it would acquire something new if there were a body around it; moreover, its various parts look in a way that changes from moment to moment at certain bodies which remain immobile in their connection; their distance from these bodies increases or decreases; it moves, therefore, really by local motion, and this not because it acquires something new, but because between its various parts and other immobile bodies there is a distance that changes from moment to moment.

"To this, one could make this objection: In any alteration, a certain quality must be acquired or lost; similarly, in any local movement, a certain place must be acquired or lost. I would reply that there is no similarity between these two cases. Nothing, indeed, is alterable but that which can receive or lose a certain quality; but there is a body which is mobile, though it cannot be in a place, taking the word place in its proper sense; this body can only serve as a place for other bodies, and from moment to moment this place looks differently upon the bodies which it accommodates, so that it is really moving by local motion. »

In this last passage the *Venerabilis Inceptor* clearly marks the opposition which exists between his doctrine and that of Gregory of Rimini; he marks it so clearly that one could take this passage for a riposte to the considerations developed by Gregory; it would be possible that it was so; the readings on the first two books of the *Sentences* of Gregory of Rimini were given in Paris in 1344, and Guillaume d'Occam surely did not die before 1347; moreover, the *Summulae in libros Physicorum* appear to be an unfinished work; they treat only of the first four books of Aristotle's *Physics*; it could be that they were among the last writings of the *Venerabilis Inceptor*. Even if the *Summulae* of William of Occam were prior to 1344, one could think that Gregory of Rimini had formulated his theory of local motion before commenting in the Sorbonne on the *Books of the Sentences*.

According to Occam's doctrine, therefore, the mobile that moves by local motion acquires no new reality from moment to moment; this is, in the philosophy of the famous nominalist, an essential principle to which he alludes in several of his writings, witness the following passage that we find in his *Questions on the books of the Sentences*[[334]](#footnote-335):

238] "Local motion is neither a new absolute effect, nor a new relative effect, and this because we deny the reality of the ubi. This movement consists simply in this that the mobile successively coexists with various parts of space..."

Local motion is not distinct from motion; in other words, according to a more modern form of language, local motion has no reality; in reality, there are only bodies that move locally. A body that moves locally is a body that, from moment to moment, behaves differently with respect to a fixed body, real or merely conceived, or whose parts behave differently with respect to the parts of this term of comparison. Such is, in summary, the doctrine of William of Occam concerning local motion; this doctrine forms one of the essential parts of the teaching of the Nominalist School.

In John Buridan this theory of William of Occam will, as well as the theory of Gregory of Rimini, find an ardent opponent. Buridan will endeavor to put back in favor the scotian hypothesis of the *forma fluens*.

# XII ter. - JEAN BURIDAN

Jean Buridan was still a master at the University of Paris in 1358; in that year a concordat was signed[[335]](#footnote-336) between the English Nation and the Picardy Nation, in order to fix the common frontier of the countries belonging to each of them; Jean Buridan was among the witnesses who represented the [239] Picardy Nation at the signing of this treaty. Buridan died around 1360.

Among his writings, whose influence on Parisian Scholasticism was extremely deep and lasting, are *Questions sur la Physique d'Aristote*. These questions were printed in Paris, in 1509, by the care of Jean Dullaert of Ghent[[336]](#footnote-337). The National Library possesses a manuscript copy[[337]](#footnote-338); it is according to this manuscript that we have been given to study them.

The questions in which John Buridan treats of place form perhaps, as a whole, the most extensive and detailed theory that any master of Scholasticism has composed concerning this notion of place. Many influences can be recognized in the reading of the discussions which form it; those which deserve especially to be pointed out are those of Roger Bacon, of John Duns Scotus, of William of Occam and of Walter Burley, either that these influences involve the assent of John Buridan, or that on the contrary he fights against them.

Jean Buridan adopts, to define the place itself, this classical formula: *Superficies ultima corporis continentis*. He comments on this formula as a faithful disciple of Occam. By *surfaces*, he understands[[338]](#footnote-339), like all the Nominalists, not a surface having only two dimensions, but a layer of a certain thickness. The result is that the containing body has an infinity of ultimate surfaces. "Let us imagine, in fact, that the orb of the Moon is divided, by means of concentric surfaces, into two halves, or into three thirds, or into one hundredths, and so on; always, among these parts, there will be one which will be the last on our side and which will touch [240] our lower world by touching the sphere of fire; each of these parts is, on our side, the ultimate surface of the orb of the moon, and there is no reason why one should receive this appellation rather than the other, so that each of them is the proper place" of fire.

"But a difficulty remains[[339]](#footnote-340): If every surface is a body, why do we say that the place is the surface of the containing body, and not that the place is the containing body? »

Indeed, the proper place is a body; but it is not in the same respect that it receives the names of place and body, while it is in the same respect that it is called place and surface.

A line is a body, but this body is called a line when it is considered to be divisible along only one dimension, the length, without taking into account its divisibility along the other two dimensions, namely the width and the depth. In the same way, a body is called a surface when it is considered as divisible along two dimensions, length and width, without considering its divisibility along the third dimension. It is only called a body when it is conceived as divisible along three dimensions, length, width and depth.

Now, the contact between the housing body and the housed body is established only along two dimensions; as a result of the mutual impenetrability of these bodies, depth is not at all interested in this contact, so that it is legitimate to say that it takes place according to the terminal surface of the contained body and the terminal surface of the containing body; it is right to say in this sense that the place properly speaking is constituted by this last surface.

From the above, it follows[[340]](#footnote-341) that the term *place* is to the *surface* term what a passion is to the subject it affects. The [241] place is defined, as every passion must be, by the definition of the subject and by the terms that explain the particular *connotation* of this subject affected by such a passion.

Having established these principles, Jean Buridan addresses the difficult question of the immobility of place[[341]](#footnote-342). What does it mean to say that a place is immobile? A first answer was given, that of Gilles de Rome: There are in the place two elements, a material element and a formal element; the matter of the place, it is the surface of the containing body; the form of the place, "it is the distance of this surface to the Sky, to the Earth and to the various parts of the World which are in rest; the Sky, indeed, exempt from any rectilinear movement, can be regarded as being in rest in a certain way, because it can be used as comparison with a view to judging the rectilinear motions of the other bodies. "The material place is mobile; but the formal place is immobile, in the sense that a body at rest always keeps the same formal place even if the surrounding substances change.

Like all the Scotists and all the Nominalists, Buridan absolutely rejects this theory; the arguments that he opposes to it are those that William of Occam and Walter Burley have already put forward against it.

The distance between two bodies is nothing else, for the Nominalists, than the various bodies which are interposed between these two; "the distance of this stone to the Earth or to Heaven is nothing else than this stone itself or the intermediate bodies which separate it from Heaven". The distance of two bodies changes, therefore, when the interposed substances change. If we define the formal place as Gilles de Rome did, such a formal place cannot be held to be immobile.

There is more; this formal place can be, in certain cases, more mobile than the material place considered by the same Gilles de Rome. This material place, the ultimate surface of the containing body, is never mobile *by itself*; it is only mobile *by accident* and by the effect of the movement of the containing body. On the contrary, [242] the distance between a body and the Earth, which is the formal locus of this first body, can be realized in a whole and unique interposed body; this last body being mobile by itself, it is the same for the formal locus.

It seems, moreover, that the language used by Gilles de Rome .is very badly justified; with more reason one could give the name of formal place to the surface of the container and that of material place to the distance between this surface and Heaven or Earth; this distance, indeed, can be a body taken in its totality; the extremity of the container, on the contrary, is inevitably a part of a body; does it not seem more reasonable to look at this part of the body as the form of the place than to attribute this role to a body which is taken in its integrity and which has its own existence?

It is therefore not possible to accept the interpretation that Gilles de Rome had proposed in order to make this statement true: The place is immobile.

Moreover, what was Aristotle's intention in introducing this epithet: immobile, into the definition of place? According to Buridan, the Stagirite had no other purpose than to distinguish between the place and the vessel. It is, in fact, the same body, the containing body, which plays at the same time, with respect to the content, the role of place and that of vessel; only it is called vessel or place according to the point of view from which it is considered. It is called a vessel when the content is likely to flow or spread; the vessel then impedes this diffusion; the movement of the vessel alone allows the content to be transported from one place to another; this name of vessel is thus attributed to the body containing it because of a certain mobility that is considered in this body. On the contrary, the name of place is given to the container because of a certain immobility which this body shows itself to be affected by when compared to the contained body; the content, indeed, at least in certain cases, can move although the container remains immobile.

Did Jean Buridan, by this analysis, grasp what is essential in the thought of the Stagirite? We don't think so. But, instead of epiloguing at length on this question, it is certainly better to ask the Parisian Master to expose us his own theory on the immobility of the place.

243] The place itself, the one to which Aristotle's definition applies, is a body; as such, it is mobile; it is as mobile as the body housed; the place can move while the body housed remains at rest; "the air surrounding the towers of Notre-Dame can move and change while these towers remain in place"; in certain cases, too, the body housed can move without the place moving at all.

One cannot therefore claim, without error, that the place *itself* is immobile; this assertion can only be made about an *improperly said* place.

One can, in fact, use the word *place* in many different meanings, as it happens, moreover, for most names; for the word *place*, as for these names, there is a primary meaning to which the others are attached by way of attribution.

The idea of distinguishing, in the theory of place, the proper sense and the derived senses of the word *place* seems to be borrowed from Roger Bacon; here is how Jean Buridan uses this idea:

It is impossible for us to perceive, at *least by sense*, that a body moves by local motion, if we do not perceive that this body behaves differently, from one moment to the next, in relation to some other body, that this change consists in a variation of distance or in a variation of situation, that the two bodies change in totality one in relation to the other or that the parts of the one are disposed differently in relation to the parts of the other.

This statement, moreover, is not a philosophical conclusion; it is a simple judgment of common sense that everyone makes. Moreover, of these two bodies which, from one instant to the next, behave in a different way from each other, it is impossible for us to judge with certainty that this one is moving if we do not know that this other one is immobile or, at least, that it is not moving with such and such a movement or with such and such a speed.

This being the case, let us imagine a housed body and its proper place, that is, according to Aristotle's definition, the ultimate part of the housing body; let us suppose that this latter body remains motionless and that we know this; if, from moment to moment, we perceive that the housed body behaves differently with respect to its place, we say that it moves by local motion; if, on the contrary, we observe that the housed body always keeps the same relation to the housing body, we say that the former body does not move locally, that it is at rest.

By way of extension, we say that an object is the locus of a body, or that it acts as a locus in relation to that body, when that object serves as a term of comparison for appreciating the motion or rest of that body; when we say that that body is immobile or that it is in motion, depending on whether, from one moment to the next, it behaves in relation to that object in the same way or in different ways. But the motionless place thus defined is an *improperly said place*.

These observations dispel the objections that had previously arisen.

"It is a common thought, in which all agree, that the towers of Notre-Dame are today in the same place where they were built, although the air that surrounds them has constantly changed, although the intermediate bodies that constitute the distance between these towers and Heaven have frequently changed. This seems difficult, but it is, in reality, very easy; indeed, the terms *the same* that we apply to the place of these towers, must not be taken in their proper and essential sense; one must admit that these words *the same* designate here the equality of distance either to the Earth, or to the Sky, or to the body, whatever it is, in relation to which we judge the rest or the movement of the other bodies. »

John Buridan does not say, as did Duns Scotus, John the Canon, William of Occam and Walter Burley, that the words *the same place* designate two equivalent places between which there may not be numerical identity; but if he does not use this language which his predecessors used, the thought he expresses is no less identical to theirs.

It is by understanding the word "place" not in its proper sense, but in its improper sense, that we can formulate this proposition: The Earth is the place of Heaven. We shall see this by examining the question: Is the supreme sphere in a place[[342]](#footnote-343)?

245] "This question," says Buridan, "has been considered very difficult; this is due, I think, to the fact that the ambiguity of the word place has not been distinguished. As we said before, the word place can be understood in the proper sense, as meaning that which contains the body housed and touches it immediately, while being distinguished from it; it can also be understood in a less proper or quite improper way; it then designates the object by means of which a certain body is judged to be moving; ... if this distinction is given and conceded, the question becomes very easy. »

In the proper sense, the ultimate sphere has no place, since no body contains it; in the same proper sense, it does not move locally, since it has no place.

But if we take the word "place" in its improper sense, if we designate by it the reference point which allows us to appreciate that a body is at rest or in motion, the supreme sphere has a place, and this place can be the Earth, or a certain wall, or a certain stone.

Jean Buridan then subscribes to Averroes' aphorism: The supreme sphere is not a place *per se*, but it is in a place *per accidens*; however, he subscribes to it with this condition, which Averroes would undoubtedly not have accepted: The place *per se* is the place properly said; the place *per accidens* is the place improperly said.

John Buridan also subscribes to Avicenna's opinion: The supreme sphere moves not by local motion, but by motion relative to the situation, for if it has no place as such, it has a situation that changes from one moment to the next; its various parts, in fact, are at varying distances from the various parts of the Earth. Averroes and St. Thomas Aquinas rejected this doctrine of Avicenna; Buridan, in his turn, declared all the objections they raised to be ill-founded.

Although the supreme sphere has no proper place, it moves; but it has an improperly said place, the immobile Earth, a term of comparison which enables us to appreciate the movement of the ultimate orbit; is this improperly said place indispensable to the movement of the last heaven? Could the movement of this heaven continue even if this improperly called place [246] did not exist? Averroes would deny this; for him, the existence of a motionless Earth is the necessary condition for the movement of Heaven.

Such is not the opinion of Buridan[[343]](#footnote-344).

Let us imagine that the divine power transforms the World into a homogeneous and continuous whole; for such a World, there would no longer be any place, neither place properly so called, nor place improperly so called; in the same way, there would no longer be any place for a stone which would remain alone while God would have annihilated all the rest of the World.

Could this homogeneous sphere, deprived of any kind of place, still receive from God the movement of which the supreme orb is currently animated? Averroes denies it; John Duns Scotus affirms it; John Buridan agrees with Duns Scotus. I prove," he says, "that God could give this world an overall rotation, by making use of one of the articles condemned in Paris. This article says: It is an error to claim that God could not move the World in a rectilinear motion. There is no reason why he should move it by rectilinear motion rather than by circular motion. Just as he imparts diurnal motion to all the celestial spheres together with the supreme orb, so he could give the whole world, including the sublunary bodies, a general rotation while the various spheres remain distinct from each other; but he could just as well move this world after transforming it into a continuous homogeneous whole. God could therefore move the whole World while this World would no longer have a place. »

Buridan's formal intention in this passage is to refute the theory of local motion proposed by Gregory of Rimini; local motion cannot be formally identical to the place that the mobile acquires at each moment.

Can local motion, as William of Occam wants, be nothing other than the mobile itself which, from moment to moment, behaves differently with respect to a fixed reference point? Buridan knows, and he has told us, that no local motion is perceptible to the sense unless the mobile body continually changes its position with respect to a fixed body, or unless the parts of this mobile body dispose themselves differently with respect to the parts of this fixed reference frame. But he cannot agree that local motion is reduced, in reality, to what allows our senses to notice its existence and to study its particularities.

"If the ultimate sphere moves, it is not simply because it behaves unceasingly in a different way with respect to the Earth or to some other body. I prove it: It would not move less even if all the other bodies would turn with it without experiencing any movement different from its own; in this case, however, there would be no object with respect to which it could behave differently from one instant to the next. In the same way, for a body to move rectilinearly, it would be necessary for it to behave differently from one instant to the next in relation to some object, just as it is necessary for it to move curvilinearly; and yet, for there to be rectilinear motion, it is not necessary for the mobile to behave differently from one moment to the next in relation to some other body; indeed, if God moved the whole World with rectilinear motion, the World would not experience a continual change of disposition in relation to the Earth. »

William of Occam, it is true, foresaw and examined this objection, and he sought to avoid it; a body that moves is not simply, according to him, a body that, from moment to moment, behaves differently with respect to a really existing immobile body, for it could be that no immobile body would be encountered; in his opinion, a moving body is, essentially, a body which, from moment to moment, would behave differently with respect to a motionless object, if such an object existed.

This conditional form given to the definition of motion does not satisfy Buridan at all: "This loophole is worthless," he says, "it does not prevent this, that the ultimate sphere [248] would in fact move even though in fact there would be no motionless body; in this case, therefore, this sphere could not in fact behave differently from one moment to the next with respect to some motionless body or to some extrinsic object. »

From then on, no hesitation is possible; "we must decide to grant the third theory; *ergo oportet concedere tertium modum*". What changes from one moment to the next in a body that moves by local motion is not a disposition in relation to some immobile object, to something extrinsic; what changes is something that is intrinsic to the body that moves and which, however, is distinct from the substance of this body; local motion is a *purely successive reality* (*res pure successiva*).

In expounding the theory of place, Buridan ranked among the faithful followers of Occam, among the pure Nominalists; but when it came to defining local motion, he clearly broke with the nominalist doctrines of Gregory of Rimini and Occam; he fully embraced the realist doctrine of Duns Scotus; with the latter, he placed the essence of local motion in a *forma fluens* which really affects the matter of the mobile.

But Buridan follows the teaching of Duns Scotus only as far as local motion is concerned. His Physics, in fact, claims the principle which directs that of William of Occam; it does not consent to the admission of a new entity, unless irrefragable arguments have forced it to admit it. Jean Buridan attributed the local movement to a special successive reality, to a *forma fluens*, because this form alone allowed him to save certain movements of which the decree of Étienne Tempier affirmed the possibility. "Does the movement of alteration also require a flux distinct from the alterable subject and from the quality in relation to which the alteration is made? "Buridan's answer to this question [[344]](#footnote-345)differs entirely from that received by the analogous question to which local motion had been subjected. There is no [249] movement of alteration that one cannot explain without invoking the existence of a fluid form, distinct from the quality that the alterable subject acquires or loses; we will not, therefore, introduce this unnecessary reality. "One would only suppose the existence of such a flow in order to save the succession; but this succession can be saved without having recourse to this added reality...; such an additional elm would therefore be the object of an entirely idle supposition; it will be clearly seen that this supposition is idle by saving without it all the reasons which seem to furnish arguments in favor of such a flow. »

By an analysis which strives not to contradict any certainty, to assume nothing but the indispensable, Buridan comes to establish an extreme difference between local motion and the other kinds of motion considered by Aristotle. For the latter, he is satisfied with the theory posited by the Nominalist School; he resolves them into two permanent realities, the subject who moves, and the quality or magnitude that this subject acquires or loses. For the local movement, he gives, against the Nominalists, reason to Duns Scotus; he attributes this movement to a purely successive reality intrinsic to the mobile. This doctrine, which assigns to local motion a character by which it is distinguished from all other motions, is certainly one of the most profound and, one might say, the most prophetic views of the leader of the Parisian School. It was not long before it was abandoned by his followers, who, with the exception of Albert of Saxony, did not understand its importance.

# XVI bis. - THE PARISIAN SCHOOL AT THE BEGINNING OF THE SIXTEENTH CENTURY: JOHANNES MAJORIS. JEAN DULLAERT DE GAND. LOUIS CORONEL. JEAN DE CELAYA.

