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PHYSICS, NEO–THOMISM AND MOSAIC COSMOGONY AT THE ROMAN COLLEGE: THE CASE OF THE JESUIT GIAMBATTISTA PIANCIANI

ROBERTO MANTOVANI *

ABSTRACT. Preliminary the figure of Abbot Feliciano Scarpellini and the scientific environment in Rome in the first half of the XIX century are introduced. It is then analysed the life and work of the physicist and philosopher Giambattista Pianciani (1784-1862) of the Society of Jesus. Pianciani was in Rome among the most peculiar representatives of that cultural program aimed at countering the theses of Enlightenment materialism through a process of conciliation and justification of scientific discoveries with Catholic doctrine. This apologetic and concordist program started under Pius VII, also continued during the pontificate of Leo XVI. In the wake of this peculiar apologetic program, the controversy that, around the mid-nineteenth century, arose in the Roman College between neotomists and some scientists of the order, for example, Angelo Secchi, is also discussed. Finally, the specific concordist program developed by Pianciani is discussed. This program aimed to reconcile the biblical account of the world's creation with the scientific results that came from the studies of natural cosmogony.

1. Introduction

A talented physicist and philosopher, Giambattista Pianciani (1784-1862) is one of the most interesting men of science among the scientists who worked in Rome in the first half of the XIX century; yet, still nowadays, he is a little known figure among the historians who study the development of Italian physics in the XIX century. He is rarely quoted in the manuals or biographical dictionaries of History of Science[1]. A possible explanation of this is that scholars have paid, until now, little attention to the subject of the development of science in the Papal States. I am explicitly referring to the historical period immediately before the Italian political unification. In 1972, in a paper assessing the available bibliographic sources of a history of the Papal States, at the entry "Science", Fiorella Bartoccini (1972, pp. 174–272) explicitly considered that the history of science in Rome and its territory had not been dealt with yet. Since then, several other studies have been carried out without giving a

[1]There is no biography of his in the Dictionary of Scientific Biography, edited by Charles Coulston-Gillespie. Also, there is none in the New Dictionary of Scientific Biography, edited by Noretta-Koertge.

comprehensive picture of the teachings and scientific research which developed in Rome during the first half of the XIX century. After Pietro Redondi's first concise but very effective reconstruction of those "scientific activities" (Redondi 1980), other scattered contributions have been added in recent years (Pizzamiglio and Tabarroni 1981; Monaco 1983; Pepe 1996; Monaco 2001; Ianniello 2003; Battimelli and Ianniello 2013; Mantovani and Briganti 2018) but there is still a lot to do. The Jesuit Angelo Secchi (1818-1878) is the scientist who has received most of the attention: he was one of the most representative scientists of the Italian scientific movement and one of the most outstanding astrophysicists of the XIX century. However, he was mainly active in the second half of the XIX century. Little attention has been paid to the many and intriguing scientists and teachers of scientific subjects who, at Pianciani's times, carried out their educational and research activities in different "places of Science" in Rome, such as astronomical observatories, Colleges and Universities. Among these, Abbot Feliciano Scarpellini is worth a mention: an eclectic scientist, art conservator in Rome of Federico Cesi's ancient *Accademia dei Lincei* ("Academy of the Lynxes"), founder of the Capitoline Observatory and professor of Sacred Physics, teaching which would help the development of a peculiar cultural programme inside the Papal States and would have a significant impact on Pianciani's work.

2. Feliciano Scarpellini and the Roman scientific environment

Abbot Feliciano Scarpellini (1762-1840) was a mathematician, experimental physicist, and an excellent maker of scientific tools. From 1780 to 1840, he may be considered "the best populariser of physical sciences" (Battimelli and Ianniello 2013, p. 36). Since 1783 he started to make and buy physical and astronomical machines that, in the following years, would become the nucleus of the most important private Cabinet of experimental Physics in Rome. When he died, the whole collection (as many as 240 pieces) was bought by Pope Gregory XVI at the impressive price of 8000 *scudi*. The section of the physical tools was taken out and placed at the Roman University (commonly called *La Sapienza*), at the Cabinet of Physics of the Roman Archigymnasium (the name derives from the ancient "Studium and Colegium Sapientia" from which the University of Rome was born). From 1784 he worked at the private Observatory of Francesco Caetani (1738-1810), Duke of Sermoneta, at the time the most important astronomical Observatory in Rome, and in 1797 he became its Director until 1814 (Monaco 1983). In 1786, he became the founder and instigator of a small Society called Physical-Mathematical Academy, whose location in Rome was at the Umbro-Fuccioli college, where topics of Physics, Chemistry and Natural Sciences were publicly discussed. Among the Roman scientists who were part of this group we can remember, most of all, the mathematician Gioacchino Pessuti (1743-1814), the physician Giuseppe De Mattheis (1777-1857) and one of his students Alessandro Flajani, the physicist Saverio Barlocci (1774-1845), the physicist, mathematician and astronomer Giuseppe Settele (1770-1841) and the chemist Domenico Morichini (1773-1836). In that same Umbro-Fuccioli College, Scarpellini, who held the position of rector from 1795 until 1825, built, at his expenses and with his talent, a rich Cabinet of Physics where public demonstrations of experimental physics and chemistry were held (Renazzi 1806, pp. 310–312). The Academy, during the years of the French occupation, was supported by the French mathematician and founder of descriptive geometry Gaspard Monge (1746-1818),

FIGURE 1. Engraving of Abbot Feliciano Scarpellini (1762-1840).

in Rome's mission to confiscate and transfer works of art to France. Monge himself, during the Roman Republic, founded the *Istituto Nazionale di Scienze Lettere ed Arti* (National Institute of Sciences, Letters and Arts), an institution of the highest scientific profile (Pepe 1996), created according to the French model of the Institut, which however, did not last long. In 1800 Scarpellini's Academy, accused of being in favour of the French, was suppressed; the following year Scarpellini, thanks to Duke Caetani's help, moved his Physical Cabinet to Palazzo Caetani, then located in Via delle Botteghe Oscure, in the heart of Rome; he kept all his instruments there until august 1807 when, to Pope Pius VII's will, his physical cabinet was renovated in the premises of the Umbro-Fuccioli College which, in the meantime, had been renamed Academy of the Lynxes (Volpicelli 1851, pp. 21–30). In 1826 the Umbro-Fuccioli College was given to the Jesuits. The following year the Academy had to be moved to the second floor of Palazzo Senatorio, in *Piazza del Campidoglio*, where Scarpellini put all his physical and astronomical machines and where, in the Palace turret, he installed the future astronomical Observatory which was known in Rome as the "Osservatorio del Campidoglio" (the Capitoline Observatory). During this period, the Academy was very active, and it became a valuable agency for technical consultation for the State. The need to evaluate industrial and and technological products pushed the papal government to ask the Academy for the necessary scientific consultations, and the Academy established, from time to time, specific committees[2]. After Scarpellini's death, in 1840, the Academy was suspended *sine die*, and we will have to wait for Pius IX's pontificate to see it rise again in 1847 under the name of "Papal Academy of the New Lynxes"[3]. Not only was Scarpellini a very good experimenter, he was also a capable teacher. He was ordained as a priest in 1787, a year later he started teaching as a "master in philosophical sciences" first at the Umbro-Fuccioli College and then at the Gregorian University of the Roman College, where he taught *Mathematical Physics*, *Logic and Metaphysics* (1797) and *Physical Chemistry* (1806). But the teaching that gave him fame was "Sacred Physics" at the Archigymnasium

[2]Already in 1830, Scarpellini declared that in 36 years of activity, the Academy had completed about 400 between memoirs and technical reports.

