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George Coyne S.J.

Agustin Udias S.J.

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# Spiritual Foundations for Jesuit Commitment to Science

By George Coyne, S.J., and Agustín Udías, S.J.

**F**rom its foundation in the 16th century, the Society of Jesus has shown a continuous institutional commitment to the natural sciences, a new educational phenomenon in the Catholic Church. After a brief historical overview, we will attempt to find an understanding of this Jesuit dedication to science in the tradition of Ignatian spirituality.

The presence of Jesuits in different fields of the natural sciences has played a significant role both in the history of the Society of Jesus and in the history of science. In fact, the work of Jesuits in science must be seen in the context of the overall history of science. From its earliest days the Society began to undertake education as the key instrument of its apostolic work. Thus, the history of Jesuit involvement in the sciences begins with the first Jesuit schools. A few years after its founding in 1540 by St. Ignatius of Loyola (1491-1556), the Society began to get involved in education, starting with the training of its own members. In 1544 there were seven colleges or residences for Jesuit students near the universities of Paris, Louvain, Cologne, Padua, Alcalá de Henares, Valencia, and Coimbra. A few years later Jesuits began to establish their own institutions, where they themselves also took charge of teaching non-Jesuit students.

This establishment of colleges and universities was for St. Ignatius a new and somewhat unplanned orientation of the recently created religious order. Colleges became, even during St. Ignatius's lifetime, the most important instrument of the order's apostolic work. At his death in 1556 the Society of Jesus already had 35 colleges in different countries of Europe and one in India. The network of Jesuit schools and universities spread rapidly so that in the 18th century there were about 625 of them. Jesuits also established colleges and universities in America, India, and the Philippines. Scientific work progressed at almost all of these colleges in Europe,

where astronomical observatories were installed. The extraordinary adventure of the Jesuit astronomers in China started, for instance, from one of those early colleges, the Roman College founded in 1551. Matteo Ricci studied there in the famous school of mathematics under Christopher Clavius, and from the time of his arrival to Beijing in 1601 science provided his entrance into Chinese culture. For 150 years thereafter, Jesuits were the directors of the Imperial Astronomical Observatory and held the dignity of mandarins.

Clavius, from his influential position at the Roman College, made a great effort to introduce the teaching of mathematical science in Jesuit colleges, and this was finally accepted among the norms established for all Jesuit schools. The first official mention about teaching mathematics in Jesuit schools is found in the Constitutions, Part IV, written by St. Ignatius, where when treating about the subjects to be taught in the Jesuit universities he says: "there must be taught logic, physics, metaphysics and moral theology and also mathematics, with the due moderation for the end that is intended."

This first century of the Society's history coincided with the origins of modern science, and Jesuit professors were in contact with many of the key scientists of those times, such as Francis Bacon (1561-1626), Tycho Brahe (1546-1601), Galileo Galilei (1564-1642), Johann Kepler (1571-1630), and Christian Huygens (1629-1695). (It is of some interest to note that later on among noted scientists who were students in Jesuit schools one finds

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*George Coyne, S.J., is the former director of the Vatican Observatory, 1978- 2006. He is currently McDevitt chair of religious philosophy at Le Moyne College. Agustín Udías, S.J., is a professor emeritus of geophysics at Universidad Complutense in Madrid and a member of Academia Europaea; he does research in seismology.*

Torricelli, Descartes, Laplace, Volta, Buffon, and Lalande). Jesuit missionaries introduced European mathematics and astronomy to China and India. Jesuits explored the new lands of America from Canada to Patagonia, and they were the first Europeans to navigate the great rivers: the Mississippi, the Amazon, and the Orinoco. Their interest in geography led to an impressive work of cartography, preparing the first maps of many regions of America, China, India, Tibet, and Ethiopia.

This work was interrupted by the suppression of the order by Pope Clement XIV in 1773. After their restoration in 1814, the Jesuits found that the situation with respect to science had changed. Science had made great progress and was firmly established with branches in physics, chemistry, geology, and biology. The situation was thus very different from what it had been before the suppression of the Society. In this period Jesuit scientific work changed with respect to the earlier periods and had a somewhat apologetic character aimed against those who, especially during the Enlightenment, attacked the Church as an enemy of science. Science was considered by many to be a field that was alien, if not hostile, to religion. Jesuits felt the need to show by their scientific work that there is no incompatibility between science and faith. Beginning in 1825, Jesuits established a new network of about 70 observatories throughout the world. Those installed in Africa, Asia, and Central and South America were, in many instances, the first such scientific institutions in those countries.

