

INTRODUCTION: A NON-ARISTOTELIAN COSMOLOGY

Between 1626 and 1630 the Jesuit Cristopher Scheiner published at Bracciano the *Rosa Ursina*, a work recognized by historians both as an important element in the development of solar physics and as a contribution to the polemic between the author and Galileo¹. The final part of the book, however, takes on a more general character as it passes from specific phenomena to consider the ideas of the universe which are proposed to explain those phenomena. Thus Scheiner clearly divorces himself from the Aristotelian theory of the heavens. He shows that there exists an alternative theory, acceptable theologically and compatible with the strange phenomena which had been observed during the previous decades, beginning with the appearance of the Nova of 1572.

He first deduces certain physical implications from the observed phenomena, he then expounds on non-Aristotelian ideas of the Greek philosophers and astronomers, and finally he presents texts from the Scriptures and the Fathers which contrasted with Aristotle². Previous scripture exegesis by the Jesuits had always explained these texts in a vague or metaphorical way, thus minimizing their contrast with Aristotelian concepts³. But Scheiner, by breaking down the separation which existed in the Society of Jesus between mathematicians, philosophers and theologians in the areas of both research and teaching, affirmed the literal meaning of the texts and their agreement with the entire Patristic tradition and the most recent astronomical discoveries. He implicitly affirmed that the acceptance of Aristotelian cosmology in scholastic theology had been inopportune and that it had glossed over realities whose truth was clear on the basis of both scientific and scriptural considerations. These realities included: the existence of only one heaven, its material is not solid but fluid, it is immobile (the heavenly bodies move through heaven not with it) heavenly matter and early matter are from the beginning equal, the igneous nature of heaven and heavenly bodies. From these realities Scheiner was led to the possibility of changes in the heavens (including the formation and dissolution of heavenly bodies) and he interpreted some of the most controversial astronomical phenomena of the recent past as a manifestation of this possibility. To avoid having his position too far outside the current of Catholic thought and that of the Society of Jesus, he added to the list of Patristic opinions, a certain number of those of recent theologians, some of them Jesuits⁴, among whom was Robert Bellarmine, cited by him more than once. Scheiner attributed to Bellarmine, who had died only a few years before (1621), cosmological ideas that were decidedly non-Aristotelian⁵. These ideas of the Cardinal, as will be seen, implied abandoning certain points of the Ptolemaic System, although not geocentrism itself.

Historical studies concerning Bellarmine and the part he played in the events of 1615-1616 have almost completely ignored this aspect of his

thought. From Duhem onward his contribution to the thought on the subject has been identified with the epistemological ideas he expounded in his letter to Father Foscarini, which have been interpreted as an assertion of the cognitive limits of scientific theories⁶, an assertion directed specifically at a denial of the physical truth of the hypothesis of Copernicus. However, the new information from Scheiner shows that Bellarmine opposed certain postulates of physics (in part common to Greek thought in general, in part specifically Aristotelian) which, accepted into the Ptolemaic system, had led to a particular analysis of astronomical data. Thus for the history of astronomy, and of the early relationship between the Church and Science, Bellarmine's thought takes on an importance which has to do not only with methodology but with content⁷.

From these considerations certain questions arise. What were the sources of Scheiner's information? What is the source of Bellarmine's posture toward certain points of Aristotelian physics? What exactly were his ideas in cosmology and in astronomy?

In order to show that such unconventional assertions were nonetheless well founded, Scheiner mentioned his sources: besides two insignificant citations from *De Ascensione mentis in Deum*,⁸ he referred to letters of Bellarmine to the Jesuits, J. R. Ziegler (editor of the *Opera Mathematica* of Clavius) and S. Heiss, and to an item contained in a work of J. N. Smogulecki⁹. His principal documentation, however, was the correspondence between the Cardinal and the Prince Federico Cesi, which, learning of through J. Faber, he published in its entirety¹⁰. In response to a long letter of Cesi of 4 August 1618, where the Prince expounds on what seemed to him to be Scripture proofs of the fluidity of the heavens, the Cardinal wrote on the 25th of August:

