# Changing Faces: The Mistaken Portrait of Legendre

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Adrien-Marie Legendre (1752–1833) made great contributions to analysis, number theory, celestial mechanics, and practical science. His name is attached to the Legendre differential equation, Legendre polynomials, the Legendre transformation, the Legendre symbol in number theory, the Legendre conditions in calculus of variations, the Legendre relation for elliptic integrals, the Legendre duplication formula for the gamma function, and the list goes on. He wrote important books on advanced calculus, number theory, and elliptic integrals. His textbook adaptation of Euclid's geometry had a long life, was translated to many languages, and brought him popular fame. His work is honored today, yet curiously he was not so highly regarded during his lifetime and there was no publication of his collected works. Little is known of Legendre's personal life and he remains a shadowy figure.

For over a century one familiar portrait (Figure 1) has been displayed wherever Legendre's work has been discussed in historical writing. It is included in books on history of mathematics such as Struik [14] and Eves [5]. It has been printed repeatedly to illustrate articles about Legendre, and it appears on many mathematical websites. Generations of mathematicians have known and recognized Legendre by that portrait.

But the portrait has nothing to do with Adrien-Marie Legendre. It is not his likeness. Instead it portrays a politician named Louis Legendre, an active participant in the French Revolution, no relation to the mathematician. This shocking and rather embarrassing revelation has emerged in the last few years, supported by strong evidence, as we will explain.



Figure 1. Louis Legendre.

It seems incredible that such an egregious error could have gone undetected for so many years. Both men were repeatedly depicted in the literature by the same lithograph portrait of Louis Legendre (Figure 1), yet no one seemed to notice the anomaly until the advent of the computer

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age, when powerful search engines transformed the art of information retrieval. Sometime during the year 2005, two students at the University of Strasbourg were astonished to find a single portrait for two different men. Their discovery was posted on the mathematics department website `les-mathematiques.u-strasbg.fr`. The error was then confirmed and actively discussed by bloggers in France, who uncovered most of the sources cited in this report.

After the error was confirmed, the first task was to determine the identity of the shared portrait. Was it a likeness of Adrien-Marie or Louis Legendre, or neither? A mystery to be solved. The website of Jean-Bernard François [6] was central to that investigation and still shows a record of the chain of discoveries which identified the portrait as that of Louis Legendre. In particular, it shows that bloggers traced the portrait to its source in a book [2] of lithographs published in 1833.

Once the traditional portrait was known to be false, a feverish search began for a true portrait of Adrien-Marie Legendre. Miraculously, an authentic portrait was discovered during the year 2008 in the library of the Institut de France in Paris, among a rare collection [1] of seventy-three caricatures of members of the Institute. One of the watercolor sketches (depicted on the cover of this issue of the *Notices*) shows the heads of Legendre and Fourier, with bodies lightly sketched in pencil. Their names "Legendre" and "Fourier" are written below the sketch. Fourier is easily recognized from existing portraits, but Legendre takes on a totally new appearance. This is the only image of Adrien-Marie Legendre known to exist.

Here is the sequence of events that brought the true portrait to light. Late in the year 2007 the mathematician Gérard Michon learned of the ongoing controversy through the website of François and posted a report (in English) on his own website [10]. Some months later, he came across an obscure website `http://institut-de-france.fr/bibliotheques/Enrichissements2000_2001.doc` that described the album containing caricature portraits ("tête seule achevée") of Legendre and Fourier. Michon announced the discovery on his website, and François used that information to obtain a copy of the sketch, which Michon posted on his website in December 2008. This writer first learned about the story from Michon's account, which contained a link to François [6]. In response to inquiries, both Michon and François kindly furnished additional information for use in this article.

Louis Legendre (ca. 1755–1797) was a butcher in Paris when the Revolution broke out in 1789. (His year of birth is variously recorded as 1752 [4], 1755 [8], and 1756 [2].) He participated in the storming of the Bastille and subsequent revolutionary events, and was elected a deputy



**Figure 2. L. Legendre pictured with Montagnards (lower left and inset).**

to the National Convention, where as a member of the far-left party known as the Montagne, he contributed to the fall of the more conservative Gironde party and voted for the execution of the king. Among the Montagnards were famous figures of the Revolution such as Danton, Marat, Robespierre, and Saint-Just. A "group portrait" [3] of the Montagnards in 1793 is shown in Figure 2. Note that Louis Legendre is represented by a variant of the familiar lithograph.

That lithograph portrait of Louis Legendre was created by the artist François-Séraphin Delpech (1778–1825) and was included in a book [2] of similar portraits of many prominent figures of the time: politicians, scientists, artists, military officers, royalty, even the unfortunate King Louis XVI. Beneath each portrait was a surname and a signature (cf. Figure 1). The book displays individual portraits of 13 of the 21 Montagnards who appear in the group portrait of 1793, including Louis Legendre. In addition, one finds mathematicians such as Lagrange, Monge, Carnot, and Condorcet
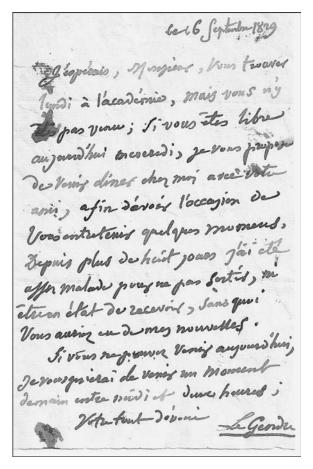
**Figure 3. Letter from A.-M. Legendre to Jacobi.**

portrayed in the book. All four were public figures, as was Adrien-Marie Legendre, with reputations extending beyond academia. The last three were prominent in politics, and Lagrange headed a national commission on weights and measures, among other assignments. It is easy to understand how the "Legendre" portrait could have been mistaken years later for the mathematician, although the book does contain an index of formal identifications. In the index one finds, for instance, the entry "LEGENDRE (Louis), né à Paris, en 1756, mort à Paris, le 13 décembre 1797". [Born in Paris in 1756, died in Paris on 13 December 1797.]

