

WILLEM JACOB 'S GRAVESANDE  
1688-1742

Willem Jacob 's Gravesande was born on 27 September 1688, the son of Dirk Storm van 's Gravesande, sheriff and councilor of the city of 's Hertogenbosch and steward of the lands of William III, King of England, and later of Prince William IV. On his mother's side, 's Gravesande was descended from the Leiden professor Johannes Heurnius. Educated at home, 's Gravesande entered the university of Leiden in 1704, at the age of sixteen, in order to study Law. In his studies he concentrated, however, on the mathematical sciences, for which he had shown an aptitude at an early age. He obtained his doctorate in Jurisprudence in 1707, with a dissertation on suicide, and for a decade practiced Law in The Hague. Here, in 1713, he was the co-founder of *Journal littéraire de la Haye*, an important journal to which he contributed book reviews and papers for two decades. In 1715, 's Gravesande was secretary of a delegation sent by the States-General to congratulate King George I on his accession to the English throne. 's Gravesande spent a year in London, where he attended sessions of the Royal Society, was elected to membership in that body, and made the acquaintance of Newton, Desaguliers, and John Keill. His visit was an important shaping influence on the style of 's Gravesande's science.

In 1717, 's Gravesande was appointed professor of astronomy and mathematics at Leiden. His inaugural lecture was entitled *De Mathematicis in omnibus scientiis, praecipue in physicis, nec non de astronomiae perfectione ex physica haurienda* (On Mathematics in all the Sciences, especially in physics, and also about the Perfection of Astronomy to be Derived from Physics). He remained at Leiden until his death, adding the professorship of civil and military architecture in 1730, and finally becoming professor of philosophy in 1734. In 1720, he married Anna Savelaire, with whom he had two sons.

Under 's Gravesande and Herman Boerhaave, the University of Leiden became the foremost scientific university in Europe, and each year a large number of foreign students came to study science and medicine there. Heavily influenced by English science during his visit to England, 's Gravesande introduced Newtonian science, both the tradition of mathematical physics of the *Principia* and the experimental science of the *Opticks*. It was through 's Gravesande that Newtonian science formed a beach head on the Continent. Voltaire came to

Leiden in 1736 to consult Boerhaave on his health and follow the lectures of 'le profond 's Gravesande' on Newtonian science. 's Gravesande was, however, no slavish follower of Newton. In his well-known 'Essai d'une nouvelle théorie du choc des corps fondée sur l'expérience', published in *Journal littéraire de la Haye* in 1722, he used the concept of *vis viva* of Huygens and Leibniz instead of Newton's momentum.

In his lectures, 's Gravesande followed Keill and Desaguliers, incorporating experiments that demonstrated the scientific principles in question. Most of the instruments for these demonstrations were constructed by Jan van Musschenbroek, brother of the Leiden professor of physics, Petrus van Musschenbroek. 's Gravesande's most important publications were treatises and textbooks. His *Physices elementa mathematica, experimentis confirmata. Sive, introductio ad philosophiam Newtonianam* (The Mathematical Elements of Physics Confirmed by Experiments. Or, Introduction to Newtonian Philosophy) (1720-1721) came out almost simultaneous in English and went through numerous editions during his lifetime. The abridged version meant for his students, *Philosophiae Newtonianae institutiones*, appeared in 1723 and went through several editions as well. In 1727 he published *Matheseos universalis elementa* (Dutch ed., 1728; English ed., 1752), and when he began lecturing on philosophy, he published an *Introductio ad philosophiam, metaphysicam et logicam continens* (1736), which went through a number of editions.