The teaching of Buridan had, at first, a great influence at the University of Paris; the masters of this University accepted fully, it seems, what this teaching told them about movement; in particular, they admired, according to [250] the opinion of Duns Scotus, that local movement was constituted by a certain purely successive reality intrinsic to the motive; this opinion, they adhered to it by virtue of the arguments that Buridan had invoked. Then, little by little, the confidence accorded to this Scotian doctrine by those who followed the methods of Parisian philosophy was seen to diminish; gradually, they returned their favor to Occam's doctrine.

Among the disciples of Buridan, no one followed more exactly than Albert of Saxony the doctrines that the master had professed concerning the place and the local movement; in § XIII, we have exposed what Albert of Saxony thinks of the nature and the immobility of the place; the analogy, which exists between the thoughts of the Saxon master and those of the philosopher of Bethune appears at the first reading.

The opinion of Albertutius is not less exactly in conformity with that of Buridan concerning the essence of the local movement; the disciple only exposes with more details and order the arguments which the master had produced in a somewhat summary and confused way.

The first question Albert examines is [[345]](#footnote-346)whether the movement of alteration consists of a quality distinct from the quality that is acquired or lost, and from the subject who acquires or loses that quality.

The movement of alteration," Albert replies, "in no way requires a *flux* distinct from the quality that is acquired or lost; ... and it is a vain work to explain an effect by a greater number of causes when a lesser number of causes suffice for that object; ... it is not necessary, therefore, to imagine that such a flux is added to the quality that is acquired and to the alterable subject. »

After formulating this conclusion about the alteration motion, Albert de Saxe turns to the study of local motion[[346]](#footnote-347).

251] He reminds us, first of all, that three theories are present:

"On the subject of this question, some have held... that a body could not move locally without a certain flux distinct both from the. Some, on the contrary, hold that this movement can exist without such a flow; and among these, some claim that it is sufficient, for a body to move, that it behaves differently from one moment to the next in relation to some other body; the others declare that for a body to move locally, it is necessary and sufficient that at each moment the mobile is in a different place from the one it occupied before. "The three theories referred to by Albert of Saxony are, as we can see, those of Duns Scotus, William of Occam and Gregory of Rimini.

In this debate, what is the party embraced by Albert of Saxony? Here it is:

If we stick to the case examined by Aristotle and Averroes, i.e. the case where the moving body whose local motion is being studied has an immobile place, these two permanent realities, which we call the mobile and the place, are enough to constitute the local motion; it is perfectly useless to add a purely successive reality, a flux; this *forma fluens* would be idle here as it would be in the explanation of the alteration motion.

It would still be idle to resort to such a successive form in the case where the mobile - such as the eighth sphere - would not have an immobile place, but where its various parts would possess one.

But one can imagine cases where a movement would occur, although neither the mobile body nor its various parts would be endowed with any immobile place. These cases, it is true, are not realized in nature, but they do not exceed the omnipotence of God; such is the case referred to by an article condemned in Paris in 1277; such is still the case imagined by the Subtle Doctor.

"We can suppose that the World becomes a homogeneous whole and that, once this is done, God makes this whole World turn from East to West; we can also suppose that God gives the whole World a rectilinear movement. Then the world would move, and it could not be local movement. Moreover, [252] whatever movement it makes, it would have to behave differently from one moment to the next. Now, it could not behave in a changing manner with respect to some extrinsic object; this is self-evident, since such an object does not exist. It would therefore behave in a way that varies from moment to moment with respect to something intrinsic, so as to possess at each moment something that it did not possess before. This consequence could not be saved if we did not suppose some flux inherent to the mobile, which represents what it acquires again, by which it behaves at each instant differently than it did at the preceding instant. »

Albert points out, first of all, that neither Aristotle nor Averroes would have admitted the possibility of the movements just defined; they would not have admitted that the World, transformed into a homogeneous whole, could continue to turn from east to west; they would not have admitted that the World could be given a rectilinear movement. We can therefore formulate this proposition: If we limit ourselves to considering the cases that Aristotle and the Commentator would have admitted, local motion requires no purely successive reality.

But there is more; "even if one were to admit the possibility of such cases, one would not be bound by this to grant that in these cases the World moves by local motion; for, for the World to move by local motion, it would have to change its place, which it does sometimes in one place and sometimes in another; Now the World, taken as a whole, is devoid of any place, for no body exists outside it; taken as a whole, therefore, it cannot move by local motion; in these cases, the possibility of which we admit, we are obliged to grant that the World moves, but not that it moves by local motion. "Since we exclude these motions from the number of local motions, we can declare that no local motion requires the admission of a *forma fluens*, of a purely successive reality distinct from the motive and the place.

But it is no longer the same for the movement of the World in [253] those "divine cases" which Aristotle and the Commentator would have rejected and of which we admit the possibility[[347]](#footnote-348).

In these "divine cases", the movement of the World is neither a local movement, nor any of the movements that Aristotle considered; it is a movement of a new kind; it is only of the same kind as the local movement.

Now, this new movement could not be if there were not a certain successive reality, inherent to the mobile, distinct at the same time from this mobile, which is a permanent reality, and from the place which, here, does not exist. We have thus established the necessity of this *fluxus formae*. And let us not evade our demonstration by saying: Undoubtedly, in these cases, the World does not behave in a variable way with respect to an external object which did not exist; but it would behave in a variable way with respect to such an object if it did exist. Indeed, to move is, in the opinion of everyone, to behave differently from one moment to the next; to move *in an actual way* is to behave in this way, in a variable and *actual* way; a mere *conditional* variation would not suffice for this movement *in act*.

The movement of new category which corresponds to the "divine cases" thus requires the intervention of a certain purely successive reality. Shall we also admit the existence of such a *fluxus formae* in the local motion proper, which is of the same kind as the preceding motion and for which, up to now, this existence had seemed to us not to be required? Certainly yes. God, in fact, could annihilate all bodies, except a certain mobile, and he could move this mobile with a movement similar in kind to the movement it possessed before, without producing any reality which did not pre-exist or which was not similar to a reality pre-existing within the mobile. Now this would be impossible if, after the annihilation of all the other bodies, this mobile moved as a result of the intervention of a certain flow, whereas before it moved without this flow existing. »

254] This whole theory of Albert of Saxony is, as we can see, nothing more than Buridan's argumentation, brought to full clarity.

In his *Abridgments of the Book of Physics*, Marsilio d'Inghen gives a [[348]](#footnote-349)brief and very clear exposition of the theory that Albert of Saxony presented to us; this exposition is so faithful that it would be idle to analyze it here.

Later, in his *Questions* on the *Physics* of Aristotle, the famous Parisian doctor returned to the doctrine of Occam and the Nominalists, completely rejecting the Scotistic theory that John of Buridan and Albert of Saxony had supported[[349]](#footnote-350).

"The local movement," he says, "is not the space that is acquired by this movement...

"Local movement is not a flow, a disposition, a successive reality inherent to the mobile and distinct from any permanent reality...

"The local movement is the mobile itself that moves locally. »

Marsilio is not unaware of the arguments by which Buridan and Albert of Saxony tried, with the help of the "divine cases", to refute this last opinion and to ensure the one that Duns Scotus had put forward; he faithfully reproduces the essential features of it. Moreover, he in no way refuses to admit the possibility of these "cases": "this continuous body formed by all the bodies of the World, he says, God could impose on it a rectilinear movement, or a circular movement, have such a movement as he would like; and, given that this is impossible for him, these movements would nevertheless be conceivable, because it is not repugnant to such a body that it moves. "The Parisian doctor must therefore refute this argument; here is how he does it:

"It is sufficient for the movement of this body that this proposition be true: This body would behave in a changing manner in relation to a motionless body if one existed. 255] Some say otherwise; because of these movements, they admit that the place is identical with the separate space; they suppose that there is an infinite place or space beyond Heaven; therefore, if God moved the whole World with a rectilinear or circular motion, the World would behave in an ever-changing manner with respect to the place or separate space in which it is found...; but the first solution is better. »

This solution, however, Marsilio had rejected it in his *Abridgement*; the argument which he had opposed to it was the same one that John Buridan, that Albert of Saxony had employed to this object; of this argument, the *Questions* written *secundum Nominalium viam* do not mention any more.

While Marsilio of Inghen rejected, after having admitted them, the concessions that John Buridan and Albert of Saxony had granted to the Scotian theory of motion, Paul of Venice takes up this Scotian theory in its integrity, without accepting the restrictions that Buridan and Albertutius had imposed on it.

Paul Nicoletti begins with the study of local motion; he wonders [[350]](#footnote-351)"if local motion differs from the mobile, from place and space. Notice", he adds, "that this doubt is introduced here because of Occam's opinion, according to which local motion is not distinguished from the mobile, and Gregory of Rimini's opinion, according to which local motion is not distinguished from space or place.

"Against these opinions, and especially against Occam's opinion, one can formulate multiple arguments, and, in the first place, this one:

"Suppose that God annihilates all bodies except the ultimate sphere, which continues to be moved as it is [256] at present; this sphere would intrinsically behave in a way that varies with time; but it would not acquire itself or any new parts; It would therefore continually acquire a motion distinct from itself, by which it could be said to behave differently from one moment to the next; but it moves now as it did before; before that, therefore, it already acquired a local motion distinct from itself.

"Here is a second argument which confirms the previous one: God could annihilate all things except the first matter endowed with motion and the supreme sphere; he could move this first matter towards the supreme sphere; if this motion were identical with the first matter, as this motion is act..., the first matter would be act, contrary to what the Philosopher and the Commentator profess in the first book of the Physics. »

The first of these two arguments bears the mark of John Buridan and Albert of Saxony; but the two reasonings also manifest the little understanding that Paul of Venice had acquired of the theory of William of Occam; never had the latter maintained that the local motion was identical to the mobile; he had simply denied that the local motion was due to the real existence, within the mobile, of some distinct form, permanent or successive.

In any case, with the Scotists, with John Buridan, with Albert of Saxony, Paul Nicoletti concludes that "the local movement is a successive accident which flows within the subject; it is a mobile form, and not a substantial form".

Paul of Venice, having fixed by this conclusion the essence of local motion, turns to the other motions defined by Aristotle[[351]](#footnote-352); he wonders "whether the motions of alteration, dilation, contraction are distinct from the quality or [257] the magnitude which is acquired or lost". "This doubt is touched here," he adds, "because of the opinion of Occam, Gregory, and John Buridan, an opinion according to which the movement of alteration is nothing other than the quality that is acquired or lost, according to which the movement of dilation, the movement of contraction are not distinguished from the greatness that is conquered, from the greatness that is lost by the subject. »

Against the authors he has just quoted, and in accordance with the Scotian doctrine, Paul of Venice declares that "dilation, contraction, alteration, are absolute accidents and not relative accidents; this is obvious, because local motion is an absolute accident, as we have seen; for the same reason, the motions we have just named are absolute accidents... Alteration, dilation, contraction, are accidents that flow within the subject..., for they are neither substances, nor permanent accidents... All motion is therefore a successive flowing form, and not a permanent flowing form..."

Paul Nicoletti notes, on this subject, that Averroes distinguishes a material movement, defined by the flow of a permanent form, and a formal movement, defined by a successive fluid form.

This distinction is admitted as at least a probable conclusion by Gaetan de Tiène[[352]](#footnote-353); he, moreover, neglects entirely, in the part of his writing to which we refer here, the argument by which John Buridan and Albert of Saxony had endeavoured to justify the Scotian definition of local motion: we have seen, in § XVI, that he briefly took up this argument again when commenting on the fourth book of the *Physics*.

The Paduan masters whose work bears the clearest trace of the influence exerted by the School of Paris thus accept, even more completely than did John Buridan and Albert of Saxony, the Scotian teaching; they depart, however, in one essential point from this teaching as it is given to us by John the Canon. According to a doctrine which they attribute, somewhat arbitrarily, to Averroes, and which they regard as at least probable, they distinguish in motion a material element and a formal element; the material element is constituted by the *esse discretum*, the formal element by the *esse continuum*; the essence of motion results from the synthesis of the two material and formal elements.

For John the Canon, the *esse continuum* constitutes by itself the whole essence of movement, such as it is in things; the *esse discretum* has reality only in our mind; by putting his thought in Kantian language, we could say that, according to him, the *esse continuum* is the essence of *objective movement*, while the *esse discretum* is the essence of *subjective movement*.

The faithful disciple of Scotus would certainly not have accepted the doctrine which Paul of Venice and Gaetan of Tiene attribute to the Commentator; we may even know the terms in which he would have refuted it. One of his contemporaries, François Bleth, held[[353]](#footnote-354) a theory about time which was very similar to that proposed by Gaetan de Tiène about motion, although one of these two theories was, in a way, the opposite of the other; François Bleth thought, in fact, that the *esse continuum* constitutes material time, while the *esse discretum* would be formal time; he admitted, moreover, that the first did not hold its existence from the mind, while the second had reality only through the mind; from these two elements, one material and the other formal, was constituted the whole entity of time. That is not, replied John the Canon, "because two differences of the same kind cannot constitute the same thing"; he would have refuted in the same way the theory of the movement which allured Gaetan de Tiène.

If we do not find in the writings of Paul of Venice and Gaetan of Tiena the theory of objective and subjective motion as formulated by John the Canon, we would recognize it in the writings of an illustrious philosopher [259] who studied in Padua at the time when Paul of Venice was still living, and who was the contemporary of Gaetan of Tiena; we want to speak of Nicholas of Cues. It would take too long to explain here the theory of motion and time which Nicholas of Cues expounded in his various works; we will refer the reader to what we have said elsewhere[[354]](#footnote-355).

While the Scotian theory of the movement was gaining illustrious followers at the universities of Bologna and Padua, it was losing ground at the University of Paris and in the schools dependent on it. However, some disciples of the Subtle Doctor kept the main propositions; thus did Pierre Tataret.

That local motion, distinct from both motive and place, is a purely successive reality, Pierre Tataret establishes by an argument that he borrows[[355]](#footnote-356), summarizing it, from John Buridan and Albert of Saxony. As for the movement of alteration, does it consist in a successive *forma fluens*, or in a succession of states of a permanent form? Tataret exposes[[356]](#footnote-357) both theories; he does not seem to find strong enough reasons to determine his choice in one direction or the other.

However, our author ends his whole study of motion with this *Conclusio responsalis*: "Motion is a successive entity which exists subjectively in the mobile and which is really distinct from the mobile and from the form according to which the motion is made. This conclusion", he adds, "remains proven by the second article"; Tataret thus extends it, by way of analogy, from local motion to any other kind of motion.

The sixteenth century brought a revival of [[357]](#footnote-358)Occamist [Nominalism] at the University of Paris.

260] At the beginning of this century, the college of Montaigu had a particularly active and influential regent in the person of the Scotsman Johannes Majoris (1478-1540), born at Glegorgn, near Hadington. In his *Commentaries to the Books of the Sentences*, this logician takes up[[358]](#footnote-359), on the subject of local movement, the formula in which the School condensed Occam's doctrine: "*Motus localis est mobile quod movetur*. »

This occamist theory seduced, at the same time as Johannes Majoris, the disciples of this master; we have the assurance of it by the writings of Jean Dullaert de Gand and Louis Coronel.

In his commentaries, of such a complicated and minutely quibbling logic, to the *Books of Physics* of Aristotle, John Dullaert of Ghent exposes the subject of the debate in these terms[[359]](#footnote-360):

"There are, on this subject, various opinions. If we begin with local motion, to this question: what is local motion, there are various answers. Some Realists say that local motion is an accident really inherent in the moving body; these are divided into two categories: some say that it is a relative accident, and this is the opinion followed by Burley; others say that it is an absolute accident, and this is the opinion followed by Paul of Venice. Others, such as the Nominalists, deny that local motion is such a successive accident, and these are equally divided into two categories; some, like Gregory of Rimini, say that local motion is nothing other than the space traversed by the mobile; others say that local motion is the mobile itself. »

These various opinions, Jean Dullaert exposes and discusses them all three in a tiring sequence of proposals, arguments, answers, instances and replies.

He makes known the argument by which Buridan, on the strength of the authority of one of the condemnations made by the theologians in 1277, had claimed to demonstrate that local motion required a successive entity inherent in the motive. But he also makes known, and not less carefully, the answers which the partisans of Occam or of Gregory of Rimini addressed to this argument; that God can move a stone whereas all the bodies would be annihilated, that could not be enough to establish the scotian thesis.

"From the fact that this stone really moves, we cannot rigorously draw this conclusion: Therefore, from one moment to the next, it behaves differently, and this change is relative neither to another object nor to any of its parts. When I suppose that there is nothing but God and this stone, this stone, from one moment to the next, behaves differently in relation to some object which is endowed not with a real existence, but with an imaginary existence; in relation to this object, its variable disposition is not real, but only imaginary.

"Gregory of Rimini answers in another way: If the ultimate heaven existed alone, if the intelligence which presides over this heaven applied its motive power to it as it applies it now, it could not however move the heaven locally, and the heaven would not move. Gregory adds that it would be astonishing if anyone could conceive the contrary; for just as a subject cannot experience a movement of alteration without losing or gaining some quality, so a body cannot move locally without losing or gaining a place or without experiencing some change relative to the place.

"This theory allows us to answer easily to the article of Paris; we will agree that God can move Heaven or the whole World with a rectilinear motion, but that it would be impossible if he did not produce at the same time a certain space.

"Georges de Bruxelles observes, with regard to this argument, that one does not give a good definition of local motion by saying that it consists in behaving differently from one moment to the next, because a body that experiences an alteration behaves differently from one moment to the next, and yet it does not move by local motion. But this is to say nothing; it was not intended, indeed, to define local motion, but to investigate what it is to move in general. »

To his long and tiresome discussion, where the Scotian theory, the theory of Gregory of Rimini and the Occamist theory were successively reviewed, Dullaert gives the following conclusion:

"The first is the most subtle and the one that best conforms to the sayings of the Philosopher; the second is the least used; in our time, the third is reputedly true; it is the most commonly accepted. »

Luiz Nunez Coronel of Segovia was, like Jean Dullaert, one of the favorite students of Johannes Majoris; under the title of *Physicae perscrutationes*[[360]](#footnote-361), he printed, in 1511, a treatise of Physics whose general order remains that which Aristotle had chosen.

Luiz Coronel begins[[361]](#footnote-362) by defining the various opinions about the local movement in these terms:

"The first opinion holds that local motion is a certain successive entity, distinct from the mobile, inherent to this same mobile during the whole duration of the motion; this is the position taken by the whole troop of those called Realists.

"The second opinion is the one embraced by Gregory of Rimini; he claims that the local motion is identical to the space covered during the motion.

"The third opinion is the one adopted by those who are called Nominalists; it affirms that the local movement is the mobile itself which moves locally. »

263] Luiz Coronel, like Dullaert, explains these three theories in detail and discusses them at length. In the course of the examination to which he submits the occamist doctrine, the following passages occur:

"Everything that is usually said about movement is easily saved in this position. It is quite true that the ways of expressing oneself that are commonly used seem to fit the first supposition; but it is sufficient for the third that these ways of expressing oneself suffer an explanation that conforms to this last theory.

"However, you may say this: To behave differently from one moment to the next is a character that is attributed to motion; but if we hold that motion is not distinguished from movement, this character cannot be saved. Let us suppose, indeed, that there is nothing but God and a stone; and that God drags this stone through the void; this stone would move; however, it would not behave in a variable way neither with respect to God, nor with respect to a place, nor with respect to anything extrinsic...

