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THE INCONVENIENT RELATION BETWEEN RELIGION AND SCIENCE: THE PREVALENCE OF THE HELIOCENTRIC THEORY

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Abstract

The relation between religion and Science is discussed in this article on the example of attitude of Western Churches towards heliocentric theory. Also reasons of such attitude of the Church were considered.

In order to consider this relation, we will first note that in the case of a religious dogma, faith must be absolute. Dogma as a theory can be proved only through itself and its power is the absence of doubt. On the contrary, in the case of science, according to the philosophical view of Descartes, doubt should be present in any problem arising in order to avoid possible errors and prejudices; through doubt we can be led to the discovery of an indisputable truth.

The military and political power of the Holy See hindered for a long time the development of knowledge and hence Science. Giordano Bruno was accused and judged because, among other, he was teaching the infinite worlds of Metrodorus of Chios and of Epicurus (4th century BC). Similarly, Galileo stood trial on suspicion of heresy and he was condemned into house arrest because the heliocentric system he was supporting was at odds with the *Old Testament*, according to which Joshua ordered the Sun to stop – and not the Earth – during the Gibeon Battle of Israelites against Canaanites.

The heliocentric theory was not favored by the Western Church because it did not comply with the 'positions' of the *Bible* and the ancient Greek geocentric theory. When science contributed to the fall of the anthropocentric myth, first by showing that the Earth, the abode of man, is not at the center of the Universe and next by showing that even human itself is a product of evolution, then its separation from the Western Church was definite.

Therefore, a kind of war was waged against the heliocentrists, not just because the system they supported was at odds with what the Scriptures said, but also because the geocentric theory, which supported an absolutely motionless Earth, was in agreement with the celestial mechanics of the 'divine scientist' Aristotle. Since Aristotle had deeply influenced the mediaeval Catholic theology, the rejection of the geocentric theory would

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diminish the authority of the great philosopher and consequently the theology of the Church. It thus became clear that the support of the geocentric theory was essentially an issue of Church authority.

Keywords: religion, science, religious dogma, Cartesian doubt, heliocentric theory

1. Introduction

Which is the relation between religion and Science? Or rather between religious dogma and Science? Convergence or opposition? Parallel or incompatible roads? Is this relation truly inconvenient?

In order to answer this question thoughtfully, we must first juxtapose these two primal notions.

In the case of a religious dogma, faith must be absolute. Dogma as a theory can be proved only through itself and its power is the absence of doubt.

On the contrary, in the case of Science, according to the philosophical view of Descartes, doubt should be present in any problem arising in order to avoid possible errors and prejudices; through doubt we can be led to the discovery of an indisputable truth. So the Cartesian doubt in the area of Science is the main methodological starting point, which leads us to the proof.

The difference between dogma and Science, or rather the difference of the religious beliefs from respective scientific theories, stems from exactly this point.

Religion is faith and absolute truth, while Science is doubt and falsifiability (or refutability). Karl R. Popper [1, 2], for example, was critical against the inductive methods used in Science. All inductive proofs are limited, he said, while he taught that falsifiability should replace the ability for verification as a criterion of the difference between the scientific and the non-scientific. Science is seen more in the frame of an unending search for objective knowledge, rather than in the frame of a knowledge system. The principle of falsifiability is for Popper the criterion for the scientific or non-scientific character of a given theory. Thus, for example, astrology or 'ufology' are classified as pseudosciences because of their incapability to be subjected to the application of the falsifiability principle. Within a religious structure there is no phenomenon that can refute the core of the theory and there is nothing that can make the foundations of the structure tremble.

In Science, when something new is discovered, anything that contradicts, even partially, to the prevailing scientific theory, then, sooner or later, the theory is replaced by a new theory. According to Popper, as cited in Theodossiou [3], scientists should rather try to disprove their theories than to verify them time and time again.

But let us consider our main topic, namely the prevalence of the heliocentric system and the controversy it created between Science and the Christian Church. When Galileo observed with his telescope the four large satellites of Jupiter, in 1609-1610, the geocentric theory suffered a fatal blow, in

spite of the reactions that followed by various scholars and the Roman Catholic Church, which had incorporated geocentric system as its favored one.

