

SCIENCE AND RELIGION IN THE SPANISH AMERICAN ENLIGHTENMENT

Rafael E. Tarragó
University of Minnesota

In Spain and Spanish America, the Enlightenment was not an anti-religious movement. Actually, the interest in the dissemination of scientific knowledge characteristic of that cultural movement which originated in Europe in the 18th century was embraced by priests and monks in Spain and Spanish America. The many examples of Catholic clergy involved in scientific endeavors in Spanish America between 1700 and 1808 mentioned in this article suggest that the Catholic Church did not oppose the scientific knowledge promoted by the Enlightenment where its advocates did not ridicule her teachings and did not attack her as an institution.

Despite what the scholarly literature says, the notion of the Enlightenment in Spanish America is still held as a contradiction in terms by popular opinion and even by many academics. Partly this is due to the long held perception that Spain never had an Enlightenment, because of the Catholic Church.¹ The purpose of this paper is to show that contrary to popular opinion, the Catholic Church did not (or could not) prevent the ideas and concerns of the Enlightenment from entering the Spanish speaking world, and that many Roman Catholic clergymen actually did much to spread and support this ideological movement in Spanish America.

In his essay “*Las Luces* and the Enlightenment in Spanish America,” Luis Monguío argues that if the separation of philosophy and technology is the fulcrum of the Enlightenment, and an acceptance of the tenets of modern philosophy, of reason, of the experience of man, and of science are its characteristics, then there was an Enlightenment in Spanish America.² That those Spanish Americans who in the 18th century believed that modern philosophy made valid contributions to knowledge, and the experience of the most enlightened men of all nations was its only foundation believed also that what God has revealed, the Church and the authority of her legitimate interpreters propose as object of belief must be believed made their Enlightenment a Christian Enlightenment.

As Henry Kamen has shown in his book on the reign of King Charles II of the Spains and the Indies (1665-1700), the last of the

Spanish Habsburgs, the stagnation of Spain before the 18th century has been much exaggerated.³ Reason was considered by people in Spain in the 16th and the 17th centuries as a positive and creative force, although it had to move within the limits of Judeo-Christian Scriptures and the teachings of the Catholic Church. The Jesuits were influential in the dissemination in Spain of scientific knowledge from other parts of Europe.⁴ Long before the Enlightenment, a tradition of rationalism developed in the Kingdoms of the Indies (as Spanish America was known from the 16th century until early in the 19th century). In 1700, the year when the first Bourbon king ascended the throne of Spain and the Indies, scholasticism was the quasi-official system of thought taught in Spanish and Spanish American institutions, and the works of many European philosophers of the previous two hundred years were forbidden by the state and church censorship. This does not mean, however, that only one school of thought was imposed—there are differences between the various schools within scholastic theology and philosophy. Nor does it mean that the ideas of authors forbidden by the Spanish Inquisition and her tribunals were universally unknown. There is evidence that the works of Copernicus, Galileo, Descartes, Leibniz, Kepler, Francis Bacon, Isaac Newton, and other “forbidden authors” were known in Spain and Spanish America before the reign of King Philip V (1700-1739).⁵

The foremost promoter of modern philosophy in Spain and Spanish America was the Benedictine Friar Benito Jerónimo Feijóo (1676-1764), who in his *Teatro crítico universal* (1726-1739), a veritable encyclopedia in nine volumes, provided information on a wider variety of subjects, including modern philosophy and science. He submitted to scrutiny popular beliefs, populist idioms (like “vox populi vox Dei”), and beliefs like that of the inferiority of Americans (expounded by “philosophers” of the Enlightenment like Buffon and de Pauw).⁶ Years before Cornelius de Pauw (1739-1799) published in Berlin his *Recherches philosophiques sur les Américains* (1768), and his being commissioned to write the article on America for the 1776-77 supplement of *L'Encyclopedie*, Friar Feijóo had proved in his “Mapa intelectual y cotejo de naciones,” one of the “discursos” in his *Teatro crítico*, that neither the indigenous peoples nor the descendants of Spaniards in America were inferior to Europeans.⁷ Always cautious, Friar Feijóo remained sceptical about the philosophical systems derived from the discoveries of Descartes and Gassendi, although he openly admitted that in the natural sciences the teachings of Aristotle had been superseded. His awareness of the cultural deficiencies in the Spanish speaking world at his time did not bring him to condemn “Spain and all

her works forever;” quite the opposite: he repudiated foreign slander and defended the past achievements of Spain and Spanish speaking peoples.⁸

