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Voltaire FRS: His career as a scientist

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Abstract. Voltaire is remembered as one of the leading thinkers of the European Enlightenment, often quoted today for his views on free speech and religious toleration. In his lifetime he also enjoyed a reputation as a scientific thinker. His *Éléments de la philosophie de Newton*, published in 1738, did much to further understanding of Isaac Newton in Europe and led to Voltaire's election as a Fellow of the Royal Society. He even tried his hand at experimental research and briefly entertained an ambition to become the Permanent Secretary of the French Académie des sciences. The plan came to nothing, but Voltaire's presentation and promotion of Newtonian physics was enormously influential and has continued to this day to influence our understanding of Enlightenment scientific thinking.

Today Voltaire (1694-1778) is thought of as one of the dominant figures of the French Enlightenment (figure 1). His philosophical tale *Candide* was a bestseller from the moment of its publication in 1759, and above and beyond his actual writings, Voltaire has become a French cultural icon, one of those writers who represents a set of cultural values (free speech, religious toleration and so forth), a celebrity writer famous for being famous. So Voltaire is known as a writer, as a polemist and even as a human rights spokesman, but we do not generally think of him as a scientist (on Voltaire's career as one of perpetual reinvention, see [1]).

Figure 1. Houdon's bust of Voltaire, produced at the end of the writer's life, memorable for his tight-lipped smile, has become the iconic image of the philosopher.

1. Voltaire as empirical scientist

The use here of the term *scientist* is of course anachronistic. Voltaire and his contemporaries might well have spoken of 'natural philosophy' rather than science. Be that as it may, it might come as a surprise that Voltaire was elected a Fellow of the Royal Society. In fact he wrote a number of works on scientific matters and the recent completion of the *Oxford Complete works of Voltaire* means that all these writings are now available in critical editions for the first time [2].[1] Voltaire's engagement with these matters began when he was living in London between 1726 and 1728 (figure 2). It is often claimed that Voltaire was present at Sir Isaac Newton's funeral in 1727 and while there is no evidence that he actually attended this formal state occasion, it is certainly true that he was living in London at that time and he must have been aware of the importance of the fact that a mere commoner was accorded all the pomp and prestige of a full state funeral: Newton's body lay in state in the Jerusalem Chamber of Westminster Abbey and after the funeral service, most of the Fellows of the Royal Society followed his coffin to the grave. Voltaire was then a young poet eager to make his mark and much concerned with the status accorded to writers; he cannot have failed to be impressed by the official recognition accorded to this commoner.

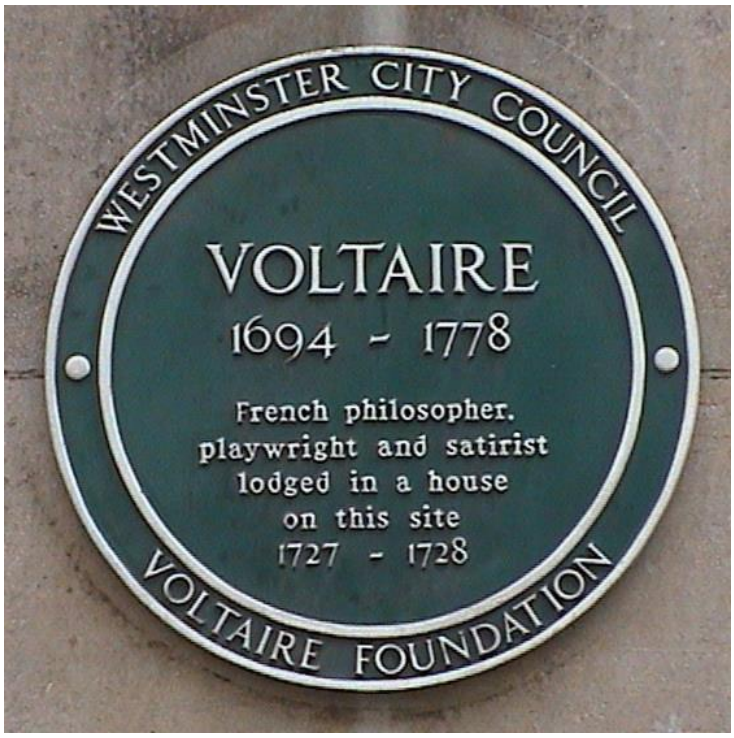


Figure 2. This plaque in Maiden Lane, north of the Strand, behind the Vaudeville Theatre, marks the site of the house where Voltaire lodged in the 1720s.

