Theodor Svedberg Biography

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Biography

Svedberg was raised by a civil engineer who shared his love of nature with his son. He studied chemistry in school because he believed many unsolved problems in biology could be explained as chemical events. As a scientist he became interested in the chemistry of colloids which led him to develop the ultracentrifuge a device which is useful in separating suspended particles.

A colloid is a mixture in which tiny particles of one or several substances are suspended in liquid such as water. These colloidal particles are larger than molecules or ions, but they are usually too small to settle under the force of gravity or to be seen with an ordinary microscope. Some important biological colloid particles include proteins, DNA, and viruses.

Svedberg wanted to identify the exact size of the colloids he studied, but this was difficult because the only way to make such measurements was to note how the particles settled through sedimentation. However, only the largest colloid particles settled out a rate fast enough to be measured. Other, smaller particles proved so small that the incessant movement of water molecules was enough to keep them suspended. Svedberg attempted to make the small particles sink faster by spinning the liquid in a centrifuge. Centrifuges were already being used to separate milk from cream and blood corpuscles from blood plasma. Yet, to force much smaller colloids out of solution, a much more powerful centrifuge was needed. In 1923 Svedberg developed the ultracentrifuge, a device that was capable of rotating fast enough to create a force hundreds of thousands of times that of gravity.

By 1936 he had produced an ultracentrifuge that spun at 120,000 times per minute and created a centrifugal force of 525,000 times the earth's gravitational force. With these centrifuges scientists could discern both the size and shape of colloid particles. This machine had far-reaching effects, enabling biologists, biochemists, physicians, and other life scientists to examine viruses and how they attack cells, the nucleus of a cell, cell functions, and individual protein and nucleic acid molecules, as well as explore genetic engineering possibilities.

Svedberg was awarded the Nobel Prize in Chemistry in 1926 for his contributions to colloid chemistry. In later years, Svedberg studied the electric synthesis of metals suspended in a colloid solvent, carried out research in radioactive processes, and helped develop synthetic rubber during World War II.