[3]The publishing of the Proceedings of the Academy started in this year and lasted until 1870, with a production of a good 23 volumes *in quarto*.

of Sapienza, which he held until his death[4] (Proja 1837). This chair was established in 1816 by Pius VII thanks to a project of his Secretary of State, Cardinal Ercole Consalvi (1757-1824), an estimator of Scarpellini and the true architect of the cultural policy of the Papal States. It was the evident expression of the Church trying to open to modern scientific discoveries but, at the same time, also an expression of the restoration spirit in Rome at the time of Pius VII's return, on May 24th, 1814. The restoration in Rome was characterised by a contrast to the materialistic and positivist philosophies coming from France. As Consalvi wrote, they misused the "progress of natural sciences, and the new notions, to introduce errors to the detriment of the catholic religion" (Volpicelli 1851, p. 42). This policy, as we will see, continued under Leo XII's pontificate, starting from the apostolic Constitution *De recta ordinatione studiorum* (better known as *Quod Divina Sapientia omnes docet*) dated August 28th, 1824 which intended to reform the education system of the whole Papal States. It was then that Pianciani's scientific work began to develop in a wide variety of interests. Of no less interest his commitment as a "Christian philosopher", because, as his most famous student, Father Angelo Secchi, said "*he tried to join the physical truths together, tries to join these to the metaphysical ones, and both to the revealed truths*" (Secchi 1862, p. 6).

3. Father Pianciani's biographical notes

A teacher of the Roman scientist Angelo Secchi and nephew of the Dalmatian scientist Ruggero Boscovich (Secchi 1862, p. 10) Pianciani was a very learned man. He wrote on various theological, historical, and literary topics. He analysed the Divine Comedy with great expertise, even though he mainly cultivated the natural and physical sciences, so that he acquired, in more than twenty-five years of teaching practice, a significant reputation in Rome, both at the university and the Roman College. As a physicist, he produced several and interesting experimental essays, mainly dedicated to electricity, magnetism, cosmology, and meteorology. As a Science teacher, he has the merit of educating, among other students, Father Angelo Secchi's personality, who later became his best biographer: he was the one to honour him with a lecture on May 19th, 1862 at the Tiberina Academy (Secchi 1862). Born in Spoleto on October 27th, 1784, at the beginning Giambattista studied at the prestigious Tolomei College in Siena, then he moved to Rome with his family. In 1804 he was admitted to the disbanded Society of Jesus, which, in that period, had been hosted by Ferdinand I in the Kingdom of Naples. The following year he went to Naples where, welcomed by Father Giuseppe Maria Pignatelli, Provincial of the Society in Naples, he took his vows. In 1806 Naples was occupied by the French and the Jesuits were expelled. At first, Pianciani took refuge in Rome; then he settled at the College in Orvieto. In 1814 we find him once again in Rome, when Pius VII's solemn bull of May 7th re-established the Society of Jesus while keeping the Roman College closed. In 1817 he was professor of Natural Sciences at the College in Viterbo. He later stayed in the cities of Tivoli and Novara, too. Young Giambattista's peregrinations lasted until 1824 when, at the behest of Pope Leo XII, the Roman College was finally given back to the Jesuits' authority, and the old schools were reopened. The Roman College was opened again in May 1824 under the leadership of the neo-Thomist Luigi Taparelli d'Azeglio (1793-1862), who was its rector until 1829.

[4]This teaching post received, since 1837, a second collaborator or assistant (substitute) for Scarpellini, Father Antonino De Luca (1805-1883), future cardinal, who took his post when Scarpellini died.

Among the new teachings that Leo XII established at the College, there was also *Physical Chemistry*, which[5] was given to Pianciani who kept it continuously until 1848. Still in 1824 at the Archigymnasium of *La Sapienza*, which, let us remember, at that time was the seat of the University of Rome, they proceeded with the creation of the Academic Board of the four Departments, which were Philosophy, Law, Medical-Surgery and Theology. Pianciani became a member of the Philosophical College[6]. With the revolutionary wave of 1848, the Jesuits scattered, and Pianciani took refuge in the United States where, in the years 1849-50, he taught "Dogmatic Theology" in Washington at Georgetown College. During his stay at the College, he wrote *In historiam creationis mosaicam commentatio*[7], whose publishing took place in Naples in 1851. In August 1850, Pianciani disembarked at Naples, coming from America, and in 1851 he went back to Rome where he soon became a collaborator of *La Civiltà Cattolica*[8]. In 1852 Pianciani resumed his teaching activity at the Roman College and taught "Metaphysics" in the second year of the Philosophy course[9]. This may have been his last teaching year (his name does not appear among the professors at the Roman College anymore). Two years later, still at the College, we find him again General Chief of Studies (he had already held that position in 1846) and, certainly since 1857, also chair

[5]This teaching post belonged to the philosophical course. The latter preceded the theological course, with which the cycle of *Higher Studies* at the Roman College ended. The *philosophical course* lasted three years and, since 1824, was renewed for some subjects, according to the regulations in the *Ratio Studiorum*. In 1832, after a new revision of the Ratio, the course was brought from three to two years, with the possible concession of a third year, once the opinion of the teachers had been obtained, only for the most deserving students. The three-year attendance was restored in 1853. These were the teaching classes: first year, *logic*, *metaphysics* (since 1851 also in the second year and, since 1860, in the third year as well) and *elementary mathematics*. This one involved the study of *algebra*, *geometry*, *plane trigonometry* and, when possible, *conic sections* and *spherical trigonometry*. In the second year, there was *mathematical-physics*, *physical-chemistry*, and *higher mathematics* (differential and integral calculus). In the third year, *special metaphysics*, *ethics*, and *astronomy*.

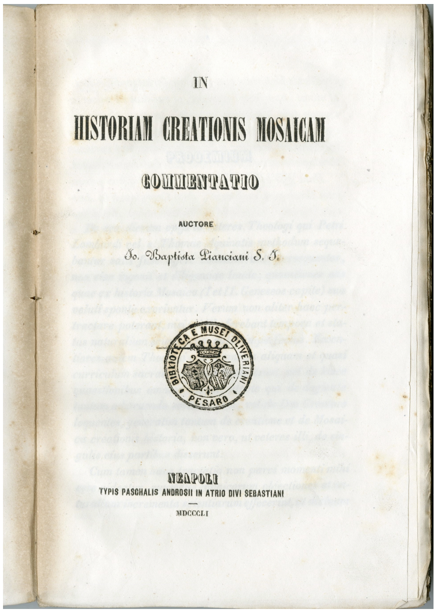
[6]The Holy Congregation of Studies proceeded in forming the Philosophical College: this was made up of 12 members. Some of them also taught in structures that were different from the Archigymnasium itself. Besides Pianciani, also the following scholars were appointed: canon Giuseppe Settele, professor of *Optics and Astronomy*, professor Giuseppe Oddi, who taught *Mechanics and Hydraulics*, Saverio Barlocci, professor of *Experimental Physics*, Giuliano Pieri, professor of *Introduction to Higher Mathematics*, Father Giuseppe Calandrelli, professor of *Mathematics*, Abbot Andrea Conti, professor of *Mathematical-Physics*, the Piarist Michele Barretti, professor of *Philosophy*, doctor Onofrio Concioli, professor of *Metaphysics*, Father Luigi Parchetti of the Clerics Regular of Somasca, professor of *Rational Philosophy*, the camaldolese abbot Albertino Bellenghi and the Jesuit Antonio Ferrarini. Scarpellini was on purpose kept out of these appointments because he was considered an “applied physicist” (Vernacchia-Galli 1984, pp. 181–182).

[7]This work, which was also translated into German by professor Fridol Schöttl (Pianciani 1853a), was reprinted in 1853 (Pianciani 1853b) and 1861 (Pianciani 1861b).

