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## *Familia, Comunidad y Maestros: How I Became a Latina Science Professor\**

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**ABSTRACT:** People of Mexican origin in the United States have long experienced discrimination in wages, housing, and schooling, which directly impacts their participation in the STEM (science, technology, engineering, and mathematics) workforce. Using interviews of Latina scientists and teachers, autoethnography, family and newspaper archives, and history and social science research, I reflect on key aspects of Mexican and Mexican American history that contribute to the challenges faced by Latinos in the US educational system today. Analysis of my own educational trajectory reveals the hidden part that teacher role models in my community and in my family played in my journey to becoming a scientist. Latina teachers and faculty, middle school science programs, and the provisioning of stipends for undergraduate researchers are emphasized as strategies for increasing student retention and success. The article concludes with several suggestions for how the ecology and evolutionary biology community can amplify the educational success of Latinos in STEM by supporting the training of Latino and other minoritized science, math, and computer science teachers.

**Keywords:** Mexicans, Mexican Americans, STEM education, teachers, Latinas.

When I think back over my academic journey and how it started, the first memory that comes to mind is that of a teacher, actually an actress named Joanna Cameron who played a high school science teacher and the Egyptian goddess Isis on a television show that ran from 1975 to 1977 (Seelye 2021). I say this a bit tongue in cheek, but it was around that time, when I was about the age of seven, that I drew a self-portrait of myself wearing a lab coat and wrote: “When I grow up I want to be a scientist [*sic*].”

I did not know any actual scientists as a child, so seeing this drawing makes me think about how someone like me,

a cis-gendered Mexican American woman of European, Indigenous Mexican, and Native American descent, became a scientist, despite unlikely odds. In the United States, people of Mexican origin are the largest minority group, comprising ~36 million individuals, or 11% of the US population (US Census Bureau 2020). In California, 55% of K–12 students identify as Hispanic/Latino (a category I note can include people of any race, Indigenous, Black, Asian, and/or white; California Department of Education 2021). Yet in our field of ecology and evolutionary biology, only 2%–5% of faculty across all ranks nationally are Latinos (Jimenez et al. 2019). This is unfortunate because research has shown that having a teacher as a role model—even a single teacher—increases student retention by 30%–40% for students of color, especially in elementary school (Gershenson et al. 2018).

Given that I grew up in California and went to a high school in a low-income Latino community with a high dropout rate, how did I become a science professor? What kinds of obstacles did my family have to overcome to make it possible for me to be where I am today? What kind of advantages did I have? It comes down to three things: *familia, comunidad y maestros* (family, community, and teachers). My career as a scientist would not have been possible without all three. And some of the family history I am going to share with you I learned only recently. If I had known some of that history earlier in my career, including some Mexican and Mexican American history, I probably would have felt more empowered as a student, struggled less, and held less negative stereotypes about myself and my community.

The first thing you need to know is that I come from a family of teachers. I have already mentioned Mighty Isis, but before Mighty Isis was my mother, Loretta Mejía. She put herself through community college, as did my father, Peter Briscoe, and then she transferred to the University of California, Riverside (UCR). In 1965, she was one of

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three Spanish-surnamed undergraduates and the only woman out of 76 from San Bernardino County, the largest county in the United States, to graduate from UCR, a school that is now a Hispanic-serving institution (*San Bernardino Daily Sun*, June 4, 1965). While she was in school at UCR, she was a cofounder of MEChA (Movimiento Estudiantil Chicano de Aztlán), an organization promoting “higher education, community engagement, political participation, culture and history,” and she was the editor of its student newspaper, *Adelante* (October 14, 1969). After my mother graduated, she began teaching third grade as an intern teacher at an elementary school that was one of the first segregated schools in the region, built for Mexican students in the 1920s (Ocegueda 2017).

My father, Peter Briscoe, a graduate of UCR, directed the Dependency Prevention Commission’s barrio tutoring program until right before he married my mother. His program’s tutors helped teach reading and math to hundreds of Black and Latino students, including two dozen illiterate adults (Briscoe 2021*b*). My parents strongly believe that literacy develops around the regular reading of newspapers and books and that this forms the basis of civic engagement and a path out of the barrio for people of color. Both my parents were first-generation community college students prior to going to university and both came from working-class families, which made me wonder how they managed to graduate from college.

It turns out that my mother’s mother, Consuelo Lozano, paved the way for my mother’s subsequent educational attainment. My grandmother attended school in a segregated district and, as a high school student, experienced food insecurity. Most of the Mexican kids she had gone to middle school with had had to drop out to work because of the Great Depression. She graduated from Colton High School in 1937 as the only Spanish-surnamed woman to graduate in a class of 110 students (*San Bernardino Daily Sun*, June 11, 1937).