Voltaire wrote a book inspired by his stay in England, published in London in 1733 under the title *Letters concerning the English nation* and in France the following year as the *Lettres philosophiques*. In these 'English Letters', he wrote about Newton, devoting separate 'letters' or chapters to his views on gravity, optics and chronology. He introduced these with a comparison between the scientific world views of René Descartes and Newton, a comparison very much favouring Newton: 'A Frenchman who arrives in London, will find Philosophy, like everything else, very much changed there. He had left the world a *plenum*, and he now finds it a *vacuum*…'. [3] The publication of the *Lettres philosophiques* in France caused a scandal on account of its unorthodox treatment of religion: the book was banned and Voltaire nearly went to prison. The public furore generated in France by the publication of the *Lettres philosophiques* placed Voltaire in an extraordinarily difficult position. On the one hand, he could legitimately consider the book a success. He had succeeded in annoying and provoking authority, always a keen source of pleasure for him, and he had clearly found his voice as a prose writer. On the other hand, how could he now capitalise on this *succès de scandale*? Once the threat of a humiliating

incarceration was over, he was faced with a greater difficulty: what next? In the eighteenth century, as in the twentieth, French cultural life was centred on the capital and Voltaire's presence was no longer welcome in Paris or Versailles. So the question facing him was a double one: what should he speak *on*, going forward? And where should he speak *from*? – with Voltaire the two questions could never be entirely separated.

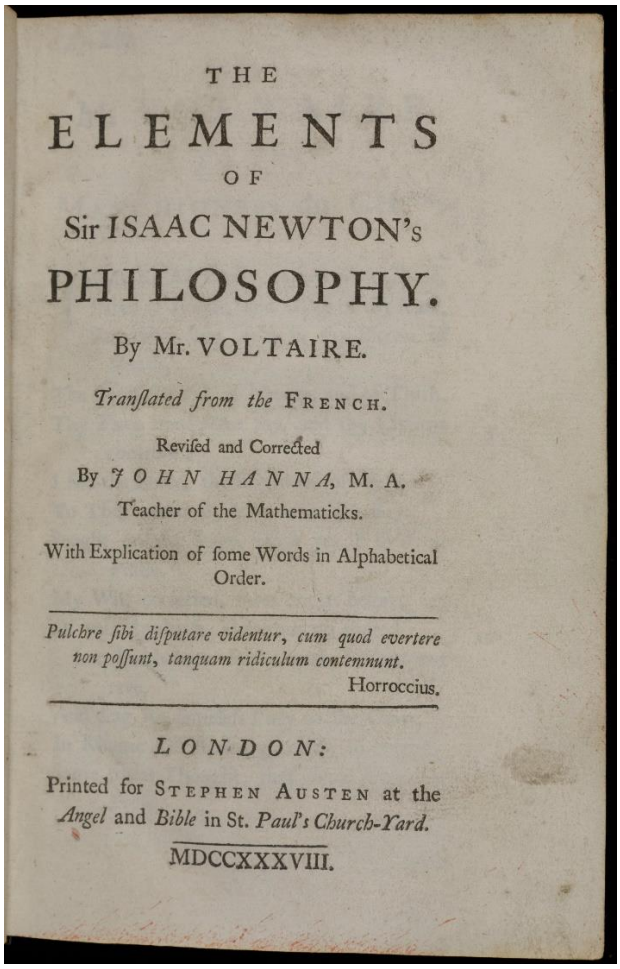
Voltaire had recently met and fallen in love with Emilie Du Châtelet, a woman of high breeding and formidable intellect. She was determined to pursue her studies and she too had a problem: if it was difficult for Voltaire to know how to position himself as a writer after the scandal of the *Lettres philosophiques*, it was all but impossible for Du Châtelet, who as a woman had absolutely no model at all for imagining any public life as a writer and intellectual. They had two big advantages in facing the world together: her social standing, which to some extent protected them from public opinion and her wealth. She and her husband owned several properties, including a rather dilapidated château at Cirey in the north-east of France and so the decision was taken that they would move together to the relative isolation of Cirey and there pursue their studies and their writing: this was a way of turning exile into a studious paradise and it would last with inevitable interruptions for some fifteen years from 1734 until Du Châtelet's death in 1749. Each occupied separate luxuriously appointed apartments and visitors commented both on the luxury and on the fierce work régime which they each observed: visitors were told not to leave their rooms before ten in the morning, so that Voltaire and the *marquise* could study undisturbed.

