Galileo and Bellarmine

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Abstract. This paper aims to delineate two of the many tensions which bring to light the contrasting views of Galileo Galilei and of Cardinal Robert Bellarmine with respect to the Copernican-Ptolemaic controversies of the 16th and 17th centuries: their respective positions on Aristotle's natural philosophy and on the interpretation of Sacred Scripture. Galileo's telescopic observations, reported in his *Sidereus Nuncius*, were bringing about the collapse of Aristotle's natural philosophy and he taught that there was no science in Scripture.

1. Introduction

This paper investigates the tensions between two of the principal protagonists in the controversies involved in the birth of modern science, Galileo Galilei and Cardinal Robert Bellarmine, and how they were resolved or not in a spirit of accommodation. Bellarmine's fellow Jesuits at the Roman College confirmed Galileo's earth-shaking observations, reported in his *Sidereus Nuntius*. Aristotle's physics was crumbling. Would Aristotelian philosophy, which was at the service of theology, also collapse? Controversies over the nature of sunspots and of comets seemed to hold implications for the very foundations of Christian belief. Some Churchmen saw the threat and faced it with an astute view into the future; others, though pioneers as scientists, could not face the larger implications of the scientific revolution to which they with Galileo contributed. Much of what occurred can be attributed to the strong personalities of the individual antagonists and Bellarmine will prove to be one of the most important of those personages.

We can identify several issues which are lurking in the wings and which will come on stage as the confrontation of the Church with Galileo goes forward. A sun-centered universe in the eyes of the Church threatened both Sacred Scripture and Aristotelian natural philosophy. As to Scripture the conflict was obvious, since to many Churchmen of those days Scripture taught in many verses that the Sun moved. As to Aristotle the earth had to be at the center since it was the heaviest of the elements. Furthermore, the philosophy of Aristotle was fundamental to Catholic theology at that time. If his natural philosophy was wrong was all of his philosophy, and therefore Catholic theology, menaced? Another lurking issue was the ambiguous meaning of

hypothesis, the contrast between the view inherited from the Pythagoreans and that which was coming to light at the birth of modern science. Galileo will be accused of not accepting Copernicanism as a hypothesis. While he did not in the sense of the Pythagoreans, as a pioneer in the birth of modern science, he certainly did in the sense which characterizes modern science.

2. Galileo and Bellarmine on Aristotle

After attempts to obtain a teaching position at Bologna, Padua and Florence, in July 1589 Galileo was called to a teaching position at Pisa. He taught the elements of mathematics and astronomy. His predecessor had taught the *Elements* of Euclid and Sacrobosco's *Sphere* (the classical treatise on the elements of Ptolemaic astronomy). What were the sources for Galileo's teaching? During the past decades through the research of Wallace and others (Wallace 1977, 1984) it has been well established that Galileo relied to a great extent upon lecture notes of Jesuits at the Roman College. This dependence of Galileo is particularly noteworthy as to his teaching in logic based on the *Posteriores Analytici* of Aristotle and on questions connected to Aristotle's *De Coelo* and *De Generatione*. There is more independence in his discussion of motion but even there concepts occur which are clearly dependent upon teaching at the Roman College. Thus it was at the Roman College that Galileo came in contact with the Aristotelian and medieval way of questioning in natural philosophy. It was a conceptual approach which Galileo inherited and which he would adapt and question in future years.

Bellarmine with his fellow Jesuits at the Roman College undoubtedly followed Aristotle in philosophy and Ptolemy in astronomy, at least for didactic purposes. As to their research and their thinking on issues in natural philosophy, both Galileo and Bellarmine will prove to be much more independent, within the confines of discipline imposed by the Society of Jesus, than the majority of their counterparts in other centers of learning. Both Bellarmine and Galileo will share the growing tensions between an Aristotelian natural philosophy and the new scientific discoveries, especially those of Galileo soon to appear. For Bellarmine this will create an even more significant tension in the realm of theological and doctrinal issues since these relied heavily upon a "Christianized" Aristotelianism.

Galileo was 28 years old when he began teaching in Padua and, as he himself said, he spent the happiest 18 years of his life there. Padua was part of the Venetian Republic which at that time found itself on various issues in opposition to Rome. The Jesuits were the defenders of Papal authority and several of Galileo's friends, defenders of the independence of the Venetian Republic, found themselves in opposition to the Jesuits (Fantoli 2003, 75-76). This, undoubtedly, had some influence on Galileo's attitude to the Jesuits, but it is also clear that Galileo maintained a cordial and productive relationship with many Jesuits, including Bellarmine.

