THE YOUNG BELLARMINE'S THOUGHTS ON WORLD SYSTEMS

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Introduction

Many interpretations have been given of the Copernican-Ptolemaic controversy, some of which seem to dominate historical research.[1] At times new historical evidence is unearthed which challenges some of those interpretations. It is with this in mind that we wish to report upon the existence of further historical evidence concerning the Copernican-Ptolemaic controversy and our project to examine this material with a specific question in mind: What role did the Roman College play in the 16th and 17th century investigations of cosmology? By Roman College we mean in a very broad sense the cultural influence of that institution established by Ignatius of Loyola, founder of the Jesuits. A frequent misconception is that the cultural influence of the Society of Jesus, or anyone of its institutions, in those early days of the order was monolithic, that there was a typical Jesuit way of thinking. Such a characterization has its roots, of course, in the great thelogical controversies of those years, notably the controversy *De auxiliis*, and the alignment of religious congregations on one or other side of the controversy. Even in such controversies, however, it is clear, if one examines the empirical evidence, that there were vast differences of opinion among Jesuits. That aside, however, it is patently clear that one must be very careful in asserting that there was such a thing as a "Roman College" of a "Jesuit" school of thought in cosmology or mathematics or the sciences in general.[2]

The Society of Jesus was founded in 1539 only four years before the publication of Copernicus' *De revolutionibus*. The young Society was only beginning to grow into an identifiable group when in 1564 Galileo Galilei was born. Furthermore, what was true of the Society

in its early days, and is true of any sizeable group of people involved in intellectual work, is the decidely different mentality of those who administer and govern and those who are engaged in the daily tasks of research. In those days the governing body of the Society of Jesus consisted mostly of men trained in philosophy, theology, and the humanities.[3] There was a noticeable contrast between their way of thinking and that of the mathematicians and scientists of the Roman College.[4]

As to the phrase, "16th and 17th century investigations of cosmology," we choose to place the question in this manner so as to leave as wide a field as possible for discussion, specifying in detail each part of that field as it arises from the empirical evidence. Otherwise we risk categorizing the evidence before we have thorougly investigated it. Such characterizations as "the case of Galileo," "the Copernican-Ptolemaic controversy," "the New Astronomy versus the Old," etc., are in a sense each too specific. For instance, Galileo is surely a principal protagonist of 17th century cosmological thought, but he is not the only one. We distort history if we *a priori* put him too much center stage. Despite attempts to hastily categorize it, the revolution of Copernicus' *De revolutionibus* was not against the Old Astronomy but rather against some old astronomers.

The project we are undertaking and will now describe is inspired by a certain view of history. Without prejudice to other views, we propose that, if one knows the principal characters and their doings, and can uncover something of their motivation, one has the principal ingredients of history. In Rome in the archives of the Jesuit Generalate *(Archivum Romanum Societatis Iesu* [ARSI]) and in the Biblioteca Nazionale there exist a number of unpublished documents which are of interest for an examination of the role of the Roman College in the 16th and 17th century controversies on world systems. These documents consist of unpublished manuscripts, correspondence, and internal Jesuit reviews of manuscripts destined for publication.[5] In many cases the documents are the work of some of the principal protagonists in the cosmological controversies. We are preparing to publish this documentation in the original language with an English translation, notes, and commentary. For the present we have the following in mind: (1) the *Louvain Lectures* (*Prelectiones Lovanienses*) of Robert Cardinal Bellarmine given during the years 1570-1572; (2) the autograph copy of the 1616 Declaration of Bellarmine to Galileo; (3) correspondence during 1619 between Grienberger, the successor to Clavius at the Roman College, and de Burgos, a military officer to Cosimo II, Granduke of Tuscany; (4) Biancani's unpublished manuscript on *De his quae moventur in acqua* and a review of it; (5) text of the conference of an anonymous professor of philosophy of the Roman College on the occasion of the appearance of the comet of 1618. The documents (1) and (2) have been published[6] and we are now proceeding with the preparation of

the other documents for publication. In the current paper we wish to discuss the principal conclusions which have already been indicated in the annotated commentary to our publication of Bellarmine's *Louvain Lectures.*

Background to the Louvain Lectures

Robert Bellarmine played an important role in the history of Galileo from the publication of the *Siderius Nuncius* in 1610 to the first process of 1616. We should recall that Bellarmine was age 69 when he made his first contacts with Galileo and 74 when the first process took place. He died at the age of 79 in 1621 between the first and the second process against Galileo. Much of what is commonly written concerning Bellarmine's involvement in the Church's controversy with Galileo is based exclusively upon the activities of these last ten years of his life. We now have evidence to show that at a very early period in his life, at the age of twenty-eight, Bellarmine had already begun to develop a quite independent view of many of the principal elements involved in the cosmological controversies which were to explode in his later years.

