

Teaching Evolution in Mexico: Preaching to the Choir

Antonio Lazcano

In some of his writings, Charles Darwin expressed his interest in visiting Mexico. Although he never fulfilled that wish, Mexicans have reciprocated his interest with a long-standing commitment to his ideas. Based on the common misapprehension that Mexico's strong Catholic background has led to a rejection of evolution, many people in the United States remain convinced that teaching and research on the origins of life must be severely limited in my country. Deriving in part from Spain's Black Legend—in which the stunning intolerance exercised by the Inquisition became unfairly viewed in subsequent centuries as iconic of the country and its colonial exploits as a whole—this self-assuring American prejudice has led many uninformed observers to believe that today's Mexicans are the intellectually suffocated children of the Counter-Reformation, still ruled by a taciturn Papist church that rejects the notion of Darwinian evolution and other major scientific advances while clinging to its theological obsessions.

I am always amused when I am asked by my American colleagues about the problems and pressures they imagine I face in Mexico because of my interest in life's beginnings. However, pressure to include creationism in

public pedagogical and research settings has been primarily a phenomenon in the United States. Only twice during my 30 years of teaching about evolutionary biology and research into the origins of life, have I encountered religious-based opposition to my work. In both cases, it came from evangelical zealots from the United States preaching in Mexico. One of the little recognized U.S. imports into Mexico is a small flow of creationists, who, through religion, are trying to impose their fundamentalist beliefs and hinder the teaching of Darwinian evolution in all levels of schooling.

It is true that the arrival of Darwinism was an unsettling event for a number of Latin American Catholics, and led to criticism from various sectors of the Church. However, historians have recorded no major controversies developing in Mexican society after the publication in 1859 of *The Origin of Species*. Such quietude stemmed in part from the fact that Rome does not advocate the literal reading of the Bible the way Protestant evangelists do. With time, the clash between the Old Testament and Darwin's ideas faded into a more or less peaceful coexistence between the theories and discoveries of evolutionary biology, on the one side, and the teachings of



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the Church, on the other. Although it might not be generally or frequently acknowledged, there has been an age-old tradition of compatibility between science and the Catholic Church. The Galileo affair stands out as an anomalous moment of extreme intolerance.

Of course, neither the Church nor its members are monolithic entities. As in other places with a strong Catholic background, such as France, Italy, Spain, and most Latin American countries, Mexican society as a whole is not only predominantly secular, but it also takes for granted the existence of strong laical institutions. This is a subtle but important distinction that explains why Mexico and many largely Catholic countries succeed at maintaining an extended form of secularism while also supporting religious freedom. This works so long as citizens in these countries express this freedom within the realm of their personal beliefs and not within a context of public policy-making. It helps here that in Latin America most Catholics tend to read the Old Testament not as the literal truth, but as a depiction of the ways in which divine creation may have taken place. It is thus possible to be a Catholic Bible-reader, or more generally a believer in the supernatural origin of life, without being a card-carrying creationist who has to reject Darwinian evolution in order to maintain logical consistency within a framework of fundamentalist Christian premises.



Antonio Lazcano
Mexico

Antonio Lazcano, a biology professor at the Universidad Nacional Autónoma de México (UNAM) in Mexico City, has studied the origin and early evolution of life for more than 30 years. He was trained both as an undergraduate and graduate student at UNAM, where he focused on the study of prebiotic evolution and the emergence of life. An academic deeply committed to public education, he has devoted considerable efforts to scientific journalism and teaching. He is the author of several books published in Spanish, including *The Origin of Life*, first printed in 1984 and which has become a bestseller with more than 600,000 copies sold. He is an avid promoter of evolutionary biology and the study of the origins of life in Latin America, and has been professor-in-residence or visiting scientist in France, Spain, Cuba, Switzerland, Russia, and the United States. In addition, he has served on many international advisory and review boards, including ones for NASA and other international organizations. He has just been reelected president of the International Society for the Study of the Origin of Life, the first Latin American scientist to occupy this position.

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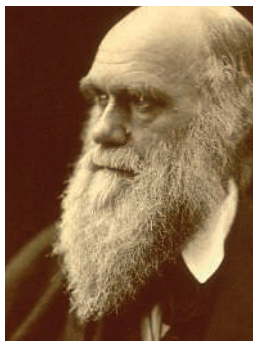
A Love Affair with Darwin

The study of the origin of life and other issues of evolutionary biology run deep in Mexican culture. This shows up in many ways, including Diego Rivera's cheerful mural paintings of Charles Darwin in public buildings and the popularity of Aleksandr Oparin's ideas about life emerging from a primordial soup. More than 70 editions of *The Origins of Life*, one of Oparin's earliest books, have been published here and read by generation after generation of high-school students since it was first translated in 1937. Perhaps even more important is the nationwide exposure for many decades of Mexico's schoolchildren to evolutionary ideas included in the textbooks published by the Mexican Secretary of Public Education, which are provided free to all students. The lessons based on these materials are a preamble to in-depth teaching of evolution in secondary (middle school) and high schools.

