The Controversy Over 'Angular Force'

In research conducted at Göttingen Univeristy with Carl Friedrich Gauss from 1830-1839, Wilhelm Weber exposed the fallacy of the attempts by Newton and his followers to reduce Kepler's discoveries of the laws governing planetary motion to an "inverse square law" relationship, and to then claim for that hoax the status of a universal physical principle. The experimental evidence established the truth of André-Marie Ampère's 1826 assertion of an "angular force" governing the relationship between electrical current elements. Hermann Grassmann insisted that the Ampère angular force could not exist, because it was more mathematically complicated than the simple inverse-square law. Hermann Helmholtz, with backing of Rudolf Clausius, later extended Grassmann's critique to Gauss and Weber's experimental validation of Ampère's electrodynamic theory.

In his 1846 memoir reporting the experimental work, Weber expressed the force between two electrical particles as dependent upon the relative velocities and accelerations of the particles. Weber later playfully described the paradoxical dependence of a force upon an acceleration (which is itself a component of "force" in the Newtonian system), as similar to the phenomenon of catalysis which Berzelius had observed in chemical action.

Experiments, carried out in collaboration with Rudolf Kohlrausch at Göttingen in 1855, established the unknown constant in the Weber force law as equal to the product of the square root of 2 into the velocity of light. In an 1858 paper, "A Contribution to Electrodynamics," Bernhard Riemann, who was present at the experiments, proposed the "retarded propagation" of the electrodynamic potential at the velocity of light. The paper, which predated James Clerk Maxwell's now-famous proposal of a less rigorous representation of the phenomenon by almost a decade, was withdrawn from publication. When it was published posthumously, Clausius criticized Riemann's effort for an alleged mathematical error.

See:

Laurence Hecht, "The Atomic Science Textbooks Don't Teach: The Significance of the 1845 Gauss-Weber Correspondence," ***21st Century Science & Technology***, Fall 1996, www.21stcenturysciencetech.com/articles/Atomic_Science.pdf.

Wilhelm Weber, ***Determinations of Electrodynamic Measure: Concerning a Universal Law of Electrical Action*** (1846), transl. by Susan P. Johnson, www.21stcenturysciencetech.com/Articles%202007/Weber_1846.pdf.

Bernhard Riemann, "A Contribution to Electrodynamics" in ***Collected Papers: Bernhard Riemann*** (Heber City, UT: Kendrick Press, 2004), pp. 273-278.

—Laurence Hecht