"In his third book of the Physics, Buridan gave so much weight to this argument that he concluded the distinction of motion and motive. Paul of Venice, in his Metaphysics, in the chapter on motion, also attributed great weight to this argument. To answer it, Georges de Bruxelles declares that one gives a bad definition of local motion by saying that it consists in behaving differently from one moment to the next, because this definition is also appropriate to the motion of alteration; but this answer cannot satisfy us...

"We must therefore say, with Gregory of Rimini, that in this case the stone does not move; let us grant that God can pull this stone through the void, or let us deny it; we cannot in any case grant that a body can move by local motion without losing or gaining any place; any other affirmation is unintelligible...

"But, you will say, admitting that motion is a distinct reality, we can save this proposition: This stone behaves differently from one moment to the next; indeed, [264] it successively acquires that entity which is required for it to move. This remark is of no value. As long as in this case we declare that this stone does not move, we have no need to posit such an entity. »

Luiz Coronel does not give any formal conclusion to his exposition; but the very order in which he develops this exposition, no less than the vivacity with which he refutes Buridan's argument, tells us enough about his intimate preferences; it is clear that they go, like those of his master Jean Majoris, like those of his fellow student Jean Dullaert, to the occamist doctrine.

At the beginning of the 16th century, therefore, with John Majoris and his followers, the occamist theory of the local movement was in favor at the College of Montaigu; it was no less well received at the College of Saint Barbara, where a Spaniard, born in Valencia, Juan de Celaya, taught.

In the study of the movement, Jean de Celaya proceeds in the same order, and almost in the same terms as Jean Dullaert and Luiz Coronel.

He first examines [[362]](#footnote-363)"the opinion of Scotus and the other Realists" whose presentation he borrows in great part from Paul of Venice, as he is careful to warn us. This opinion of the Realists, he submits it to a very long and very meticulous discussion. He then examines[[363]](#footnote-364), much more briefly, the theory of Gregory of Rimini and finally passes[[364]](#footnote-365) to the "opinion of the other Nominalists".

John of Celaya mentions the argument which Buridan opposed [265] to the nominalist theory; he also mentions the dismissal which Gregory of Rimini opposed to arguments of this kind; then he adds:

"In his first question on the first book *On Heaven and the World*, Albert of Saxony concedes that the supreme sphere moves by local motion or by a motion of the same kind as local motion; it is not necessary, in fact, according to the same author, that such a motion should be a change of place; it is sufficient that it should be such that the mobile animated by this motion would experience a change of place if it were in a place that surrounded it. However, in the sixth question on the third book of *Physics*, he holds that those who admit such divine cases are forced to admit the reality of a motion distinct from the mobile. But, in truth, as easily as he supports the possibility of the motion of the eighth sphere, one can defend the possibility of motion for the isolated body considered in these cases; for this body to move, this is enough: this body would be, from one moment to the next, in a different place, if there were a place surrounding it; this is what Albert of Saxony concedes for the ultimate sphere. We must not, therefore, abandon the lucid sentence of the Nominalists because of these cases. »

# NOTE - ON A *SUM OF LOGIC* ATTRIBUTED TO SAINT THOMAS D'AQUIN[[365]](#footnote-366) .

We have analyzed various texts in which Saint Thomas Aquinas had exposed his opinions on the nature and the immobility of the place; but a text had escaped us of which we want to say a word here.

A very clear and concise treatise on Logic is attributed to Saint Thomas, entitled: *Summa of Aristotelian Logic*[[366]](#footnote-367). This Summa treats successively of *Predicables* [266] or *Universals*, *Predicaments* or *Categories*, *Enunciation*, *Syllogism*, and finally *Demonstration*. It is in the second part, devoted to the study of the ten Predicaments, that we find the passages on which his attention will be focused.

In this part[[367]](#footnote-368), the author, dealing with the place, recalls the peripatetic definition of it: *Locus est superficies corporis continentis immobilis*; but, in spite of this definition, the place is not classified in the same kind as the simple surface; the place is a surface, it is true, but a surface to which is added a specific difference which is not appropriate to it simply as surface; this difference is marked, in the preceding definition, by the epithet: *Immobilis*.

Except for the supreme sphere, every body is surrounded by another body whose ultimate surface is contiguous with its own. If this enveloping surface is called a place, it is not simply because it surrounds the body housed; if it were so, the water of a river where a ship is at anchor would be the place of this ship, and then this ship, while remaining immobile, would incessantly change place as a result of the flow of the river water. The raison d'être of the place (*ratio loci*)[[368]](#footnote-369) is therefore not the same as the raison d'être of the surface. "The raison d'être of the place consists in the fact that it is immobile, this immobility referring to the situation of the Universe. If the World were empty, and Heaven alone existed, surrounding this emptiness, a stone placed in the center of the World would no longer be surrounded by the surface of any containing body; this stone, however, would be in a place, for it would be in a region of space that would remain immobile with respect to the situation of the Universe or Heaven. »

This doctrine is closely related to the one we read in the *Commentary on Aristotle's Physics* composed by St. Thomas and in the opuscule, perhaps apocryphal, *De natura loci*. 267] These last two writings distinguished two elements in the notion of place, a mobile element, the surface of the surrounding body, and an immobile element, the *ratio loci*, which is the situation in relation to the whole World. These two elements appeared as equally essential to the constitution of the place; if Saint Thomas did not say, as Gilles de Rome was going to do, that the first of these two elements was the matter of the place and that the second was its form, at least he insinuated it clearly enough. It is the defect of the first of these elements which made the definition of the place of the supreme orb so strangely embarrassing.

Now, in the chapter we have just analyzed, the first of these two elements is considered as quite accessory in the constitution of the notion of place; the place can subsist even if this element would come to be missing; the place can be reduced to the *ratio loci*, to the situation in relation to the Universe, not of the surface of the housing body, since this one could not exist, but of the surface of the housed body.

The *ratio loci*, as understood in the *Commentary on the Physics* or in the pamphlet *De natura loci*, offered a certain analogy with the qšsij, which, for Simplicius, essentially constitutes the place; the text which we have just analyzed transforms this analogy into an identity, because it makes the *ratio loci* what the qšsij was, an attribute of the content, and not of the container. The doctrine of the pamphlet attributed to Saint Thomas seems to merge with that held by the Franciscan Peter Aurioli.

The author of the *Summa of Logic* recalls[[369]](#footnote-370) the definition of predicament given by Gilbert de la Porrée; this definition, he tries to clarify it by the following considerations:

"The surface of the housing body can be considered in two different ways. First, it can be considered as it is in the body to which it belongs; it then serves to name it. Secondly, it can be considered insofar as it serves to denominate the lodged body, and in this case, it generates the predicament ubi; this predicament is then nothing other than the place, insofar as this place serves to denominate the lodged body, to give it an extrinsic denomination; thus the citizen receives this name from the city, thus the inhabitant of Prague derives this designation from the city of Prague. According to another view, the predicament ubi is the relation of the ambient body to the housed body... It is an extrinsic relation which has its foundation in the housing body and its term in the housed body. »

"In every finished body[[370]](#footnote-371), there is therefore a proper ubi which is there by way of denomination, according to the first opinion, or which finds its term there, according to the second opinion. »

Between these two opinions, the first of which is frankly nominalistic, while the second seems realistic, the author remains in an indecision which is surprising on the part of the Angelic Doctor; this indecision would rather be understood in some contemporary of John the Canon, dizzy, as was the latter, by the noise of the discussions to which the predicate ubi gave rise within the Scotian School. - No less astonishing is this allusion to the city of Prague in the pen of Thomas Aquinas; one would have expected to hear him mention a place whose name was more familiar to him. As our reading continues, we perceive more clearly the hint of an apocryphal writing that the *Summa totius logicae Aristotelis* gives off.

It follows obviously from what precedes, says our author[[371]](#footnote-372), that the local movement does not occur in the place as such, but that it is relative to the predicament ubi; any movement, indeed, has for subject the body which moves, the mobile; the kind of the movement is determined by the kind of the form which is acquired by the movement and which is its term. Now, the place does not move, since it is the immobile surface of the container; it is the housed body that moves. The place, as such, is not the form that is acquired by this housed body; it is a form of the housing body. Nothing, then, is acquired [269] by the moving body, except the ubi; this ubi, in fact, is a relation of the place to the lodged body, a relation in virtue of which the place circumscribes the lodged body; or, according to the first opinion, it is a denomination which presupposes this relation; this relation has its term in the lodged object itself... This relation has its end in the housed object itself...; it is the one that is acquired in this object that moves ceaselessly from one ubi to another until the movement reaches its end.

"By this we see obviously that in the other kinds of movements an intrinsic form is acquired. In the movement of alteration by which a body passes from cold to hot, heat is acquired, which is an intrinsic form adhering to the very body that has been heated... But, in local movement, what is acquired is the ubi, which extrinsically denotes the body moved or which, according to the second opinion, is a relation extrinsic to the body housed, a relation that has its term in this body and its foundation in the housing body. »

At a pinch, all this could have been written by St. Thomas; he could have admitted that the ubi, and not the place, is the term of local motion; when he speaks of this motion, in the course of his commentary on Aristotle's Physics[[372]](#footnote-373), he sometimes calls it *motus in ubi*; however, in all his writings, he assigns the place as the term of local motion, and not the ubi. But the developments we have just read are much better understood if we attribute them to some author after Duns Scotus; it seems, indeed, that their object is to refute an opinion of the Subtle doctor; this one wants the local motion to be a *forma fluens* intrinsic to the mobile, and this can be, because he makes the ubi an intrinsic attribute of the housed body; does it not seem that the passages previously quoted emanate from some Thomist wishing to refute this Scotian doctrine ? Does it not seem, moreover, that this Thomist is influenced by Gregory of Rimini or, at least, by Antonio d'Andrès?

The Summa of Logic devotes several chapters to the study [270] of the predicament which the Latin calls *situs* or *positio*, and which the French can designate by the word *disposition*; what it says about it contains nothing which does not easily agree with the doctrines which Saint Thomas develops when he comments on Aristotle's[[373]](#footnote-374) *Physics*; nor does it contain anything which bears in an undeniable way the mark of the Angelic Doctor. Moreover, we find in these chapters, with regard to certain discussions, a floating and indecisive attitude which seems very strange if we attribute it to Thomas Aquinas. After having made *disposition* a relation or a denomination which has its origin in the various parts of the place and is attributed to the various parts of the body housed, the author of the *Summa of Logic* recalls[[374]](#footnote-375) that some philosophers, on the contrary, want *disposition* to have its origin in the parts of the body housed and to be an attribute of the parts of the place. This opinion is contrary to the one expressed in the treatise *On Categories*; "But... this treatise on predicaments was not composed by Aristotle; the one who composed it did not have as much authority as the Philosopher; this book has not been commented on by any author of any authority; so each of the modern authors says, about these predicaments, what seems right to him... I therefore leave it to the judgment of the reader to decide which of these two opinions is the more probable. »

Many other considerations lead us to think that the sonnet of Logic, while emanating from a Thomist, was composed neither by Thomas Aquinas nor by any of his contemporaries; here is one which seems to us particularly worthy of note:

The author of the *Summa of Logic* studies [[375]](#footnote-376)the substantial forms which are susceptible of various intensities; he maintains that the various degrees of the same form do not derive from each other by way of addition, but that each of [271] these degrees is constituted by a single form distinct from any form of lesser degree and more perfect than this one.

This doctrine is perfectly in conformity with that which Saint Thomas has very carefully expounded in a writing[[376]](#footnote-377) whose authenticity is not disputed. But the language of the author of the *Summa of Logic* differs in one essential point from the language of the Angelic Doctor; as a synonym of the expression *intensio formae*, the author of the *Summa of Logic* frequently uses the expression *latitudo formae*; never, we believe, does this denomination occur in the writings of St. Thomas nor of his contemporaries; it appears in Scholastica, it seems, towards the middle of the 14th century; in the second half of this century, it becomes in common use.

This remark led to the idea that the time when the *Summa of Logic* was written was after the year 1350. One could then explain the allusion to the city of Prague, so strange to the pen of Thomas Aquinas, by attributing the composition of the *Summa of Logic* to some Thomist master of the University of Prague; this University, indeed, was founded in 1348 by Charles IV.

It is true that this allusion to the city of Prague is, itself, open to question. Instead of *Praga*, *Pragensis*, perhaps one should read *Braga*, *Bragensis*; it would then be not Prague, but the city of Braga in Portugal.

A passage from the *Summa of Logic* recommends this explanation; here is the passage[[377]](#footnote-378):

"Sciendum quod verba infinitivi modi aliquando ponuntur ex parte subjecti, ut cum dicimus: Currere est moveri. Et hoc est quia habent vim nominis. Unde graeci addunt eis articulos, sicut nominibus. Hoc idem facimus nos in logica vulgari, [272] nam dicimus : *Ei corere mio*, ubi verbum *mio* [[378]](#footnote-379)est articulus. "*Ei corere mio* is neither Spanish nor Portuguese[[379]](#footnote-380), but it may be the corruption of a Spanish or Portuguese sentence. This passage, in any case, would suffice to prove to us that the *Summa of Logic* is not the work of Saint Thomas Aquinas.

# CONCLUSION

We have finished this long investigation on the theory of place and motion; after having led it through Antiquity, the Middle Ages and modern times, let us try to give it a conclusion and to condense here what can be said, on this subject, in a clear and certain way.

In the first place, we are sure that the only movements that are perceptible, that the only ones, therefore, that can be objects of direct experience, are relative movements. Our senses can observe that a concrete body always remains in the same situation with respect to another concrete body, or that the situation of the first body with respect to the second changes from one moment to the next according to a certain law. But if we were to say that a concrete body always keeps the same position, or that its position changes from moment to moment, without designating another body to which this position is related, we would be formulating propositions that are inaccessible to all experience; our perception would provide us with no means of telling whether these propositions are true or false. These first principles are not disputed by anyone; they have been clearly formulated by Aristotle and by Averroes as well as by Descartes and by Kant.

Geometry does not reason about concrete bodies, but about figures which are pure concepts; however, these concepts have been formed by way of abstraction from the concrete bodies which external perception makes known to us; so some of the laws of external perception are also binding on Geometry. Geometry can reason about the immobility or motion of a figure in relation to another figure; but if one were to speak simply of the immobility or motion of a figure without designating any other figure of reference to which this immobility or motion relates, one would be uttering words that Geometry could not incorporate in any of its reasonings, words that, for it, would be meaningless. Like external perception, geometrical deduction knows only relative motion; this is a second principle as incontestable as the first.

A physical theory is a set of mathematical concepts about which certain postulates have been formulated, chosen in such a way that the consequences of these postulates provide a representation of the laws that experience has revealed about concrete bodies.

In the mathematical ensemble that serves to compose such a theory, there are certain geometrical figures to which are attached certain magnitudes whose object is to represent properties unknown to Geometry, such as density, electric state, magnetic state, etc. These figures are intended to represent the concrete bodies on which the experiment is based; they can be called theoretical bodies. These figures are intended to represent the concrete bodies on which the experiment is based; we can call them *theoretical bodies*.

The mathematical set that constitutes a physical theory can also include certain figures to which no property is attributed other than those that Geometry confers on them. These figures do not correspond to any concrete body.

The reasonings which have as their object the development of the consequences of physical theory can, of course, only relate to relative motions; but these motions may be either motions of theoretical bodies relative to each other, or motions of theoretical bodies relative to certain geometrical figures, or finally motions of geometrical figures relative to each other. For a consequence of [274] the theory to be directly comparable with experience, it will be necessary that the only motions it mentions be motions of theoretical bodies relative to each other. The motions of theoretical bodies relative to geometrical figures, or the relative motions of geometrical figures, can only play the role of intermediaries; they can serve, indeed, to determine the motions of theoretical bodies relative to each other; but directly, and taken by themselves, they mean nothing that can be confronted with the teachings of experience.

In accordance with this remark, one will choose, to build the physical theory, a certain purely geometrical figure, a certain fundamental reference trihedron; it is to this trihedron that one will relate all the motions that one will have to deal with; the motions of the theoretical bodies in relation to each other will be deduced from the motions of these theoretical bodies in relation to the fundamental trihedron.

A certain fundamental trihedron having been chosen, it was possible to constitute a physical theory which presents these two characters:

First, the motions of the theoretical bodies in relation to each other, as predicted by this theory, represent with sufficient accuracy the relative motions of the concrete bodies, as known from experience.

Secondly, the postulates that serve as principles for the deductions of this theory have a simple form that satisfies the mind; for example, according to this theory, a theoretical body of infinitesimal dimensions, which would exist alone in the presence of the reference trihedron, would move, with respect to this trihedron, in a straight line and with a constant speed.

Once in possession of this satisfactory theory, one can approach the following problem, of which a very simple Geometry gives the complete solution: To the reference trihedron primitively adopted, one substitutes a second trihedron moved, with respect to the first, by a given motion; all the motions being now related to this second trihedron, one proposes to build a new physical theory in such a way that the relative motions of the theoretical bodies foreseen by this new theory are identical to those foreseen by the first.

275] It is immediately evident that the second theory will give an approximate representation of the observable facts which will have exactly the same degree of approximation as the representation given by the first theory. But to this new theory, one will be obliged to give for principles postulates which will be, in general, very complicated and very unsatisfactory for the mind; for example, a theoretical body, infinitely small, which would be alone in the presence of the new reference trihedron, would no longer be animated, with respect to this trihedron, by a rectilinear and uniform motion; it would describe a curvilinear trajectory with a variable speed.

So there is a certain way to choose the reference trihedron, so that the physical theory has its maximum simplicity and elegance. Is this preferred trihedron determined without ambiguity? Are there other reference trihedra that can be substituted without altering the simplicity of the theory?

It is obvious, first of all, that to a first reference trihedron one can, without changing the form of the theory, substitute another one which is fixedly connected to the first one; such a change leaves immobile, in the second system of movements, any body which was immobile in the first system.

But is the privileged trihedron susceptible to greater indeterminacy than this?

As long as the physical theory was limited to represent the phenomena that we call mechanical, it was possible to formulate the following proposition: If to a first privileged reference trihedron, one substitutes a second trihedron which is animated with respect to the first one by a simple motion of uniform translation, one substitutes to the first physical theory a second theory; and the postulates on which this one rests have exactly the same form as the postulates on which this one rests; in such a way that the second trihedron is, like the first, a privileged trihedron.

But since physical theory has proposed to represent not only mechanical phenomena, but also many other phenomena and, in particular, electrical phenomena, it seems that the preceding proposition [276] can no longer be kept; it would then be necessary to substitute this other proposition: A privileged reference trihedron being given, any other privileged trihedron is invariably related to the first.

From this proposition would then be concluded this one: A theoretical body which is immobile with respect to a privileged trihedron is also immobile with respect to all privileged trihedra.

Whatever the degree of indeterminacy of the privileged trihedron, here is a new proposition which is not in doubt: It is not necessary that there exists any theoretical body which remains immobile with respect to the privileged trihedron. This proposition can also be stated as follows: It is not necessary that there exists in the Universe any concrete body that the physical theory, brought to the most satisfactory and simple form, figures approximately by means of an immobile theoretical body.

The choice of the reference trihedron is one of the hypotheses on which the construction of the physical theory is based; this choice thus presents the characteristics that all the hypotheses that support this theory present, in a general way.

