



## **Ludvig August Colding - the first Danish hydrologist**

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In 1843 Ludvig August Colding stated the first law of thermodynamic on the conservation of energy as one of three scientists, who independently and almost at the same time found this result, the two others being Julius von Mayer and James Joule. Subsequent scientific work covered a broad range of disciplines: Thermodynamics, magnetism, steam power, hydraulics, soil physics, hydrology, heating and ventilation, meteorology, and oceanography. In 1853 he described the likely courses for spreading of the Copenhagen cholera epidemic together with the chemist Julius Thomsen, one year before John Snow in London gave the final proof for the route of the infection. As Chief Engineer in Copenhagen, Colding subsequently became responsible for building the first water works in the city as well as for gas lightening and sewerage. He planned and projected the water supply based on water from a nearby lake but augmented by groundwater originating from upstream artesian wells being led to the lake through a canal. The piped water in the city was pressured by steam power supplemented by an elevated consumption equalisation reservoir water outside the city. Based on measurements of the inflow to the wells, he later came to the same general law for movement of water in the soil as Darcy without knowledge of Darcy's work. In addition, he analysed soil water and drainage as well as evaporation from a free surface. Moreover, he described the free surface patterns in flowing water and determined the necessary slope for self-cleaning pipes. Colding developed synoptic weather maps and examined thoroughly wind systems and ocean currents including the Gulf Stream, a hurricane that hit St. Thomas (Virgin Islands) in 1971 and flooding of the Danish islands Lolland and Falster in 1972. He lectured at the Technical University of Denmark, where he became adjunct professor in 1869, and in 1871, he was simultaneously with Joule awarded an honorary doctoral degree at the University of Edinburgh.