Mariano Picón Salas argues in his *A Cultural History of Spanish America* (Berkeley, 1962) that there was no quick shift from scholastic thought to 18th century ideology in Spanish American universities and points out that in forgotten theological tracts, like *the Thesaurus Indicus* of the Peruvian Diego de Avendaño, one may notice a theory of the state that has affinities with the ideas of Locke and the French “philosophers” of the 18th century side-by-side with a “radically Christian” concept of the social problems of America.⁹ He concludes that what he calls “Jesuit humanism”—that is, the Christian humanism taught by the Jesuits—was one of the bridges that joined in Spanish America the scholastic thought of the 17th century to that of the 18th century. Paulino Castañeda Delgado, in his “La hierarchie ecclesiastique dans l’Amérique des Lumières,” says that by the second half of the 18th century modernizing Jesuits had already produced a synthesis of Catholic doctrine and modern philosophy equivalent to a Catholic Enlightenment.¹⁰

It is important to take into account the peculiar relationship between the Spanish Crown and the Catholic Church and the political as well as the philosophical views of the Bourbon kings of Spain and the Indies in the 18th century in order to understand fully the reform of educational institutions in those realms by King Charles III (king from 1759 to 1788). Since the times of the Catholic Monarchs, Isabella I of Castile and Ferdinand V of Aragon at the beginning of the 16th century, the Spanish Crown had enjoyed the rights of the Patronato over the Church in Spanish America, which gave it quasi-papal powers in Church affairs there. The Spanish Crown had also obtained or wrested from the popes various privileges, including a percentage from tithes, and the right to nominate bishops in Spain. The Spanish Inquisition was a Crown institution, independent from the pope.

The Catholic Monarchs and their successors of the House of Habsburg tended to negotiate concessions with Catholic prelates and popes and supported Catholic institutions. The Bourbon kings were too impatient to negotiate and wanted outright control over “the Spanish Church.” The Bourbon educational reforms came about at the time when the kings of that dynasty wanted Spain and Spanish America to participate in the philosophical and scientific movements of their age, like their native France, and also because they wanted to introduce in their domains theological and philosophical theories supportive of French regalism (that is, royal authority over the Church) and French

absolutism. King Charles III found two scholarly supporters of his policies in his ministers Pedro Rodríguez, Count of Campomanes (1723-1803) and Gaspar Melchor de Jovellanos (1743-1811). Campomanes concluded in his *Juicio imparcial* (1769) that “the Church is the congregation of the faithful who fight at their own expense to acquire the celestial inheritance, without any temporal matter the object of so holy a mother,” and he challenged papal rights to appoint bishops in the Western Church.¹¹ Jovellanos was a sincere Catholic, but he shared the same views of Campomanes on papal rights, which he deemed usurpations of the Roman Curia.¹²

By the second half of the 18th century a movement within the Church in Spain had developed whose adherents called themselves Jansenists. Most historians claim that Spanish Jansenism had nothing or little to do with the doctrines of Cornelius Jansenius (1585-1638), condemned by the Catholic Church.¹³ This movement was composed of various groups who disagreed among themselves over issues like the autonomy of the bishops from the pope, papal infallibility (in those days not a defined dogma), the temporal power of the Church, and moral theology. The only thing that all of them had in common was hatred for the Jesuits, and indeed, the Jesuits called Jansenists all those who opposed them. Spanish Jansenists favored a theology and philosophy that would not follow the neo-scholasticism and Aristotelianism of the Jesuit Francisco Suárez (1548-1617); an internal piety contrary to the Jesuits’ penchant for religious pageantry and richly decorated churches; and a moral rigorism emphasizing fear of sin, unlike the emphasis on conscience, circumstances, and understanding of human weakness characteristic of the probabilism of the Jesuits.¹⁴