In the first place, this trihedron is determined only in an approximate way; or, to speak more exactly, the situation with respect to this trihedron of the various theoretical bodies intended to represent the concrete bodies is determined only in an approximate way; if, without changing in any way the form of the postulates which serve as principles of the theory, one alters by a small quantity the disposition, in relation to the reference trihedron, of the theoretical bodies to which one applies these postulates, one obtains a new theory which represents the experimental laws with the same approximation as the theory constructed at first.

Secondly, the determination of the reference trihedron is subordinated to the acceptance of all the other propositions on which the theory rests. The theory which we consider today as the simplest and most satisfactory one supposes the use of a reference trihedron with respect to which the theoretical bodies are distributed in a certain way; it supposes, moreover, the adoption of a certain number of postulates. 277] By distributing the theoretical bodies in another way with respect to the reference trihedron and by adopting other postulates, we can construct a second theory which represents the experimental laws just as accurately as the first; but we judge this second theory to be less simple and less satisfactory than the first. It is this judgment, advised by reasons of aesthetics, and not imposed by reasons of logical necessity, that determines our choice; it is this judgment that leads us to prefer the first way of arranging the reference trihedron with respect to the various theoretical bodies.

Now, this judgment is not definitive, because the physical theory is not a doctrine that is forever immutable; the incessant progress of the experimental procedures imposes to the physical theory continuous developments and continuous alterations; therefore, it can happen that the position thanks to which the trihedron of reference assures to the physical theory its simplest and most satisfactory form is not always the same one; at a certain time, it can be useful, in view of the perfection of the theory, to substitute to the trihedron of reference admitted until then a new trihedron in relation to which the theoretical bodies move in a different way.

Thus, like all the assumptions on which physical theory is based, the determination of the reference trihedron is always *approximate* and always *provisional*.

The considerations we have just exposed are all that the physicist is entitled to assert about the problem we are dealing with; the use of physical theory requires nothing more and teaches nothing more. But an irresistible tendency urges us to go further, to go beyond our role of physicist and, consequently, to do Metaphysics.

The object of physical theory is to provide a mathematical representation of observable facts; from this point of view, it would seem that the relative motions of theoretical bodies are the only interesting ones to consider, since only they are likely to represent the relative motions of concrete bodies, which are themselves the only motions that observation can capture.

278] Now, it happens this way: If we wanted the postulates of the theory to relate exclusively and directly to these relative motions of the theoretical bodies, we would have to construct an extremely complicated and unsatisfactory theory. In order to bring the physical theory to the highest degree of simplicity, we are forced to make our postulates concern the motions of the concrete bodies in relation to a privileged reference trihedron, which is a pure geometrical figure and which does not represent any concrete body.

The *privileged motion* of each theoretical body, i.e. the motion related to the privileged trihedron, appears to us then as the essential and first element of the theoretical construction; the relative motion of the various theoretical bodies, although it is the object in view of which the theory is constructed, appears only now as a consequence, as the result of the privileged motions of these same theoretical bodies.

Therefore, just as we are led to consider the relative movements of the various theoretical bodies as not being, *in physical theory,* something primary and irreducible, but as being a secondary effect, a result of the privileged movement of each of these bodies, so we are led to admit that the relative movements of the concrete bodies are not, *in reality,* something primordial, that they represent something derived and that they are the consequence of the *absolute movement* of each of the concrete bodies.

The absolute motion of a concrete body, whose real existence is thus postulated, is not a certain relative motion of this body with respect to another concrete body; it cannot therefore be observed by any conceivable experiment. It cannot be geometrically represented by the procedures of Kinematics; so that the privileged motion of a theoretical body must not be considered as the geometric representation of the absolute motion of the concrete body to which this theoretical body corresponds. At most, it is legitimate to admit that the privileged motion of the theoretical body is an *index of* the absolute motion of the concrete body, so that to two identical privileged motions [279] correspond two identical absolute motions, and to two different privileged motions correspond two different absolute motions.

Experience and theory thus urge us to affirm the existence of absolute motions; they provide us with a sensible way of saying whether two absolute motions are or are not different; but their power stops there; absolute motion is something equally elusive to experience and to geometrical figuration; The physicist can in no way speculate on the nature of this movement; he must, on this subject, leave it to the metaphysician; he alone will be able to try to scrutinize the essence of this *forma fluens* which baffles both the observer and the geometer, and passes their means of knowledge.

These few remarks seem to us to be the summary and the culmination of what modern thinkers and, in particular, Kant and M. Carl Neumann, have written about place and motion. Among the conclusions which have just been formulated, there are two which seem to us particularly worthy of attention.

The first is this: The reference trihedron to which the physical theory relates all the movements it deals with, a trihedron which is identical to Kant's absolute space or to Mr. Carl Neumann's Alpha body, is a pure concept, a pure geometrical figure; neither exactly nor approximately is it required that this trihedron finds its representation in concrete nature.

The second essential conclusion is this: The physical theory leads us to the threshold of a metaphysical assertion that it is almost impossible for us not to formulate: Relative movements, the only ones that can be experimentally observed in concrete nature, the only ones accessible to the representations of Kinematics, are not primary and irreducible things; they are the results, the consequences of absolute movements, transcending all observation and all geometrical representation.

Now, these two propositions, which so many philosophical schools have ignored, we have already encountered, in the last [280] centuries of Hellenic thought, in the doctrine of Damascius and Simplicius; later, in our fourteenth western century, they were found by John of Duns Scotus, by William of Occam, by John Buridan, by Albert of Saxony and by their disciples.

Philosophical problems, as has often been noticed, remain eternally posed; the solutions which the human mind proposes in order to solve one of these problems belong, in general, to a small number of types, and these various solutions are, in turn, put back in favor to be abandoned again, as if a periodic ebb and flow brought each of them closer to, then further away from, the human understanding.

This general law which presides over the development of Philosophy, is particularly clear when we follow the history of theories relating to place and local motion. These theories can be reduced to a small number of really distinct doctrines. The Greek genius had already formulated them all. The Islamic or Christian Middle Ages found them again. Modern science has exposed and discussed them a third time.

But when a philosophical theory, once in vogue, is revived after centuries of neglect, the form in which it emerges is not absolutely identical to that in which it was clothed at the moment when oblivion had swallowed it up; it reappears clearer, more precise, richer in content, in a word more perfect.

Indeed, while the human mind was disinterested in this theory, it was unconsciously working to perfect it, and this by the very progress it was making in other directions. The development of doctrines apparently different from this one has brought to light facts hitherto unknown, has dispelled prejudices, has shown the obscurity of false evidence, has revealed unsuspected points of view. When the theory inaugurates its second period of life, it finds itself in an intellectual environment which it had not known in its first phase; it draws from it food suitable for a new growth, for a more ample development.

When the theory of Damascius and Simplicius reappeared [281] in the writings of Duns Scotus, John Buridan and their followers, the astronomical system of Ptolemy, in triumphing over the system of the homocentric spheres, ruined certain essential assertions of Aristotle and the Peripatetians; Other assertions, formulated by the Stagirite or his Commentator, were contradicted by the Christian orthodoxy and were condemned by the doctors of Sorbonne; the discussions of the astronomers as well as the condemnations carried by Étienne Tempier contributed, for a great part, to specify and to strengthen the theory of the place and the movement.

This theory, supported by the Scotists and the Terminalists, has arisen a third time, thanks to the meditations of Kant and the modern mechanics. The centuries during which it slept have worked for its progress, because they have constituted a new Dynamics, a new Astronomy; also the thoughts formerly conceived by the Subtle Doctor or by the *Venerabilis inceptor* of the Terminalist School are now drawn with an extreme precision that the use of the mathematical language assures them, at the same time that the physical theory, finally constituted, discovers all the richness of their content.

The history of the theory of place thus highlights once again the law that has so often governed the movement of doctrines. It seems that this movement results from two other simpler movements. The first and most apparent one consists in an indefinite series of oscillations by which Philosophy seems perpetually tossed between opposite solutions, without being able to attach itself firmly to any of them. The second, less easily recognizable, reveals itself only to attentive and prolonged observation; this one is a very slow march, but one which always continues in the same direction; in spite of the alternatives by which each system seems periodically to rise, then to fall, to rise again and fall again, this march assures the continual progress of human wisdom.

1. Aristotle: Perˆ OÙranoà tÕ B, g (*De Caelo et Mundo* l. II, c. III). [↑](#footnote-ref-2)
2. Aristotle: Perˆ OÙranoà tÕ A, h (*De Caelo et Mundo* l. I, c. VIII). [↑](#footnote-ref-3)
3. Simplicii philosophi acutissimi *Commentaria in quatuor libros de Caelo Aristotelis*, noviter fere de integro interpretata, ac cum fidissimis codicibu graecis recens collata ; Venetiis, apud Hieronymum Scotum, MDLIII, In lib. II comm. 11, p. 138. [↑](#footnote-ref-4)
4. Themistii Peripatetici lucidissimi *Paraphrasis in libros Aristotelis de Caelo nunc primum in lucem edita*, Moyse Alatino Hebraeo Spoletino medico ac philosopho interprete. Ad Aloysium Estensem Card. amplissimum. Cum privilegio. Venetiis, apud Simonem Calignanum de Kalera, MDLXXIII. [↑](#footnote-ref-5)
5. Themistius: *Op. cit.* l. II, fol. 27, recto. [↑](#footnote-ref-6)
6. Aristotle, FusikÁj ¡kro£ewj tÕ D, d, *Physicae auscultationis* l. IV, c. IV. [↑](#footnote-ref-7)
7. Descartes: *The Principles of Philosophy*, Part II, art. 25. [↑](#footnote-ref-8)
8. Simplicii philosophi perspicacissimi *Clarissima commentaria in octo libros Arist. de Physico Auditu*, nuper quam emendatissimis exemplaribus, innumeris locis pene locis integritati restituta, et ab innumeris erroribus diligentissime castigata. Omnium denique scitu dingorum, quae in eis desiderantur, et nunc in margine a nobis accurate describi curavimus ad optatum omnium studiosorum commodum. Index copiosissimus additus est. Venetiis, apud Hieronymum Scotum. MDLXXVI. L. IV, c. IV, comm. 47, p. 210, and c. V, comm. 53, p. 220. [↑](#footnote-ref-9)
9. Simplicii, *Commentaria in octo libros Aristotelis de Physico Auditu*; Venetiis, MDLXXVI, L. IV, c. IV, comm. 48, p. 211. [↑](#footnote-ref-10)
10. Aristotle: Perˆ OÙranoà tÕ A, q (*De Caelo et Mundo* l. I, c. IX). [↑](#footnote-ref-11)
11. Aristotle, FusikÁj ¡kro£ewj tÕ D, e, *Physicae auscultationis* l. IV, c. V. [↑](#footnote-ref-12)
12. Simplicii, *Commentaria in octo libros Aristotelis de Physico Auditu*; Venetiis, MDLXXVI, L. IV, c. V, comm. 50, p. 212-213. [↑](#footnote-ref-13)
13. Simplicii, *Commentaria in octo libros Aristotelis de Physico Auditu*; Venetiis, MDLXXVI, L. IV, c. V, comm. 51, p. 214. [↑](#footnote-ref-14)
14. Simplicii, *Commentaria in octo libros Aristotelis de Physico Auditu*; Venetiis, MDLXXVI, L. IV, c. V, comm. 51, p. 214-215. [↑](#footnote-ref-15)
15. Themistii Peripatetici lucidissimi *Paraphrasis in Aristotelis Posteriora et Physica. In libros item de Anima, Memoria et Reminiscentia, Somno et Vigilia, Insomniis, et Divinatione per somnum*. Hermolao Barbaro Patricio Veneto interprete. Additis lucubrationibus, quae Themistii obscuriora quaedam loca apertissima reddunt. Additoque indice, necnon contradictionibus et solutionibus Marci Antonii Zimarae in dictis eiusdem Themistii, quae omnia a studiosis desiderantur. Venetiis apud Hiernymum Scotum, 1542. [↑](#footnote-ref-16)
16. Themistii *Paraphrasis in Aristotelis Physica*; Venetiis, 1542. L. IV, art. 45 and 46, pp. 130-131. [↑](#footnote-ref-17)
17. Gap. [↑](#footnote-ref-18)
18. Simplicii, *Commentaria in octo libros Aristotelis de Physico Auditu*; Venetiis, MDLXXVI, L. IV, c. V, p. 218 and p. 224. [↑](#footnote-ref-19)
19. Joannis Grammatici cognomento Philoponi *eruditissima commentaria in primos quatuor Aristotelis de naturali auscultatione libros*. Nunc primum e Graeco in Latinum fideliter translata. Guilelme Dorotheo Veneto Theologo Interprete. Cautum est Privilegio Senati Veneti, ne quis hunc Librum intra decennium imprimat vendet ve. Venetiis, MDXXXXII. Colophon: impressum Venetiis per Brandinum et Octavainum Scotum. MDXXXXI. L. IV, digressio, foll. 11 recto - 15 verso. [↑](#footnote-ref-20)
20. John Philopon, *loc. cit.* fol. 12, col. b. [↑](#footnote-ref-21)
21. Simplicii, *Commentaria in octo libros Aristotelis de Physico Auditu*; Venetiis, MDLXXVI, L. IV, c. V, p. 220. [↑](#footnote-ref-22)
22. John Philopon, *loc. cit.* fol. 12, col. c. [↑](#footnote-ref-23)
23. John Philopon, *loc. cit.* fol. 12, col. d. [↑](#footnote-ref-24)
24. John Philopon, *loc. cit.* fol. 12, col. c. [↑](#footnote-ref-25)
25. Simplicii, *Commentaria in octo libros Aristotelis de Physico Auditu*; Venetiis, MDLXXVI, L. IV, c. V, p. 213. [↑](#footnote-ref-26)
26. John Philopon, *loc. cit.* fol. 13, col. a. [↑](#footnote-ref-27)
27. John Philopon, *loc. cit.* fol. 13, coll. A and b, fol. 14, coll. c and d. [↑](#footnote-ref-28)
28. John Philopon, *loc. cit.* fol. 13, col. b. [↑](#footnote-ref-29)
29. John Philopon, *loc. cit.* fol. 14, col. d. [↑](#footnote-ref-30)
30. John Philopon, *loc. cit.* fol. 15, col. b and c. [↑](#footnote-ref-31)
31. John Philopon, *loc. cit.* fol. 14, col. d. [↑](#footnote-ref-32)
32. John Philopon, *loc. cit.* fol. 15, col. a and b. [↑](#footnote-ref-33)
33. Simplicii, *Commentaria in octo libros Aristotelis de Physico Auditu*; Venetiis, MDLXXVI, L. IV, c. V, p. 224. [↑](#footnote-ref-34)
34. Simplicius, *loc. cit.* , p. 221-222. [↑](#footnote-ref-35)
35. Simplicii, *Commentaria in octo libros Aristotelis de Physico Auditu*; Venetiis, MDLXXVI, L. IV, c. V, p. 226-234. [↑](#footnote-ref-36)
36. Simplicius, *loc. cit.* , p. 227. - For the Greek text, see : Simplicii *Commentarie in octo Aristotelis Physicae auscultationis libros cum ipso Aristotelis textu*. In fine: Venetiis, in aedibus Aldi, et Andreae Asulani Soceri Mensae (*sic*), Octobri MDXXCI, fol. 146, verso. [↑](#footnote-ref-37)
37. Simplicius, *loc. cit.* , p. 227. [↑](#footnote-ref-38)
38. Simplicius, *loc. cit.* , p. 228-230. [↑](#footnote-ref-39)
39. Simplicius, *loc. cit.* , p. 229. - For the Greek text, see : Simplicii *Commentarii in octo Aristotelis Physicae auscultationis libros cum ipso Aristotelis textu*. Venetiis, MDXXCI, fol. 148, recto. [↑](#footnote-ref-40)
40. SIMPLICIUS, *ibid*. [↑](#footnote-ref-41)
41. CARRA DE VAUX : *Avicenne*, Paris, 1900, p. 85. [↑](#footnote-ref-42)
42. CARRA DE VAUX, *loc. cit.* , p. 191. [↑](#footnote-ref-43)
43. AVERROIS CORDUBENSIS *Commentaria magna in octo libros Aristotelis de physico auditu*; l. IV; summa prima : De loco; c. IX; comm. 45. [↑](#footnote-ref-44)
44. AVERROES, *Op. cit*, l. IV; summa prima, c. IX, comm. 43. [↑](#footnote-ref-45)
45. AVERROIS CORDUBENSIS *Commentaria magna in octo libros Aristotelis de physico auditu*; l. IV, summa prima, c. VIII, comm. 41. [↑](#footnote-ref-46)
46. AVERROIS CORDUBENSIS *Commentaria magna in octo libros Aristotelis de physico auditu*; l. IV, summa prima, c. IX, comm. 43. - AVERROIS CORDUBENSIS *Commentarii in quatuor libros Aristotelis de Caelo et Mundo* ; l. II, summa secunda, quaesitum II, comm. 17. [↑](#footnote-ref-47)
47. AVERROIS CORDUBENSIS *Commentarii in quatuor libros Aristotelis de Caelo et Mundo*; l. II, summa secunda, quaesitum II, comm. 17. [↑](#footnote-ref-48)
48. AVERROIS CORDUBENSIS *Commentarii in quatuor libros Aristotelis de Caelo et Mundo*; l. II, summa secunda, quaesitum V, comm. 35. [↑](#footnote-ref-49)
49. AVERROIS CORDUBENSIS *Expositio in XII libros Metaphysicae Aristotelis*; l. XII, summa secunda, c. IV, comm. 45. [↑](#footnote-ref-50)
50. AVERROIS CORDUBENSIS *Commentaria magna in octo libros Aristotelis de physico auditu*; l. IV, summa prima, c. IX, comm. 43. [↑](#footnote-ref-51)
51. AVERROES, *Loc. cit*, comm. 43. [↑](#footnote-ref-52)
52. Under the title: *Liber de natura loci ex longitudine et latitudine ejusdem proveniente*, Albert the Great composed a pamphlet where we find nothing on the general theory of place and motion, but only interesting developments on the theory of natural place. [↑](#footnote-ref-53)
53. BEATI ALBERTI MAGNI, Ratisbonensis episcopi, Ordinis Praedicatorum, *Parva naturalia...* recognita per R. A. P. F. Petrum Lammy... Operum tomus quintus. Lugduni, MDCLI. *Liber de motibus progressivis* : Tractatus I : De modo motus progressivi ; cc. II, III and IV; p. 509-511. [↑](#footnote-ref-54)
54. BEATI ALBERTI MAGNI... *Parva naturalia...* Liber secundus de motibus animalium; Tractatus I: De ipsis motibus et proprietatibus ipsorum; c. III, p. 125. [↑](#footnote-ref-55)
55. In presenti volumine infrascripta invenies *opuscula* ARISTOTELIS cum expositionibus SANCTI THOME : ac PETRI DE ALVERNIA. Perquam diligenter visa recognita : erroribusque innumeris purgata.

    SANCTUS THOMAS *De sensu et sensato*. *De memoria et reminiscentia*. *De somno et vigilia*. Ultimo altissimi Proculi (Sic) *de causis cum* ejusdem SANCTI THOME *commentationibus*.

