Central peaks were formed by the recoil. The rays emanating from some of the more prominent and fresher-appearing craters were splash features, consisting of material thrown out from the impact that formed them.

Gilbert's most elegant piece of work was his identification of what he called "sculpture"—a pattern of parallel grooves or furrows and smoothly contoured oval hills whose trend lines all converged on a point located near the middle of Mare Imbrium impact basin.

Gilbert's seminal 1892 paper "On the Face of the Moon" seems startlingly modern. Indeed, he deserves to be called the Champollion of the Moon—after Jean François Champollion, the French Egyptologist who completed the decryption of the famous Rosseta Stone. With the insight of genius, he had presented a unified view of the Moon's incredibly diverse and hitherto largely unintelligible detail. But Gilbert was too far ahead of his time; for decades his work was virtually ignored until it was validated and extended by **Ralph Baldwin** and Eugene Merle Shoemaker (1928–1997).

It must be noted that Gilbert's work on lunar cratering theory constituted an extremely small component of his scientific oeuvre. Gilbert was a powerful figure in late 19th-century American science, so important in fact that the National Academy of Sciences [NAS] chose to identify him as the most important American scientist in the first century of that organization's existence. His NAS biographical memoir is, accordingly, the longest such memoir ever published.

Thomas A. Dobbins

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Gilbert [Gilberd], William

BornColchester, Essex, England, 1544Diedprobably London, England, 1603

William Gilbert is best known today for his study of magnets and magnetism, in which he discusses (among other things) the Earth's magnetic field.

Gilbert was the eldest son of Jerome [Hieron] Gilberd, recorder of Colchester. William entered Saint Johns College, Cambridge, and obtained a BA (1561), an MA (1564), and finally an MD (1569). He became a Junior Fellow of Saint Johns in 1561, and a Senior Fellow in 1569. Some authors suggest that he also studied in Oxford, but this is not established. On leaving Cambridge, Gilbert probably undertook a long journey on the continent (likely in Italy). He then settled in London in 1573 to practice medicine. He was elected that same year a fellow of the Royal College of Physicians and was in turn Censor (1581/1582, 1584-1587, and 1589/1590), Treasurer (1587-1591, 1597-1599), Elector (1596/1597), Consilarius (1597-1599), and President (1600) of the College. Gilbert participated in the compilation of the College of Physicians' Pharmacopoeia. His medical career was very successful, and he was one of the prominent physicians in London. Near the end of his life, he became one of the personal physicians to Queen Elizabeth I (1600-1603). After the death of Queen Elizabeth (24 March 1603), he continued as royal physician to King James I and kept this position until his own death by plague 8 months later.

Gilbert's achievement as a doctor would have been enough to secure his fame, but he is best remembered today for his book De Magnete (written in Latin). In this book, published in London in 1600, he presents investigations on magnets. De Magnete provides a review of what was known about the nature of magnetism, as well as knowledge added by Gilbert through his own experiments. Gilbert is sometimes quoted as the father of experimental research and De Magnete described him as the first exemplar of modern science. Gilbert devoted long sections of his book to a critical examination of earlier ideas about the magnet and the compass. The distinction between earlier discoveries and his own input, however, is not always obvious in the text. Gilbert refuted many folk tales, including the medicinal properties of magnets to cure all sorts of headaches, the effect of garlic to weaken the magnetic properties of the compass needle, or even the possibility of a perpetual motion machine. Gilbert also described as "vain and silly" the idea of "magnetic mountains or a certain magnetic rock or a distant phantom pole of the world." Relying on many experiments, Gilbert drew analogies between the magnetic field of the Earth and that of a terrella (Gilbert's word for a spherical lodestone). He studied the magnetic dip (declinatio in Gilbert's word) near the terrella, and conjectured that "the Earth globe itself is a great magnet" (Magnus magnes ipse est globus terrestris); however, rigorous demonstration of the internal origin of the geomagnetic field was only given by Carl Gauss in 1838. Gilbert also proposed to determine longitude and latitude using magnetic dip and declination (Variatio).

