

# Poinsot, Louis | Encyclopedia.com

Complete Dictionary of Scientific Biography COPYRIGHT 2008 Charles Scribner's Sons  
9-11 minutes

---

(b. Paris, France, 3 January 1777; d. Paris, 5 December 1859)

*mathematics, mechanics.*

At the end of October 1794 Poinsot, who was a student in his last year at the Collège Louis-le-Grand in Paris, presented himself as a candidate in the first competitive entrance examination to the future École Polytechnique. Admitted despite an insufficient knowledge of algebra, he left in 1797 in order to enter the École des Ponts et Chaussées, where he remained for three years. Neglecting his technical studies—which held little attraction for him—in favor of mathematics, he eventually gave up the idea of becoming an engineer. From 1804 to 1809 he taught mathematics at the Lycée Bonaparte in Paris; he was then appointed inspector general of the Imperial University.

Despite the frequent travels to the provinces necessitated by this new post, on 1 November 1800 Poinsot was named assistant professor of analysis and mechanics at the École Polytechnique, substituting for Labey. Although he held this position until the school was reorganized in September 1816, he actually taught there for only three years, after which time he arranged for A. A. L. Reynaud and later for Cauchy to substitute for him. He owed his appointment at the Polytechnique to the favorable reception given to his *Éléments de statique* (1803) and to three subsequent memoirs that dealt with the composition of momenta and the composition of areas (1806), the general theory of equilibrium and of movement in systems (1806), and polygons and polyhedra (1809). His reputation also resulted in his election on 31 May 1813 to the mathematics section of the Académie des Sciences, replacing Lagrange.

From 1816 to 1826 Poinsot served as admissions examiner at the École Polytechnique, and on several occasions after 1830 he worked with the school's Conseil de Perfectionement. Although in 1824 he gave up his duties as inspector general, his nomination in 1840 to the Conseil Royal de l'Instruction Publique kept him informed of university problems. Meanwhile he continued research on [number theory](#) and on mechanics, publishing a small number of original and carefully executed memoirs. Named to the Bureau des Longitudes in 1843, he displayed a certain interest in [celestial mechanics](#). Moderately liberal in his political opinions, he protested against the clericalism of the Restoration but later accepted nomination to the Chambre des Pairs (1846) and to the Senate (1852).

Poinsot was determined to publish only fully developed results and to present them with clarity and elegance. Consequently he left a rather limited body of work, which was devoted mainly to mechanics, geometry, and [number theory](#). He showed almost no interest in algebra except for his early investigations concerning the fifth-degree equation and his remarkable analysis of Lagrange's *Traité de la résolution des équations numériques de tous les degrés* (1808). Similarly, the infinitesimal calculus appears in his work only in the form of extracts (published in 1815) from his course in analysis at the École Polytechnique.

Poinsot's contributions to number theory (1818–1849) have been analyzed by L. E. Dickson. They deal primarily with primitive roots, certain Diophantine equations, and the expression of a number as a difference of two squares.

A fervent disciple of Monge, Poinsot was one of the principal leaders of the revival of geometry in France during the first half of the nineteenth century. In particular, he was responsible for the creation in 1846 of a chair of advanced geometry at the Sorbonne, which was intended for Chasles. Poinsot, who had a presentiment of the importance of the geometry of position, established the theory of regular star polygons and discovered several types of regular star polyhedra (1809), a general study of which was carried out by Cauchy shortly afterward.

Yet it was in mechanics that Poinsot most effectively displayed his gift for geometry. Although *Éléments de statique* (1803) was merely a manual designed for candidates to the École Polytechnique, the work possessed the great merit of applying geometric methods to the study of elementary problems of mechanics and of introducing the concept of the couple. The latter notion, moreover, held a central place in two more highly developed memoirs that Poinsot presented to the Académie des Sciences in 1804 and published in the *Journal de l'École polytechnique* in 1806. The second of these memoirs inspired an interesting debate between Poinsot and Lagrange concerning the principles of mechanics.

