Biographical Encyclopedia of Astronomers

Rittenhouse, David

Born Paper Mill Run near Germantown, Pennsylvania, (USA), 8 April 1732

Died Philadelphia, Pennsylvania, USA, 26 June 1796

David Rittenhouse, a noted self-educated man of many dimensions, rose from obscure beginnings as a clock- and scientific instrument-maker in Norriton, Pennsylvania, to prominence in the world of science as an effective observational astronomer and experimental scientist

The origin of Rittenhouse's clockmaking knowledge is unclear, though it is certain that he inherited a wealth of tools from a maternal uncle, and that his father purchased the additional tools he originally needed to enter the clockmaking trade. The tall clocks Rittenhouse made in the roadside workshop he opened in Norriton around 1749, while not unusual in their mechanism, were nevertheless masterpieces of craftsmanship. He included small orreries in three of these works, and between 1767 and 1771 he designed and built two large vertical orreries. One of these was purchased by the Pennsylvania General Assembly for the College of Philadelphia (later the University of Pennsylvania), the other by the College of New Jersey (now Princeton University).

Indeed, it was his clockwork orreries and telescopes that led Rit-tenhouse to astronomy and ultimately brought him to the attention of the scientific community in Philadelphia. Four years after his marriage to Eleanor Coulston on 20 February 1766, he and his family took up residence in Philadelphia. Eleanor died giving birth to the second of their two children; David remarried in 1772, this time to Hannah Jacobs

However, it was the transit of Venus in 1769 that turned Rittenhouse to serious observational astronomy and earned him a place among the world's astronomers. He had previously taught himself mathematics and physical sciences by reading, mostly from Isaac Newton's Principia. For the transit, Rittenhouse first prepared a proposal to the Philosophical Society in which he recommended that the society establish two stations to observe the transit. He volunteered to equip a station at Norriton as one of the two sites. After the society approved his plan, Rittenhouse constructed a transit telescope (possibly the first telescope made in America), in addition to an equal altitude instrument and an 8-day clock, all for use at Norriton

The observational techniques Rittenhouse reported were of greater significance than the data he obtained, more for their inventiveness than for their innovation. For instance, around 1785 he resolved the difficulty in aligning his meridian telescope on a distant mark by installing a collimating lens system enabling him to use a much closer mark. Such a lens system was not new, so he cannot be credited with its origin, but his inventiveness was showcased. The same can be said of his use of spider web in his telescope, for he did not know that it had been previously used by Francesco Fontana

In Philadelphia, Rittenhouse established an astronomical observatory and made many astronomical observations, provided data for almanacs, and lectured on astronomy. In 1786, he published a paper describing his invention and study of a plane transmission grating, in this case a series of closely spaced fine wires wrapped on frames. Using one of these frames, he observed up to six orders of diffracted spectra, measured the angular displacement of each, and from the data developed a workable theory of diffraction to account for his observations, but he took the experiments no further. It would be left for Joseph von Fraunhofer and Augustin Fresnel to carry them forward

Rittenhouse also took part in the Mason-Dixon survey of the boundary between Pennsylvania and Maryland (1763), and carried out surveys of other state and colonial boundaries, as well as canals and rivers, usually with instruments of his own construction. He served in various capacities during the Revolution, and in 1792 became the first director of the United States Mint. He was one of the earliest members elected to the American Philosophical Society and succeeded Benjamin Franklin as president of the society (1791). Rittenhouse was elected a foreign member of the Royal Society of London (1795).

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Selected References

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