SAMPLE

Famous Astronomers: William Herschel

Discoverer of Uranus

Aira Astralis

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Conclusion

This free sample contains the Introduction and Chapter 1. The complete book contains the full contents above.

Introduction

On the night of March 13, 1781, a music teacher in Bath, self-taught in astronomy and three years into a hobby of grinding his own telescope mirrors, turned his home-made reflector on a stretch of sky between the Twins and the Bull and found a disc that did not belong there. William Herschel, forty-two years old, a professional oboist, violinist, and organist of one of England's most fashionable cities, had discovered a new planet, the first ever found in recorded history. Every planet the human race had known before that night had been known since the invention of writing; Uranus, which he first announced as a comet, doubled the reach of the known solar system at a stroke, and made a musician into the most celebrated astronomer in the world.

His story is one of the strangest and most satisfying in the history of science. Born in Hanover in 1738, the son of a military bandsman, he came to England as a young musician in the Hanoverian connection, and rose through the provincial music trade to the organist's post at Bath, where he taught, conducted, and composed, and worked astronomy into the hours between his engagements. When his interest outgrew the telescopes he could buy, he built his own, casting and grinding speculum metal mirrors in the basement and cellar of his house, with his musician's hands and a theorist's patience, until his instruments were the finest in the world. His sister Caroline, brought from Hanover to keep his house and swept into his second career, became his permanent assistant and, in time, a great astronomer in her own right, the first woman in England paid to do the work of the science.

Together, from their observatory houses near the Thames at Datchet, Old Windsor, and Slough, the Herschels remade the study of the deep sky. William cataloged two and a half thousand nebulae, classified them into a system that shaped astronomy for a century, and mapped the Milky Way by counting stars, concluding that the whole system is a lens-shaped stratum in which the Sun is one member among uncounted millions. His surveys of double stars proved that many are true binaries, bound by gravity, and carried Newton's law beyond the solar system for the first time. He measured the Sun's own motion through space, coined the term asteroid, discovered two moons of Uranus and two of Saturn, found that Mars has seasons like ours at its poles, and, in 1800, in an experiment with a prism and thermometers in the Sun's spectrum, discovered infrared radiation, a form of light beyond the visible, extending the spectrum beyond what any eye had ever seen.

A note on the book's method, before the story starts: the record of Herschel's life is unusually complete, and the account that follows is built on it. The

manuscripts at the Royal Astronomical Society and the national collections hold the sweeps' ledgers, Caroline's diaries, the family's correspondence, and the observing books of four decades; the printed record holds the papers to the Philosophical Transactions, the three nebula catalogs, and the double-star lists; and the modern scholarship, two centuries of biography and instrument study, has tested all of it, the mirrors' figures and the catalogs' entries and the family's economy, against the sky and the archive. The numbers quoted here, the two thousand four hundred nebulae, the eight hundred forty-eight doubles, the three thousand star gauges, are the standard counts of the standard record; the interpretations, where the record leaves room, are marked as interpretations; and the whole account keeps the man's own division of labor, between what he measured and what he conjectured, as the organizing rule of the story.

This book tells the whole arc: the Hanover boyhood and the musician's England, the self-made instruments, the planet, the royal favor and the move to the King's observatory, the great catalogs, the star gauges, the forty-foot telescope, the sister at the desk beside him, the last years honored and still observing, and the modern understanding of what his work began. He found a planet with a telescope he had built himself in a house where he taught music, and then he built the science of the universe's construction out of the rest of his life, one night's field at a time. The chapters that follow keep both men in view, the musician and the astronomer, because the second was made out of the first, and the making is the story.

Chapter 1: The Discovery of William Herschel

His discovery, in the sense of the making of him, began in Hanover, in a musical household. Friedrich Wilhelm Herschel was born on November 15, 1738, one of ten children of Isaac Herschel, an oboist in the Hanoverian Guards band, a man of modest means and serious music who filled his house with it; six of the children survived and four of them became professional musicians, and the family's trade, for the boy Wilhelm, was fixed early: he played oboe and violin with his father in the band, at an age when other children were learning letters. The Hanover of his childhood was a small German court linked by royal blood to England, and the connection, a thread of the Eighteenth Century's politics, would carry him there. The second thread, the family's, ran beside it: his father, an amateur with a taste for the heavens, showed the children the constellations, and his son remembered, decades later, the first questions the sky had planted.

