

# JEFFERSON EDUCATIONAL SOCIETY

## JEFFERSON REPORT: PROBING EDUCATION

### Laura Bassi: Breaks Glass ceiling for 18th century women

By Rev. Charles Brock  
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*Editor's note: This Jefferson Publications series examines ancient universities that thrive today – how they have shaped the world and influenced education methods, citizenship, the meaning of government, and cultural life. Today's article features the University of Bologna and 18th century scholar Laura Maria Catarini Bassi, the first woman to become a physics professor at a European university.*

#### **Fifth in a Series**

The date of the University of Bologna's founding is uncertain but believed by most accounts to have been 1088. The university arose around mutual aid societies of foreign students called "nations" (as they were grouped by nationality) for protection against city laws that imposed collective punishment on foreigners for the crimes and debts of their countrymen. These students then hired scholars from the city's pre-existing lay and ecclesiastical schools to teach them subjects such as liberal arts, notarial law, and theology. The lectures were given in informal schools called *scholae*.

The *Studium* grew to have a strong position of collective bargaining with the city, since it began to derive significant revenue from foreign students, who would depart if they were not well treated. The foreign students in Bologna received greater rights, and collective punishment was ended. There was also

collective bargaining with the scholars who served as professors at the university. By the initiation or threat of a student strike, the students could enforce their demands as to the content of courses and the pay professors would receive.

University professors were hired, fired, and had their pay determined by an elected council of two representatives from every student "nation" that governed the institution, with the most important decisions requiring a majority vote from all the students to ratify. The professors could also be fined if they failed to finish classes on time, or complete course material by the end of the semester. A student committee, the "Denouncers of Professors," kept tabs on them and reported any misbehavior. Professors themselves were not powerless, however, forming *collegia doctorum* (professors' committees) in each faculty, and securing the rights to set examination fees and degree requirements. Eventually, the city ended this arrangement, paying professors from tax revenues and making it a chartered public university.

**Bettisia Gozzadini** earned a law degree in 1237, being one of the first women in history to obtain a university degree. She taught law from her own home for two years, and in 1239 she taught at the university, becoming the first woman in history to teach at a university. According to legend, she had to wear a veil when teaching, to avoid distraction to her students. (*Wikipedia – University of Bologna*)

**Laura Bassi** (born October 31, 1711, Bologna, Italy and died February 20, 1778, Bologna) was an Italian scientist who was the first woman to become a physics professor at a European university.

Bassi was a child prodigy and studied Latin and French. When she was 13, physician Gaetano Tacconi, who was the Bassi family doctor and a professor of medicine and philosophy at the University of Bologna, took charge of her education. In 1731, Tacconi invited philosophers from the university, as well as the archbishop of Bologna, Prospero Cardinal Lambertini, to examine her progress. Lambertini and the philosophers were very impressed. Word quickly spread of Bassi's intelligence, and in 1732 she was at the center of a series of public events organized by Lambertini.

On March 20, 1732, Bassi was admitted to the Bologna Academy of Sciences as an honorary member, and she was its first female member. On April 17, Bassi defended her theses for the degree of Doctor of Philosophy. She had become famous in Bologna and thus made her defense in the town hall before Lambertini rather than in the churches of the religious orders, as was customary. Several of her theses showed the influence of Isaac Newton's works on optics and light. On May 12, when Bassi received her degree, the excitement in Bologna over her accomplishments culminated in public celebrations and with collections of

poetry published in her honor. On June 27, she defended another set of theses about the properties of water, which led to her being awarded an honorary post at the university as a professor in physics. At the age of 21, in 1732, she was appointed professor of Anatomy at the University of Bologna. Her interests were wide-ranging.

The defense of her degree, awarding ceremony, and first lecture in 1732 were significant as they took place in the Palazzo Pubblico, one of the most important government buildings in Bologna. These events were attended by “not only the university faculty and students, but also by principal political and religious figures of the city – the Papal legate and vice-legate, the Archbishop of Bologna, the Gonfaloniere, the Elders, senators and magistrates. Additionally, 'all the ladies of Bologna and all the nobility.’”

One of her most important patrons was Cardinal Prospero Lambertini, who encouraged her scientific work. He continually supported the University of Bologna and intervened when other members of the institute tried to segregate Bassi from the rest of the professors.

On June 27, 1732, Bassi defended 12 additional theses at the Archiginnasio, the main building of the University of Bologna. This was a petition for a teaching position to the Senate of the university. Her theses covered a wide range of subjects, such as chemistry, physics, hydraulics, mathematics, mechanics, and techniques. In October 1732, the Senate and the University of Bologna granted Bassi's candidature and she was appointed professor of natural philosophy (modern equivalent of honorary position) in December. She became the first salaried woman lecturer in the world, thus beginning her academic career.