Among Poinsot's other writings on mechanics, the most important is *Théorie nouvelle de la rotation des corps* (1834). Pursuing the theoretical study undertaken in the eighteenth century by Euler, d'Alembert, and Lagrange, Poinsot established in a purely geometric fashion the existence of the axes of permanent rotation and worked out a very elegant representation of rotary motion by the rolling of the ellipsoid of inertia of a body on a fixed plane (Poinsot motion). This theory was developed

by Sylvester and was applied by Foucault to the discovery of the gyroscope. Poinsot's remarkable geometric intuition also enabled him to elaborate a purely geometric theory of the [precession of the equinoxes](#) (1858).

In frequent opposition to the French analytic school of the first half of the nineteenth century, Poinsot produced an original body of work by successfully submitting to geometric treatment a certain number of fundamental questions in the mechanics of solids.

## BIBLIOGRAPHY

I. Original Works. Poinsot's best known work, *Éléments de statique* (Paris, 1803), went through many editions: the 9th ed. (1848) was the last to appear in his lifetime; 12th ed. (1877). This work was accompanied, progressively, by some of his most important papers on statics; the 8th through 10th eds. contain four memoirs on the composition of momenta and of areas, on the unchanging plan of the system of the world, on the general theory of equilibrium and of the movement of systems and on a new theory of the rotation of bodies. There is an English trans. of this work by T. Sutton (Cambridge, 1847).

Most of Poinsot's other publications are listed in [Royal Society Catalogue of Scientific Papers](#), IV, 960–961, which includes 31 articles and memoirs on mechanics, algebra, number theory, infinitesimal calculus, geometry, infinitesimal geometry, and [celestial mechanics](#), all of which were published in various academic collections or in mathematical or astronomical reviews. Many of these papers were also published as offprints and enjoyed a fairly broad distribution.

An important analysis of the 2nd ed. of Lagrange's *Traité de la résolution des équations numériques de tous les degrés* is in *Magasin encyclopédique*, 4 (1808), 343–375 (repr. in 1826 in the 3rd ed. of this work, pp. v–xx), as well as two pamphlets that do not appear to be offprints: *Recherches sur l'analyse des sections angulaires* (Paris, 1825) and *Théorie nouvelle de la rotation des corps présentée à l'Institut le 19 mai 1834* (Paris, 1834), with English trans. by C. Whitley (Cambridge, 1834).

The bulk of Poinsot's MSS have been preserved in Paris at the Bibliothèque de l'Institut de France (MSS 948–965, 4738); MS 4738, which is an offprint of one of Poinsot's first memoirs, "Théorie générale de l'équilibre et du mouvement des systèmes," in *Journal de l'École polytechnique*, 6 (1806), 206–241, contains in the margin MS criticisms by Lagrange and Poinsot's responses.

II. Secondary Literature. Poinsot's life and work have not yet been subjected to the detailed study they merit. His geometric writings have been analyzed in detail by M. Chasles, in *Aperçu historique ...* (Brussels-Paris, 1837), see index; and in *Rapport sur les progrès de la géométrie* (Paris, 1870), 13–17; those on number theory have been analyzed by L. E. Dickson, in *History of the Theory of Numbers*, 3 vols. (Washington, 1919), see index. Other aspects of his work remain to be examined.

The most complete study of Poinsot's work is J. Bertrand, "Notice sur Louis Poinsot," in *Journal des savants* (July 1872), 405–420; and in Poinsot, *Éléments de statique*, 11th ed. (Paris, 1872), ix–xxviii. See also J. Bertrand, "Éloge historique de Louis Poinsot, lu le 29 décembre 1890," in *Revue générale des sciences pures et appliquées*, 1 (1890), 753–762, repr. in *Mémoires de l'Académie des sciences de Paris*, 45 (1899), lxxiii–xcv, and in J. Bertrand, *Éloges académiques*, n.s. (Paris, 1902), 1–27.

Other articles (listed chronologically) include G. Vapereau, in *Dictionnaire universel des contemporains*, 2nd ed. (Paris, 1861), 1408; E. Merlieux, in F. Hofer, ed., *Nouvelle biographie générale*, XL (Paris, 1862), 562–563; P. Mansion, in *Résumé du cours d'analyse infinitésimale* (Paris, 1887), 289–291; M. d'Ocagne, in *Histoire abrégée des sciences mathématiques* (Paris, 1955), 200–202; and P. Bailhache, "La théorie générale de l'équilibre et du mouvement des systèmes de Louis Poinsot et sa signification critique" (thesis, Paris, 1974).

RenÉ Taton