At the time when the Spanish Crown wanted greater control over the Church and claimed absolute political authority, and an increasing number of elements within the Church opposed the Jesuits because of their theology and were jealous of their influence, they persisted in teaching a constitutional theory of political authority and the supremacy of the pope in Church matters. In 1767 King Charles III expelled the Jesuits from all his domains, refusing to give a reason for this action, but he would never have dared to expel them had he not been assured of the support of an influential party within the Catholic Church. According to the historian D. A. Brading, Charles III’s minister of Justice, Manuel Roda, was a Jansenist, and contemporary sources claimed that Roda was responsible for engineering an alliance between “free thinkers” and Jansenists to destroy the Jesuits.¹⁵ It is debatable that the closing of hundreds of schools in Spain, Spanish America, and the Philippines caused by this expulsion was a blow for education, but

it is generally assumed that the royal decrees bringing the universities of the Spanish speaking world under royal authority that followed it portended an educational reform.

The educational reforms in Spain and Spanish America were characterized by the end of the monopoly of scholasticism, the introduction of modern philosophers in the curriculum of the universities and colleges, and that of French theologians favorable to royal authority over the Church. Jesuit neo-scholastic authors were forbidden, but the works of Saint Thomas Aquinas (1225-1274) and Alonso Cano (1601-1667) were commended. Theology students were encouraged to read Scripture, the writings of the Fathers, the papers of the Councils, and the history of the Church. In the new plan of studies for the seminaries in New Granada (present day Colombia) eclecticism was espoused by the declaration that the only thing to dominate the curriculum should be freedom of choice of philosophical system for the student. This middle-of-the-road approach dominated also in moral theology. In his guidelines for the seminary of Saint Joseph in Guadalajara, bishop Juan Ruiz de Cabañas advocated probabilism, chiding away both probabilism and rigorism.¹⁶

Juan Benito Díaz de Gamarra (1745-1783) and José Pérez Calama (1740-1792) were two bishops who advocated the Enlightenment in Spanish America, and both were eclectic philosophers. In his *Elementa recentioris philosophiae* (1774) Díaz Gamarra criticizes the way in which scholasticism had been taught.¹⁷ Pérez Calama was also critical of scholasticism, and in his articles for the journal *El Mercurio peruano* he decried its methods.¹⁸ Both bishops were critical of Aristotle, although it would be more accurate to say that they were critical of the way in which Aristotle was taught. In his *Reflexiones* (Lima, 1788), José Rezábal y Ugarte made the distinction in his comments on the plan for educational reform at the Convictorio de San Carlos, in Lima saying, “The authors of that plan make a strong attack against scholastic theology, but my criticism goes rather against the abuses committed in its name, which have, indeed, caused harm to the Church.”¹⁹

In the chapter “The Last Stand of the Schoolmen,” in his *Academic Culture in the Spanish Colonies* (Port Washington, 1971), John Tate Lanning points out that for the men of the Enlightenment, Aristotle had become a symbol of the educational system based on authority that they wanted to overturn, but in Spanish America the ideas of the classical philosopher were not condemned “in toto.” In a dispute between Friar A. de Valverde and the Count of Saint Xavier in Caracas in 1770, the former admitted that he would not defend Aristotle’s

Physics and that his *Metaphysics* were obscure, but he argued that he could see no reason and why he could not be guided by Aristotle's *Dialectics* or his *Art of Poetry*.²⁰ The defenders of Aristotle and scholasticism performed a useful service in checking the excesses of the supporters of change, and in certain way, they preserved pluralism.

In Lima, Viceroy Manuel de Amat (1773) insisted that students be allowed to accept any system of philosophy, and a similar intellectual freedom was decreed by Viceroy José Vertiz of Buenos Aires about the same time.²¹ For a while Spanish American academics lived in peace in an eclectic environment. Some modern methods, like those of Descartes and Leibniz, were taught peacefully alongside with Thomism, and reconciled with Christian faith. This was more difficult to achieve with systems like the sensationalism of Etienne Bonnot de Condillac (1714-1780). In 1811 a sensationalist, Father Félix Varela, was assigned to reform the program of studies at the University of Havana, and he abandoned scholasticism altogether. The same sort of educational reform took place eventually in other Spanish American universities, like those of Argentina, where the reforms of Juan Crisóstomo Lafinur in 1819 banished scholasticism.²²

