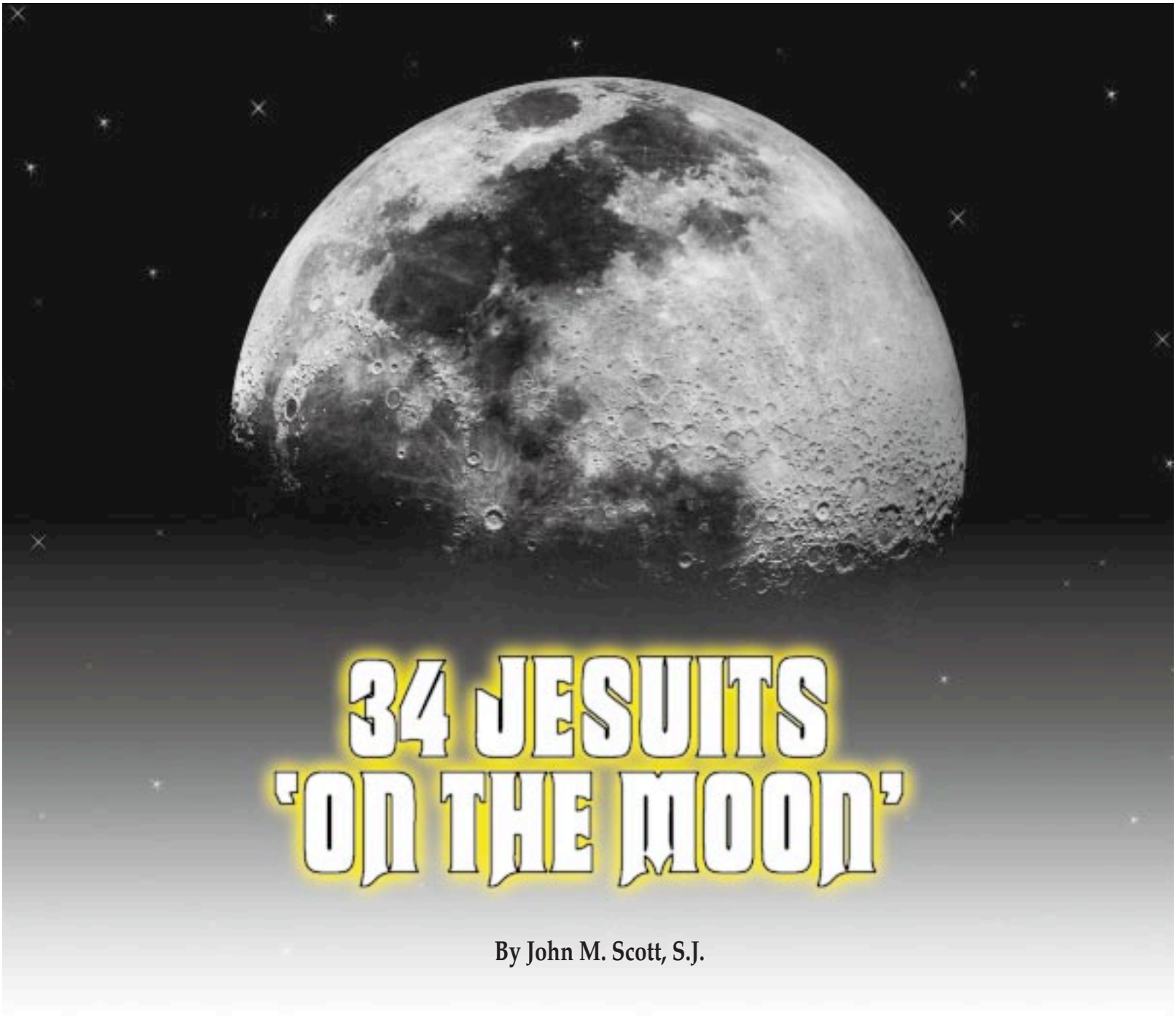


34 JESUITS 'ON THE MOON'

By John M. Scott, S.J.

The next time you look up at the moon, remember that you are looking at the "home" of 34 Jesuits. Their names have been given to craters on the moon.

When our astronauts were in orbit around the moon, they used Jesuit names in describing the rough terrain beneath them.

Who were these men, and what did they do to merit this honor?

Thanks to Fr. Joseph MacDonnell, S.J., of Fairfield University, I can share the following information with you.

