

Scholars and Literati at the Academy of Sciences of Bologna (1714–1800)

Cecilia Rolla

Chiara Zanardello

IRES/LIDAM, UCLouvain

This note is a summary description of the set of scholars and literati who were members or associates of the Academy of Sciences of Bologna from its inception in 1714 to the eve of the Industrial Revolution (1800).

1 THE ACADEMY

The *Accademia delle Scienze dello Istituto di Bologna*, established to foster reforms at the University of Bologna, took the place of a former institution, the *Accademia degli Inquieti*. The latter was founded in 1690 in the house of Eustachio Manfredi (1674-1739), and it was initially attended by teenage students, Manfredi himself being sixteen at the time of foundation. From 1705 the *Accademia degli Inquieti* had as its headquarters Palazzo Poggi, the residence of the Count Luigi Ferdinando Marsili (1658-1730). The partnership between Marsili and Manfredi led to the birth of the Institute of Sciences in 1711, under the protection and patronage of Pope Clement XI (1649-1721). This is the official date of the foundation of the *Accademia delle Scienze dello Istituto di Bologna*, even if it was not fully operational until 1714.

In its original composition, the Academy had five professors from the following disciplines: Astronomy, Military Architecture, Physics, Natural History, and Chemistry. Two professors of Anatomy and Practical Surgery were added in the following decades.

The Cardinal Lambertini (1675-1758) who became Pope Benedict XIV in 1740, was the principal benefactor of the Academy in that period. In 1745 he led a reform to the statute of the Academy, devoting it mainly to the study of experimental, medical, and physical-mathematical sciences. It became the centre for the development and diffusion of new scientific theories in Bologna, attracting prominent personalities from Italy and abroad, including visiting and corresponding members. It was the first Italian academy composed of a body of scientists regularly employed and salaried by public funds (Cavazza 1990).

In the field of medicine, the Academy promoted research and discussion to advance techniques for birth and surgery. It was also a locus for advancement of vaccines, and Sebastiano Paoli (1720-1797) documented the first inoculations of the smallpox vaccine.

Moreover, bolstered the interest of Pope Benedict XIV himself, surgery was promoted with the creation of a special school to study and improve the therapies for the disease of the century, "male della pietra" (kidney stones).

Also of special interest were the disciplines of Engineering and Agronomy. Within the *Accademia delle Scienze*, Bartolomeo Beccari (1682 - 1766) studied new ways to improve the resistance of populations to famine due to shortages of wheat and corn, substituting them with other cereals such as millet and rye.

In 1804, the Academy was temporarily closed due to the disruptions of the Napoleonic period, and its activities would resume in 1829.

2 SOURCES

Our main source was the book *Accademia delle Scienze dello Istituto di Bologna dalla sua origine a tutto il 1880* by Ercolani (1881), which includes the history of the *Accademia delle Scienze* and a complete list of affiliated scholars, from its foundation to 1880. We also used the dictionaries of Istituto dell'Enciclopedia Italiana (1929), in particular the online section *Dizionario Biografico degli Italiani*, for further information on the biographies and activity of the members of the *Accademia delle Scienze*.

To complete our research about the history of the Academy, we used the work of Marta Cavazza *Dal Coro anatomico agli Inquieti* from *Settecento inquieto. Alle origini dell'Istituto delle Scienze di Bologna* (1990).

3 SOME STATISTICS

Table 1 shows some descriptive statistics. There are 680 scholars, and the year of birth is known for most of them (62.4%). The average age at nomination is 40.8 years, while the mean age at death is above 69 years. For 72.9% of these scholars the birthplace is known. The median distance between the city of Bologna and the location of birth is 126 km. The success of the Academy is well known, and is demonstrated by the high quality of its members: more than 40% of the counted scholars have a Wikipedia page written in some language (41.6%), and 66.3% of them have left a footprint in Worldcat, the catalogues of the libraries of the world, either by having published some work, or by having been the subject of published books and articles.