To appreciate my grandmother’s accomplishment, you need to know that people of Mexican descent living in the United States have long faced discrimination in wages, housing, and school (González 1990; Valencia 2005; Ruiz 2008; Griswold del Castillo 2008; Carpio 2019). As one example: “[In] 1931 [the] principal of the Lemon Grove Grammar School [in San Diego County, California] . . . stood at the door and admitted all pupils except the Mexican students. [He] announced that the Mexican children did not belong at the school, could not enter, and instructed them to attend a two-room building constructed to house Mexican children. Dejected, embarrassed, and angry, the Mexican children left the school and returned home” (Alvarez 1986).

My grandmother had a deep admiration for education, and in her 60s, after her children had grown up, she went

back to college, earned a teaching credential, and became a bilingual elementary school teacher (*San Bernardino County Sun*, June 1, 1979; Briscoe 2021*b*).

I did not really appreciate where her inspiration to become a teacher came from until I started looking into her family five years ago. I learned that my mother’s side of the family emigrated to the United States from Michoacán, Mexico, between the years of 1898 and 1905. They had been living on a hacienda (one of the large estates with fields and livestock worked by poor people and owned by individual wealthy landowners) located on the ancestral lands of the Purépecha Indigenous people.

But literacy has deep roots in my mother’s background: I was astonished to learn that my grandmother’s grandfather, my great-great-grandfather Luis Hernández, was a literate man, a teacher on the hacienda who taught all of his children how to read and write in Spanish.

When I was growing up and going to high school, I was deeply bothered by the large number of my fellow Latino classmates who were continuing to drop out, 50 years after my grandmother attended the same high school. It was only as I began to learn about the intentional labor exploitation; the political, educational, and reproductive disenfranchisement; and the grinding poverty (Tuck 1946) that I understood why it was so difficult for young people in my community to do basic things that we hold dear as academics, such as graduate from high school and go to college.

While my family was living on the hacienda, during the rule of the Mexican dictator Porfirio Díaz, conditions were changing in rural Mexico in a way that deeply affected their life. During the 1880s, Díaz rewarded US and European businessmen who had backed his armed ascent to power with land grabs and railroad rights, displacing indigenous people. By 1900, 25% of arable land in Mexico was owned by US investors, as were about 80% of railroads by 1910 (Hart 2002; Hernández 2022). However long and tirelessly my family worked in the hacienda, the rents and costs were such that they, like most landless people, stayed mired in poverty.

Instead of paying the workers in pesos, many hacienda owners printed their own paper money in arbitrary denominations. These vouchers could be used only in the hacienda store, where the owner of the hacienda made back all of the wages that he paid out by selling the farmers goods and services at marked-up prices that they had no choice but to pay (Çuburu-Ithorotz 2008; Romero 2017). Once you accumulated debt as a tenant farmer, even if you died, your debt would be passed on to your children.

So my great-great-grandfather Luis left Michoacán and, like thousands of men from the region, headed north in 1898. To support their families, thousands of men like him from Michoacán crossed the border at El Paso, Texas,

