Siméon Denis Poisson

Early in his career, French mathematician and physicist Siméon Denis Poisson (June 21, 1781 – April 35, 1840) applied differential equations to problems in physics and published between some 400 papers in that subject, mathematics, and astronomy. His most famous work was his *Traité de mécanique* first printed in 1811 and revised in 1833. It was the standard work on mechanics for many years. Today he is better known for his presentation of the exponential limit of the binomial distribution. Although Abraham de Moivre had arrived at the same result earlier, the distribution is known as the *Poisson distribution*. Some events rarely happen, for instance, car accidents at a certain intersection or the number of typographical errors on a page. Still, over a period of time, it is possible to say something about the nature of rare events. The Poisson distribution can be used to approximate distribution of random occurrences of some phenomenon in a specified unit of space or time.

Poisson's application of his model to the deliberations of juries did not attract much interest at the time. The Poisson distribution remained practically unknown for more than 60 years. One of its first applications was an 1898 paper by Ladislaus von Bortkiewicz, who noted how the number of Prussian soldier deaths caused by being kicked by a horse could be estimated by Poisson's formula. Since then the Poisson distribution has been employed in the study of random events such as the number of times a piece of radioactive material emits particles, the number of requests arriving at a server computer, the number of mutations in a given stretch of DNA, and the number of phone calls a company receives per day. Poisson's name is also attached to many other ideas, for instance, Poisson's integral, Poisson's equation in potential theory, Poisson's law of large numbers, Poisson brackets in differential equations, Poisson's ratio in elasticity, and Poisson's constant in electricity.

Poisson was born in Pithiviers, France, the son of an ex-soldier. When he was a small boy, he was left in the care of a nursemaid, who when she went out suspended him by a small cord attached to a nail in the wall. This was to prevent him from being bitten by the various creatures that roamed the floor. To entertain himself, he would swing from side to side, a practice that he later claimed explained his interest in pendulums. His father, who held a small administrative post in the local government, taught his son at home. When it was decided that young Poisson should become a physician, Siméon's uncle, a surgeon in Fontainebleau, offered to show him the trade. The first thing he had his nephew do was to practice pricking the veins of cabbage-leaves with a lancet. Soon Siméon was promoted to lancing blisters. Regrettably one of the first times he performed the "operation" on a human, the patient died within a few hours. Although his uncle reassured him that this was quite common, Poisson vowed to have nothing further to do with the medical profession.

After spending some time at the École Centrale, where he demonstrated considerable talent for mathematics, Poisson entered the École Polytechnique at age 17 and his mathematical career began. His exceptional abilities impressed his teachers Lagrange and Laplace, who would become his colleagues and friends for life. Legendre reported so favorably on a memoir that Poisson wrote on finite differences that it was published in the *Recueil des savants étrangers*. After graduating, Poisson lectured at the Polytechnique from 1802 to 1808, at which time he became an astronomer at the Bureau des Longitudes. In 1809 he was appointed to the chair of pure mathematics at the newly opened Faculté des Sciences. Rather than pursue a public service career, Poisson was drawn to teaching, at which he was remarkably successful.

In 1817 Poisson married Nancy de Bardi and found that family life was just one of the many pressures

placed on his time and energy. He never wished to occupy himself with two things at the same time. When a research project occurred to him that did not have an obvious connection with what he was doing at the time, he wrote a few words on the matter in a little notepad he always carried to be taken up at some later time. His chief treatises in addition to the two volumes of the *Traité de mécanique* were *Théorie nouvelle de l'action capillaire* (1831), *Théorie mathématique de la chaleur* (1835), and *Recherches sur la probabilité des jugements* (1837). He did not live long enough to write a planned work that would cover all of mathematical physics, into which the previously named books would be incorporated. Among his memoirs in pure mathematics, the most important are those on definite integrals, the applications of Fourier series to physical problems, essays on the calculus of variations, and his papers on probability. In applied mathematics he wrote on the theory of electrostatics and magnetism.

Quotation of the Day: "Life is good for only two things, discovering mathematics and teaching mathematics." - Siméon Poisson