The fundamental difference between Science and religion we mentioned before was always rendering their relations inconvenient, especially in the West. For a certain period these relations were so tense that blood was shed in their sake; but it was rather the relation between the prevailing dogma and Reformation or the coming change that made that happen, and not the relation between religion and Science. The night of August 24th, 1572, is known in history as the Night of Saint Bartholomew because of the massacre of thousands of the Huguenots by fanatic Catholics in France. The kings of France were fighting violently Reformation, which was represented by Huguenots, because the alliance with the powerful Catholic Church allowed them better to hold their power steadily.

It is an indisputable fact that the military and political power of the Holy See hindered for a long time the development of knowledge and hence Science. Giordano Bruno was accused and judged because, among other, he was teaching the infinite number of worlds of Metrodorus of Chios and of Epicurus (4th century BC). Similarly, Galileo stood trial on suspicion of heresy and he was condemned into house arrest because the heliocentric system he was supporting was at odds with the *Old Testament*, according to which Joshua ordered the Sun to stop – and not the Earth – during the Gibeon Battle of Israelites against Canaanites; this reference means that the contemporary scholars were believing Earth was motionless and the Sun was revolving around it, i.e. into a genuine geocentric system.

2. The Gibeon Battle and other Scripture references

The ancient city Gibeon was to the northwest of Bethlehem; during the battle conducted there by Joshua against the Canaanites, Joshua asked God to cause the Sun and Moon to stand still, so that he could finish the battle in daylight and win it: *"and he said in the sight of Israel, Sun, stand thou still upon Gibeon; and thou, Moon, in the valley of Ajalon. And the Sun stood still, and the moon stayed, until the people had avenged themselves upon their enemies… …So the sun stood still in the midst of heaven, and hasted not to go down about a whole day"* (Joshua 10.12-13, The King James version).

The stillness of the Earth and the respective motion of the Sun is apparent also in other parts of the *Old Testament*, as in the *Psalms* and the *Ecclesiastes*: *"the world also is established, that it cannot be moved"* (Psalm 93.1), *"He appointed the moon for seasons: the sun knoweth his going down"* (Psalm 104.19), *"The sun also ariseth, and the sun goeth down, and hasteth to his place where he arose"* (Ecclesiastes 1.5).

3. Later incidents of opposition of the Church to the heliocentric theory

Nicolaus Copernicus (1473-1543) hid his fundamental work *De revolutionibus orbium coelestium* [4] for years, unwilling to publish it, exactly because he did not dare and did not want (as a priest himself) to clash with the Roman Catholic Church, to which he always belonged. His research was in support of the heliocentric system, contrary to the Church-supported geocentric system.

Even centuries later, Charles Darwin delayed in a similar way for several years the publication of his pioneering book *On the Origin of Species* [5] because he was either afraid of the power of the Church, or unwilling to oppose to it, although England was not subject to the Vatican authority!

In the 20th century it is known that some religious scholars and Church people even attempted to stop the translation of cuneiform writings from Mesopotamia and of the Dead Sea Scrolls because it was probable that they could reveal that our world is older than *circa* 6,000 years, an age they believed that can be calculated from the *Old Testament*. This calculation was originally made by the Archbishop of Armagh James Ussher (1581-1656), who concluded that the Earth was created on October 23rd, 4004 B.C.; others after him calculated similar chronologies that have been long ago rejected by modern sciences [6].

The revolution for the observation of the heavens came from Galileo in 1609, when for the first time in the history of astronomy he used a dynamic and pioneering for the times instrument, the telescope, which gave him the ability to discover wonderful things in the firmament: from the phases of Venus to the four large satellites of Jupiter, a miniature planetary system.

That year belonged to the first decade of the 17th century; a century that marked a period of multiple crisis. Philosophy, religion and Science itself found themselves into a maelstrom that shook the foundations of Western society. That maelstrom engulfed in its whirl the foundations of Astronomy, the science of the heavens. The 'peaceful' geocentric and at the same time egocentric system that was prevailing for many centuries gave its place to the correct heliocentric one.

A new physics appeared in the West in the 17th century, under the philosophical canopy of the Cartesian philosophy, the spirit of which had its deep influence on all his contemporary savants. This new physics, as was defined by Galileo and Kepler, was not interested in searching for purpose, but rather it was seeking for causes. The teleological model of understanding the Universe had now been fully unleashed from the bondage of Aristotelian philosophy. From the study of History and Philosophy of the sciences it can be said that this was the time the subject is placed as central entity on the philosophical stage; however, its place is not secured, in spite of the blows against the 'traditional' view on nature and human by the new science.