Period		nb.	% birth year	mean age	mean age	exp. age
Start	End	obs	known	at appoint.	at death	at death
1686	1733	199	41.2	41.6	69.3	66.4
1734	1800	481	71.1	40.6	69.7	68.5
1686	1800	680	62.4	40.8	69.6	68.2
			% birth place	median distance	% with	% with
			known	birth-institution	Wikipedia	Worldcat
1686	1733		62.3	0	23.6	51.3
1734	1800		77.3	150	49.1	72.6
1200	1800		72.9	126	41.6	66.3

Table 1: Summary statistics by period

4 FIELDS

Figure 1 shows the relative importance of fields, broadly defined. The great dominance of the fields of science, medicine and applied science reflects the strong scientific character of the Academy. Indeed, scholars linked to humanities are only 14% of the total, and less than 2% of the professors teach law and theology. In addition, there are 32 members without observed scientific merit, called “honorary”. More than 23% of the total cannot be connected to a specific field of research. However, even when we look at Figure 2, which shows the same pie chart as Figure 1 but exclusively for publishing members (i.e., academicians with a Wikipedia page and/or Worldcat link), the proportion of the fields does not change, confirming that the Academy of Sciences of Bologna was strongly science-oriented.

5 PLACE OF BIRTH

Figure 3 is a plot of the places of birth of the ordinary members of the Academy of Sciences of Bologna, while Figure 4 presents only corresponding members. The latter are scholars who had

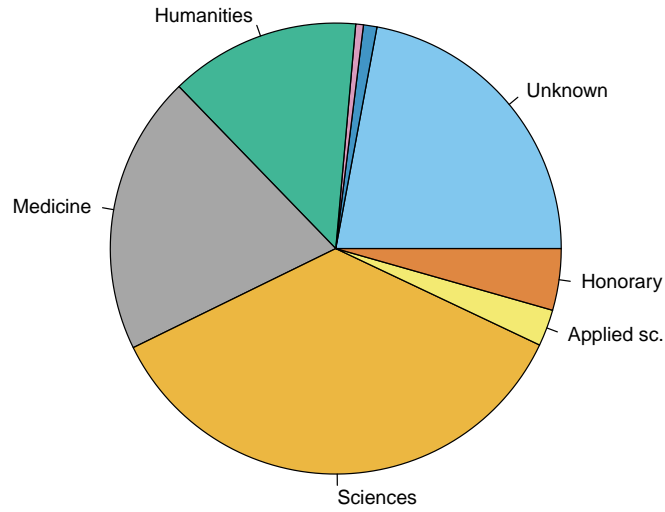


Figure 1: Broad fields at the Academy of Sciences of Bologna – publishing and unknown members

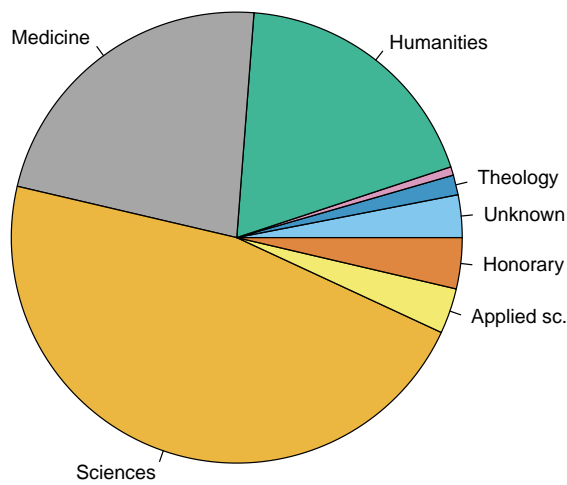


Figure 2: Broad fields at the Academy of Sciences of Bologna – publishing members

never been in Italy but who contributed to the Academy through correspondence with the ordinary members. Alternatively, the status of corresponding member was assigned if the scholar was a honorary member of another academy but had some contacts with professors in the Academy – if no other specific information was found. Figure 4 shows that through correspondence and external contributions, the Academy was connected with the whole of Europe. However, looking at the ordinary members, most interactions are concentrated in the North/Centre of Italy, with a few connections in the north of Europe (i.e., Paris and Berlin), in Spain and in Greece.

In both figures the yellow and orange dots represent the places of birth of scholars affiliated to the Academy of Sciences of Bologna between 1714 and 1733, and between 1734 and 1800, respectively.