The music brought him to England. The Seven Years' War sent the Hanoverian band to campaigns, and the boy oboist, sixteen, served and suffered in the war's years; in 1757, after the defeat at Hastenbeck scattered the band, he crossed to England, following his brother Jakob, and began the musician's provincial climb: oboe in London, then the north-country circuit, Durham and Newcastle and Leeds, and the organist's trade learned on the way. He wrote symphonies and concertos in the fashion of the age, played and taught with a reputation that grew, and in 1766 was appointed organist of the Octagon Chapel in Bath, the spa city's center of fashion and music, and there he settled: the city's busiest musician, teaching, directing, and composing, a man whose professional life was music and whose evenings, increasingly, belonged to the sky.

The turn to astronomy was gradual and then total. The books came first, then a telescope rented or borrowed, and by 1773 the thirty-four-year-old organist was grinding mirrors in his own house, working through the physics of the reflecting telescope in the standard books and beyond them, because the books' instruments were not good enough for what he wanted to see. Speculum metal, the alloy of copper and tin that served for mirrors, was cast, ground, and polished by his own hands, in the cellar and the back room of the Bath house, with Caroline, newly arrived from Hanover to keep his house, feeding the process and reading to him while he worked; the first mirrors failed, then worked, and the first instruments, five, seven, and ten feet long, outperformed the best he could buy.

By 1778 he had built a seven-foot reflector, with a mirror of his own figuring, that was widely judged the finest telescope in England, and with it he began,

in the strict professional sense, to discover.

One further thread of the early years belongs in the discovery chapter, because the record keeps it and it explains the man: the self-education. Herschel's astronomy was learned from the books he could buy and borrow in the provincial England of his thirties, the standard treatises of the era's optics and the observers' manuals, worked through in the hours the music left; his mathematics, enough for the theory of the mirrors and the reductions of the sweeps, was self-taught to the same standard; and his Latin, the era's science language, was picked up for the reading of the classical authors.

The autodidact's record matters for the shape of the science he built: the surveys and the mirrors, the parts of the trade that a disciplined craftsman could master alone, are the strongest parts of his legacy, and the parts that needed the profession's training, the orbit mathematics, the positional rigor of the national observatories, are the parts he left to others. The self-made astronomer, in sum, built the science that self-making could build, and the building, as the next chapters show, was the century's largest.

A final note on the discovery chapter's central irony, which the biographies all keep: the man was looking for one thing and found the century's greatest other. The seven-foot's program in the spring of 1781 was the double-star survey, the parallax program, the search for the small shifts that would prove the Earth's motion; the disc that crossed the field between Gemini and Taurus was an interruption, a strange object in a survey of stars, and its report as a comet was the honest reading of the category the era allowed. The great discoveries, the case teaches the science, are the interruptions honored: the wrong program, pursued with the right instrument and the right honesty, found the new planet, and the finder's willingness to report the strange thing as it appeared is the discovery's other author.

The discovery of March 13, 1781, came in the ordinary course of his survey, the systematic examination of the sky that his instruments were built for. In the back garden of the house at New King Street, between the music lessons, he swept the field between Gemini and Taurus, and found a disc, a body with a visible size, where no star or nebula belonged; he had been cataloging double stars for months, and the new object, in the field with another star, read at first as a curious one. He watched it move, night after night, and reported it as a comet, the era's only category for a moving disc; the astronomers of Europe followed it, and the orbit computations, within months, told the truth the disc's size had hinted: the object was a planet, beyond Saturn, circling the Sun at twice the old system's radius.

The amateur who found it became, in the year that followed, the famous man

of the age: the Royal Society's Copley Medal, the summons to the court of George the Third, the offer of the King's patronage, and the decision, at forty-four, to leave the music trade and live by the sky.

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ABOUT THE AUTHOR

Aira Astralis is a science writer specializing in astronomy and space exploration. Her work spans the full breadth of humanity's relationship with the cosmos -- from the earliest naked-eye observations to the engineering marvels of modern space missions.

Her books are built on a foundation of primary sources: peer-reviewed research, mission archives, and direct engagement with the scientific community. She writes for readers who want to understand not just what we know about the universe, but how we came to know it.

She believes that the most important frontier is not out there but in the gap between what scientists discover and what the public understands. Her books exist to close that gap.