Augustín Udías

Jesuit Contribution to Science: A History. Heidelberg: Springer, 2015. Pp. xi + 277. Hb, $129.

In his previous book, *Searching the Heavens and the Earth: The History of Jesuit Observatories* (2003), Augustín Udías gave his reader breadth instead of depth, and largely eschewed analysis in favor of description. Even so, the overall effect was awe at the extent of the Jesuit involvement with the earth and space sciences, both before and after the suppression of the order. In the present volume, Fr. Udías uses a similar technique, though with more analysis, and the result is similarly breathtaking. Fr. Udías has succeeded in proving a point that he makes a number of times in the book: for the Jesuits, at least, there was never a conflict between science and religion. He also grapples with three causal questions: why mathematics and astronomy had such an important position in the Jesuit colleges of the sixteenth and seventeenth centuries; why the Society established a worldwide network of observatories in the nineteenth century; and why Jesuit presence in science decreased after the 1970s.

Fr. Udías's section on the pre-suppression order mostly recounts the standard historiography. The Ignatian injunction to find God in all things freed the Jesuits to pursue science in a way that other orders could not. Fr. Udías notes the Jesuits' ability to establish a fresh curriculum, just as modern science was beginning to develop. Not surprisingly he devotes his first chapter to Christopher Clavius, who made mathematics and astronomy an integral part of Jesuit higher education. He subsequently singles out two other Jesuit scientists for extended discussion: Athanasius Kircher, who wrote about a wide range of scientific issues—astronomy, magnetism, volcanoes, earthquakes, disease, geography, antiquarianism, among others—and organized a museum of natural history (which both served as a repository of curiosities and as a spur to experimentation); and Roger Boscovich, who influenced Pope Benedict XIV to overturn the prohibition against the Copernican theory and developed a dynamic atomic theory that unified all natural forces. Jesuit missions across the world also aided their scientific efforts, and Fr. Udías writes about Matteo Ricci's use of mathematics and astronomical prediction in establishing the China mission. Likewise, José de Acosta mapped the terrain, flora, and fauna of Central and South America. In between, Fr. Udías lists the many scientific books written by Jesuits and the many observatories they set up wherever they carried their mission.

The expulsion of the Jesuits from Portugal and Spain and their colonies, their suppression in France, and finally the papal suppression of the Society in

1773 meant not only the end of Jesuit scientific endeavors, but also the closure or takeover of the institutions they developed.

Fr. Udías points out that the suppression coincided with the secularization of education and the beginnings of industrialization in Europe. New technologies encouraged the establishment of observatories, while the specific contexts of the Jesuit missions around the world dictated some of the directions of their efforts. In particular, two new sciences contain elements of both the new and the old—meteorology and seismology. Pre-suppression Jesuits had shown some interest in both these areas, but in the nineteenth century, members of the Society became leaders. Hurricanes and cyclones in the Caribbean and Asia encouraged Jesuit missionaries to study weather phenomena, with the worldwide distribution of observators and the centralization of data through the order allowing them to establish global patterns. Likewise, seismological stations were set up all over the world; Jesuits founded their own seismological association, as well as taking leadership roles in other societies. However, from the mid-twentieth century, as government and international institutions took over tracking weather and earthquakes, the importance of Jesuit institutions began to decline. Fr. Udías singles out four great Jesuit modern scientists: Angelo Secchi, who, in the mid-nineteenth century, pioneered the use of spectroscopy for solar and stellar research; Stephen Joseph Perry, also active in the mid-nineteenth century, who studied geomagnetism (positing the relationship between the variations in the terrestrial magnetic field and the magnetic pole) and led scientific expeditions for the Royal Society; James Bernard Macelwane, who wrote the first textbook of seismology; and the well-known mystic Pierre Teilhard de Chardin, who incorporated his studies of evolution into his Christology. By the 1970s, Jesuit involvement with science had begun to wane. Fr. Udías gives two main reasons: the declining number of men joining the order and the increased emphasis on social justice work.

Fr. Udías ends his work with two appendices that reinforce the strong relationship between the Jesuit order and science—a list of Jesuit scientists by field and a list of Jesuit scientists in the *Dictionary of Scientific Biography*, presumably to show the recognition members of the Society have garnered. More than anything, these appendices emphasize how crucial a starting point this volume is for anyone interested in Jesuit science.

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