

This PDF file is subject to the following conditions and restrictions:

Copyright © 2006, The Geological Society of America, Inc. (GSA). All rights reserved. Copyright not claimed on content prepared wholly by U.S. government employees within scope of their employment. Individual scientists are hereby granted permission, without fees or further requests to GSA, to use a single figure, a single table, and/or a brief paragraph of text in other subsequent works and to make unlimited copies for noncommercial use in classrooms to further education and science. For any other use, contact Copyright Permissions, GSA, P.O. Box 9140, Boulder, CO 80301-9140, USA, fax 303-357-1073, editing@geosociety.org. GSA provides this and other forums for the presentation of diverse opinions and positions by scientists worldwide, regardless of their race, citizenship, gender, religion, or political viewpoint. Opinions presented in this publication do not reflect official positions of the Society.

Mattia Damiani (1705–1776), poet and scientist in eighteenth century Tuscany

Giancarlo Scalera*

Istituto Nazionale di Geofisica e Vulcanologia (INGV), Via di Vigna Murata 605, I-00143 Roma, Italy

ABSTRACT

Mattia Damiani da Volterra (1705–1776), “renowned Doctor,” was the author in 1754 of a collection of scientific poems, *Le Muse Fisiche (The Physical Muses)* on two subjects: Newtonian physics and the plurality of the worlds. Damiani’s interest in science was precocious, but even at that, it was superimposed on his studies in jurisprudence completed in Pisa in 1726. In 2003, Damiani’s lost text, *De Hygrometris et eorum defectibus disputatio (Disputation about hygrometers and their defects)*, which was printed in 1726 in Pisa, was brought to light. It characterizes him as a young scientist who reflected upon the properties and limits of laboratory instruments and on nascent aspects of climatology. In this *Disputation*, a delightful amalgamation of scientific and humanistic literature is pursued. A discussion of the properties and limits of contemporary hygrometers and a comparison of the Cartesian and Newtonian hypotheses about cloud formations are interspersed with quotations of verses on natural phenomena, mostly from poems of the classic age—a prelude to the author’s future involvement in writing scientific verses. The poetry of Damiani, which often shows a musicality comparable to that of the poet Giacomo Leopardi (1798–1837), deserves to be recognized and saved from oblivion. Especially remarkable is the implicit “multimedia” project of a union among science, poetry, theater, and music. The rediscovered *Disputation about hygrometers* opens a new window on the personages involved and on the evolution of meteorological concepts in Europe in the context of the then-new Galilean and Newtonian physics.

Keywords: geophysics, meteorology, climatology, Earth’s evolution, hygrometers, Newton, Descartes, Galilei, Metastasio, Jansenism, Enlightenment.

INTRODUCTION

My encounter with the works of Mattia Damiani (1705–1776) was fortuitous. Some years ago, I found a book of scientific poems, *Le Muse Fisiche (The Physical Muses)*, dated 1754, in poor condition, on the bookstall of a street vendor. On first inspection and before buying it, I judged the text to be a work of Metastasio, because of the large-size type of the Pietro Metastasio name printed on the frontispiece. Moreover, Damiani’s name was absent from the frontispiece. Only more careful inspection

led to recognition of the actual author, who had signed a short introductory poem and was the addressee of a foreword by Anton Francesco Gori (1754), the well known, learned archaeologist who founded a museum in Florence.

Preliminary investigation on the World Wide Web led to confirmation of Damiani’s identity as a friend of Pietro Metastasio (alias Pietro Trapassi, Italian poet, Imperial poet in Wien, and author of many libretti, 1698–1782) (Astaldi, 2001). A volume of the complete edition of Metastasio’s works was dedicated to a collection of the 54 letters from the imperial poet to Damiani

*E-mail: scalera@ingv.it

from September 1734 to March 1776 (Metastasio, 1847). At least one wrong classification of the book was made by an Italian library, resulting in Damiani's poems being attributed to Metastasio. Notwithstanding my attempts to find the name of Damiani either in a modern or old history of Italian literature, I was not able to find any reference to him, and only the indication of a referee of this paper allowed me to become aware of a shortest mention of Damiani in a book by Giulio Natali (*Il Settecento*, 1964). Girolamo Tiraboschi's (1731–1794) large panorama of Italian literature (1829) stops at the first years of the eighteenth century, and in the continuation to the next century, which was written by his pupil, Antonio Lombardi (1768–1847), no mention of Damiani's books is found (Lombardi, 1827–1830).

BIOGRAPHICAL SKETCH

The known modern accounts of the Damiani's life are the short notes of Losavio (1925), Bertini (1965), and Marrucci (1997), all based on an old manuscript of Persio Benedetto Falconcini (1729–1809), *De claris Viris Volaterranis* (1777). Among several volumes constituting Falconcini's original manuscript about the biographies of many of the personalities of Volterra, only the one, containing, among others, Damiani's life, has come down to us. Cristiano Balducci (2005) recently translated the manuscript on behalf of Istituto Nazionale di Geofisica e Vulcanologia (INGV). The incipit of the manuscript section dedicated to Damiani says:

Mathias Damianus ex honestissimâ Populari Familiâ Volaterris ortus est postridie Kalendas Maias anno MDCCV. Hic etsi haud parem Virtuti fortunam obtinuerit, adeptus tamen est tantam nominis celebritatem, divino penè ingenio, scriptisque commendatam suis, ut Iure inter illustriores, atque honoratioris Nostrates recenseatur. Magnos enim homines, ut in Eumene aiebat olim Cornelius Nepos, Virtute, non fortunâ metimur.

Mattia Damiani was born in Volterra in May 2, 1705, from a very respectable family of the popular classes. Although the destiny he received was not peer to his virtue, all the same he reached so high reputation—a celebrated fame—because of his almost divine talent and because his writings—to be rightfully counted among our more illustrious and honored fellow citizens. Indeed, as Cornelius Nepos once said in *The life of Eumene*, we esteem the greatness of men on the basis of their virtue, and not on the basis of their fortune.

The Damianis were an educated family of Volterra (Tuscany), whose father, Girolamo—married to Francesca Cetti—was a country doctor. Mattia's two brothers, the elder, Pietro, and the younger, Nicola, become a chemist and a surgeon, respectively. Having completed the study of Latin and rhetoric at the age of fifteen, the precocious Damiani began attending the University of Pisa, from which he obtained a degree in literature and jurisprudence in 1726. The eminent Newtonian scientist and mathematician, Guido Grandi (Cremona 1671–Pisa 1742) gave him lessons in mathematics and the sciences. His graduation thesis was, indeed, devoted to meteorological subjects, with the title *De Hygrometris et eorum defectibus disputatio* (*Disputation about hygrometers and their defects*) and was recalled in Falconcini's manuscript as a very careful work, full of erudition. After his graduation and three years spent in Volterra, Damiani decided to turn to the legal profession. He moved to Rome as a guest of his brother, Pietro, the chemist, at which time he met Pietro Metastasio, who became his friend and then confidant for life.

In 1733, after five years in Rome, Damiani consented to the request of the Bishop of Volterra, Ludovico Maria Pandolfini, to accept an appointment as headmaster of the Bishop's Seminary

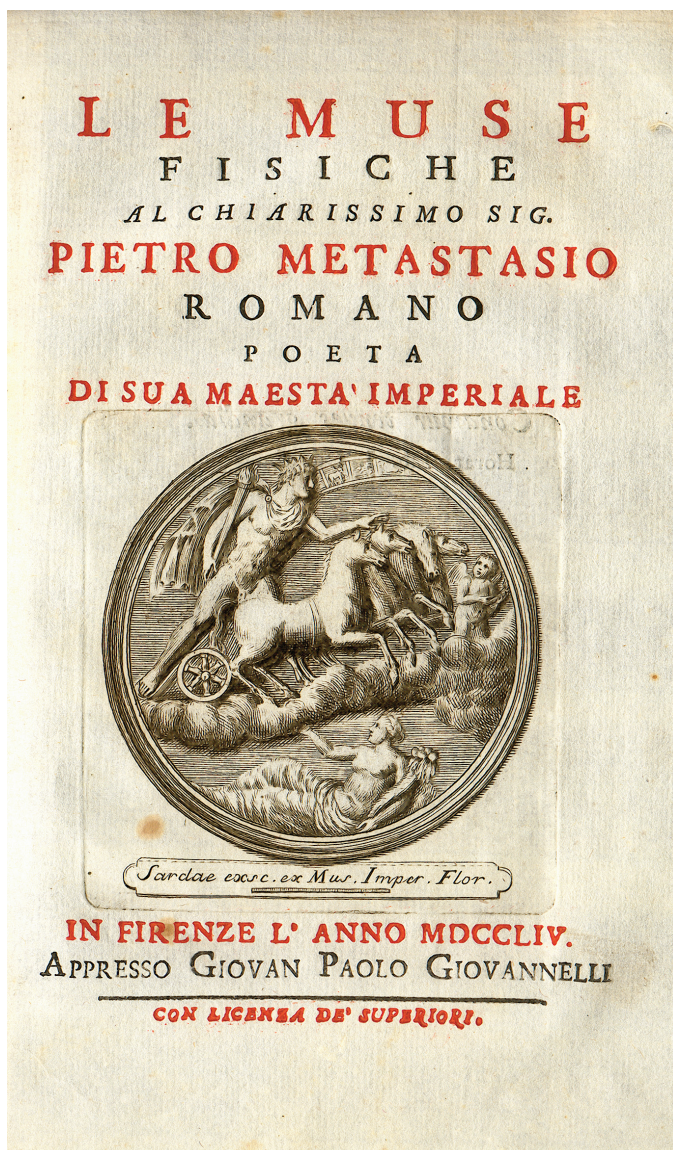


Figure 1. The frontispiece of Damiani's most famous book *Le Muse Fisiche* (*The Physical Muses*) published in 1754.

high school of the town. He was ordained in 1735. In his biography, Falconcini writes that Damiani's teaching was of great quality and effectiveness, but that he never abandoned literature, adopting the style of Metastasio as a model and working on poetry at night. At this point, Falconcini writes that Bishop Pandolfini, lacking in moderation, tended to revive old disagreements with the local nobility. Some excessively severe punishments and recriminations by Pandolfini against the young noble scholars led to Damiani's decision not to become involved, and to accept the proposal of Francesco Gaetano Incontri, then appointed Bishop of Pescia, to act as his vicar in 1738. After three years, Incontri was transferred to Florence, and Damiani become plenipotentiary vicar of Pescia. After the appointment of a new Bishop, however, some disagreements with this superior led Damiani to leave Pescia and accept the proposal of Vincenzo Riccardi to become tutor to his two sons, Carlo and Cosimo. In this happy period of his life, Damiani helped Giovanni Lami, Riccardi's librarian, to publish the journal *Novelle Letterarie* (*Literary Newsletter*). Other friends of these years were Anton Francesco Gori (1754), an expert in Etruscan antiquities, and Andrea Pietro Giulianelli,

the deputy director of the Laurentian Medicean Library. All these friendships allowed Damiani to be co-opted and accepted as a member of the *Florence Academy* and the *Apatisti Academy*, both interested in an amalgamation of literature, science, and art.