's Gravesande was a generalist who made few original contributions to science, yet he was perhaps the most famous scientist in Europe. In 1721 and 1722, he made visits to Kassel to examine a perpetual motion machine constructed by a certain Orffyreus (and concluded that apparently perpetual motion machines were possible). 's Gravesande declined invitations from Peter the Great of Russia (1724) and Frederick II of Prussia (1740) to join their academies. He was also immensely productive. Under his care two editions of Christiaan Huygens's theretofore unpublished works were prepared, *Opera Varia* in 1724 and *Opera Reliqua* in 1728. He also saw to the publication of Newton's *Arithmetica*, John Keill's *Introductiones ad veram Physicam et veram Astronomiam*, and the first four volumes of the Amsterdam reprint series of *Ouvrages adoptés par l'Académie Royale des Sciences avant son renouvellement en 1699*.



*Primary works*

A complete and very useful list of 's Gravesande's publications and orations, and publications about him, can be found in C. de Pater, ed., *Willem Jacob 's Gravesande. Welzijn, wijsbegeerte en wetenschap* (Baarn: Ambo, 1988) 152-160. *Oeuvres Philosophiques et Mathématiques de Mr. G. J. 's Gravesande, rassemblées et publiées par Jean Nic. Leb. Allamand, qui y a ajouté l'histoire de la vie et des écrits de l'auteur* (Amsterdam, 1744); *Essai de perspective*, trans. *Proeve over de doorzichtkunde* (Leiden, 1707; English translation, 1724); *Physices Elementa Mathematica experimentis confirmata. Sive Introductio ad Philosophiam Newtonianam* (Leiden, 1720-1721, 1725, 1742), Dutch translation by J. Engelsman (1721), English translation by Desaguliers (1720-1721), French translation by Joncourt (1746-1747); *Philosophiae Newtonianae institutiones in usus Academicos* (Leiden, 1723, 1728, 1744); *Introductio ad Philosophiam, Metaphysicam et Logicam continens* (Leiden, 1736, 1737, 1756, 1765; Venice, 1737, 1748; Dutch ed., Leiden, 1746; French ed., Leiden, 1748).

*Secondary sources*

Pierre Brunet, *Les physiciens hollandais et la méthode expérimentale en France au XVIIIe siècle* (Paris 1926). C.A. Crommelin, *Descriptive Catalogue of the Physical Instruments of the 18th Century, Including the Collection 's Gravesande—Musschenbroek* (Leiden, 1951); P. Costabel, 's Gravesande et les forces vives ou des vicissitudes d'une expérience soi-disant cruciale', *Mélanges Alexandre Koyré*, 2 vols (Paris: Hermann, 1964), vol. 1, 117-134; G. Gort, *La fondazione dell' esperienza in 's Gravesande* (Florence: La Nuova Italia, 1972); P.R. de Clercq, 'The 's Gravesande collection in the Museum Boerhaave, Leiden', *Nuncius: Annali di Storia della Scienza* 3 (1988) 127-137; C. de Pater, ed., *Willem Jacob 's Gravesande. Welzijn, wijsbegeerte en wetenschap* (Baarn: Ambo, 1988); *idem*, 'The textbooks of 's Gravesande and Van Musschenbroek in Italy', in: C.S. Maffioli and L.C. Palm, eds, *Italian scientists in the Low Countries in the 17th and 18th centuries*, (Amsterdam: Rodopi, 1989) 231-241; *idem*, 'Willem Jacob 's Gravesande (1688-1742) and Newton's "Regulae philosophandi" 1742', *Lias: Sources and Documents Relating to the Early Modern History of Ideas* 21 (1994) 257-294; A.C. van Helden, 'Theory and Practice in Air-Pump Construction: The Cooperation between Willem Jacob 's Gravesande and Jan van Musschenbroek', *Annals of*

*Science* 51 (1994) 477-495; Simon Schaffer, 'The show that never ends: Perpetual motion in the early 18th century', *British Journal for the History of Science* 28 (1995) 157-189 (on 's Gravesande's judgement of Orffyreus's perpetual motion); P. de Clercq, *The Leiden Cabinet of Physics. A descriptive catalogue* (Leiden: Museum Boerhaave, 1997).  
E. Mortreux, in: *NBW*, vol. 6, 623-627; A.R. Hall, in: *DSB*, vol. 5, 509-511.

[A.v.H.]