    PETRUS DE ALVERNIA *De motibus animalium*. *De longitudine et brevitate vite*. *De juventute et senectute*. *De respiratione et inspiratione*. *De morte et vita*.

    Egidius Romanus. *De bona fortuna*.

    Colophon :... Impressa vero Venetiis mandato sumptibusque Heredum nobilis viri domini Octaviani Scoti civis Modoetiensis, per Bonetum Locatellum presbyterum Bergomensem. Anno a partu virgineo Saluberrimo septimo supra millesimum quinquiesque centesimum quinto idus Novembris.

    *Expositio super Librum de motibus animalium* secundum PETRUM DE ALVERNIA. Lectio I, fol. 35, coll. b and c. [↑](#footnote-ref-56)
56. ALBERTI MAGNI, *De Caelo et Mundo*, 1iber secundus; tract. I; c. VIII: De causa finali propter quod caelorum motus oportet esse plures. [↑](#footnote-ref-57)
57. ALBERTI MAGNI *Physicorum* liber quartus; tract. I; cc. XI and XII. [↑](#footnote-ref-58)
58. ALBERTUS MAGNUS, *loc cit.* c. XIII. [↑](#footnote-ref-59)
59. We quote this work from : Aristotelis *Opera nonnulla* latine fecit Joannes Argyrophilus, Augustae Vindelicorum, Ambrosius Keller, 1479. The *Liber sex principiorum* Magistri Gilberti Porretani begins on fol. 39, verso, and ends on fol. 48, verso, of the first part of this work. [↑](#footnote-ref-60)
60. GILBERT DE LA PORRÉE, *Op*. *cit.* c. VII, fol. 44, verso. [↑](#footnote-ref-61)
61. The printed text says: *extremitas*, but the primitive text must have read: *extremum*, because all the adjectives and pronouns which relate to this word are in the neuter. [↑](#footnote-ref-62)
62. SANCTI THOMAE AQUINATIS, *Expositio in libros Aristotelis de Caelo et Mundo*; in lib. II, lectio IV. [↑](#footnote-ref-63)
63. SANCTI THOMAE AQUINATIS, *Expositio in libros physicorum Aristotelis expositio*; in lib. IV, lectio VII. [↑](#footnote-ref-64)
64. DIVI ROBERTI LINCONENSIS *Super octo libros physicorum brevis et utilis summa*; in lib. IV. - This sum is found at the end of the following work: *Emptor et lector Aveto*. DIVI THOME AQUINATIS *In libros physicorum Aristotelis interpretatio sum et expositio...* Colophon: Impressa in inclyta Venetiarum urbe per Bonetum Locatellum Bergomensem prebyterum mandato et sumptibus heredum nobili viri domini Octaviani Scoti civis Modoetiensis Anno a nativitate Domini quarto supra millesimum quinquiesque centesimum, sexto Idus Aprilis. [↑](#footnote-ref-65)
65. The text says: *naturaliter*; it should be read, I think: *materialiter*. [↑](#footnote-ref-66)
66. SANCTI THOMAE AQUINATIS, *Expositio in libros physicorum Aristotelis expositio*; in lib. IV, lectio VI. [↑](#footnote-ref-67)
67. See note 368. [↑](#footnote-ref-68)
68. See note 368. [↑](#footnote-ref-69)
69. SANCTI THOMAE AQUINATIS *Opuscula*; Opusc. LII : *De natura loci*. - Many opuscules attributed to Saint Thomas are apocryphal: it is quite possible that the opuscule *De natura loci*, whose doctrine differs from that which the Angelic Doctor maintains in other works, is not from him. [↑](#footnote-ref-70)
70. See note 368. [↑](#footnote-ref-71)
71. See note 368. [↑](#footnote-ref-72)
72. SANCTI THOMAE AQUINATIS, *Expositio in libros physicorum Aristotelis expositio*; in lib. V, lectio VI. [↑](#footnote-ref-73)
73. EGIDII ROMANI *In libros de physico auditu Aristotelis commentaria accuratissime emendata : et in marginibus ornata quotationibus textuum et comentorum, ac aliis quamplurimis annotationibus : cum tabula questionum in fine*. - Ejusdem *questio de gradibus formarum*. Colophon: Preclarissimi summique Egidii Romani De gradibus formarum tractatus Venetiis impressus mandato et expensis heredum nobilis viri domini Octaviani Scoti civis Modoetiensis per Bonetum Locatellum presbyterum. 12o kal. Octobr. 1502. In lib. IV lectio VII text. comm. 41, dubitatio 2, fol. 72, *recto*. [↑](#footnote-ref-74)
74. ÆGIDIUS ROMANUS, *Op*. *cit.* in lib. IV lectio VIII, text. comm. 36, dubitatio 2, fol. 73, *verso*. [↑](#footnote-ref-75)
75. ÆGIDIUS ROMANUS, *Op*. *cit.* in lib. IV lectio VII, text. comm. 41, dubitatio 2, fol. 72, *verso*. [↑](#footnote-ref-76)
76. ÆGIDIUS ROMANUS, *Op*. *cit.* in lib. IV lectio VIII, text. comm. 46, dubitatio 4, fol. 74, *recto*. [↑](#footnote-ref-77)
77. See note 368. [↑](#footnote-ref-78)
78. ÆGIDIUS ROMANUS, *Op*. *cit.* in lib. IV lectio VIII, text. comm. 46, dubitatio 4, fol. 74, *recto*. [↑](#footnote-ref-79)
79. R. P. DENIFLE et CHATELAIN, *Chartularium Universitatis Parisiensis*, tomus I (1200-1285); Paris, 1889. Room n° 473, March 7, 1277. [↑](#footnote-ref-80)
80. *Chartularium Universitatis Parisiensis*, tomus I, p. 546, error n°49. [↑](#footnote-ref-81)
81. R. P. F. JOANNIS DUNS SCOTI, DOCTORIS SUBTILIS, Ordinis Minorum, *Quaestiones Quodlibetales*; Operum tomus duodecimus; Lugduni, sumptibus Laurentii Durand, MDCXXXIX. Quaestio XI : Utrum Deus possit facere quod, manente corpore et loco, corpus non habent ubi, sive *esse* in loco ?, pp. 266-267. [↑](#footnote-ref-82)
82. J. DUNS SCOT, *loc. cit.* , p. 262. [↑](#footnote-ref-83)
83. On Gilbert de la Porrée, see: DE WULF, *Histoire de la Philosophie médiévale*, second edition, Leuven and Paris, 1905; pp. 204-207; CARL PRANTL, *Geschichte der Logik im Abendlande*, 2te Aufl., Leipzig, 1885, Bd. II, Ss 217-229. [↑](#footnote-ref-84)
84. GILBERTI PORRETANI PICTAVIENSIS, *Liber sex principiorum*, Cap. VII. This writing is printed with Aristotle's *Organon* in most ancient editions of the Latin translations of the *Organon*. See: PRANTL, *Op. cit.* p. 225, in note, and p. 226, in note. We quote it from the following edition: ARISTOTELIS *Opera nonnulla*, Augustae Vindelicorum, Ambrosius Keller, 1479. [↑](#footnote-ref-85)
85. R. P. F. JOANNIS DUNS SCOTI, DOCTORIS SUBTILIS, Ordinis Minorum, *Quaestiones in librum IV Sententiarum :* Operum tomus octavus ; Lugduni, sumptibus Laurentii Durand, MDCXXXIX. Dist. X, quaestio II : Utrum idem corpus possit esse localiter simul in diversis locis ? p. 513. [↑](#footnote-ref-86)
86. J. DUNS SCOT, *Op. cit.* dist. X, quaest. I. [↑](#footnote-ref-87)
87. J. DUNS SCOT, *Quaestiones Quodlibetales*: quaest. XI. Operum tomus XII, p. 266-267. [↑](#footnote-ref-88)
88. R. P. F. JOANNIS DUNS SCOTI, DOCTORIS SUBTILIS, Ordinis Minorum, *Quaestiones in librum II Sententiarum :* Operum tomi sexti pars prima ; Lugduni, sumptibus Laurentii Durand, MDCXXXIX. Dist. X, quaestio VI : An locus angeli sit determinatus , punctualis, maximus et minimus ? p. 193. [↑](#footnote-ref-89)
89. See note 368. [↑](#footnote-ref-90)
90. See note 368. [↑](#footnote-ref-91)
91. See note 368. [↑](#footnote-ref-92)
92. See note 368. [↑](#footnote-ref-93)
93. R. P. F. JOANNIS DUNS SCOTI, DOCTORIS SUBTILIS, Ordinis Minorum, *Quaestiones in librum IV Sententiarum :* Operum tomus octavus ; Lugduni, sumptibus Laurentii Durand, MDCXXXIX. Dist. X, quaestio I : Utrum possibile sit corpus Christi sub specie panis et vini realiter contineri ? p. 501. [↑](#footnote-ref-94)
94. See note 368. [↑](#footnote-ref-95)
95. J. DUNS SCOTI *Quaestiones quodlibetales* : quaest. XI. Operum tomus duodecimus, p. 263. [↑](#footnote-ref-96)
96. On this character, see: BULEUS: *Historia Universitatis Parisiensis*: Tomus IV, ab anno 1300 ad annum 1400, p. 185. - The information that Du Boulay gives on Jean le Chanoine is borrowed from the famous Franciscan writer Luc Wadding. [↑](#footnote-ref-97)
97. JOANNIS CANONICI *Quaestiones super VIII libros Physicorum Aristotelis*, Paduae (no publisher's name), 1475. - Venetiis, per Octavianum Scotum, 1481. - Venetiis, per Bonetum Locatellum et Octavianum Scotum, 1487. - (With Joannis Ganduae *Commenta in Libros Physicorum*, Vicentiae per Henricum Librarium, 1485. - Venetiis, per Bonetum Locatellum et haeredes Octaviani Scoti, 1492. - Venetiis, per Bonetum Locatellum et haeredes Octaviani Scoti, 1520. [↑](#footnote-ref-98)
98. JOANNIS CANONICI *Quaestiones super VIII libros Physicorum* : lib. VII, quaest. I. [↑](#footnote-ref-99)
99. The nickname *Anglicus* is given by the scholastics to several persons named Thomas: it is probably the Dominican Thomas de Walleis, a compatriot and contemporary of John Marbles. [↑](#footnote-ref-100)
100. AVERROIS CORDUBENSIS *In quatuor Aristotelis libros de Caelo et Mundo*; l. II, summa secunda, quaesitum I, comm. 14. [↑](#footnote-ref-101)
101. JOANNIS CANONICI *Quaestiones in VIII Physicorum Libros de Caelo et Mundo* : lib. IV, quaestt. I and II. [↑](#footnote-ref-102)
102. See note 368. [↑](#footnote-ref-103)
103. It should be noted, however, that in various passages, Gilles de Rome expresses himself, no doubt through negligence, as if the formal place were an attribute not of the container, but of the content. [↑](#footnote-ref-104)
104. JOANNIS CANONICI *Quaestiones in VIII Physicorum Libros de Caelo et Mundo* : lib. IV, quaest. I. [↑](#footnote-ref-105)
105. JOANNIS CANONICI *Quaestiones in VIII Physicorum Libros de Caelo et Mundo* : lib. IV, quaest. II. [↑](#footnote-ref-106)
106. JOANNIS CANONICI *Quaestiones in VIII Physicorum Libros de Caelo et Mundo* : lib. IV, quaest. I. [↑](#footnote-ref-107)
107. JOANNIS CANONICI *Quaestiones in VIII Physicorum Libros de Caelo et Mundo* : lib. IV, quaest. II. [↑](#footnote-ref-108)
108. JOANNIS CANONICI *Quaestiones in VIII Physicorum Libros de Caelo et Mundo* : lib. IV, quaest. I. [↑](#footnote-ref-109)
109. VENERABILIS INCEPTORIS FRATRIS GULIELMI DE VILLA HOCHAM ANGLIE : Achademie Nominalium principis *Summule in lib. Physicorum adsunt*. Cum gratia ut patet in suis privilegiis. Laus Deo optimo maximoque. - Colophon : Expliciunt auree summule in lib. Physicorum Francisci Guilielmi de villa Occham Anglie : Academie Nominalium principis : sacrarum litterarum professoris : ex ordine minorum : correcte vigili studio ac labore Patris Fratris Augustini de Filizano ordinis Sancti Augustini sacre theologie professoris. Impresseque Venitiis per Lazarum de Soardis. Anno 1506. Die 17 augusti. Cum privilegio. [↑](#footnote-ref-110)
110. R. F. JOANNIS DUNS SCOTI, DOCTORIS SUBTILIS, *Quaestiones in lib. II Sententiarum :* distinct. II, quaest. 9. Operum tomi sexti pars prima, pp. 256-257. [↑](#footnote-ref-111)
111. GULIELMI DE OCCAM *Tractatus de Sacramento Altaris*, Capp. I, II and IV. - *Quodlibeta*, Quodlib. I, quaest. 9. - *Logica*, Cap. de Quantitate, etc. [↑](#footnote-ref-112)
112. GULIELMI DE OCCAM *Summulae in libros Physicorum* : lib. IV, capp. XX and XXI. [↑](#footnote-ref-113)
113. GULIELMI DE OCCAM *Summulae in libros Physicorum* : lib. IV, capp. XXII. [↑](#footnote-ref-114)
114. GULIELMI DE OCCAM, *loc. cit.* [↑](#footnote-ref-115)
115. Cf. Pierre Duhem, *Léonard de Vinci et les deux infinis* (*Études sur Léonard de Vinci, ceux qu'il a lu et ceux qui l'ont lu*; 2° série, IX, pp. 39-42). - Leonardo da Vinci and the plurality of worlds (Ibid., X, pp. 75-78.) [↑](#footnote-ref-116)
116. BURLEUS *Super octo libros Physicorum*, Colophon: Et in hoc finit expositio excellentissimi philosophi Gualteri de Burley Anglici in libros octo de physico auditu Aristo. Stragerite (*sic*) emendata diligentissime. Impressa arte et diligentia Boneti Locatelli Bergomensis, sumptibus vero et expensis nobilis viri Octaviani Modoetiensis. Et humato Jesu ejusque genitrici Virgini Marie sint gratie infinite. Venetiis, anno Salutis nonagesimo primo supra millesimum et quadringentesimum, quarto nonas Decembris. - The leaves do not carry any pagination, although the *tabula dubiorum* indicates one; the theory of the place forms the *Tractatus primus quarti libri* whose seven chapters occupy folios 76, *verso*, to 95, *recto*. [↑](#footnote-ref-117)
117. BURLEUS *Super octo libros Physicorum*, lib. IV, tract. I, cap. V, foll. 86, *verso*, and 87, *recto*. [↑](#footnote-ref-118)
118. WALTER BURLEY, *loc. cit.* fol. 87, col. d. [↑](#footnote-ref-119)
119. WALTER BURLEY, *loc. cit.* fol. 87, *verso*, and fol. 89, col. a. [↑](#footnote-ref-120)
120. This proposal is not correct; Burley should have assumed that the overall motion of the Universe is north or south. [↑](#footnote-ref-121)
121. WALTER BURLEY, *loc. cit.* fol. 87, col. c, and fol. 89, col. a. [↑](#footnote-ref-122)
122. WALTER BURLEY, *loc. cit.* fol. 88, col. a. [↑](#footnote-ref-123)
123. WALTER BURLEY, *loc. cit.* fol. 89, *recto*. [↑](#footnote-ref-124)
124. WALTER BURLEY, *loc. cit.* fol. 89, col. b and c. [↑](#footnote-ref-125)
125. WALTER BURLEY, *loc. cit.* fol. 88, col. d. [↑](#footnote-ref-126)
126. See note 368. [↑](#footnote-ref-127)
127. WALTER BURLEY, *loc. cit.* fol. 89, col. c. [↑](#footnote-ref-128)
128. BURLEUS *Super octo libros Physicorum*, lib. I, tract. I, cap. VI, fol. 91, col. b. [↑](#footnote-ref-129)
129. BURLEUS *Super octo libros Physicorum*, lib. IV, tract. I, cap. V, fol. 89, col. d. [↑](#footnote-ref-130)
130. BURLEUS *Super octo libros Physicorum*, lib. IV, tract. I, cap. VI, fol. 91, col. b. [↑](#footnote-ref-131)
131. WALTER BURLEY, *loc. cit.* fol. 91, col. d. [↑](#footnote-ref-132)
132. WALTER BURLEY, *loc. cit.* fol. 78, col. c. [↑](#footnote-ref-133)
133. JOANNIS DE JANDUNO *In libros Aristotelis de Caelo et Mundo quaestiones subtilissimae* ; in librum I quaestio XXIV : An sit possibile esse plures mundos ? [↑](#footnote-ref-134)
134. JOANNIS DE JANDUNO *Super octo libros Aristotelis de physico auditu acutissimae quaestiones* ; super lib. IV quaest. VI : An locus sit immobilis ? [↑](#footnote-ref-135)
135. JOANNIS DE JANDUNO *In libros Aristotelis de Caelo et Mundo quaestiones subtilissimmae* ; in lib. II quaest. VI : An Terra propter Caeli motum necessaria sit ? [↑](#footnote-ref-136)
136. R. P. DENIFLE et CHATELAIN, *Chartularium Universitatis Parisiensis*, tomus II, sectio prior (1286-1350), Paris, 1891, p. 103. [↑](#footnote-ref-137)
137. DENIFLE and CHATELAIN, *Ibid*, p. 186. [↑](#footnote-ref-138)
138. DENIFLE and CHATELAIN, *Ibid*, p. 303. [↑](#footnote-ref-139)
139. E. RENAN, *Averroès et 1'Averroïsme, essai historique*; Paris, 1852; p. 269. [↑](#footnote-ref-140)
140. DENIFLE et CHATELAIN, *Chartularium Universitatis Parisiensis*, tomus II, sectio prior, p. 154. [↑](#footnote-ref-141)
141. JOANNIS DE JANDUNO *Quaestiones super octo libros Aristotelis de physico auditu* ; in lib. IV quest. IV : An locus sit ultimum continentis ? [↑](#footnote-ref-142)
142. JEAN DE JANDUN, *Op. Cit.* in lib. IV quaest. V : Locus in quonam genere sit ? [↑](#footnote-ref-143)
143. JEAN DE JANDUN, *Op. Cit.* in lib. IV quaest. VI : An locus sit immobilis ? [↑](#footnote-ref-144)
144. JEAN DE JANDUN, *Op. Cit.* in lib. IV quaest. IX : An ultima sphaera si in loco ? [↑](#footnote-ref-145)
145. JOANNIS DE JANDUNO *Quaestiones super parvis naturalibus* ; *quaestiones de motibus animalium* : quaest. V : Num in motu progressivo ipsius animalis requiratur extra ipsum aliquod fixum ? - Quaest. VI : Num Caelum in motu suo indigeat aliquo corpore quiescente ? - Quaest. X: Utrum inanimata requirant aliquod fixum in motu locali ? [↑](#footnote-ref-146)
146. JOANNIS DE JANDUNO *Quaestiones in octo libros Aristotelis de physica auscultatione*; in lib. IV, quaest. IX : Utrum ultima sphaera sit in loco ? - *Quaestiones in libros de Caelo et Mundo* ; in lib. II, quaest. VI : An Terra propter Caeli motum necessaria sit ? [↑](#footnote-ref-147)
147. JOANNIS DE JANDUNO *Quaestiones de motibus animalium*, quaest. X : Utrum inanimata requirant aliquod fixum in motu locali ? [↑](#footnote-ref-148)
148. JOANNIS DE JANDUNO *Quaestiones de motibus animalium*, quaest. X : Num Caelum in motu suo indigeat aliquo corpore quiescente ? [↑](#footnote-ref-149)
149. JOANNIS DE JANDUNO *Quaestiones de motibus animalium*, quaest. VII : Utrum fixio Caeli sit causaliter ex fixione Terrae ? [↑](#footnote-ref-150)
150. BURLEUS *Super octo libros Physicorum*, lib. IV, tract. I, cap. VI, fol. 92, col. d. [↑](#footnote-ref-151)
151. JEAN DE JANDUN, *loc*. *cit*. [↑](#footnote-ref-152)
152. JEAN DE JANDUN, *loc*. *cit*. and *Quaestiones in libros de physica auscultatione*; in lib. IV quaest. IX. [↑](#footnote-ref-153)
153. ARISTOTE, Metewrologikwn tÕ A, b, (lib. I, cap. II). [↑](#footnote-ref-154)
154. JOANNIS DE JANDUNO *Quaestiones in libros de Caelo* ; in lib. II quaest. IV : An Terra propter Caeli motum necessaria sit ? [↑](#footnote-ref-155)
155. JOANNIS DE JANDUNO *Quaestiones in libros de physica auscultatione*; in lib. IV quaest. IX : An ultima sphaera sit in loco ? [↑](#footnote-ref-156)
156. JOANNIS DE JANDUNO *Quaestiones de motibus animalium* : quaest. VI : Num Caelum in motu suo indigeat aliquo corpore quiescente. [↑](#footnote-ref-157)
157. JOANNIS DE JANDUNO *Quaestiones de motibus animalium*; quaest. IX : Utrum Caeli motor sit majoris virtutis in movendo, quam Terra in quiescendo ? [↑](#footnote-ref-158)
158. *Acutissimae quaestiones super libros de physica auscultatione ab* ALBERTO DE SAXONIA *editae* : in lib. IV quaest. I : Utrum locus sit superficies ? [↑](#footnote-ref-159)
159. ALBERTI DE SAXONIA *Quaestiones super libros de physica auscultatione* : in lib. I quaest VI : Utrum omnis res extensa sit quantitas ? [↑](#footnote-ref-160)
160. *Tractatus de figuratione potentiarum et mensurarum difformitatum*. In fine : Explicit *tractatus* Magistri NICHOLAI ORESME *de uniformitate et difformitate intensionum* (Bibliothèque nationale, fonds latin, Ms. n° 7371. Fol. 214, recto, to fol. 266, recto.) [↑](#footnote-ref-161)
161. NICOLE ORESME, *Op*. *cit.* tertiae partis capp. IV and XII; foll. 261, recto, and 265, verso. [↑](#footnote-ref-162)
162. ALBERTI DE SAXONIA *Quaestiones super libros de physica auscultatione*; in lib. IV quaest. I. [↑](#footnote-ref-163)
163. ALBERTI DE SAXONIA *Quaestiones super libros de physica auscultatione*; in lib. IV quaest. II : Utrum locus sit equalis locato ? [↑](#footnote-ref-164)
164. ALBERTI DE SAXONIA *Quaestiones super libros de physica auscultatione*; in lib. IV quaest. IV : Utrum diffinitio loci sit bona, in qua dicitur : locus est terminus corporis continentis immobile primum ? [↑](#footnote-ref-165)
165. ALBERTI DE SAXONIA *Quaestiones super libros de physica auscultatione*; in lib. IV quaest. III : Utrum locus sit immobilis ? [↑](#footnote-ref-166)
166. ALBERTI DE SAXONIA *Quaestiones super libros de physica auscultatione*; in lib. IV quaest. VII : Utrum omne ens sit in loco ? [↑](#footnote-ref-167)
167. *Quaestiones subtilissimae* ALBERTI DE SAXONIA *in libros de Caelo et Mundo* ; in lib. I quaest. I : Utrum cuilibet corpori simplici insit naturaliter tantum unus motus simplex ? [↑](#footnote-ref-168)
168. ALBENTI DE SAXONIA *Quaestiones super libros de physica auscultatione*; in 1ib. IV quest. VII. [↑](#footnote-ref-169)
169. *Logica* ALBERTUCII. *Perutilis logica* excellentissimi sacre theologie professoris magistri ALBERTI DE SAXONIA ordinis eremitarum Divi Augustini : per reverendum sacre pagine doctorem magistrum Petrum Aurelium Sanutum Venetum ejusdem ordinis professum : quam diligentissime castigata : nuperrimeque impressa. - Colophon: Explicit perutilis logica... impressa Venetiis ere et sollertia Heredum Domini Octaviani Scoti civis Modoetiensis et sociorum. Anno a Christi ortu MDXXII. Die XXII mensis Augusti. Tractatus primi cap. XXV: De predicamento quando et aliis sex predicamentis; fol. 10, col. d. [↑](#footnote-ref-170)
170. ALBERTI DE SAXONIA *Quaestiones super libros de physica auscultatione*; in lib. IV quaest. VIII. [↑](#footnote-ref-171)
171. ALBERTI DE SAXONIA *Quaestiones super libros de physica auscultatione*; in lib. IV quaest. VII. - *Quaestiones in libros de Caelo et Mundo* ; in lib. I quaest. I ; in lib. II quaest. VIII : Utrum omne caelum sit mobile ? [↑](#footnote-ref-172)
172. ALBERTI DE SAXONIA *Quaestiones super libros de physica auscultatione*; in lib. IV quaest. VII. [↑](#footnote-ref-173)
173. ALBERT DE SAXE, *loc. cit.* [↑](#footnote-ref-174)
174. ALBERTI DE SAXONIA *Quaestiones in libros de Caelo et Mundo* ; in lib. II quaest. X : Utrum illa consequentia sit bona : caelum movetur, ergo necesse est Terram quiescere ? [↑](#footnote-ref-175)
175. ALBERTI DE SAXONIA *Quaestiones in libros de Caelo et Mundo* ; in lib. IV quaest. X; cf. *ibid.* quaest. VII. [↑](#footnote-ref-176)
176. ALBERTI DE SAXONIA *Quaestiones in libros de Caelo et Mundo* ; in lib. IV quaest. X. [↑](#footnote-ref-177)
177. Celebratissimi Patris Domini BONAVENTURAE, DOCTORIS SERAPHICI, Ordinis minorum, *In secundum librum Sententiarum disputata*; Secunda pars; libri secundi distinctionis XIV pars quarta; quaestio III: Utrum conveniat alicui orbi moveri abque stellis? [↑](#footnote-ref-178)
178. This writing bears the title: *Opus* CAMPANI *de modo adaequandi planetas, sive de quantitatibus motuum caelestium orbiumque proportionibus, centrorumque distantiis, ipsorumque corporum magnitudinibus*, in ms. n°7298 of the Latin collection of the National Library; in n° 7401 of the same collection, it is simply designated by these words: *Theorica planetarum* CAMPANI. The passage which interests us at the moment is in the second chapter after the *Prooemium*. [↑](#footnote-ref-179)
179. J. DUNS SCOTI *Quaestiones quodlibetales*; quaest. XI. [↑](#footnote-ref-180)
180. JOANNIS CANONICI *Quaestiones super VIII libros Aristotelis de physica auscultatione*; in lib. IV quaest. II. [↑](#footnote-ref-181)
181. ALBERTI DE SAXONIA *Quaestiones in libros de Caelo et Mundo* ; in lib. II quaest VIII. [↑](#footnote-ref-182)
182. *Incipiunt subtiles doctrinaque plene Abbreviationes libri Phisicorum* edite a prestantissimo philosopho MARSILIO INGHEN doctore Parisiensi (This work bears no typographical indication; in his *Repertorium bibliographicum*, Hain classifies it among the incunabula. The leaves are not paginated). [↑](#footnote-ref-183)
183. MARSILE D'INGHEN, *Op*. *cit.* fol. signed b, col. d. [↑](#footnote-ref-184)
184. *Quaestiones subtilissimae* JOANNIS MARCILII INGHEN *super octo libros Physicorum secundum nominalium viam*, cum tabula in fine libri posita ; suum in lucem primum sortiuntur effectum. - Colophon: Expliciunt quaestiones super octo libros Physicorum magistri Johannis Marcilii Inguen secundum nominalium viam. Impressae Lugduni per honestum virum Johannem Marion. Anno Domini MCCCCCXVIII, die vero XVI mensis Julii Deo gratias.

