

Living in the Past

Historical perspective

The Newton of electricity



A prosperous merchant in Lyon, France, in the 1770s, Jean-Jacques Ampere was one who did not believe in exposing his children to a formal education, but rather one obtained through self-study and access to published information. Thus, his son Andre-Marie Ampere had little traditional schooling, but absorbed his father's rich library of the world's knowledge at the time. Indeed, Andre not only embraced history, philosophy, travels, poetry, and the natural sciences, but began studying advanced mathematics as early as age twelve.

During the French Revolution, when Andre was 18 years old, his father was guillotined for resisting the political tides of the day. A few years later, Andre married, and took his first real job teaching mathematics. In 1802, due to the swiftly moving changes imposed by the Revolution, he was named professor of physics and chemistry, which accelerated his scientific maturation. After the passing of his wife, Andre moved to Paris, where he was appointed professor of mathematics, but also taught courses in astronomy and philosophy, and by 1824 was elected chair of experimental physics at College de France.

In 1820, Andre became fascinated by the discovery of Hans Christian Oersted regarding the connection between electric current and magnetism, and began devoting time to investigating this phenomenon by identifying their mathematical and physical relationships. He took Oersted's experiments further, and discovered that current-carrying electric wires attracted or repelled each other, depending on the directions of their currents, formulating a concept known today as ***Ampere's Law***, one of Maxwell's four fundamental equations.

$$\nabla \times \mathbf{B} = \mu_0 \mathbf{J}$$

This formed the foundation for what Andre called *electrodynamics*, which today we recognize as classical electromagnetism. Using this physical explanation of electromagnetic behavior, Andre developed a physical account of electromagnetic phenomena that was both empirically demonstrable and mathematically predictive. It wasn't until 1915, nearly a hundred years later, that Albert Einstein and Wander de Haas proved Andre Ampere's hypothesis correct. However, probably the highest recognition came from James Clerk Maxwell, who referred to Ampere as the *Newton of electricity*.

Through his experimentation, it became apparent to Andre that an elementary influence was responsible for the effects he had measured and calculated, and he proposed the existence of what we call today the *electron*. Other notable achievements by Andre Ampere included the discovery of the element Fluorine. He devised one of the first charts that listed elements by their properties, the forerunner of the Periodic Table.

Today, the SI base unit for current (the ampere, symbol "A") was named in Andre's honor. You can read more about his life and achievement history on the Famous Scientists website.