All the Jesuits, whose names are on moon maps, taught and wrote books on astronomy, physics and mathematics, and many of these books are still extant. During the first two centuries of Jesuit history there were 631 Jesuit authors of geometry books alone!

Moon Maps

At the entrance to the Smithsonian's moon exhibit is a large copy of one of the earliest (1651) selenographs or moon maps. This map is taken from *Almagestum Novum*, a book authored by Jesuit astronomers Jean-Baptiste Riccioli and Francesco Grimaldi. Across the top is written: "Neither do men inhabit the moon nor do souls migrate there." It is the best known of all selenographs, having been used by most scholars of lunar nomenclature for three centuries.

During these centuries astronomers took turns naming and renaming craters, a process that resulted in conflicting lunar maps.

In 1922 the International Astronomical Union (IAU) was formed. It codified all lunar objects, and 34 of the 39 Jesuit names survived to be listed in the National Air and Space Museum (NASM) catalog, which identifies about 1,600 points on the moon's surface.

Additional Jesuit names are still being added to the list by the IAU.

It would be a mistake to think the Jesuit names are on selenographs only because other Jesuits put them there. Their inclusion was, rather, the result of a convergence of astronomers' opinions over three centuries. Selenographers before and after Riccioli confirmed the decisions again and again that these Jesuits deserved the honor.

This is not surprising.

Recent histories emphasize the enormous influence Jesuits had not only on mathematics but on the other developing sciences such as astronomy. Historians of science always listed a surprisingly large number of Jesuits among the greatest scientists and mathematicians of all time.

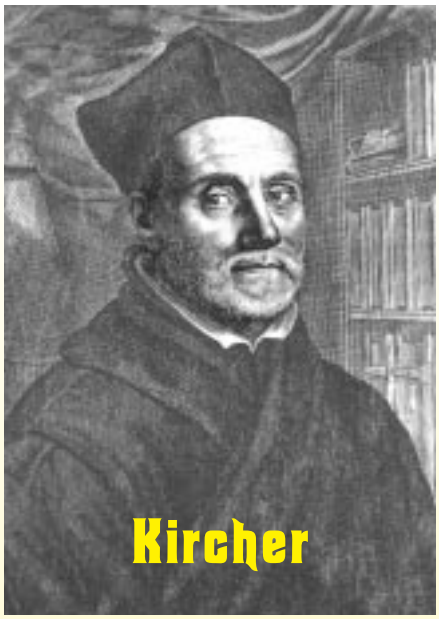
Jesuits, at the cutting edge of the sciences, by 1773 operated 30 of the world's 130 observatories.

Our Men on the Moon

It is fascinating to consider briefly some of the Jesuits whose names are on moon maps.

First and foremost is Christopher Clavius, for whom one of the moon's largest craters is named. When Galileo, with the help of his "cannocchiale" or "telescopio," discovered the phases of Venus, the "three-bodied" appearance of Saturn, and the mountains of the moon, Clavius verified these phenomena and praised Galileo for his discoveries. Galileo was delighted and expressed his joy with Clavius' compliments, "as much appreciated as it was desired and little expected," bringing him "such testimony to the truth" of his observations. In fact Galileo was sick in bed when he received Clavius' letter and claimed that the letter brought him so much joy, it occasioned his immediate recovery. Galileo knew the impact that Clavius' opinions had on the learned world, and wrote: "All the experts, especially the Jesuit fathers, agree with me, as everybody will soon know."

Christopher Grienberger, Clavius' successor, verified Galileo's discovery of the four moons of Jupiter, then later in 1611 organized a convocation honoring Galileo. At this gathering of cardinals,



princes and scholars, the students of Clavius and Grienberger expounded Galileo's discoveries, to the delight of Galileo. The Jesuits said that if Galileo had heeded their advice and proposed his teachings as hypotheses, he could have written on any subject he wished, including the rotation of the earth. (Instead, Galileo alienated the church by proposing his ideas as truth.)

Francesco Grimaldi, also a Jesuit, discovered diffraction and anticipated the invention of the diffraction grating. He was one of the earliest physicists to suggest that light was wave-like in nature. He formulated a geometrical basis for a wave theory of light. His treatise attracted Isaac Newton to the study of optics.