Monique Frize writes: “Eighteenth century theses were not pieces of original research as they are now, but answers and a discussion on a set of questions the candidate prepared ahead of time. The candidate first produced written responses in Latin to the questions posed by the professors, which were then read by a committee, and finally defended orally. This particular examination was quite out of the ordinary. Students normally defended their thesis at the university in the presence of the teaching staff, definitely not in the presence of such a large and prestigious public as was the case on this day. The uniqueness of this event is explained by the fact that the candidate was not a young man, as we would expect, but a young woman, 20-year-old Laura Bassi. ... Because of her sex, Laura had to perform in a very public manner in order to obtain recognition of her abilities and knowledge.”

The first lecture she gave was titled "*De aqua corpore naturali elemento aliorum corporum parte universi*," which can roughly be translated from Latin as, "*Water as a natural element of all other bodies.*" The University, however, still held that women were to lead private lives, so she was more restricted than

male teachers from delivering public lectures. She then fought for teaching rights equal to those of men, but to no avail. From 1746 to 1777 she gave only one formal dissertation per year ranging in topic from the problem of gravity to electricity. It is reported that she gave at least 31 dissertations to the university. In 1739, her plea for normal teaching duty was supported by Lambertini and Flaminio Scarselli, the secretary to the Bolognese ambassador at the papal court. She was again denied, but she was allowed to start private lessons and granted funds for experiments at her home in 1759. This allowed her to avoid the constraints of the university and to explore new ideas.

During that year she became the first female member of the Academy of Science of Bologna when 16 members of the Academy unanimously agreed that she be admitted after they had heard (see, for example):

The presentation that Signor Eustachio Manfredi, Signor Jacopo Bartolomeo Beccari, Father Abundio Collina, and others gave regarding the infinite and incredible erudition demonstrated by this young girl, beyond her sex and age, supported by the many conclusions that she sustained many times about all of philosophy, with such liveliness, quickness, nobility of speech, and profound learning that you would not be able to believe it if you had not heard her.

The Senate expected Bassi to attend various events because she was a symbol and political figure. The Carnival Anatomy, a public dissection with tickets open to anyone, was an event she was expected to attend because it was a central feature of public life at the university that attracted the attention of many foreigners and important community members. She began attending this event annually in 1734.

In 1738, Bassi married Giovanni Giuseppe Veratti, a physician and a professor at the university. Because, as a woman, Bassi was not allowed to teach at the university, she gave lectures and experimental demonstrations at her home. She was an early proponent of Newtonian physics and based her courses on material found in Newton's *Principia*. In 1740, Lambertini became Pope Benedict XIV, and in 1745, he reorganized the Bologna Academy of Sciences to create a special group of 25 scientists, called the Benedettini, who were expected to regularly present their research. Bassi lobbied Benedict XIV to become the 25th Benedettini. For a woman to be awarded such an honor was particularly controversial, so Benedict XIV compromised and named Bassi to the Benedettini but without the same voting privileges as the others.

Marta Cavazza writes: "Unlike other learned women of her time, Laura Bassi was not indebted to her husband, who had a degree in medicine, for her philosophical and scientific education or indeed for her career. On the contrary, when they married, her knowledge of mathematics was far greater and much

more contemporary than his, since she had acquired it from the school of Gabriele Manfredi, one of the Italian pioneers of infinitesimal calculus. ... Her knowledge of literary culture, i.e., Greek, Latin, and French, in addition to Italian, was also greater than his and she composed highly appreciated occasional verse in the Arcadian fashion. Thus, all the conditions necessary for a relationship between equal partners, in terms of family life and scientific collaboration, were present in the life of the Bassi-Veratti couple. This was not only unusual but almost inconceivable in the social, juridical, and cultural context of the 18th century, much less in the Pontifical State.”

She was mainly interested in Newtonian physics and taught courses on the subject for 28 years. She was one of the key figures in introducing Newton's ideas of physics and natural philosophy to Italy. She also carried out experiments of her own in all aspects of physics. To teach Newtonian physics and Franklinian electricity, topics that were not part of the university curriculum, Bassi gave private lessons. In her lifetime, she was the author of 28 papers, the majority of these on physics and hydraulics, although she did not publish any books. Only four of her papers were printed.

There seems to have been quite a split in members of the Academy at this time with Tacconi and some others being committed to the natural philosophy tradition from Aristotle to Descartes while others were firm believers in Newton's approach. Bassi was becoming more and more a Newtonian: “By shaping the content of Bassi's public presentations of her learning, once her degree had been conferred and she was well on her way to becoming a university professor, the Newtonian members of the 'Istituto' established her status as a modern natural philosopher.”

Bassi faced financial constraints for her experiments, which she mentioned in a letter to Flaminio Scarselli on July 16, 1755, saying, "As for my physical experiments, and in view of the fact that the continual expense that arises requires some form of assistance if I am to advance and perfect them, I am almost in despair." But she and Domenico Galeazzi were at the time paid the highest salaries (1,200 lire) in the university.

In the 1760s, Bassi began performing experiments with Veratti on possible medicinal applications of electricity, but she did not publish any papers on the subject. She was appointed to the chair of experimental physics at the University of Bologna in 1776, with Veratti named as her assistant. Bassi thus became the first woman named to a chair of physics at a university.