     In the seventeenth century, when they had already been printed for nearly a century, these *Questions,* which all accounts attributed to Marsilio of Inghen, were suddenly attributed to Duns Scotus in the following writing: JO. DUNS SCOTI, Doctoris Subtilis, *in VIII lib. Physicorum Aristotelis Quaestiones et Expositio*, in celeberrima et pervetusta Parisiensium Academia ab ipso Authore publice ex cathedra perlectae, nunc primum ex antiquissimo manuscripto exemplari abstersis omnibus mendis in lucem editae et accuratis annotationibus illustratae, a R. Adm. P. F. Francisco de Pitigianis Arretino, Ord. Minorum de Observantia provinciae Tusciae, olim Sereniss. Ferdinandi Gonzagae Mantuae et Montisferrati Ducis Theologo, Suaeq. Serenissima Dominationi ne ipsomet vivente dicatae. Venetiis, MDCXVII, apud Joannem Guerilium.

     The *Exposition* and the *Questions* are inserted in volume II of the *Opera omnia* of Duns Scotus, of which the eight volumes appeared in Lyon, with Laurent Durand, in 1639; they bear this title:

     R. P. F. JANNIS DUNS SCOTI, Doctoris Subtilis, Ordinis Minorum, *dilucidissima expositio et quaestiones in octo libros Physicorum Aristotelis*.