Despite the common reference to the influential thinkers of the Enlightenment as “philosophers,” the men (and some women) of that age were concerned more with “practical knowledge” than with philosophical speculation. The Spanish kings of the 18th century were men of their age, in as much as their support of learning and the sciences was mostly utilitarian. They were concerned also about prestige. In a century when prowess in science and technology were a sign of “enlightenment,” they supported science in order to be thought “enlightened.” The philosophical ideas developed in Europe since early in the 17th century—perhaps as early as the publication by Francis Bacon of his *Novus organum* (1620)—had brought about a change in the perception of the nature of science.²³ Science before the 17th century was natural philosophy, systematic and contemplative. By the beginning of the 18th century, it was increasingly considered an agent of domination.²⁴ The academies of science founded by kings and rulers became information centers for them, and the work of the scientists that joined them a source of prestige and legitimacy for the political actions of their sponsors.

The Spanish Bourbons of the 18th century were generous supporters of the sciences in their domains. Under their rule an interest in practical knowledge began to develop in Spain and Spanish America, which found expression in the Sociedades Económicas de Amigos del País, formed in several cities of the Spanish speaking world for the

promotion of learning and of local economies, which became centers where new ideas were often discussed. The Sociedades Económicas were influential in popularizing philosophical and scientific ideas, making them known outside of the circles of scholars and aristocrats where until then they had been confined. Clergymen formed an important element of the membership of these societies, including several bishops as well as curates and friars.²⁵ The various periodical publications printed in Spain and Spanish America during the Enlightenment were also agents in the dissemination of practical knowledge. Catholic clergymen contributed to them, and the Mexican José Antonio Alzate was actually the publisher of the influential *Gaceta de México*.²⁶

Western natural and physical sciences were cultivated in Spanish America before the 18th century. Father Carlos Sigüenza y Góngora (1645-1700) of New Spain (present day Mexico) is perhaps the most prominent of pre-Enlightenment Spanish American scientists. The method of purification of silver ore by amalgamation with mercury that produced a world inflation in the 16th century was invented by Bartolomé de Medina in Zacatecas, New Spain around 1555, and in Potosí, Bolivia, Father Alvaro Alonso Barba discovered a dry method of purification by amalgamation (the cazo method) which he described in a handbook published in Madrid in 1640, *El arte de los metales*. The “cazo method” was improved in 1785 by Baron Ignaz Born, in Austria, causing a veritable technological revolution in Central Europe.²⁷ In the River Plata area the Jesuits appear to have been the first to introduce the study of Newton and the experimental sciences.²⁸

Fermín del Pino Díaz and Angel Guirao de Vierna list 41 scientific expeditions funded by the Spanish Crown in the 18th century in their article “Las expediciones ilustradas y el estado español.”²⁹ Except for the archeological expedition of Guillermo Dupaix in 1805, all of these royal expeditions had a practical end.³⁰ One of the most ambitious, and perhaps the only one to be successful in its practical end of discovering marketable natural resources, was the botanical expedition in New Granada (present day Colombia) planned by Father Jose Celestino Mutis (1732-1808).³¹

Father Mutis arrived in New Granada in 1760, as physician in the entourage of Viceroy Pedro Mejía de Cerda. His interest in botany led him to begin a correspondence with the Swedish botanist Carl von Linné (1741-1783), and in 1764, he sent to that savant samples of a chinchona that grew in the region of Loja, which allowed him to correct some opinion that he had given on that plant. Eight years later Father Mutis found another specie of chinchona near Santafé de Bogotá,

capital of New Granada.³² The reputation of Father Mutis as a botanist has obscured his knowledge on astronomy, and the event that made his reputation as a scientist in New Granada, his public defense in 1770 of the Copernican system, before the viceroy and religious and academic authorities gathered at the Colegio de Nuestra Señora del Rosario, in Santafé de Bogotá. Four years later the Dominican fathers in that city challenged him to defend the Copernican theory of an heliocentric planetary system against charges that it was contrary to Sacred Scripture and contrary to Catholic teaching. Father Mutis, with the support of Viceroy Manuel de Guirior, confounded the perpetrators of this provocation, and this action brought about official Crown support of heliocentrism in New Granada.³³ Father Mutis's cause was helped by the fact that Nicholas Copernicus's treatise proposing heliocentrism, *De revolutionibus* (1543), had been approved implicitly by the Roman Inquisition in 1757—by taking it out of its *Index librorum*.

