STAR-CROSSED LIVES

1. Tycho Brahe's nose

LARGER THAN LIFE SIZE accurately describes Tycho Brahe, both as to his present-day scientific reputation and as to the physical appearance he presented to his contemporaries.

In the 16th century, a profound change was beginning in western ideas about celestial bodies and their relation to the world. Within a few generations the traditional concept of a small, Earth-centered cosmos was to give way to the realization that our globe is one of several planets swinging in elliptical orbits around the Sun, in a vast space thinly sprinkled with distant stars.

Among the many thinkers who brought about this change, Tycho Brahe will always be remembered for three outstanding observational contributions. His thorough studies of the brilliant new star of 1572 refuted the orthodox doctrine of the immutability and perfection of the celestial spheres. His work on the great comet of 1577 demonstrated that such objects move through interplanetary space, instead of being mere atmospheric phenomena as Aristotle had taught. And most important of all, his thousands of accurate positional measurements of heavenly bodies were the material from which Kepler was to deduce the laws of planetary motions.

But the big red-bearded Danish nobleman preferred to think of himself as an aristocrat rather than an astronomer. His father had a considerable estate in Scania, the southern province of present-day Sweden that was Danish until 1658. There is a tradition that Tycho always wore court costume while observing. The most obvious explanation is not that Tycho had some unusual reverence for astronomy, but that he sought to escape being branded with the low social status of scientific practitioners in 16th-century Europe.

This proud and quarrelsome man was the feudal lord of the island of Hven, assigned to him in 1576 by King Frederick II of Denmark. Here Tycho lived in state for two decades amid his retainers and scientific aides, in a combined manor house and observatory which also had a private jail. He was an oppressive landlord to the farmers on his island, who finally rose against him. To many of his contemporaries he must have seemed more a hot-tempered country squire than one of the greatest scientists of his time.

His temper gave rise to a celebrated mishap that was described in P. Gassendi's biography of 1654 and repeated in J. L. E. Dreyer's *Tycho Brahe* (1890). As a young student at Rostock, Germany, in 1566, Tycho fell out with another Danish nobleman, named Manderup Parsbjerg. They first quarreled at a dance on December 10th (four days before Tycho's 20th birthday), renewed their dispute at a Christmas party, and two nights later fought with swords. In the duel Tycho lost part of his nose. To hide the disfigurement he replaced the lost piece by a device of gold and silver. Gassendi was told by a pupil of the Danish astronomer that the latter always carried in his pocket a box of ointment, which he frequently rubbed on his nose. Dreyer adds: "The various portraits which we possess of Tycho show distinctly that there was something strange about the appearance of his nose, but one cannot see with certainty whether it was the tip or the bridge that was injured, though it seems to be the latter."

The story that Tycho lost his nose in a duel and thereafter wore an artificial one became widely spread and acquired various apocryphal details. One little indication of its diffusion in the early years of the 19th century is a stanza in the famous Astronomer's Drinking Song, which Augustus de Morgan quoted in his *Budget of Paradoxes:*

The noble Tycho placed the stars,
Each in its due location;
He lost his nose by spite of Mars,
But that was no privation:
Had he but lost his mouth, I grant
He would have felt dismay, sir,
Bless you! he *knew what he should want*
To drink his bottle a day, sir!

When Dreyer published his standard life of Tycho in 1890, the episode seemed hardly better founded than George Washington's cherry tree or Isaac Newton's apple. But belatedly fresh evidence appeared. On June 24, 1901, 300 years after Tycho Brahe's death, the city officials of Prague opened his marble tomb in the Tyn church, in the presence of Prof. A. Schrutz and Dr. H. Matiegka of the university medical school. There were two skeletons inside, one of a man clad in a red silk robe, the other of a woman with crossed hands.

Tycho Brahe's nose

The appearance of Tycho's nose seems a bit strange in this little-known portrait that resides at Gavno Castle, Naestved, Denmark. It is one of two depicting this famous Danish astronomer discovered in the castle's collection by Fletcher G. Watson during a visit in 1976. According to the inscription, the painting was done when Tycho was 50, presumably in 1596. This portrait is recorded as a copy, and the name of the original artist is unknown. Courtesy Baron Otto Reedtz-Thott.