In the early part of the 20th century, the Mexican naturalist Alfonso L. Herrera (1865–1942) became one of the most active early popularizers of evolutionary ideas. With relentless energy, he lectured, wrote, and established public museums devoted to the promotion of Darwinism. He also contributed to the science of evolutionary biology by developing a theory on the autotrophic origins of life, according to which the first cells had been endowed since their emergence with the plantlike ability to synthesize their own components from carbon dioxide. Although none of Herrera's associates built upon his theory, he had a lasting influence in Mexican biology. Many years after he died, his contributions are still acknowledged, a fact that indirectly helped my own early professional development.

Some 30 years ago, I became intensely interested in the prebiotic significance of extraterrestrial organic compounds, and decided to teach a course on the origins of life at the Universidad Nacional Autónoma de México (UNAM). In large part because of the intellectual foundation Herrera had laid down many decades ago, and the sympathy that Darwin's ideas inspire in Mexico, my proposal to teach the course—in spite of my youth and lack of experience—was greeted with considerable enthusiasm by my colleagues, the university administration, and the students. To this day, new generations of students continue to flock to this and other courses on evolutionary biology.

In yet another sign that Mexico's educa-



tors and students embrace Darwinism, my associates and I are often invited to speak in public and private schools, including those run by Catholic nuns and priests, to talk about the origin and evolution of life. The list of venues includes a conference at the oldest Mexican Catholic seminary. Many of the students and professors at the seminary may have seen evolution as the unfolding of a divine plan, but they also saw no doctrinal conflict between their own personal faith and Darwin's scientific ideas. They even found hilarious the idea of teaching creationism based on biblical literalism.

As shown by the opinion article published on 7 July 2005 in the *New York Times* by Christoph Cardinal Schönborn, not all members of the Catholic hierarchy feel comfortable with the premises and results of evolutionary theory. It is equally true that some Church thinkers and theologians have tried to criticize the philosophical tenets of evolutionary theory, but most tend to accept the results of

What a guy. In Mexico, Darwin doesn't get a lot of grief.

experimental research and the general evolutionary framework, while maintaining a spiritualist stand. This attitude, which has been prevalent among Vatican theologians especially since the times of Pope Pius

XII in the middle of the last century, owes much to the intellectual sophistication of orders like the Jesuits and the Dominicans.

In his famous 1996 address to the Pontifical Academy of Sciences, the late Pope John Paul II acknowledged that the theory of evolution is not a mere hypothesis, while also reiterating the supernatural origin of the human soul. By shifting emphasis from creation per se, to the origin of the soul, Pope John Paul II found a relatively safe common ground to stand on, since scientists are entirely unable to prove (or have no interest in proving) the existence or nonexistence of the soul. In spite of such subtleties, most Mexican Catholics clearly do not view the premises and developments of evolutionary theory as a battleground or as major theological risk. Stealing the spotlight for the moment for Mexican Catholics and other Christians are ethical controversies associated with new and emerging biotechnologies, especially those based on stem cells, fertility research, and genetic manipulation

Science Be Damned

It is hard for Mexicans to understand the hold that religion has in America, and many of us are baffled by the lax attitude of policymakers in the United States to the religious

right, who manage to influence and sometimes undermine the public educational system. Thomas Jefferson's famous phrase about "the wall of separation" between the Church and State may be a guiding principle of American politics, but the huge cultural space that evangelical Protestantism and other politically active religious movements have gained in the United States demonstrates how tenuous are the boundaries between the secular and the religious.

As summarized by Noah Feldman in his book *Divided by God*, the belief that the Old and New Testaments were literally and verbally inspired is deeply rooted in American mainstream culture, and remains a pervasive influence in many aspects of everyday life, including elementary and higher education. In contrast, Mexico still maintains some anticlerical attitudes, and public education bears the secular trademark of the Enlightenment, whose introduction into the country was facilitated by some prominent priests and Jesuits.

Feldman's thesis itself has deep roots. "For more than a thousand years," wrote Thomas H. Huxley in 1843 in the preface to his book *Science and Hebrew Tradition*, "the great majority of the most highly civilized and instructed nations in the world... have held it to be an indisputable truth that, whoever may be the ostensible writers of the Jewish, Christian, and Mahometan [Islamic] scriptures, God Himself is their real author; and, since their conception of the attributes of the Deity excludes the possibility of error and—at least in relation to this particular matter—of willful deception, they have drawn the logical conclusion that the denier of the accuracy of any statement, the questioner of the binding force of any command, to be found in these documents is not merely a fool, but a blasphemer. From the point of view of reason he grossly blunders; from that of religion he grievously sins."

