

# Dupin, Pierre-Charles-François I

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(b. Varzy, France, 6 October 1784; d. Paris, France, 18 January 1873)

*mathematics, economics, education.*

Dupin grew up in his native Nivernais, where his father, Charles-André Dupin, was a lawyer and legislator. His mother was Cathérine Agnès Dupin (her maiden name was also Dupin). The second of three sons, Dupin graduated in 1803 from the École Polytechnique in Paris as a naval engineer. In 1801, under the guidance of his teacher Gaspard Monge, he had made his first discovery, the cyclid (of Dupin). After assignments in Antwerp, Genoa, and Toulon, he was placed in charge of the damaged naval arsenal on Corfu in 1807. He restored the port, did fundamental research on the resistance of materials and the differential geometry of surfaces, and became secretary of the newly founded Ionian Academy. In 1810, on his way back to France, he was detained by illness at Pisa; and during his convalescence he edited a posthumous book by his friend Leopold Vacca Berlinghieri, *Examen des travaux de César au siège d'Alexia* (Paris, 1812). At the Toulon shipyard in 1813, Dupin founded a maritime museum that became a model for others, such as that at the Louvre. That year he published his *Développements de géométrie*.

In 1816, after some difficulty, Dupin was allowed to visit [Great Britain](#) to study its arsenals and other technical installations. The results were published in *Voyages dans la Grande Bretagne entrepris relativement aux services publics de la guerre, de la marine... depuis 1816* (1820–1824).

Settling down to a life of teaching and public service, Dupin accepted the position of professor of mechanics at the Paris Conservatoire des Arts et Métiers, a position he held until 1854. His free public lectures, dealing with mathematics and mechanics and their industrial applications, became very popular. His *Applications de géométrie et de mécanique* (1822) was a continuation of the *Développements* but placed greater stress on applications. Many of Dupin's lectures on industry and the arts were published in *Géométrie et mécanique des arts et métiers et des beaux arts* (1825); his *Sur les forces productives et commerciales de France* appeared two years later. In 1824 the king made him a baron.

The *Développements* contains many contributions to differential geometry, notably the introduction of conjugate and asymptotic lines on a surface, the so-called indicatrix of Dupin, and “Dupin's theorem,” that three families of orthogonal surfaces intersect in the lines of curvature. A particular case Dupin investigated consisted of confocal quadrics. In the *Applications* we find an elaboration of Monge's theory of *déblais et remblais*—and, hence, of congruences of straight lines, with applications to geometrical optics. Here Dupin, improving on a theorem of Malus's (1807), stated that a normal congruence remains normal after reflection and refraction. He also gave a more complete theory of the cyclids as the envelopes of the spheres tangent to three given spheres and discussed floating bodies. In 1840 he introduced what is now called the affine normal of a surface at a point.

In 1828 Dupin was elected deputy for Tarn, and he continued in politics until 1870. In 1834 he was minister of marine affairs, in 1838 he became a peer, and in 1852 he was appointed to the senate. He tirelessly encouraged the establishment of schools and libraries, the founding of savings banks, the construction of roads and canals, and the use of steam power. In 1855 he reported on the progress of the arts and sciences, as represented at the Paris World Exhibition; the part of the report dealing with Massachusetts was published in English (1865).

Dupin married Rosalie Anne Joubert in 1830. He was a correspondent of the Institut de France (1813) and a member of both the Académie des Sciences (1818) and the Académie des Sciences Morales et Politiques (1832). His older brother, André, known as Dupin *aîné*, was a prominent lawyer and politician.

## BIBLIOGRAPHY

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II. Secondary Literature. On Dupin's life, see J. Bertrand, *Éloges académiques* (Paris, 1890), pp. 221–246; and A. Morin, *Discours funéraires de l'Institut de France* (Paris, 1873). Dupin's mathematical work is discussed in J. G. Darboux, *Leçons sur la théorie générale des surfaces* (Paris, 1887–1896, see index), and *Leçons sur les systèmes orthogonaux et les coordonnées curvilignes* (Paris, 1898; 2nd ed., 1910), ch. 1.

For information on the Dupin family, I am indebted to M. Baron Romain, Corvol d'Embernard (Nièvre).

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