"But that which I wished from Your Excellency is not to know that the Sacred Scripture and the Fathers held that the heavens are fixed and the stars move and also that the heavens are not hard and impenetrable like iron but rather soft and very easy to penetrate like air; these things I knew already; but what I wished to learn from Your Excellency is how to save the motions of the Sun and of the Stars, and especially of those which are fixed... When I was young, I tried to save the motion of the planets from West to East... by saying that their motion from East to West was not in twenty four hours for all of them but for the Sun it was twenty-four hours, for the moon it was twenty-four and a quarter, making it appear that the moon in its own motion had turned somewhat backwards, so that little by little it went away from and then approached the Sun. As for the motion of the planets from the south to the north, I tried to explain it by saying that the motion of the planets was not a perfect circle but a spiral, and so little by little they would pass from the south to the north and then would return by the same route..."

Scheiner did not examine in depth this application of the Cardinal's ideas to the planets and all evidence indicates that he knew of it only by means of this letter, while, as we shall see, the mathematicians of the Roman College had already discussed it about the year 1616. It is, however, evident that the letter not only expressed a belief in certain non-Aristotelian characteristics of the cosmos but also contains a sketch of a *theorica planetarum* which, although not developed mathematically, is nonetheless certainly not Ptolemaic. None of the edited works of Bellarmine mentions this sketch but, through an extended

search in numerous unedited works¹², it has been possible to establish that the phrases with which in 1618 he described the ideas of his youth to Cesi were not just chance meditative recollections but the almost literal citation of an insert on astronomy in the *Lectiones Lovanienses*, the greatest of his youthful works and perhaps the most important of his unpublished ones¹³.

The *Lectiones Lovanienses*

Historians have used indifferently the titles *Lectiones Lovanienses* and *Praelectiones Lovanienses* to designate the manuscripts of the theological lectures which Bellarmine gave at Louvain beginning in October 1570. Both titles are the result of sheer convention, because each of the four volumes which comprise the autograph manuscript of the work give at the beginning the simple indication of the part of the *Summa* which is being treated¹⁴. There exist an unknown number of copies of the *Lectiones*¹⁵. The autograph manuscript is obviously the essential reference and the texts published here are taken from it. In principle, however, we cannot exclude that there are copies written by a participant in the course, which contain variations and additions¹⁶. Among the four volumes of the original only the first contains material of interest to astronomy and cosmology, because Bellarmine (following the Thomistic order, as was always done in the Society of Jesus) discusses there the question placed by Aquinas in the *Summa Theologica* I. 1 concerning the description of the creation in Genesis. Some dates written in the volumes permit us to determine the schedule of the lectures. As mentioned above, the course began in October, 1570. By Easter of 1572 the lessons on questions I to LXXIV had been written and explained. The draft of the first volume terminates at the end of August 1572. As indicated in the Notes, this fact is of some interest because it proves that the arguments of that volume (all before question number LXX), in which Bellarmine criticizes the Aristotelian physics of the heavens and certain aspects of spherical astronomy, were written, and the respective lectures given, before the appearance of the Nova of 1572 which promoted the criticism of the Aristotelian cosmology even in some Jesuit commentaries. We know that the Nova was first observed only in November of that year¹⁷.

The Declaration Released to Galileo

The interventions of Bellarmine in what has been described as the first process against Galileo may be placed in four historical periods. The first comprises the time from the first exchange of ideas of the Cardinal with Galileo (Rome, 1611) up to the letter of 1615 to P. A. Foscarini. It includes the noted letter to the mathematicians of the Roman College inquiring about the exactness of the telescopic observations of Galileo. The second period corresponds to the activity of the Cardinal within the Congregation of the Index, up until the decree condemning Copernicanism (from late 1615 to February 1616). Obviously this was the period most removed from the public

eye and is, therefore, the least documented. Then there is the communication at the end of February 1616 to Galileo from Bellarmine of the contents of the decree. Finally, there is the presentation to Galileo at his request of the noted declaration from Bellarmine concerning the fact that he had not been asked to abjure nor had he been subjected to any other provision of ecclesiastical authorities (26 May 1616).

