Faith, Physics, Calculus and Catholics

Trevor Lipscombe

Ask a seasoned home schooler about literature, history, or social studies and she'll probably speak glowingly about a certain curriculum or set of books that she's used. Ask about science, and it's a different matter. As Catholics, though, we should rejoice in science and be proud of our contribution to it. We live in an age where many people regard faith and science as incompatible or, as with Galileo and the Inquisition, antagonistic. Faithful Catholics, though, have brought about some of the finest achievements of modern science.

Take the use of Arabic numerals. We use these every day and teach our children multiplication from early on. They are a marked improvement over Roman numerals. Anyone who disagrees should tell me, as quickly as possible, what LXXII/ IX equals! The first champion of Arabic numerals in Western Europe was Gerbert d'Aurillac, a man better known to history as Pope Sylvester II. To date, he is the only Pope to have had his mathematical works collected and published.

Ioannes Sacrobosco (John of Holywood) was one of the first book writers to use Arabic numerals. In undergraduate days, you probably hauled around the bulky textbooks required for physics and astronomy. These come and go, as they become outdated, or changes in the curriculum require a new book. John of Holywood, though, cornered the market. For some two hundred years, every European university required students to read his three major works, *De Sphaere, Algorismus,* and *Computens.* John was buried in the graveyard of Saint Mathurin in Paris, the principle house of the Order of the Most Holy Trinity, to which he may well have belonged. His De Sphaere, a set of lectures on Ptolomy's Almagest (an "Almagest for Dummies") was in use for over four hundred years, even after the heliocentric view of the solar system had become common. The man who introduced the sun-centered solar system was Nicolaus Copernicus, a Catholic monk.

Sacrobosco's *Algorismus* described methods to calculate certain formulae (the word stems from the Arab astronomer Al-Khwarizmi, and is the root of the word Algorithm, used in computer science). It seems as though we Catholics have been good at such calculations. Internet credit-card security depends upon large prime numbers (actually, two of them, multiplied together to make one huge non-prime number). As long as an eavesdropper can't find those two factors, your credit-card info is safe. How do you discover large prime numbers? Rely upon the work of Marin Mersenne or, more accurately, Fr. Mersenne of the Order of Minims. Mersenne primes, an entire

class of prime numbers that includes the largest ones known to mathematicians, is named after him.

Another Catholic mentioned in most algebra books is Maria Gaetana Agnesi. She had twenty siblings and she had wanted from an early age to become a nun, though her father objected strongly. She's mostly famous to math teachers for the "Witch of Agnesi," a curious curve that is fun for students to draw. Agnesi was brilliant, speaking a slew of languages -- living and dead -- and was learned in philosophy and theology as well as mathematics. At the urging of her tutor, a monk, Agnesi wrote one of the first textbooks in mathematics not composed in Latin. John Colson, a professor of mathematics at England's Cambridge University was so impressed that he learned Italian simply in order to translate the book into English. He didn't do it that well, for he mistook the word versiera (curve) for aversiera (witch), so the "curve of Agnesi" became the "witch of Agnesi" for all time. Pope Benedict XIV appointed Agnesi to a personal Chair at the University of Bologna and also awarded her a Papal medal. In her later years she gave up the life of the intellect and worked with the poor and the sick, founding a hospice for elderly women.

Catholics have also left their mark on twentieth-century science. While no-one should claim that Einstein was Catholic, he did participate in Catholic catechism classes in the Petersschule that he attended. Later, in Princeton, he used to discuss transubstantiation with the Catholic chaplain, for it was a subject that fascinated Einstein. When Einstein came up with general relativity, he looked for solutions of his equations in which the universe was static and unchanging. Another physicist, though, saw that Einstein's equations also described an expanding universe. This physicist was Fr. Georges Lemaitre, a Belgian diocesan priest who served on the Pontifical Academy of Sciences. He's been called the "Father of the Big Bang" and coined the phrase "the primeval atom" to describe the nature of the early universe. When Pius XII was informed of Lemaitre's "Big Bang" solution, he was delighted. An expanding universe meant a universe with a beginning in time, a moment of Creation. A moment of Creation, the Pope thought, implied there was a Creator. Physicists at Cambridge University were so disturbed by the Big Bang's theological implications, they constructed a rival model. Their so-called Steady State model is now thoroughly discredited, and the Big Bang has won the day. Sadly, though, many Catholics have forgotten Pius XII's delight and want to disown the Big Bang, with its implicit moment of Creation and whose description so closely matches the account in Genesis.

No matter where you look in science, major contributions by faith-filled Catholics abound. We worry about cloning, and rightly so, but the study of genetics is certainly a proper line of human inquiry. The laws of genetics were laid down by Gregor Mendel, an Augustinian monk who came up with laws of heredity by cultivating sweet peas in the monastery garden. His rules for the inheritance of genes may help doctors and scientists one day to overcome hereditary illnesses, such as cystic fibrosis and sickle-cell anemia.

We can, in this age of science, seem slightly old fashioned with our notions of belief and faith. A story is told of a young man in France who shared a train compartment with an elderly gentleman on the way to Paris. The old man got out his rosary and started to tell his beads. The young man, irate, lectured the other on the wonders of modern science, of how belief was old-fashioned, and how the old man should stop praying the rosary. The old man smiled, listened politely, then completed all fifteen decades. As the train pulled into the station, the elderly gentleman thanked his companion for their conversation and gave the young man his business card. It bore the name Louis Pasteur.

As Catholic home schoolers, we should be proud of the rich heritage of Catholic science. We have played a major role in formulating the current theories of the universe, we have eradicated major diseases, we have discovered the rules of hereditary, we have championed branches of mathematics. The Pontifical Academy of Sciences draws some of the world's major scientists to attend its meetings, and the Vatican Observatory is one of the world's major astronomical observatories. We have much to be proud of. We have much to teach our young. Let's renew our efforts to teach our children science, so they may help to unravel the mysteries of God's universe.

Trevor Lipscombe lives in Catonsville, Maryland. A father of four, he has a doctorate in physics from Oxford University and has "assisted" in homeschooling his children by helping them make Hoverpets, use vacuum bazookas, and see if toast really does land jelly-side down. He works for Johns Hopkins University Press.