After performing the task of tutor to the complete satisfaction of the Riccardi family, Damiani—thanks to the good offices of Riccardi—obtained an ecclesiastical allowance in Volterra. This was a moderate life annuity in return for the small job of performing religious services as a bestower of the sacraments at communions, weddings, etc., for the pupils of the “Maria Magdalena” Hospital–Boarding School for Women in Volterra.

In 1745, he returned to the town of his birth. At the same time, the Great Duke of Tuscany, Francesco di Lorena, became the German Emperor, and culture flourished in the Grand Duchy. Then, the *Accademia dei Sepolti* (*Academy of the Buried*) was revived in Volterra, to which Damiani was appointed the permanent secretary. The quarrelsome Bishop Pandolfini died in 1746, and a series of tumultuous events allowed a dear friend of Damiani, Iacopo Gaetano Inghirami, to become the regent of the Volterra diocese. Damiani's life then became easier and

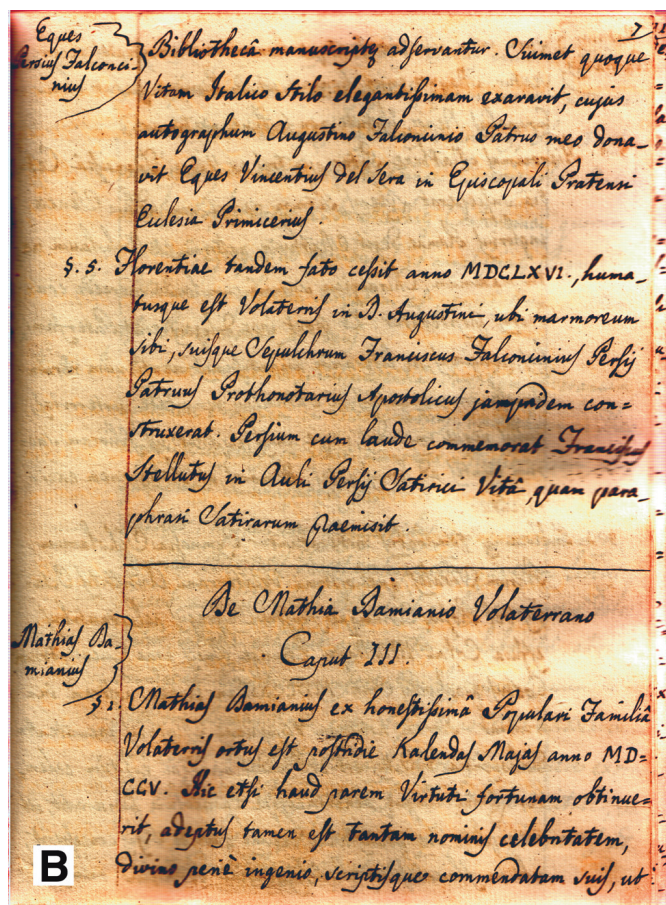
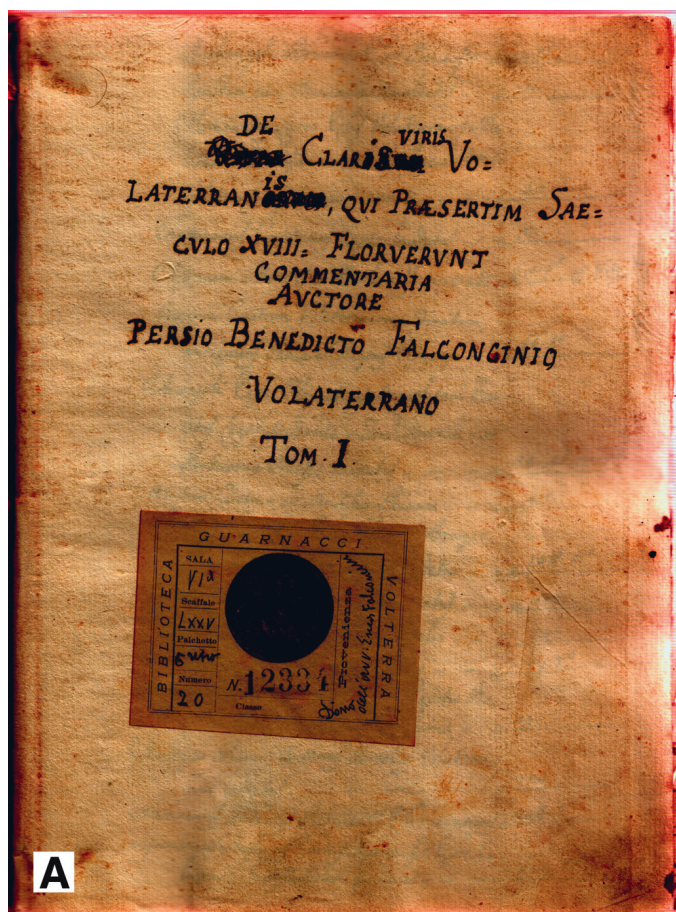


Figure 2. (A) The frontispiece of the manuscript of Persio Benedetto Falconcini. The manuscript is kept at the Guarnacci Library in Volterra. (B) The incipit of the section of Falconcini's manuscript that is dedicated to Damiani's biography.

was divided among a new appointment to teach in the seminary, the practice of law, especially as a highly-regarded justice of the peace, poetry, and natural philosophy. In this period, Damiani became a cultural point of reference in his town, having friendships and correspondence with many important men and women of his time (correspondence with Ludovico Antonio Muratori, 1672–1750, for instance). Falconcini writes:

... any more or less famous man of letters, Italian or English or from elsewhere, coming to Volterra stimulated by an erudite curiosity to visit the vestiges of this glorious antiquity, sought a meeting with Damiani, or a meeting was sought by him and welcomed with high regard, courtesy, and respect.

After the appointment of Iacopo Inghirami as Bishop of Arezzo in 1755 and the nomination of the fellow-citizen, Filippo Nicola Cecina, as regent of the Volterra diocese, Damiani's delicate health started to decline. A progressive contraction and stiffening of his legs afflicted him for the next twenty years of his life. It is difficult today to understand the real nature of his illness. Well-grounded hypotheses can indicate a slipped disk, fibrosis of the ligaments of rheumatic origin, or autoimmune progressive fibrosis. The associated shooting pains referred to by Falconcini make the first hypothesis most probable. When his physical condition became too severe for him to continue to work, in 1768, Damiani asked to be replaced at the seminary by his nephew, Lorenzo Cetti. The Grand Duke, Pietro Leopoldo, visited Volterra in 1773, but Damiani could not meet him. However some of his odes—written on this occasion in honor and celebration of the Grand Duke—were sung by excellent choristers. Mattia lost his battle with death on 27 July 1776, when he was seventy-one years old.

THE LITERARY AND SCIENTIFIC EIGHTEENTH CENTURY

Science was not completely separated from philosophy and literature in the eighteenth century, and the Enlightenment produced an increased interest in the sciences and in the spread of science (Consoli, 1972; Borsellino and Pedullà, 2004). As a consequence, a number of examples of literary works about astronomy, physics, and the life sciences can be quoted from different parts of Europe. In Italy, the best known of these compositions included the *Dialogues* (1737) of Francesco Algarotti (1712–1764) (*Il newtonianismo per le dame* [*The Newtonian theories explained to the ladies*]), enlarged in the subsequent editions that came out titled *Dialoghi sopra l'ottica newtoniana* (*Dialogues about Newtonian Optics*). A series of seven dialogues (six in the first edition) discusses the different topics of the scientific revolution. Algarotti was a member of the Institute of the Science and Arts of Bologna, founded by Luigi Ferdinando Marsili (1658–1730) in a cultural climate in which an integration of art, literature, and science started to be more efficaciously favored in Bologna by Cardinal Gabriele Paleotti (1522–1597) and Ulisse Aldovrandi (1522–1605) (Vai and Cavazza, 2003).

In the eighteenth century, most literature was influenced by reaction to the immediately preceding Baroque literature, which was “experimentalist,” redundant, transformist, and an expression of a luxurious life style (Battistini, 2005). The reaction sought a simpler stylistic form and arrived at the end of the seventeenth century, embracing what looked the opposite style; namely, a bucolic life away from the affectation and intellectualism of the cities. At least three examples are known of cases of noneducated people (shepherds or sons of very poor people, such as Giandomenico Peri [1564–1639]; Benedetto Di Virgilio [1602–1666]; and Jacopo Martino [1639–1656]), who were able to compose fine pieces of prose and poetry (Tiraboschi, 1829). Giandomenico Peri especially, born near Siena, was the composer of pastoral dramas. He never abandoned his shepherd's garb. These cases roused admiration and imitation and were one of the manifold causes of the success of the Arcadian movement. The Catholic church monopolized the Arcadian Academy because of the need to drive the intellectual energies of the time and to attenuate the emerging rationalism.

In Tuscany, the need for a simpler and clearer way of writing went toward a link with the tradition begun with the *Vocabolario della Crusca* (Dictionary of the Crusca Academy) and by Galileo Galilei's scientific-literary works (Galilei, 1632), and in this Italian region, a greater number of people pursued the aim of diffusing scientific results by adopting a plain and more understandable style. In the seventeenth century, Galilei, Cesi, Redi, Magalotti, and the reports of the Academies of Lincei (Rome) and of Cimento (Florence), became models for subsequent writers of the eighteenth century, in which Arcadia was combined with the Enlightenment.

While common opinion (but biased by a philosophic preconception) is that these didactic compositions never reached great heights, in a few cases the pedagogic purpose linked masterfully to Arcadian loveliness and neoclassic forms. The best known examples are works of the already mentioned Francesco Algarotti (1712–1764; *Dialogues*, 1737), and of Carlo della Torre di Rezzonico (1742–1796; *Il Sistema de' Cieli*, 1775) and Lorenzo Mascheroni (1750–1800; *L'invito a Lesbia Cidonia*, 1793). But Mattia Damiani's writing is different from all these, assuming a form that was completely original because all the arts—literary, visual, and musical—are combined together and to the science.