The apparent death knell to Aristotelian natural philosophy comes with Galileo's telescopic observations, published in his *Sidereus Nuntius* (Starry Message), of the myriads of stars of the Milky Way, of the Medicean satellites of Jupiter, of the phases of Venus, of the mountains and craters on the moon and of the sunspots. Bellarmine was at first skeptical of Galileo's observations. Since Galileo was convinced of the veracity of his observations and knew that the

Jesuits at the Roman College would be objective in their evaluation, and that their opinion would carry a great deal of weight, he urged them to carry out further observations with a better telescope. Galileo showed Jupiter's satellites to the Jesuits in Florence and they were convinced. His hope was that they in turn would urge their brothers at the Roman College to carry out like observations. They did so and Galileo's telescopic observations were authenticated.

The case of Bellarmine is quite different. In his early years of teaching at Louvain he had shown a very independent view of Aristotle (see Baldini and Coyne 1984). He did not hold, for instance, that the heavens were immutable and incorruptible. As he matured as a Jesuit, it became clear that he was neither a devotee nor an opponent of Aristotelian natural philosophy. With respect to Aristotle he was an eclectic. Whatever supported Catholic doctrine in that natural philosophy was fine; what was indifferent to Catholic doctrine was up for grabs.

Bellarmine had heard of Galileo's observations and wished to know if they were true and what implications they held. He turned to the Jesuit scientists at the Roman College and they unanimously confirmed Galileo's observations. But there was some hesitation expressed by the Jesuit philosophers and theologians of the Roman College who were not pleased with the all too positive appreciation of Galileo's discoveries and especially the anti-Aristotelian implications of those discoveries (see Paschini 1965, 226). The hesitation on the part of the philosophers was soon reinforced by a circular letter of 24 May 1611 from Father General Claudio Acquaviva to all Jesuits in which he recommended "uniformity of doctrine." He was speaking of the philosophy of Aristotle, baptized by St. Thomas Aquinas, placed by St. Ignatius in the Constitutions of the Society of Jesus as the basis for the teaching of philosophy and reconfirmed in the *Ratio Studiorum* issued by Acquaviva himself in 1599. That persistent requirement of fidelity to Aristotelianism had nothing to do directly with Copernicanism. It was motivated by the conviction that Aristotelianism furnished a solid basis for philosophy and, upon adaptation, for the so-called "preambles of the faith." But Acquaviva's letter certainly reflected a growing preoccupation with the enthusiasm of the Jesuit astronomers at the Roman College for the telescopic observations of Galileo and the anti-Aristotelian implications that could be drawn from them (see Blackwell 1991). The natural philosophy of Aristotle was crumbling.

The structure of the Aristotelian system was a whole. If the natural philosophy of Aristotle crumbled, would the structure itself give way? How then to maintain "uniformity of doctrine." There was not, of course, an open, public schism among the philosophers, mathematicians and astronomers of the Roman College. Loyalty to a tradition, reinforced by religious superiors, remained the dominant factor. But the Jesuits astronomers were steadily embracing Copernicanism.

3. The Notion of Hypothesis

The mathematicians might resolve the growing tensions about Copernicanism by taking refuge in the notion that all world systems, those of Ptolemy, of Brahe and of Copernicus, were mere mathematical expedients and in that sense hypothetical. There is an ambiguity involved in the use of the word "hypothesis" and it would be well to clarify it so that one can understand the

extent to which Bellarmine had the same view as that of Galileo. There are two distinctly different uses of the word: a mathematical expedient to predict celestial events or an attempt to understand the true nature of the heavens. This important difference in meaning must be seen against the history of the word's use from antiquity through medieval Christianity to the time of Copernicus through to Galileo. The best historical example of this is, of course, the case of Osiander. In his attempt to save Copernicus, Osiander, unbeknownst to the author and contrary to his intent, wrote his famous preface to advise the reader that the *De Revolutionibus Orbium Coelestium* of Copernicus was intended, in the tradition of medieval astronomy, only in the former sense, a mathematical expedient.

There is no doubt that Galileo understood his own investigations to be an attempt to understand the true nature of things. It is well known that he preferred to be seen as a philosopher of nature rather than a mathematician. It can be debated as to whether Galileo himself was ever convinced that he had irrefutable proofs for Copernicanism (involved in that debate would be the very meaning of proof for him and for us) but it cannot be denied that he sought evidence to show that Copernicanism was really true and not just a mathematical expedient. Galileo rejected that Copernicanism was a hypothesis in the latter sense. He sought to find experimental verification of it in the former sense. Most of the Jesuit astronomers at the Roman College were of the same stance. Bellarmine, however, in carrying out the request of Pope Paul V to give a private warning to Galileo about Copernicanism, told him that he could only teach it as a hypothesis and Bellarmine clearly intended the Pythagorean use of the word, i.e., a mathematical expedient.