[8]This influential Italian magazine, which was released twice a month, about Jesuit culture, was founded in Naples in April 1850 by Father Carlo Maria Curci as a transformation of the magazine *La scienza e la fede* (Science and Faith). In October of the same year, Curci moved to Rome, where he continued publishing the magazine which, except a break between 1870 and 1877, went on until the present time. Among the first collaborators of the magazine, there were, besides Pianciani, also Fathers Antonio Bresciani (1798-1862), Matteo Liberatore (1810-1892) and Luigi Taparelli d’Azeglio.

[9]The post of professor of *Physical-Chemistry* he had held at the College until 1848 was given, in the years 1852-53 and 1856-1884, to the Jesuit Father Francesco Saverio Provenzali (1815-1894). He was able to keep alive in the College the studies for Chemistry-Physics, by publishing the following works: *Elements of Physical-Chemistry* (Provenzali 1865) and *Elementary Treatise of Modern Chemistry* (Provenzali 1877). Provenzali also held the position of professor of *Higher Calculus* at the College in 1851-1856

of the Philosophical College of the University of Rome (Moroni 1857, p. 184). From this moment on, very little is known about him. He was an active member of the Academy of Arcadia, of the National Academy of the Lynxes, of the National Academy of Sciences called Academy of the XL and other scientific societies. He died at the Roman College on March 23rd, 1862.



IN

HISTORIAM CREATIONIS MOSAICAM

COMMENTATIO

AUCTORE

Io. Baptista Pianciani S. I.

NEAPOLI

TYPIS PASCHALIS ANDROSII IN ATRIO DIVI SEBASTIANI

MDCCCLI

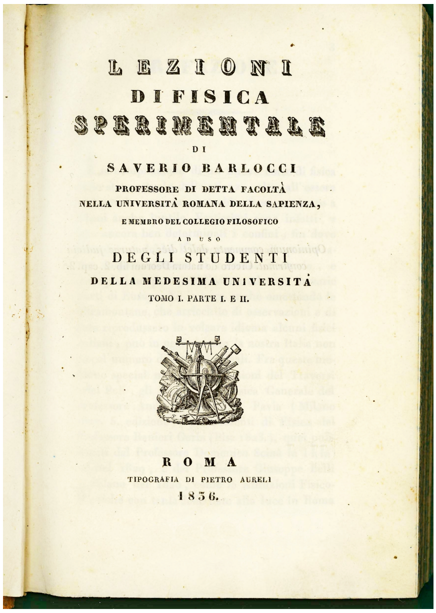
FIGURE 2. Frontispiece of the Pianciani's work published in 1851. By courtesy of "Oliveriana" Library in Pesaro.

4. Apologetics and concordism from Pius VII to Gregory XVI

In the early nineteenth century, a cultural programme was developed in Rome to counter the theses of Enlightenment materialism. This programme, apologetic and concordist, had started under Pius VII's pontificate, thanks also to Cardinal Consalvi's extraordinary abilities, and was meant to establish a positive correspondence between the results of the natural sciences and the biblical account. To carry out his programme, Pius VII had founded, in 1816, a Cardinalitial Board, the *Congregation of Studies*, with the specific task of reforming public education, and, in particular, university, but also of monitoring professors and their teachings. They needed to sweep away the French revolutionary spirit and "restore" the strictest doctrinal foundations of the catholic teaching. Therefore, they reinforced the scientific education, even though according to an apologetic function. It happened in 1816, as already said that at the Roman Archigymnasium the teaching of *Sacred Physics* of Abbot Feliciano Scarpellini was established. As it was customary at that time, the course would be dictated to the students from the desk and sometimes it was also named with the epigraphs "Mosaic Physics" or "Theological Cosmogony". It was placed within a tradition of studies, theological physics, which, since Robert Boyle (1627-1691), William Whiston (1667-1752) and other theologians-physicists[10], had taken on the task of explaining the biblical facts in terms of the laws of physics. Scarpellini discussed the first chapter of the Book of Genesis, which is the biblical account of the creation and the initial distribution of matter. Following the sequence of creation of all things in six days, set according to tradition by Moses, the lessons dealt with the following topics in progressive order: the creation of the world and elementary substances (I); firmament, that is of the air and the division of waters (II); distribution of the waters in continents and seas and production of vegetation (III); heavenly bodies, their movements and purpose (IV); creation of fish and birds (V); creation of other animals and man (VI) (Proja 1837, p. 107). The peculiarity of Scarpellini's teaching was not just in the kind and in the order of the topics he was dealing with, but in the method he was proposing, which was based on the new results deriving from natural and experimental sciences. The purpose was to conciliate scientific research and religious truths and to show how the progress of science, which were then tumultuously developing, were consistent with the teaching of the holy scriptures. Following this method, Scarpellini did not hesitate to put notions n the course coming from the new areas of physics-chemistry, with the addition also notions in the optics, geology, astronomy and natural history. To support his teaching, he even used specific experimental demonstrations[11]. Pius VII's apologetic and concordist programme was carried on by his successor, Leo XII (1823-1829). He was the author of the bull *Quod Divina Sapientia* of 1824, where he renovated the scientific teaching in an apologetic sense, with strict and well-defined rules. A lot of professors at university had to comply with these strict rules. In the preface to his *Lessons of Experimental Physics*, printed in Rome in 1836, the laic physicist Saverio Barlocci, professor at the Roman Archigymnasium, after mentioning some deserving physics essays for the young students, said: *nevertheless, it was still necessary and indispensable, for the public teaching of experimental physics at the Roman university, a particular course which could be similar and compliant to the regulations and disciplines required by the rules of the studies in the august constitution Quod Divina Sapientia of August 24th 1824 by the immortal Pope Leo XII. Therefore, to suit this important task and to fulfil the duty that said Constitution requires, I am about to write up this course of physics, deducing the facts from the observations and from the experiences I have had the opportunity of preparing and repeating along with the long practice of my teachings* (Barlocci 1836, p. 4). The determination of keeping a strong control over scientific teaching also continued during Gregory XVI's pontificate (1831-1846).

[10]Among these, it is worth mentioning: Pierre-Louis Moreau de Maupertuis (1698-1759), for the finalistic interpretation given to his so-called "least-action principle"; Edmond Halley (1656-1742), because he thought he had interpreted in the study of the astronomical nebulae a passage from the Genesis Book where it was shown that God had created light before the Sun; and lastly, the Swiss naturalist Johann Jakob Scheuchzer (1672-1733), because he had written, in the years 1731-1733, a successful work in 4 volumes entitled *Physica Sacra* (Scheuchzer 1731), full of 750 engravings.

[11]In 1820, the Academy of the Lynxes held a contest for three medals for those students of *Sacred Physics* who, with their papers, would best display the progress of the experimental sciences in support of the holy scriptures (Volpicelli 1851, p. 44). The practical demonstrations took place first on the premises of the Umbro-Fuccioli College and, since 1827, in the halls of the Senate Palace on Capitoline Hill.


LEZIONI
DI FISICA
SPERIMENTALE
DI
SAVERIO BARLOCCI
PROFESSORE DI DETTA FACOLTÀ
NELLA UNIVERSITÀ ROMANA DELLA SAPIENZA,
E MEMBRO DEL COLLEGIO FILOSOFICO
AD USO
DEGLI STUDENTI
DELLA MEDESIMA UNIVERSITÀ
TOMO I. PARTE I. E II.

ROMA
TIPOGRAFIA DI PIETRO AURELI
1836.

FIGURE 3. Frontispice of the first edition of Barlocci's Treatise on *Experimental Physics* for the use of his students. The work had a second (1841) and third edition (1845).