Each of these periods is only known through the documents printed by Favaro in his edition of the *Opere* of Galileo. This means that no substantial data have been added for eighty years. Thus the numerous reconstructions of these events have varied a great deal more in interpretation than in documentation, while a definitive judgement remains impossible because there is no completely adequate documentation for any of the periods considered¹⁸. The papers of Bellarmine in the archives of the Jesuits in Rome (*Archivum Romanum Societatis Iesu*; hereafter referred to as ARSI) contain little information for the periods one through three¹⁹ and only one document of interest for the fourth period, the hand-written draft of the Cardinal's declaration to Galileo. At the printing of the declaration in a definitive text, which he found in the codex of the Archivio Segreto Vaticano, containing the documents of the process against Galileo, Favaro gave some information on the draft which he read in a codex then located, as the other documents we are considering here, in the Vatican Archives, but now found in ARSI (*Opera Nostrorum*, 243 I)²⁰. Favaro also noted that in the codex the hand-written declaration of Bellarmine was followed directly by two short excerpts of letters without the author's name but certainly written to Galileo. The one he was able to recognize as an excerpt pertaining to a letter of G. F. Sagredo to Galileo (Venice, 23 April 1616). The complete text of this letter he found among the manuscripts of Galileo in Florence. The second excerpt (dated Pisa, 20 April 1616) did not have a counterpart in the manuscripts of Galileo and Favaro printed it separately in the *Opere*, considering it to be (an almost certain hypothesis) a part of a letter of Benedetto Castelli²¹. The excerpts made it clear that in order to prove to the Cardinal the reality of the rumours that he had been condemned, Galileo showed him the two letters, and that Bellarmine requested that the two important passages be transcribed, probably in order to be able to document the reasons whereby he had consented to write the declaration.

As Favaro had already pointed out, there are two phrases in the manuscript which the Cardinal later on cancelled, and they were not, therefore, transcribed into the copy given to Galileo. In addition there is a sentence added in the margin. Favaro did not, however, discuss the reasons or the significance of the corrections. We shall discuss this in the Notes.

Particulars concerning the edition, the translation and the commentary on the Lectiones:

The manuscript of the *Lectiones* displays Bellarmine's way of working. His text is put together with a whole series of additions, modifications, and cancellations, where the writing is superimposed to such an extent that in some cases it is difficult to read, especially when one also considers the

difficult handwriting of the Cardinal and his frequent use of abbreviations. The style, literary usage and punctuation are partially that of classical Latin and partially that of the scholastics. At times there are hasty and even erroneous expressions which can be explained by the fact that the material was not planned for publication. We faithfully reproduce these characteristics in this publication, even in the very frequent case (common in 16th Century usage) of lower case letters at the beginning of sentences. The one exception is that we have spelled out many abbreviations which would otherwise not have been easily understood.

The selection given here does not include all of the parts of Volume I of the *Lectiones* which have to do with physics, cosmology and astronomy, but only those which either spell out those physical characteristics of the universe which the Cardinal held to be plausible or describe a planetary model derived from those characteristics.

Every translation into modern languages of ancient or medieval astronomical terms encounters difficulties. Since the meaning of a term depends upon the distinct characteristics of the class of objects which it designates, its use varies with time as the ideas on the nature of the designated objects varies. The text of Bellarmine frequently offers a good example of this, as he uses indifferently such terms as *astrum*, *sidus*, *stella*, *planeta*. These terms varied in current Latin and Greek usage²². Usually a general meaning can be attributed to *astrum* and so the translation, "heavenly body"; but there is no systematic norm which one can apply to the other terms, and their meaning has been determined in each particular case and the modern term chosen which best fits a designated class of objects. The notes are intended to provide certain data helpful for the interpretation of the texts and for clarifying certain textual references and the relationship between the texts²³.

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NOTES TO INTRODUCTION AND TEXTS

In these notes the name of an author followed by a date refers to writings listed with that index reference in the Bibliography at the end. In the notes to the *Lectioes Lovanienses* there are many references to the *Patrologiae Cursus Completus* (Lutetiae Parisiorum 1844 and ff.) of J. E. Migne. In such cases P. L. and P. G. refer to *Patrologia Latina* and to *Patrologia Graeca*. Roman numerals indicate the volume and arabic numerals the column.

