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(*b*. Tours, France, 22 July 1795; *d*. Paris, France, 1 May 1870)

mathematics.

Like most French mathematicians of his time, Lameé attended the Eècole Polytechnique. He enterd in 1813 and was graduated in 1817. He then continued at the Eécole des Mines, from which he was graduated in 1820.

His interest in geometry showed itself in his first article, “Mémoire sur les intersections des lignes et des surfaces” (1816–1817). His next work, *Examen des diffeérentes meéthodes employeées pour résoudre les probleèmes de geéomeétrie* (1818), contained a new method for calculating the angles between faces and edges of crystals.

In 1820 Lameé accompanied Clapeyron to Russia. He was appointed director of the School of Highways and Transportation in St. Peterburg, where he taught analysis, physics, mechanics, and chemistry. He was also busy planning roads, highways, and bridges that were built in and around that city. He also collaborated with Pierre Dominique Bazaine on the text *Traité élémentaire du calcul inteégral*, published in St. Peterburg in 1825. In 1832 he returned to Paris, where he spent the rest of his career and life.

For a few months after his return to Paris, Lameé joined with Clapeyron and the brother Flachat to form an engineering firm. However, he left the firm in 1832 to accept the chair of physics at the Eécole Polytechnique. He remained there until 1844.

Lamé always combined his teaching positions with work as a consulting engineer. In 1836, he was appointed chief engineer of mines. He also helped plan and build the first two railroads from Paris to Versailles and to St.-Germani.

In 1843 the Paris Academy of Sciences accepted him to replace Puissant in its geometry section. In 1844 he became graduate examiner for the University of Paris in mathematical physics and probability. He became professor of mathematical physics and probability at the university in 1851. In 1862, he went deaf, and resigned his positions. He was in retirement until his death in 1870. In spite of the unsettled and often troubled political climate, Lameé managed to lead a serene and quiet academic life. His sole and quite tenuous connection with politics was his *Esquisse d' un traiteé de la reépublique* (1848).

Although Lameé did original work in such diverse areas as number theory, thermodynamics, and applied mechanic, his greatest contribution to mathematics was the introduction of curvilinear coordinates and their use in pure and applied mathematics. These coordinates were conceived as intersections of confocal quadric surfaces. By their means, he was able to transform Laplace’s equation $\nabla^2 V = 0$ into ellipsoidal coordinates in a form where the variables were separable, and solve the resulting form of the generalized Laplace equation.

In 1836, Lameé had written a textbook in physics for the Eécole Polytechnique, *Cours de physique de l’ Ecole polytechnique*. In 1852 he oublished his text *Lecçons sur la theéorie matheé de l’ eélasticiteé des corps solides*, in which he used curvilinear coordinates. This work resulted from his investigation into the conditions for equilibrium of a spherical elastic envelope subject to a given distribution of loads on the bounding spherical surfaces. He succeeded in the derivation and transformation of the general elastic surfaces.

As early as 1828, Lameé had shown an interest in thermodynamics in an article “Propagation de la chaleur dans les polyeèdres,” written in Russia. In 1837 his ’Meémoire sur les surfaces isothermes dansles corps solides homogeènes en eéquilibre de tempeérature’ appeared in Liouville’s *Journal*. In these articles Lameé used curvilineat coordinates and his elliptic gunctions, which were a generalization of the spherical harmonic funtions of Laplace, in a consideration of temperatures in the interior of an ellipsoid. *Lecçons sur la theéorie analytique de la chaleur* followed in 1861.

In *Lecçons sur les coordonneés curvilignes et leurs diverses applications* Lameé extended his work in thermodynamics to the solution of various problems of a physical nature involving reneral ellipsoids, such as double refraction in the theory of propagation of light in crystals.

Lamés investigations in curvilinear coordinates led him even into the field of number theory. He had begun with a study of the curves which are symmetric with respect to a triangle (as well as the space analogs symmetrical with respect to a tetrahedron). When these equations are written in nonhomogeneous form, they appear as

and, when a = b, as $x^n + y^n = a^n$. This naturally led Lame' to study Fermat's last theorem.

In 1840 he was able to present a proof of the impossibility of a solution of the equation $x^7 + y^7 = z^7$ in integers (except for the trivial cases where z = x or y, and the remaining variable is zero). In 1847 he developed a solution, in complex numbers, of the form $A^5 + B^5 + C^5 = 0$, and in 1851 a complete solution, in complex numbers, of the form $A^n + B^n + C^n = 0$.

Another result in number theory having nothing to do with Lamés main interests and endeavors was the theorem: The number of division required to find the greatest common divisor of two numbers is never greater than five times the number of digits in the smaller of the numbers. This theorem is yet another example of the attraction that number theory has always seemed to have for mathematicians. This result and the "Esquisse" previously mentioned are the only examples of Lamée's work that were not devoted entirely to his main purposes.

Lamé was considered an excellent engineer. While in Russia, he wrote a number of articles that appeared in Gergonne's *Journal*, "Sur la stabilité voutes," on arches and mine tunnels (1822); "Sur less engrenages," on gears (1824); and studies on the properties of steel bridges. His work on the scientific design of built-up artillery was considered a standard reference and was much used by gun designers. His final text, *Cours de physique mathématique rationnelle* (1865), was a composite of practice and theory. All of his researches were undertaken with practical application in mind.

It is difficult to characterize Lame and his work. Gauss considered Lamé the foremost French mathematician of his generation. In the opinion of Bertrand, who presented a eulogy of Lamé on the occasion of his demise, Lamé had a great capacity as an engineer. French mathematicians considered him too practical, and French scientists too theoretical.

Lamé himself once stated that he considered his development of curvilinear coordinates his greatest contribution to curvilinear coordinates his greatest contribution to mathematical physics. True, his applications of were all to physics—to the theory of elasticity, the thermodynamics of ellipsoids and other solids, ellipsoidal harmonics, among others. In his opinion, just as rectangular coordinates made celestial mechanics possible, so general curvilinear coordinates would make possible the solution of more general question of physics. Yet the work he began was generalized almost as soon as it appeared by such mathematicians as Klein, Bôcher, and Hermite. It now has a strictly mathematical format, being used in the study of ordinary and partial differential equations. We can conclude that Lamés major work was in the field of differential geometry.

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