In particular, it was the powerful Secretary of State Luigi Lambruschini (1836-1846) who had to comply with a strong defence of the catholic dogma through policies of control and isolation of the scientists of the Papal State against the philosophies and materialistic contaminations coming from abroad. This action became explicit and loud when it was forbidden, to every professor and every employee of the universities of the Papal State, to attend the *Meetings of the Italian Scientists* which were held, between 1839 and 1845, respectively in the cities of Pisa, Turin, Florence, Padua, Lucca, Milan and Naples[12]. Further to this point, it is meaningful what Cardinal Lambruschini wrote in a note sent from the Sacred Congregation of the Studies to the Chancellors of all the Universities of the State as the organization of the First Meeting of the Italian Scientists in 1839 was approaching: "*... next October in Pisa there will be a meeting of scientists, even Italian scientists, and to the purpose, the printed invitations have already been sent. As the Papal Government of the Holy See has sensible and serious reasons to forbid the pontifical subjects' attendance to such meeting, and not only going there but also having any kind of correspondence with it, I am informing Your Eminent Lordship of those determinations needed so that the professors of this university, the Directors of the Natural Museums and of the Botanical Gardens, and the other scientists who are under Your jurisdiction remain forbidden to attend such activities.*" (Linaker 1898, p. 414). It is in this cultural environment and under this pontificate that in Rome, at the Roman College, Father Giambattista Pianciani's

[12]There was a breakthrough in the situation only in 1846 when Pope Pius IX's pontificate began. He let the scientists of the State of the Church participate in the meeting that was to be held in Genoa that year.

scientific, philosophical and theological work will start to take shape. At this point, we need to introduce the cultural environment of the Roman College and, in particular, the debate which developed around Thomism and its supposed ability to conciliate the progress of science with the ancient scholastic concept of nature: this controversy did not affect Pianciani directly, but undoubtedly, going along the road of concordism, he was deeply influenced by it.

5. Physics and neo-Thomism at the Roman College

The contributions of the scientists of the Roman College related to mathematics, physics and astronomy have been well-known since the XVII century. Anyway, as regards scientific, philosophical and theological speculations, their action within the Society of Jesus was not homogeneous and coordinated but varied and with tones and positions sometimes even opposed, one against the other. This variety of positions was particularly evident in the Galileo *affaire*. As regards the teachings of the philosopher from Pisa, only the Roman College kept a certain homogeneity of positions. However, soon enough, this disciplinary code had to deal with the pressure of scientific discoveries, which were imposing continuous adjustments and explanations to preserve the ancient Peripatetics' edifice. In the XVIII century, the Society's fundamentals of natural philosophy were strongly renovated by the scientific work of the Dalmatian scientist Ruggiero Giuseppe Boscovich (1711-1787).

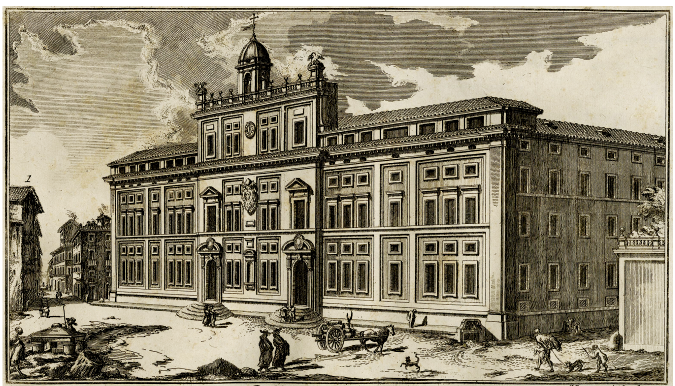


FIGURE 4. Engraving showing the Roman College in the 18^{th} Century. (From: *New Collection of the most beautiful views of Rome drawn, and carved by famous authors*, Rome 1761).

He was professor of mathematics at the Roman College from 1740 to 1759 and among the first to spread and discuss Newton's Natural Philosophy in a critical way in Italy. His most important work, *Philosophiae naturalis theoria redacta ad unicam legem virium in natura existentium* (Boscovich 1758), developed the attempt to reduce all the forces in nature to one single law, and provided an early general mathematical theory of the atomic structure of matter. Boscovich (1758) had a lot of followers and agreement within the Society of Jesus, and his work contributed to disempower the scholastic culture and concept of nature. Lavoisier's new chemistry at the end of the XVIII century and the outstanding developments of chemistry-physics of the early XIX century produced new experimental evidence about the constitution of matter. These cultural and conceptual changes had a strong influence when the school activities of the Roman College started again in 1824. As a matter of fact, a certain degree of teaching freedom within the College, consciously granted by the top authorities of the Society, had allowed the mutual coexistence of a variety of different philosophical approaches, most of the times diametrically opposed among the different professors. The different viewpoints stemmed from the need to balance the new discoveries of mathematical and experimental physics with a deeply rooted tradition of the philosophical and theological knowledge, whose origins were to be found in Saint Ignatius and whose unavoidable philosophical benchmarks had been Aristotle and Saint Thomas. On the other hand, as specialisation was moving forward and academic disciplines were increasing in number, a renewal in terms of methods and content was strongly needed, and this did not match well with the most traditional positions. In that sense, the positions within the Roman College were rather clear: on the one hand, there were the neo-Thomists who, at least until the first half of XIX century, represented a minority but enjoyed key positions within the Jesuit organisation[13] and were extremely combative; on the other hand, there were more modern stances, essentially opposite of the Aristotelian-Thomist synthesis, open to the progress of natural philosophy, whose primary inspirational source was still the Cartesian and Newtonian trend. The neo-Thomists maintained that a discrepancy in speculative positions only produced "ideological" confusion within the Society and supported a rigid return to the orthodoxy of the great medieval philosopher's thought. Among the most representative exponents of this trend, we may remember the Jesuits Luigi Taparelli d'Azeglio, Matteo Liberatore and Giovanni Maria Cornoldi (1822-1892), the latter among the most determined and inflexible interpreters of Saint Thomas Aquinas's thought[14]. A large part of the teachers at the Roman College and of the scientists of the order sided against neo-Thomism. Among these, for the strength of their ideas, we remember the physicist and astronomer Angelo Secchi and Father Salvatore Tongiorgi[15], both advocates of the progress acquired by chemical atomism. They elaborated, autonomously and apologetically, a rational study of nature which, though in line with the most advanced researches of the theoretical and experimental physics of the time (generally carried out by laic scientists), however supported the reflection of the divine perfection into the matter as the ultimate interpretation. Still, in opposition to Thomism, but with a less experimental position, closer to Boscovich's physics-mathematics, we have Father Domenico Palmieri's (1829-1909) thought and work, a pupil of Tongiorgi's and professor of "Special Metaphysics" at the

[13]Consider Taparelli's rectorate at the Roman College in 1824-1829 and his efforts to modernise scholastics (Sulas 2017).

[14]As regards Cornoldi, Luciano Malusa, with his *Neotomismo e intransigentismo cattolico* (Neo-Thomism and catholic fundamentalism), outlines organically and accurately the Jesuit philosopher's formation, thought and political-religious commitment (Malusa 1986, 1989). It is particularly intriguing the re-enactment he makes of the philosophical teaching at the Roman College in the period when Cornoldi was a student there (1846-48).

[15]Born in Rome on 25th December 1820, he joined the Society of Jesus in 1837. He taught *Rational Philosophy* at the College from 1853 to 1862 and *Moral Philosophy* in 1863-1864. He wrote a couple of successful philosophical compendia, with many reprints. Among the philosophers at the College, he was the one who moved away the most from the dictates of scholastic physics, enriching his metaphysical speculations with the results of the experimental science. He died in 1863.

FIGURE 5. Engraving (anonymous) of the neo-Thomist Father Luigi Taparelli d'Azeglio (1793-1862), rector of the Roman College from 1824 to 1829. (Source: Archivum Romanum Societatis Jesu).