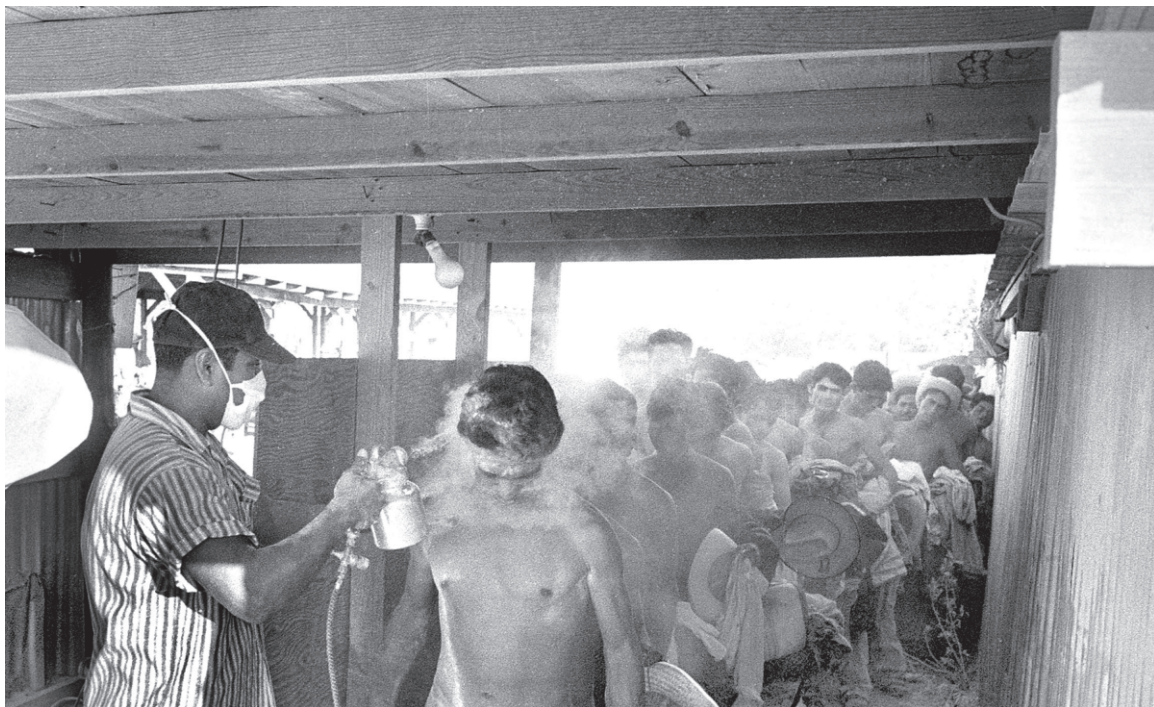
and became migrant farmworkers in California (Gonzalez 1994; Serrano 1998, 2015; Alamillo 2006).

What was going on in El Paso in the late 1800s, I think, is relevant to the ethical practice of science today. Reading Maria Hinojosa's book *Once I Was You*, I was horrified to learn that in El Paso, Mexican workers, both men and women, were routinely subjected to full body inspections, vinegar and kerosene baths, and toxic fumigations using DDT, a now-banned pesticide (from about 1917 onward; fig. 1), and Zyklon B gas (from 1929 onward), and this went on until the 1950s (*El Paso Herald*, January 29, 1917; Romo 2016, 2018; Hinojosa 2020; Terrell 2020). Photographs of these procedures were published in international newspapers and in a German scientific journal (Peters 1937). Dr. Gerhard Peters, the same scientist who published an article in a German pest science magazine about the El Paso use of Zyklon B, went on to become the managing director of Degesch, a German company that in 1940 acquired the patent for the gas's mass production (Romo 2005). Nazis, inspired by what they saw in El Paso, adopted Zyklon B in their gas chambers not just to fumigate clothes but to kill people during the holocaust (Romo 2005; Hinojosa 2020). Peters was convicted during the Nuremberg trials of crimes against humanity (*New York Times*, March 29, 1949). For me, this is one of the most poignant examples of the abuse of science.

Science is not neutral or objective in itself, and this is why we need people of color, LGBTQIA+, two-spirit, and disabled people, who are accountable to other marginalized people in positions of oversight to try to prevent these horrific abuses. My family was unquestionably subjected to this treatment as they crossed the border in El Paso to visit relatives many times, although they never spoke of it.

Seven hundred fifty miles from El Paso is the town of Colton, in an area that had been home to Mexicans since the time of Spanish rule (Vickery 1977). This is where I grew up, less than two miles from the cement plant, in an ethnically segregated Mexican and Mexican American community (Muckenfuss 2015). However, by settling in Colton, my great-great-grandfather had moved himself and later his sons from one system of US and European labor extraction (the hacienda) to another (the citrus industry and cement plant; Alamillo 2006; Carpio 2019). They were intentionally excluded from supervisory roles (Alamillo 2006), and with the deck stacked against them as it was, people in my community got stuck in generational poverty, which is nearly impossible to escape, regardless of the capability and motivation of the individuals involved (Balboni et al. 2022).

For example, one of the people in my family who had to drop out of school to work in the orange groves as a result



**Figure 1:** Braceros (guest workers) being fumigated with DDT at the Hidalgo Processing Center in Hidalgo, Texas, in 1956. Photo credit: Leonard Nadel, National Museum of American History.



of poverty was my grandfather Sebastian Mejía, born in Mexico and brought to New Mexico in 1915 by his parents when he was two years old (Mexican border crossers were not considered illegal in the United States until 1917, during World War I; Hernández 2010). Prior to World War II, my grandfather, like thousands of other Mexicans, was an agricultural worker at the Pacific Fruit Express, loading citrus on trucks. He then fought in the army during World War II (fig. 2; Griswold del Castillo 2008).

