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# In Talks Ranging from Microbes to Distant Galaxies, AAAS Caribbean Division Exhibits a Commitment to Public Engagement

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## News [2]

SAN JUAN, Puerto Rico—When Daniel Altschuler talks about the public’s relationship with science, he is an uncompromising realist. While some people have a good grasp, he said, most have misimpressions and even profound gaps in basic understanding. But as an author and former director of the Arecibo Observatory, Altschuler knows, too, that almost everyone is fascinated by the question of life on other planets.

And so, when he spoke to students, teachers, and scientists at the AAAS Caribbean Division’s Annual Conference here, Altschuler appealed directly to this common interest, flashing colorful slides of Martians and extraterrestrials as depicted in comic books and film. But before long, there was a seamless transition: Though he continued to talk about extraterrestrial life, he had dismissed pseudo-science and was offering plain-spoken lessons in cosmology, chemistry, and even mathematics that must guide any serious scientific effort to find life beyond Earth. The audience—from elementary school students and their teachers to other scientists—was rapt.

Altschuler’s presentation was one of the highlights at the Caribbean Division conference, held 24 October at the soaring Puerto Rico Convention Center. The day featured talks on Darwin, microbes and the International Year of Astronomy, plus chemistry workshops for students at different levels, but the overarching theme was building public interest in science.

At a brief ceremony to open the meeting, AAAS Caribbean Division President Jorge Colón and University of Puerto Rico astronomer Carmen Pantoja dedicated the meeting to Daniel R. Altschuler, former director of the Arecibo Observatory.

“A large segment of the population is interested in science, but they don’t really know how to approach it,” Altschuler said in an interview. “A lot of books are written by scientists who want to popularize their subject, but the books are inaccessible to this segment. They need something more basic, but they’d be bored by a basic chemistry or physics book.... So the way to do it—you have to write narratives. You have to write stories.”

Altschuler is the author of “Children of the Stars” (2002), published in Spanish as “Hijos de las Estrellas,”

and in Italian, as well. The conference was dedicated to Altschuler for his long work in promoting science not only at Arecibo, but in Puerto Rico, the Caribbean, and the world. Another successful scientist-author, Mexican biologist Antonio Lazcano, talked about Charles Darwin and evolution at the level of microbes, while other presentations focused on the astronomy and green-chemistry workshops for students at different levels.

But throughout the day-long meeting, the overarching theme was building public interest in science, an issue that resonates in Latin America as it does, increasingly, throughout the world.

“We strongly believe that the public, including poor and disadvantaged groups, has the right to enjoy the benefits of scientific progress and its applications,” said Caribbean Division President Jorge Colón, an associate professor of chemistry at the University of Puerto Rico. “But that right can only be fulfilled if science and technology are broadly available and accessible so that all members of society will appreciate them, understand their significance, participate in decision making about setting priorities in their development, and become aware of the potential dangers of the misuse of science and technology. That’s why public engagement is an important mission for the Caribbean Division as we try to strengthen our region’s science and technological capacity.”

The Caribbean Division was founded in 1985, and its meetings often have focused on issues of global interest—marine science, island ecology, new energy sources, neuroscience, and AIDS, among others. The division also works closely with the Puerto Rico Science Teachers Association.

This year’s meeting was held in conjunction with the Southeastern Regional Meeting of the American Chemical Society, which convened at the soaring Puerto Rico Convention Center in San Juan from 21-23 October. The AAAS Caribbean Division was a co-sponsor of that meeting, and held its own sessions on 24 October.

This year’s Caribbean Division theme—“Astronomy and the Origin of Life”—was intended to celebrate the 200th anniversary of Charles Darwin’s birth and the 150th anniversary of the publication of Darwin’s masterwork, *On the Origin of Species*, along with the International Year of Astronomy [3].

Antonio Lazcano speaks with members of the audience after his presentation.

But Lazcano and Altschuler are the embodiment of international science. Altschuler was born in Uruguay to German parents; he was educated in the United States and worked 17 years at the Arecibo observatory in Puerto Rico. Lazcano has held scholarly posts in France, Spain, Cuba, Switzerland, Russia, and the United States, and he was the first Latin American scientist to serve as president of the International Society for the Study of the Origin of Life.