THE KNOWN WORKS OF DAMIANI

The Physical Muses

The literary productivity of Damiani (1747, 1754, 1758, 1761, 1765a, 1765b, 1770–1771, 1772, 1773) began ca. 1747 with a *Componimento pastorale-filosofico detto in Firenze nell'Accademia degli Apatisti* (*Pastoral-philosophic composition declaimed in Florence at Apatisti's Academy*); the second main work was the *Le Muse Fisiche* (*The Physical Muses*), a collection of scientific poems that, during the years preceding their printing in a single book in 1754, probably were presented on

different occasions. The work is a set of nine poems on different scientific arguments:

1. *De' Satelliti di Giove (About the satellites of Jupiter);*
2. *Della vicendevoles gravità de' Corpi, o sia delle Forze Attrattrici (About the gravity of the bodies, namely the forces of attraction);*
3. *Del Suono (About Sound);*
4. *Della Luce, e sue proprietà (About light and its properties);*
5. *Della Vita, e della Fecondazione delle Piante (On the life and on the fecundation of plants);*
6. *Dell'Azione de' Corpi Celesti (On the action of the celestial bodies);*
7. *Della Pluralità de' Mondi (About the plurality of the worlds);*
8. *Dello scioglimento de' Corpi in Fiamma (About the dissolution of the bodies into flame);*
9. *Della Natura dell'Acqua (About the nature of water).*

The text style is not that of a normal poetic composition but follows the form of libretti designed to be set in music. The dialogues among the personages—deities, shepherds, nymphs—alternate groups of verses of different length, hendecasyllabic and seven-syllabic, followed by a *cantabile* section in which the verses are shorter, regular, and all seven-syllabic. Damiani's project is superior to many of the other contemporary attempts to make public the new concepts of science. Indeed, although the poems can be merely read and enjoyed as they are, in them works a strict amalgamation of new science, poetry, music, and theatrical spectacle designed for a particular social target—an educated audience.

The nine poems of *Le Muse Fisiche* are clearly an exposition of Copernican and Newtonian theories, and contrary to expectations, the book did not incur the Inquisition's anger. Perhaps an expedient of Damiani to avoid registration in the *Index of Forbidden Books* was to omit the name of the author on the frontispiece. This was not an unusual practice. In the eighteenth century, a similar expedient was adopted in the case of a clever upholding of the Copernican and Newtonian system; namely, the (at the time) famous *Ragionamento Filosofico intorno al Moto della Terra (Philosophic reasoning about the motion of the Earth)* by the Apulian professor, Giuseppe Carlucci (1766). This manuscript, after long, free circulation, was published anonymously in 1766 (Marvulli, 2001; Raucci, 2001; Sisto, 2003). Damiani cleverly avoided all possible pretexts for accusing him of heresy. In fact, in a short sentence—a premise of few words contained in a single page—the declaration is made that the use of words such as “deity,” “fate,” and “numen,” are simple poetic expressions.

All the poems bear witness to progress in the freeing of the cultural world, and in particular of the ecclesiastic reflection—Damiani was a priest—about the new sciences and the new system of the world. Formal cancellation of the Copernican books from the *Index of Forbidden Books*, as declared

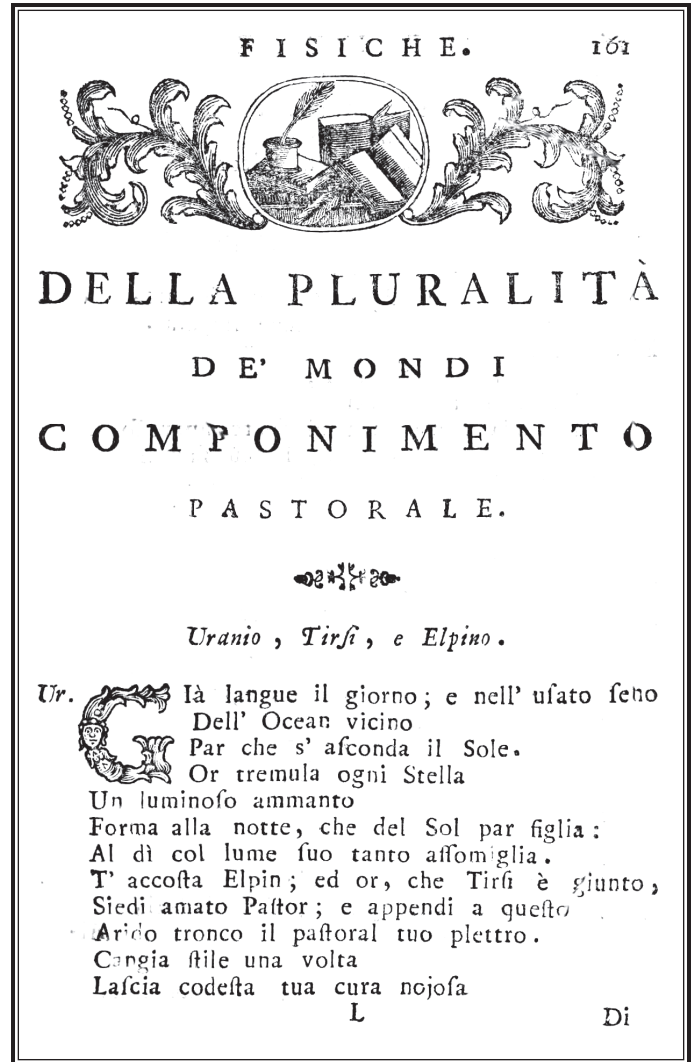


Figure 3. The first page of the poem *Della Pluralità dei Mondi—Componimento Pastorale (On the Plurality of the Worlds—Pastoral Composition)*. The first seven verses are: *The day is already languishing / and in the aged bosom / of the nearby Ocean / the Sun seems to hide. / Every twinkling star / contributes to the luminous mantle / that forms Night, / which of the Sun seems the daughter: / She [Night], with his light, has a close resemblance to the Day.*

by Pope Pio VII, happened with the publication of the *Handbook of Astronomy* by the priest Giuseppe Settele (professor at the University *La Sapienza* in Rome) in 1822 (Maffei, 1987). The poems of Damiani are a further example of the practical ineffectiveness of the Inquisition's decrees about the forbidden Galilei and Copernicus theories.

Damiani's poem, *About the Plurality of the Worlds*, is a particular example of the exposition of Copernican ideas giving them the form of complete generalization—an idea proposed by the philosopher Giordano Bruno (1548–1600) and followed by Bernard le Bovier de Fontenelle (1686) and many others, raising a never-ending collective cultural discussion that is today focused

upon the solution of the so-called Enrico Fermi (1901–1954) paradox (Webb, 2002). This is also an anticipation of modern trends in planetary geology. These concepts on the existence of many worlds—possibly an infinity of them—were considered nearer to heresy than the concepts of Copernicus or Newton. Very cautiously, Damiani adopted a dissimulation strategy. In a footnote to the last cues of the poetic dialogue among Uranio, Tirsi, and Elpino, Damiani wrote—insincerely—that the words of Elpino deride the plurality of the worlds and that he himself considered this idea a mere hypothesis. In reality, the Elpino personage is persuaded of the truthfulness of the plurality idea throughout the course of the seventh poem, and his last cue is a confirmation—in a form of joke—of his conviction. This kind of strategy is analogous to that adopted by Galileo Galilei during his trials to defend his *Dialogue concerning the two chief world systems, Ptolemaic and Copernican* (Galilei, 1632) from the accusation that it was in complete favor of the Copernican system.

The Miscellaneous Poetry

Damiani was author of a large number of poetic works—whether philosophic or dedicated to famous people of Tuscany and Volterra—canzoni, short lyrics, cantatas, and some melodramas in music. The poetic works were reprinted several times with additions (Damiani, 1758, 1765a, 1770–1771). In the last edition of 1770–1771, the editor uses four letters of Metastasio as a foreword. The philosophic lyrics (e.g. *Philosophy, Liberty*, etc.) are little gems and among them, the poem, *Time*, is particularly exquisite. Galilei’s argument of the relativity of motion is applied to time and to its apparent shifting from the past to the present and the future. The conclusion is drawn that time-motion is not real but, instead, time is the progressive transformation of reality and of ourselves. This transformation produces the sensation of time passing. Damiani’s concept, eliminating the paradoxical motion of time, is of particularly high value and anticipates ideas that are much more modern. The Appendix to this paper offers selected parts of the lyric, *Time*, with its translation. Damiani’s concern for time in the eighteenth century is not only important for physics but also in the particular contexts of the geological time scale and the age of Earth, which were going to change dramatically with Buffon (1707–1788) (*Epochs of Nature*, 1774, the Earth’s age increased to 75,000 years) and James Hutton (1726–1797) (*Theory of the Earth*, 1788, the Earth as being indefinitely old).

Besides the manuscripts of Mattia Damiani’s published works, a number of unpublished manuscripts of lyrics—donated by Pietro Damiani (the great-grandson of Nicola, Mattia’s younger brother) in 1870—are conserved in the files of the Guarnacci Library in Volterra. Examples of them are the nostalgic sonnet, *Dedicated to Volterra*, which was written on an occasion when Damiani was going away, far from his birth place for a long time, and the sonnet, *The Trinity*, based on the theological paradox of God as one and trine.

The Eulogy of Genovesi

The true unification of Italy was already complete in the cultural field a century before political unity was achieved. All the personages of the Italian Enlightenment were linked to each other by mutual esteem and cultural exchanges. Indeed the “renowned Doctor,” Mattia Damiani (1772), felt himself honored to write the funeral eulogy in verse for the Neapolitan economist and philosopher, Abbot Antonio Genovesi (1712–1769). The Apulian Abbot, Domenico Forges-Davanzati (1742–1810), wrote the foreword and footnotes to the eulogy, which was published in 1772. Forges-Davanzati was the nephew of Bishop Giuseppe Davanzati (Bari 1665; Trani 1755), and in 1774 and 1789, he was the publisher of his uncle’s manuscript, *Dissertazione sopra i Vampiri (Dissertation on Vampires)* (Davanzati, 1774)—a long text addressing the stupid superstitions that afflicted the church and the people in Europe at that time. G. Davanzati devoted some pages of his *Dissertation* to statements in support of the Copernican system and was the author of a lost *Treatise on Comets*.

The works of Antonio Genovesi on economic science and philosophy were listed in the *Index of Forbidden Books* (Anonymous, 1824), and the eulogy of Genovesi, written in 1772 by a scholar of his work, Giuseppe Maria Galanti (1743–1806), suffered a similar fate (decree of November 1773; Anonymous, 1824). This indicates the risk to which Damiani was exposed in publishing his eulogy of Genovesi and in participating in the more liberal practices of Italian cultural life, but on the other hand, it also bears witness to an epoch when the cultural climate in Tuscany—one favored by the Grand-Dukes of Tuscany—was liberal and benevolent toward novelties coming from the great streams of French and American ideals (Montanelli and Gervaso, 1970).

THE JANSENISM OF DAMIANI

Religious arguments are often touched on by Damiani in his works, and some deductions about his adherence to some current ideas of eighteenth-century theology can be made. A first clue lies in a *cantabile* part of the fourth poem of *The Physical Muses* (1754), *About Light and its Properties*. In this cantata, some statements in favor of a rigid determinism are made: the first cause of all being the Deity. A second stronger clue is found in the poem *On the Existence of God*, contained in the *Collection of Different Poems* (1770–1771). Many statements are written about the driving power of divinity on human behavior. Evil happens in the human reality to give greater prominence to the good. The creative act of God is not limited to a moment in the past—the beginning of the world—but is continuous and is realized also in the continuance of human behavior and thinking.