A thorough scientific examination of the former verified that it was indeed the remains of Tycho. The measurements of height, the massive bones, and the great mustaches and beard agreed with descriptions and portraits. There was a narrow, curved mark on the skull at the upper end of the nasal opening, and this opening was rimmed by a bright green stain of copper, except for its lowest third.

Dr. Matiegka's account identifies the curved mark as unquestionably the reaction to a wound and shows that the green stain came from some object that remained in postmortem contact with bone for a long time. "This object that contained copper was," says Dr. Matiegka, "in all likelihood the oft-mentioned prosthetic device, the artificial nose. Although it may have been described as silver or gold, it certainly had a high copper content. Tycho Brahe, who was expert in casting metal, would naturally spend much time and effort in obtaining a composition that would be both durable and nearly the color of his skin, so it is understandable that he chose a copper alloy."

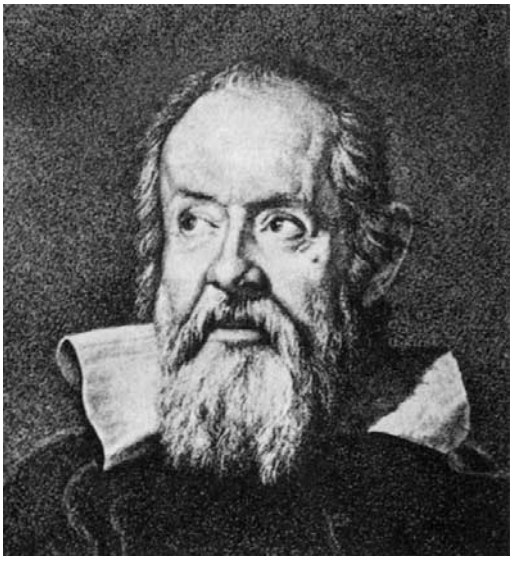
2. The cosmic vision of Robert Burton

GALILEO BUILT HIS FIRST TELESCOPES IN 1609, and the following year announced to the world his epoch-making observations of the satellites of Jupiter, the phases of Venus, the rugged lunar surface, and the resolution of the Milky Way into hosts of faint stars. Some of the earliest reports in English literature of these revolutionary discoveries can be found in Robert Burton's oddly titled *Anatomy of Melancholy*, together with much other astronomical material old and new.

Burton, who was born in 1577 and died in 1640, two years before Galileo, was primarily not an astronomer but an Oxford don of the widest intellectual interests. He spent most of his "silent, sedentary, solitary, private life" in omnivorous reading within one of Europe's best libraries. The distillate of this reading was the *Anatomy of Melancholy*. In this strange but fascinating book, says a modern author, Burton "explored the human mind with the aid of all the learning of the classical world. He is a freebooting scholar, who finds his prizes all equally worthwhile, and all equally relevant to the great purpose he has in mind. He examines the disease of melancholy, Hamlet's disease. . . . Few volumes in English are so full of curiosities, and this eccentric writer has given pleasure to discerning minds in all the centuries since his death."

The astronomical allusions in the *Anatomy* occur chiefly in a long section wherein Burton enthusiastically proposes study of the heavens and Earth as a powerful remedy for care-ridden minds. This passage, entitled "Digression of Air," depicts an imaginary intended journey through space, giving its author the opportunity to list all manner of marvels and scientific puzzles.

On the outward leg of his cosmic voyage, Burton proposes to fly over the arctic regions to discover the cause of terrestrial magnetism. "I will first see . . . whether there be . . . a great rock of Loadstones, which may cause the needle in the Compass still to bend that



Galileo Galilei (1564–1642). Courtesy American Museum of Natural History.

way, and what should be the true cause of the variation of the Compass. Is it a magnetical rock, or the Pole-star, as Cardan will; or some other star in the Bear, as Marsilius Ficinus; or a magnetical meridian, as Maurolicus; or situated in a vein of the earth, as Agricola; or the nearness of the next Continent, as Cabeus will; or some other cause . . . ; why at the Azores it looks directly North, otherwise not?"