6 HUMAN CAPITAL OF SCHOLARS AND LITERATI

For each person in the database we compute a heuristic human capital index, identified by combining information from Worldcat and Wikipedia using a principal component analysis. The details are given in RETE in volumes 1–5. Figure 5 shows the names of all the resident and national scholars with a positive human capital index. The vertical green lines (rug plot) show the distribution of all these scholars, including the obscure ones, over time (counting from the beginning of their active life). Figure 5 shows half-a-dozen super stars, and a large portion of resident and national scholars belonging to the mid-high part of the human capital distribution.

7 TOP 5 SCHOLARS

We now provide a brief overview of the five resident professors with the highest human capital index.

Ruggero Giuseppe Boscovich (1711 Dubrovnik (Ragusa) – 1787 Milan) was a physicist, astronomer, mathematician, and diplomat. Born from a Croat father and an Italian mother, he studied in Rome in the Collegio Romano, a Gregorian University (De la Croix and Karioun 2021), where he was appointed professor of mathematics and physics in 1740. He also taught at the University of Fermo (Di Caprio and Vitale 2021), and in 1744 he was ordained as a priest. In 1763, he was appointed Professor of Mathematics at the University of Pavia, and during his life he published various dissertations across different fields. In the field of Astronomy, he was the first to theorize a procedure to calculate the orbit of a planet, based on three observations of its position; he also created a method to determine a planet's equator. He worked on practical engineering projects: he was consulted about repairs to St Peter's Dome in Rome, and the Milan Cathedral.

Luigi Galvani (1737 Bologna – 1798 Bologna) was a physiologist, physicist and anatomist. He was the first to start experimenting on "animal electricity". His findings were published in his famous treatise *De viribus electricitatis in motu muscolari* (1791), presented at the Accademia delle Scienze. His work had enormous impact on the study of human and animal physiology. In 1797, wanting to stay true to his beliefs in the independence of scientific research, he refused to swear fidelity to the newly established Cisalpine Republic. He subsequently lost all of his academic positions.

Lazzaro Spallanzani (1729 Scandiano – 1799 Pavia) was an Italian priest and biologist. Educated in a Jesuit seminary and ordained as a priest in 1754, he also studied science at the University of Bologna. He undertook some field trips in Italy, France and Switzerland to carry out scientific observations, in particular in the fields of zoology and vulcanology. He is especially remembered for his studies on animal reproduction: he was the first to obtain a *in vitro* fecundation by successfully observing the development of a frog embryo in his laboratory.

