



Giovanni Domenico Cassini

A Modern Astronomer in the 17th
Century

Gabriella Bernardi

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A Modern Astronomer in the 17th Century

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Back cover images: *Giovanni Domenico Cassini*, an Italian-French mathematician, astronomer, engineer, and astrologer, vintage engraved illustration. Le Magasin Pittoresque - 1874. With permission by Science Photo Library.

Cassini was launched in 1997 with the European Space Agency's (ESA) Huygens probe, Cassini was the first spacecraft to orbit Saturn. Among Cassini's objectives was the study of Saturn's rings, Titan's atmosphere, and the behavior of Saturn's magnetosphere. Cassini ended its mission with an intentional dive into Saturn's atmosphere on September 15, 2017 **Mission Duration:** October 1997- September 2017; **Operating Network:** Deep Space Network; This image was last Updated on Sept. 18, 2017 by editor Ashley Campbell. With permission by NASA.

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To Alberto

Preface

When I was a young physics student at the university, the name of the astronomer Giovanni Domenico Cassini evoked a central street in Turin, my town of birth, and a well-known meridian in Bologna. So, I remember some Italian professors assumed that he was from Bologna.

Recently, the name of Cassini is back in the spotlight thanks to the NASA space mission Cassini–Huygens that bears his name, but in the literature, little content has been devoted to his life, only a few articles or some brochures.

Several years after my graduation, some scientific journalists told me about Cassini and his origin, so I discovered a pretty village in Liguria, and I went out to compose an “astrotourism” feature on Perinaldo (never paid, the magazine closed thereafter). There I learned that Cassini was born probably in his family castle, and one of his nephews left this house and joined him in Paris to become his assistant astronomer.

Today, the Perinaldo’s castle is inhabited and not open to the public, but the tourist can visit the Cassini Museum, the “planet” street, and some astronomical garden and a permanent scientific exposition. On some nights, it’s possible to visit the little domed astronomical observatory above the Town Hall.

Here began my idea to write a book about this great astronomer of the past; but despite this, little is known about his life in Italy or elsewhere in the world.

I wish to thank my friend and colleague scientific journalist Giuditta Bricchi for having informed me about the importance of Perinaldo in the life of Cassini. I also thank Marina Muzi for her availability during my visit to Perinaldo and its museum.

I am grateful to the Springer staff, in particular to Marina Forlizzi for having set me on the right path, as executive editor, and to Barbara Amorese and Isabella Mantovani for their professional support. Thanks also to the copy editor Ken Quinn for having improved the manuscript.

Finally, I wish to express my gratitude to my husband for his constant support and for having provided the maps in this book.

Torino, Italy

Gabriella Bernardi

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Chapter 1

Introduction

Giovanni Domenico Cassini, or Cassini I, is the complete name of the famous astronomer of the 16th century who founded a dynasty of scientists including astronomers, cartographers, and ending with a lone biologist. This remarkable family scored the extraordinary record of a total of six astronomers, four Cassinis and two nephews belonging to the Maraldi lineage, who worked at the Paris Observatory. Yet, the most famous of them remains Cassini I, whose fame is mostly linked to the rings and the satellites of Saturn, as well as to his earlier realization of the great meridian line in the Basilica of San Petronio in Bologna.

Was Giovanni Domenico Cassini from Bologna then?

No, only in 1702, ten years before his death, the city of Bologna conferred on him its citizenship with a decree of the Senate, fulfilling one of his dearest wishes.

So was he French?

No, but Cassini I obtained French citizenship in 1673 from Louis XIV, and he married a French noblewoman.

Already a French citizen for more than 20 years, at the age of seventy he went to Italy with his second son Jacques Cassini, or Cassini II. On this journey, he visited Bologna to accommodate the above mentioned great meridian line in the Basilica of San Petronio, and later he visited for the last time a village not too far from Genoa, where he was born in his family's castle on the 8th of June, 1625. The name of this small hill-top town is Perinaldo, and our voyage begins right there in order to the discover the first real European astronomer in the history of science.

What did Giovanni Domenico Cassini looked like?

In his portrait in Bologna's Rectorate, Cassini looks like a middle-aged man: not too young, but not so old. Actually, there are many portraits of him made at various ages, but in my opinion this one, which belonged to Cardinal Filippo Maria Monti, reflects his essence (Fig. 1.1).

Cassini wears stylish clothes such as a silk cloak with a sober, lace, white collar and carries a large dark curled wig as was fashionable at that time. But the focus is on his face.



Fig. 1.1 Portrait of Giovanni Domenico Cassini

The face brightens the whole painting, showing his regular features and especially his eye-catching gaze. The man who is watching a bystander is a wealthy man of the 17th century, like many in other similar portraits of that period, but one detail stands out: the left eye brow and the eye itself are surrounded by wrinkles, and it seems he almost wants to wink at you, if it weren't for the serious attitude of the pose.