4. Bellarmine and Galileo on Holy Scripture

For Bellarmine the issue was that a sun centered universe, the one of Copernicus and Galileo, appeared to be untenable theologically because it contradicted Scripture. Many have interpreted Bellarmine's *Letter to Foscarini* (see Blackwell 1991) as establishing two conclusions which appear to make Bellarmine both the most open-minded of theologians and respectful of science. One must, according to this interpretation of Bellarmine, be circumspect in interpreting Scriptural statements about natural phenomena in the face of possible scientific proofs contrary to the interpretation. If such proofs are forthcoming, one must reinterpret Scripture. Note that the epistemic primacy here is given to Scripture. Since Galileo had no irrefutable proofs of Copernicanism, the current interpretation of Scripture by theologians, including Bellarmine, should remain, but always subject to reinterpretation. Is this a correct presentation of Bellarmine's position?

Some interpret Bellarmine as saying: “As long as there are no proofs for the movement of the Earth about the Sun, it is necessary to be cautious in interpreting Scripture.” (see Poupard 1994, 93-97) What Bellarmine actually says is: “Should proofs be had, then we must go back and reinterpret Scripture.” The difference is: Bellarmine did not say: “Theologians should be cautious NOW in interpreting Scripture in expectation that proofs for Copernicanism might appear” but rather “ON THE DAY IN THE FUTURE that proofs might appear, theologians must be cautious in interpreting Scripture.”

The erroneous interpretation of Bellarmine's position is based on only a partial and selective reading of the *Letter to Foscarini*. In this letter Bellarmine had taken a very restrictive position by stating that:

> Nor can one answer that this [geocentrism] is not a matter of faith, since if it is not a matter of faith "as regards the topic", it is a matter of faith "as regards the speaker"; and so it would be heretical to say that Abraham did not have two children and Jacob twelve, as well as to say that Christ was not born of a virgin, because both are said by the Holy Spirit through the mouth of the prophets and the apostles (see Finocchiaro 1989, 67-69).

Clearly if geocentrism is a matter of faith "as regards the speaker" then openness to scientific results and circumspection in interpreting Scripture are simply ploys. They lead nowhere. Furthermore, Bellarmine cites Scripture itself in the person of Solomon to show that proofs for Copernicanism are very unlikely. At the end of the *Letter to Foscarini* Bellarmine appears to exclude any possibility of a proof by stating that our senses clearly show us that the sun moves and that the earth stands still, just as one on a ship senses that it is the ship that is moving and not the shoreline. Bellarmine stated:

> I say that if it [geocentrism] were really demonstrated ... then it would be necessary to proceed with great circumspection in the explanation of the Scriptural texts which seem contrary to this assertion and to say that we do not understand them, rather than to say that what is demonstrated is false. (Finocchiaro 1989)

What is often not cited is the next sentence of Bellarmine: "But I will not believe that there is such a demonstration until it is shown me." From the concluding sentences of the letter it is clear that Bellarmine was convinced that there was no such demonstration to be shown. A further indication of this conviction of Bellarmine is had in the fact that he supported the decree of the Congregation of the Index in 1616 which was aimed at excluding any reconciliation of Copernicanism with Scripture. If Bellarmine truly believed that there might be a demonstration of Copernicanism, why did he not recommend waiting and not taking a stand, a position embraced, it appears, by Cardinals Barberini and Caetani? And why did he accept to deliver an admonition to Galileo in 1616? This admonition prohibited Galileo from pursuing his research as regards Copernicanism. Galileo was forbidden to seek precisely those scientific demonstrations which, according to Bellarmine, would have driven theologians back to reinterpret Scripture.

Galileo's view of the interpretation of Scripture must be seen against the historical background of his times. Martin Luther's break with Rome in 1519 set the stage for one of the principal controversies to surface in the conflict of the Church with Galileo, the interpretation of Sacred Scripture. In the 4th Session of the Council of Trent, the reformation council, the Catholic Church in opposition to Luther solemnly declared that Scripture could not be interpreted privately but only by the official Church:

> Furthermore, to control petulant spirits, the Council decrees that . . . no one, relying on his own judgment and distorting the Sacred Scriptures according to his own conceptions, shall dare to interpret them according to his own conceptions, shall dare to interpret them contrary to that sense which Holy Mother Church . . . has held and does.