In 1763 Father Mutis wrote to King Charles III a proposal for a royal scientific expedition in New Granada, but nothing came out of it until twenty years later, when Viceroy-archbishop Caballero y Góngora brought Mutis's project to the attention of the king, who approved it in 1783. The scientific expedition in New Granada was a veritable scientific program which was to include astronomical, geographic, and physical observations as well as the study of the flora and fauna of the Kingdom of New Granada.³⁴ King Charles III supported it splendidly, with scientific instruments, a technical library, and an astronomical observatory designed by Father Mutis and built by Friar Domingo Retrés in Santafé de Bogotá. This scientific expedition disseminated modern scientific knowledge and became a gathering point for intellectuals in New Granada. Father Mutis became the mentor of young American scientists like Francisco José de Caldas and Jorge Tadeo Lozano. The priest, and the scientists around him, made the first effort to establish an American science, yet his achievements had universal stature, and they were known well beyond his local surroundings. Proof of Father Mutis's renown outside New Granada is that in April 1810 the German scientist Alexander baron von Humboldt and his companion the French naturalist Aimé Bonpland went through a hazardous journey up the Magdalena River in order to meet him in Santafé de Bogotá, and to learn from him.³⁵

Father Mutis placed in the development of Spanish American science the same fervor that other Spanish priests had given to the conversion of non-Christians in the 16th and the 17th centuries. Without being an unbeliever, he was a secularist, and in that sense a man of the Enlightenment. He was a Catholic in good standing in as much as he did

not harbor theological opinions contrary to Catholic teachings, but his heart was in scientific observation, and he was a modern scientist, because his observations were not motivated solely by a desire to understand God's creation, but by a desire to understand the laws of nature and to disseminate that knowledge and its applications.³⁶

The scientific mission of Father Mutis in New Granada achieved the conversion of a scientific backwater dominated intellectually by conceits of the 16th century at the beginning of the second half of the 18th century into a thriving scientific center at an equal pace with the scientific knowledge of its times by the first decade of the 19th century. His exchange with the Dominicans of Santafé de Bogotá in 1774 suggests that he was aware of his bringing about a scientific revolution in New Granada. He did not oppose scholasticism as much as he opposed the use of its methodology in order to impede innovation. Thus he says about scholastic logic in his *Discurso preliminar* (1762) that "it was an art invented in order to guide the intellect which had been turned into a tool to corrupt it." He opposed the pretensions of all systems of thought, weary of their rigidity, criticizing in his *Elementos de filosofía natural* "that species of systematic intellects incapable of addressing diversity." He understood that there is no opposition between breakthrough in knowledge and historical continuity, aware that there is no opposition between the past and the present but an evolution of knowledge.³⁷ The latter insight shows him a man before his time—enlightened rather than a man of the Enlightenment.

The weight of authority bore down heavily upon medicine well into the century of the Enlightenment. It is ironic, given the denial of an Enlightenment in the Catholic Spanish speaking world, that the first modern treatise on experimental medicine appeared in 16th century Spain—the Spain of Philip II and all that king has come to represent. The treatise *Novae veraeque medicinae experimentis et evidentibus rationibus comprobate*, by Gómez Pereira (b. 1500), a treatise on medical principles and facts experimentally arrived, was published in Medina del Campo in 1558. Also in 16th century Spain we find innovative physicians like Luis Mercado (1520-1606), who criticized Hippocrates as unsuited to the modern world, and Francisco Valles (1524-1592), who administered a purgative to King Philip II on the fifth day of a typhoid fever, whose survival disproved the theory of Galen that the patient who grew worse on the fourth day of an illness would inevitably die on the sixth.³⁸