After this overview of the five centuries of Jesuit scientific tradition, unique in the Catholic Church, one may wonder how this constant involvement of Jesuits in science is to be explained. Obviously other religious orders have also had important scientists. For example, the Augustinian Gregor Mendel was a pioneer in the understanding of genetics. But among Jesuits there has been a continuous, almost institutional, presence from the very founding of the Society up to the present day. We suggest that Ignatian spirituality is an important factor in an attempt to understand this phenomenon and that all aspects of that spirituality derive from the very nature of the universe that Jesuit scientists explore.

Science has shown that the evolution in the universe of

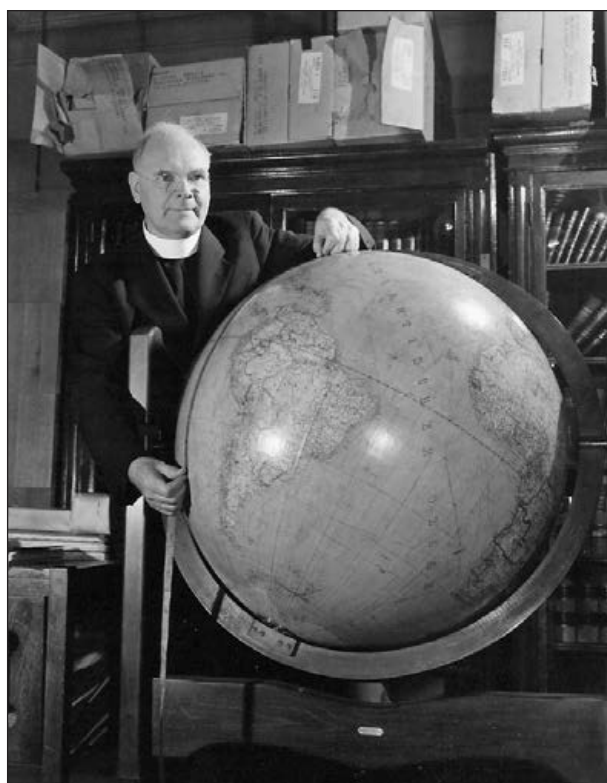
complex organisms, including ourselves, has occurred by natural processes intrinsic to a universe which is about 14 billion years old and contains about  $10^{22}$  stars. Evolution in an expanding universe is still occurring in marvelous ways. The universe is not all predetermined (see *Conversations*, No. 40, Protestant. 40-42). This scientific view of the evolutionary universe and of our place in it opens one to spiritual reflections which are at the core of Ignatian spirituality.

Such reflections bring us to recognize our role as co-creators in God's continuous creation of the universe. We, in a special way, share in the creativity which God desired the universe to have. The apostolic work of a Jesuit derives from the very nature of the universe, and this has a particular significance for Jesuit scientists. Scientific research cannot be separated from faith, our relationship of love to God, the source of all creativity in the universe. Jesuit identity is much more than what Jesuits do. It is bound intimately to the very nature of the universe. From this foundational connection of Ignatian spirituality to the very nature of the universe which science explores we reflect upon the following characteristics of that spirituality.

In the early Society beginning with St. Ignatius there is the constant refrain: "finding God in all things." This is particularly evident in the last meditation of the Spiritual Exercises, the

"Contemplation to Attain Love." Here one is asked: "to look how God dwells in creatures, in the elements, in the plants, in the animals, in men [in me, myself]... and to consider how God works and labors for me in all things created on the face of the earth." Thus, all things, people, and circumstances are occasions for finding God.

Jerónimo Nadal, a companion of St. Ignatius, refers to what has been called the "Jesuit way" with the expression "contemplatives in action." This implies a union between prayer and action. There is no activity, no matter how profane it may look, that cannot be transformed into prayer. Teaching mathematics or physics in a university, observing the light from a distant galaxy, or drawing a map of an unknown region are activities that a Jesuit finds perfectly compatible with his vocation. Through them he seeks to find God in his life.