Roman College. One of the neo-Thomists' most controversial positions, which did not easily match with the progress of chemistry and physics at the beginning of the century on the atomic structure of matter, was the St. Thomas and Averroes doctrine of hylomorphism[16]. This rigid interpretation of Thomism dealt with the intimate constitution of the bodies and their capability of changing or keeping a certain degree of immutability. In scholastic natural philosophy, the substances, that is the natural objects we know through senses, were considered the union of two logical components, the *materia prima* (the prime matter) and the form, that is a combination of power and action. The prime matter, containing in itself the principle to every modification, might potentially receive the forms that could be either substantial or accidental. The first consequence of these ideas was that the human soul, meant as soul-form, had to be united to the body, but in a substantial, not accidental form[17]. The supporters of anti-Thomism opposed this position: they conversely were in favour of a physical-mechanical vision of nature which had nothing to do with the world of spirituality and considered the soul as an autonomous substance, free from the body. The hylomorphic approach did not just focus on the metaphysical aspect of matter but wanted to penetrate its microscopical constitution to explain the inner mechanisms. According to Cornoldi, nature could not be reduced to an inert-atom governed "mechanical system", acting only

[16]Against this doctrine, supported by Cornoldi, Angelo Secchi would harshly fight. On this controversy, refer to Malusa (Malusa 1989, pp. 235–423).

[17]This idea was strongly supported both by Cornoldi and Liberatore, the latter in his work "Del composto umano" (On human composite) (Liberatore 1862) which collected a series of papers published on Civiltà Cattolica since 1856. Father Tongiorgi first, and then Father Secchi strongly opposed it (Jacquin 1958).

under the laws of motion; it was necessary that the atoms, the molecules and more in general, the bodies they made up were provided with a motion of the matter transmitted by an intrinsic principle of nature and also had inborn abilities to interact (for example, attraction and repulsion). This explanation's weak point, clashing against the evidence of physical-chemical atomism, lay right in that metaphysical "inner principle" governing the causality of atomic interactions and the movements of the bodies. This principle was to be attributed to substantial form, according to Thomist physics. From 1850 on, we could witness a radicalization of this clash as regards the problems of neo-scholastics and the consequent anti-mechanistic and anti-dynamists debate: on one side Father Cornoldi and the founders of *La Civiltà Cattolica*, that is Fathers Curci, Taparelli and Liberatore, on the other Fathers Tongiorgi, Palmieri and Secchi. In this *querelle*, a strong and influential action of propaganda in favour of Thomism was carried on by the prestigious Italian Jesuit magazine *La Civiltà Cattolica*, all through the second half of XIX century. In particular, the second series of this magazine, started in 1853 under Father Giuseppe Calvetti's (1819-1855) direction, aimed specifically at the restoration of Thomist philosophy[18] (Sale 1999, pp. 555–556). However, we need to point out that this specific philosophical position inveighed neither against the experimentalist practice nor against the technical-scientific progress, both of which were then tumultuously advancing, but maintained that science's pressing results might agree with the explanations provided by Thomism. Thus, in fact, can be read in the programmatic article written in 1853 by the new Director of the Jesuit magazine, in which it was argued that philosophy should take inspiration from Saint Thomas Aquinas's teachings, adding more importantly that it should be "enriched with all the findings of modern sciences" (Calvetti 1853, pp. 271–275). What had to be rejected were the consequences emerging from theoretical and experimental studies, irreconcilable with the scholastic hylomorphic doctrine of the matter. On a more progressive front, positions were more varied. Tongiorgi and Palmieri went against Thomists keeping their discussions on the grounds of the metaphysics of the problem. They did not deny the principles of matter and form as part of scholastics; they simply thought that those concepts could not provide a credible and rational explanation of the nature of the bodies and the structure of the universe. Tongiorgi, especially, maintained that the most reliable explanation that could substitute the obscure concepts of prime matter and substantial form was the action of the cohesion forces: these explained, on the one hand, the relationship between atoms and molecules and, on the other, were directly responsible for the extent and, therefore, of the shapes of the bodies (Tongiorgi 1861, pp. 188–189). More articulate and scientifically more authoritative were instead Secchi's ideas. He dealt with the organisation of the bodies in a European scientist's frame of mind, as his knowledge was updated to the latest progress of the physics of the matter[19].

[18]This position, with alternate vicissitudes, thanks also to the propaganda of this magazine, was proclaimed the foundation of the Catholic doctrine in 1879 with the encyclical "Aeterni Patris" by Pope Leo XIII.

[19]In 1864 Secchi published *L'Unità delle Forze Fisiche. Saggio di Filosofia Naturale (The Unity of the Physical Forces. Essay on Natural Philosophy)*, a work on the correlation of the forces working in matter, which turned out to be a remarkable publishing success all over Europe. In Italy there was a second (Secchi 1874) considerably increased edition in two volumes, followed by a third posthumous one (Secchi 1885), which was preceded by a biographical essay on Secchi written by Father Francesco Denza. Abroad, there were two French (Paris, 1869 & 1874), three German (Leipzig 1876 & 1884-85; Braunschweig 1891) and even three Russian editions (St. Petersburg 1872 & 1880; Vyatka, 1873).

L'UNITÀ
DELLE
FORZE FISICHE
SAGGIO
DI FILOSOFIA NATURALE
DEL
P. ANGELO SECCHI D. C. D. G.
DIRETTORE DELL'OSSERVATORIO DEL COLLEGIO ROMANO

4.ª Edizione. - 3.ª Italiana.
PRECEDUTA DALLA BIOGRAFIA DEL P. A. SECCHI
per F. Denza

VOLUME PRIMO.

MILANO
FRATELLI TREVES, EDITORI
1885.

FIGURE 6. Frontispiece of the Secchi's work *The Unity of the Physical Forces. Essay on Natural Philosophy*, Third Italian edition, Vol.1, Milan 1885.

Secchi reasoned within a mechanistic programme where the structure of the universe was considered in terms of dynamic equilibrium between ponderable matter and inert and imponderable matter (the light ether). This model considered inert atoms in perpetual motion that never grouped (the ether), and atoms that, pressed by the ether, grouped first in molecules and then in ponderable bodies. According to the Jesuit scientist, the dynamic equilibrium worked through interactions governed by the mechanical laws and by the new principle of conservation of energy[20]. Ether especially had the causal function of transmitting all the impulses in the universe mechanically. In this explanatory picture, metaphysics had no role but the act of the creation of the matter and the atoms' starting movement which, according to Secchi, was transmitted from the divine intelligence through "a principle of activity consisting in an indestructible motion" (Secchi 1864, p. 432). For the prestige of his thought, the Jesuit physicist's point of view would become, very soon, the firmest antagonist of the neo-scholastic movement. Tongiorgi himself, even if he did not overlook the importance of metaphysics within scholastics, borrowed from Secchi's mechanistic model, while a different position was carried on by Palmieri whose philosophy of the bodies of their principles and their inner elements[21] was influenced both by "Christian

[20]This scheme emerged from the overcoming of the fluidics models of the "imponderables", which were popular most of all from the second half of the XVIII century, and which were used to explain a multitude of experimental facts.

[21]Cornoldi named this position "Dynamic System". In one of his papers from 1864, the Jesuit dedicated few pages to this system (Cornoldi 1864, pp. 61–67), which was, at the time, already "almost generally abandoned by everybody" (Masinelli 1865, p. 137)

Wolff's theory of metaphysical points" and by Boscovich's mathematical theory of "points of force". Pianciani did not take part directly in the debate against neo-Thomists, but there is no doubt that, since his first years of teaching at the College, he supported a kind of teaching of Natural Sciences which was anti-peripatetic and contrary to the doctrine of hylomorphism.