     But they are preceded by a *Censura*, due to the learned Fr. Luc Wadding, where it is proved that these *Questions* are not of Duns Scotus, that they are attached to the Nominalist School of Paris, and where Marsile d'Inghen is quoted as one of their probable authors. [↑](#footnote-ref-185)
185. MARCILII INGUEN *Abbreviationes libri Physicorum*, fol. signed *d 3*, coll. c and d. [↑](#footnote-ref-186)
186. JOHANNIS MARCILII INGUEN *Quaestiones super VIII libros Physicorum* : in lib. IV quaest. III : Utrum locus sit ultima superficies corporis continentis ? [↑](#footnote-ref-187)
187. MARSILE D'INGHEN, *Op*. *cit.* in lib. IV, quest. III. [↑](#footnote-ref-188)
188. MARSILE D'INGHEN, *Op*. *cit.* in lib. IV, quest. VII: Utrum omne ens sit in loco? [↑](#footnote-ref-189)
189. MARSILE D'INGHEN, *Op*. *cit.* in lib. IV, quest. VII. [↑](#footnote-ref-190)
190. We have consulted these *Questions* in the following text: *Questiones super tres primos libros Metheororum et super majorem partem quarti* a MAGISTRO JO. BURIDAN; National Library, Latin fund, ms. n° 14723 (Old fund Saint-Victor, ms. n° 712). [↑](#footnote-ref-191)
191. GEORGII DE BRUXELLA *Questiones in libros Metheororum*, in lib. I, quaest. XXI; ms. cit. fol. 202, col. b. [↑](#footnote-ref-192)
192. GEORGE DE BRUXELLES, *loc*. *cit.* fol. 204, col. a. [↑](#footnote-ref-193)
193. Reverendissimi Domini PETRI DE ALLIACO, Cardinalis et Episcopi Cameracensis, Doctorisque celebratissimi, *Quatuordecim quaestiones in Sphaeram Johannis de Sacro-Bosco* : quaest. II : Utrum sint praecise 9 sphaerae caelestes et non plures nec pauciores ? [↑](#footnote-ref-194)
194. *Cursus librorum philosophie naturalis venerabilis magistri* NICOLAI DE ORBELLIS, *ordinis minorum, secundum viam Doctoris Subtilis Scoti*. Colophon: Expliciunt libri Ethicorum Basilee impressi: Anno incarnationis domini MCCCCCIII. - This writing includes eight parts which carry the following titles: *Mathematica*; *Physica*; *De Celo et Mundo*; *De generatione et corruptione*; *Metheora*; *De Anima*; *Metaphysica*; *Ethica*. [↑](#footnote-ref-195)
195. NICOLAS DE ORBELLIS, *Op. Cit.* , *Physicorum* lib. IV, cap. I. [↑](#footnote-ref-196)
196. *Commentarii* Magistri PETRI TATARETI *in libros Philosophie naturalis et Metaphysicae Aristotelis* - PETRI TATARETI *clarissima singularisque totius Philosophie necnon Metaphysice Aristotelis expositio* - or again: *Commentationes* PETRI TATARETI *in in libros Aristotelis secundum Subtilissimi Doctoris Scoti sententiam*. According to Hain's *Repertorium bibliographicum*, seven editions of this manual existed before the year 1500; they continued to multiply during the first third of the 16th century. [↑](#footnote-ref-197)
197. *Commentarii* Magistri PETRI TATARETI *in libros Philosophie naturalis et Metaphysicae Aristotelis* : in lib. IV Physicorum quaestio prima. [↑](#footnote-ref-198)
198. PIERRE TATARET, *loc. cit.* quaest. I and quaest. III. [↑](#footnote-ref-199)
199. PIERRE TATARET, *loc. cit.* quaest. IV. [↑](#footnote-ref-200)
200. PIERRE TATARET, *loc. cit.* dub. primum. [↑](#footnote-ref-201)
201. PIERRE TATARET, *loc. cit.* dub. III. [↑](#footnote-ref-202)
202. Cf. Carl Prantl, *Geschichte der Logik im Abendlande*, Bd. IV, 1870; SS. 187-192. [↑](#footnote-ref-203)
203. CONRADI SUMMENHART *Commentaria in summam Physice Alberti Magni*. Colophon: Habes nunc candidissime lector Conradi Summenhard theologi eruditas commentationes in Albertum recognitas quam plenissime ex corrupto exemplari recognosci potuere. Que miro ingenio literis sunt excuse (*sic*) a solerti Henrico Gran calcographo in Hagenaw... Vale ex Hage. cursim anno 1507 septimo Kal. maias. [↑](#footnote-ref-204)
204. CONRAD SUMMENHARD, *Op. cit.* tractatus primi cap. X, prima difficultas. [↑](#footnote-ref-205)
205. CONRAD SUMMENHARD, *loc. cit.* tertia difficultas. [↑](#footnote-ref-206)
206. CONRAD SUMMENHARD, *Op. cit.* tract. V, cap. V. [↑](#footnote-ref-207)
207. A very erudite bookseller, Mr. Joseph Baer, of Frankfurt am Main (*Catalog* D, zweiter Teil, n°1109) assures that this indication given by Hain in his *Repertorium Bibliographicum*, is erroneous and that the first edition of the *Margarita philosophica* is the one whose colophon is thus written: Chalcographatum primiciali hac pressura Friburgi Joanne Schottum Argen. Citra festum Margarete anno gratiae MCCCCCIII. - Stnu nu-nhard having died two years before the publication of this edition, it would have to be concluded that the reference to the *Margarita philosophica* which we find in his *Commentaria* results from an interpolation; the form in which this mention is given is not, moreover, incompatible with this assumption. [↑](#footnote-ref-208)
208. GREGORII REISCHI *Margarita philosophica* : lib. II : De principiis logicis : tract. II : De praedicamentis ; Cap. XII : De ubi. [↑](#footnote-ref-209)
209. GRÉGOIRE REISCH, *Op. cit.* lib. VIII : De principiis rerum naturalium ; cap. XL : De loco et eius speciebus... [↑](#footnote-ref-210)
210. CARL PRANTL, *loc. cit.* , p. 190 [↑](#footnote-ref-211)
211. *Collecta et exercitata* FRIDERICI SUNCZEL MOSELLANI liberalium studiorum magistri *in octo libros Physicorum Aristotelis* : in almo studio Ingolstadiensi. Cum adjectione textus nove translationis Johannis Argiropoli Bizatii (*sic*) circa questiones. Colophon: Laus Deo : finiunt collecta et exercitata Friderici Sunczell...Impressa sub hemisperio Veneto Impensis Leonardi Alantse bibliopole Viennensis arte vero et ingenio Petri Liechtenstein Coloniensi anno MCVI die XXVIII mensis madii Maximiliano primo Romanorum rege faustissime imperante, etc. [↑](#footnote-ref-212)
212. FRÉDÉRIC SUNCZEL, *Op*. *cit*. in lib. IV quaest. II : Utrum locus sit terminus sive ultimum corporis continentis. [↑](#footnote-ref-213)
213. FRÉDÉRIC SUNCZEL, *Op*. *cit*. in lib. IV quaest. I : Utrum quilibet locus sit equalis suo locato. - Quaestio IV : Utrum diffinitio loci Aristotelis sit sufficiens. [↑](#footnote-ref-214)
214. FRÉDÉRIC SUNCZEL, *Op*. *cit*. in lib. IV quaest. III : Utrum locus sit immobilis. [↑](#footnote-ref-215)
215. FRÉDÉRIC SUNCZEL, *Op*. *cit*. in lib. IV quaest. VI : Utrum ultimus sphaera sit in loco. [↑](#footnote-ref-216)
216. ERNEST RENAN, *Averroès et l'Averoïsme : essai historique*, Paris, 1852, p. 258. [↑](#footnote-ref-217)
217. We quote the following editions: Venetiis (1475); - Venetiis (1476); - Mediolani (1476); -Without place indication (1477); - Venetiis (1491); - Padua (1493); - Venetiis (1502); - Venetiis (1504); - Parisiis (1512); - Parisiis (1513); Parisiis (1521). Cf. Hain, *Repertorium bibliographicum*, vol. II, nos. 12515, 12516 and 12523. - BARTHÉLEMY HAUREAU, Art. *Paul of Venice* of the *Dictionary of the Philosophical Sciences*. - HOUZEAU and LANCASTER, *Bibliographie générale de l'Astronomie*, tome I, Brussels, 1887, no 2271. Our quotations are taken from a 15th century manuscript. [↑](#footnote-ref-218)
218. PAULI VENETI *Summa totius philosophiae*; pars prima, cap. XIX. [↑](#footnote-ref-219)
219. PAUL OF VENICE, *Op. cit*, prima pars, cap. XXI. [↑](#footnote-ref-220)
220. PAUL OF VENICE, *loc. cit.* [↑](#footnote-ref-221)
221. PAULI VENETI *Summa totius philosophiae*; pars II, cap. XIV. [↑](#footnote-ref-222)
222. *Expositio* PAULI VENETI *super octo libros Phisicorum Aristotelis necnon super comento Averrois cum dubiis eiusdem*. Colophon : Explicit liber Phisicorum Aristotelis : expositum per me fratrem Paulum de Venetiis : artium liberalium et sacre theologie doctorem : ordinis fratrum heremitarum beatissimi Augustini. Anno Domini MCCCCIX, die ultima mensis Junii : pia festum celebratur commemorationis doctoris gentium et christianorum Apostoli Pauli. Impressum Venetiis per providum virum dominum Gregorium de Gregoriis. Anno nativitatis domini MCCCCXCIX, die XXIII, mensis Aprilis. - The *Expositio in octo Phisicorum Aristotelis libros* of PAULUS DE VENETIIS is preserved in a manuscript of the XVth century in the National Library (Latin fund n° 6530). Our quotations refer to the edition of 1499, the only one, we believe, which was given. [↑](#footnote-ref-223)
223. On the subject of the Averroism of Paul of Venice, cf. ERNEST RENAN, *Averroès et l'Averroïsme*, pp. 273-276. [↑](#footnote-ref-224)
224. PAULI VENETI *Expositio super libros Physicorum* : libri quarti tractatus primus, capituli tertii pars secunda, sextum notandum. [↑](#footnote-ref-225)
225. This interpretation of the meaning that should be given to the words *simple place*, *compound place*, does not at all accord with what the Author of the *Six Principles* says. [↑](#footnote-ref-226)
226. PAUL OF VENICE, *loc. cit.* septimum notandum. [↑](#footnote-ref-227)
227. PAULI VENETI *Expositio in libros Physicorum* : libri quarti tractatus primus, capituli tertii pars secunda, sub prima rub. : contra. [↑](#footnote-ref-228)
228. PAUL OF VENICE, *loc. cit.* sub secunda rub. contra. [↑](#footnote-ref-229)
229. As we have noted above, Paul of Venice lends Gilbert de la Porrée an opinion quite different from that which he professed. [↑](#footnote-ref-230)
230. PAUL OF VENICE, *loc. cit.* notandum sextum. [↑](#footnote-ref-231)
231. PAULI VENETI *Expositio in libros Physicorum* : libri quarti tractatus primus, capitulum quartum, notandum sextum. [↑](#footnote-ref-232)
232. PAUL OF VENICE, *loc. cit.* notandum quartum. [↑](#footnote-ref-233)
233. PAULI VENETI *Expositio in libros Physicorum* : libri sexti tractatus secundus, capituli tertii secunda pars, in fine. [↑](#footnote-ref-234)
234. PAUL OF VENICE, *loc. cit.* sub rub. quarto sequitur. [↑](#footnote-ref-235)
235. PAUL OF VENICE, *loc. cit.* [↑](#footnote-ref-236)
236. PAULI VENETI *Expositio in libros Physicorum* : libri quarti tractatus primus, capituli quarti notandum octavum. [↑](#footnote-ref-237)
237. PAULI VENETI *Expositio super libros Physicorum* : libri octavi tractatus quartus, capituli primi quarta propositio, notandum tertium. [↑](#footnote-ref-238)
238. ARISTOTELIS *De physico auditu libri octo cum* AVERROIS CORDUBENSIS *Commentariis* : lib. VII, comm. 76. [↑](#footnote-ref-239)
239. *Recollecte* GAIETANI *super octo libros physicorum cum annotationibus textuum*. Colophon: Impressum est hoc opus Venetiis per Bonetum Locatellum jussu et expensis nobilis viri domini Octaviani Scoti Modoetiensis Anno Salutis 14961 Nonis sextilibus Augustino Barbadico Serenissimo Venetairum Duce. Lib. IV, quaest. I, fol. 29. [↑](#footnote-ref-240)
240. GAETAN OF TINE, *Op*. *cit*. IV, fol. 28, col. d. [↑](#footnote-ref-241)
241. GAETAN OF TINE, *Op*. *cit*. IV, fol. 29, col. d. [↑](#footnote-ref-242)
242. GAETAN OF TINE, *Op*. *cit*. IV, fol. 30, col. a. [↑](#footnote-ref-243)
243. LUDOVICI VIVIS *In pseudodialecticos*; *Operum* tomus I, pp. 272 seq. [↑](#footnote-ref-244)
244. GEORGII VALLAE PLACENTINI viri clariss. *De expectendis et fugiendis rebus opus, in quo haec continentur...* In fine tomi secundi : Venetiis in aedibus Aldi Romani impensa ac studio Joannis Petri Vallae filii pientiss. Mense Decembri MDI. Totius operis liber XXIII et Physiologiae quartus ac ultimus : De Caelo, quodque Mundus non sit aeternus, et Aristotelis argumentorum confutatio ; c. I. [↑](#footnote-ref-245)
245. GEORGIO VALLA, *Op. cit.* Totius operis liber XXII, Physiologiae vero tertius: De naturalibus principiis et causis; c. X. [↑](#footnote-ref-246)
246. GIORGIO VALLA, *Op. cit.* Totius operis liber XXIII et Physiologiae quartus ac ultimus : De Caelo, quodque Mundus non non sit aeternus, et Aristotelis argumentorum confutatio ; c. I. [↑](#footnote-ref-247)
247. GIORGIO VALLA, *loc. cit.* [↑](#footnote-ref-248)
248. KLEOMHDOUS KukliÁj qewr...aj metewrîn tÕ A, a. - CLEOMEDIS *De motu circulari corporum caelestium*, lib. I, c. I. Ed. Hermann Ziegler, Leipzig (Teubner), 1891; p. 11. [↑](#footnote-ref-249)
249. MARCI ANTONII ZIMARE philosophi consummatissimi *Tabula dilucidationum in dictis Aristotelis et Averrois*. Venetiis, apud Hieronymum Scotum, MDLVI; p. 14. - Zimara summarizes faithfully, in this aphorism, the teaching given by Averroes in many passages of his commentaries. [↑](#footnote-ref-250)
250. AUGUSTINI NIPHI PHILOSOPHI SUESSANI *Super octo Aristotelis Stagiritae libros de physico auditu*, cum duplici textus translatione, antiqua videlicet et nova eius, ad Graecorum exemplarium veritatem ab eodem augustino quam fidissime castigatis : Averrois Cordubensis in eosdem libros prooemium, ac commentaria, cura ipsius Augustini Suessani refertissima expositione, annotationibus, ac postremo in omnes libros recognitionibus, castigatissima conspiciuntur... Venetiis. Apud Hieronymum Scotum, MDLIX. [↑](#footnote-ref-251)
251. ARISTOTELIS STAGIRITAE de Caelo et Mundo libri quatuor, e graeco in latinum ab AUGUSTINO NIPHO PHILOSOPHO SUESSANO conversi, et ab eodem etiam praeclara, neque non longe omnibus aliis in hac scientia resolutione aucti expositione... Venetiis. Apud Hieronymum Scotum, MDLIX. [↑](#footnote-ref-252)
252. AUGUSTINI NIPHI *Expositio in libros de physica auscultatione*, comment. in lib. IV; ed. cit. fol. 294. [↑](#footnote-ref-253)
253. AGOSTINO NIFO, *loc*. *cit.* fol. 301. [↑](#footnote-ref-254)
254. AUGUSTINI NIPHI *Expositio in libros de Caelo et Mundo*; lib. II; ed. cit, fol. 81. [↑](#footnote-ref-255)
255. NICOLAI COPERNICI TORINENSIS *De revolutionibus orbium caelestium libri sex*, lib. I, cap. VIII. [↑](#footnote-ref-256)
256. NICOLAS COPERNIC, *Op*. *cit*. I, cap. X; De ordine caelestium orbium. [↑](#footnote-ref-257)
257. Void supra, § [XIV](#_XIV._-_L'ÉCOLE). [↑](#footnote-ref-258)
258. *Ad clarissimum virum D. Joannem Schonerum. De libris revolutionum eruditissimi viri, et Mathematici excellentissimi, Reverendi D. Doctoris Nicolai Copernici Torunnaei, Canonici Varmiensis*, per QUENDAM JUVENEM, MATHEMATICAE STUDIOSUM *Narratio prima*. In fine : excusum Gedani per Franciscanum Rhodum, MDXL. - This work was reprinted in Basel, in 1541, then, on the occasion of the fourth centenary of the birth of Copernicus, in the following edition: NICOLAI COPERNICI THORUNENSIS *De revolutionibus orbium caelestium libri VI. Ex auctoris autographo recudi curavit Societas Copernicana Thorunensis. Accedit* GEORGII IOACHIMI RHAETICI *De libris revolutionum narratio prima*. Thoruni, sumptibus Societatis Copernicanae, MDCCCLXXIII. Our quotations refer to this last edition. [↑](#footnote-ref-259)
259. J. RHAETICI *Narratio prima*; Universi distributio; ed. cit. p. 465. [↑](#footnote-ref-260)
260. DESCARTES; *The Principles of Philosophy*; Second part, art. 10. [↑](#footnote-ref-261)
261. DESCARTES; *The Principles of Philosophy*; Second part, art. 13. [↑](#footnote-ref-262)
262. DESCARTES; *The Principles of Philosophy*; Second part, art. 24 and 25. [↑](#footnote-ref-263)
263. *Système du mouvement*, par M. DE GAMACHE, chanoine régulier de Sainte-Croix de la Bretonnerie ; printed in : *Essais sur le mouvement où il est traité de sa nature, de son origine, de sa communication, des chocs des corps qu'on suppose parfaitement solides, du plein et du vuide, et de la nature de la réaction*, par Monsieur DE CROUSAZ, de l'Académie Royale des sciences de Paris, et Professeur de Mathématiques et de Philosophie dans l'Université de Groningue. At the Hague, by Alberts and Van der Kloot, MDCCXXVIII. - Reprinted in *Astronomie physique ou Principes généraux de la nature appliqués au mécanisme astronomique et comparés aux Principes de la Philosophie de M. Newton*, by M. DE GAMACHE, canon régulier de Sainte-Croix de la Bretonnerie, de l'Académie Royale des Sciences ; a Paris, chez Charles-Antoine Jombert, MDCCXL. First dissertation. [↑](#footnote-ref-264)
264. DESCARTES *to Mersenne*, of Amsterdam, November 13, 1639 (*Œuvres* de DESCARTES, published by Adam and Tannery, *Correspondance*, t. I, art. XlV, p. 69). - Cf. DESCARTES, *Les principes de la Philosophie*, second part, art. XXXVII. [↑](#footnote-ref-265)
265. *Philosophiae naturalis principia mathematica* autore ISAACO NEWTON; Definitiones, scholium. [↑](#footnote-ref-266)
266. NEWTON, *loc*. *cit*. [↑](#footnote-ref-267)
267. ISAAC NEWTON, *Philosophiae naturalis principia mathematica*; Axiomata sive leges motus : corollarium IV. [↑](#footnote-ref-268)
268. ISAAC NEWTON, *Philosophiae naturalis principia mathematica*; Liber tertius: de Mundi systemate, Propositiones; propositio XI, theorema XI. [↑](#footnote-ref-269)
269. ISAAC NEWTON, *loc*. *cit*, propositio XII, theorema XII. [↑](#footnote-ref-270)
270. ISAAC NEWTON, *loc*. *cit*, hypothesis I. [↑](#footnote-ref-271)
271. ISAAC NEWTON, *loc*. *cit*, propositio XI, theorema XI. [↑](#footnote-ref-272)
272. EULER, *Reflections on space and time* (*History of the Royal Academy of Sciences and Belles-lettres of Berlin*: volume IV, 1750, pp. 324-373). [↑](#footnote-ref-273)
273. EULER, *loc*. *cit.* pp. 328-330. [↑](#footnote-ref-274)
274. Euler's thinking is less clear-cut and more uncertain in his *Theoria motus corporum solidorum seu rigidorum*, 1765. See, on this subject: HEINRICH STREINTZ, *Die physikalischen Grundlagen der Mechanik*, Leipzig, 1883; pp. 40-51. [↑](#footnote-ref-275)
275. EULER, *Reflections on space and time*, p. 328. [↑](#footnote-ref-276)
276. ERNST MACH, *Die Geschichte und die Wurzel des Satzes von der Erhaltung der Arbeit* : Prag, 1872, p. 50. [↑](#footnote-ref-277)
277. C. NEUMANN, *Ueber die Principien der Galilei-Newlon'schen Theorie*, Academische Antrittsvorlesung gehalten in der Aula der Universität Leipzig am 3 November 1869; Leipzig, 1870. [↑](#footnote-ref-278)
278. C. NEUMANN, *loc*. *cit*, pp. 14-21. [↑](#footnote-ref-279)
279. CARL NEUMANN, *loc*. *cit*, pp. 9. [↑](#footnote-ref-280)
280. CARL NEUMANN, *loc*. *cit.* at 21. [↑](#footnote-ref-281)
281. F. REECH, *Cours de Mécanique d'après la nature généralement flexible et élastique des corps*, Paris, Carilian-Gœury et Vor Dalmont, 1852. Introduction, p. 5. [↑](#footnote-ref-282)
282. P. DUHEM, *Commentaire aux principes de la Thermodynamique* ; première partie : Le principe de la conservation de l'énergie (*Journal de Mathématiques pures et appliquées*, 4e série, t. VIII, pp. 270-271 ; 1892). [↑](#footnote-ref-283)
283. P. PAINLEVÉ, *Leçons sur l'intégration des équations différentielles de la Mécanique* (autogr.); Paris, 1895; pp. 1-2. [↑](#footnote-ref-284)
284. JULES ANDRADE, *Leçons de Mécanique physique*, Paris, 1898, p. 95. [↑](#footnote-ref-285)
285. *Premiers principes métaphysiques de la Science de la Nature*, by EMMANUEL KANT, translated for the first time into French, and accompanied by an introduction on the Philosophy of Nature in Kant, by Ch. Andler and Éd. Chavannes, Paris, Alcan, 1891. [↑](#footnote-ref-286)
286. KANT, *Op. cit.* chapter I; trans. ANDLER and CHAVANNES, pp. 21-22. [↑](#footnote-ref-287)
287. KANT, *loc. cit.* p. 29. [↑](#footnote-ref-288)
288. KANT, *loc. cit.* p. 69. [↑](#footnote-ref-289)
289. KANT, *loc. cit.* p. 22. [↑](#footnote-ref-290)
290. KANT, *loc. cit.* p. 88-89. [↑](#footnote-ref-291)
291. KANT, *loc. cit.* p. 93. [↑](#footnote-ref-292)
292. KANT, *loc. cit.* p. 94. [↑](#footnote-ref-293)
293. KANT, *loc. cit.* p. 94. [↑](#footnote-ref-294)
294. KANT, *loc. cit.* p. 90-91. [↑](#footnote-ref-295)
295. HEINRICH STREINTZ, *Die physikalischen Grundlagen der Mechanik*; Leipzig, pp. 18-27. [↑](#footnote-ref-296)
296. CHARLES JOURDAIN: *Dissertation sur l'étal de la philosophie naturelle en Occident pendant la première moitié du XIIe siècle*, Paris, 1838, p. 101. [↑](#footnote-ref-297)
297. BAHTHÉLENY HAUREAU, art. *Guillaume de Conches*, in *Nouvelle Biographie générale* published by Firmin-Didot frères, coll. 667-673, Paris, 1859. [↑](#footnote-ref-298)
