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Nobel Prize Essay: Jean Baptiste Perrin (1926)

Jean Baptiste Perrin was born in Lille, France on September 30<sup>th</sup>, 1870. He received his first education at the École Normal Supérieure, where he was an assistant in the Physics department from 1894-1897 (Nobel). This is where he began researching cathode rays and x-rays. For a thesis regarding cathode rays, he was awarded an advanced degree in science called the “docteur ès sciences” (Nobel). In 1898, Perrin began work at the University of Paris where he worked as a professor from 1910-1940, when the Germans invaded (Nobel). In World War I, he served in the army as an engineer at the age of 44 (Nobel). After the Germans invaded France, he fled to America, where he lived until he died at the age of 69 on the 17<sup>th</sup> of April, 1942 (Nobel). His body was carried back to France by ship in 1948 and was buried in the Panthéon.

Perrin earned his Nobel Prize for research on many different subjects across his field of science, but mainly for his study of colloids and Brownian motion (Nobel). Brownian motion is “the erratic movement of particles suspended in a liquid” (Britannica). Einstein did analysis on this and hypothesized that the particles were being moved around by collisions with the water molecules around them (Nobel). He confirmed Einstein’s theory using newfound technology at the time. This was important as it was the first time molecules could actually be viewed and

sized, making atoms and molecules a real part of science instead of a non-viewable figment of scientific interest (Britannica). This also confirmed one of Einstein's many theories to help advanced the scientific cause.

He did all of his work in France, but he received honors and awards from many societies and universities all over Europe. He did most of his work in Paris, at the place where he worked, the University of Paris. His work was done in the late 1800s-mid 1900s. He worked through World War I and World War II, where his work was interrupted both times by the Germans (Nobel). If his work had not been interrupted both of these times, who knows what he could've accomplished? Clearly the wars did not create any of his work, except as an engineer in the French Army (HAHA, FRENCH ARMY! THE QUEENS OF SURRENDERING...ehem, sorry, back on topic). In this, it can clearly be seen that the only influence the wars had on Perrin's work were disruptive.

Perrin researched Brownian motion because he wanted to take a major scientist's recent findings and prove something correctly. He also did this as he was interested in colloids, which are "mixtures whose particles are larger than the size of a molecule but smaller than particles that can be seen with the naked eye" (Colloids). Einstein had concluded that colloids should obey gas laws, and therefore could be used to calculate Avogadro's number, this being the number of molecules in a gram multiplied by the molecule's atomic weight (Nobel). The result he obtained nearly matched all of the other values obtained in different ways, so he was able to conclude that these particles did indeed obey the gas laws and he confirmed Einstein's theory (Nobel). This won him the Nobel Prize in 1926.

He did all of this using the newly invented ultra-microscope. He used this to view the particles and determine their movement, their size, and other properties (Britannica). From this he determined that they followed the same laws as normal molecules and conformed to Avogadro's number. He also verified "sedimentary equilibrium" within the particles (Nobel).

Although he was famous for his work with colloids, he worked with X-Rays and Cathode Rays for most of the beginning of his scientific career. He studied X-Ray effects on gases, fluorescents, disintegration of radium, and along with all that the transmission of sound (Nobel). He had an impressive start as a scientist in Paris, and this allowed him to continue on to the other parts of the world.

"He held honorary doctorates of the Universities of Brussels, Liege, Ghent, Calcutta, New York, Princeton, Manchester, and Oxford" (Nobel). He was part of many societies in France and around Europe. He was one of the most respected scientists of the time period, and his developments have effected generations after him for almost a century.

Perrin was elected to join the French Academy of Sciences in 1923, somewhere he had always dreamed to be (Nobel). He became a "Commander of the Legion of Honor" in 1926 (Nobel). He wrote a book in 1913 called *Los Atomes*, which was relatively successful into the 30s (Nobel). He was a member of the Royal Society in London and in the Academies of Science in many other countries all over Europe (Nobel). He was a very successful man who spread his influence all over Europe.

Although his work was halted by the Nazi invaders in 1940, Perrin still helped the world advance to greater states than it had before. He died in 1942 in America, but in France, he still will forever be remembered as the man who made France look like somewhat of a decent country (or optionally made the atom a truly recognizable concept and proved Einstein's atomic theories, but France is always fun to make fun of, right?).

## Works Cited

“Colloid”. *Science Clarified*. Advameg, Inc., 2012. Web. 27 Apr. 2012.

“Jean Baptiste Perrin”. *Nobel Lectures, Physics 1922-1941*. Nobel Media, 1965. Web. 27 Apr. 2012.

“Jean Perrin”. *Encyclopædia Britannica. Encyclopædia Britannica Online*. Encyclopædia Britannica Inc., 2012. Web. 27 Apr. 2012