FIGURE 7. Engraving of Jesuit Father Angelo Secchi (1818-1878), master of Pianciani and one of the most influential Italian scientists of the 19th century. (From: *The Unity of the Physical Forces. Essay on Natural Philosophy*, Third Italian edition, Vol. 1, Milan 1885).

6. Mosaic cosmogony and Science of Nature

The concordist programme, introduced in 1816 by Scarpellini, was resumed and developed with strength by Pianciani already in 1839, as he informs us in a successive paper[22]. This programme thoroughly studied both the scientific results coming from the studies of "natural cosmogony", and the "mosaic cosmogony": the latter was studied to defend it from those false interpretations which saw it at the mercy of different currents of thought, such as the biblical rationalists, the neo-Thomists and the positivistic naturalistic scientists. Consequently, his commitment as a scientist-theologist developed on different grounds, but his final goal was the careful hermeneutic study of the mosaic account of the creation of the world. On a theological ground, Pianciani had to defend the critical interpretation of the Holy Scriptures from biblical rationalism, a current of thought established in Germany

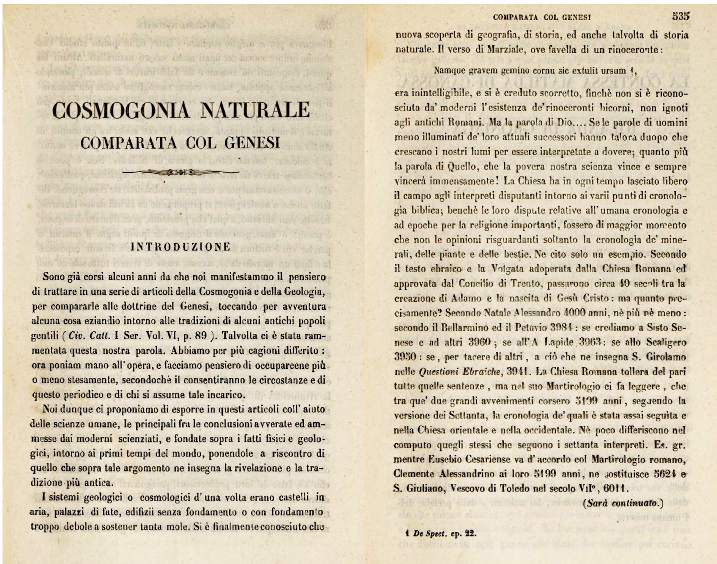
[22]This writing is entitled "Observations on Cosmogony" (Pianciani 1847). Here Pianciani discussed the cosmogonic theory proposed in 1833 by André-Marie Ampère (1775-1836) (Roulin 1833), an approach that the Jesuit considered of high scientific relevance; but, at the same time, he thought it needed to be modified somewhere to make it compatible with the biblical account. In the first pages of this work, Pianciani says that he first became interested in the Cosmogonic theme in 1839 and that he discussed Ampère's theory in one of his works entitled "Essay of Egyptian Cosmogony" (Pianciani 1839).

(in Tübingen) in the first half of the XIX century, which denied the truthfulness of any supernatural event in the biblical account. An influential exponent of this school of thought was the German philosopher and theologist David Freidrich Strauß (1808-1874), the author, in the years 1835-1836, of the controversial work *Das Leben Jesu kritisch bearbeitet* (Strauß 1835). Strauß adopted some interpretative models typical of the historical-critical method and maintained that the evangelical accounts were not historically reliable but were a mythological construction of the first Christian communities. This bold interpretation did not bring Jesus's historical existence into question, but it questioned his divine nature. The question of anti-clerical rationalism highlighted by Pianciani belonged with full rights to a more general philosophical debate which, halfway through the XIX century, involved most of the professors at the Roman College. The subjects that were dealt with concerned the birth of the Cosmos, the origin of matter and its tiniest structure, the appearance of life and its evolution. The Jesuit scientist's positions, for the prestige of his knowledge and his teachings[23], were always much respected among the limited number of scientists at the Roman College[24]. In particular, as regards the origin and structure of matter, he carried on ideas that were different from the neo-Thomists', ideas which later on considerably influenced and gave shape to his most famous pupil's work, Father Angelo Secchi. One of the theories supported by Cornoldi since 1864 was that the atomism proposed by Secchi and Tongiorgi was simply a new edition of the old model proposed by Democritus and Epicurus, that is a mechanism that considered matter as totally inert, an aspect that suggested a hidden materialistic thought[25] (Cornoldi 1864, pp. 15–18). This argument had been discussed and confuted by Pianciani already in 1858, when he had started discussing, in a series of papers published in *La Civiltà Cattolica*, the creation of the world, considered as an immediate act of the divine omnipotence.

[23]Surely, his teaching at the Roman College was held in the highest reputation if one of his students, during Taparelli's rectorship, a certain Gioacchino Pecci, who later would become Pope Leo III, did not remember, among his dearest teachers, a Thomist philosopher but an atomic physicist such as Pianciani (Duranti 1962, p. 253).

[24]At Pianciani's times, several scientists and valuable teachers came in succession. Omitting Secchi, we shall remember the most important: Father Andrea Caraffa (1789-1845), an excellent mathematician, professor of *Higher Mathematics* (1830, 1834-1842) and *Mathematical Physics* (1825-1830, 1837-1841, 1844-45), author of an appreciated treatise of *Mathematical Physics* (Caraffa 1840); Father Etienne Dumouchel (1773-1840), professor of *Astronomy* (1825-1831) and, between 1824 and 1838, director of the Astronomic Observatory of the Roman College; Father Francesco de Vico (1805-1849), professor of *Astronomy* (1837-1841, 1844-1848), Dumouchel's successor as director of the Observatory (1839-1848) and author of several astronomical studies, particularly on comets; Father Luca Boccabianca (1810-1875), professor of *Mathematical Physics* (1842-45, 1847-48, 1851-57), *Elementary Mathematics* (1841-1848, 1851-1856) and *Higher Mathematics* (1845-46); Father Francesco Saverio Provenzali (already mentioned), Pianciani's successor as professor of *Physical Chemistry* (1852-53, 1856-84); Father Felice Ciampi (1826-1889), professor of *Physical Chemistry* (1854-55); Father Giacomo Foglini (1822-1907), mathematician and physicist, professor of *Mathematical Physics* (1858-1888) and *Infinitesimal Calculus* (1857-1866, 1879-1904), author of an essay of *Rational Mechanics* (Foglini 1864, 1870).

[25]Not by chance, in his booklet Cornoldi matches Secchi's thought with Jakob Moleschott's (1822-1893), then a professor of *Physiology* at the University of Turin and one of the most representative exponents of scientific materialism in Europe. Acutely, Luciano Malusa observes that Moleschott published a work in Turin entitled *The Unity of Life* (Moleschott 1864) and that "the astronomer Secchi, almost involuntarily, echoed him with *The Unity of Physical Forces*" (Malusa 1986, p. 83).



COSMOGONIA NATURALE

COMPARATA COL GENESI

INTRODUZIONE

Sono già corsi alcuni anni da che noi manifestammo il pensiero di trattare in una serie di articoli della Cosmogonia e della Geologia, per compararle alle dottrine del Genesi, toccando per avventura alcuna cosa eziandio intorno alle tradizioni di alcuni antichi popoli gentili (*Civ. Catt.* I Ser. Vol. VI, p. 89). Talvolta ci è stata rammentata questa nostra parola. Abbiamo per più cagioni differito: ora poniam mano all'opera, e facciamo pensiero di occuparcene più o meno stesamente, secondochè il consentiranno le circostanze e di questo periodico e di chi si assume tale incarico.

Noi dunque ci proponiamo di esporre in questi articoli coll'aiuto delle scienze umane, le principali fra le conclusioni avverate ed ammesse dai moderni scienziati, e fondate sopra i fatti fisici e geologici, intorno ai primi tempi del mondo, ponendole a riscontro di quello che sopra tale argomento ne insegna la rivelazione e la tradizione più antica.