Other geographical problems that Burton lists for investigation are whether Hudson's new-found Bay in fact exists, and whether the latest maps are correct in informing us that "California is not a Cape, but an Island." There are also controversies to settle about the Earth's interior: "Franciscus Ribera will have Hell a material & local fire in the Center of the earth, 200 Italian miles in diameter. . . . But Lessius will have this local Hell far less, one Dutch mile in Diameter, all filled with fire and brimstone; because, as he there demonstrates, that space cubically multiplied will make a Sphere able to hold eight hundred thousand millions of damned bodies (allowing each body six foot square) which will abundantly suffice."

In Burton's lifetime Copernican ideas were still fighting for acceptance, and it is therefore natural that the *Anatomy* contains at great length the arguments for an Earth-centered solar system as well as

the newer heliocentric system. Burton is up to date enough to dismiss as "absurd and ridiculous" the notion that the vast machinery of concentric spheres, epicycles, and eccentrics has a material existence. At best he regarded them as concepts arbitrarily invented to help describe mathematically the motions of the Moon, Sun, and planets.

The Medicean Stars, as Burton calls the four bright satellites of Jupiter, are referred to repeatedly. The Oxford scholar had seen them himself, "by the help of a glass eight feet long" he tells us in a footnote. But he also mentions some very early erroneous discoveries of satellites to other planets. "Those several Planets have their several Moons about them, as the earth hath her's, as Galileo hath already evinced by his glasses: four about Jupiter, two about Saturn (though Sitius the Florentine, Fortunius Licetus, and Julius Caesar la Galla cavil at it): yet Kepler, the Emperor's Mathematician, confirms out of his experience that he saw as much by the same help, & more about Mars, Venus; and the rest they hope to find out, peradventure even amongst the fixed stars, which Brunus & Brutius have already averred."

The "two [Moons] about Saturn" is an allusion to Galileo's first telescopic observations of the planet in 1610, which led him to announce Saturn as being triple. Not until nearly two generations later was Saturn's ring recognized as such; Galileo's moons were merely imperfect views of it. The first bona-fide Saturnian satellite was Titan, discovered by Christiaan Huygens in 1655. The early suggestion of planetary systems of other stars is worth notice.

Selenography is mentioned in this book published only 12 years after Galileo took his first look at the Moon through a telescope. Burton notes that Galileo, Kepler, and others "find by their glasses those spots on the face of the moon, the brighter parts are Earth, the dusky Sea, which Thales, Plutarch, and Pythagoras formerly taught: and manifestly discern Hills and Dales, and such like concavities. . . ."

Sunspots raised much controversy among the earliest telescopic observers, and some even regarded them as inferior planets (the Bourbonian Stars) seen in transit upon the solar disk. Burton tells us about this: "One saith the Sun stands, another he moves; a third comes in, taking them all at rebound, and, lest there should any paradox be wanting, he finds certain spots and clouds in the Sun by

the help of glasses, which multiply (saith Kepler) a thing seen a thousand times bigger in plane, and makes it come 32 times nearer to the eye of the beholder: but see the demonstration of this glass in Tarde, by means of which the Sun must turn round upon his Center, or they about the Sun. Fabricius puts only three, and those in the Sun: Apelles 15, and those without the Sun, floating like the Cyanean Isles in the Euxine Sea. Tarde the Frenchman hath observed 33, and those neither spots nor clouds, as Galileo supposeth, but Planets concentrick with the Sun, and not far from him, with regular motions. Christopher Scheiner . . . divides them into Spots and Torchlets, and will have them fixed on the Sun's surface, and to absolve their periodical and regular motion in 27 or 28 days, holding withal the rotation of the Sun upon his Center: and are all so confident, that they have made schemes and tables of their motions. The Hollander [Fabricius], in his controversy with Apelles, censures all: and thus they disagree amongst themselves, old and new, irreconcileable in their opinions. . . ."