Lazcano is a biology researcher and professor in the School of Sciences at Universidad Nacional Autónoma de México (the National Autonomous University of Mexico) in Mexico City. He has studied the origin and early evolution of life for more than 35 years, and his 1984 book, “The Origin of Life,” has sold more than 600,000 copies. In a lecture that opened the conference, Lazcano offered tales of Darwin’s youth, humanity’s shifting regard for microbes, and the power of evolution as a concept for revealing human history and the human experience.

Darwin, he said, grew up in an influential family of English doctors and researchers. He attended medical school, but uneasy at the sight of blood, he shifted course to natural science. As he traveled, conducted

research and wrote about evolution, Darwin, like his colleagues of the time, was inclined to use a taxonomy that divided the world simply into animal, plant, and thing. He was aware of microbes, Lazcano said, but they did not draw his close attention, and he did not incorporate them into his theory of evolution through natural selection.

Even before Darwin, and well after, researchers were beginning to discover the power of evolution as a concept, Lazcano told the audience. They could see evolution in religions, the solar system, languages, and civilizations. Things tend to change to adapt to a changing environment; those that can't adapt tend to weaken and die out.

Within a few years after publication of *On the Origin of Species*, microbes began attracting closer scientific scrutiny. Since then, Lazcano said, "for many, many decades, microbes have been the bad guys," disdained in the popular mind as sources of contamination and disease.

But antibiotics introduced after the first broad use of penicillin in the mid-1940s offered a real-time lesson in evolution. Typically within about a decade after a new antibiotic debuted, microbes mutated and became resistant to it. And researchers have come to realize the critical constructive role microbes played building the early Earth's soil and atmosphere, preparing an environment that could nurture the advance of more complex life forms, including humans.

This, Lazcano said, is where both pioneering research into microbes and pioneering research into the stars has a critical impact on our understanding of Earth and its life.

"Our planet is very unique in the solar system," he said in an interview. "Part of its uniqueness results from its interaction with the biosphere—the atmosphere, for instance, or the sediments." The discoveries that the laws of natural science extended beyond Earth into the theological "sphere of the stars"—the locus of heaven in medieval thought—were revolutionary.

"The moment that Galileo points his telescope at the moon, or the Milky Way, and sees that we are made of the stars, it is a shattering of the former picture of the universe," Lazcano said. "I think we really should use this year as much as possible to cherish the inheritance we have both from Galileo and from Darwin."

Altschuler, in his book, followed a different course, but came to a similar conclusion. He traced the creation of the universe, the formation of the planets, the emergence and evolution of life on Earth—and warned of the profound threat that humans are posing to Earth's environment.

In his presentation at the AAAS Caribbean Division conference, Altschuler's mission was in some ways more challenging: He had to engage fidgety fifth-graders, hold the attention of teen-agers as Saturday night approached, and impart useful information to teachers and fellow scientists.

The UFO strategy was a calculation based on long experience in science presentations. He reached back to antiquity and to ornate astrological charts; he summoned the Italian astronomer Giordano Bruno from the 16th century, citing Bruno's conviction that there must be life similar to Earth's on other planets in other solar systems. He flashed posters of Orson Welles' famous "War of the Worlds" radio program and the covers of tabloid newspapers. He described astronomer Percival Lowell's conjecture that canals perceived on the surface of Mars suggested intelligent life on that planet.

It was about that time that one of the younger students in the audience inadvertently turned on a music

player, which filled the room with pop music and nervous laughter.

Altschuler sidled over to the table. “You can turn it off,” he deadpanned in Spanish, “or we can dance.” With the situation defused, he resumed.

How did Martians look? Altschuler projected a series of images from comic books and television programs showing big-eyed, bug-headed aliens. In fact, he said, people think they see evidence of extraterrestrial life in fuzzy, older satellite images of the Martian landscape. They think they see supernatural apparitions in the patterns on a tortilla or the stains surrounding a crack in a cement wall.