I sistemi geologici o cosmologici d'una volta erano castelli in aria, palazzi di fate, edifizii senza fondamento o con fondamento troppo debole a sostener tanta mole. Si è finalmente conosciuto che

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nuova scoperta di geografia, di storia, ed anche talvolta di storia naturale. Il verso di Marziale, ove favella di un rinoceronte:

Namque gravem gemino cornu sic extulit ursum [1],

era inintelligibile, e si è creduto scorretto, finchè non si è riconosciuta da' moderni l'esistenza de' rinoceronti bicorni, non ignoti agli antichi Romani. Ma la parola di Dio.... Se le parole di uomini meno illuminati de' loro attuali successori hanno talora duopo che crescano i nostri lumi per essere interpretate a dovere; quanto più la parola di Quello, che la povera nostra scienza vince e sempre vincerà immensamente! La Chiesa ha in ogni tempo lasciato libero il campo agli interpreti disputanti intorno ai varii punti di cronologia biblica; benchè le loro dispute relative all'umana cronologia e ad epoche per la religione importanti, fossero di maggior momento che non le opinioni risguardanti soltanto la cronologia de' minerali, delle piante e delle bestie. Ne cito solo un esempio. Secondo il testo ebraico e la Volgata adoperata dalla Chiesa Romana ed approvata dal Concilio di Trento, passarono circa 40 secoli tra la creazione di Adamo e la nascita di Gesù Cristo: ma quanto precisamente? Secondo Natale Alessandro 4000 anni, nè più nè meno: secondo il Bellarmino ed il Petavio 3984: se crediamo a Sisto Senese e ad altri 3960; se all'A Lapide 3963: se allo Scaligero 3950: se, per tacere di altri, a ciò che ne insegna S. Girolamo nelle *Questioni Ebraiche*, 3941. La Chiesa Romana tollera del pari tutte quelle sentenze, ma nel suo Martirologio ci fa leggere, che tra que' due grandi avvenimenti corsero 5199 anni, seguendo la versione dei Settanta, la cronologia de' quali è stata assai seguita e nella Chiesa orientale e nella occidentale. Nè poco differiscono nel computo quegli stessi che seguono i settanta interpreti. Es. gr. mentre Eusebio Cesariense va d'accordo col Martirologio romano, Clemente Alessandrino ai loro 5199 anni, ne sostituisce 5624 e S. Giuliano, Vescovo di Toledo nel secolo VII°, 6011.

(*Sarà continuato.*)

1 *De Spect.* ep. 22.

FIGURE 8. First entry (front and final pages) of the column "Natural Cosmogony compared with Genesis" held by Pianciani anonymously from 1858 to 1862 in the magazine *La Civiltà Cattolica*.

At the beginning of time, the Jesuit says, matter was created "passive and inert", but in continuous motion and in its simplest and smallest state, that is the atoms of the elementary substances. Pushed by an initial divine impulse, matter supposedly started moving and interacting, following the laws of physics, these latter initially imposed or "created with" matter itself and then left immutable in space and time. In time, atoms started to aggregate in regular forms, according to a physical order that considered their relative weight and some determined and fixed proportions (Pianciani 1858b, pp. 659–665). In this explicative context, Pianciani points out that the matter's primordial movement was not meant to be the one produced by Epicurus's atoms "randomly wandering in the void", but by atoms capable of aggregating according to a precise natural order which excluded and confuted "the absurd idea of chance" (Pianciani 1858b, p. 665). These considerations on the origins of the material universe we're part of a more general debate of research falling also within the scope of the evolution of life and, most of all, the delicate question of the slow but gradual transformation of living species into one another. What was at stake was the resolution of the conflict between science and faith, and Pianciani wanted to give his contribution by working hard on an exegetic comment to the holy scriptures, which may be consistent with the developments of science at the time. Many were the problems up for discussion, and it was necessary to reach an agreement between the account of the Genesis and the experimental data that were gradually coming from *Astronomy*, *Physical Chemistry*, *Biology*, *Geology* and *Palaeontology* studies. Pianciani's concordist programme took shape in 1851 when *In historiam Creationis Mosaicam Commentatio* was published: here he recognised Carl Nilsson Linnaeus's (1707-1778) old theory of the fixity of animal and vegetable species, linking it to the principle of the divine creation. Moreover, to ensure that the new paleontological discoveries were compatible with the account of the Genesis, Pianciani interpreted the days of creation as “long periods”, meaning “geological eras” that, according to the Jesuit, were responsible for the development of more and more complex life forms until the appearance of man on Earth, the last and most perfect being of creation (Pianciani 1851, p. 166). The topics in the 1851 work were recalled and updated since 1858 (Pianciani 1858a) in a series of papers that went on until 1862. Pianciani published these articles anonymously in *La Civiltà Cattolica*, in a column called “*Natural Cosmogony compared to Genesis*”. In these articles, he discussed and took a stand on several topics, which were then widely debated by the European scholars and were functional to an interpretation, from a scientific point of view, of the biblical account. One of the first discussions dealt with the birth and the extinction of living species (Pianciani 1860b, pp. 55–76). Pianciani did not doubt the birth of species and declared that they had been created by “the Almighty’s immediate action”[26]; better-structured developed, instead, the discussion on the causes that led to the extinction of some living species. This latter topic saw, one against the other, on one side the doctrine of uniformity by the Scottish geologist Charles Lyell (1797-1875), and on the other the English philosopher and naturalist William Whewell’s (1794-1866) catastrophism theory. Pianciani took a stand in favour of the mechanism of the slow accumulation of events in nature as elaborated by Lyell but refused Whewell’s position supporting the idea that the extinction of species was due either to cataclysmic events or to a divine intervention (Corsi 1984, p. 61). Another debated topic was the *origin of organized species* that Pianciani dealt with in the first part of a paper, dated July 9th 1860 (Pianciani 1860a, pp. 164–179). In this paper he discussed, in detail, the theory of the biological transformation by the French naturalist Jean Baptiste Lamarck (1744-1829): he criticized and rejected, on the subject, questions related to the species mutability and the inheritance of acquired characteristics, but he accepted, though just in part[27], the positive and stimulating role that the environment had played in causing the abilities of use and adaptation of the animals’ internal organs or the vegetables’ vital parts to change in time. Among those who defended the mutability of the living species, there were some Naturalists who professed pantheistic ideas and who thought that the series of the natural beings should live “ab eterno” and have the characteristics of “necessary and temporary forms of the universal entity”. On this delicate topic, Pianciani spoke in defence of Lamarck’s ideas:

> “*We are not going to declare Lamarck’s system as pantheistic . . . this gifted naturalist, but not as much a good philosopher, recognizes God’s creative power, but as the creator only of the primitive matter and of nature, who leaves the latter in care of organizing and producing everything, plants, animals and all the bodies*.” (Pianciani 1860a, p. 166).

[26]Pianciani writes: “Despite the undeniable and prodigious increase of natural sciences, on this matter [i. e. the immediate origin of the animals’ existence] we are not, and never will be, more advanced than we were at Moses’s times. God ordered, and according to what He had ordered, the various species appeared. This way and no other way, we understand the possibility and existence of the matter and the laws imposed on it” (Pianciani 1860b, p. 75).

[27]Pianciani did not attribute to the environment the capability, in time, of destroying or conjuring up new organs or vital parts in the organic structures of animals or vegetables. The use or little use of the vital organs could only produce changes in their morphology.

