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ABOUT THE COVER: VOLTAIRE, DU CHÂTELET, AND NEWTON

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Everyone even casually interested in mathematics knows that Newton and Leibniz developed the ideas of the calculus. Volumes have been written about just when and how this happened, though it was probably between 1666 (Newton) and 1684 (Leibniz). But what does this even mean? Where do Fermat, Barrow, Huygens, and others fit in, as they discovered bits and pieces of the calculus around that time? Though Newton probably had some ideas about the calculus during his *annus mirabilis*, 1666, he did not publish his results until 1687 with the appearance of his *Philosophiæ naturalis principia mathematica*. Leibniz, however, published his paper, "Nova methodus pro maximis et minimis", on differential calculus in the *Acta Eruditorum* in 1684. So it's all something of a muddle.

Of one question there is no doubt. Newton's *Principia* was first translated into French by Gabrielle Émilie le Tonnelier de Breteuil, La Marquise Du Châtelet (1706–1749), an impressive mathematical and scientific talent during the first half of the 18th century. For the translation she used the third edition of the *Principia* (1726), the last edition published during Newton's lifetime. Though work on the translation began in 1744, the complete work did not appear until 1759, well after her all too early death. It has remained the only translation into French. It came along too late to influence the race between British mathematicians of the day and the continental school in seeking solutions to many outstanding problems. Newton's cumbersome notation is often cited as a reason that British mathematics lagged behind while mathematics flourished in France, Germany, and Russia (in the last case, largely due to the efforts of one man, Euler). Of course, though Newton's clumsy notation may have hampered progress in England, there is also