The signature of Louis Legendre, as displayed with his portrait, is distinctly different from that of Adrien-Marie, who actually signed his name "Le Gendre" (see the sample in the letter to Jacobi, Figure 3), but the disparity appears not to have attracted attention until the last few years.

When was the erroneous portrait first introduced into the literature? That is difficult to say, but in a book by Alphonse Rebière [13] published as early as 1900 we find the portrait of Louis Legendre adorning a discussion of Adrien-Marie's work. Why did mathematicians not challenge the error? The obvious answer is that the mistaken portrait made its appearance so long after Legendre's death in 1833 that no one who remembered him was still alive, and no true likeness was available to contradict it. (Photography was invented only about 1840.) We know from testimony of Poisson that Legendre did not welcome personal attention, but wanted his work to speak for itself. Speaking at Legendre's funeral, Poisson [12] said, "Notre confrère a souvent exprimé le desir qu'en parlant de lui il ne fût question que des ses travaux, qui sont, en effet, toute sa vie. Je me conformerai religieusement à sa volonté, dans cet hommage que je viens rendre ..." [Our colleague often expressed the desire that in speaking of him it would be only a question of his works, which are in fact his whole life. I will comply strictly with his wish in this tribute that I come to pay ...] In view of these remarks, it seems likely that Legendre actively discouraged the making of portraits.

The album of caricatures [1] has a mysterious history. It is the work of Julien-Léopold Boilly (1796–1874). His father Louis-Léopold Boilly (1761–1845) was a more famous artist, a member of the Académie des Beaux-Arts best known for his oil portraits. The younger Boilly was commissioned to do a series of engravings of members of the Institute, but the work was never finished; the partial collection (also in the library of the Institut de France) includes a formal portrait of Fourier but apparently none of Legendre. The album of caricatures had been in private hands until it was donated to the Institute by Daniel Wildenstein, himself a member of the Académie des Beaux-Arts, in 2001. Wildenstein had bought the album at a public auction held by Christie's in New York on January 28, 1999. According to the 1999 Christie's catalog, the album had been listed in the auction of the artist's studio (lot number 160) on December 14, 1874, shortly after his death. We are indebted to Fabienne Queyroux, curator of manuscript collections at the Institut de France, for all of this information.

The collection [1] also contains a caricature of Laplace, but no other mathematicians are represented. The entire album can be viewed on the website of the Réunion des musées nationales `www.photo.rmn.fr`. (Click on "recherche", then type in "Boilly" for searching and click repeatedly on "suivante".) The two Boilly artists appear to be confused, since the website attributes the album of caricatures to the father Louis-Léopold.

In the juxtaposition of Legendre and Fourier, the artist seems to be commenting on a contrast of personalities: Fourier fat and jolly, Legendre lean and acerbic. However, the historical record sometimes portrays Legendre in quite a different light. A case in point is the kind reception he gave to Abel and Jacobi.

In the latter part of his career, Legendre devoted many years to research in the theory of elliptic integrals. His monumental treatise [9] was finally published in 1827, in two volumes: one for the mathematical theory, the other for extensive numerical tables largely compiled by Legendre himself. Shortly thereafter, the two young mathematicians N. H. Abel (1802–1829) and C. G. J. Jacobi (1804–1855) made sensational discoveries that revolutionized the subject. Legendre learned of their work through published papers and by direct correspondence. He might well have reacted with dismay, but to his credit he welcomed the innovations with open arms, carried on an enthusiastic mathematical correspondence [11] with Jacobi for two years, and added a third volume to his treatise to present the new discoveries in coordination with his earlier work. (Poisson [12], departing from his stated mission, comments at length about this episode.)

On August 19, 1829, Jacobi wrote to tell Legendre that he had traveled as far as Frankfurt and had decided to come to Paris for several weeks because "I am burning with desire to see the man to whom I am so much indebted for kindnesses…". On 16 September 1829, while Jacobi was in Paris, Legendre wrote him the letter displayed in Figure 3. [Translation: I was hoping to find you Monday at the Academy, but you didn't come. If you are free today (Wednesday), come to dinner at my place with your friend, so that I will finally have a chance to speak with you for a few minutes. For more than eight days I was too sick to go out or to receive company; otherwise you would have had my news. It you are not able to come today, I beg you to come for a moment tomorrow between noon and two o'clock.]

We will never know the news (presumably mathematical) that Legendre was so eager to convey to Jacobi. One thing is clear, however. The letter is written with the warmth of friendship. The tone is hardly lean and acerbic!

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