Bellarmine's known writings on astronomy and cosmology are few, involving mostly some correspondence with Galileo and others. From this material a certain picture of Bellarmine's role has emerged which contains numerous erroneous presuppositions. A recent publication by Baldini [7] has discussed Bellarmine's astronomical views and has served to correct many of these erroneous judgements. Much of what is presented by Baldini (unfortunately published only in Italian) is implicit in what we discuss here and some of it is explicit in the commentary and notes to the publication of the *Louvain Lectures.* [8] The historians of theology and political theory have actually investigated Bellarmine's writings more throughly than the historians of science. Bellarmine is frequently presented as a typical cultured man of his time, foreign to the sciences and not informed on the scientific method. He is also seen as one who, out of fidelity to the Church and its theology, was thoroughly Aristotelian and rejected Copernicanism on principle and *a priori*. He is referred to as an epistemological pragmatist who preached to Galileo the exclusively hypothetical nature of Copernicanism for purely pragmatic reasons.

Bellarminé's knowledge of astronomy derives from the following activities. Between 1565 and 1570 he taught a course on the "Sphere of the Fixed Stars," probably using Piccolomini's *Sfera,* [9] which contained arguments against a moving earth. During the years 1570-1572 he gave lectures at Louvain on the first questions of the *Summa* of St. Thomas Acquinas concerning the creation. [10] From 1576 he held a chair at the Roman College and he followed closely and with interest the reform of the calendar through his close

friendship with Clavius. He discussed with Clavius such issues as the variations in the length of the tropical year and the precession of the equinoxes.[11] As rector of the Roman College from 1592 to 1595 he saw to the strengthening of the mathematics teaching under Clavius.[12] In fact, Bellarmine initiated a period of struggle between the philosopher-theologians and the mathematician-scientists of the Society of Jesus when he supported a deeper awareness of the independent epistemological value of the latter. In this paper we concentrate upon the earliest of Bellarmine's writings concerning astronomy, namely the *Louvain Lectures*. Many of the themes we find there prove to be recurrent ones which continued to mature as Bellarmine aged. It is important to note that the lectures, which reveal a skeptical attitude of Bellarmine toward Aristotelianism, where completed before the appearance of the Nova of 1572, an event which created widespread criticism of the Aristotelian cosmology. Bellarmine's thought in the *Louvain Lectures* is independent of that event.[13]

The Astronomy of the Louvain Lectures

From Bellarmine's writings one cannot derive a consistent cosmology but only certain tendencies in his thought. Many of these tendencies are either clearly enunciated or at least foreshadowed in the earliest of Bellarmine's writings, the *Louvain Lectures*. We wish now in a summary fashion to indicate these tendencies, while referring the reader for further detail to the annotated commentary which accompanies our publication of selected texts of the *Lectures*.[14]

Basing his arguments upon Scripture and the Church Fathers, Bellarmine states that there are probably three heavens: the atmospheric one, the starry or fiery one, and the empiraeum.[15] The atmospheric heaven we know of through sense experience, the empiraeum through revelation. It is the task of astronomers to investigate the internal state of the second heaven. When Bellarmine sets himself to do this he displays more independence in astronomy and philosophy than he does in theology. He holds firmly to geocentrism because of his view of Scripture in general and of Genesis in particular and because of the traditions of the Church Fathers. On the other hand he displays a remarkable independence from the traditional thinking of Aristotle, Thomas, and Ptolemy when he discusses the nature of the second heaven. He denies the Aristotelian notion of the *simplicitas* of the heavenly motions, whereby each body could have only one regular motion and all apparent motions were resolved into a combination of uniform circular motions. He is, therefore, skeptical about what he sees as an arbitrary multiplication of spheres in Ptolemaic-like systems. He thinks that it is possible that every heavenly body has, within the fluid medium of the second

heaven, a real irregular motion whose origins are internal to it.[16] In this way of thinking Bellarmine breaks with Aristotle, Ptolemy, Copernicus, and Galileo and aligns himself with the approach of Kepler. There are, of course, great difficulties with Bellarmine's conception. If one excludes both fixed spheres and the mobility of the earth, then it is conceptually extremely difficult to explain the motions of the heavenly bodies.[17]