This collective evidence suggests that Damiani held a theological position similar to Jansenism, which was very common among the Italian adherents of the Enlightenment, and Tuscany was the Italian center of this theological movement, under the leadership of Bishop Scipione de Ricci. In many cases, those

following the idea of grace, justification, predestination, and determinism had the aim of limiting the decisional power of the papacy. Jansenism was strongly opposed by the Jesuit order, coupled with more or less degrees of Vatican decisiveness. The doctrine of Jansen, however, was nearly coincident with Augustinian theology, and it was not substantially different from the Christian doctrine traditionally followed for sixteen centuries. It is common opinion that, under the pressure of the Jesuits to renew Christian thinking in response to post-Renaissance Humanism, the church developed the political solution of censuring Jansenism because it could not condemn the traditional Augustinian doctrine (Iemolo, 1928).

It is impossible to know with certainty if Damiani was simply following the old traditional Augustinian doctrine or adhering with awareness to Jansenism. An historian of the church (Iemolo, 1928) writes that, in the first half of the eighteenth century, the Jansenists-Augustinians were tolerated without being marginalized and that many of them reached prominent positions in the church hierarchy. The famous synod of Pistoia—which gathered the Italian Jansenists—was held in 1786, ten years after Damiani's death. Only after this synod was the Jansenist movement practically defeated in Italy (Stella, 1972).

THE FORMERLY LOST *DISPUTATION ABOUT HYGROMETERS*

In 2002, thanks to the kindness of an Antiquarian of Florence, Dr. Paolo Pampaloni, a copy of the public dissertation of Mattia Damiani at Pisa University, published in the year 1726, was made available to INGV. A complete Italian translation of the Latin text, comprising thirteen theses and a foreword in the form of a letter addressed to the Bishop of Volterra, the Prince Ludovico Maria Pandolfini, has been made.

Damiani's rediscovered dissertation, *De Hygrometris et eorum defectibus disputatio* (*Disputation about hygrometers and their defects*), is a critique of the experimental methods used in meteorology to measure the amount of humidity in the air. The history of these criticisms has never ended, and a more modern example can be read, for example, in a paper by Aliverti (1929), in relation to the hygrometers of the beginning of the twentieth century. The *Disputation* is also a discussion of the two opposing ways of explaining the meteorological phenomena, by Newton laws or Cartesian whirls (see De Fontenelle, 1732, Section IX). Damiani took the side of Newtonian physics.

A number of different ideas on the nature of clouds existed at the beginning of the eighteenth century (Hamblyn, 2001). The most credited theory claimed that water particles, under the action of sunlight, could transform themselves into little bubbles filled by low-density air, the so called "aura." These bubbles, like ballonets, tended to rise and accumulate at high-altitude, forming clouds. The rupture of these little spheres produced rain and closed the cycle by returning the moisture to Earth's surface.

Others held the view that acids circulating in the atmosphere corroded the dissolved water in the air and that this corrosion

became visible as clouds. An analogy was between the irregular shapes and colors of clouds and the corroded zones of metals exposed to acids.

Another idea on the production of water vapor and clouds attributed the role of elevating the vapor to hypothesized igneous particles transported by light rays. These lighter-than-air particles adhered to the vapor drops like a life-belt, transporting them skyward. When detachment of the igneous particles occurred, rain was generated.

The concepts discussed by Damiani belong to yet another school of thought. He hypothesized that air was composed of filaments wrapped in spherical spirals. Particles of water vapor were considered to be endowed with gluten and thus able to adhere to the air particles. In this way, winds could transport a

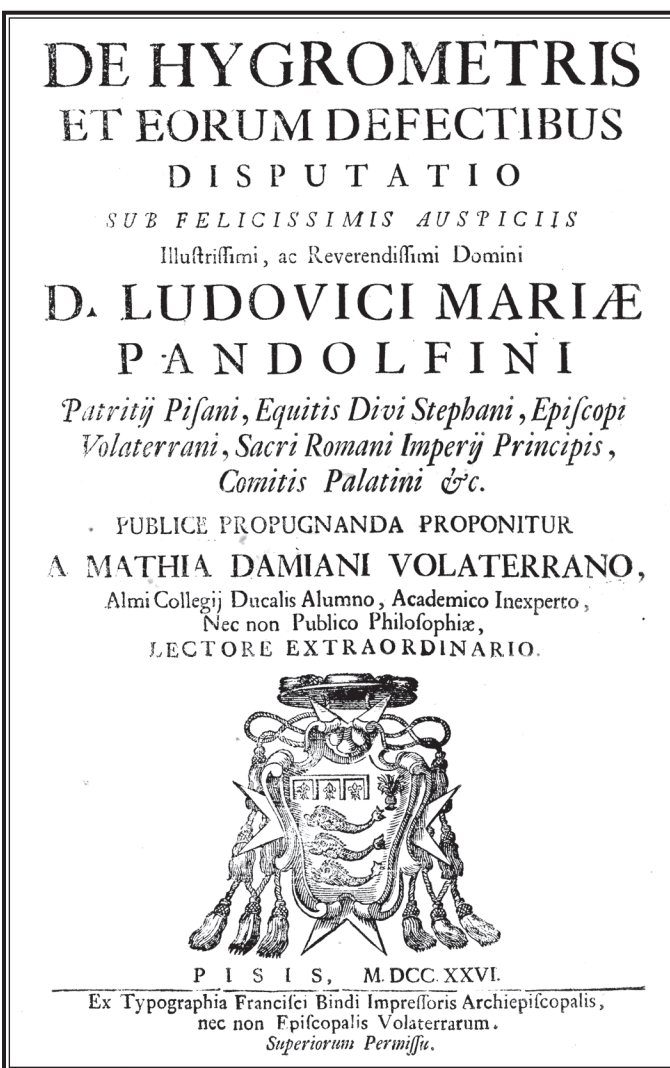


Figure 4. The frontispiece of the Damiani's dissertation *De Hygrometris et eorum defectibus disputatio* (*Disputation about hygrometers and their defects*) published in 1726.

large quantity of vapor to great heights, thus forming clouds. Similar transportation would be more difficult for dust particles, he reasoned, because they are not glutinous. After a long discussion of these ideas, Damiani, in the small thirteenth section of the third thesis, inserted a short quotation about the above-mentioned hypothetical igneous-particle—“life-belt” mechanism—which he judged a plausible idea.

Although in sixteenth century a better way of reasoning was inaugurated by Nicolaus Copernicus (1473–1543) and Giordano Bruno (1548–1600), who thought correctly that the air was simply a participant in Earth’s rotation, in the century preceding the birth of Damiani, nascent Galilean physics was mixed with ancient Aristotelian concepts. Using these still-uncertain concepts, thoughtful individuals tried to place atmospheric phenomena in a context of the new awareness of the movement of Earth. An example of these resulting misinterpretations is the explanation that a follower of Copernicus, Father Paolo Antonio Foscarini (Foscarini, 1615; Romeo, 1992), gave about the phenomenon of the equatorial winds being constantly directed toward the west. The ghost of the *Primum Mobile* is still present in his ideas. Foscarini wrote to Galilei (Caroti, 1987; Scalera, 1999):

I have judged that, under the equinoctial line, the phenomenon of the perpetual west-directed wind is due to nothing but a little resistance of the air against the motion of the Earth, which, in it [the air] contained and moving in accord with it from west to east, produces the night and the day.

[...]

But if the air that contains the clouds is moving with the same motion of the Earth, by which cause do the clouds not move by the same motion? And if somebody will propose the wind as cause, I will reply that, in comparison to the impetus of the wind, the impetus that transports the natural motion of the air together with the Earth is greater. Since the circle of the air is greater than the circle of the Earth, if the Earth moves at eight hundred miles/hour or more, the air will move at 1500 miles/hour. But no wind—however impetuous it can be—can reach this velocity.

In the case of Foscarini and many others (Scalera, 1999), Earth’s motion was considered a primary phenomenon, but discussion about atmospheric motions and clouds was soon influenced by the Cartesian system of the world in which the primary cause of planetary motion was the whirling of very thin matter pervading the universe. The French philosopher’s ideas were also fonts for erroneous explanations of meteorological processes.

In the continuation of his third thesis, Damiani confuted the mechanical process of cloud formation—like a centrifuge effect—as proposed by some followers of Descartes. Descartes’ space filled with material whirls was judged by Damiani as a complicated way to describe nature, which actually could divert thinking from a simple and realistic explanation of the phenom-

ena. In the case of the rising of the water vapor that gives rise to clouds, Damiani strongly criticized the action of the whirling thin matter proposed by the followers of Descartes:

[...]

Indeed the existence of the abovementioned very thin matter—that is present in all the space between the Earth and the Moon—is uncertain. And also if any evidence was adduced of the existence of this matter, the circular motion of this matter around the Earth would nevertheless be uncertain, and the cause that produces the movement itself and its conservation without decrement would be obscure. Moreover, it is not known with certainty if the velocity of the thin matter was constant or would become greater thanks to the velocity of the bodies that are pushed and driven in its whirl. [...]

Moreover, if a circular movement of this kind is admitted, it is difficult to explain the mechanism by which the Moon—dragged by the whirl of matter moving around it—can complete both the rotation on its axis and the revolution along its orbit in 27 days, 7 hours, 43 minutes. Finally, it cannot be understood how the Earth complete the movement of rotation around its axis in 24 hours. And given that [the uprising of the vapours] is founded on all these hypotheses, all the same the opinion that the uprising of the vapours was produced by the centrifugal force of the material whirls must be judged uncertain and doubtful.

... like in a building, if the ruler itself is wrong,
if the set-square is not rectilinear,
and if in some part of the level the wire is curled,
all the house will be built incorrectly,
bent, twisted, bowed and deformed.
(Lucretius, *De Rerum Natura*, IV)
[...]

Damiani (like Algarotti and many others) emerges from all the misunderstandings of the seventeenth century with a clear preference for the physical concepts of Newton (1642–1727).

Throughout the *Disputation*, a delightful amalgamation of scientific and humanistic literature is pursued. Alongside the discussion of the properties and limits of the contemporary hygrometers, the text is interspersed with quotations of verses on natural phenomena, mostly from poems of the classic age—a prelude to the author’s future personal engagement in writing scientific verses. These quotations are inserted for a purely aesthetic purpose, because they do not constitute the basis on which to found the reasoning. The quotations have then different general sense from the *ipse dixit* of the Aristotelian tradition. An example of the old way of quoting old sentences from writings of classic authors can be easily found in the 43rd chapter of *Il Saggiatore* (Galilei, 1623), in which a long section of a work of Lotario Sarsi (the nickname of Orazio Grassi) is transcribed. The work of Sarsi—containing innovative concepts about the comets—is example of

how the old literary and methodological customs are mixed with new science. Only Galilei and other members of the Accademia del Cimento and Accademia dei Lincei inaugurated a more modern way to write scientific works (e.g., Magalotti, 1667).