The time that Voltaire and Emilie Du Châtelet spent together at Cirey was a period of intense shared interest in philosophy and science, and it is clear that Du Châtelet provided every comfort and support for Voltaire to provide him with an ideal working environment. Moreover this was a working couple. The old-fashioned characterisations of 'Mme Du Châtelet', as she was usually described, as handmaiden to the intellectually dominant Voltaire will no longer do. Du Châtelet was a significant scholar in her own right and her translation of Newton's *Principia* from Latin into French, published posthumously in 1756, is still considered the standard translation; she was also an important influence, perhaps even a competing influence, on Voltaire's intellectual development. Voltaire had returned from England with an intellectual framework clearly in place: John Locke and Newton were now the cornerstones of his empirical worldview. Living and working with Du Châtelet at Cirey in the 1730s, Voltaire strove to develop as an experimental philosopher and to be taken seriously as a writer on scientific matters.

Firstly, Voltaire set to work to really understand Newtonian physics. When he had written on Newton in the *Lettres philosophiques*, he had been dependent entirely on secondary sources. Now he read Newton carefully and made his best attempt to synthesise his thinking in a long book, the *Eléments de la philosophie de Newton*, which appeared in 1738 and was immediately translated into English (figure 3). This was essentially a work of vulgarisation, but vulgarisation at a high level and it had a significant impact on the reception of Newton's thought outside Britain. The book provoked a number of responses, ranging from pamphlets to a 400-page book by the Cartesian physicist Jean Banières. Voltaire published a full reply, which in due course provoked a further response in 1739 from two other physicists. Voltaire had evidently created a debate and the *Eléments de la philosophie de Newton* were to have a decisive influence on the European reception of Newton's thought.

Voltaire was not content, however, simply to try to enhance his bookish understanding of Newton; he also wanted to try his hand as an experimental scientist. He constructed a single-storey wing to the château at Cirey, so as to have a workspace of his own, separate from Du Châtelet and here he set up a scientific laboratory, his *cabinet de physique* (figure 4). He wrote to Henri Pitot in Paris, asking him to acquire on his behalf various items of scientific equipment and in 1737 he even engaged a chemist to assist him in his experiments.[2] In the summer of 1736 Voltaire wrote to the abbé Moussinot (D1138), enquiring about the forthcoming prize competition at the Académie des sciences and the following year he submitted his entry, an *Essai sur la nature du feu et sur sa propagation*. In 1738 he learned that he had not won the prize – and nor had Emilie Du Châtelet, who had entered the competition separately. Voltaire wrote to Pitot (whom he suspected of having been one of the judges) to find out if his essay

had been well received (D1504) and then successfully made the case that his and Du Châtelet's essays should be published alongside the three prize-winning contributions.[3]



THE
ELEMENTS
OF
Sir ISAAC NEWTON's
PHILOSOPHY.
By Mr. VOLTAIRE.
Tranſlated from the FRENCH.
Reviſed and Corrected
By *JOHN HANNA*, M. A.
Teacher of the Mathematicks.
With Explication of ſome Words in Alphabetical Order.
Pulchre ſibi diſputare videntur, cum quod evertere non poſſunt, tanquam ridiculum contemnunt.
Horroccius.
LONDON:
Printed for STEPHEN AUSTEN at the *Angel* and *Bible* in St. *Paul's Church-Yard.*
MDCCXXXVIII.

Figure 3. The English translation of Voltaire's major work on Newton was published in London in 1738.

The publication of his *Essai sur la nature du feu* is often seen as the culimination of Voltaire's career as a scientist, but that is not correct. He continued to build up his *cabinet de physique*, which was used also by Emilie and he went on making revisions to the *Eléments*, incorporating responses to criticisms that had been made of the work. Citing these editorial changes, Robert L. Walters and W. H. Barber comment that '*these examples show that in 1741 Voltaire's scientific world is still expanding and evolving; he has increased his knowledge through study and experiments*.' [2; vol. 15, p 126] Voltaire wrote a *Mémoire sur un ouvrage physique de Mme la marquise Du Châtelet* and an *Exposition du livre des Institutions de physique*, both works generously designed to promote Du Châtelet's writings. At the same time, the two lovers were also in dialogue. In her *Institutions de physique* (1740), Du Châtelet took the metaphysical views of Gottfried Leibniz as her starting point and Voltaire in effect replied to her in print in his *Métaphysique de Newton, ou parallèle des sentiments de Newton et de Leibniz*, published separately in 1740, then incorporated the following year into a revised and enlarged edition of the *Eléments*. His *Doutes sur la mesure des forces motrices et sur leur nature*, published in 1741, showed Voltaire again silently refuting the views of Du Châtelet as he reaffirmed his opposition to the philosophical ideas of Leibniz and Christian Wolff. An intriguing aspect of this whole story is the climate of scientific collaboration and simultaneous rivalry that existed between the two inhabitants of the Château de Cirey. Important scientific papers belonging to Emilie Du Châtelet that have recently