These might even be an indication of professional stress, consistent with a habitual squeeze to close the left eye lid in order to observe through the telescope with the right eye. Here is Giovanni Domenico Cassini as I like to imagine him. A serious and professional man, with an indefinable twist suggesting intelligence and passion.

Part I

Liguria

Liguria is the name of a small Italian region, enclosed between hills and sea. It is renowned for flowers, olive trees, and Giovanni Domenico Cassini, who was born in a small town on the top of one of its hills (Fig. [I.1](#)).

His education began at home, and then he was sent to the Jesuit College in Genoa. After completing his studies, he started to earn a living by teaching mathematics to the sons of the noble Genoese families.



Fig. I.1 Map of northwest Italy in 1700. Perinaldo was on the border between the Republic of Genoa and the Duchy of Savoy

Chapter 2

Perinaldo, Land of Astronomers

*Je suis né le 8 juin de l'année 1625, et non en 1623,
comme le prétend l'abbé Giustiniani dans son ouvrage degli
Scrittori Liguri...*

*Mémoires pour servir à l'histoire des sciences
et à celle de l'Observatoire de Paris, Parigi, Bleuett, 1810
Jean-Dominique Cassini*

“I was born on June 8 of the year 1625, and not in 1623, as claimed by the Abbot Giustiniani in his book on Ligurian writers...”

The astronomer Giovanni Domenico Cassini opens his autobiography with these lines in French that specify his exact birthdate. Cassini on this occasion wants to emphasize and correct the error reported by the Abbot Michele Giustiniani in his work, *Ligurian writers*, a book collecting various information about the most important representatives in the fields of Letter and Sciences from Liguria, the region in the Northwest of Italy, where he was born. The attention to such details shown by Cassini should not surprise the reader. Scientific accuracy and rigor always characterized his astronomical work, and sometimes was at the core of conflicts or misunderstandings, even, for example, with the King of France, Louis XIV.

It is therefore again not surprising that the archives of the San Nicolò Parish Church of Perinaldo, the northern Italian hometown of the famous astronomer, prove him right. The Book of Baptisms of the year 1625 records Cassini's christening two days after his birth in this way:

Alli 10 di d.º Gio. Dominico figlio di Giac. Cassino e di Tullia sua moglie è stato battezzato da me sud.º Ber.^{do} curato, tenendolo m. Ant.º Maria Crovese e Battista Cassini q. Antonio, natto dui giorni inanti.

Its English translation from the XVII-century Italian is:

On the tenth day of this month of June, Giovanni Dominico, son of Giacomo Cassino and of Tullia, his wife, born two days ago, has been baptized by me, Curate Bernardo, with godparents Antonio Maria Crovese and Battista Cassini.

Cassini's parents, Giacomo Cassino and Tullia Crovese, daughter of a public notary, had nine children in total, of whom survived only the firstborn Giovanni Domenico and two sisters Francesca and Angela Caterina. Cassini in his biography does not report any news of his parents, and only his great-grandson Jean Dominique Cassini, or Cassini IV, wrote in his papers that the Cassini family originated in Siena, in the Italian region of Tuscany.

Probably, Cassini was born in the family's manor, now known as Maraldi's Castle, but we have no documentation about the exact birthplace, so maybe it could have been in another house of the "Contrada Grande", the oldest part of Perinaldo. Today, if you stroll through the old and narrow streets, you can see in Maraldi Street a gravestone on the doorway of the castle. It is written in Italian and commemorates the three astronomers born in this house. Besides Giovanni Domenico Cassini, in fact, his nephew, son of his sister Angela Caterina Cassini, Giacomo Filippo Maraldi was born here. And the third is Gian Domenico Maraldi, the nephew of the latter, whom we will meet toward the end of this book.

Perinaldo is a pleasant place in the hills on the western side of Liguria, from which you have a spectacular view of the Ligurian sea, a part of the Mediterranean, and of the Maritime Alps in the opposite direction. Sitting on a ridge between the valleys of the Rio Merdanzo, a tributary of the river Nervia, and of the river Verbone, Perinaldo is close to the coastal cities of Bordighera and Ventimiglia, a few kilometers inside Italy from the present border with France. These places evoke quite vividly the history of the interplay between the two former states that occupied the Italian territories of Liguria and Piedmont.

Indeed, it has to be remembered that Italy became a unified nation only in 1861. Before this date, and since the fall of the Western Roman Empire in 476 AD, the Italian peninsula was divided into many small countries, which were frequently engaged in ferocious fights and wars. In the 17th century, one of these states was the Duchy of Savoy, which comprised approximately the majority of the current Italian regions of Aosta Valley and Piedmont (actually the western part of the latter) and some territories now belonging to France, like the Savoy and Nice. The Republic of Genoa, in contrast, occupied the coastal region of Liguria and the isle of Corsica. Perinaldo was a territory in contention at the border between these two states, and, at the time of Cassini's birth, it belonged to the Duchy of Savoy as part of the province of Nizza, now the French city of Nice.

