tially thought that this might be a result of animate life hidden within the grains, but found that the same erratic motion occurred when the pollen grains were replaced with ground glass or dye particles. Although he had no explanation for the phenomenon, he reported the result, which has since been called "Brownian motion."

Brownian motion found an explanation in the kinetic theory of gases developed in around 1860 by the Scottish mathematician James Clerk Maxwell. Amazingly the kinetic theory itself owes its initial formulation not to physics and chemistry, but to the social sciences. After the French revolution the great mathematician Pierre Simon Laplace was required to adapt his work to serve the revolutionary goals, and to educate the populace through a series of public lectures. To this purpose Laplace adapted his studies of probability theory (initiated to rescue "Laplacian determinism" from the measurement imprecision that he attributed to "human weakness" rather than to innate indeterminacy) to demography and actuarial determination. Laplace's lectures were attended by the Belgian astronomer Adolphe Quetelet, who was inspired by them to formulate the study of "Staatswissenschaft," the forerunner of the modern statistical social sciences. Quetelet's work was heralded as a cure for societal ills, and was championed by the social reformer Florence Nightingale. This subsequently inspired James Clerk Maxwell, through his reading of an essay on Quetelet's work written by John Herschel, to adopt a strategy using Laplace's probabilistic methods as a basis for his kinetic theory of gases. Maxwell's formulation of statistical mechanics marked a turning point in physics, since (in contrast to Laplacian determinism) it presupposed the operation of chance in nature. Thus in this case the "exact sciences" borrowed from the "social sciences."

It should be noted that the contributions of Florence Nightingale were of great significance. Although usually remembered as a pioneer in nursing, she was also one of the leading mathematicians of her time. She developed new techniques of analysis and innovations in the collection, tabulation, interpretation, and graphical display of statistical data. During the Crimean War she invented the now familiar "polar-area" diagram (pie-chart) to dramatize the needless deaths caused by unsanitary conditions in military hospitals.Although she lived to see the Einstein era (she died in 1910) her mathematical interest can be traced to the post-revolution lectures of Laplace (she was 6 years old when Laplace died in 1827).

Although the kinetic theory of matter provided a qualitative explanation of Brownian motion, a quantitative formulation was still lacking. This was provided by Einstein in his 1905 Doctoral Dissertation and in the May paper of his annus mirabilis. Einstein attacked this problem using the same probabilistic methods developed by Laplace, here the "Random Walk," which is a sequence of discrete steps, each in a random direction. For a large object, the number of molecules striking on all sides and