Grimaldi was also the first to publish verification of Galileo's discovery for free-fall depending on the square of the time, and first to consider the effect on free-fall resulting from air resistance.

Another Jesuit, Christopher Scheiner, discovered sunspots independently of Galileo, but erroneously thought they were small planets. But he correctly explained the elliptical form of the sun near the horizon as the effect of refraction.

Magic Lantern and Egyptian Hieroglyphics

The late Cecil B. De Mille was the main speaker at a Communion breakfast held at Loyola University, Los Angeles, March 11, 1956. De Mille said, "We who have been in the motion picture industry for 40 to 50 years sometimes think of ourselves as pioneers - but the real pioneer of motion pictures was a Jesuit, Athanasius Kircher, who invented the magic lantern in the middle of the 17th century.

"It is interesting," De Mille continued, "to note that the same Fr. Kircher was the first European scholar to call attention to the importance of Egyptian hieroglyphics."

Kircher's interest in interpreting obelisks led him to such a thorough study of the subject that princes, popes and cardinals appointed him to decipher various obelisks. It was not until the discovery of the Rosetta stone in 1799 that anyone else had any success. In fact it was because of Kircher's work that scientists knew what to look for when interpreting the Rosetta stone. Kircher has been called the real founder of Egyptology.

Because of his widespread interest and genius Kircher has been compared to Leonardo da Vinci. His first publication concerned magnetism; he emphasized the parallel between the forces of gravity and magnetism. Then he wrote of sundials and in 1656 on the bubonic plague. In the latter he attributes the plague to tiny animals which he had observed under a microscope. This is one of the earliest hints of what we today call "germ theory."

In his book, *Arce Noe* (Amsterdam 1675), Kircher makes it clear that he understands the evolutionary process; later biologists have been impressed by this remarkably progressive viewpoint.

Present at the violent eruption of Mount Etna in 1630, Kircher had himself lowered into the cone for closer observation. It was good preparation for his two-volume work, *Mundus subterraneus*, (Amsterdam, 1665), probably the first printed work on geophysics and vulcanology. In it he held that many of the phenomena on earth including the formation of minerals were due to the fact that there was fire under the terra firma, an unusual teaching for those days.

1. Mario Bettini, *Italian, 1582 -1657, math/astr*
2. Jacques de Billy, *French, 1602-1679, math/phys*
3. Giuseppe Biancani, *Italian, 1566-1624, math/astr*
4. Roger J. Boscovich, *Croatian, 1711-1787, math/phys*
5. Nicolas Cabei, *Italian, 1586-1650, phys/astr*
6. Christopher Clavius, *German, 1538-1612, math/phys*
7. Jean-Baptiste Cysat, *Swiss, 1588-1657, math/phys*
8. Francois de Vico, *French, 1805-1848, astr*
9. Gyula Fenyi, *Hungarian, 1845-1927, astr*
10. George Fournier, *French, 1595-1652, math*
11. Francesco Grimaldi, *Italian, 1613-1663, phys*
12. Chris. Grienberger, *Swiss, 1564-1636, astr*
13. Johann Hagen, *Austrian, 1847-1930, astr*
14. Maximilian Hell, *Hungarian, 1720-1792, phys/astr*
15. Athanasius Kircher, *German, 1602-1680, science*
16. Francis X. Kugler, *German, 1862-1929, hist/math*
17. Charles Malapert, *French, 1580-1630, math/phil*
18. Christian Mayer, *German, 1719-1783, astr/math*
19. Paul McNally, *American, 1890-1955, astr*
20. Theodore Moretus, *Belgian, 1601-1667, math*
21. Denis Petau, *French, 1583-1652, hist/astr*
22. Jean-Bap. Riccioli, *Italian, 1598-1671, selenography*
23. Matteo Ricci, *Italian, 1552-1610, math/geog*
24. Rodes, *Hungarian, 1881-1939, astr*
25. Romana, *Spanish, astr*
26. Christophe Scheiner, *German, 1575-1650, math/phys*
27. George Schoenberger, *German, 1597-1645, math/astr*
28. Ange Secchi, *Italian, 1818-1878, astrophys*
29. Hughues Semple, *Scottish, 1596-1654, math*
30. Gerolamo Sirsalis, *Italian, 1584-1654, selenography*
31. Andre Tacquet, *Belgian, 1612-1660, math*
32. Adam Tannerus, *Austrian, 1572-1632, math/theol*
33. Nicolas Zucchi, *Italian, 1586-1670, math/astr*
34. Jean-Baptiste Zupi, *Italian, 1590-1650, astr*

For three centuries a science museum founded by Kircher (perhaps one of the first of its kind in the world) survived in Rome. Recently the scientific items of this museum were divided up and spread throughout three Roman museums.