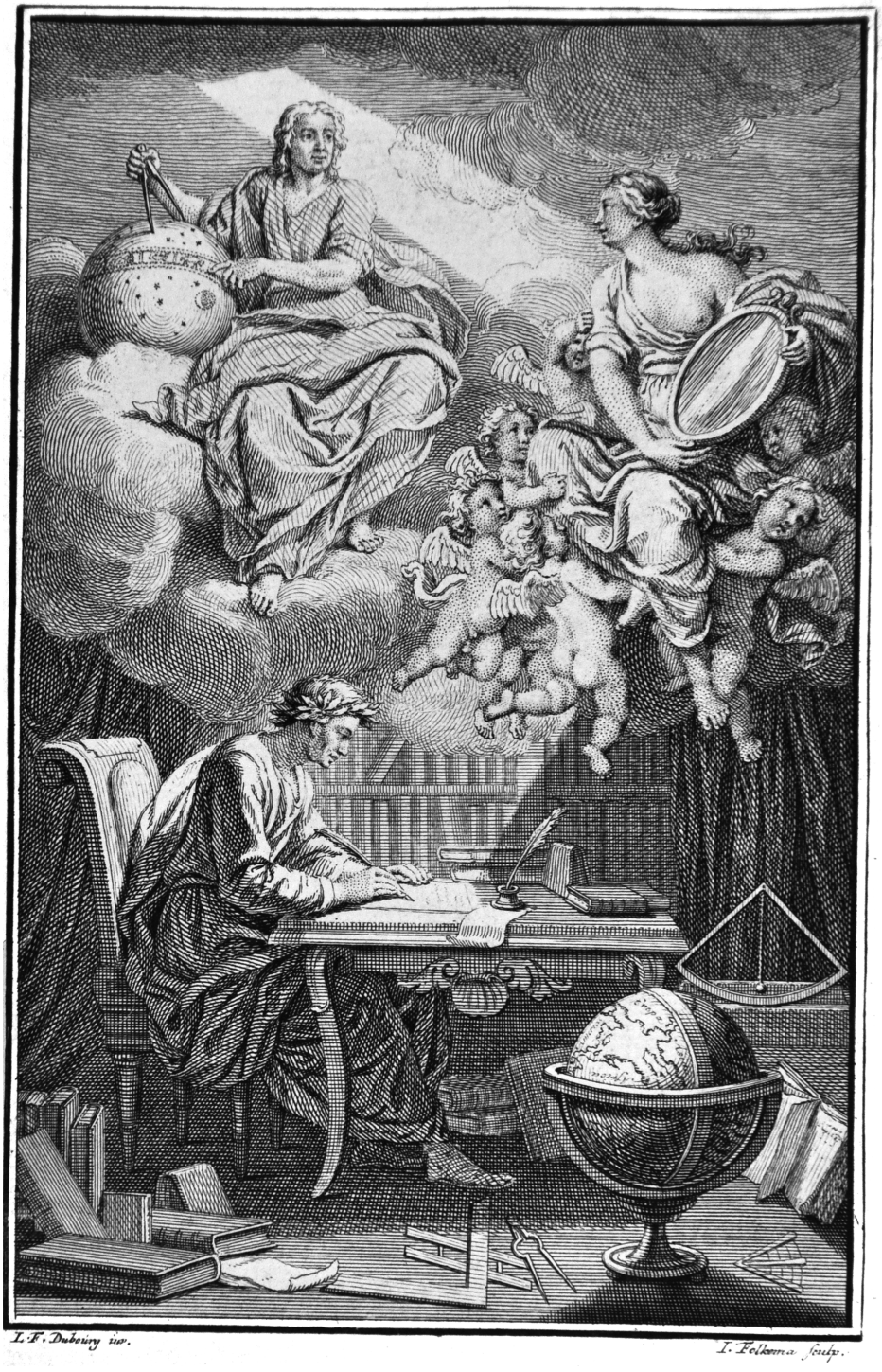

FIGURE 1. Clear copy of the cover: Frontispiece from Voltaire's *Élémens de la Philosophie de Neuton*

the obvious abundance of powerful mathematicians on the Continent in the 18th century—Jacob, Johann, and Daniel Bernoulli, as well as Euler, and in the next generations, Laplace, Lagrange, Legendre, and eventually Gauss and a powerful northern European collection of mathematicians in Berlin, Paris, and Göttingen.

Nevertheless, the Marquise Du Châtelet became a potent force in advancing the case for Newton on the Continent. And she had an ally, Voltaire (1694–1778), who was a champion of Newton's ideas, less in what we would now identify as strictly mathematics, more in physics and philosophy. The actual science in Voltaire's *Élémens de la Philosophie de Neuton* was quite likely written by Du Châtelet, not Voltaire. On the title page of the 1738 first edition [1] there is an attractive printer's mark with two figures holding up a banner reading "L'Esperance me guide" above a sailing ship. The book is dedicated to "Madame la Marquise Du Ch.**[Châtelet]" and the dedication consists of 92 lines of rather rapturous verse about the marquise, in the form of rhyming couplets. Important scholar that Du Châtelet was, the dedication was perhaps not exclusively motivated by her scientific work. Voltaire was one of her several paramours, as was widely known at the time, but he was a very special one. At the time of her death, six days following childbirth, her then lover, the minor poet Jean-François de Saint-Lambert [2, pp. 287–288], was with her, but following her death, her chambermaid brought Voltaire and her husband to see her one last time.

The first eight lines of the dedication are:

> "Tu m'appelles à toi vaste & puissant Génie;
> Minerve de la France, immortelle Émilie;
> Disciple de Neuton, & de la Vérité,
> Tu pénétres mes sens des feux de ta clarté,
> Je renonce aux lauriers, de long-tems au Théâtre
> Chercha d'un vain plaisir mon esprit idolâtre,
> De ces triomphes vains mon cœur n'est plus touché,
> Que le jaloux Rufus à la terre attaché,"
> Etc.

Voltaire makes his case for Newton (and Du Châtelet) over the next 306 pages, with 115 illustrations ranging from elaborate classical engravings for the beginning and end of each of the 25 chapters, plus many technical illustrations, some of them fold-outs.

The principal and fairly well-known illustration on the cover of this issue and in Figure 1 is the frontispiece of Voltaire's book. In the upper left-hand corner the man seated on the cloud holding a sphere and compasses is clearly Newton, recognizable from portraits by Kneller and Roubiliac, in oil and marble, respectively. Both artists were roughly contemporary with Newton. There is a ray of light representing scientific ideas emanating from God, passing through the head of Newton and beyond to a woman surrounded by lots and lots of putti while holding a mirror. She represents the Marquise Du Châtelet, and with the mirror she is aiming the shaft of light in the direction of the man seated at a desk writing, surrounded by mathematical instruments, books, and a globe. The ideas are coming from God through Newton to Du Châtelet, thence to the man at the desk, Voltaire, who is recording them.

The marquise's scientific interests ranged over a variety of questions in mathematical physics: problems of heat, light, energy (where, to be balanced, she was

following work of Leibniz), optics and linguistics [2, pp. 208–211]. She managed to lead a full scientific and personal life tragically cut short after forty-two years.

Acknowledgments

I am pleased to acknowledge assistance in revising an earlier draft of this note from a well-known Du Châtelet scholar, Ronald Smeltzer.

References

[1] Voltaire, [François Marie Arouet de], *Élémens de la philosophie de Neuton/Mis à la portée de tout le monde*, Étienne Ledet, Amsterdam, 1738.

[2] Judith P. Zinsser, *La Dame d'Esprit/A Biography of the Marquise Du Châtelet*, Viking, New York, 2006.

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