It may be that the crucial role for the liberation from Aristotelism, or for this revolution of the natural sciences, belongs to the dynamical appearance of the new astronomy, which put the Sun in the place of the Earth; however, several explanations have emerged based on a much wider understanding of the big change that took place in Italy and the Western Europe.

At least two to three centuries before 1609, the West was a boiling pot. Great scholars, such as Jean Buridan (Johannes Buridanus, ca. 1295-1358), Nicole d'Oresme (1323-1382), Nicolaus Cusanus (1401-1464), Copernicus (1473-1543) and many others in the natural sciences, centuries before Galileo and Kepler, based on the Pythagorean and pre-Socratic Greek natural philosophers, had added their small stone to the building of the new physics; at the same time, they had ignited the great change in Science and in the way to understand natural phenomena. A change that, stemming from the mentality shift in Astronomy, was now focusing attention to switching the European scientific thought from theory to practice, through experiment, observation and the use of Mathematics and their methods.

Galileo Galilei (1564-1642), the first physicist with the modern meaning of the term, rejected through his experiments the common perception for motion, setting the base for the modern mechanics, while Rene Descartes (1596-1650) generalized the re-explaining of everyday experience and proposed a new image of reality beyond experience. Descartes tried to show through his philosophy that nature's reality is not similar to what our senses present to us. Our world is not a finite wholeness with an impeccable internal structure, as it was presented in Aristotle's view of Cosmos and later in its slight alteration by Dante [7].

Things changed in new astronomy, too; scholars, liberated from the tightly closed and powerful crystal spheres, started to talk about an infinite Universe that didn't have or was controlled from a natural hierarchy, while its unity was a result of laws governing it, laws valid for all its parts.

4. Why the heliocentric theory proponents were persecuted?

The revivalist of the heliocentric theory, Copernicus, was according to Martin Luther '*the fool who wanted to overturn the Science of Astronomy'*. Later on, Giordano Bruno was burned for his views and ideas, while Galileo was put under house arrest. Why?

The answer lies in the indisputable fact that these scientists, by indicating the weakness of the geocentric theory were undermining in an essential way the egocentrism or the man-centred Universe, in other words a basic aspect of the Christian worldview, for which human is the centre and the reason for all Creation. Indeed, the German Neo-Kantianist philosopher and historian of Philosophy Wilhelm Windelband (1848-1915) assigned to the Christian worldview a 'human-centred character', because according to it (in contrast to the ancient Greek thought) human and human history become the reason for the Universe [8]. Yet, the human-centred view was inherent in all ancient astronomy, capitalized with the Ptolemaic view for the Cosmos (with the Earth

at the centre of it). To this the religious view that human is the central creature of the Creator and everything else revolves around him, dovetailed nicely.

The rare independence of thought combined with an integrated knowledge of Astronomy and Cosmology, knowledge not easily attainable at that period of time, were the necessary prerequisites for Copernicus, Giordano Bruno, Galileo and Kepler to expose persuasively the superiority of their heliocentric system version. That great proposition of Copernicus, which revived the heliocentric theory of Aristarchus of Samos not only paved the way towards modern Astronomy, but also helped to bring a decisive change in the way humans were facing the Universe. When people grasped that the Earth was not the centre of the Universe but instead just one of the Sun's planets, a member of the Solar System, the illusion of the central importance of humanity itself lost its support. Therefore, the heliocentric theory was not favoured by the Western Church because it did not comply with the 'positions' of the *Bible* and the ancient Greek geocentric theory. When Science contributed to the fall of the anthropocentric myth, first by showing that the Earth, the abode of man, is not at the centre of the Universe and next by showing that even human itself is a product of evolution, then its separation from the Western Church was definite.

