Vandermonde, Alexandre-Théophile | Encyclopedia.com

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also known as **Alexis, Abnit** , and **Charles-Auguste Vandermonde**

(*b*. Paris, France, 28 February 1735; *d*. Paris, 1 January 1796)

mathematics.

Vandermonde's father, a physician, directed his sickly son toward a musical career. An acquaintanceship with Fontaine, however so stimulated Vandermonde that in 1771 he was elected to the Académie des Sciences, to which he presented four mathematical papers (his total mathematical production) in 1771–1772. Later Vandermonde wrote several papers on harmony, and it was said at that time that musicians considered Vandermonde to be a mathematician and that mathematicians viewed him as a musician. This latter view was unfair in that his mathematical work–although small, not generally well known, and a little delayed in publication—was both significant and influential.

Vandermonde's membership in the Academy led to a paper on experiments with cold, made with Bezout and Lavoisier in 1776, and a paper on the manufacture of steel with Berthollet and Monge in 1786. Vandermonde became an ardent and active revolutionary, being such a close friend of Monge that he was termed "femme de Monge." He was a member of the Commune of Paris and the club of the Jacobins. In 1782 he was director of the Conservatoire des Arts et Métiers and in 1792, chief of the Bureau de I'Habillement des Armées. He joined in the design of a course in political economy for the école Normale and in 1795 was named a member of the Institut National.

Vandermonde is best known for the determinant that is named after him:

The determinant does not seem to occur in Vandermonde's work, although his third paper dealt with factorials and he did work with products elsewhere. Lebesgue believed that the attribution of this determinant to Vandermonde was due to a misreading of his notation. Muir (see Bibliography) did not mention this particular determinant, which some also attributed to Cauchy, but Muir asserted that Vandermonde's fourth paper was the first to give a connected exposition of determinants because he (1) defined a contemporary symbolism that was more complete, simple, and appropriate than that of Leibniz; (2)defined determinants as functions apart from the solution of linear equations presented by Cramer but also treated by Vandermonde; and (3) gave a number of properties of these functions, such as the number and signs of the terms and the effect of interchanging two consecutive indices (rows of columns), which he used to show that a determinant is zero if two rows or columns are identical. On this basis Muir said that Vandermonde was "The only one fit to be viewed as the founder of the theory of determinants." Lebesgue, how2ever, felt that this was neither very original, since there had been earlier workers, nor very important, since others were building equivalent theories, but t hat Vandermonde's real and unrecognized claim to fame was lodged in his first paper, in which he approached the general problem of the solvability of algebraic equations through a study of functions invariant under permutations of the roots of the equations.

Cauchy assigned priority in this to Lagrange and Vandermonde. Vandermonde read his paper in November 1770, but he did not become a member of the Academy until 1771; and the paper was not published until 1774. During this interval Lagrange published two *mémoires* on the topic. Although Vandermonde's methods were close to those later developed by Abel and Galois for testing the solvability of equations, and although his treatment of the binomial equation $x^m-1=0$ could easily have led to the anticipation of Gauss's results on constructible polygons, Vandermonde himself did not rigorously or completely establish his results nor did he see the implications for geometry. Nevertheless, Kronecker dated the modern movement in algebra to Vandermonde's 1770 paper.

According to Maxwell, Vandermonde's second paper was cited in one of Gauss's notebooks, along with some work of Euler, as being one of two attempts to extend the ideas of Leibniz on the geometry of situation or analysis situs. The paper dealt with the knight's tour and involved the number of interweavings of curves, which Gauss then represented by a double integral and associated with the study of electrical potential.

Unfortunately Vandermonde's spurt of enthusiasm and creativity, which in two years produced four insightful mathematical papers, at least two of which were of substantial importance, was quickly diverted by the exciting politics of th time and, perhaps, by poor health.

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