298. *Philosophicarum et astronomicarum institutionum* GULIELMI HIRSAUGIENSIS OLIM ABBATIS *libri tres*. *Opus vetus et nunc primum evulgatum et typis commissum*. Basileae excudebat Henricus Petrus, mense Augusto, anno MDXXXI. [↑](#footnote-ref-299)
299. *Patrologia latina* de Migne t. XC (BEDAE VENERABILIS *Operum* tomus I), coll. 1141-1142. [↑](#footnote-ref-300)
300. *Incipit liber primus Communium naturalium* FRATRIS ROGERI BACON, *habens 4or partes principales* (Bibliothèque Mazarine, ms. n° 3576). [↑](#footnote-ref-301)
301. FRATRIS ROGERI BACON *Communium naturalium* liber primus, partis tertiae dist. 2, : De locu et vacuo, habens capitula octo ; Capitulum primum est de distinctione modorum loci. Ms. cit. 52, a, to fol. 54, a. [↑](#footnote-ref-302)
302. ROGER BACON, *loc. cit.* fol. 52, a and b. [↑](#footnote-ref-303)
303. ROGER BACON, *loc. cit.* fol. 53, a. [↑](#footnote-ref-304)
304. ROGER BACON, *loc. cit.* fol. 51, a and b. [↑](#footnote-ref-305)
305. ROGER BACON, *loc. cit.* fol. 53, b. [↑](#footnote-ref-306)
306. ROGER BACON, *loc. cit.* fol. 51, c. [↑](#footnote-ref-307)
307. FRATRIS ROGERI BACON *Communium naturalium* liber primus, partis tertiae dist. 2a, cap. 4a : De vacuo quantum ad ejus necessitatem propter locata et propter motum augmenti et nutrimenti, et propter motum localem. Ms. cit. fol. 59 d. [↑](#footnote-ref-308)
308. *Clarissimi theologi Magistri* RICARDI DE MEDIA VILLA *Seraphici ord. min. convent. Super quatuor libros Sententiarum Petri Lombardi Quaestiones subtilissimae*. Tomus secundus. Brixiae, MDXCI. Lib. II, dist. XIV, art. III, quaest. III: Utrum Deus posset movere ultimum coelum motu recto; p. 186. [↑](#footnote-ref-309)
309. *Questiones* Scoti *super Universalia Porphyrii, necnon Aristotelis predicamenta ac Peryarmenias*. *Item super libros Elenchorum*. *Et* ANTONII ANDREE *super libro Sex principiorum*. *Item questiones* JOANNIS ANGELICI (sic) *super quaestiones ejusdem Scoti*. Colophon : Expliciunt questiones Doctoris subtilis Joannis Scoti super universalia Porphyrii : et Aristotelis predicamenta : et peryarmenias : ac elenchorum necnon discipuli ejus Antonii Andree super libro sex principiorum Gilberti porretani : studiosissime correcte per Reverendissimum patrem magistrum de portu Hibernicum archiepiscopum Turinnensem ordinis minorum. Impresse Venetiis per Philippum pincium Mantuanum. Anno domini 1512, die 9 Augusti. [↑](#footnote-ref-310)
310. *Quaestiones clarissimi doctoris* ANONII ANDREE *super sex principiis Gilberti Porretani*. Quaestio VIII : Utrum ultimum cœlum sit in loco ; ed. cit. fol. 60, col. d. [↑](#footnote-ref-311)
311. ANTONIO D'ANDRÉS, *Op. cit.* quaestt. XII, XIII and XIV; ed. cit. fol. 60. [↑](#footnote-ref-312)
312. ANT. ANDREE *Conventualis franciscani, ex Aragoniae provincia ac Ioannis Scoti doctoris subtilis discipuli celeberrimi*, *In quatuor Sententiarum Libros opus longe absolutissimum* : Quod, cum diu latuerit : a F. Constantio A Sarnano ejusdem ordinis, e tenebris jam nunc vindicatum... ; felicio anspicio prodit... Venetiis, Apud Damianum Zenarum. MDLXXVIII. Lib. II, Dist. III, quaest. V: Utrum angelus sit in loco; fol. 53, col. b. [↑](#footnote-ref-313)
313. ANTONIO D'ANDRES, *Loc. cit.* fol. 53, coll. c and d. [↑](#footnote-ref-314)
314. *Opera* JOANNIS DE BASSOLIS *Doctoris Subtilis Scoti (sua tempestate) fidelis Discipuli, Philosophi, ac Theologi profundissimi, In Quatuor Sententiarum Libros (credite) aurea. Quae nuperrime Impensis non minimis, Curaque, et emendatione non mediocri, Ad debitae inlegritatis sanitatem revocata, Decoramentisque marginalibus, ac Indicibus, adnotata : Opera denique et Arte Impressionis mirifica Dextris Syderibus elaborata fuere*. Venundanter a Francisco Regnault : Et Joanne Frellon. Parisiis. - Book I was published in 1517. - Book II has the following title: *Profundissimi Sacre theologie professoris* F. JOANNIS DE BASSOLIS *minorite in secundum sententiarum Questiones ingeniosissime et sane quoque utiles...* Venundantur in vico Mathurinorum apud Joannem Frellon fidelissimum Bibliopolam sub signo Avicludii commorantem, Parhisius. Colophon: ... Impresse noviter in alma Parhisiorum lutecia... sumptibus honestorum bibliopularum Prancisci Regnault et Joannis Frellon. Arte vero et nitidissimis caracteribus Nicolai de Pratis Calcographi probatissimi. Anno ab orbe redempto millesimo quingentesimo decimosexto, die ultimo mensis Octobris. - The last two books are from 1516 and 1517. [↑](#footnote-ref-315)
315. JOANNIS DE BASSOLIS *Op. cit*. II, dist. X, quaest. unica, art. III; fol. LXI, col. a. [↑](#footnote-ref-316)
316. JOANNIS DE BASSOLIS *Op. cit*. II, dist. II, quaest. III, art. IV. [↑](#footnote-ref-317)
317. GREGORIUS DE ARIMINO *In secundo Sententiaram nuperrime impressus*. *Et quam diligentissime sue integritati restitutus*. *Per venerabilem sacre theologie bacalarium fratrem Paulum de Genezano*. Colophon : Explicit lectura secundi sententiarum Fratris Gregorii de Arimino : sacri ordinis Heremitarum Sancti Augustini : theologie professoris exeellentissimi : Prioris generalis quondam prefati ordinis : qui legit, Parisius anno domini 1344°. Per venerabilem sacre theologie bacalarium fratrem Paulum de Genezano quamdiligentissime castigata et sue pristine integritati restituta. After the table, second colophon: Venetiis sumptibus heredum quondam domini Oclaviani Scoti Modoetiensis ac sociorum. 8 octobris 1518. - The first edition, given by Paul de Genezano is of 1502. [↑](#footnote-ref-318)
318. GREGORIUS DE ARIMINO *Lectura in secundo Sententiarum*, dist. VIa, quaest. Ia, art. 2. [↑](#footnote-ref-319)
319. ARISTOTELIS *De physico auditu libri octo*, *cum* AVERROIS CORDUBENSIS *variis in eosdem commentariis*. Libri tertii summae secundae cap. 1, comm. 3. [↑](#footnote-ref-320)
320. D. THOMAE AQUINATIS *In libros physicorum Aristotelis interpretatio et expositio* ; in lib. III lect. I. [↑](#footnote-ref-321)
321. ALEXANDRI ALENSIS Metaphysicae lib. V, ad comm. 18 - We borrow these two pieces of information on Avicenna and Alexander de Halès from the *Commentarium* COLLEGII CONIMBRICENSIS E SOCIETATE JESU *super octo libros physicorum Aristotelis Stagiritae*. Pars prima, Lib. III, Cap. II, Quaest. I ; Venetiis, MDCXVI, Apud Andream Baba, pp. 310 sqq. [↑](#footnote-ref-322)
322. Sic legitur. [↑](#footnote-ref-323)
323. JOANNIS CANONICI *Quaestiones super VIII Physicorum libros Arristotelis*; in lib. III quaest I, art. 1. [↑](#footnote-ref-324)
324. JEAN LE CHANOINE, *loc. cit*, art. 3. [↑](#footnote-ref-325)
325. JOANNIS CANONICI *Quaestiones super VIII libros Physicorum Aristotelis*, lib. IV, quaest. V, quantum ad secundum articulum. [↑](#footnote-ref-326)
326. *Tria principia* CLARISSIMI DOCTORIS ANTONII ANDREE *secundum doctrinam doctoris subtilis Scoti*. Nec non et expositio FRANCISCI MAYRONIS DOCTORIS ILLUMINATI *super octo libros phisicorum valde ulilis et brevis juxta Ari. propositiones et demonstrationes, et formalitates* EIUSDEM. Colophon: Impressum in inclita Civitate Ferrarie regnante Hercule Duce secundo per Magistrum Laurencium de rubeis de Valentia. Anno domini MCCCCLXXXV. Idus Madii. [↑](#footnote-ref-327)
327. It will be noticed that Antonio d'Andrès uses the terms *forma fluens* and *fluxus formae* precisely where John the Canon would have said, inversely, *fluxus formae* and *forma fluens*; the greatest confusion reigns, in the various scholastic treatises, as regards the use of these two denominations; the context, fortunately, makes it possible to dissipate the uncertainty which results from it. [↑](#footnote-ref-328)
328. GREGORII DE ARIMINO *Lectura in secundo Sententiarum*; dist. I, quaest. IV, art. I. [↑](#footnote-ref-329)
329. GRÉGOIRE DE RIMINI; *loc. cit.* art. 2. [↑](#footnote-ref-330)
330. VENERABILIS INCEPTORIS FRATRIS GULIELMI DE VILLA HOCCHAM ANGLIA : ACHADEMIE NOMINALIUM PRINCIPIIS : *Summule in lib. Physicorum adsunt*. Colophon: Impressum Venetiis per Lazarum de Soardis. Auno 1506, Die 17 Augusti. Partis tertiae cap. V, fol. 14, col. d, and fol. 15, col. a. [↑](#footnote-ref-331)
331. GUILLAUME D'OCCAM, *Op*. *cit.* pars III, cap. VI; ed. cit. fol. 15, coll. a and b. [↑](#footnote-ref-332)
332. GUILLAUME D'OCCAM, *Op*. *cit.* pars III, cap. VII; ed. cit. fol. 15, col. c. [↑](#footnote-ref-333)
333. GUILLAUME D'OCCAM, *Op*. *cit.* pars III, cap. X; ed. cit. fol. 17, coll. a and b. [↑](#footnote-ref-334)
334. *Tabula ad diversa hujus operis* MAGISTRI GUILHEMI DE OCKAM *super quatuor libros sententiarum annotationes et ad centilogii theologici ejusdem conclusiones facile reperiendas apprime conducibiles*. Colophon, at the end of the *Questions on the books of the Sentences*: Impressuin est autem hoc opus Lugduni per M. Johannem Trechsel Alemannum: virum hujus artis solertissimum. Anno domini nostri MCCCCXCV. Die vero decima mensis novembris. In lib. II qucest. XXVI : Utrum potentiae sensitivae differant realiter ab ipsa anima sensitiva et inter se. [↑](#footnote-ref-335)
335. DENIFLE and CHATELAIN, *Chartularium Universitatis Parisiensis*, tomus III, p. 56; n° 1240. [↑](#footnote-ref-336)
336. *Acutissimi philosophi reverendi magistri* JOHANNIS BURIDANI *subtilissime questiones super octo Phisicorurn libros* diligenter recognite et revise a magistro Joanne Dullaert de Gandavo antes nusquam impresse. Venum exponuntur in edibus Dionisii Roce, Parisiis, in vico divi Jacobi, sub divi Martini irtersignio. - Colophon: Hic finem accipiunt questiones reverendi magistri Johannis Buridani super octo Phisicorurn libros, impresse Parchisiis opera ac industria magistri Petri Ledru, impensis... Dionisii Roce... anno millesimo quingentesimo nono, octavo calendas novembres. [↑](#footnote-ref-337)
337. Bibliothèque nationale, Latin collection, ms. n° 14723 (former Saint-Victor collection, n° 712). [↑](#footnote-ref-338)
338. Quaestiones totius libri phisicorurn edite a MAGISTRO JOHANNE BURIDAM ; in lib. IV quaest. 1: Utrum locus sit aequalis suo locato; ms. cit. fol. 61, col. a. [↑](#footnote-ref-339)
339. JEAN BURIDAN, *Op*. *cit.* in lib. IV quaest. II: Utrum locus sit terminus corporis continentis; ms. cit. fol. 62, col. a. [↑](#footnote-ref-340)
340. JEAN BURIDAN, *Op*. *cit.* in lib. IV quaest. IV : Utrum diffinitio loci sit bona, in qua dicitur : locus est ultimum corporis continentis immobile primum. [↑](#footnote-ref-341)
341. JEAN BURIDAN, *Op*. *cit.* in lib. IV quaest. III : Utrum locus sit immobilis. [↑](#footnote-ref-342)
342. JEAN BURIDAN, *Op*. *cit.* in lib. IV quaest. VI : Utrum ultima sphaera seu suprema sit in loco. [↑](#footnote-ref-343)
343. JEAN BURIDAN, *Op*. *cit.* in lib. IV quaest. VII: Utrum motus localis est res distincta a loco et ab eo quod localiter movetur. [↑](#footnote-ref-344)
344. JOHANNIS BURIDANI *Quaestiones in libros de physica auscultatione* : in lib. III, quaest. II. [↑](#footnote-ref-345)
345. ALBERTI DE SAXONIA *Quaestiones in libros de physica auscultatione*; in lib. III quaest. V : Utrum motus alterationis sit res distincta a qualitate quae acquiritur et a qualitate quae deperditur, et ab alterabili cui talis qualitas acquiritur vel deperditur. [↑](#footnote-ref-346)
346. ALBERT DE SAXE, *Op. cit.* in lib. III quaest. VI : Utrum secundum Aristotelem et ejus Commentatorem ad hoc quod aliquid moveatur localiter requiratur aliqua res quae sit quidam fluxus distinctus a mobili et a loco. [↑](#footnote-ref-347)
347. ALBERT DE SAXE, *Op. cit.* in lib. III quaest. VII : Utrum admittentes casus divinos oporteat concedere quod motus localis sit alia res à mobili et a loco. [↑](#footnote-ref-348)
348. *Incipiunt subtiles doctrinaque plene abbreviationes libri phisicorum edite a prestantissimo philosopho* MARSILIO INGUEN DOCTORE PARISIENSI, 17th fol. printed, col. d, and 18th fol. coll. a and b. [↑](#footnote-ref-349)
349. *Questiones subtilissime* JOHANNIS MARSILII INGUEN *super octo libros Physicorum secundum nominalium viam*. Colophon: Impresse Lugduni per honestum virum Johannem Marion, anno Domini MCCCCCXVIII, die vero XVI mensis Julii. - In lib. III, quaest. VII : Utrum motus localis sit res distincta a mobili. [↑](#footnote-ref-350)
350. *Expositio* PAULI VENETI *super octo libros phisicorum Aristotelis necnon super comento Averois cum dubiis eiusdem*. Colophon: Impressum Venetiis per providum virum dominum Gregorium de Gregoriis. Anno nativitatis domini MCCCCXCIX die XXIII mensis Aprilis. Physicorum lib. III, tract. I, cap. III; fol. signed p, coll. b, c, d, secundum dubium. - These considerations on local motion are reproduced, with insignificant variants, in : PAULI VENETI *Summa totius philosophiae*, Pars VI et ultima, Metaphysica, cap. XXVII : De quidditate motus. [↑](#footnote-ref-351)
351. *Expositio* PAULI VENETI *super octo libros phisicorum* : lib. III, tract. I, cap. III; fol. signed p, col. b, fol. signed p. 2 and fol. signed p. 3, coll. a and b; dubium tertium. - The same considerations are reproduced, with slight variations, in: PAULI VENETI *Summa totius philosophiae*, Pars VI, Metaphysica, cap. XXVIII : De motu alterationis, augmentationis et diminutionis. [↑](#footnote-ref-352)
352. *Recollecte* GAIETANI *super octo libros physicorum cum annotationibus textuum*. Colophon: Impressum est hoc opus Venetiis per Bonetum Locatellum jussu et expensis nobilis viri Octaviani Scoti Modoetiensis. Anno salutis 1496. Nonis sextilillus. In lib. III quaest. I, fol. 23, col. c. [↑](#footnote-ref-353)
353. JOANNIS CANONICI *Quaestiones in VIII libros Physicorum Aristotelis*, lib. IV, quaest. V, quantum ad secundum articulum. [↑](#footnote-ref-354)
354. *Nicolas de Cues and Leonardo da Vinci*, V (*Studies on Leonardo da Vinci*, 2nd series, XI, pp. 157-160). [↑](#footnote-ref-355)
355. *Commentarii* MAGISTRI PETRI TATARETI *in libros Philosophiae naturalis et Metaphysicae Aristotelis* ; Physicorum lib. III; tract. I : De motu ; dubium 2m : Utrum motus localis sit res distincta a mobili et a loco. [↑](#footnote-ref-356)
356. PIERRE TATARET, *Loc. cit.* Dubium 1m : Utrum praeter subjectum alterabile et qualitatem secundum quam est alteratio requiratur motus seu fluxus distinctus ab illo subjecto alterabili. [↑](#footnote-ref-357)
357. Legitur: Nominalistic. [↑](#footnote-ref-358)
358. JOANNES MAJOS *In primum Sententiarum* ex recognitione Jo. Badii. Venundantur apud eundem Badium. On the reverse of the title, Epistola: Joannes Major Georgio Hepburnensi... dated: Ex Monte Acuto, 7 kal. Junii 1509 : impressit autem Jo. Badius, anno MDXIX. Dist. XX, quaest. unica; fol. LXXXIII, col. a. [↑](#footnote-ref-359)
359. JOANNIS DULLAERT DE GANDAVO *Questiones in libros physicorum Aristotelis*. Colophon : hic finem accipiunt questiones phisicales Magistri Johannis Dullaert de Gandavo quas edidit in cursu atrium regentando parisius in collegio montisacuti impensis honesti viri Oliverii senant solertia vero ac caracteribus Nicolai depratis viri hujus artis impressorie solertissimi prout caracteres indicant anno domini millesimo quingentesimo sexto vigesima tertia martii. In lib. III, quaest. I. [↑](#footnote-ref-360)
360. *Physice perscrutationes magistri* LUDOVICI CORONEL HISPANI SEGOVIENSIS. Prostant in edibus Joannis Barbier librarii jurAti Parrhisiensis acadernie sub signo ensis in via regia ad divinum Jacobum. On the fol. which follows the title, a letter of Sinon Agobert de Bourges to his brother Jean Agobert carries this date: Parrhisiis, MDXI. Simon Agobert tells us that Luiz Coronel taught philosophy at the College of Montaigu. [↑](#footnote-ref-361)
361. LUDOVICI CORONEL *Op. cit*. III, pars I: De motu locali, fol. XLV, col. d and fol. XLVI, col. a. [↑](#footnote-ref-362)
362. *Expositio* MAGISTRI JOANNIS DE CELAYA VALENTINI *in octo libros physicorunn Aristotelis : cum questionibus ejusdem, secundum triplicem viam beati Thome, realium et nominalium*. Venundantur Parrhisiis ah Hemundo le Feure in vico sancti Jacobi prope edem sancti Benedicti sub intersignio crescentis lune commorantis. Colophon: Explicit in libros phisicorum Aristotelis expositio a magistro Joanne de Celaye Hyspano de regno Valentie edita : dum regeret Parisius in famatissimo dive Barbare gymnasio pro cursu secundo anno a virgineo partu decimoseptimo supra millesimum et quingentesimum VII idus decembris, diligenter impressa arte Johannis de prato et Jacobi le messier in vico puretarum prope collegium cluniacense commorantium: Sumptibus vero honesti viri Hemundi le feure in vico sancti Jacobi prope edem sancti Benedicti sub intersignio crescentis lune moram trahentis. Laus deo. - Physicorum lib. III, cap. III, fol. LX seq. [↑](#footnote-ref-363)
363. JOANNES DE CELAYA, *loc. cit.* fol. LXII, col. d, foll. LXIII, coll. a and b. [↑](#footnote-ref-364)
364. JOANNES DE CELAYA, *loc. cit*, fol. LXIII, coll. b, c and d. [↑](#footnote-ref-365)
365. The attribution of this work to St. Thomas Aquinas is today unanimously rejected. [↑](#footnote-ref-366)
366. DIVI THOMAE AQUINATIS, *ordinis Praedicatorum*, *Totius logicae Aristotelis summa* (D. THOMAE AQUINATIS *Opuscula* : opusc. XLVIII). - Cf. CARL PRANTL, *Geschichte der Logik im Abendlande*, Leipzig, 1867; pp. 250-257. [↑](#footnote-ref-367)
367. D. THOMAE AQUINATIS *Totius logicae Aristotelis summa*, pars IIa, De Praedicamentis; Tractatus de praedicamento quantitatis; cap. VI : De loco qui est species quantitatis continuae. [↑](#footnote-ref-368)
368. In the text, we have sometimes translated *ratio loci* by rational place; this translation is obviously defective. [↑](#footnote-ref-369)
369. D. THOMAE AQUINATIS *Totius logicae Aristotelis summa*, pars IIa, De Praedicamentis; De praedicamento ubi; cap. I : Quid sit formaliter et in quo sit subjective. [↑](#footnote-ref-370)
370. SAINT THOMAS OF AQUIN, *loc. cit*. Cap. II: Quia ubi non suscipit magis nec minus, nec habet contrarietatem, et quod est in omni corpore terminato superficie. [↑](#footnote-ref-371)
371. SAINT THOMAS OF AQUIN, *loc. cit*. Cap. I. [↑](#footnote-ref-372)
372. SANCTI THOMAE AQUINATIS *In libros physicorum Aristotelis expositio* : in lib. V lect. IV. [↑](#footnote-ref-373)
373. SANCTI THOMAE AQUINATIS *In libros physicorum Aristotelis expositio* : in lib. IV lect. VII. [↑](#footnote-ref-374)
374. D. THOMAE AQUINATIS *Totius logicae Aristotelis summa*, pars IIa, De Praedicamentis; De praedicamento situ; cap. II: Quod positio est denominatio seu respectus sumptus a partibus loci ratione partium locati. [↑](#footnote-ref-375)
375. D. THOMAE AQUINATIS *Totius logicae Aristotelis summa*, pars IIa, De Praedicamentis ; Cap. IV : Quod substantia non suscipit contrarietatem, nec magis, nec minus, licet sit subjectum utriusque per sui mutationem. [↑](#footnote-ref-376)
376. D. THOMAE AQUINATIS *De pluralitate formarum*, Opusc. XLV. - PRANTL (*Geschichte der Logik im Abendlande*, Bd. III, p. 245) regards this writing as apocryphal without giving reasons for his opinion. St. Thomas Aquinas, moreover, took up the question treated in *De pluralitate formarum* in two crude writings and solved it exactly in the same way (D. Thomae Summa theologica, secunda secundae, quaest. 24. - D. Thomae *In primum Sententiarum*, dist. XVII). The pamphlet *De pluralitate formarum* is today attributed to Thomas de Sutton]. [↑](#footnote-ref-377)
377. D. THOMAE AQUINATIS *Totius logicae Aristotelis summa*, De interpretatione seu de enonciatione : Cap. II : De verbo quid sit formaliter secundum descriptionem logicam. [↑](#footnote-ref-378)
378. Instead of: *mio*, it should obviously be: *ei*. [↑](#footnote-ref-379)
379. PRANTL (*Geschichte der Logik im Abendlande*, Bd. III, p. 250) seems to regard this sentence as Spanish. [↑](#footnote-ref-380)