Therefore, a kind of war was waged against the heliocentrists, not just because the system they supported was at odds with what the Scriptures said, but also because the geocentric theory, which supported an absolutely motionless Earth, was in agreement with the celestial mechanics of the 'divine scientist' Aristotle. Since Aristotle had deeply influenced the mediaeval Catholic theology, the rejection of the geocentric theory would diminish the authority of the great philosopher and consequently the Theology of the Church. It thus became clear that the support of the geocentric theory was essentially an issue of Church authority. This was the main reason Pope Urban VIII (1623-1644) moved the procedure against Galileo and included the work of Copernicus in the *Index Librorum Prohibitorum*.

The space of the Universe with the new astronomy and Physics departs from the set of the differentiated Aristotelian spaces and then it is identified with the space defined by Euclidean geometry, a homogeneous and isotropic space, to finally become, in the 19^{th} and 20^{th} centuries the space of non-Euclidean geometries.

Johannes Kepler, as a mystic and religious person, believed that the Universe was full of secret and transcendental forces. He was convinced that if he plugged the mystic mathematical harmonies into the study of the celestial sphere he could connect the planetary orbits with perfect geometrical solids. According to the German astronomer only the motions of the celestial bodies, eternal and perfect as they were, could be analyzed mathematically and geometrically, since he supported the view that Astronomy should be based on the principles of geometrical simplicity. However, Kepler was a Protestant and as such he never felt the pressure of Catholicism and the Inquisition [9, p. 266].

After the observations and the theoretical studies of these two great astronomers, Galileo and Kepler, the abdication of the Earth from its planetary throne was a reality. After thousands of years of reign for our small planet in the human thought, the heliocentric system prevailed and the Sun rightly occupied the position held by the Earth in the geocentric system. The eternal crystal spheres of the closed Aristotelian geocentric system with the perfect internal arrangement and the strict hierarchy gave place to a new cosmology that favoured an infinite Universe without any natural hierarchy.

Kepler, with his book *Astronomia nova* (1609) [10], came into conflict with the then prevailing ideas. The adoption of the material moving force he proposed was a blow against the divinely created cosmic order, imposed in the western thought by the Aristotelian physics.

As a conclusion we can state that Galileo with his pioneering observations and Kepler with his theoretical insight were the true founders of the new heliocentric system and the discoverers of the laws governing our planetary system; both in 1609, with the first telescopic observations of Galileo and the publication of *Astronomia nova*, which put on new bases the celestial science, since Kepler therein presented the two of the three basic laws governing planetary motions: The orbits of the planets are ellipses, the one focus of which is occupied by the Sun, and the line joining a planet and the Sun sweeps out equal areas during equal intervals of time. It can be said that the observational justification of the heliocentric theory began with Galileo and its mathematical foundations were laid exclusively by Johannes Kepler.

The heliocentric theory of Aristarchus and Copernicus was a blasphemy according to the Church, because it sowed the ideas for a science uncontrolled by Catholicism and the Inquisition. For this reason, in 1616 this theory was condemned by the Roman Catholic Church as irrational, impious and 'pseudo-scientific'. This condemnation lasted until 1820, when the heliocentric theory was regarded by the Church as rather 'proved' and 'scientific'; after that, the persecution against its supporters stopped.

5. Was there a solution?

A solution? Of course! The true solution to the problem of relations between Science and religion was and still is the separation of their roles. In any case, God is beyond the limits of Science; He reveals himself, He can't be calculated with equations or through theories; therefore, the scientific occupation of scientists with the divine is both dangerous and vain.

It must be noted that these questions are important not only because the terms 'science' and 'scientific' are present everywhere. The problem of the boundaries of Science is also of great social and political importance. We should not forget that in the late Soviet Union the communist party had the right to decide what science was and what was not, at any given case. Besides, the understanding of what is or is not science influences more or less the scientific

policy of the State, and this has consequences for the advancement or the stagnation of the scientific or the corresponding technological research.

For example, an empiricist's view on what is science favours the blind empirical research without the respective interest for its theoretical foundations: It is well-known in astronomical circles that the United States Air Force keeps an office responsible for the collection and analysis of information concerning the Unidentified Flying Objects (UFOs), which are normally reported to ignore the known laws of Physics and/or carry extraterrestrials! It is also known that several universities keep laboratories dedicated to 'paranormal research', which is at odds with the 'official' natural science and has up to now failed to give a single law for the 'paranormal phenomena'.