Probably, the name Perinaldo is derived from Earl Rinaldo, or Rainaldo of Ventimiglia. Between 1045 and 1055, he bought and founded a castle on the site called Villa Junchi, known later as Podii Rainaldo, which in Latin means the Hill of Rainaldo. A small town grew up around this castle, passing through a series of local ownerships. In 1524, the last of the feudatory lords of the territories that included this town, Bartolomeo Doria, was forced to cede Perinaldo to Duke Charles III of Savoy as part of a dispute between powerful local families, including the Grimaldi of Monaco. Such a fight was in turn an episode of the long series of wars fought between France and Spain at the beginning of the 16th century. The duke reunited administratively Perinaldo with the County of Nice, under which it remained until

1818, reaching its present arrangement some time later when the King of Sardinia, Vittorio Emanuele II, integrated the city into the province of Oneglia (Imperia).

The rivalry between Piedmont and the Republic of Genoa over the city of Perinaldo was still burning when Cassini was growing up, under the protection of his uncle Antonio Maria Crovese, a brother of his mother and probably the same referred to as Godfather in the baptism act, who also took care of his initial education. He was a bright child, as it is attested in the writings of astronomer Valperga di Caluso from Turin: “...*sin dalla fanciullezza diede segni di gran talento...*” (...since childhood gave signs of great talent...).

Cassini's tutor was no longer able to follow him, so he spent two years being educated by Father Apro시오 of Vallebona, and, at the age of thirteen, he was sent to Genoa by his family to receive higher education in the famous Jesuit College of that city.

Curiosity

As recognition of the importance of the Cassini family, during his military campaign in 1794, Napoleon himself and Massena, one of his generals, slept one night in Maraldi Castle. Moreover, in 1797, an administrative reform of the French government moved the capital of the canton from Dolceacqua to Perinaldo.



Fig. 2.1 A showcase in the little Museum of Astronomy in Perinaldo with a telescope of the 17th century that was probably used by Giovanni Domenico Cassini (Author's photo reproduced with the permission of the city of Perinaldo)

Today, Perinaldo is a picturesque little village of less than 1000 inhabitants in the interior of the Province of Imperia in the northwest of Liguria, situated at 600 m altitude at the foot of the Maritime Alps. It is only 14 km from the seaside, 50 km from Monaco, 22 km from San Remo, and 80 km from Nice.

The city hosts a small astronomical observatory and a museum (Fig. 2.1) commemorating not only the Cassini family but also the one of the Maraldis, whose family history is closely interlaced with that of the Cassinis. Its astronomical places of interests include also a “planets street”, which you can walk along, a statue of Giovanni Domenico Cassini, the darkroom sundial in the Sanctuary of the Visitation, a Stars terrace, and two Arc-Meridians.

Chapter 3

Genoa and the College of the Jesuits

*...Di questo tempo[1645] tra nostri scolari
esterni contavasi il Celebre Matematico Gio Dom^{co} Cassini...
Annue memorie del Collegio di Genova...1686*
by Father Nicolò Gentile

As reported in the Italian version above, Nicolò Gentile, a Jesuit priest in Genoa, wrote in his memoirs about this college: "...At the time [1645], present among our non-residential students was the famous mathematician Gio Dom^{co} Cassini..."

This is a precious witnessing of his time at the college, because Cassini in his memoirs does not report the exact dates of his stay, but, also from this record, it can be assumed that his attendance occurred from 1638 to 1646. The young Cassini left Perinaldo to continue his studies in Genoa, in one of the most prestigious Italian Jesuit colleges (today's University building, Fig. 3.1), following the so-called *Ratio Studiorum*. His astronomical career outside of Perinaldo would have started soon afterwards.

The *Ratio Studiorum*, from the Latin "study plan", was a particular teaching method followed within the Jesuit community as the result of a long-standing development. It was characterized by a gradual teaching procedure, which tried to favor a steady and natural learning, and included written examinations and awards. The basic course of five years was of a humanistic leaning. The classic Latin authors (except for Cicero) were studied, obviously in the original versions, and the students had always to speak in Latin, with the exception of recreation time. The best students also pursued additional courses that eventually, in the language of the time, would lead them "*ad perfectam eloquentiam*" (to perfect eloquence). Rhetoric and a daily exercise in Latin composition in prose and verse were part of this special plan, and Cassini, for a lifetime, would commemorate various events through Latin verses.

There existed several bodies of students, but they were somewhat different from present-day fraternities. For example, they were not created and managed by the students independently, but rather by the college itself, and they were reserved only for the best and the most interested students.