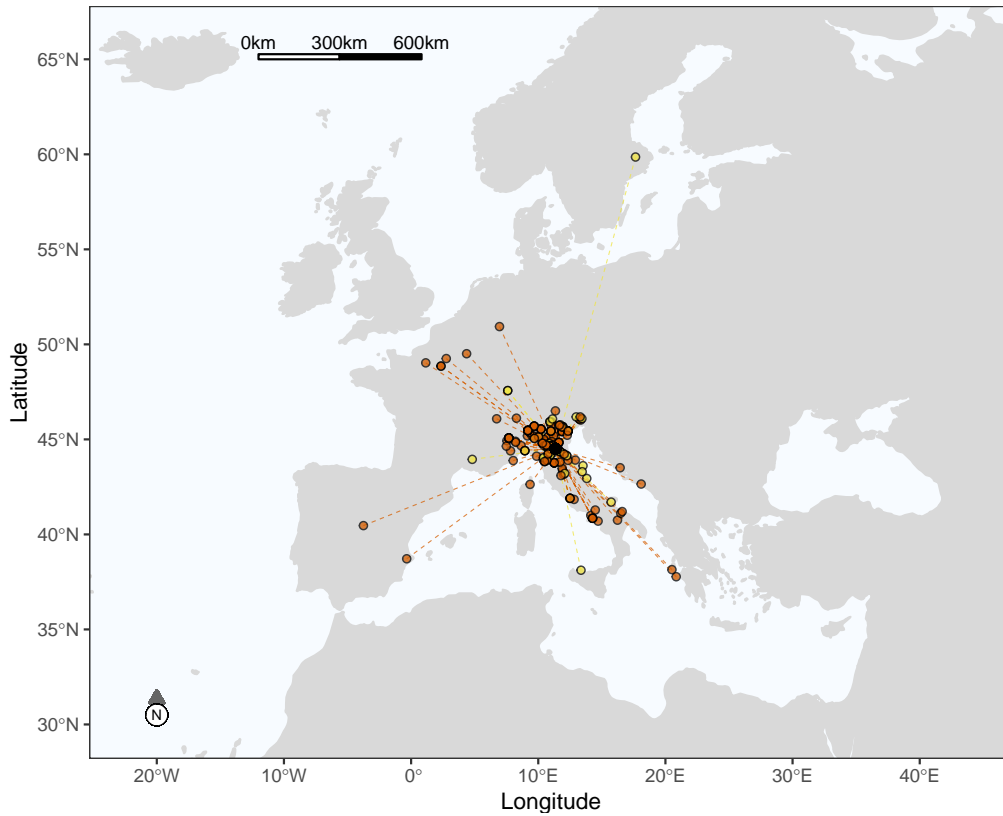


Figure 3: Place of birth of the scholars at the Academy of Sciences of Bologna - Ordinary members

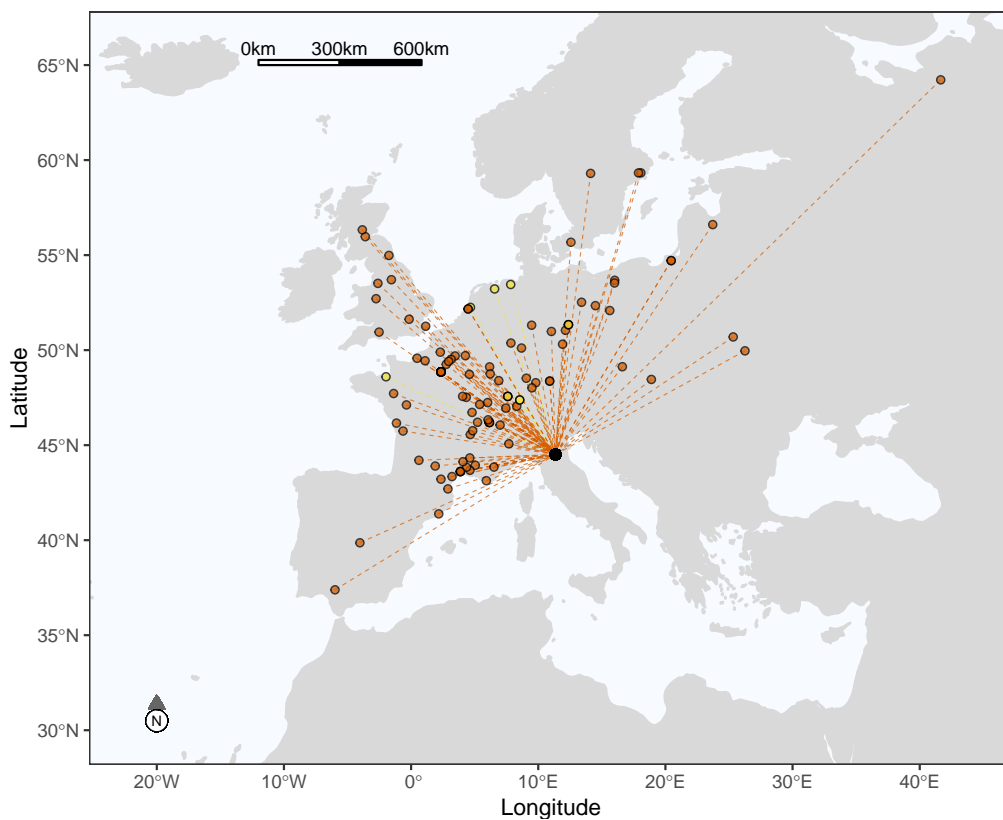


Figure 4: Place of birth of the scholars at the Academy of Sciences of Bologna - Corresponding members