come to light are teaching us more about the importance of her scientific work. There are surely discoveries still to be made about the nature and extent of her academic collaboration with Voltaire.

2. Voltaire aspires to be Perpetual Secretary of the Académie des sciences

At a point in the early 1740s Voltaire must have realised that he had perhaps reached his limits as an experimental philosopher and that it was not by following this path that he would really make his name. But at the same time his record of scientific activity was enormously important in career terms. The early decision to support Newton against Descartes was taken on scientific grounds in part, but also for institutional reasons and these are not to be underestimated.

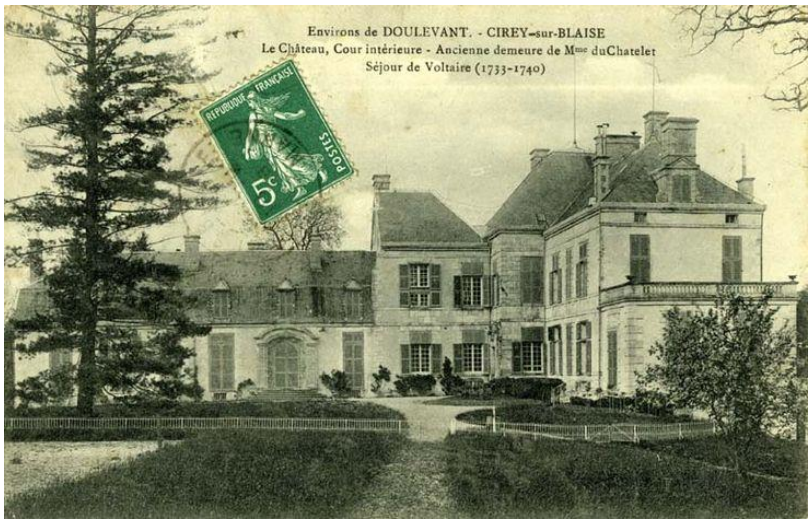


Figure 4. The Château de Cirey, in the Haute-Marne: the wing which Voltaire constructed to house his laboratory is on the left.

For some years there had been a major scientific debate about the movement of planets. One could observe with a telescope that planets move in slightly strange and unexpected directions, and the challenge was to explain this movement. The Cartesian tradition said that that the atmosphere was full and that there were vortices that supposedly accounted for why planets move as they do. Newton proposed a very different solution: he claimed that space is empty once one gets beyond the Earth's atmosphere and that the planets, existing in a void, move in the way they do because they are pulled by gravitational force. J. B. Shank has recently shown that the fight between the Newtonians and the Cartesians was essentially an institutional war [4]. In the history of ideas, particular theories do not triumph because they are right or wrong, they triumph because a particular group or sect promoting those ideas is in the ascendant at a particular moment. So it was with these two competing theories. Bernard de Fontenelle was the secretary of the Académie des sciences – a major position of power in the Parisian literary world – and he espoused the Cartesian cause. It was a younger and brilliant scientist, Pierre Louis Maupertuis, who was far more persuaded by the Newtonian argument. From his correspondence with Maupertuis, Voltaire was quite clearly converted to the Newtonian faith (his term!), both intellectually but also sociologically. Voltaire had long been a thorn in the side of the Parisian Establishment and in becoming a Newtonian, he was identifying with the young Turks against Fontenelle and the old guard.