As we shall see, Galileo interpreted Sacred Scripture privately which contributed to his condemnation, even though he essentially anticipated by some 300 years the official teachings of the Church on the interpretation of Scripture. On 18 November 1893 Pope Leo XIII issued his encyclical *Providentissimus Deus* which called for the study of the languages, literary forms, historical settings, etc. of Scripture so that a fundamentalist approach to Scripture could be avoided. On 7 May 1909 Pope Pius X founded the Pontifical Biblical Institute which is dedicated to such studies.

One of the first indications that Scripture was to play an important role in the Galileo affair occurred over lunch in 1613 at the palace of the Grand Duke of Tuscany when the Duke's mother, Christina, became alarmed by the possibility that the Scriptures might be contradicted by observations such as those of Galileo which might support an earth-centered universe. Since Galileo was supported in his research by the Grand Duke and Duchess and in general by the Medici family, this episode was of acute interest to him. Although he was not present, it was reported to him by his friend, Benedetto Castelli. Galileo hastened to write a long letter to Castelli in which he treats of the relationship between science and the Bible (Favaro 1968, V, 282-288). In it Galileo stated what has become a cornerstone of the Catholic Church's teaching:

> I would believe that the authority of Holy Writ had only the aim of persuading men of those articles and propositions which, being necessary for our salvation and overriding all human reason, could not be made credible by any other science, or by other means than the mouth of the Holy Ghost itself. But I do not think it necessary that the same God who has given us our senses, reason, and intelligence wished us to abandon their use, giving us by some other means the information that we could gain through them - and especially in matters of which only a minimal part, and in partial conclusions, is to be read in Scripture.

Galileo was encouraged and supported in his thinking about Scripture by the publication of a letter by the Carmelite theologian, Antonio Foscarini, which favored Copernicanism and introduced detailed principles of the interpretation of Scripture which removed any possible conflict (see Blackwell 1991). Bellarmine responded to arguments of Foscarini by stating that:

> . . . I say that if there were a true demonstration that the sun is at the center of the world and the earth in the third heaven, and that the sun does not circle the earth but the earth circles the sun, then one would have to proceed with great care in explaining the Scriptures that appear contrary; and say rather that we do not understand them than that what is demonstrated is false. But I will not believe that there is such a demonstration, until it is shown me.

However, in the end, as I have stated above, Bellarmine was convinced that there would never be a demonstration of Copernicanism and that the Scriptures taught an earth-centered universe (Finocchiaro 1989)

Finally in June 1615 Galileo completed his masterful Letter to Christina of Lorraine (Favaro 1968, 309-348). This is the same Christina, Duchess of Tuscany of the Medici family to whom he now essentially proposes what the Catholic Church will begin to teach only about three centuries later, i.e., that the Books of Scripture must be interpreted by scholars according to the literary form, language and culture of each book and author. His treatment can be summed up by his statement that:

> . . . I heard from an ecclesiastical person in a very eminent position [Cardinal Baronio], namely that the intention of the Holy Spirit is to teach us how one goes to heaven and not how heaven goes. (Favaro 1968, 319)

In the end, however, the Church's Congregation of the Holy Office will declare that putting the sun at the center of the world is "foolish and absurd in philosophy, and formally heretical since it explicitly contradicts in many places the sense of Holy Scripture." (Favaro 1968, 321) The Church had declared that Copernicanism contradicted both Aristotelian natural philosophy and Scripture. This sentence will over time come home to roost!

5. The Events of 1616 and 1633 and the Consequences

In 1616 the Congregation of the Holy office issued a decree in which Copernicanism was condemned: it was absurd in philosophy (contradicted Aristotle) and formally heretical to hold that the sun was stationary at the center of celestial motions; it was absurd in philosophy and, therefore, suspect of heresy that the earth moved. The "therefore", although not formally in the wording of the decree is justified and very important. For the consultors of the Holy Office, the natural philosophy of Aristotle was so "sacred" that to deny it was tantamount to heresy. Soon after that decree appeared, at the behest of Pope Paul V Galileo was summoned to appear before Cardinal Bellarmine to accept a private admonition not to promote Copernicanism. In 1633 Galileo was condemned by the same Holy Office for having, in fact, in his *Dialogue* promoted Copernicanism, contrary to the injunction given to him in 1616. What part did Bellarmine have in all of this?