At least in medicine, Spain and Kingdoms of the Indies were not much more backward than the rest of the Western World. In the 16th

century, autopsies were performed in the Indies, and in the 17th century, the Mexican priest Carlos Sigüenza y Góngora was one of the earliest examples of donators of their body for anatomical studies. Father Sigüenza y Góngora, who died in 1700, wrote in his will that his body should be dissected to enable the surgeons to find the cause of the disease which proved fatal. Spanish medicine was so highly developed politically as to anticipate much that has been done in the realm of public health policy in the 20th century. After 1621, no one who was not a graduate of an approved university and duly examined could arrogate the title of bachelor, doctor or master. The creation of the office of the Protomedicado in the Indies in 1570 was a signal step in the direction of the control of medical practice. The Protomedicado became a tribunal of justice as a court and board of medical examiners.³⁹

In 1803 King Charles IV (king from 1788 to 1808) proclaimed his desire to send a medical expedition to his domains in the New World and Asia with the intention of erradicating smallpox. This expedition was an enterprise of its times, in as much as it involved the application of useful knowledge to a beneficent control of nature. Smallpox was a serious thing at the beginning of the 19th century, because there was no cure for it, and in an age unaware of bacteria, people had no idea of the causes of contagion. The most that had been achieved for the prevention of epidemics was quarantining and burning articles of personal use of the ill, as advised in Dr. Francisco Gil's *Disertación fisicomédica en la cual se prescribe un método para preservar los pueblos de las viruelas*, a treatise that Minister Bernardo Gálvez had printed and distributed throughout New Spain in 1785.⁴⁰

The discovery in 1796 by the English physician Edward Jenner of the vaccine against smallpox was a momentous event in the history of medicine. It consisted of the inoculation in a person of the pus in the pustules of cows with cowpox or of that in the pustule that formed in a vaccinated person. Dr. Jenner published his discovery in 1798, and in 1800 it was known in Spain. A translation into Spanish of Jenner's work, *Extracto acerca del origen y efectos de una enfermedad conocida con el nombre de viruela de las vacas*, was printed in Lima in 1802 by Guillermo Río.⁴¹

On 6 June 1803, King Charles IV issued a Royal Order telling viceroys and governors of his non-European realms to give financial support from the Royal Treasure to the vaccination expedition that would depart from Spain later that year and asking bishops and priests to cooperate with its personnel.⁴² The vaccination expedition under Dr. Francisco Xavier de Balmis sailed from Corunna, in northwestern Spain on 30 November 1803, carrying 22 boys from the orphanage of that city

so that, vaccinated successively on the trip, arm-to-arm inoculation could be made. This expedition not only vaccinated thousands of people in the Antiles, Mexico, Central America, Venezuela, Colombia, Ecuador, Peru, Bolivia, and Chile, but also instructed Spanish American doctors on the preparation and the preservation of the vaccine and established vaccination centers.

The Catholic clergy gave their support to the vaccination campaign. In New Spain the expedition was welcomed and feted in cities like Guadalajara and Oaxaca by their bishops. The bishop of Oaxaca encouraged the clergy to support the vaccination campaign, preaching that none of them should feel no obligation to do so, thinking he had the care of souls and not that of bodies; such a view would show his ignorance, a lack of charity, and a failure to understand that he who is able to save a fellow human being and does not do so commits a crime.⁴³ The bishop of Puebla wrote a pastoral letter encouraging his flock to get vaccinated, and he himself assisted in the formation of a vaccination board.⁴⁴

Upon its arrival to Venezuela, the expedition divided in two. Dr. Balmis took his section to Cuba, New Spain, the Kingdom of Guatemala (present day Central America) and the Philippines. Dr. Salvany, the assistant director of the expedition, took his section to South America, where he received support from the Catholic clergy, too. In Popayan (in present day Colombia), the vaccination expedition was welcomed by Church authorities, who celebrated a solemn act of thanksgiving in the major church of the city. In Quito (in present day Ecuador), the bishop and other city authorities carried in arms into the city the children bearing the source of the vaccine.⁴⁵ After Quito, the expedition under Salvany went to Cuenca, where the Bethlehemite Friar Justiniano de los Desamparados joined it. From Lima, Dr. Salvany sent Dr. Manuel Julián Grajales to Chile, where he found that the vaccine had been introduced from Buenos Aires and that it had been administered by Friar Pedro de Manuel Chaparro.⁴⁶