Notes to the Introduction: A Non-Aristotelian Cosmology

1. Scheiner, C. 1626-1630.
2. Book IV, part II: c. XII ('Ad physiologiam caelestem plurimae Veritates panduntur e Phaenomeno solari'); XXIII ('Pro natura Solis ignea insinuantur auctoritates philosophicae'); XXVIII ('Pro caelo liquido antiquorum Philosophorum auctoritates'); XVII ('Pro Natura Solis, Astrorum et Caeli ignea, Auctoritates Sanctorum Patrum'); XXII ('Pro Natura Solis ignea auctoritates e Sacris litteris'); XXIV ('De Caeli et siderum naturali corruptibilitate, auctoritates ex sacra Scriptura'); XXV ('Pro natura caelorum corruptibili sancti Petri epistola affertur'); XXVI ('Pro liquida caeli substantia... Auctoritates ex sacra Scriptura... Auctoritates Sanctorum Patrum').
3. This attitude will be considered further on in Pereira.
4. Book IV, Part II, c. XIX ('Pro Natura Solis, astrorum et Caeli ignea, auctoritates Doctorum recentium'); XXVII ('Pro natura caeli vel liquida vel ignea, vel utraque auctoritates Theologorum Neotericorum, Philosophorum et Physiologorum'); XXIX ('Pro caelo liquido auctoritates astronomorum').
5. Scheiner, C., 1626-1630, 644 (Bellarmino, following the Scriptures and not Aristotle, has admitted the existence of water in the heavens, the future disintegration of the heavens, the igneous nature of heavenly material); pp. 731-733 (a letter of the Prince F. Cesi to J. Faber in which the founder of the Accademia dei Lincei confirms that the Cardinal had expressed these ideas to him many times). As a comment Scheiner (p. 733) added that Bellarmine had based his thesis "not on human understanding but on the divine word, not on his personal opinion but on the common thought of the Fathers, not on a sudden impulse but on the experience of a life of study carried out for many years; and he did this fully aware that he was acting against that torrent of the teaching of the Schools which dragged along with itself into error the mathematicians, who seek to resist since they are inclined to a judgement altogether the opposite". In fact Cesi wrote to Faber (p. 731) that Bellarmine had told him that he had not divulged his astronomical ideas "because of the opposition which the Schools usually raised".
6. Historiography has commonly accepted Duhem's (1908) interpretation of the topics of the letter, although not necessarily his positive evaluation of them. For a different opinion see Baldini (1984).
7. From this point of view Bellarmine's thought has remained practically unknown to historians. This can be explained by the fact that *Rosa Ursina* has been studied only by specialists for its technical content, which is concentrated in the first part of the work (see, for example, Schreiber 1898). Thus it has happened that, even such a standard work on the process of Galileo as that of De Santillana

(1960, 195-197) presents Bellarmine as incompetent in astronomy and more rigid than St. Thomas himself in defending Aristotelean cosmology. In the same book (pp. 205-206) it is assumed as established that, of the *De Revolutionibus* of Copernicus, Bellarmine knew only the preface of Osiander, adding that it would have been enough for him to read the dedication of Copernicus to Paul III in order to change his judgement on the work. In a subsequent note it will be shown that Bellarmine recorded a passage precisely from the dedication. For Bellarmine's knowledge of Copernicus' ideas see Baldini (1984).