Of course, a certain answer to the question of what is science and what gives it its validity and effectiveness could be given – as in the Middle Ages – by resorting to some authority, such as the authority of Aristotle or some other ancient philosophers. But it seems that this solution causes problems. A tradition is known about the Pisa experiment conducted by Galileo: in order to disprove the Aristotelian belief that the heavier bodies fall faster than the lighter ones, Galileo climbed on the Leaning Tower of Pisa holding two objects, one light and one much heavier than the first, and he released them simultaneously to fall to the ground from the top of the Tower. The two objects reached the ground at the same moment, not caring for what Aristotle would say.

The wise professors of the University of Pisa, instead of acknowledging Aristotle's fallacy by means of the experiment, argued that the two bodies did not reach the ground simultaneously; while some that saw the truth thought that their eyes had played a trick to them, since Aristotle did not agree with that outcome. Therefore, the appeal to any authority does not offer necessarily a good answer to such questions; it rather creates more problems.

In the example of the above Pisa experiment tradition one can discern a widely held view of our age concerning what is science. It is the view of the empiricism: All knowledge is acquired through experience, which is the immediate perception of objects and phenomena through our senses. Galileo and Kepler were the first astronomers and physicists who escaped from the view that true knowledge can be acquired only through the study of the classic ancient texts as the writings of authorities, such as of that master of universal knowledge, Aristotle.

According to Alexandre Koyré [11], the scientific revolution of the 17th Century smashed the ancient Greek notion of Cosmos, of the Aristotelian vision, a world of first impressions, and replaced it with an Archimedean Universe of precision, of the 'geometrization' of space and of measure. The real world is not considered anymore a closed, finite and hierarchically structured wholeness, as limited by the mediaeval approach, which explained the world based on the *Bible* in accordance with the ancient Greek geocentric view; instead, it is an open, infinite and vague Universe, defined by the natural laws and by its fundamental components. The clash in the crucial field of Cosmology and the different way to approach and study nature was the point of transit to the final

theory of the Universe without an 'edge'. This clash was provoked by the works of great scientists and philosophers of the 16th and 17th centuries, including Copernicus, Tycho Brahe, Kepler, Galileo, Descartes and Newton.

As Bertrand Russell writes: "*Kepler and Galileo proceeded from the observation of separate events to the formulation of accurate quantitative laws; with their aid future events could be predicted in detail. They annoyed a lot their contemporaries, because not only their conclusions were in stark contrast to the beliefs of that period, but also the blind faith to an authority allowed the savants to limit their researches in the libraries and the professors were utterly upset by the idea that they would have to observe the world in order to learn exactly how it is.*" [12]

In this passage Russell gives us the main characteristics attributed to Science by the so-called positivist philosophers, such as John Stuart Mill, Herbert Spencer, or the more recent ones Moritz Schlick, Otto Neurath, Kurt Gödel, Rudolf Carnap and others.

In very broad lines, for positivism science means sure and proved knowledge. Science provides the only method to reach absolute certainty. The scientific theories are built based on general and personal prepositions. According to positivism, we start from the partial, i.e. the personal propositions that describe observations, and we end up with the general, that is the universal propositions, which are the laws of Science.

The two basic principles of the original positivism are:

1. Every piece of knowledge that pertains to events-phenomena is based on the 'positive' elements of experience (the term 'positive' means affirmative);
2. Beyond the world of natural phenomena there is the world of pure Logic and pure Mathematics.

Positivism, as a main component of the physics mentality, is: secular, anti-theological and against Metaphysics; it sticks to the testimony of observation and experience – positive knowledge and experiment. Positivism, by rejecting Metaphysics helped to supersede preoccupations of the past and forwarded the development of the logical physical thought. In a positivistic world view, science is considered the way we can discover the truth and understand the world as good as possible, so that we will be able to predict it or change it [3, p. 94].

6. Conclusions

As a concluding remark, it should be stressed that our treatment of the topic is centred on the Western Christianity - Roman Catholic Church and Protestantism.

In the Orthodox tradition, in the words of theologian G.N. Filias [13], the two opposite trends characterizing the Western tradition – the clericalism of the Roman Church and the absence of clerical power in the Protestant denominations – can't be developed. This is probably why Orthodoxy did not experience situations like the Roman Catholic medieval society, in which

becoming a member of the clergy was considered something relative to the entrance in the mechanism of state (secular power).

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