Burton clearly recognizes that if the orbital motion of the Earth is admitted, the Earth becomes one of many planets. Thus the others may be inhabited. Kepler is one of the many authors he cites in this connection. "For the Planets, he yields them to be inhabited, he doubts of the stars: and so doth Tycho in his Astronomical Epistles, out of a consideration of their vastity and greatness, break out into some such like speeches, that he will never believe those great and huge bodies were made to no other use than . . . to illuminate the earth. But who shall dwell in these vast bodies, Earths, Worlds, if they be inhabited? rational creatures? as Kepler demands, or have they souls to be saved? or do they inhabit a better part of the World than we do? Are we or they Lords of the World?"

The last few lines may seem familiar; H. G. Wells adopted them as the motto for his famous novel, *The War of the Worlds*.

3. Hans Egede and early astronomy in Greenland

ONE OF THE VERY FIRST astronomical observatories in North America was, surprisingly, at Godthaab, in Greenland. There during the 1780's a Danish astronomer named Linge systematically observed eclipses of Jupiter's satellites, with the aid of a primitive nonachromatic refractor eight feet long. This short-lived establishment at Godthaab was one of a series of observing stations maintained by the Danish government in its overseas possessions; there were others in Iceland and at Tranquebar, in India.

Godthaab had been founded in 1728 by Hans Egede, whose name has been attached to a lunar crater near Aristoteles. He was born in Norway in 1686 when it was part of Denmark. Educated for the church, he was given a pension by King Frederick IV and was sent to Greenland as a missionary to the Eskimos. Landing there with his wife and four children on July 3, 1721, he built a house of stone and earth on Haabets Oe (Hope Island), but later Egede came to Godthaab. Here he was an active missionary until he finally returned to Copenhagen in 1736.

The *Description of Greenland* that Egede published in 1757, a year before his death, contains a long and interesting account of the astronomical knowledge and myths of the Greenland Eskimos. It has special value in dating back to a time before contact with Europeans had made any marked changes in Eskimo culture, so we can recapture their original lore.

To the Eskimos, all the heavenly bodies were originally persons or animals who became transferred to the sky. Anningait, the Moon, was a man who chased his sister Malina, the Sun, into the sky. Now and then the Moon returns to earth in human form to seek amorous adventure. This is why, said Egede, young Eskimo girls are afraid to stare at the Moon. During solar eclipses no man goes outdoors, and during lunar eclipses women stay at home.

As might be expected for an Arctic people who have no dark

nights in summer, the Eskimos' constellation lore was limited to the stars of other seasons. To them Taurus was Kellukturset, a pack of hounds surrounding a bear; this was the star group by which they told the hours of the night. The star Aldebaran was called Nennerroak. Another winter asterism was Siektut, the three belt stars of Orion. According to legend these were three Greenlanders who were lost at sea while seal fishing.

Egede tells us that Nelleraglek was the name for Canis Major, but this attribution may be a slip, for few of the bright stars of this constellation rise in Godthaab's latitude of 64° north. Perhaps the star Sirius was meant, since it can attain an altitude of nine degrees above the southern horizon there. To the Eskimos, Gemini and Auriga formed a single vast constellation, Killaub Kuttuk, the breastbone of heaven. Among the dwellers around Godthaab, Ursa Major was Tugto, the reindeer. Farther north, however, along the shores of Disko Bay, it was called Asselluit, after a wooden implement to which a seal hunter ties the end of his harpoon line.

Egede tells us about the timekeeping of the Eskimos: "They have no calendar or almanacks, nor do they compute time by weeks or years, but only by months; beginning their computation from the Sun's first rising above their horizon in winter; from whence they tell the month, to know exactly the season, in which every sort of fishes, sea animals, or birds seek the land; according to which they order their business."

To this should be added a second account, written nearly two centuries later by the Danish explorer Knud Rasmussen, who in 1903–1904 visited the nomadic Eskimos living in the extreme northwest of Greenland around latitude 77° north. A young man named Maisanguaq told him: "When the constellation of the Great Bear is seen at dawn men are filled with great delight; for then it will not be long till the light comes again. And when at last the Sun comes men call out: 'Joy! joy! the Great Warmer has come; soon we shall be able to seek the sunny side!' And then comes the time when people build sheltering walls of snow and gather round a man's meat at great banquets."