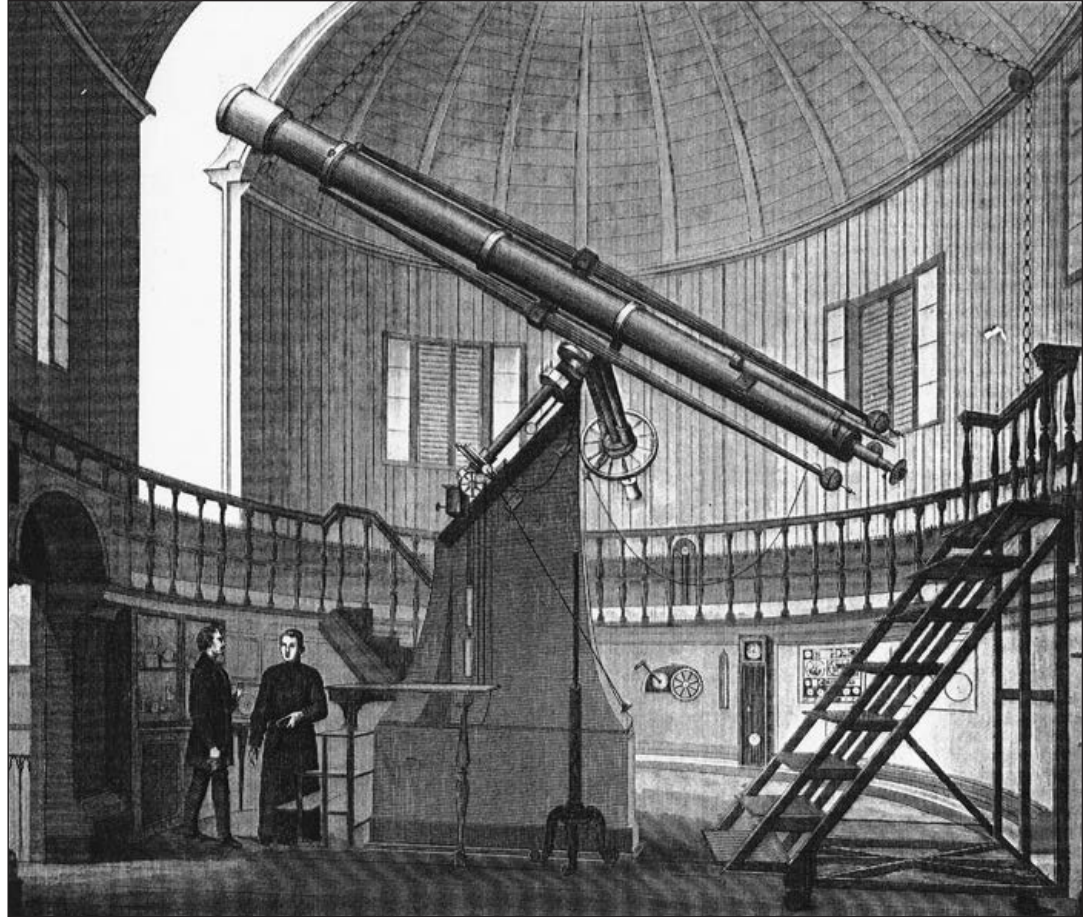


Fr. James B. Macelwane – great seismologist at Saint Louis University.

Ignatian spirituality also places an emphasis on Christian service, which channels religious dedication outward into profane activities not usually associated with religious life. It embraces an active engagement with the world, which leads, in the spirit of science, to a respect for experience, testing, and proof by trial and error. For many, this may become a personal attitude, but for Jesuits it stems from the core of their spirituality. In this spirit Jesuits endeavor in their apostolic work to enter the field of scientific research as a mission territory. Thus patient work in observatories and laboratories is for Jesuits as proper as preaching or pastoral work in parish churches. For them science as knowledge and as an instrument for the good of humankind is also a means for the propagation of the Christian faith. In 1976 the Superior General Pedro Arrupe (1907-1991) put forward the same argument in a letter on the intellectual apostolate:

How can we make the Church present, and keep the necessary personal contacts in a social context of so vital importance as the scientific and technological, without giving to science the importance it deserves? How can we make a theological reflection that is intelligible without a profound knowledge of the scientific roots of this mentality?

Allied to this missionary character of Ignatian spirituality is a preference for situations and activities that may be called "frontier work." Pope Benedict XVI recognized this when he said to the Jesuits: "As my Predecessors have said to you on various occasions, the Church needs you, relies on you, and continues to turn to you with trust, particularly to reach those physical and spiritual places which others do not reach or have difficulty in reaching." This explains how a Jesuit may be praying in a Buddhist monastery or carrying out research in a particle accelerator. Jesuits are always searching for frontiers, for places and situations where the Christian message is not yet known. For example, this spirit drove Matteo Ricci and his companions in the 17th century to present themselves in the Imperial Court of China as



Frs. Algué and Saderra at Manila Observatory.

astronomers of the West, adopting the dress and manners of Chinese scholars.

To summarize, we have shown how from their foundation in the 16th century Jesuits have shown a continuous and institutional commitment to the natural sciences. Carried out for the most part in conjunction with their educational commitments in a network of schools, colleges, and universities, it was marked by different characteristics in the two periods of Jesuit history, the first between the 16th and 18th centuries and the second from the 19th century until today. But the presence of Jesuits in science has continued throughout their long history. The basic motivation for such work is to be found in Ignatian spirituality, which is itself derived from spiritual reflections on the very nature of the universe. The core of this spirituality lies in the emphasis on finding God in all things, the union of prayer and work, a missionary spirit which seeks the greater glory of God, and the preference for work "on the frontiers." This has often involved Jesuits in unconventional activities and situations, including scientific research. The Jesuit scientific tradition has a long history and is still alive. It serves as a special apostolate in the Catholic Church, characteristic of Ignatian spirituality. ■