After the fiasco of the censorship of the *Lettres philosophiques* in the mid-1730s, Voltaire was desperate to find rehabilitation in the French capital. Membership of an academy was an obvious route to literary and academic respectability in the Ancien Régime and in 1739 he wrote to his friend Count d'Argental that the publication of some recent attack on him might damage his chances of being elected to an academy, '*even that of St Petersburg*' (D1837). He had recently been turned down by the Académie française, essentially because he was seen as too much of a firebrand. Then in 1743 he was elected as a Fellow of the Royal Society in London. This honour was awarded to him in recognition of the important

role that the *Eléments de la philosophie de Newton* had played in disseminating knowledge of Newton across Europe.[4] Voltaire's luck seemed to be changing. In 1745 he was welcomed at Court and during this period of favour (which was not to last) he was first appointed *Historiographe de France* (Royal Historiographer) in 1745 and then in 1746 on the third attempt he was at last elected to the Académie française. At the same time he was elected to a whole host of Italian academies: in April 1746 he composed in Italian his *Saggio intorno ai cambiamenti avvenuti sul globo della terra* [*Essay on changes that have occurred in the world*], published the following July in the *Mercure de France* at the moment of his quarrel with the scientific writer, the comte de Buffon and designed as a reception piece for the Academy of Bologna; this essay equally served as his calling-card for other Italian academies. Voltaire was now recognised in academies in France, England and Italy, and outside France this recognition was connected with his writing on scientific topics.

Here is a fact missing from every biography of Voltaire: in the years before his election to the Académie française in 1746 he had clearly been angling to become Perpetual Secretary of the Académie des sciences (an ambition never fulfilled). Voltaire had observed the Royal Society at first hand in London in the 1720s and in the *Lettres philosophiques* he compared the institution unfavourably with the Académie des sciences, which was widely praised in this period for having a useful public function [5].[5] In May 1737 Voltaire wrote to Frederick II that the French Académie des sciences was a monument that honoured the nation (D1331); later, around 1740 he even suggested that the public had greater respect for this institution than for the Académie française' (D.app.57). So Voltaire appreciated the role of the Académie des sciences and in his letters of this period one can see how he tried hard to maintain links with the official world of science in Paris. In June 1737, for example, Voltaire referred to books ordered from the Académie des sciences (D1352) and he relied on Henri Pitot to learn the news of the Académie des sciences (June 1738, D1525). Then in 1743 the post of Perpetual Secretary of the Academy of sciences fell vacant. This was a high-profile position, which had been held with distinction by Fontenelle from 1697 to 1740. Following a brief hiatus, Jean-Jacques Dortous de Mairan took on the position in 1741 and when he stepped down in 1743 it appears that both Voltaire and Maupertuis let it be known that they would accept the post of Perpetual Secretary of the Academie des Sciences. In the event, neither was successful and in September 1743, Jean-Paul Grandjean de Fouchy was appointed. He would remain in post until 1776, to be succeeded by Voltaire's disciple, the marquis de Condorcet, who would hold the position from 1777 until 1793.

What is the evidence that Voltaire considered returning to Paris from Cirey as Secretary of the Académie des sciences? There appear to be three sources in all. Firstly, there is Voltaire's own assertion that Maupertuis tried to get Mairan dismissed. In a manuscript *mémoire* dating from 1753, often copied in the eighteenth century and first printed only in the nineteenth, Voltaire told the story that Maurepas proposed a sort of job share, whereby Maupertuis would take on mathematics, leaving for Voltaire physics and the composition of the *Eloges*. Voltaire claimed that he saw this as a trap because Maupertuis would consider himself the senior partner and he turned down the offer to protect his own independence [2; vol. 32B, p 268–9][6]. This, at least, is how Voltaire told the story.

Secondly, there is the evidence of Laurent Angliviel de la Beaumelle who, in his *Vie de Maupertuis*, claimed that Maupertuis was keen to help Voltaire enter the Académie des sciences and be elected Perpetual Secretary, a post which Voltaire 'wanted with passion'. He did not explain the reasons why this plan failed [6]. La Beaumelle wrote the *Vie de Maupertuis* after Maupertuis's death in 1759 on the advice of Charles Marie de La Condamine and at the time of his own death in 1773 the manuscript was complete but unpublished [7][7]. It was finally published only in 1856, appearing with '*ouvrage posthume*' on the title page. It is hard to know exactly how much weight to give this testimony, given that La Beaumelle became a celebrated antagonist of Voltaire's and had no reason to treat him kindly; at the same time it seems unlikely that he would or could have completely invented the story.

Thirdly and finally, there was a further, entirely independent source for this story, identified by J. B. Shank. The astronomer Jérôme Lalande left a manuscript collection of miscellaneous notes in Latin, now in the Bibliothèque nationale de France, in which he claimed that both Maupertuis and Voltaire sought the position in 1743 when Grandjean de Fouchy was appointed, and fascinatingly he claimed

that Voltaire's chances were ruined on account of an unwise remark made at court: when asked what attracted him to Versailles, Voltaire is supposed to have replied, '*It is not the master of the house*' [4; p 242, note 12].

