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ABOUT THE COVER: LAPLACE AND HIS AMERICAN TRANSLATOR

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Pierre Simon, Marquis de Laplace (1749–1827), has often been referred to as the "French Newton". Much of his scientific work was in extending the work of Newton on the movement of the planets. He was, along with Lagrange, one of the two most able mathematicians in France in the 18th century, though identifying him as a mathematician may be misleading, since he did a combination of what we would today call mathematics, physics, and astronomy. Nevertheless, as R. Hahn, Laplace's biographer, points out, "Laplace's fundamental message ... was the same: Newton's principle of gravitation was the basic true law of nature that fully governed the solar system" [2, p. 144].

He came from a family of modest means, farmers in the Calvados district (Normandy). Not surprisingly the family produced cider. He most certainly was not a marquis from birth. The title came much later after he had been made a count in 1806 by Napoleon I during the First Empire and later a marquis in 1821 by Louis XVIII during the Bourbon Restoration. (Lagrange, his long-time rival, was made a count by Napoleon in 1808 but did not make it to the next step—he died before the Bourbons came back into power.)

Early in life he had been interested in some number theory problems and differential equations, but in the period between 1796 and 1812 he published four major books: his *Exposition du système du monde* (1796—l'an IV), the *Théorie de mécanique céleste* (the first two volumes in 1798 or 1799—l'an VII, the third in 1802, and the fourth in 1805; a fifth volume, mainly devoted to commentary, came out considerably later, in 1825). Two books were on probability: the *Théorie analytique des probabilités* and the *Essai philosophique sur les probabilités*. The *Exposition du système du monde* is sometimes described as the *Mécanique Céleste* without the mathematics. It was much easier to read. Of the two books on probability, the *Théorie analytique* is the more important. The work in these is relevant to Laplace's *Mécanique Céleste*, which was, without doubt, his masterpiece.