It seems to me that there is documentary evidence contrary to the assertion by Gerald R. Cragg in his *The Church and the Age of Reason, 1648-1789* (Penguin Books, 1966) that in Spain the new philosophy of the 18th century made little impression and left the Church virtually untouched. His assumption that the Inquisition had long restricted any free activity of the spirit and done its utmost to isolate Spain from the contagion of foreign thought grossly overestimates the power and the efficiency of that peculiar institution.⁴⁷ It can be argued that Spain and Spanish America had an Enlightenment, although one more akin to that of Germany— according to Lewis White

Beck, a mixture of pietism, French classicism, and Leibniz-Wolffian scholasticism until King Frederick II of Prussia peopled the Berlin Academy with French free thinkers—than to that of France.⁴⁸ In the 18th century, the Spanish speaking world was not the only place where the Enlightenment co-existed with a deeply Catholic feeling. That was true also of Austria, according to Nicholas Till in his *Mozart and the Enlightenment* (New York, 1993).⁴⁹

Far from a general clerical opposition to the Enlightenment in Spanish America, the examples that we have presented are testimony of the support of the Enlightenment in theology and philosophy, the natural sciences, and public health policies by members of the Spanish American clergy, including bishops. In New Spain, the most outstanding scientist of the century of the Enlightenment was Father José Antonio Alzate (1737-1799). Father Alzate disseminated scientific knowledge in the various scientific publications that he edited between 1769 and 1795.⁵⁰ The first vaccination center in Mexico City was established in September 1804, in the parish of San Miguel, at the expense of the pastor, Father José María Guereña.⁵¹ All that said, we may ask, in the fashion of the Enlightenment, “What is the use of that knowledge?” We may answer that question with a baroque answer, paraphrasing the 17th century Mexican polymath Sor Juana Inés de la Cruz, “We learn to be less ignorant.” But there is also an Enlightenment answer to that question, “History is a lesson book.” The complex and unpredictable relations between science and religion in the Spanish American Enlightenment corroborate what Rodney Stark says in the chapter on the religious origins of science of his controversial monograph *For the Glory of God* (Princeton, 2003) to the effect that many of those who made the Scientific Revolution saw themselves as students of God’s handiwork.⁵²

Notes

1. Gerald R. Cragg, *The Church and the Age of Reason, 1648-1789* (Harmondsworth: Penguin Books Ltd., 1966.), p. 229
2. Luis Monguío, “‘Las Luces’ and the Enlightenment in Spanish America.” In *The Ibero-American Enlightenment*, A. Owen Aldridge, ed. (Urbana: University of Illinois Press, 1977), p. 211.
3. See Henry Kamen, *Spain in the Later 17th Century* (London: Longman, 1980).

4. Otis Howard Green, *Spain and the Western Tradition* (Madison; University of Wisconsin Press, 1963-1966), v. 1, pp. 207-208; see Victor Navarro Broton, "Los jesuitas y la renovacion cientifica en la España del siglo XVII" *Studia Historica. Ha. Moderna*, 14 (1996), pp. 15-44.
5. John Tate Lanning, *Academic Culture in the Spanish Colonies*. (Port Washington, NY: Kennikat Press, 1971), p. 64.
6. D. A. Brading, *The First America* (Cambridge: Cambridge University Press, 1991), p. 423. astique dans l'Amérique espagnole a l'epoque des Lumières." In *L'Amérique espagnole a l'epoque des Lumières* (colloque franco- espagnol du CNRS, 18-20 septembre 1986) (Paris: Editions du Centre National de la Recherche Scientifique, 1987), p. 94.
11. Brading, Op. Cit., p. 504.
12. Ibid., p. 509.
13. Juan Marichal, "From Pistoia to Cádiz: A Generation's Itinerary, 1786-1812." In *The Ibero-American Enlightenment*, p. 105; Castañeda Delgado, Op. Cit., p. 89.
14. Castañeda Delgado, Op. Cit., p. 94.
15. Brading, Op. Cit., p. 499.
16. Castañeda Delgado, Op. Cit., p. 95.
17. Joseph Perez, "Tradition et innovation dans l'Amérique des Bourbons." In *L'Amérique espagnole a l'epoque des Lumières*, p. 238.
18. Ibid., p. 239, note 8.
19. Ibid., p. 240, note 10.
20. Lanning, Op. Cit., p. 67.
21. Ibid., p. 69.
22. Luis Leal, "Felix Varela and Liberal Thought." In *The Ibero-American Enlightenment*, pp. 236-237.