8. Bellarmine R., 1615.
9. Scheiner, C., 1626-1630. On Ziegler see Burke-Gaffney (1944, 23, 36, 107); for his teaching career see Fischer (1978, 75, 224); for his works see Sommervogel (1890, VIII, 144). On Heiss see Sommervogel (1890, IV, 225-232). The letter of Bellarmine was written by 1614 because Heiss died on 20 July of that year (Fejer 1982, I, 118). For the writing of Smogulecz see Schönberger (1626), who was probably the true author of it (Sommervogel 1890, VII, 848). In 1629 Smogulecz gave some conferences at the Roman College (Villoslada 1954, 269) and it could be that Scheiner came to know his ideas on these occasions.
10. Scheiner, C., 1626-1630, 777-784.
11. *Ibid.*, 783 (there follows on p. 784 a Latin translation of the letter).
12. Almost all the extant manuscripts of Bellarmine are found in two collections, both in Rome. One is in the Archives of the Pontifical Gregorian University (APUG) where there are about 35 codices (a list is given in Kristeller 1963, II, 136-7). The other is in the codices of *Opera Nostrorum* of the Archivum Romanum Societatis Jesu (ARSI), numbers 230-239 and 249-251. A collection of letters is found in 240-248. A discussion of these collections is in Le Bachelet (1911) together with an indication of the parts that are published (up to about 1910).
13. Compare the text of the letter from "when I was a youth..." with the text of the *Lectiones* located at the end of folio 232.
14. Thus at the beginning of Volume I (ARSI, *Opera Nostrorum* 234, Ir) Bellarmine wrote: *In Primam partem D. Tho. Lectiones*. For information on the work see Tromp (1933). For unknown reasons Bellarmine always refused to publish it and at his death, by his last will, the manuscript together with his books and letters went to the library of the Roman College. At the time of the suppression of the Society the manuscript went to the Archivio Segreto Vaticano and in recent times to ARSI where it is located in *Opera Nostrorum*, 234-237.
15. Sommervogel (1890 I, 1252-3) mentions at the Letter D a copy listed in the catalog of 1832 of the Van de Velde library of Gand, at the letter K a copy in the University of Cologne library, at the letter P the autograph presently in ARSI. The copy in Cologne, consisting also of four volumes (MSS. 149 I - IV) is described in Vennebusch (1976, 117-121).
16. The original manuscript has frequent annotations, references and quotations to be developed more fully. Bellarmine probably made these during the lectures.
17. See Cecchini-Gratton, (1942) and Clark-Stephenson (1977). Further on we will recall the mention of the Nova by Clavius and Pereira. M. Vitelleschi, future General of the Society of Jesus, also speaks of it in his physics lectures at the Roman College (1589-1590). See Wallace (1977, 269).
18. So the activity of Bellarmine within the Congregation of the Index has been reconstructed on conjectures and judged in contradictory ways. To some it appears that Bellarmine provided a moderating influence, since Copernicus' work was not completely prohibited but only suspended until corrected, and the

use of his teaching for purposes of calculation was allowed. Others, however, see his position as being that of the intransigent conservatives. In reality we simply do not have sufficient historical material to substantiate these interpretations.

19. These elements are: (A) ARSI, *Opera Nostrorum* 243, II, 258r. The handwritten draft of Bellarmine's letter to the mathematicians of the Roman College (29 April 1611), asking their opinion about the telescopic observations of Galileo. The text is identical to that of a copy given to Galileo and printed by Favaro in the *Opere*; (B) ARSI, *Opera Nostrorum* 245, 43r. Two brief excerpts from two of the works included in the decree of 1616: the commentary on the Book of Job by Diego de Zuñiga and the book of Copernicus. "Ex Didactico Stunica. In caput nonum Job, n. 6. Quod autem hoc capite Ecclesiastes, et multis aliis Scriptura Sacra Solis motum commemorat, quem centro universi immotum stare vult Copernicus, nihil eius placito adversatur. Num motus terrae in sermonibus soli assignatur, sic ut terrae cursum saepe solis cursum appellent". "Ex epistola Nicolai Copernici dedicatoria ad Paulum III in fine. Si fortasse erunt ματαιολογοι qui cum omnium mathematicum ignari sint, tamen de illis iudicium assumunt, propter aliquem locum Scripturae male ad suum propositum detortum, ausi fuerint hoc meum institutum reprehendere, ac insectari, illos nihil moror, adeo ut etiam illorum iudicium, tamque temerarium contemnam". The two excerpts certainly go back to the time when the Congregation of the Index was discussing these works. The second excerpt, in particular, shows that Bellarmine was aware that Copernicus had attributed physical reality to his mathematical model.
20. Favaro, A., 1890-1909, XIX, 348, n. 1
21. *Ibid.* XII (the letter of Sagredo) and 254 (a fragment of the letter attributed to Castelli).
22. Consult, for example, the word *ASTRUM* in the *Thesaurus Linguae Latinae*, II, 968.
23. For a fuller discussion of some of these points see Baldini (1984).