“There are many illusions,” he warned, but “our perceptions, and the testimony of experts, often cannot be confirmed.”

From there, Altschuler offered a brief lesson in optical illusions, and the workings of the scientific method. And on from there into a discussion of distances in space, the measure of a light year, the role of water in supporting life, and the imperative that a climate must be basically stable for millions of years as life emerges and evolves.

When he was done, the audience offered enthusiastic applause.

Zayra Feliciano, Ashley McClain, and Erika Navarro, all 17-year-old seniors at Central High's School of Visual Arts in San Juan

“I was practically dragged here by my friends,” admitted 17-year-old Erika Navarro, an aspiring artist who’s now a senior at Central High’s School of Visual Arts in San Juan. “When I was younger—in first grade, maybe up to fifth grade—I was really interested in science, but as I grew up, I lost interest.... This definitely gets me more interested.”

“This was really inspiring because, with the way it was presented, it was easy to understand,” said classmate Zayra Feliciano, also 17. “Science is needed for almost everything you’re going to do.”

Lazcano and Altschuler both focused on the connection between even the simplest life and the majesty of the universe, but they found common cause also on a more immediate issue: The need for scientists to engage with the public on science and technology issues—through schools, museums, and the news media.

A stereotypical view is that the dominance of the Roman Catholic Church in Latin America has impeded science and science education, but Lazcano flatly rejected that, noting the strong contributions to science over the course of centuries from Catholic clerics and scholars. Rather, he and Altschuler see economic problems hobbling the school system, which leads to a too-common disconnect from science.

“There’s a big, big hole there—a silent minority, or maybe it’s a majority,” Altschuler said. “They’re very confused about Darwin, about the universe, about what a galaxy is—they don’t know.”

The challenge, they said, is to get people to see pursuit of science as a defining cultural characteristic, and as critical to preserving the culture.

“When you see Latin America,” Lazcano said, “you see a region of the world that has produced extraordinary writers, extraordinary painters, extraordinary artists. Clearly we have the intellectual capacity to produce extraordinary scientists. But that requires a long-term vision from politicians and from society

to demand that the investments—not only economic, but social and political—continue regardless of the changes in regimes or the economy.”

Failure to do that poses tangible risks. When poverty and lack of education isolate people from the mainstream, they become more vulnerable to the appeal of creationism, which is encroaching from the North, they said. A lack of scientific understanding also poses risks to the environment.

“We are one of the regions of the world—and this is particularly true of Mexico and some South American countries—that have a higher biodiversity,” Lazcano said. “The diversity of plants, animals, and fungi that we have is extraordinary and surprising—and it’s also a biological diversity that we’re losing very quickly because of the lack of awareness of its significance. Whenever you lose a plant or an animal because we lack legal ways to protect them... you may be losing the potential for new drugs, but you’re also losing something that’s very important to your history and your culture.”

In Altschuler’s view, advancing public engagement with science is a way to advance a reason-based view of the world. But pursuit of that goal requires resources. He dreams of the day when Puerto Rico, a U.S. territory that’s home to 4 million people, will have the sort of major science center that’s found in most major U.S. cities.

During his time at Arecibo, Altschuler led the effort to finance and build a visitors center <sup>[4]</sup> that now draws over 120,000 visitors every year, roughly a third of them students. But he envisions something bigger and more ambitious: a major regional facility—devoted, perhaps, to Caribbean science—that would engage the public, serve as a research center, and provide resources and training for teachers and reporters.

Not only would it educate, he said, but it would inspire.

“I’ve thought, and continue to think, that Puerto Rico deserves investment in a major science center,” he said. “It’s an investment in the future. If you get one out of 100 kids who visit to pursue a career in science or engineering or math, you begin to get a very real return on your investment.”

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#### **Links:**

[1] <http://www.aaas.org/person/edward-w-lempinen>

[2] <http://www.aaas.org/topics/news>

[3] <http://www.astronomy2009.org/>

[4] [http://www.naic.edu/outreach/describe\\_fset.htm](http://www.naic.edu/outreach/describe_fset.htm)