In his book, *Jesuite Geometers*, Fr. MacDonnell gives us this interesting account: "As a youngster Kircher had three near-death experiences. While swimming in a forbidden pond he was swept under a mill wheel; later inadvertently he was pushed from an onlooking crowd into the path of race horses, and finally he suffered a gangrenous leg from a skating accident. The last cured suddenly after he prayed to the Blessed Virgin and it occurred to young Kircher that he was receiving a great deal of divine protection and he did not forget these signs. In 1661 he found the remains of an ancient Marian church built by Constantine on the spot of St. Eustace's vision. He restored the place as a shrine and visited it often. When he died, his heart was buried there according to his last request. It is rather remarkable that this brilliant geometer and encyclopedist, called the father of geology and of Egyptology, founder of the first public museum and skilled in so many other branches of knowledge, should reveal such simple piety. Kircher deserves the title given him, 'Master of a Hundred Arts.'"

Reflecting Telescope

The reflecting telescope was invented by Nicolas Zucchi in 1606 who brought it to Johannes Kepler as a gift from the Society of Jesus at the urging of another Jesuit, Paul Guldin. Kepler was so thrilled with it that he dedicated his last book to Guldin.

Achromatic Telescope

The achromatic telescope was invented by Jesuit Roger Boscovich. He did not suffer fools gladly. When shown the treasures of the Jesuit school at Sens in France, that included a rib of the prophet Isaiah, he told the rector to throw it away in the interest of truth.

Boscovich developed the first coherent description of an atomic theory - one of the great attempts to explain the universe in a single idea. His influence on modern atomic physics is undoubted and his works are kept as the Boscovich Archives in the Bancroft Library of Rare Books at the University of California, Berkeley.

The Most Well-Known European Name in China

The *Encyclopedia Britannica* called the Jesuit Scientist Fr. Matteo Ricci "the most well-known European name in China until recent times." Fr. Ricci's arrival in China in 1583 marked the beginning of the Catholic missions there. After working in various provinces he finally settled in Peking in 1601, where, under the protection of the emperor Wan-li, he remained until his death.

His success was due to his complete adaptation to the culture, as well as to his personal qualities and abilities. Recognized as an authority in mathematics and science, he disseminated geometry by lecturing, writing, publishing maps and making scientific instruments. He introduced trigonometric and astronomical instruments and translated the first six books of Euclid into Chinese.

Fix That Clock!

For 20 years Ricci had tried to reach the emperor in person, but the emperor was a recluse not accustomed to seeing even his own people. For a time suspicious landlords would drive Ricci and his companions from their dwellings, until they hit on the plan of renting houses that locals considered to be haunted. Then no one bothered them.

Unexpectedly the emperor summoned Ricci and his companions to inquire about a ringing clock brought to him by the Jesuits. His own scientists had failed to fix it when it stopped. Since the emperor could not receive these foreigners in person, he had an artist draw full length portraits of them, so that they could have a vicarious interview with him.

Eclipse of the Sun

Another opportunity for the Jesuits in China was occasioned by an eclipse of the sun: The prediction of the expected time and duration made by the emperor's own Chinese astronomers differed considerably from the Jesuit prediction. When the latter prediction proved correct, the place of the Jesuit mathematicians was secure.

It is curious that the Jesuits taught the Chinese the heliocentric theory, unaware that Galileo's trial had taken place. So, at the very moment Galileo was being accused of heresy in Rome, the Jesuits in China were teaching the same heliocentric message that they had learned from their Jesuit colleagues before they had left Rome. There was a good five-year lag in communications.

The China Mission

The influence of the China mission was spectacular, and included such projects as determining the Russo-Chinese border. These stories are told in tapestries and paintings found in the world of art, and world histories include references to this mission. Europe was thrilled at the venture.

Louis XIV was so enthusiastic about the work of this mission that at his own expense he equipped a Jesuit group of "Royal Mathematicians" with the latest scientific instruments and paid their passage to Peking. W