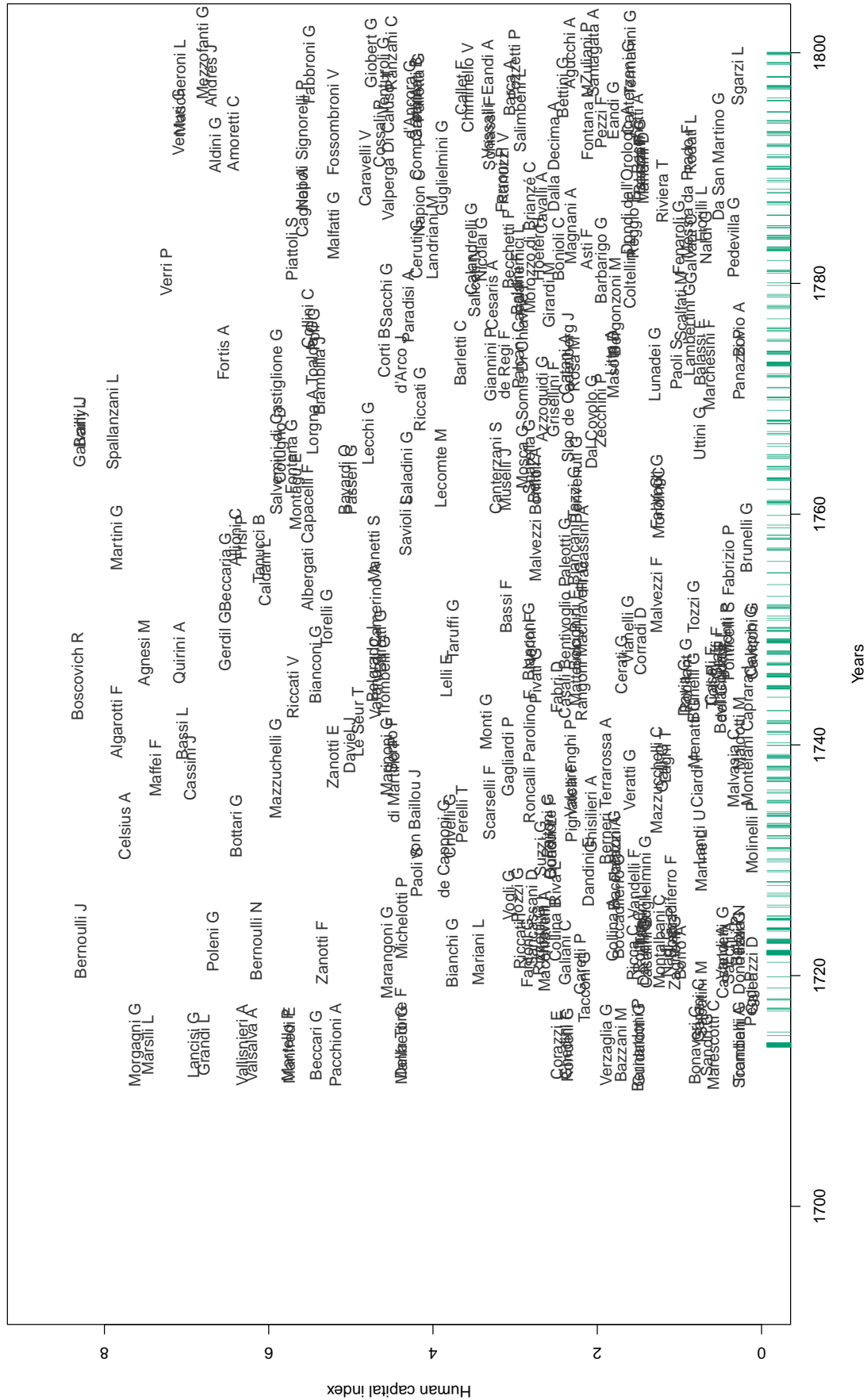


Figure 5: Famous scholars by period

Giambattista Martini (1706 Bologna – 1784 Bologna) was a Franciscan friar, musician, composer and theorist of music. His reputation as a musician and composer grew over the years, in Italy and abroad. A standout among the young musicians he mentored, was Wolfgang Amadeus Mozart. At the Academy of Sciences in Bologna he taught his theories of music composition, arguing that it was possible to apply geometrical principles to this field.