The seventeenth century gave birth to modern climatology with the Torricelli barometer. In the attempt to measure the quantity of water dispersed in the air, a series of different scientific instruments were developed and tested. Damiani discusses a number of these apparatuses, highlighting their limits and flaws. The nonlinear behavior of the instruments in response to a linear variation in the moistness is especially emphasized.

After he had established the inadequacy of the human senses to evaluate precisely the water-vapor content of the air, Damiani, in the fifth thesis, started his analysis of the hygrometers. First, he classified hygrometers into two types:

1. Hygrometers that absorb vapor from the air and indicate the water quantity by an increase in weight or other effects; and
2. Hygrometers that are able to collect the water vapor, condensing it in a graduated glass.

The First Type of Hygrometer

In the sixth thesis, the use of salt, sponge, wool, cotton, and other hygroscopic materials is scrutinized. The author criticizes the trials using an increased weight of these substances because of lack of linear response, and because, in his opinion, when the pores of the materials become filled with water, their sensitivity to further increase in moisture becomes zero. In this thesis, the experiments of Cardinal Nicola da Cusa (1401–1464), Father Francesco Lana (1631–1687), and learned members of the Academy of Nuremberg are quoted and confuted.

In the seventh thesis, strings of hemp and catgut are considered. The nonlinearity of their response to a linear increase in humidity is shown. The savants involved were Christian Wolf (1679–1754), Leonhard Christoph Sturm (1669–1719), Jean-Baptiste Duhamel (1624–1706), Ogier Ghislain De Busbecq (1522–1592), and Ludovico da Ripa. This last author is quoted by Damiani as author of *De vi vaporum in Hygrometris. Disertat. Geometric. Mechan.*, but is not inserted in Italian Encyclopaedias and not mentioned in classic compilations on the history of the Hygrometry (Agamennone and Cancani, 1885).

In the eighth thesis, the fibres of the ears of oat are discussed. The confutative arguments are similar to the ones he used for ropes of hemp and catgut in the seventh thesis. The personages referred to are Anastasio Kircher (1601–1680), George Sinclair (?–1696), M. Gottfried, and Ferdinand Helfrich Lichtscheid (1661–1707).

In the ninth thesis, the change of the sound of a catgut string in response to moisture variations is examined. Some investigators tried to measure the variation in humidity by counting the number of semitone changes with respect to the original tone compared to a reference flute note. Confutation of this method, besides the arguments raised in the seventh thesis, cites the possibility that, in turn, the flutes also change their notes in response

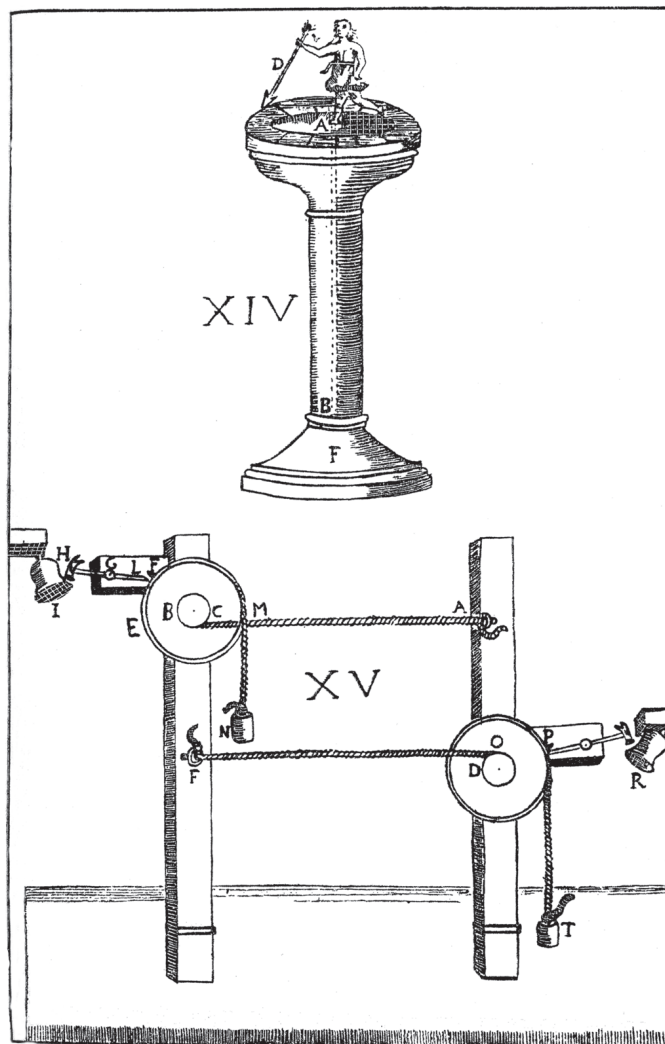


Figure 5. A first type of hygrometer discussed by Damiani in his *De Hygrometris et eorum defectibus disputatio (Disputation about hygrometers and their defects)*. The engraving represents an hygrometer built by Francesco Lana using a long vegetal fiber contained in the cylinder. The torsions of the fiber in response to the variation of the humidity is indicated on a graduate scale by the arrow in the hand of the little paper-figure (Fig. 14, Table 5, in Francesco Lana, *Prodromo all'Arte Maestra*, chap. 8th, 1670). The other instrument on the bottom of the table is able to alert with bell strokes for an arbitrary high value and an arbitrary low value of humidity. It is based on the property of the ropes to lengthen or shorten in response to humidity variations. Little teeth on the gears arm the hammers.

to the contraction or dilation of wood and metal due to variations in moisture and temperature. In addition, the limits of the human auditory apparatus to perceive variations in sound are noted. The quoted scientists are Sturm, Lana, Claude Perrault (1613–1688), and groups at the Academies of Florence and Paris.

In the tenth thesis, hygrometers are examined in relation to contraction and dilation of little wood bars that they contain. The simplest one—consisting only of two wooden bars—was the

instrument constructed by Christian Wolf, and the most elaborate one—having many little wood bars and gears—was that developed by Gottfried Tauber. Confutation of this thesis relies on the impossibility of finding two equal wooden bars, because of the inhomogeneous nature of wood. This counterargument is accompanied by a list of the unfavorable characteristics of wood that make it unsuitable for use in precision instruments. An experiment of Perrault and the unsuccessful attempts to reproduce it is quoted as supporting evidence.

The eleventh thesis—using reservations similar to those in the seventh thesis—deals with the behavior of sheets or ribbons of paper, parchment, and leather.

Finally, in the twelfth thesis, a hygrometer made by Guillaume Amontons (1663–1705) is described. The instrument was based on the expansion or contraction, under the effect of the amount of water vapor contained in the air, of a leather sphere filled with mercury. The mercury emitted by the contracting sphere was canalized into a vertical narrow pipe, and the level of the mercury in the pipe was read on a graduated scale. The shortcoming of this instrument was again the nonlinear response and the effect of other problems similar to those described in the preceding theses.

The Second Type of Hygrometer

The second type of hygrometer is the subject of the last, or thirteenth, thesis. Only the hygrometer constructed by scholars of the *Accademia del Cimento* (Academy of Florence) is described. The apparatus is based on the condensation of vapor on cold surfaces. In this hygrometer, an upside-down cone filled with ice collects the condensed drops of water in a graduated tube (Magalotti, 1667). The measure of humidity is determined as the rate of increase of the water in the tube in a given unit of time. The critical argument of Damiani is that, although correctly based in principle, the results of this experiment are temperature-dependent and if the air temperature is less than the ice temperature, the apparatus does not condense vapors at all. The criticism is based on the experience of drinkers in a tavern in winter, when no water vapor condenses on glasses.

Damiani uses this thirteenth thesis as the conclusion of his *Disputation*. He was perfectly aware that he was only making a critique of the status of the art of hygrometric science. Moreover, he was aware that he had nothing new to propose and had only been able to identify problems and urge scientists to find new solutions and design new instruments. Following a traditional literary custom, this quotation from Horace's (Quintus Horatius Flaccus, 68–8 B.C.) *Ars Poetica* concludes the book:

*My role will be that of the whetstone, which sharpens
the iron that was previously unable to cut.
I will teach the task and the duty without writing anything.*

Damiani's approach through Galilean and Newtonian physics and his views on the origin of meteorology (a field to become geologically important in understanding, for example, ancient climates and climate change, chemical and physical weathering and erosion, sediment generation and deposition, and soils) would seem as if he anticipated Hutton, Lyell, and Darwin, who in setting forth their respective principles, spread the net of their evidence so very widely, reasoned in similar fashion to Damiani, and would not subscribe to divine intervention or metaphysical forces.

DISCUSSION AND CONCLUSIONS

The individuality of the personage of Mattia Damiani has probably not facilitated proper acknowledgment from either his contemporaries or posterity, but some additional external conditions could also have contributed to his neglect.

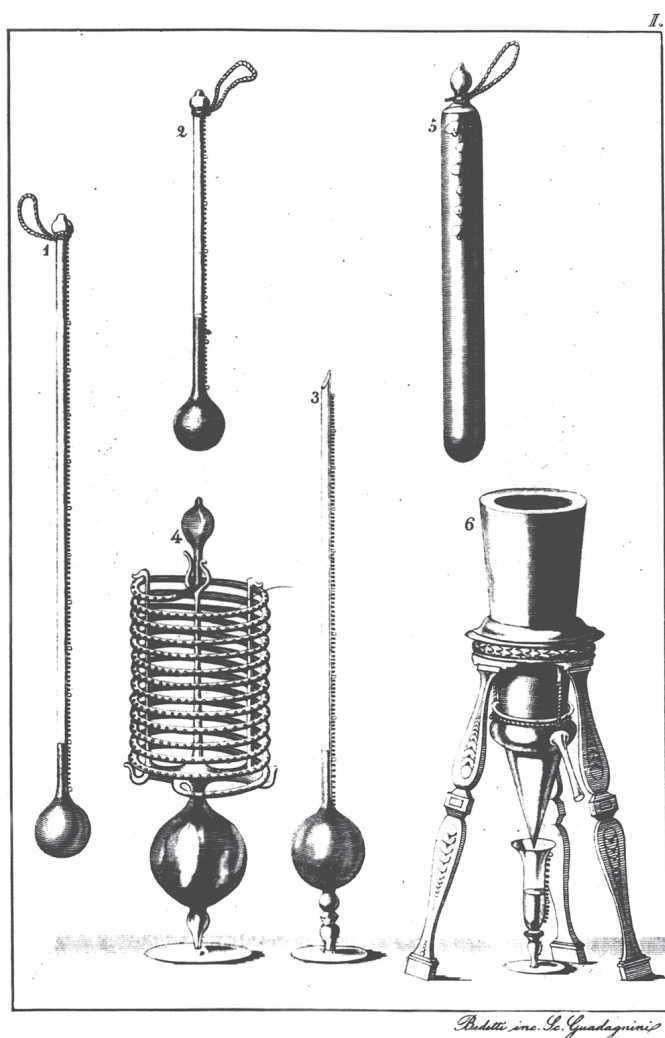


Figure 6. A second type of hygrometer discussed by Damiani in his *De Hygrometris et eorum defectibus disputatio* (*Disputation about hygrometers and their defects*). This hygrometer—Figure number 6 in table II of the volume on the experiments of the *Accademia del Cimento* of Florence, 1841, third edition (Magalotti, 1667)—is the instrument described in the Damiani's *Disputation* as drawn by the engravers Bedetti and Guadagnini.

