

Biographical Encyclopedia of Astronomers

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Hevel, Johannes

Born Danzig (Gdańsk, Poland), 28 January 1611

Died Danzig (Gdańsk, Poland), 28 January 1687

Johannes Hevelius excelled as an observer and instrument builder. His publications were comprehensive in their discussion of historical background, methodology, and instrument design in addition to the actual observations, but are generally found wanting in a theoretical sense. With his second wife, Elisabetha Hevelius, he engraved an atlas well known for its beauty and for the addition of seven new constellations, of which four survive under the International Astronomical Union's modern standards

Abraham Höwelcke, a prosperous Danzig brewer and property owner, and his wife, Cordelia (*née* Hecker), had ten children, of whom Hevelius was the second. The family name appears in as many as seven forms in addition to Höwelcke, most often as Hevel or Heweliuza. Johannes adopted the Latinized version of Hevelius as a matter of personal choice. In this privileged family, Hevelius received an excellent education at the local Gymnasium until its closure. For a time, he studied in Bromberg, Poland, where he was a student of mathematician and astronomer Peter Krüger. In addition to the customary training in these subjects, Krüger devoted special attention to Hevelius in extra sessions on practical observational astronomy and encouraged him to learn instrument making and engraving, all of which Hevelius applied well in his later years

At age 16, Hevelius returned to Danzig to complete his training at the newly reopened Gymnasium. Following his parents' wishes that he prepare for a career in public service, Hevelius sailed from the old Hanseatic port to the Netherlands at the age of 19, but found it difficult to exclude astronomy from his thoughts as he observed a solar eclipse *en route*

Hevelius studied jurisprudence at the University of Leiden in 1630 and 1631. He then traveled to England, where he improved his English somewhat and published his observations of the eclipse in the *Philosophical Transactions of the Royal Society*. Moving to France, Hevelius became acquainted with Pierre Gassendi and Ismaël Boulliau in Paris and Athanasius Kircher in Avignon. However, he cancelled a planned trip to Italy to visit Galileo Galilei and Christoph Scheiner when his parents called him home in 1634. Once home, Hevelius settled into the routine of his family's brewing business and began a career in public service as a councilor in his native town. In 1635, he married Katharina Rebeschke, the daughter of another wealthy Danzig merchant. The couple remained childless, but Katharina was an active partner in the marriage, assisting in the Management of the brewery to free Hevelius's time for participation in civil affairs and pursuit of his other interests.

Having largely ignored astronomy after leaving Paris, Hevelius visited his former mentor Krüger in 1639, shortly before the latter died. Although throughout his life he took a leading part in municipal affairs, the visit to Krüger was probably instrumental in the fact that from

then on, Hevelius's chief interest centered on astronomy. He established an observatory, which he called Stellaburgum, on the roof of his Danzig home. The platform gradually expanded until it covered three adjacent buildings. It supported shelters for some of his instruments and his printing press. Hevelius divided his time between observing and supervising the construction of astronomical instruments. Caught up in the drive to improve refractor performance by reducing color dispersion and spherical aberration, in 1641 he built a telescope with a focal length of 50 m. With the lens mounted on a spar suspended with ropes from a 25-m mast, the telescope was a failure. Other refracting telescopes of more conventional design were, however, successful, as evidenced by Hevelius's reported selenographical investigations. In these, and in his later efforts, the Polish crown supported Hevelius financially; Stellaburgum was visited by both King Jan II (Casmir) and King Jan III (Sobieski).

Hevelius observed sunspots from 1642 to 1645 with sufficient thoroughness to derive a rotational period for the Sun, but his main interest devolved to charting the lunar surface. Although previous maps of the Moon had been published, notably those of Francisco Fontana, Claude Mellan (working for Pierre Gassendi and Nicolas de Peiresc), and Michael van Langren, Hevelius's project was more ambitious than those previous efforts. He prepared 40 engravings representing the Moon in various phases. His maps included three full-moon illustrations with maps of the libration zones appended, the first such recognition of an effect that apparently confused earlier selenographers. Hevelius likely benefited in this regard from his construction of a lunar globe that allowed him to depict both the longitudinal and latitudinal librations. He published his maps in *Selenographia sive Lunae Descriptio* (1647), a work in which the lunar maps were usefully supplemented with a description of the current state of observational astronomy. Hevelius began with the art of lens making, a discussion of optics, and other aspects of telescope making. He included his sunspot observations and extensive commentary on the planets. In effect, the reader of *Selenographia* received a full discourse on the state of astronomical practice in the middle of the 17th century. The maps themselves would have entitled Hevelius to be called the founder of lunar topography. However, *Selenographia* was widely read and admired by contemporary astronomers for all these other resources as well.