Francesco Algarotti (1712 Venezia – 1764 Pisa) was a philosopher and writer, whose interest ranged across various fields, from art and architecture to natural sciences and optics. Aged sixteen, he publicly replicated Newton's optic experiments with a prism at the Academy of Sciences. He then travelled around Europe, and was admitted to courts and academies. In London, he became a member of the Royal Society, and in Paris he presented his work "Newtonianismo per le dame" (*Newtonianism for ladies*, 1737) consisting of information on mathematics, physics and recent scientific theories, which aimed to bring women closer to science.

8 RELATED SCHOLARS

In addition to the ordinary members residing in Italy, several individuals were linked to the Academy of Sciences of Bologna through a foreign or corresponding membership status. The five scholars shown here belonged to this category. These scholars are included in the calculations for all figures but Figure 5.

The seven corresponding scholars with the highest human capital index are: Voltaire, Georges-Louis Leclerc de Buffon, Jean le Rond D'Alembert, Mikhail Vasiljevich Lomonosov, Nicolas de Condorcet, Joseph-Louis de Lagrange and Gabrielle-Emilie du Châtelet. We decided to tell the story of Mikhail Vasiljevich Lomonosov and Gabrielle-Emilie du Châtelet, the least known among these seven.

Mikhail Vasiljevich Lomonosov (1711 Denisovka - 1756 Saint Petersburg) was a Russian scientist and writer. After completing his studies in humanities and sciences, both in Russia and at the German University of Marburg, he was appointed Professor of Chemistry at the Russian Academy of Sciences. One of his most important findings was the postulation of the law of conservation of mass in chemical reactions, the discovery of which was attributed to him and Lavoisier. He was also the first to discover the atmosphere of Venus through his observations in 1761. His keen interest in languages inspired him to write a Russian Grammar in 1755, which was influential in the formation of modern Russian literary language.

Gabrielle-Emilie du Châtelet (1706 Paris – 1749 Lunéville) was a physicist, mathematician and philosopher. Her efforts to disseminate Newton's theories led her to publish a translation of one of the scientist's most important works, the *Philosophiæ Naturalis Principia Mathematica* (1687). In the commentary to this work, she included her own original contribution, a postulate for the law of conservation of total energy.

Her own works were translated and published in various countries. She corresponded with well known scientists and mathematicians across Europe, such as Johann Bernoulli (1710 - 1790) and Leonhard Euler (1707 - 1783). In 1738 she entered a contest at the Paris Academy, submitting an essay on the nature of fire. Although her work was not awarded first place, it received honorable mention and she became the first woman to have her work published by the Academy.

9 DIVERSITY

Very few women participated in the activities of the Academy, and in this it was similar to the University of Bologna (De la Croix and Vitale 2021). From its foundation until 1800, the Academy of Sciences of Bologna had only five women among its affiliated members. Two of them, Laura Maria Bassi (1711 Bologna - 1778 Bologna, see Section 11) and Agnesi Maria Gaetana (1718 Milan -

1799 Milan), were regular members, specialized respectively in Physics and Mathematics. They also taught at the University of Bologna, underlining the strong connection between the two institutions. The other three women were Gabrielle Emile du Chatelet (1706 Paris – 1749 Lunéville, see Section 8), Anne Marie du Boccage (1710 Rouen - 1802 Paris), and Marguerite Lecomte (Paris 1717 - Paris 1800); all three were from France and corresponding members of the Academy of Bologna.

10 FAMILIES OF SCHOLARS

We were able to find 6 father-son pairs who were both members of the Academy of Sciences of Bologna, and one mother-son pair. Among these 6 families, three of them have members in both the Academy and in the University of Bologna, confirming a strong relationship between the two institutions. Figure 6 shows this close connection. Considering members of both institutions from 1722 (the year when we detect a massive subscription to the Academy), almost half of university professors are also members of the Academy.

An interesting case for this interaction is the family comprising Giovanni Giacinto Vogli and his sons Giuseppe and Marc'Antonio, represented in Figure 7. Giovanni Giacinto (1697 Budrio -1762 Bologna) graduated with a doctorate in philosophy and medicine in 1714, aged 17 years old, from the University of Bologna. He was a Professor of Anatomy at the same university, and carried out his research within the Academy of Sciences of Bologna, focusing on comparative physiology. His son Giuseppe (1733 Bologna-1811) was an ordained priest, who held a Chair of Philosophy at the University of Bologna, but also devoted himself to natural sciences. Within the Academy of Sciences of Bologna, he presented an account of the earthquake that struck Bologna in 1779. Marc'Antonio (1736 Bologna - 1821) was a member of the Barnabite order, and was known as a jurist and humanist. He was affiliated both with the University of Bologna and the Academy of Sciences of Bologna, but there is almost no trace of his work in these institutions.