Although many American churches appear to reject the fundamentalist campaign against Darwinism, some of the most aggressive versions of creationism—including the latest one dubbed "intelligent design" by its champions—have been growing rapidly in the fertile soil provided by some of the evangelical churches that sprung up in the 19th and early 20th centuries. The United States is unique among Western countries for its religiosity. Polls consistently show that only a small percentage of Americans hold a secular view of the world, compared with an overwhelming 40% of the population that believes in strict biblical creationism.

This explains in part why following the 1987 United States Supreme Court ruling that opposed the teaching of so-called creation

science in the classroom, a new, recycled, highly pragmatic creationism has evolved (if you pardon the pun). It is a movement that has eliminated open references to Christianity; built networks of lecturers and researchers that propagate the creationist theology; introduced new players like the intelligent design movement; found major sources of funding from foundations run by politically active Christian conservatives; and adapted its fundamentalist literalism not only to the rhythm of pop music but also to the Web.

Their accomplishments can be measured not only by their emerging success in undermining the separation of Church and State in the context of science education in public schools in some states like Kansas, Ohio, and Pennsylvania, but also in the statements by major political figures, including President Bush, that attempt, if not to appease the religious right, at least to assure the public of their unwillingness to take a firm stand in support of evolutionary theory.

Dangerous Exports

Since we can never know in full detail how the origin of life took place, it is not surprising that it is becoming a target for intelligent design creationists. The geological and chemical evidence required to understand life's beginnings remains insufficient and difficult to understand. For creationists, that evidentiary gap provides an opportunity to erect a framework of controversy and endless discussion around the study of prebiotic evolution and the origin of life, which they assume are best explained by an intelligent cause rather than by an undirected process like natural selection.

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It is true that there is a huge gap in the current descriptions of the evolutionary transition between the prebiotic synthesis of biochemical compounds and the last common ancestor of all extant living beings. Even the unanticipated discovery in 1982—by the research teams directed by Thomas Cech and Sidney Altman—of catalytic RNA molecules (ribozymes), which can be loosely described as nucleic acids that simultaneously have characteristics of DNA and enzymes, has not closed this gap. Instead, that and related discoveries have led to a more precise definition



Darwin's place. At this elementary school, named Evolución, in the small Mexican city of Pachuca, children celebrate Darwin's birthday (12 February) with a ceremony and display of murals on his life and theory.

of what should be understood as the origin of life. The origin of protein synthesis is still not understood, but the surprising conservation of widely distributed polypeptide sequences related to RNA metabolism has led my group and others to suggest that these sequences provide insights into an RNA/protein world that may have resulted from the interaction of ribozymes with amino acids, and that very likely preceded our familiar DNA/RNA/protein world. Our understanding of the origin and early stages of biological evolution still has major unsolved problems, but they are recognized by the scientific community as intellectual challenges, and not as requiring metaphysical explanations, as proponents of creationism would have it.

Scientists from other countries could take a certain solace in the fact that the creationist movement appears to be largely confined to the United States. I find it extremely encouraging that Mexican students, for the most part, are not driven by gaps in the scientific view of life to search for religious explanations or to vitiate evolutionary theory by advocating intelligent design. Our teachers and pupils alike generally view the framework of intelligent design as a thinly disguised attempt to introduce religious preconceptions into the classroom. Even so, it would be unwise to

simply sit back and watch with incredulity as our American colleagues struggle against intelligent design creationists and other fundamentalisms. There are, in fact, manifold indications that the creationism movement has been flexing its muscles and looking to proselytize far and wide. Its potential threat to science education in Mexico and other Latin American countries should not be underestimated.

In the United States, Hispanics account for 14% of the population, but the demography of American science does not reflect this figure. The success of the American educational system in attracting Latinos (many of whom live in the Bible belt) into science careers has been limited, but the evangelical movement has not lost time in recruiting them. Its progress in the United States has been extended by many fundamen-

talist Mormons and Pentecostalist missionaries who travel abroad to search for adherents in other countries. Their followers now include growing numbers of legal and illegal Mexican migrants, driven by the American dream, who go back and forth across the border. Steeped in the parochial thinking of biblical literalism, the open commitment by these missionaries to impose nonsecular views in education is an indication of a looming confrontation in both countries. Tall fences make good neighbors, but stronger new forms of cooperation between the academic communities on both sides of the Mexican-American frontier could do better.

Creationism is a danger to science education that should be addressed by a constructive dialogue and collective actions led by imaginative researchers and educators on both sides of the border. Our answer to the fundamentalist challenge could include better academic exchange programs, common strategies designed to promote the teaching of evolutionary biology, and joint outreach activities for both Mexican and U.S. Latino students, who share important cultural backgrounds. The potential benefits of such common strategies could be manifold, including a proper honoring of the freedom of all to follow (or not) religious beliefs, while rendering to Caesar the things that are Caesar's, to God the things that are God's...and to Darwin those that are Darwin's.

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