Voltaire's own testimony in a single manuscript that he was invited to consider the post of Secretary of the Académie des sciences is not necessarily reliable, but the existence of two other witness accounts by La Beaumelle and Lalande, each seemingly independent of the other, seems to confirm the story beyond all doubt. That Voltaire would have been attracted to the position is not in the least surprising. It was a moment in his career when he needed to re-establish his position in the capital and the Académie moreover was at a turning point in its fortunes. The Newtonian party was by now successfully challenging the Cartesian establishment. Jean le Rond d'Alembert had been elected to the Académie des sciences in 1741 as an ally of the Maupertuis group and in 1743 just at the moment the Secretaryship fell vacant, he wrote in his *Traité de dynamique* that the Cartesians '*are a sect that is very much weakened*'; in same year Maupertuis wrote to Johann Bernoulli that 'Cartesianism is done for [*foutu*], even in the Academy.' [4; p 242]. Voltaire's candidature at this juncture was therefore not at all unthinkable. So why then did he fail? Whenever Voltaire had a setback in his career, he tended to gloss over it, so it is no surprise that he did not discuss this anywhere and one can only make conjectures about what really happened. Voltaire clearly had the academic credentials to be elected to the Académie des sciences and it is perhaps the brief testimony of Lalande that is most revealing: if it is true that he made an off-hand ironic remark about the King at court, that would have been enough to sink his chances of preferment. Voltaire had a habit of letting his wit get the better of him and Grandjean de Fouchy, an astronomer from a noble family who played the organ at his local church on Sundays, was undoubtedly seen as a safer pair of hands: he would hold the post for over three decades.

From the mid-1730s science was an important focus for Voltaire as he sought to deepen his understanding of Newton and establish himself as an original scientific thinker in the empirical tradition. Working alongside Emilie Du Châtelet (and his debt to her has still not been fully acknowledged or understood), he set up a laboratory and performed experiments, he entered scientific competitions and he published a long work attempting to synthesise Newtonian thought. The *Eléments de la philosophie de Newton* (1738) played a key role in spreading knowledge of Newton in Europe and in re-establishing and re-orienting Voltaire's reputation. These scientific writings are no longer what we most associate with Voltaire and the works promoting religious toleration and attacking fanaticism – the works on which his modern reputation rests – were still in the future. The writings on scientific topics are nonetheless of great importance. They are a reminder that behind his natural scepticism and his intellectual commitment to empiricism, he aspired to be a 'real' researcher. Science mattered to Voltaire, not just for its intrinsic intellectual importance but also in career terms because of the cultural capital it afforded him. And if his ambition to be elected to the Académie des sciences proved to be a dead end, he went on to be elected to the Royal Society, to other academies in Italy and finally to the Académie française. One aspect of his scientific work had lasting influence. The narrative of what might be called liberal empiricism deriving from Locke and Newton is one largely invented by Voltaire in the *Lettres philosophiques* and in due course it became the standard narrative of the European Enlightenment, recycled by d'Alembert and then by Condorcet [2; vol. 6A (I), pp 280–8]. Voltaire may not have succeeded as an experimental scientist, but he made a lasting contribution to the history of scientific thought, using Newton to create what J. B. Shank calls '*an Enlightenment manifesto*' [4; p 297].

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[1] See also the articles under the rubric 'Voltaire et les sciences', in *Revue Voltaire*, 8 (2008), pp 177–263.
[2] See D1384. Numbers preceded by 'D' refer to the letters in Voltaire, *Correspondence and related documents*, 'Definitive edition', ed. Theodore Besterman, in [2; vols 85–135 (Oxford, 1968-1977)]. In quoting from this edition, spelling has been modernised throughout.
[3] Voir *Essai sur la nature du feu, et sur sa propagation*, éd. W. A. Smeaton et Robert L. Waters, [2; vol. 17, pp 11–22]
[4] An English translation appeared immediately in 1738, followed in 1741 by translations into German and Italian. Many Europeans of course read the work in French.
[5] See also D864 and D950.
[6] In the manuscript which serves as the base text in this edition, the passage is crossed out and corrected: Voltaire evidently gave some importance to this detail. This passage was first published in the *Œuvres de Voltaire*, ed. Adrien Beuchot, 72 vols (Paris, 1829-34), vol. 50 (1834), p 615.
[7] Mme de La Beaumelle tried, but failed, to publish the work in 1802, despite having the support of Lalande [7, p 547].