Bellarmine, of course, played a key role in the events of 1616. There have been many caricatures of his role, most notably de Santillana's (1955) the *Crime of Galileo*. The most faithful historical reconstruction of his role is given by Fantoli (2003, 138-168) and I summarize it here. Bellarmine was not a dye-in-the-wool Aristotelian, as noted above. But he was profoundly convinced that, contrary to the statement of Cardinal Baronio, replayed by Galileo, that: "Scripture teaches us how to go to heaven and not how the heavens go", in some instances the Scriptures do teach a natural philosophy. The best presentation of his position is in his *Letter to Foscarini*, which has, as I have described above, been misinterpreted by many Churchmen.

While the personality and high Church office of Bellarmine might tend to dominate any judgment of the role of the Jesuits, one wonders whether he is representative of a Jesuit position, if there be such. Probably most representative is that of the Jesuit astronomers of the Roman College, although simplifications are required even here to be able to speak of a Jesuit position. The Jesuits astronomers were not ivory tower "pure scientists." They lived and breathed a climate of diversity and intellectual intensity with their philosopher and theologian colleagues. They were devoted with the same fidelity to tradition and Church teaching, but they were also participants in the birth of modern science. Even the preliminary discoveries of that science were challenging the existing basis of Catholic doctrine and the very meaning of Scripture. There was no philosophy of nature to replace that of Aristotle which was crumbling under the onslaught of astronomical observations. The position of the Jesuit astronomers in general was one of expectation and certainly not one of timidity or fear. The adventure of scientific discovery was only beginning. Eventually all else would accommodate itself to what the universe had to say to us.

Both Galileo and Bellarmine were devoted to the Church and searching for a compromise between the new discoveries about the universe and a fidelity to Scripture. But they clearly differed in their views of the role of Scripture. Galileo and many of Bellarmine's brother Jesuits at the Roman College were clearly on the side of openness to scientific discovery unfettered by an erroneous view of Scripture. They would have sought to keep the Church from declaring itself on a worldview that was in its infancy. This is what Galileo sought, and rightly so.In the Galileo case the historical facts are that further research into the Copernican system was forbidden by the decrees of 1616 and then condemned in 1633 by official organs of the Church with the approbation of the reigning Pontiffs. Galileo was a renowned world scientist. The publication of his *Sidereus Nuntius* (the Starry Message) established his role as a pioneer of modern science. He had provoked anew the Copernican-Ptolemaic controversy. Observational evidence was increasingly overturning Aristotelian natural philosophy, which was the foundation of geocentrism. Even if Copernicanism in the end proved to be wrong, the scientific evidence had to be pursued. A renowned scientist, such as Galileo, in those circumstances should have been allowed to continue his research. He was forbidden to do so by official declarations of the Church. Why did Bellarmine not take this position in 1616? I surmise that in the end he was seriously mistaken in judging that Scripture actually taught anything about natural philosophy. That is, for his time, an understandable, but serious mistake.

6. The Future

Could the Galileo affair and the tensions between Bellarmine and Galileo, interpreted with historical accuracy, provide an opportunity to come to understand the relationship of contemporary scientific culture and inherited religious culture? In the Catholic tradition there is what Blackwell (1998) calls a "logic of centralized authority" required by the fact that revelation is derived from Scripture and tradition which are officially interpreted only by the Church. In contrast, authority in science is essentially derived from empirical evidence, which is the ultimate criterion of the veracity of scientific theory. In the trial of 1616 Blackwell sees the defendant to be a scientific idea and the authority which condemned that idea to be derived from the decree of the Council of Trent on the interpretation of Scripture. What would have been the consequences if, instead of exercising its authority in this case, the Church had suspended judgment? But, having already exercised that authority over a scientific idea, the Church then applied that authority in the admonition given by Bellarmine to Galileo in 1616. That admonition would go on later to play a key role in the condemnation of Galileo in 1633 as "vehemently suspect" of heresy.

There is a clear distinction here between authority exercised over the intellectual content of a scientific idea and that exercised over a person in the enforcement of the former. This results in the

fact that, as Blackwell (1998) so clearly puts it, the abjuration forced on Galileo in 1633 "was intended to bend—or break— his will rather than his reason." Could this contrast between the two authorities result in other conflicts? It is of some interest to note that in the third part of the discourse whereby he received the final report of the Galileo Commission John Paul II says:

> And the purpose of your Academy [the Pontifical Academy of Sciences] is precisely to discern and to make known, in the present state of science and within its proper limits, what can be regarded as an acquired truth or at least as enjoying such a *degree of probability that it would be imprudent and unreasonable to reject it*. In this way unnecessary conflicts can be avoided (John Paul II 1994).

Would that the Congregation of the Index in 1616 had displayed such wisdom regarding the degree of probability for Copernicanism! Would that this wisdom may guide the Church's action in times to come!

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