Bellarmine takes a strong stand against Aristotelianism when he asserts that the sky is corruptible[18] and that the stars are made of fire.[19] He thinks that the number of stars in existence may be greater than the number we actually see.[20] Because its period would be about six times longer than the age of the universe itself, he denies the reality of precession.[21]

In the course of his productive life, from the *Louvain Lectures* of 1570 to 1572 until his death in 1621, he saw his rejection of some of the major tenets of Aristotelianism vindicated by developments in astronomy: those of Brahe and Kepler against the Aristotelian notion of *simplicitas* and the multiplicity of spheres, the observations of Galileo reported in the *Siderius Nuncius* against the Aristotelian incorruptibility and immutability of the heavens and against the multiplicity of spheres.

The Epistemology of the Louvain Lectures

There is a certain consistency to Bellarmine's astronomical views as expressed in the *Louvain Lectures* in the sense that he both holds fast to geocentrism and rejects Ptolemaic multiplicity of spheres based on the *simplicitas* of motions in Aristotle for one and the same reason: namely, the primacy of Scripture as a source of knowledge. For Bellarmine the literal sense of Scripture was not to be abandoned unless absolutely demanded by philosophical, mathematical, and scientific arguments.[22] It is perhaps at this point that the "meeting of faith and science," the title of this conference, becomes most specific, acute, and personalized in the diverse views of Bellarmine and Galileo on the relationship between two different ways of knowing: Scripture and philosophical/scientific investigation. For Galileo there was a primacy to scientific investigation. Where the Scriptures spoke of astronomical matters the Scriptures must be interpreted in a way that was consistent with the results of scientific investigation. In some sense this was also accepted by Bellarmine. He enunciates it in his *Louvain Lectures*[23] and it is implicit in his letter to Foscarini. But Bellarmine limits the application when it comes to a "literal" text where a statement appears evident and univocal. Here there can be no further search for a meaning (metaphorical, accomodation to common language usage, etc.) and the apparent conflicting results of scientific investigation cannot be

accepted. Thus Scripture, at least in its literal passages, was a criterion for the acceptability of scientific results. Both Bellarmine and Galileo accepted as axiomatic the need for agreement between Scripture and nature, but for Bellarmine the fallibility of human investigation (such as Aristotelian cosmology) found a criterion in the non-equivocal and literal assertions of Scripture.[24]

Bellarmine also enunciates in a limited way in the *Louvain Lectures* the autonomy of scientific research with respect to the research of theologians.[25] On the other hand he reveals at times a certain skepticism about cosmological models when, for instance, he makes such statements as that we can only know that the heavens exist; their nature we will only know when we arrive there.[26]

Summary Reflections

Upon publishing the autograph copy of Bellarmine's Declaration of 1616 to Galileo[27] we proposed an interpretation of Bellarmine's emendations to that manuscript in the sense that he was attempting to provide as wide a defense as possible to Galileo, while still insisting that Galileo accept the judgment that Copernicanism could only be presented as an hypothesis. At that time Bellarmine was 74 years of age. In the *Louvain Lectures*, given when he was 28-29 years of age, we believe one can see the early beginnings of this respect of Bellarmine for an unprejudiced search for understanding. While he manifests a constant concern and the deepest respect for tradition, he also shows a keeness to evaluate independently all the facets of a problem. To appreciate this let us, for purposes of discussion, accept the quite reasonable position that the thought of Kepler, expressed in his *Astronomia Nova* and *Epitome Astronomiae Copernicanae,* was most characteristic of the new astronomy of the 16th and 17th centuries. The essential newness consisted in the break with the old principle of having to reduce all celestial motions to uniform circular motions. In this sense both Copernicus and Galileo belonged to the old school. Bellarmine did not. From the time of his youthful *Louvain Lectures* he denied the need for the Aristotelian *simplicitas* of the motion of heavenly bodies and the need for a multiplicity of spheres. He asserted that the heavenly bodies moved through a fluid medium by some power of their own. That he was not also convinced of heliocentrism was due to his allegiance, if we may call it that, to a certain notion of Scripture as we have discussed above. He was a theologian and a Churchman — for much of his adult life a Church administrator — and not a scientist. Yet in his thinking on scientific topics he was more free than when he thought as a theologian, at least as to his view of Scripture. One is tempted to hazard a guess that Galileo, the scientist, was somewhat the opposite — more free in his view of Scripture, as witnessed in his