Several famous men visited the laboratory established by the Bassi-Veratti couple in their home. Some visitors wanted to view experiments done by Laura or Giuseppe; at other times they performed experiments with the couple on interesting problems of the day. Laura debated with men on several of the ideas

that were of prime interest in her time, especially those regarding theories of electricity, gases, and water. Giuseppe studied the potential therapeutic effect of electricity on animals and on the human body.

In 1772, Paolo Balbi, professor of experimental physics, died suddenly. Although Bassi's husband Verratti was Balbi's longtime assistant, Bassi believed she could fill the vacancy, and in 1776 at the age of 65, she was appointed to the Chair of Experimental Physics by the Bologna Institute of Sciences, with her husband as a teaching assistant. Two years later she died, having made science into a lifelong career and advanced the status of women in academic circles.

Only a limited number of her scientific works survive, but her scientific impact is evident through her many correspondents including Voltaire, who wrote to her saying, "There is no Bassi in London, and I would be much happier to be added to your Academy of Bologna than that of the English, even though it has produced a Newton."

*Pastiche from **Laura Bassi** - Erik Gregersen, *Encyclopedia Britannica*; *Wikipedia*:*

**“What we have at University of Bologna was a remarkable structure.** Students controlled most of the life and study, as was the case in early Oxford after revolting against the faculty of Paris. Cambridge University was founded after student revolts in Oxford. Students aren't taken very seriously today when it comes to teaching and organizing the universities.

**“What we have at Bologna are two early remarkable women, Bettisia Gozzadini and Larua Bassi** – a lawyer and a physicist (with concentration here on the latter). Bassi's appointment at 65 to the chief of experimental physics with her famous husband as her assistant was unique in university life as far as I know. Italy was not known for feminine breakthroughs, but here is a great one. And it happened in Europe's oldest university, and so often the older the university is the more conservative it might be. Not so with Bologna.

**“There is a need today to reign in scholarship to make it useful again.** My Italian economist relative from the World Bank has this to say: 'Today, even the most outstanding intellectuals know 'everything' (that is known), about an ever narrower 'slice' of knowledge.' For example, if they are doctors, they know geriatrics or physiatry, etc., but they know little of general internal medicine. If they are economists, they may know everything about labor economics or health economics, but very little about broader economic issues. In the economic profession I can perhaps count four to five people able to master a very broad range of historical and economic literature (Thomas Piketty, for example, is one of these few). Most economists are not intellectuals; they are technicians.

“So, I guess in addition to the challenges above the other challenge for higher education systems is how to balance breadth and depth. If they focus on breadth, the risk is that the courses they propose would not be credible, because they would lack depth. Hence, most focus on narrow/monographic topics. Look for example at history graduate courses. You may see graduate courses such as: ‘Peasant Uprisings in Europe in the 13th Century.’ Very few people would be interested in attending such very specific courses. And those few who attend them would end up knowing a lot about that specific topic, but nothing at all about other historical eras, places, and issues. So, this extreme division of intellectual labor generates a lot of frustration ... just as the increased division/specialization of manual labor generated a lot of frustration in the industrial revolution centuries.”[1]

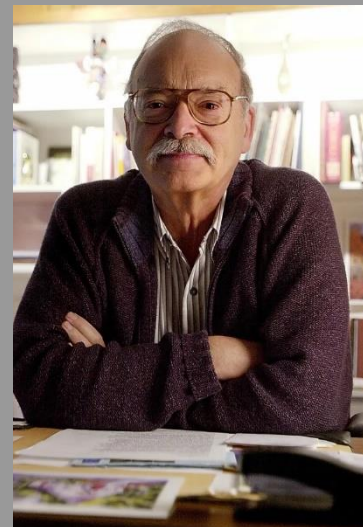
There is much truth here. If I taught an undergraduate course on “The Peasant Revolts in Europe,” I would try to look at it from political, religious, historical, economic, and other perspectives, and draw some tentative conclusions related to social issues today. I would emphasize the integration of subjects.

I realize this is not a popular way to teach because it takes in too many things, but students gain a lot from it if carefully done for their current perspectives. I realize there is a difference between undergraduate and graduate teaching methods and content. But all knowledge is integrative and relevant to a wide range of fields and ideas.

[1] Paolo Belli (Harvard, LSE), personal email

## ABOUT THE AUTHOR

**Rev. Charles Brock**, an Erie native, is an Emeritus Fellow, Chaplain, and Director of Ministerial Education at Mansfield College, Oxford, UK, where he taught for 35 years. He serves as the Director of the Institute on the American Dream at Penn State Behrend. Rev. Brock is acting minister of the First Unitarian Universalist Church of Girard, Pa., and he is a Founding Member of the Jefferson Educational Society. Rev. Brock serves as the Director of the Brock Institute for Mega Issues Education at the Jefferson and serves as Secretary of the Jefferson Educational Society’s Board of Trustees.



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