

Petit, Alexis Thér | Encyclopedia.com

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(b. Vesoul, France, 2 October 1791; d. Paris, France, 21 June 1820),

physics.

Petit was an outstanding pupil at the École Centrale in Besançon and later at a private school in Paris that was staffed by teachers from the Ecole Polytechnique. He had fulfilled the entrance requirements for the Ecole Polytechnique by the time he was ten-and-a-half and he enrolled there in 1807, when he was sixteen, the minimum age for entry. He was first in his entering class; when he graduated, in 1809, he was placed *hors de ligne*, and the next student in the year was designated “first.” Petit was immediately taken onto the staff as a teaching assistant.

In 1810 Petit also became professor of physics at the Lycee Bonaparte in Paris. As a teacher he was both popular and successful, and when he succeeded to J. -H. Hassenfratz’ s chairs of physics at the Ecole Polytechnique in 1815, after a year as assistant professor, he extended and improved the courses in his subject. His last years, however, were clouded by grief and illness; shortly after the death of his young wife, in 1817, he contracted tuberculosis, the disease from which he died. He was a member of the Société Philomatique from February 1818 but was never elected to the Academie des Sciences

Petit’ s most important work was done in collaboration with his close friend Pierre Dulong. (This collaborative work is discussed in detail in the article on Dulong.) Their association began in 1815, probably in response to the prize competition on thermometry and the laws of cooling that was then set by the first class of the Institute. By 1818, when the prize was awarded to them, Petit and Dulong had conducted a classic experimental investigation, which established the gas thermometer as the only reliable standard and put the approximate nature of Newton’s law of cooling beyond all doubt. It was after a further year of intense activity, devoted mainly to the measurement of the specific heats of solids, that Petit and Dulong discovered their law of atomic heats. Since the discovery was made, suddenly and quite by chance, only one week before it was announced the Academie des Sciences on 12 April 1819, it is not surprising that the evidence for their categorical statement, “the atoms of all elementary substances have exactly the same capacity for heat,” was inadequate. In fact the exactness of the law was in doubt from the start and was never to be established.

Petit’s comments on theoretical issues were characterized by his receptiveness to new ideas. He received a thoroughly conventional education in physics at the Ecole Polytechnique, where the customary emphasis was placed on such doctrines as the corpuscular theory of light, the caloric theory of heat, and the other theories of imponderable fluids. Thus, not surprisingly, when he himself began to teach there, his teaching was completely orthodox, as may be seen in some manuscript notes of the lectures that he gave in the winter of 1814–1815. But on December 1815, as a result of some experiments on the refraction of light in gases—which he had performed with his brother-in-law Dominique Arago—Petit openly rejected the corpuscular theory and became one of the earliest supporters of the wave theory, which had just been revived in France by Fresnel

The Petit-Dulong paper of April 1819 on atomic heats was likewise marked by a skepticism toward established doctrine. In it Petit and Dulong rejected the caloric theory and, almost certainly under the influence of Dulong’s close friend Berzelius, substituted for it the electrical explanation of heats of chemical reaction. The 1819 paper also contained a statement of reaction. The 1819 paper also contained a statement of support for the chemical atomic theory, which, owing largely to the opposition of Berthollet and his followers, had made little headway in France

Although he is best known for his experimental work, Petit had an equal, if not greater, talent for mathematics. Evidence of this is found in his brilliant doctoral thesis of 1811 on the theory of [capillary action](#) (treated in the manner of Laplace) and in a paper on the theory of machines written in 1818

BIBLIOGRAPHY

I. Original Works. In the absence of an ed. of Petit’s collected works, his papers have to be consulted in the journals in which they originally appeared. The *Annales de chimie et de physique* between 1816 and 1819 is the most useful source. A partial bibliography is given in Poggendorff, II, 415–416.

II. Secondary Literature. The standard biographical sketch of Petit is the obituary notice by J.-B. Biot, published in *Annales de chimie et de physique*, **16** (1821), 327–335, and *Journal de physique, de chimie, d’histoire naturelle et des arts*, **92** (1821), 241–248. On his work with Dulong, see R. Fox, “The Background to the Discovery of Dulong and Petit’s Law,” in *British*

Journal for the History of Science, 4 (1968–1969), 1–22; J. Jamin, “Études sur la chaleur statique. Dulong et Petit,” in *mondes*, 2nd ser., **11** (1855), 375–412; and J. W. van Spronsen, “The History and Prehistory of the Law of Dulong and Petit as Applied to the Determination of Atomic Weights,” in *Chymia*, **12** (1967), 157–169. See also R. Fox, *The Caloric Theory of Gases From Lavoisier to Regnault* (Oxford, 1971), especially pp. 227–248. Petit’s paper on the history of machines is discussed in C. C. Gillispie, *Lazare Carnot savant* (Princeton, 1971), 107–111.

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