



# Gould and Gauss

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## **Benjamin A. Gould**

Last April 30 [2018] it was 241 years since the birth of Johann Carl Friedrich Gauss, which occurred in 1777 in Brunswick, Lower Saxony, Germany (the ancient "Holy Roman Empire"). Gauss is famous for his numerous contributions to the sciences; as a mathematician he ventured into number theory, algebra, analysis, geometry, probability and error theory. He also carried out research in observational astronomy, celestial mechanics, geodesy, geomagnetism, electromagnetism and optics, among others. For their contributions, the magnetic field unit of the International System was named "Gauss", just as a lunar crater and German mark notes carry their image. Gauss remarkably rich scientific activity places him as one of the greatest and virtuous scientists of all time, for which he is widely recognized today.

What is little known is his relationship with the founding director of the first Argentine astronomical institution, Dr. Benjamin A. Gould, who was a disciple of Gauss.

Undoubtedly, one of the reasons that led President Domingo F. Sarmiento to choose Dr. Gould to lead the Observatorio Nacional Argentino (Argentine National Observatory), founded in 1871 in the city of Córdoba, was his extensive relations with the most important scientists of the time.

Gould was born in Boston, Massachusetts, USA, on September 27, 1824, graduated from Harvard University in 1844. Determined to dedicate his life to astronomy, the year after he graduated, with 21 years old, he undertook a long study

tour of Europe. In July 1845 he began the tour of Ireland, Scotland and England and he visited the Royal Observatory of Greenwich from London six times; there he established a relationship with his director, George Biddell Airy. Later he moved to France, where he met Francois Arago and Jean B. Biot at the Paris Observatory, staying four months.



*Left:* Benjamin A. Gould in 1856 (Partial painting by T. H. Matteson, Albany Institute of History & Art., Dudley Observatory). *Right:* Johann Carl Friedrich Gauss in 1940 (Painting by Christian A. Jensen. Archiv der Berlin-Brandenburgischen Akademie der Wissenschaften - <http://archiv.bbaw.de/>).

But without a doubt, where he achieved the greatest benefit was in Germany, at that time “a mecca of science” and in particular of world astronomy. It arrived in the spring of 1846 and remained at the Berlin Observatory until April 1847, with its director, the astronomer Johann Franz Encke (1791-1865). Encke, discoverer of the second known periodic comet and one of the divisions of Saturn's rings, was also a disciple of Gauss.

In Berlin he met Alexander von Humboldt (1769-1859), who was 77 years old, famous in his time and extremely influential. Gould established friendship with Humboldt, which was very useful, since it helped him to make a place in the scientific circle. Before being President, Sarmiento had interviewed the German scientist at the time of his trip to Europe in the late 1840s. This scientist also maintained a friendship with Dr. Germán Burmeister, first director of the Academia Nacional de Ciencias

(National Academy of Sciences) founded in Cordoba at the same time as the Observatory.

During the period in which Gould remained in Berlin, an historical event happened, in September 1846 Johann Gottfried Galle (1812-1910) discovered Neptune on the basis of the calculations made by the Frenchman Urbain Jean Joseph Leverrier, at the behest of the aforementioned Arago. Gould made a friendship with Galle that lasted over time. The future director of the Argentine observatory also studied with Struve, Peters and Hansen and was related to the mathematician F. G. Eisenstein.



Alexander von Humboldt

(<http://library.humboldt.edu/humco/images/AVonHumboldt.gif>).



Humboldt in his Library 1856 ([http://germanhistorydocs.ghi-dc.org/sub\\_image.cfm?image\\_id=266](http://germanhistorydocs.ghi-dc.org/sub_image.cfm?image_id=266)) © Bildarchiv Preußischer Kulturbesitz, Original: Staatliche Museen zu Berlin - Preußischer Kulturbesitz, Kunstbibliothek).