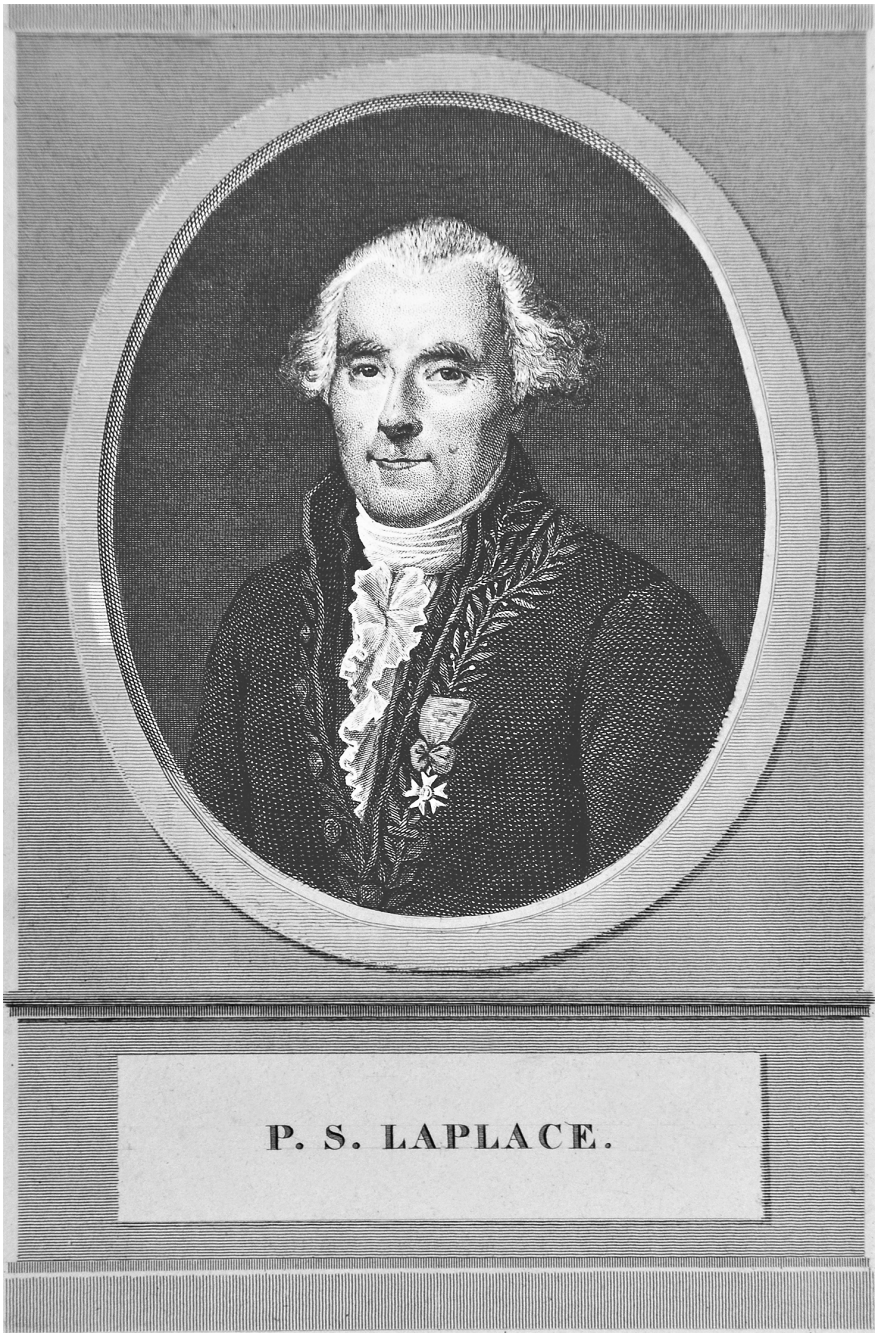

FIGURE 1. CLEAR COPY OF THE COVER. Pierre Simon, Marquis de Laplace (1749–1827). This illustration is from the frontispiece of *Mécanique Céleste* [3, vol. 3].

(The dates of publication of these can be confusing because it was the period when France was abandoning the traditional calendar in favor of the new one that measured dates from the year of the French Revolution. To complicate things further, some of the "complete" sets of the *Mécanique Céleste* consist of only the first four volumes.)

The first edition of the *Théorie analytique des probabilités* (1812) was dedicated to Napoleon I, but 1812 was not a good year for Napoleon (as Tchaikovsky observed), and the dedication was removed in subsequent editions. These volumes grew in length by roughly 30%, as Laplace worked to make them more comprehensible.

But let us return to the *Mécanique Céleste*. Though there were some early translations into English—by J. Toplis, published in Nottingham in 1814, and by H. Harte, published in Dublin in 1821—they were translations only of volume 1 or volumes 1 and 2, respectively [2, p. 280]. All four volumes did not appear in English until they were translated and published in Boston by the early American autodidact and polymath, Nathaniel Bowditch (1773–1838). In American science Bowditch was a pioneer. Coming from a seafaring family, he started his career as a seaman, but after four trips to the various corners of the earth, he decided his interests lay in science, in particular in navigation, so he wrote his classic, *The New American Practical Navigator* (1802), "sold by every book-seller, ship-chandler, and mathematical instrument maker in the United States and West-Indies." Though Bowditch explored a variety of questions in science, his strong concern for accurate navigation explains his interest in Laplace's work on the solar system and the stars.

The first four volumes of the first edition of the *Mécanique Céleste* comprise 1508 medium-size (small quarto) pages, but Bowditch's English translation of the same material runs to 3832 large (folio) pages. What happened? We know that French is a lean, crisp language, very precise. But this is an extraordinary increase in length when the text is put into English. There is an explanation, however. The original was known to be unusually terse. Florian Cajori [1, p. 262] wrote that J. B. Biot reported "he once asked Laplace some explanation of a passage in the book which had been written not long before, and that Laplace spent an hour endeavoring to recover the reasoning which had been carelessly suppressed with the remark 'Il est facile de voir' [It is easy to see that...]". Such cases could require hours of work on the part of his followers. So Bowditch provided plenty of explanation of what Laplace was saying—even to the point where very commonly a page has one to three lines of the original translated English text in a medium font size at the top of the page. This is followed by a hairline, below which one finds maybe 35–40 lines in a small font explaining Laplace's argument. This vastly larger text comes in four massive volumes that are difficult to hold, let alone read.

Bowditch (or one of his children) lists in the fourth volume institutions and individuals that received copies of the translation, including the expected: (in America) the Boston Atheneum, Harvard, Benjamin Peirce (which is misspelled as Pierce), and (in Europe) the Royal Society of London, the British Museum, the Bodleian Library, Oxford, Trinity College, Cambridge, as well as George Biddle Airy (the astronomer royal), Charles Babbage, Sir William Rowan Hamilton (the Irish astronomer royal), and Mrs. Mary Somerville, among many others, including (in Paris) M. Legendre and the Marquis de La Place [sic], though Laplace had died before the translation was completed [3, vol. 4, pp. 165–167]. My own copy is