The literary productivity of Damiani was not vast, but an important part of what he studied and wrote about follows a path between science and literature (Battistini, 1977). Important scientists and philosophers have overcome the boundary between science and literature many times in the past. Galileo Galilei (1632) is remembered for the titanic literary enterprise of his *Dialogo sopra i due massimi sistemi del mondo, tolemaico e copernicano* (*Dialogue concerning the two chief world systems, Ptolemaic and Copernican*), but there are older literary compositions of Galilei, such as the commentaries about Torquato Tasso and lessons on the topography of Dante Alighieri's hell (Banfi, 1940; Spongano, 1956; Sansone, 1965), are also deserving of close attention. Tommaso Campanella (1568–1639) is still studied for his poems (Ruschioni, 1980). Even the Russian chemist, Michail Lomonosov (1711–1765) is remembered as a composer of poems. In general, all post-Renaissance European science and philosophy is marked by sporadic links between science and art.

In Damiani's work *Le Muse Fisiche*, however, overcoming the barrier between the "two cultures" (Snow, 1970) is more complete. This is evident not only in the direction of poetry, but also theater, with its links with the visual arts, and music. Indeed, Damiani lived at the time of the birth of melodrama (Mila, 1956), and he was certainly fascinated by the fusion among the arts that it realized. His object was to add science to an amalgam of images, costumes, scenery, poetry, and music. While I cannot be certain, there is a distinct probability that some "pastoral compositions" from *The Physical Muses* were actually performed in a Tuscan theater. Today, the music of most of the melodramas of the eighteenth century is lost, and only conjectures about the style, musicality, and instrumental ensembles used in the performances is possible (Mila, 1956; Giuntini, 1994).

Some logic can now be seen for the start of the creative process of the nine compositions in *The Physical Muses* of 1754. Their interior elaboration can be carried back to the time of collecting the poetic material about natural phenomena that was quoted in the *Disputation about hygrometers and their defects* of 1726. This material in verse—from Lucrece, Virgilio, Horace, etc.—constitutes the ideal basis on which to found Damiani's inspiration and his achieving of the artistic aims of all his predecessors toward an enlarged multimedia—or better, blended-arts—characterization.

During his life, Damiani always showed great modesty, and he attributed his decision to become a poet to his friendship with Pietro Metastasio. The sincere amity of this relationship has been mistaken by a prejudicial critic (Losavio, 1925) as intellectual dependence upon Metastasio, and the same critic, basing his judgment on idealistic prejudices, disdained the mere presence of scientific topics in the poetry. Only a later critic, Silvano Bertini (1965), reached a more balanced appraisal of the value of the Damiani's poetic work. Losavio's harsh criticisms did not distinguish the different levels of philosophic elaboration of the two friends. The recently rediscovered *Disputation about the hygrometers* makes it clear that Damiani did not regard himself entirely a poet; rather, his cultural background made him more

a philosopher of nature *sensu lato*. The spirit of his activity—Damiani's target—was not purely aesthetic, as were Metastasio's aims, but it had, beside the Enlightenment component, a strong component of the Renaissance spirit. Damiani can be defined as a "Renaissance man" in that he starts from the observation of nature in defining and limiting his own thoughts. It is not coincidental that an ode of eulogy by him was dedicated to Antonio Genovesi, who in his philosophical works attempted a dissection of all the "systems of the world," demonstrating that most of them were based on preconceptions and not on observations (Galanti, 1772). This attitude of Damiani—coming from his long lapses of time spent in Renaissance centers of Pisa and Florence—is harmoniously blended to the more philosophical attitude of the Enlightenment *Weltanschauung*.

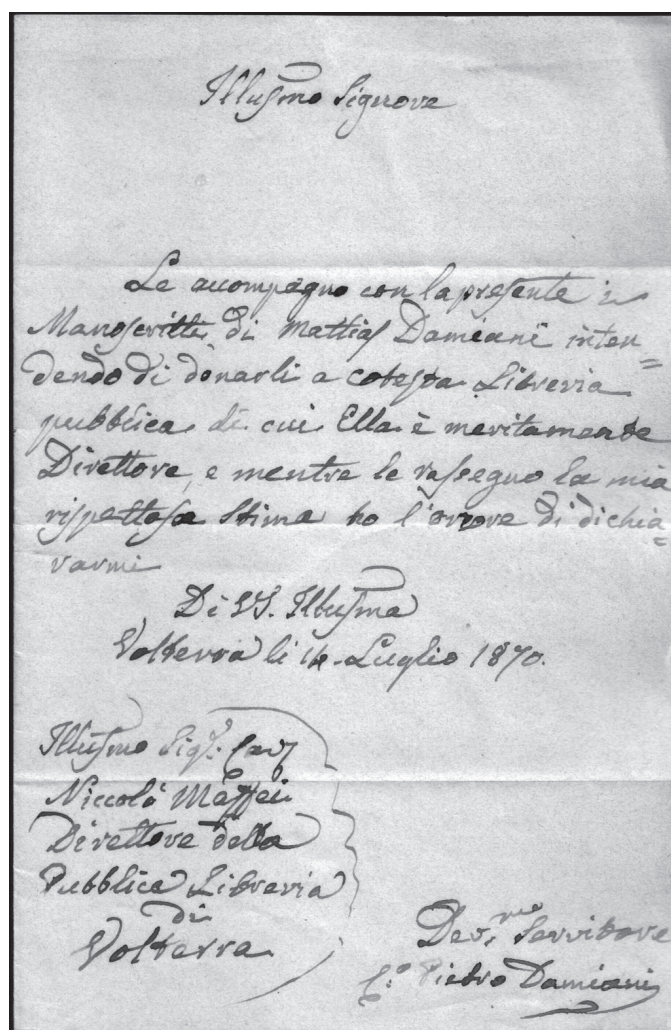


Figure 7. The collection of manuscripts bequeathed by Mattia Damiani. The donation was made by Pietro Damiani on 14 July 1870 to the Public Library of Volterra. The letter was addressed to the librarian, Niccolò Maffei. The text says: *Enclosed with this letter are the manuscripts of Mattia Damiani, which I wish to donate to the Public Library of which you have the well-deserved position of Head Librarian ...*

The manifold causes of the oblivion of Damiani's work can be attributed to:

1. Some vicissitudes in the Italian cultural scene. Influential people, like the Jesuit Giambattista Roberti (1719–1796) (Borsellino and Pedullà, 2004), recommended only a parsimonious introduction of physics into poems. The Arcadian movement in the eighteenth century was under the cultural control of the church, trying to curb Libertinism and the nascent cult of the “Deity Reason,” so rationalistic works like *The Physical Muses* were probably not regarded benevolently. The idealistic conservative critics of the first half of twentieth century considered the introduction of physics into the pure aesthetic poetry as not legitimate (e.g., Losavio, 1925).

2. Damiani's ideas were close to the theological positions of the Jansenists, and the possibility exists that a hidden suppression of dissident voices operated in literature and theology, especially after the Pistoia Synod of 1786. Even today, in some recent compilations about the history of the church, the Jansenist movement is almost completely ignored (Fernandez, 2000), including the bloody struggle between the Jansenists and the Jesuits in the seventeenth century, mostly in France, of which the Port Royal des Champs vicissitudes, a Jansenist stronghold until the nuns were expelled in 1709, provides an example. The time was one of transition from the old to the new Christian attitude—from predestination to free will.

3. The founder of the Italian history of literature, Girolamo Tiraboschi (1731–1794), was a Jesuit, and it is possible that some cultural filter was applied by him and transmitted to those historians who followed him. Indeed, clues supporting this possibility can be found in the introduction of Antonio Lombardi's (1768–1847) *History of the Italian Literature of the XVIII Century* (Lombardi, 1827–1830).

As for the implication of Damiani's work in demanding logical explanations of natural phenomena, a tendency to dismiss theological explanations (mostly Diluvianism), which was then dominant in European earth science, in favor of a pure scientific approach, already quite common in Italy, is reconfirmed.

Damiani was follower of a new conception of time, adoption of which by the western scientific community was of primary importance in the expansion of the geological time and the age of the earth from few thousands of years (biblical computations stated only 6000 yr) to millions or billions of years.

I am personally convinced that, at present, cultural life is being irresistibly spread under the influence of multimedia, and so a revaluation of the work of Mattia Damiani—late Renaissance man, follower of the Enlightenment, accomplisher of the most complete banishment of the “two culture” separation—is both necessary and urgent. The present paper is a small contribution to that end, and further revaluation of Damiani's contribution will be continued by research on the original manuscripts deposited in the Guarnacci Library of Volterra. Marrucci (1997) has already given a short biographical sketch of Damiani, and now the recent translation (Balducci, 2005) of the fortuitously preserved Falconcini manuscript (in Latin), which contains Damiani's biography, has allowed the biographical sketch in this paper to be presented.

Finally, it should be stressed that the rediscovered *Disputa-tion about hygrometers and their defects* opens a new window on the personages involved and on the evolution of the meteorological concepts in Europe in a context of Galilean and Newtonian physics. Moreover, the text is a precise source of information on the probably seventeenth-century published work (quoted by Damiani as *De vi vaporum in Hygrometr. dissertat. geometric-mechan.*) of Ludovico da Ripa on hygrometers—which today is lost, but profitably might be sought by historians of science.