Special mention should be made of the discussion of the satellites of Jupiter in the *Selenographia*. In that section, Hevelius confronted a 1643 claim by Antonius de Rheita that the latter had discovered five new satellites of Jupiter. Hevelius had been observing the planet at the same time and showed, by plotting both the satellites and the surrounding stars in the constellation of Aquarius, that the satellites that Rheita had claimed to discover were indeed fixed stars in the constellation. Anyone could still observe the same stars in Aquarius even though Jupiter had moved away from the constellation. In the process, Hevelius established an effective standard of evidence for future discoveries.

Between 1652 and 1677, Hevelius observed many comets, some of which might be credited to him as "discoveries" in more modern times. However, the difficulties of communication between astronomers in the 17th century make such priority claims meaningless. Hevelius's comet observations, published in *Cometographia* in 1668, have proven valuable to modern studies of comet orbits. His parallax observations indicated that the orbits of comets were well beyond the orbit of the Moon. However, there is little evidence to support the suggestion that

he understood that comets followed parabolic tracks around the Sun. Hevelius did include, as the frontispiece of *Cometographia*, an engraving showing himself pointing to a curved comet path in order to allegorically contrast his views with those of Aristotle, who described comets as sublunary, and Johannes Kepler, who believed they traveled in a straight line

In 1662, Katharina died after 27 years of marriage, managing the Hevelius household, and assisting with brewery management. Within a year, Hevelius remarried, this time to Catherina Elizabetha Koopman, a 16-year-old beauty with a burning desire to participate in his astronomical pursuits. Their productive collaboration over the next 26 years is frequently cited as a model scientific/marital relationship similar to that of William and Margaret Huggins. In the case of Johannes and Elizabetha, however, three daughters blessed their union and lived to maturity.

One odd aspect of Hevelius's career in both telescope building and observation came to a head in 1679 when a dispute with Robert Hooke and John Flamsteed flared up. Although Hevelius had been an early practitioner of telescope building and used them for many of his observations, he resisted the application of telescopic sights to his stellar position-measuring devices. He held this opinion even though nearly all other astronomers had changed their practice. Considering himself an observer in the tradition of Tycho Brahe, and perhaps fearing that a change so late in life would compromise the value of his extensive observations without such devices, Hevelius refused to accept the new concept. He declared that his observations with naked-eye sights were as accurate as any made with telescopic sights. In an effort to resolve the dispute, the Royal Society dispatched the young Edmond Halley to Danzig to compare observations made with telescopic sights with those made simultaneously by Hevelius. While Halley was impressed with the accuracy of Hevelius's instruments and techniques, retrospective comparisons of their results generally show a slight advantage for the telescopic sightings in both accuracy and precision.

On 26 September 1679, a fire destroyed the Hevelius home and observatory, instruments, and many of his books and manuscripts. With the help of King Jan III and many others, Johannes and Elizabeth promptly rebuilt the observatory, though with less elegant instrumentation, so that by December 1680 he was able to observe the great comet C/1680 V1. His observations on the variable star "Mira," which he named, are included in *Annus Climactericus* (1685).

After Johannes died, Elizabetha completed the editing of a catalog of over 1,500 stars and saw it published as *Prodromus astronomiae* (1690). When Francis Bailey reduced the Hevelius catalog and published it in the *Memoirs of the Royal Astronomical Society* in 1843, he explained that the catalog was essentially ready for submission to the publisher at the time of Johannes's death, implying that Elizabetha's role in the effort was *de minimus*. Given Johannes's failing health in his later years, however, it is more likely that Elizabetha carried or at least shared the burden of the preparation and editing of the catalog. In an atlas of 56 sheets entitled *Firmamentum Sobiescianum sive Uranographia* (1690), seven new constellations are delineated. One of the constellations (Scutum Sobieski, now known as Scutum) was named in honor of the king who had helped the Heveliuses so significantly in their later years. Elizabeth personally dedicated the atlas to Sobieski.

In 1664, Hevelius was elected to full membership in the Royal Society in London.

Fathi Habashi

Alternate name

Hevelius

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