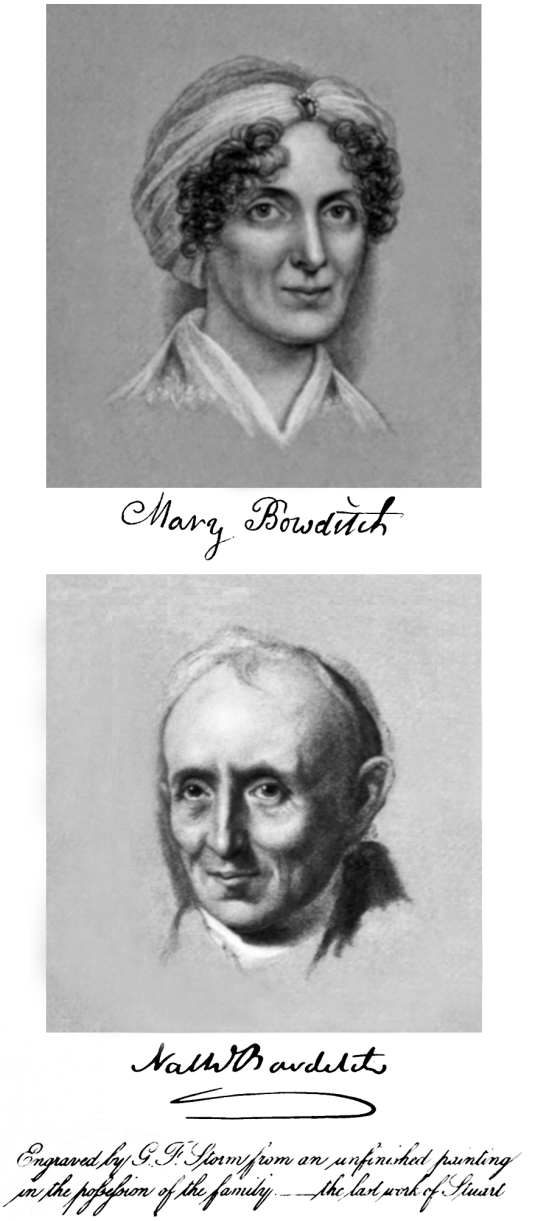

FIGURE 2. Frontispiece portraits of Nathaniel and Mary Bowditch from *Mécanique Céleste* [3, vol. 4].

the one presented to Charles Babbage, inscribed on the title pages "Presented to Charles Babbage Esq F.R.S., by the translator" on all but the fourth volume which appeared in 1839. Bowditch had died in 1838, before the last volume appeared in print. So the inscription to Babbage in the fourth volume reads, "Presented to Charles Babbage Esq F.R.S., by the children of the translator. June 5, 1839."

There were no portrait frontispieces in the French first edition and none in the first two volumes of the translation. But in the third volume there is a portrait of Laplace and in the fourth volume there is a frontispiece portrait of the translator (something I have never seen before) and, further, a portrait of his wife Mary with the dedication, "Mary Bowditch; who devoted herself to her domestic avocations with great judgment, unceasing kindness, and a zeal which could not be surpassed; taking upon herself the whole care of her family, and thus procuring for him the leisure hours to prepare the work; and securing to him, by her prudent management, the means for its publication in its present form, which she fully approved; and without her approbation the work would not have been undertaken" [3, vol. 4, p. 7]. That dedication, despite its no doubt good intentions, just wouldn't get past an editor in the twenty-first century! Following these two portraits there appears a 160-page "memoir" by Bowditch's son, Nathaniel Ingersoll Bowditch, tracing the family history back to 1639 when one William Bowditch settled in Salem, Massachusetts. Nathaniel senior had been made a member of the American Academy of Arts and Sciences in 1799 and received an honorary M.A. from Harvard (of which he was not informed until he heard his name being called at Commencement). In March of 1798 he had married Elizabeth Boardman, then 18 years old, but she died in October of that year. In October two years later he married his cousin, Mary Ingersoll, then 19, who over some years gave birth to four sons and two daughters. It is to this wife the translation is dedicated.

As noted, by the time the English translation appeared, Laplace had died in Paris, having survived the French Revolution, the reign of Napoleon I, and the restoration of the Bourbons to the throne in France. Throughout the turmoil Laplace managed to live a comfortable life on his estate in the country outside Paris. He was heavily involved in politics during Napoleon's reign. He became active again in the politics of the Academy of Sciences, when it was allowed to resume functioning under the Bourbons.

Laplace's reputation in science remains at the highest level. As a person he appears to have been flawed—loath to give proper credit to colleagues, ambitious and eager for honors, he was an early recipient of the *Légion d'Honneur*. He received titles because he was willing to bend with the politics of the time, eager to please leaders in one regime after another. But perhaps it was the only way to survive in tumultuous times. Some of his contemporaries did not survive that era of the guillotine, summary executions, and mysterious disappearances.

References

[1] Florian Cajori, *A History of Mathematics, 2nd edition*, Macmillan, New York, 1919.
[2] Roger Hahn, *Pierre Simon Laplace (1749–1827): A Determined Scientist*, Harvard University Press, Cambridge, MA, 2005.
[3] Pierre Simon de Laplace, *Mécanique Céleste*. Translated with a commentary by Nathaniel Bowditch. Hilliard, Gray, Little, and Wilkins Publishers, Boston, 1829–39.

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