23. Francis Bacon, *New Organon*, edited with an introduction by Fulton H. Anderson (Indianapolis: Bobbs-Merrill Educational Publishing, 1960), pp. 114-120.
24. Antonio Lafuente, "Las expediciones científicas del setecientos y la nueva relación del científico con el estado" *Revista de Indias* 47 (1987), p. 373.
25. Karl Schmitt, "The Clergy and the Enlightenment in Latin America: An Analysis" *The Americas* (Academy of American Franciscan History) 15 (April 1959), p. 385.
26. José Luis Martínez, *El libro en Hispanoamérica: origen y desarrollo* (Madrid: Ediciones Piramide, 1986), pp. 43-48.
27. Perhaps the best work on mining technology in early Spanish America is Clement G. Motten's *Mexican Silver and the Enlightenment* (Philadelphia: University of Pennsylvania Press, 1950).
28. Schmitt, Op. Cit., p. 384.
29. Fermín del Pino Díaz and Angel Guirao de Vierna, "Las expediciones ilustradas y el estado español" *Revista de Indias* 47 (1987), p. 429.
30. Lafuente, Op. Cit., p. 377.
31. Miguel Angel Martínez, *Contribuciones americanas al mundo* (Madrid: Anaya, 1988), p. 62.
32. Ibid., p. 63.
33. John Tate Lanning, "El sistema de Copérnico en Bogotá" *Revista de historia de America* (Mexico) 18 (1944), pp. 279-306.
34. Diego Mendoza, *La expedición botánica de José Celestino Mutis al Nuevo reino de Granada y memorias inéditas de Francisco José de Caldas* (Madrid: Librería General de Victoriano Suárez, 1909), p. 94.
35. Eduardo Mendoza Varela, *Regreso a la expedición botánica* (Bogota: Litografía Arco, 1983), pp. 107-108.

36. Jeanne Chenu, "De la terre aux étoiles: quête scientifique et identité culturelle en Nouvelle Grenade." In *L'Amérique espagnole à l'époque des Lumières*, p. 247.
37. *Ibid.*, p. 250.
38. Lanning, *Academic Culture in the Spanish Enlightenment*, p. 93.
39. *Ibid.*, pp. 112-115.
40. *Ibid.*, p. 121.
41. *Ibid.*, p. 123.
42. Michael M. Smith, "The 'Real Expedición Marítima de la Vacuna' in New Spain and Guatemala" *Transactions of the American Philosophical Society*. New Series 64, pt. 1 (1974), pp. 14-15.
43. Gonzalo Díaz de Yraola, *La vuelta al mundo de la expedición de la vacuna*, facsimile of the 1948 edition and English translation by Catherine Mark (Madrid: Consejo Superior de Investigaciones Científicas. Instituto de Historia, 2003), p. 57.
44. Francisco Fernández del Castillo, *Los viajes de Don Francisco Xavier de Balmis. Notas para la historia de la expedición vacunal de España a América y Filipinas (1803-1806)*, 2nd ed. (Mexico: Sociedad Médica Hispano Mexicana, 1985), p. 148.
45. *Ibid.*, p. 192.
46. Lanning, *Academic Culture in the Spanish Colonies*, p. 123.
47. Cragg, *Op. Cit.*, pp. 229-230.
48. *Eighteenth Century Philosophy*, edited and with an introduction by L. W. Beck (New York: The Free Press, 1966), p. 11.
49. See Nicholas Till, *Mozart and the Enlightenment: Truth, Virtue, and Beauty in Mozart's Operas* (New York: W. W. Norton, 1993).
50. Elias Tribulse, *El círculo roto* (México: Fondo de Cultura Económica, 1984), p. 107.

51. Fernández del Castillo, Op. Cit., p. 141.

52. Rodney Stark, *For the Glory of God. How Monotheism Led to Reformations, Science, Witch-Hunts, and the End of Slavery* (Princeton: Princeton University Press, 2003), pp. 166-172.