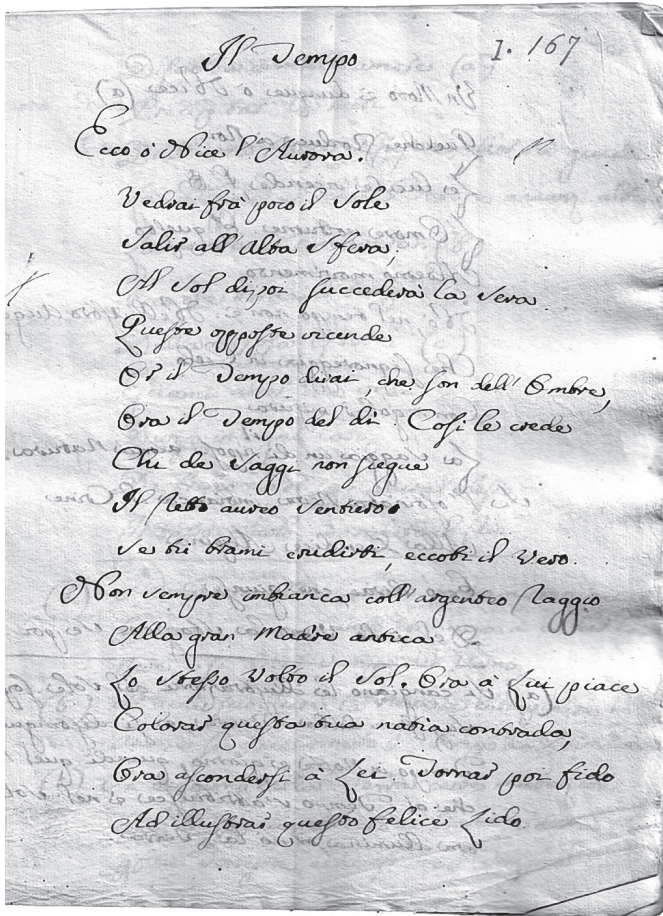


Figure 8. The first page of the manuscript of the poem *Il Tempo* (Time). This poem deals with the mystery of physical time. Damiani confutes the concept of the passing of time, and he proposes that the sensation of passing time is an illusion produced by the continued evolution and transformation of ourselves and of our surrounding environment. Because of the progressive diffusion of this new conception of time, the geological time and the age of the Earth expanded in the western scientific thought from few thousands of years (biblical computations stated only 6000 yr) to millions or billions of years.

APPENDIX. Selected parts of the poem *Time*, by Mattia Damiani.

IL TEMPO

Ecco, o Nice, l'Aurora:
 Vedrai fra poco il Sole
 Salir all'alta sfera;
 Al Sol dipoi succederà la sera.
 Queste opposte vicende
 Ora il tempo dirai, che son dell'ombre,
 Ora il tempo del dì. Così le crede
 Chi de' saggi non siegue
 Il retto aureo sentiero;
 Se tu brami erudirti, eccoti il vero.
 Non sempre imbianca coll'argenteo raggio
 Alla gran Madre antica
 Lo stesso volto il Sol. Or a lui piace
 Colorar questa tua natia contrada,
 Or ascondersi a lei; tornar poi fido
 Ad illustrar questo felice lido.
 Un moto è dunque, o Nice,
 Quel che produce a noi
 Le lucide vicende,
 L'ombre notturne. E questo
 Alterno movimento
 No, nel Tempo non è. [Esso è] Nell'Astro augusto,
 Che signoreggia in Cielo,
 [... ...]

E se miri la vite
 Spiegar su gli orn i già fecondi tralci,
 Dirai, che giunse il Tempo
 Sacro al Nume Tebano,
 Nume, che anima i vili,
 Rasciuga al mesto i pianti,
 Fuga il rossor dai timorosi amanti.
 Ma queste chi produce
 Mutabili vicende
 Nel regno di Natura? Agita il Sole
 Allor che più si volge
 Sull'Arcadi Campagne,
 Il pigro umor racchiuso
 Nel sen del verde suolo, e ne' riposti
 Del Mirto, e della Rosa
 Infiniti ricetti; ed ecco il ramo
 Cinto di nuova fronda; ecco sen riede
 L'aurea Stagion de' fiori, ecco ritorna
 La tormentosa Estate,
 L'Autunno a Bacco sacro, il Verno rio,
 Se cangiando sentier l'Astro del giorno,
 In questa vasta sullunar Sostanza
 Novelli riconduce
 Opposti cangiamenti,
 Ch'or tu chiamasti, o Nice,
 Primavera felice,
 Ora feconda Estate,
 Autunno a Bacco amico,
 Or crudo Verno ai bei piacer nemico.
 [... ...]

TIME

Lo, o Nike, Aurora:
 Shortly you shall see the Sun
 Climb to the noble sphere;
 Then shall the eve follow the Sun.
 These opposing events
 Now you will say time is of darkness,
 Now of the day. So it is believed
 By those who do not follow
 The straight golden path of the wise;
 If you desire to be enlightened, here is truth.
 Not always does the Sun cast his rays
 On the same face of the great Ancient Mother.
 At times he likes
 To paint this your native village,
 Or hide from her; then to return confident
 To illuminate this happy shore.
 Motion, o Nike, is then
 What produce for us
 The events of light
 And darkness
 And this alternating movement
 Is not in Time but in the august Star,
 That reigns in the Sky.
 [... ...]

If you behold the vine
 Spreading its already fecund shoots on the ash
 You will say that the Time has arrived
 That is sacred to the Theban God,
 The God who animates the faint-hearted
 Who dries the tears,
 Flees the blushes of timorous lovers.
 But who creates
 Changing events
 In Nature's realm? The Sun is what arouses
 As he casts his beams
 On the Arcadian Countryside,
 The idle humor enclosed
 Within the bosom of the green soil,
 Of Myrtle, and the Rose
 Infinite secret haunts; and lo the branch
 Girded in fresh foliage; now here is
 The golden Season of the flowers, now returns
 The tormenting Summer,
 The Autumn sacred to Bacchus, the wicked Winter,
 If the Star of day, changing its path,
 In this vast sublunar substance
 Brings back new
 Opposing changes,
 Which, o Nike, you called
 Now happy spring,
 Now fecund Summer,
 Now autumn the friend of Bacchus,
 Now crude Winter, the enemy of sweet pleasures.
 [... ...]

(continued)

Quei dì, ch' a te promette a mille a mille
 La Parca non avara, altro non sono
 Che un mutabil successo ora di lieti,
 Or d'infelici avvenimenti. I giorni,
 I mesi, e gli anni, e i lustri
 Non succedon fra lor, moto non hanno,
 Il corso non gli affretta
 Basta, o Nice, t' intesi.
 Ma per vie più fiorite
 Guidar ti vo', per cui tu giunga al Vero:
 Se udirmi ancor t'aggrada, ecco il sentiero.
 Se di vago naviglio
 Sedesti mai sulla dipinta prora
 Dolce cantando al mormorio dell'onda,
 Sembrato ti sarà, che l'alta riva
 Da te sen voli, e fugga;
 E che la nave tua dell'acque in seno
 Immobile riposi.
 E sai perché? Non t'accorgesti allora,
 Che dividea quell'onda
 Fuggitivo il naviglio, e il moto impresso
 Nel condottiero legno
 Ascrivevi delusa al fermo lido,
 Mercé del ciglio tuo, duce malfido.
 Fingi or, che sia del tempo
 L'immobil ripa la verace imago;
 La nave, che sen vola,
 Sia dell'umane cose
 Il mutabil successo; e t'avvedrai
 Del concepito inganno,
 E non sarai fra quei, che il ver non sanno.
 [... ...]

Così se delle cose
 Al variabil progresso
 Volgi il pensier, conoscerai, che il moto
 Il cangiamento, il corso
 Non van del tempo in compagnia; ma l'orme
 Sieguono delle cose,
 Poiché il moto Natura in lor ripose.
 [... ...]

Those, days, promised to you by the thousands
 By Fate who is not mean, are none other
 Than a changing succession now of happy,
 Now of unhappy events. The days,
 The months, and the years, and the lustrums
 Happen not by themselves, motion they have not,
 Their course hastens them not ...
 Enough, o Nike, I have understood.
 But along more flourishing trails
 I want to lead you, so that you may reach Truth:
 If you are still pleased to hear me, here is the path.
 If you ever sat on the painted prow
 Of the roaming vessel
 Softly singing to the murmuring waves,
 It must have seemed to you, that the high bank
 Flew from you, and fled;
 And that your ship remained motionless,
 In the bosom of the water.
 And do you know why? Then you did not perceive,
 That the craft cleaved that river
 And the motion given
 To the beam of the prow.
 Crestfallen, you ascribed to the motionless shore,
 At the mercy of your brow—untrustworthy leader.
 Now you feign, that the motionless shore
 Is the true image of time;
 That the ship, that flies forth,
 Is the changeable result
 Of things human; and you will perceive
 The deception conceived,
 And will not be among those who know not Truth.
 [... ...]

So direct your thought
 To the variable progress
 Of things, and you will discover, that motion,
 the change, the elapsing
 Do not go hand in hand with time; but they follow
 The traces of things,
 Since Nature has placed motion in them.
 [... ...]

ACKNOWLEDGMENTS

Many people have helped me develop this work by assisting me in a highly professional manner. Luca Pini, Giancarlo Baroncini, and the late Angelo Marrucci facilitated my research in the Guarnacci Library of Volterra. Paolo Pampaloni has kindly provided a photocopy of the *Disputation about hygrometers*. Tiziana Bison and Gianni Biazzo translated the *Disputation* and then assisted me in the scientific revision. Cristiano Balducci provided a high quality paleographic interpretation and translation of the Falconcini manuscript. David Branagan and the editors provided invaluable linguistic suggestions and corrections. Phil Rand revised the section “Biographical Sketch”—which was added in course of editing—and translated the poem *Time*. Andrea Battistini has suggested invaluable additions and improvements. Michele Marvulli kindly provided information and a photocopy of the rarest Carlucci book. To all these, and to many others, I extend my thanks.