In the second part of the paper, dated July 19th 1860 (Pianciani 1860a, pp. 272–283), for the first time[28] we can find the news of the publishing in London, in 1859, of *On the origin of Species* by Charles Darwin (1809-1882). Pianciani reported the news with these words:

> "*The celebrated English naturalist Charles Darwin published last year in London, a work on the origin of species, which it is said to have caused a great sensation in England, though it is nothing but the extract or the compendium of a wider project he is still working on to this day. One cannot deny that his doctrine is very close to Lamarck's, as he too thinks that the different zoological characters are the product of gradual modifications*" (Pianciani 1860a, pp. 280–281).

Pianciani received the information of the publishing of Darwin's book in 1860, indirectly, thanks to the reading of a review (Pictet de la Rive 1860) written by François Jules Pictet de la Rive (1809-1872), which appeared in the journal Bibliothéque Universelle de Genève, where the Swiss naturalist was expressing some rather harsh critical opinions on the English scientist's work. The wide debate caused by Darwin's book and the sharing of Pictet's criticism pushed Pianciani to state, once again, his point of view in favour of the theory of the fixity of species[29]; therefore in Rome in 1862 he collected and reprinted, in one volume, the papers he had already published on *Civiltà Cattolica* under the title *Cosmogonia Naturale Comparata col Genesi* (Natural Cosmogony compared to Genesis) (Pianciani 1862). However, as already well highlighted, "*the appearance of Darwin's hypothesis found Father Pianciani disoriented and hesitant, afraid that it was in contradiction with the principles of the Church*" (Scarpelli 1988, p. 299). After all, the evolutionist theory, more than opposing the idea of the fixity of species, aimed at discrediting the message of faith that the revelation conveyed.

7. Final conclusion

In Rome, Pianciani was among the unique representatives of that cultural programme that wanted to oppose the theories of Enlightenment materialism through a process of conciliation and justification of the scientific discoveries with the catholic doctrine. Most of his philosophical and scientific production dealt with this subject which he developed between 1835 and the year of his death. Pianciani did not directly take part in the debate on neo-Thomism, but he professed a sort of experimental philosophy whose aim was to research, through the help of the scientific method and the support of the progress of experimental physics, valid arguments to glorify the divine perfection. His opinions and his teachings influenced his favourite pupil's ideas, Father Angelo Secchi. The latter strenuously wanted

[28] In the same year, Darwin's text was also reviewed in a couple of periodicals in Northern Italy. In Milan, a short paper by Carlo Cattaneo appeared without any comment in the Enlightened oriented magazine "Il Politecnico" (Cattaneo 1860); in Turin, with few commenting lines, a review appeared in *Rivista Contemporanea* (Anonymous 1860).

[29] "But without wasting any more time in examining the metamorphosis of apes into men, it is enough to remember that, for what we have just discussed, animal species are stable, and they do not change their peculiar characters under accidental circumstances; and it seems very much proved that they are permanent and immutable as far as their essential characters are concerned, that is so as the Creator formed them in the beginning, such they are and are going to be, as long as He pleases, and they do not turn one into the other" (Pianciani 1861a, p. 171).

to defend his overall vision of the physical world and the universe against the interferences of hylomorphism; for this reason, he published the already cited (footnote 19) *L'unità delle forze fisiche* (The Unity of the Physical Forces), a work which was received favourably by the scientific community of the time for its rigorous philosophical-scientific synthesis. A valuable experimental physicist, Pianciani published a textbook of *Physical-Chemistry*[30] between 1833 and 1835, which had a great circulation in the Papal States. The work, which was one of the first essays on *Physical-Chemistry* ever published in Italy, dealt with a lot of topics, and among these the chemical affinity theory and electrochemistry, subjects which let the Roman scientist master with expertise the states of aggregation of matter and the forces within. It is on the grounds of this knowledge and on the understanding of physical-chemical atomism that he tried to interpret the biblical account of creation.


ISTITUZIONI
FISICO-CHIMICHE
DI
G. B. PIANCIANI
DELLA COMPAGNIA DI GESÙ
PROF. NEL COLLEGIO ROMANO
E MEMBRO
DEL COLLEGIO FILOSOFICO
VOLUME I.
ROMA 1833.
PRESSO L'EDITORE CRISPINO PUCCINELLI
TIPOGRAFO IN VIA DELLA VALLE N. 53.

FIGURE 9. Frontispiece of the first edition of Pianciani's textbook *Principles of Physical-Chemistry*, Vol. 1, Rome 1833.

This apologetic commitment of his was favourably received by the first editors of "Civiltà Cattolica", perhaps also because he had not clearly expressed his ideas on Thomism yet[31]. His presence was nevertheless considered vital because it guaranteed the new periodical attention toward the experimental sciences and a kind of knowledge that was inspired by Christian principles. As a matter of fact, at least in the first years of the periodical, the coexistence between radical positions, such as the hylomorphic vision of matter and the knowledge acquired by the experimental physics on molecular movement, remained relatively hidden and did not represent a relevant cultural problem. The main goal was to discourage the adoption of materialistic doctrines by providing a plausible explanation

[30]The work is *Istituzioni Fisico-Chimiche*, in four volumes, printed in Rome (Pianciani 1833). In 1840, in Naples, a new edition of the work followed in two volumes, structured as a compendium, to make it more functional for its use in schools (Pianciani 1840). Simpler and more compact, this work had a second and third edition in the years 1843 and 1844, respectively in Naples and Rome (Pianciani 1843, 1844).

[31]We shall remember that the periodical founders were, besides Pianciani, Curci, Taparelli, Liberatore and Bresciani. With the only exception of the last one, the others had studied in Naples, more or less, around the person and the doctrine of Father Domenico Sordi, a fervent Thomist.

of the universe's higher harmony. Nuanced and more complex is, on the other hand, his work in the field of natural sciences, and on the great questions of the fixity of species and Darwinism. His ample theoretical and experimental knowledge (data coming from direct observations) related to several branches of Natural knowledge let him discuss with competence a multitude of problems linked to one another, which dealt with geography, geology, biology, palaeontology, and comparative anatomy. Mediated also by a profound knowledge of European and Italian naturalistic literature, his opposition to the rising evolutionary theory was not rigid and narrow, but remarkably moderate. Not by chance, even though he believed Lamarck's theory little convincing on the whole, Pianciani considered it credible in some parts and even unfairly accused of atheism. One of the most original merits of this approach was not, therefore, the refusal of the rising evolutionist theory tout court, just because it was in contrast with the faith and the theology of revelation, but the necessity of discussing it and discrediting it on the ground of the scientific controversy. Pianciani certainly must be given credit for opposing the rising evolutionistic theory based only on on the theoretical and experimental knowledge of the science of his days, but this original and much-appreciated effort, remarkable as it might be, did not bear fruit. The hope for an account of an Earth's natural history devoted to a finalist vision and within a fixing theory quickly disappeared. Darwin's theory turned out to be an insurmountable obstacle for many Catholic natural scientists[32] and, as a matter of fact, after Pianciani every other attempt in Italy to follow a natural philosophy in the light of a concordist exegesis rapidly failed.

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[32]In Italy, among those who were against Darwinism, we may remember the zoologist and geologist Giovanni Giuseppe Bianconi (1810-1878), the poet Giacomo Zannella (1820-1888), the Catholic scholar and patriot of Dalmatian origins Niccolò Tommaseo (1802-1874), the Jesuit and collaborator of "Civiltà Cattolica" Beniamino Palomba (1818-1896) and, most of all, the geologist and paleontologist Antonio Stoppani (1824-1891).

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* Università di Urbino Carlo Bo
Dipartimento di Scienze Pure e Applicate (DiSPeA)
Gabinetto di Fisica: Museo urbinate della Scienza e della Tecnica
Collegio Raffaello, Piazza della Repubblica 13, 61029 Urbino (PU), Italy

Email: roberto.mantovani@uniurb.it

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