

Biographical Encyclopedia of Astronomers

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Borda, Jean-Charles de

Born Dax, (Landes), France, 4 May 1733

Died Paris, France, 19 February 1799

Jean-Charles de Borda was a positional astronomer, instrument designer, and one of the founders of the metric system. Borda was born into a noble family, the son of Jean-Antoine de Borda and Jeanne-Marie Thérèse de Lacroix. He began his education at the Jesuit school La Flèche and later entered the light cavalry and then the Academy of Engineers of Mézières. His scientific curiosity made him eligible for the Paris Academy of Sciences in 1756. Borda's first publications in the annals of the academy dealt with a subject not directly related to astronomy: the resistance of fluids. In 1769, due to Aymar Joseph de Roquefeuil's insistence, the Marine Academy was created, and Borda was elected a member and professor of mathematics. There, he developed a great deal of his astronomical knowledge

In 1771, Borda embarked on the frigate *La Flore*, destined for America. He was accompanied by the astronomer Alexandre Pingré, with the goal of studying the behavior of chronometers and determining their utility when using the lunar-distances method to determine longitude at sea. The simplified method, which Borda tested on this voyage and was published in two volumes with tables in 1778, became common practice in the French navy. Simplified versions of the method were also published in the *Connaissance des temps* in 1779, 1780, and 1787

Borda specialized in positional astronomy for use in navigation and astronomical instrumentation, and in this field he accomplished his best work. Further voyages to America and Africa cemented his fame as a sailor and as an educated scientist. He was named captain and was captured during combat by the British in 1782 and 1784. His health too weak for life at sea, Borda was appointed superintendent of construction of the school of naval engineers. In 1795, at its creation, he was also selected as a member of the Bureau of Longitudes

From 1778, Borda perfected an instrument adumbed by Tobias Mayer in 1752, which he named the "repeating circle" or "astronomical circle." Borda's circle competed with the traditional quadrant used for astronomical measurements both at sea and on land, and its superiority was demonstrated in the operation of the geodesic union of the observatories in Greenwich and Paris, which took place in 1787. Under his direction, the artist E. Lenoir made a great number of instruments of various dimensions. In 1801, the Spanish astronomer and mariner José de Mendoza introduced new improvements that led to the instrument's definitive shape for use in navigation and in terrestrial operations. Borda also calculated, in subsequent years, numerous trigonometric sexagesimal and centesimal tables for better use of the instrument

As an expert observer and a careful experimenter, Borda's name was associated from the very beginning with the activity that would be the most important of his later years: the work on the basis of a new system of weights and measures promoted by revolutionary France. It was his initiative, recorded in the Procès verbaux de l'Académie des sciences, to create a commission that drew up the definitive project. Indeed, on 16 February 1791, the academy selected him, along with Pierre de Laplace, J. A. Condorcet, Joseph Lagrange, and Gaspard Monge, to propose a new model of measurements based on the

Length of a terrestrial meridian. The report of 19 March 1791 undoubtedly established the origin of the decimal metric system, which became the international system of weights and

measures. In his work to define the metric system, Borda displayed unwearied activity until his death. He was in charge, along with C. A. de Coulomb, of measuring the length of the pendulum that marked seconds at the 45° parallel. Borda verified the rules used to measure the geodesic bases and to determine the model kilogram. He supervised the construction of repeating circles, which Jean Delambre and Pierre Méchain used in their measurements

On 5 July 1795, Borda presented his *Rapport sur la vérification du mètre qui doit servir d'étalon pour la fabrication des unités républicaines*, which introduced the provisional meter and was part of all the commissions that determined the definitive meter. In the middle of these efforts to officially approve this new measurement, Borda died.

Antonio Ten

Translated by: *Claudia Netz*

Selected References

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