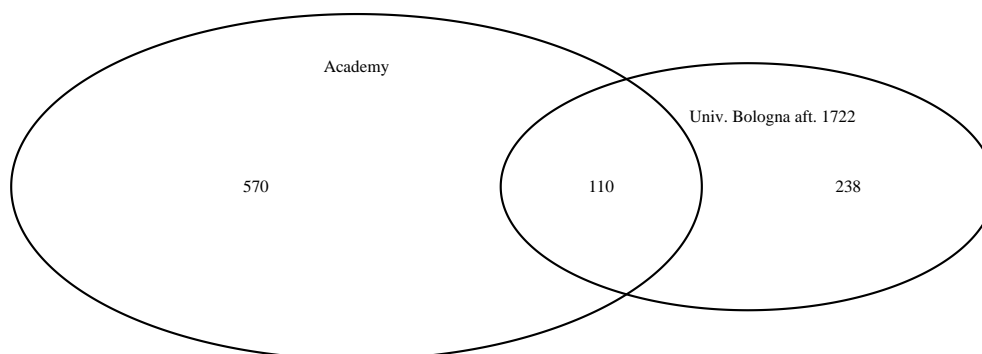


Figure 6: Venn diagram showing the interaction between the University and the Academy of Sciences of Bologna

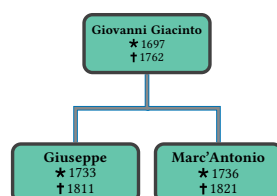


Figure 7: The Vogli family. Members of both the University of Bologna and the Academy of Sciences Bologna in green squares.

11 ANECDOTES

Laura Maria Caterina Bassi (1711 Bologna - 1778) was one of the first women in Italy to graduate and to obtain a chair in a university (De la Croix and Vitale 2022). In addition to teaching natural philosophy at the University of Bologna, she carried out her research at the Academy of Sciences of Bologna, gaining reputation as an expert in Newtonian physics, and experimenting in the fields of fluid dynamics, optics and electricity.

In 1738 she married the physician Giuseppe Veratti (1707 - 1794), who she chose as her husband because he promised to not hinder her studies and research. They carried out their research together, and they started in their own home an informal academy dedicated to the discussion of new scientific theories. This endeavour gained a reputation in Italy and abroad. In 1776, when she was assigned a chair of experimental physics in the Academy of Sciences of Bologna, her husband was appointed as her assistant.

ACKNOWLEDGMENTS

This project has received funding from the European Research Council (ERC) under the European Union's Horizon 2020 research and innovation programme under grant agreement No 883033 "Did elite human capital trigger the rise of the West? Insights from a new database of European scholars."

First version July , 2022.

REFERENCES

- Cavazza, Marta. 1990. *Settecento inquieto. Alle origini dell'Istituto delle Scienze di Bologna*. Bologna, il Mulino.
- De la Croix, David, and Soraya Karioun. 2021. Scholars and Literati at the Gregorian University in Rome (1551–1773). *Repertorium Eruditorum totius Europae* 3:19–26. <https://doi.org/10.14428/rete.v3i0/gregorian>.
- De la Croix, David, and Mara Vitale. 2021. Scholars and Literati at the University of Bologna (1088–1800). *Repertorium Eruditorum totius Europae* 1:1–10. <https://doi.org/https://doi.org/10.14428/rete.v1i0/Bologna>.
- . 2022. Women in European academia before 1800 – religion, marriage, and human capital. CEPR Discussion Paper 17229.
- Di Caprio, Giovanni, and Mara Vitale. 2021. Scholars and Literati at the University of Fermo (1585–1800). *Repertorium eruditorum totius Europae* 5:27–34. <https://doi.org/10.14428/rete.v5i0/fermo>.
- Ercolani, Giovanni Battista. 1881. *Accademia delle Scienze dello Istituto di Bologna dalla sua origine a tutto il 1880*. Bologna.