

correspondence, which was rescued from his flat and office by Hamilton.

Harman's account is remarkable for interweaving Price's life with the history of evolutionary theory, including the debates about group selection and altruism in nature. Price had no inkling of how his work on altruism would later influence evolutionary theory. He had links to two men in particular who provided the framework for the evolutionary biology of the 1960s and 1970s: R. A. Fisher and J. B. S. Haldane. Price formalized Fisher's fundamental theorem of natural selection and shared connections with Haldane through University College London and his friends Hamilton and Maynard Smith. Harman's

description of the nexus of debts and rivalries between these and others in the field reveals that altruism was not always present in the actions of those working on it.

Eponyms in science are becoming rare, but the Price equation is still with us. Evolutionary biologists who use it have no excuse not to know what manner of man devised it, or how — at some point between the evening of 5 January and the early morning of 6 January 1975 — that man took a pair of scissors, put them through his carotid artery and bled to death. ■

**W. F. Bynum** is emeritus professor of the history of medicine at University College London. e-mail: w.bynum@ucl.ac.uk

moved to Florence in 1587 when Ferdinando became Grand Duke of Tuscany, manufacturing this even larger sphere in 1588–93.

The instrument is a sumptuous demonstration piece rather than an observational tool. Its lavish ornamentation reflects the power and magnificence of the Medici family as well as the wonder of the heavenly array centred on God's Earth. It is crowned by an orb and cross, a symbol of divinely ordained rule and of Christ as saviour of the world. The disc below the orb depicts God the Father, blessing the Universe he has created. God is painted with great professional skill, possibly by the artist Ludovico Cigoli, author of a treatise on perspective and a friend of Galileo Galilei. The discs marking the spring and autumn equinoxes are each adorned with two angels supporting the shield of the Medici and Christine of Lorraine, Ferdinando's wife. Four more Medici shields are distributed around the celestial equator, lest we forget who is responsible.

The Medici family had an impressive record of supporting astronomers. The stakes in astronomy were huge, both in practical terms and in that it promised a kind of immortality. Cosimo I, the first Grand Duke and father of Ferdinando, brought the astronomer Ignazio Danti to Florence. But after Cosimo's death in 1574, Danti eventually moved to Rome and worked on the reform of the calendar that was eventually decreed by Pope Gregory XIII. Had Cosimo lived longer, we might now have a Medicean calendar rather than a Gregorian one.

Santucci's reputation, like those of other Medicean and papal astronomers, has been cast into the shade by the giant figure of Galileo. Galileo himself provided testimony of the late conversion of Santucci to the Sun-centred view of the cosmos. In a letter to Christine of Lorraine in 1615, he reported that "the late mathematician of the University of Pisa ... undertook in his old age to look into the Copernican doctrine". Santucci "found himself persuaded", Galileo wrote, "and from an opponent he became a very staunch defender of it".

It is poignant that the maker of the grandest of Earth-centred armillary spheres changed his mind shortly before he died. Santucci's immortality lay not in being right, but in being a great designer and maker. ■

**Martin Kemp** is emeritus professor in history of art at the University of Oxford, Oxford, UK.

## Moving in elevated circles

Antonio Santucci's great armillary sphere reveals how patrons sought immortality through science, explains **Martin Kemp**.

Big science has always needed big patronage, from rulers, rich aristocrats or state organizations. A striking example is the huge armillary sphere by the sixteenth-century astronomer Antonio Santucci. The sphere, now splendidly restored, resides in the Museo Galileo — formerly the Museo di Storia della Scienza — in Florence, where it forms the centrepiece of a display of astronomical devices and globes.

A mechanical representation of the scheme of the cosmos according to the Earth-centred view of Ptolemy, the sphere stands about 3 metres high. It is meticulously crafted from gilded and painted metal and wood. The vertical and horizontal axes of the outer celestial sphere support a nested series of seven inner spheres, each of which traces the motion of a planet. The large central Earth, with its tilted rotational pole, Equator and tropics, is marked with the continents and seas as they were then known. Particular care has been lavished on the band on which the 12 signs of the zodiac are painted, reflecting astronomers' duty to provide astrological charts. The ensemble stands on a sculpted base, perhaps a later replacement, of four female sea creatures with bifurcated serpentine tails. Their puffed-out cheeks suggest that they signify the four cardinal winds. A handle was provided to set the model in motion.

Santucci was a little-known astronomer from Pomarance, a small town in the province of Pisa. Probably of humble origins, he excelled in making magnificent instruments and rose to become professor of mathematics at the University of Pisa.

Santucci flourished under the patronage of Cardinal Ferdinando I de' Medici in Rome, who sent another of Santucci's armillary spheres to Philip II of Spain. It is now in the Escorial museum near Madrid. Santucci



Santucci's gilded creation represents Ptolemy's Earth-centred cosmos.