

# D'arcy (or D'Archi) | Encyclopedia.com

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(b. Galway, Ireland 27 September 1725; d. Paris, France, 18 October 1779)

*Mathematics, astronomy.*

D'Arcy's father, Jean, and his mother, Jeanne Linch, were of noble birth. In 1739, to escape the English persecution of Catholics, he was sent to Paris, where he was cared for by an uncle. He lived in the same quarter as Jean Baptiste Clairaut, a mathematician who tutored him. D'Arcy became a good friend of Clairaut's son, the far more famous Alexis Claude, the pioneer in France of Newtonian mathematical astronomy. D'Arcy was somewhat of a mathematical prodigy and presented two memoirs on dynamics to the Paris Academy of Sciences at about the age of seventeen.

The elder Clairaut normally tutored a number of young military officers. Influenced by this association, d'Arcy entered the army as a captain and served in Germany and Flanders. He participated in an expedition to the coast of Scotland in 1746, was captured, and was later repatriated because of his reputation as a mathematician. D'Arcy reentered the military in 1752 as a colonel and served for the rest of his life, advancing to the rank of *maréchal-de-camp* in 1770. He was admitted to the Academy of Sciences on 12 February 1749 as *adjoint mécanicien* and advanced through its ranks, becoming *pensionnaire géomètre* on 20 February 1771. Profits from mining interests, his military pensions, and a legacy from his uncle left d'Arcy a rather rich man. He married his niece in 1777, just two years before his death from cholera.

A staunch patron of Irish refugees, d'Arcy enjoyed good relations with the English scientific community in spite of his hatred for the English king. His character has been described by Condorcet as "firm, independent, and quick to anger." This is reflected in d'Arcy's polemics with Maupertuis, d'Alembert, and others. He was tall and well built, and his active military career and social interests furthered his tendencies toward being something of a scientific gadfly.

D'Arcy did work in rational mechanics, military technology, and physics. In the *Mémoires* of the Academy of Sciences for 1747 he presented his principle of conservation of areas, stating the moments of bodies with respect to a given axis thus: "The sum of the products of the mass of each body by the area that its radius vector describes around a fixed center,... is always proportional to the time." In opposition to Maupertuis's principle of least action, d'Arcy extended his principle to what he called the principle of conservation of action: The sum of the products of the masses, velocities, and perpendiculars (drawn from the center toward the bodies) is a constant. In the extension of his principle to the problem of the procession of the equinoxes, d'Arcy criticized d'Alembert's work and was in turn criticized by both d'Alembert and Lagrange.

In 1751 d'Arcy presented a memoir on the physics and chemistry of gunpowder mixtures, the dimensions and design of cannon, and the placement of the charge in cannon. This work was continued in *Essai d'une théorie d'artillerie* (1760). He had the chemist Antoine Baumé conduct chemical analyses of gunpowder and showed that the physical mixing procedure, rather than the chemical content, was most important in obtaining a good product. In measuring the recoil and power of cannon he invented a momentum pendulum that was adopted by the Régie des Poudres.

In 1749 d'Arcy and Jean Baptiste Le Roy developed a floating electrometer. In it a float in water supported a metal rod and plate. A second, charged plate was brought near it. Weights needed to restore the floating plate to its original level measured the electrostatic force. This device never proved very successful in practice, however. In 1765 d'Arcy presented an interesting memoir, "Sur la durée de la sensation de la vue." His eyesight had been damaged in an accident; and he was forced to use an observer while conducting the experiment, in which he attempted to measure the optical persistence of visual images. For example, in moving a light in a small circle, he found that above seven revolutions per second, the single light gave the appearance of a continuous circle. This hastily performed experiment bears out a further remark of Condorcet's about d'Arcy's tendency to begin a project and leave it unfinished, for although he raised a number of important questions relating to the physiology of vision, d'Arcy never completed the work.

## BIBLIOGRAPHY

I. Original Works. Most of d'Arcy's memoirs are printed in the *Mémoires de l'Académie royale des sciences* for 1747–1765. A fairly complete list of these is given in Poggendorff, I, 58. His first memoir on conservation of area is "Principe général de dynamique, qui donne la relation entre les espaces parcourus et les temps, quel que soit le système de corps que l'on considère, et quelles que soient leurs actions les unes sur les autres," in *Mémoires de l'Académie royale des sciences, année 1747* (1752), 348–356. Several of his Academy memoirs were also printed separately, and a partial list of these is given in the entry for

d'Arcy in the general catalog of the Bibliothèque Nationale, Paris. His *Essai d'une théorie d'artillerie* was published in Paris (1760) and Dresden (1766).

II. Secondary Literature. The best *éloge* of d'Arcy is by Condorcet, in *Histoire de l'Académie royale des sciences, année 1779*(1782), 54–70. J. B. A. Surad utilizes the Condorcet article but adds comments on d'Arcy relationship with Condorcet in "Patrice d'Arcy," in *Biographie universelle*, II(Paris, 1811), 389. A discussion of the principle of conservation of areas is given in [Ernst Mach](#), *The Science of Mechanics*, 6th Eng.ed.([La Salle](#), III., 1960), pp. 382–395. An excellent critical discussion of this principle and of the evolution of the general law of moment of momentum is C. Truesdell, "Whence the Law of Moment of Momentum?," in *Mélanges Alexandre Koyré, I.L'aventure de la science*, no.12 of the series Histoire de la Pensée (Paris, 1964), pp. 588–612. The controversy between Maupertuis and d'Arcy over the principle of least action is discussed in P. Brunet, *Maupertuis—l'oeuvre et sa place dans la pensée scientifique et philosophique du XVIII<sup>e</sup> siècle* (Paris 1929), ch. 5.

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