Biographical Encyclopedia of Astronomers

Bernoulli, Jacob [Jacques, James]

Born Basel, Switzerland, 27 December 1654

Died Basel, Switzerland, 16 August 1705

Jacob Bernoulli was a member of a family of celebrated mathematicians and physicists; he was a prominent Cartesian. His father and grandfather were spice merchants, and his mother came from a prominent family of bankers and city councilors. He was sent to the University of Basel to study philosophy and theology, taking a degree in philosophy in 1671 and in theology in 1676. Against the wishes of his parents, he also studied mathematics and astronomy, and became the first of the mathematicians among the Bernoullis.

After graduating in 1676, Bernoulli first went to Geneva, then to Paris, where he studied with the followers of René Descartes under Nicolas Malebranche. Descartes had postulated a vast system of vortices, subtle particles that whirled endlessly around the Sun This could explain the motion of the planets, and the properties of the vortex could be derived from Johannes Kepler's three laws. However, the system of vortices could not explain comets, and in particular, how the comets could pass through the whirling vortex particles without deflection. An explanation was advanced by Bernoulli in 1680. Rather than having comets cut through the vortices of the planets, he suggested that a comet was an object that orbited a stationary point that lay outside the orbit of Saturn, a system reminiscent of the Ptolemaic system of deflections and epicycles. This was rewritten several times, appearing in its final form in 1682. Shortly afterward, Bernoulli wrote Dissertatio de Gravitate Aetheris (1683), where he attempted to explain all physical phenomena using the motion of the subtle particles of the Cartesian vortices.

Bernoulli eventually returned to Basel and taught mechanics at the University of Basel from 1683, and became a professor of mathematics in 1687. When Jacob's brother Johann entered the University under parental orders to study medicine, Johann asked Jacob to teach him mathematics; the brothers became early converts to Gottfried Leibniz's calculus. The two attempted to collaborate, but they were both headstrong, arrogant, vindictive, and convinced of the other's mathematical inferiority, causing them to part as bitter rivals. An impartial observer would judge that Jacob was the better mathematician, and Johann the more creative. Jacob held the chair of mathematics at the University of Basel until his death in 1705.

Jeff Suzuki

Selected References

Bernoulli, Jakob (1969). *Die Werke von Jakob Bernoulli*, edited by J. O. Fleckenstein. Basel: Birkhäuser.

Fleckenstein, J. O. (1949). *Johann und Jakob Bernoulli*. Basel: Birkhäuser.

Hofmann, J. E. (1970). "^(Jacques) I." In *Dictionary of Scientific Biography*, edited by Charles Coulston Gillispie, Vol. 2, pp. 46–51. New York: Charles Scribner's Sons