REFERENCES CITED

- Aliverti, G., 1929, Sui metodi di misura dell'umidità (On the measurement methods of humidity): *Il Nuovo Cimento*, v. VI, no. 6, p. CXVII–CXXXIII.
- Agamennone, G., and Cancani, A., 1885, Contributo alla storia ed allo studio dell'igrometria (Contribute to the history and to the study of the Hygrometry): *Annali dell'Ufficio Centrale di Meteorologia Italiana*, Ser. II, vol. 7 (parte I), p. 1–35.
- Anonymous, 1824, *Index Librorum Prohibitorum*: Neapoli, Ex Typographia Xaverii Jordani, 351 p.
- Astaldi, M.L., 2001, *Metastasio (a biography)*: Milano, Fabbri Editori, 359 p.
- Balducci, C., 2005, Transcription and translation of the manuscript of B.P. Falconcini: *De claris Viris Volaterranis* [Unpublished manuscript]: Roma, Istituto Nazionale Geofisica Vulcanologia, 21 p.
- Banfi, A., 1940, *Galileo Galilei, Quaderni di Analisi Letteraria*: Milano, Valardi Editore, 185 p.
- Battistini, A., editor, 1977, *Letteratura e scienza*: Bologna, Zanichelli, 234 p.
- Battistini, A., 2005, La cultura del Barocco, in Malato, E., ed., *Storia della Letteratura Italiana*, Vol. V (I): Roma-Milano, Salerno Editrice e Il Sole 24 Ore, p. 463–560.
- Bertini, S., 1965, *Mattia Damiani poeta volterrano amico del Metastasio*: Volterra, anno IV (7/8) luglio-agosto, p. 4–7.
- Borsellino, N., and Pedullà, W., 2004, *Storia generale della Letteratura Italiana vol. VII—Il secolo riformatore: Poesia e ragione nel settecento*: Milano, Motta Editore, 744 p.
- Carlucci, G. (but anonymous), 1766, *Ragionamento Filosofico intorno al Moto della Terra (Philosophic reasoning about the motion of the Earth)*: Napoli, Per Vincenzo Flauto, 103 p.
- Caroti, S., 1987, Un sostenitore napoletano della mobilità della Terra: il padre Paolo Antonio Foscarini, in Lo Monaco, F., and M., Torrini M., eds., *Galileo e Napoli*: Napoli, Guida Editori, p. 81–121.
- Consoli, D., 1972, *Dall'Arcadia all'Illuminismo*: Bologna, Cappelli Editore, 220 p.
- Damiani, M., 1726, *De Hygrometris et eorum defectibus disputatio—Sub felicissimis auspiciis Illustrissimi, ac Reverendissimi Domini D. Ludovici Mariae Pandolfini*: Pisa, Ex Typographia Francisci Bindi Impressoris Archiepiscopalis, 46 p.
- Damiani, M., 1747, *Componimento pastorale-filosofico detto in Firenze nell'Accademia degli Apatisti*.
- Damiani, M., 1754, *Le Muse fisiche—al chiarissimo sig. Pietro Metastasio romano poeta di sua maestà imperiale*: Firenze, Appresso Giovan Paolo Giovannelli, XVI + 231 p.
- Damiani, M., 1758, *Poesie liriche (con lett. ded. “A sua eccellenza la signora duchessa di Choiseuil”)*: Parma, XI + 180 p.
- Damiani, M., 1761, *Componimento drammatico pastorale sulla morte di S. Ottaviano*, Volterra.
- Damiani, M., 1765a, *Cantata a due voci in morte del chiarissimo signore cavaliere Lorenzo Guazzasi*: Arezzo, Appresso Michele Bellotti, 8 p.
- Damiani, M., 1765b, *Delle poesie del celebre sig. dottore Mattia Damiani*: Firenze, Appresso Andrea Bonducci, 338 p.
- Damiani, M., 1770–1771, *Raccolta di poesie diverse del signor dottore Mattia Damiani di Volterra: Terza edizione notabilmente accresciuta*: Livorno, Stamperia di Gio. Vincenzo Falorni, 3 vls., v. 1, XV + 280 p.; v. 2, IV + 228 p.; v. 3, 217 p.
- Damiani, M., 1772, *Componimento in morte del signor abate Antonio Genovesi pubblico professore nella Regia Università di Napoli: Del celebre signor dottore Mattia Damiani di Volterra (con lettera prefazione di Forges Davanzati, Domenico [1742–1810])*: Napoli, Nella Stamperia Raimondiana, 31 p.
- Damiani, M., 1773, *Per la venuta in Volterra di s.a.r. Pietro Leopoldo arciduca d'Austria granduca di Toscana—cantata dell'abate Mattia Damiani*: Firenze, Appresso Stecchi-Pagani, 16 p.
- Davanzati, G., 1774, *Dissertazione sopra i Vampiri (Dissertation about Vampires)*: Reprinted in 2000 by Giacomo Annibaldi, G., ed.: Nardò, Besa, 159 p.
- De Fontenelle B. Le B., 1686, *Entretiens sur la pluralité des mondes (Conversations on the plurality of worlds)*: Italian translation by E. Concanari, Roma-Napoli, Edizioni Theoria, 130 p.
- De Fontenelle, B. Le B., 1732, *Théorie des tourbillons Cartésiens, avec des réflexions sur l'Attraction (Section IX—Sur les Atmosphères des Corps célestes, p. 282–302)*, in *Œuvres de Monsieur De Fontenelle, des Académies, Française, des Sciences, des Belles-Lettres, de Londres, de Nancy, de Berlin & de Rome, Nouvelle Édition (1766)*. Tome IX : Paris, Chez les Libraires Associés, p. 143–326.
- Falconcini, P.B., 1777, *De claris Viris Volaterranis*: Manuscript conserved in the Library Guarnacci, Volterra, p. 7–21.
- Fernandez, F.G., 2000, *I movimenti dalla Chiesa degli apostoli a oggi*: Milano, Rizzoli, 344 p.
- Foscarini, P.A., 1615, *Lettera sopra l'opinione de' Pitagorici, e del Copernico: Della mobilità della Terra e stabilità del Sole e del nuovo Pitagorico Sistema del Mondo*: Napoli, Lazzaro Scorriggio, Reprinted by Romeo, L., ed., in 1992, *Montalto Uffugio (Cosenza)*, Grafiche Aloise, IX + 64 p.
- Galanti, G.M., 1772, *Elogio storico del Signore Abate Antonio Genovesi*, in *Actis-Perineti*, L., ed., 1973, *Gli Illuministi Italiani*: Torino, Loescher Editore, 159 p.
- Galilei, G., 1623, *Il Saggiatore*: Translation from Latin by Libero Sosio, 1979: Milano, Feltrinelli Editore, 330 p.
- Galilei, G., 1632, *Dialogo sopra i due massimi sistemi del mondo, tolemaico e copernicano (Dialogue concerning the two chief world systems: Ptolemaic and Copernican)*, in Sosio, L., ed.: Torino, Einaudi, 1970, 593 p.
- Giuntini, F., 1994, *I drammi per musica di Antonio Salvi*: Bologna, Società Editrice il Mulino, 269 p.
- Gori, A.F., 1754, *Sig. Abate Damiani amico onorabilissimo: Foreword letter to “Le Muse Fisiche,” in Mattia Damiani: Le Muse fisiche—al chiarissimo sig. Pietro Metastasio romano poeta di sua maestà imperiale*: Firenze, Appresso Giovan Paolo Giovannelli, p. IX–XV.
- Hamblyn, R., 2001, *L'invenzione delle nuvole (The invention of clouds)*: Milano, Rizzoli, 366 p.
- Iemolo, A.C., 1928, *Il Giansenismo in Italia prima della rivoluzione*: Bari, Laterza, 439 p.
- Lana, F., 1670, *Prodomo all'Arte Maestra*, new annotated edition by Battistini, A.: Milano, Longanesi, 380 p.
- Lombardi, A., 1827–1830, *Storia della Letteratura Italiana nel secolo XVIII: Modena, Presso la Tipografia Camerale*, v. I, XXI + 521 p., v. II, VI + 352 p., v. III, VIII + 456 p., v. IV, VII + 501 p.
- Losavio, F., 1925, *Un poeta volterrano del settecento: Mattia Damiani*, *Rassegna Volterrana*, anno II (2) settembre, p. 92–97.
- Maffei, P., 1987, *Giuseppe Settele, il suo diario e la questione galileiana*: Foligno, Edizioni dell'Arquata, 583 p.
- Magalotti, L., 1667, *Saggi di naturali esperienze, fatte nell'Accademia del Serenissimo Principe Leopoldo di Toscana e descritte dal Segretario di essa Accademia: Lorenzo Magalotti, Terza edizione con aggiunte 1841*: Firenze, dai torchi della Tipografia Galileiana, p. 133–183-XC.
- Marrucci, A., 1997, *Damiani Mattia*, in *I personaggi e gli scritti: Dizionario biografico e bibliografico di Volterra*: Fondazione Cassa di Risparmio di Volterra, p. 9659–66.
- Marvulli, M., 2001, *Il declino dell'Università di Altamura in un inedito di Luca de Samuele Cagnazzi*: Altamura, *Rivista Storica/Bollettino dell'A.B.M.C.*, no. 42, p. 175–217.
- Metastasio, P., (Pietro Trapassi), 1847, *Lettere inedite dell'abate P. Metastasio*

- a Mattia Damiani poeta volterrano (53 letters), *in* Metastasio, P., *Opere: Volterra, Tipografia all'Insegna di S. Lino*, v. XXVII, 102 p.
- Mila, M., 1956, La nascita del melodramma, *in* Il Sei-Settecento, a cura della Libera Cattedra di Storia della Civiltà Fiorentina: Firenze, Sansoni, p. 167–194.
- Montanelli, I., and Gervaso, R., 1970, *L'Italia del Settecento*: Milano, Rizzoli, 702 p.
- Natali, G., 1964, *Il Settecento*: Milano, Vallardi, v. I, 585 p.
- Raucci, B., 2001, Uno scienziato nel Regio Studio di Altamura: Luca de Samuele Cagnazzi: Altamura, *Rivista Storica/Bollettino*, dell' A.B.M.C., no. 42, p. 151–172.
- Romeo, L., ed., 1992, Reprint of: Foscarini, P.A., 1615, Lettera sopra l'opinione de' Pitagorici, e del Copernico: Della mobilità della Terra e stabilità del Sole e del nuovo Pitagorico Sistema del Mondo: Napoli, Lazaro Scorigio, IX + 64 p.
- Ruschioni, A., 1980, Tommaso Campanella filosofo-poeta: Brunello (VA), Edizioni otto/novecento, 256 p.
- Sansone, M., 1965, Considerazioni su Galileo letterato: Bari, *Annali della Facoltà di Lettere e Filosofia*, Pubblicazioni dell'Università di Bari, v. X, p. 395–423.
- Scalera, G., 1999, *I moti e la forma della Terra (Motions and shape of the Earth)*: Roma, Tangram-Istituto Nazionale di Geofisica, 195 p.
- Sisto, P., 2003, I nostri illuministi tra scienza, ideologia e letteratura: Fasano (Brindisi), Schena Editore, 118 p.
- Snow, C., 1970, *Le due culture*: Milano, Feltrinelli, 105 p.
- Spongano, R., 1956 Galileo scrittore, *in* Il Sei-Settecento, a cura della Libera Cattedra di Storia della Civiltà Fiorentina: Firenze, Sansoni, p. 107–122.
- Stella, P., 1972, *Il Giansenismo in Italia*: Bari, Adriatica Editrice, 168 p.
- Tiraboschi, G., 1829, *Storia della Letteratura Italiana*: Milano, Per Antonio Fontana, v. XXIX, XVIII + 232 p.
- Vai, G.B., and Cavazza, W., editors, 2003, Four centuries of the word "geology": Ulisse Aldovrandi 1603 in Bologna: Argelato (Bologna), Minerva Edizioni, 327 p.
- Webb, S., 2002, *If the universe is teeming with aliens... where is everybody?: Fifty solutions to the Fermi paradox and the problem of the extraterrestrial life*: New York, Copernicus Books & Praxis Publishing Ltd., 288 p.

MANUSCRIPT ACCEPTED BY THE SOCIETY 17 JANUARY 2006