Letter to the Duchess Christina and elsewhere, and more traditional in his adherence to Aristotelianism, at least as concerns the motions of the heavenly bodies. The interplay between these two personalities is surely one of the principle ingredients in the history of 16th and 17th century cosmological thought. It is at least curious to recall that Galileo Galilei was in the sixth year of his life when the twenty-eight year old Robert Bellarmine began at Louvain a series of lectures wherein he already reveals certain reflections on world systems. As they matured these reflections prepared him for his role as one of the principal protagonists with Galileo in the unforgettable events which characterized the meeting of faith and science during the first three decades or so of the 17th century.

REFERENCES

[1] Such, for instance, have been the theses of Duhem (*Sozein to phainomena. Essai sur la notion de théorie physique de Platon à Galilée,* Paris, 1908) and De Santillana (*Processo a Galileo,* Milan, 1960) concerning the role of Bellarmine in the 16th and 17th controversies over world systems.

[2] One can cite, for instance, the contrasts between the mathematicians and the theologian-philosophers of the Roman College.

[3] A notable exception to this trend is Vitelleschi, a professor of natural philosophy at the Roman College, who later became General of the Jesuits.

[4] We plan to publish material from the *Archivum Romanum Societatis Iesu* (ARSI), notably a selection from the internal Jesuit censorship of manuscripts destined for publication, which demonstrate this contrast.

[5] The practice of the Society of Jesus was, and is, that material destined for publication must be reviewed by three members of the Order. They were called *revisori*.

[6] Baldini, U. and Coyne, G.V. 1984, "The Louvain Lectures (Lectiones Lovanienses) of Bellarmine and the Autograph Copy of His 1616 Declaration to Galileo," *Vatican Observatory Publications, Special Series, Studi Galileani,* Vol. 1, No. 2.

[7] Baldini. U. 1984, "L'astronomia del cardinale Bellarmino," in *Novità celesti e crisi del sapere. Atti del Convegno Internazionale di studi galileiani (Pisa, Venezia, Padova, Firenze, 18-26 March 1983)* Florence, 293-305.

[8] Baldini and Coyne 1984, *op. cit.*

[9] Piccolomini, A. 1540, *Della sfera del mondo e de le stelle fisse libro uno,* Venice.

[10] Baldini and Coyne 1984, *op. cit.*

[11] Baldini, U. 1984, op. cit., p. 293.

[12] *Ibid.*

[13] Baldini and Coyne 1984, *op. cit.* p. 5.

[14] Baldini and Coyne 1984, *op. cit.*

[15] Ibid., pp. 14-17, 37 (note 71).

[16] Ibid., pp. 18-22, 32-33 (note 39), 38 (note 82), 41 (note 94).

[17] Bellarmine later on admitted the inadequacy of his limited conception. See Baldini and Coyne 1984, *op. cit.,* pp. 36 (note 64), 41 (note 94).

[18] Baldini and Coyne 1984, *op. cit.,* pp. 8, 30 (note 4).

[19] *Ibid.,* pp. 18-19.

[20] *Ibid.,* pp. 12, 34 (note 40).

[21] *Ibid.,* pp. 22, 23, 43, 44 (note 95).

[22] *Ibid.,* pp. 39-41 (note 92).

[23] *Ibid.,* p. 20 (note 93).

[24] *Ibid.,* pp. 39-41 (notes 92 and 93), 45-46 (note 103).

[25] *Ibid.,* pp. 20, 39 (note 90).

[26] *Ibid.,* pp. 14, 36 (note 56).

[27] *Ibid.,* pp. 25-26. Note that line six of the English text must be corrected to read: "Galileo has *not* abjured into *our* hands."

II.

GALILEO AND THE DEVELOPMENT OF SCIENCE

Louvre.

Portrait of Galileo by Ottavio Leoni.