## Disciple of Gauss

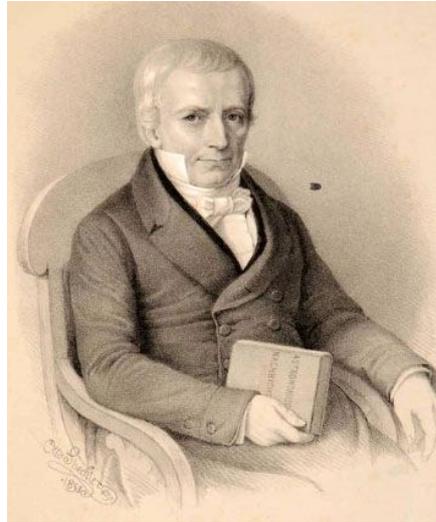
On March 23, 1847 Gould sent a letter requesting to be received as a student of Carl Friederich Gauss in Göttingen, who was 70 years old. The request was accepted thanks to his relationship with Humboldt, who recommended him especially. Gauss also consulted Heinrich Christian Schumacher (1780-1850), editor of the famous magazine *Astronomische Nachrichten*. The young Gould moved to that city where he remained between September 1847 and May 1848.

As a disciple of Gauss, he studied the problem of planetary movements, including the asteroid Flora -years later, in Córdoba, he would observe this asteroid again to determine the solar parallax-. In 1848 he received his doctorate with the work entitled: "*Untersuchungen über die Gegenseitige Lage der Bahnen der zwischen Mars and Jupiter sich bewegende Planeten*" on the orbits of the "planets" -asteroids- located between Mars and Jupiter. In this way he became the first American to obtain that degree in astronomy.

Later he visited the observatory of Altona and Gotha, where he stayed for a month. In Hamburg he worked for four months with Schumacher. At this time, probably germinated in Gould the idea of a scientific newspaper for his country, similar to the *Astronomische Nachrichten*, created by Schumacher in 1821, intended concrete on his return with *The Astronomical Journal*, a publication that still exists today. There are abundant references to Gould in the correspondence between Gauss and Schumacher.



Observatorio de Göttingen a mediados del siglo XIX, época en la que lo visitó el Benjamin Gould (*Niedersächsische Staats und Universitätsbibliothek Göttingen* [http://webdoc.sub.gwdg.de/ebook/e/2005/gausscd/html/sternwarte\\_hist\\_tafel52.jpg](http://webdoc.sub.gwdg.de/ebook/e/2005/gausscd/html/sternwarte_hist_tafel52.jpg))



Heinrich Christian Schumacher in 1853 (<http://museen-sh.de/Objekt/DE-MUS-076111/lido/P4-S-22>)

It is important to highlight the fact that in this journey Gould knows in Bonn the astronomer Friedrich W. Argelander (1799-1875) who he considered his teacher and friend, and his teachings and work became the basis for programming the main activity that would develop in the Argentine observatory. The Uranometría Argentina (Argentine Uranometry) and the later Córdoba Durchmusterung can be considered the austral extension of the main works carried out by this German scientist.

Finally, in September 1848 Gould returned home via Paris and London, arriving in North America in November. In the United States there was a precarious scientific reality, very different from the European one. He had serious difficulties to develop his scientific activity, dedicating himself mainly to the teaching of mathematics, French and German, with what he earned his livelihood. In this context, in September 1851, a remarkable fact happens, Gauss offers Gould the position of Professor of Astronomy at the University of Göttingen, which shows his high valuation of the young American astronomer. Dr. Gould accepts in the first instance, but then declines the honor, despite pressure from some friends like Benjamin Peirce and Alexander Agassiz. It is a somewhat mysterious aspect, because it was a position coveted by many and that was ideal for Gould.



It is worth highlighting Gauss' various relations with the United States. He had more than 12 students of that nationality. One of these students was Edward Everett professor at Harvard and then pastor of the Unitarian Church, to which Gould also belonged. Everett was later governor of Massachusetts, time in which the son of Gauss was received in that state. Gauss was a member of the American Academy of Arts and Sciences in 1822, and his diploma was signed by the grandfather of Gould's future wife, the honorable J. Quincy. Alexander Bache, who would later be Gould's boss and with whom Gould maintained a fluid mail letter exchange.

Translation: **Dr. David Merlo**

*Benjamin Gould discípulo de Gauss*

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