Giovanni Domenico Cassini by *Gabriella Bernardi*. Springer International Publishing, 2017, isbn 978-3-319-63467-8 (hbk) xi+186 p.





Gabriella Bernardi

Gabriella Bernardi has a physics degree but is now a science writer, with some specialisation in astronomy. She wrote several books on this topic, among which *The Unforgotten Sisters. Female Astronomers and Scientists before Caroline Herschel* (Springer 2016) in which she gives 25 biographies of famous female scientists, mostly astronomers of the past 4000 years.

In the current biography she focusses on Giovanni Domenico Cassini, also known as Jean-Dominique Cassini, or Cassini I, since he was born Italian in 1625 in a small village Perinaldo in the North-West of Italy near the French border, not far from Nice, but later moved to France and he was naturalized with all the privileges of a French born citizen. He is the founder of a dynasty of French astronomers and scientists.

Cassini was educated by Jesuits and was first employed at the observatory of Marquis Malvasia. Simultaneously he became a professor of astronomy in the university of Bologna in 1650-51 where he replaced Cavalieri, who was a student of Galilei, and had died in 1647. He published his observations of the comet passing by in 1652-53 which brought him some fame. On the floor of the nearby Basilica of San Petronio in Bologna, Ignazio Danti had a meridian constructed in 1575-76 to compute the Earth's orbit around the sun for introduction of the Gregorian calendar. A pinhole was made in the roof and an oval light spot was projected on the floor. The spot changed with the Earth moving on its planetary orbit. In 1655 Cassini was asked to build a new meridian. The improved results confirmed Kepler's second law. With Galileo's trial 23 years earlier, it was still dangerous in Italy to defend the heliocentric system and Cassini remained indecisive on the topic. Until today the meridian of 67.72 m is still to be seen in the Basilica (see picture).

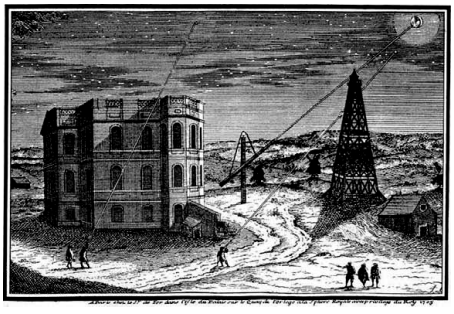


Ciovanni Cassini



Meridian in San Petronio

The Pope appointed Cassini in 1657 as Superintendent of Public Waters for the region which involved to maintain the direction and flow of the waters and the maintenance of the bridges. That was highly time consuming but Cassini continued doing astronomical observations with improved telescopes. He investigated the moons of Jupiter, he coined the term zodiacal light (a faint glow visible at night caused by light from the Sun scattered by dust particles), and he worked on the important practical problem of defining the longitude of a place on Earth. His method relied on the fact that the time that a moon disappearing behind Jupiter depended on the longitude from where it was observed. The longitude problem was only solved at the end of the 17th century when John Harrison invented a portable clock[1].



Paris Observatory

In 1668 Cassini was invited by Louis XIV and his prime minister Colbert to supervise the construction of a new observatory for the newly founded *Académie Royale des Sciences* in Paris. Cassini immediately objected against the plans of Claude Perrault because three big towers jutting out of the building were hindering the astronomical observations, but because his French at his arrival was very poor his advise was ignored. The *Observatoire* marked also the Meridian of Paris. The building can be seen in the background of Cassini's portrait above and on the left we see also the Marly Tower which was an hydraulic machine to pump water from the Seine to deliver it to the Palais de Versailles, but Cassini had it moved so that he could attach lenses to it to obtain a long aerial telescope. The larger the instrument, the more precise the observations that it delivered.

[1]See the book *Longitude* by Dava Sobel reviewed earlier in this Newsletter.

Christiaan Huygens who was president of the Académie worked also at the observatory. He was a solitary aristocrat, a theoretical genius which was almost the opposite of Cassini who was much more of a socializing man who spent much time in consistently making observations for several days in a row. Cassini made observations of sunspots and of Saturn along with Huygens. The latter is the reason why the Saturn probe launched in 1997 was called the Cassini-Huygens mission. The largest gap in the rings of Saturn is also called the Cassini gap.



Meridian of Paris at the observatoire today

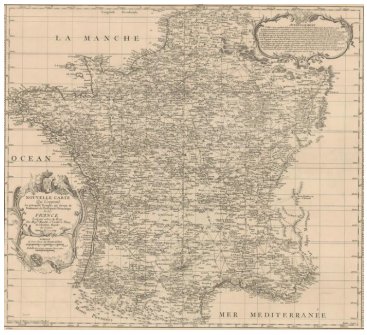
While his original visit in 1669 was planned to last only for a short time, he stayed for the rest of his career. Cassini's French improved, also because the publications of the Académie had to be in French. He became a French citizen in 1673, and changed into Jean-Dominique. That same year he married the noble Geneviève de Laistre. Louis XIV himself attended the wedding. He had two sons, both mathematicians, Jean-Baptiste (who died in the battle of La Hougue in Normandy during the Spanish Succession War) and Jacques who became astronomer and was known as Cassini II. Although the observatory has no official director, it was Cassini who organized the observations. It was only in 1771 that his grandchild Cassini III became an official director.


Iconic picture of Jupiter's moon Io, taken by the Cassini probe in 2001

Immediately after his arrival in Paris, Giovanni Cassini also collaborated with Jean Picard who was compiling a topographical map of France. It took four generations of the Cassini family to finish the Cassini map in 1744 that consisted of 182 sheets that could be joined to form a big map of France. Together with Picard, Cassini was also involved in measuring the meridian of Paris and in so doing computing the meridian of the Earth. In 1671 Picard presented his *Mesure de la terre* to the Académie[2]. Cassini also made a very detailed map of the Moon. Near the end of his life in 1711 Cassini was blind. he died in 1712 at the age of 87.

Bernardi continues to briefly describe the Cassini dynasty, all of them were astronomers conveniently numbered from Cassini I (Giovanni Domenico) up to Cassini V, although the latter became a botanist. Giovanni had a nephew Giacomo Filippo Maraldi who became involved and also the Maraldi family became associated with the Paris Observatory. Three Maraldis, (again numbered I-III) are also briefly discussed by Bernardi.


The Moon



Cassini map of France

The book is a very readable account of the achievements of Cassini (and there are many more than what is mentioned in my brief summary). She gives many quotes in French from the letters and biographies that were written by the Cassini dynasty, many of them are from Giovanni Domenico. The English translations are immediately following the quote. In appendices also an Italian poem *Frammenti di Cosmographia* by Giovanni is found, which is apparently dedicated to Christina, Queen of Sweden. Another appendix in French is about the construction of the Observatoire in Paris. Yet another French text is an obituary of Jean-Dominique Maraldi, also born in Perualdi, an astronomer of the Maraldi dynasty. The exhaustive time line with events from Cassini's life and his scientific achievements is most informative.

A peculiarity is that Bernardi gives the facts in every chapter, but always ends each chapter with a paragraph called "Curiosities" in which she gives some side remarks or an anecdote or some background information.

Adhemar Bultheel

[2]See *The Measure of the World* by Denis Guedj (2001) reviewed earlier in this Newsletter: issue 47, 2003.