De Magnete is divided into six "books." The progression is remarkable. In book III, Gilbert neglected declination to simplify his task. Then he started book IV by reintroducing this notion: "So far we have been treating direction as if there were no such thing as variation." This sort of simplification has now become a rather classical scientific approach, but it was not at that time. The final book (VI) concerned stellar and terrestrial motions. In this book, Gilbert departed somewhat from the scientific rigor that characterizes his work. Guided by the fact that magnetic North and astronomical North are so close, Gilbert suggested that the Earth's rotation was due to its magnetic nature. Gilbert described as "philosophers of the vulgar sort (...), with an absurdity unspeakable" those that believed the Earth to be stationary. He expected the dipole nature of the Earth's magnetic field to add support to the Copernican theory. Because of this book, Gilbert is sometimes considered as one of the earliest Copernicans; his ideas influenced **Johannes Kepler** also.

A second book, *De mundo nostro sublunari philosophia nova*, was published (and coauthored) posthumously in 1651, by one of Gilbert's brothers. This lesser-known text includes a map (or rather a sketch) of the Moon drawn by Gilbert (before the telescope).

Emmanuel Dormy

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Gildemeister, Johann

Born Bremen, (Germany), 9 September 1753

Died Bremen, (Germany), 9 February 1837

Johann Gildemeister of Bremen was a prominent member of **János von Zach**'s "Himmel Polizei" ("Celestial Police").

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Giles of Rome

BornRome, (Italy), circa 1247DiedAvignon, France, 22 December 1316

Giles' significance in the history of astronomy lies in his metaphysical investigations into such fundamental physical notions as matter, space, and time.

Giles was the most significant theologian of the Order of the Augustinian Hermits in the 13th century. His exact date of birth is uncertain, as is his alleged relation to the noble family of the Colonna (which is not mentioned in contemporary sources). He entered the Augustinian order at a young age, about 1260. Later, Giles was sent to study in Paris, where he probably was among the students of Thomas Aquinas from 1269 to 1272, and started writing his commentary on Peter Lombard's Sentences, as well as extensive commentaries on Aristotle's works. If one can believe the traditional, yet often debated attribution, it was also during this period, around 1270, that he composed De Erroribus Philosophorum, the compilation of the philosophically doubtful and theologically condemnable positions of Aristotle, Ibn Rushd, Ibn Sina, Abū al-Ghazali, al Kindi, and Rabbi Moses Maimonides. This work was very much in agreement with the spirit of the 1270 condemnations issued by Stephen Tempier, the Bishop of Paris. Nevertheless, in 1277, Tempier's zeal found even Giles' doctrine suspect on several counts. But Giles' troubles did not prevent King Philip III from entrusting him with the education of his son, the future Philip the Fair. Giles' immensely influential political work, De Regimine Principum, dates from this period, and is dedicated to his royal student.

By 1281, Giles returned to Italy, where he started to play an increasingly important role in his order. Yet, in 1285, upon the reexamination of his teachings, Pope Honorius IV asked him to make a public retraction of some of his theses condemned in 1277. The retraction regained for Giles his license to teach, and so in effect it enabled him to exert an even greater influence in his order and beyond. As a result, the general chapter of the Augustinian Hermits held in Florence in 1287 practically declared his teachings the official doctrine of the order, commanding its members to accept and publicly defend his positions. After serving in further, increasingly important positions, in 1292 Giles was elected superior general of his order at the general chapter in Rome. Three years later, in 1295, the new pope, Boniface VIII, appointed him archbishop of Bourges. As an Italian archbishop in France, and a personal acquaintance of the parties involved, Giles had a difficult role in the conflict between Philip the Fair and Boniface VIII, but on the basis of his theological-political principles, he consistently sided with the pope. On the other hand, after Boniface's death, he supported the king's cause against the Order of Templars. In the subsequent years Giles continued to be active in the theological debates of the time, until his death at the papal Curia in Avignon.

Giles' investigations into the nature of matter, space, and time, although usually carried out under the pretext of merely providing further refinements of traditional positions, in fact opened up a number of new theoretical dimensions, pointing away from traditional Aristotelian positions.

For example, Giles' interpretation of the doctrine of the incorruptibility of celestial bodies does not rely on the traditional Aristotelian position of attributing to them a kind of matter (ether, the fifth element, quintessence) that is radically different from the matter of sublunary bodies (which were held to be composed of the four elements, earth, water, air, and fire). Since matter, according to Giles, is in pure potentiality in itself, it certainly cannot make a difference in the constitution of celestial bodies. Therefore, he argued that what makes the difference is that the perfection of the determinate dimensions of these bodies, filling the entire capacity of their matter, renders their matter incapable of receiving any other forms, and that is why