So as the granddaughter of farmworkers, I think about the status of agricultural workers in the United States; these are the people who fed us before the pandemic and during the pandemic, who continue to feed us and at the same time are among the most hard hit by wildfires and COVID in California (Méndez et al. 2020). They pay taxes but, because a majority are undocumented, are denied ba-



**Figure 2:** Sebastian Mejía (*right*), grandfather of the author, and an unknown soldier (*left*) in a US Army camp in the Philippines during World War II. Photo courtesy of Adriana Briscoe.

sic social services, like health care and social security, by design (Hernández 2010).

Agricultural workers underpin a \$1.1 trillion industry in the United States (USDA 2020). Currently there are ~2.5–3 million agricultural workers in the United States (National Center for Farmworker Health 2017), 75% of whom are foreign-born; 69% are born in Mexico, and 6% are born in Central America. Many come from Indigenous communities (Méndez et al. 2020; National Center for Farmworker Health 2022). They do not all speak Spanish or English, but they bring their Indigenous knowledge of food production with them to help feed us.

Given the background I have outlined, you can imagine how shocked I was in 2019 to go to the local San Bernardino County Museum, my community's museum, to view a brand-new exhibit on the regional history of the citrus industry and to notice there was no mention of Mexican or Mexican American farmworker participation. The lived experience of thousands of Mexicans and Mexican Americans who labored in the citrus groves, including two generations of my family, was erased.

For my own part, in my work as a scientist, I do not want to contribute to the erasure of scientists from the Global South (Haelewaters et al. 2021; <http://www.scidev.net>), so when I collect specimens and conduct research with Mexican scientists and other scientists from Latin America, to appropriately acknowledge their local knowledge of the biology of the organisms I am studying, I invite them to be coauthors on the publications that result (Macias-Muñoz et al. 2019b; Krishna et al. 2020). Some of my most important articles have come out of these collaborations. For example, in 2009 Jorge Llorente-Bousquets, a professor at Universidad Nacional Autónoma de México (UNAM) in Mexico City, took me and his students to his study site in a rain forest in Oaxaca, Mexico, where we were able to demonstrate that a switch to a new yellow pigment on the wings of *Heliconius* butterflies could serve as both a signal to differentiate potential mates from other butterfly species in a community of mimics and as a warning color to avian predators (Briscoe et al. 2010; Bybee et al. 2012).

With my deeper understanding of my family's history and status in Colton, I can now leverage my position to encourage Latino students and researchers, but it took me a very long time to understand that some of the negative stereotypes I carried around with me about being Mexican American had a lot to do with the political climate in California and the United States in general toward Latinos and toward people of Mexican descent in particular. In 1994, California restricted access to health care and education to undocumented immigrants. In 1996, it banned affirmative action. In 1998, it banned bilingual education. Throughout the entire 1990s, anti-Black and anti-Brown legislation, such as the three-strikes law,

was passed in California. Both my mother and grandmother were bilingual elementary school teachers, so some of these laws affected me directly. By learning more about Mexican and Mexican American history, I have realized that I am where I am because I had teachers who were role models, including in my own family. This was a missing part of the puzzle of my own educational attainment.

As one example, in second grade I had a Mexican American teacher, Mrs. Gloria Preader, who acted on an IQ test I had been administered in kindergarten to advocate for me to be accelerated into the third grade. Although skipping a grade is now discouraged as not being good for students socially or emotionally, in retrospect my teacher's action was a stroke of good luck—42% of schools nationwide did not identify a single student with gifts and talents in 2015–2016, and among those schools with programs for such students, Native American, Black, and Latino students were underrepresented (Gentry et al. 2019). As sociologist Glenda Flores (2017) has argued, teachers of color can sometimes serve as indispensable advocates for minority students who would otherwise be overlooked.

I was fortunate to skip a grade because it put me in Ms. Cejka's classroom. Ms. Cejka volunteered at the La Brea Tar Pits in the summer and brought to class a saber-toothed cat fang we were allowed to handle, and she taught us the scientific names of dinosaurs by having us learn dinosaur songs played on a record player. It was one of my first memories of being exposed to the concept of geological time and evolution, and it became a lifelong passion.

At university and in graduate school, I was fortunate to have had phenomenal women scientist/teacher role models. Professor Carol Boggs and her husband, Professor Ward Watt, introduced me to the wonders of fieldwork at the Rocky Mountain Biological Laboratory. Importantly, Professor Watt paid me a stipend to do research in his lab, which helped me convince my parents to let me do field research instead of coming home for the summer to work. And in graduate school, one of my PhD coadvisors, Professor Naomi Pierce, taught me how to build a dynamic research group and how to collaborate with others in a thoughtful way, and she provided unwavering support for my dissertation study of butterfly vision, a subject my lab continues to study today.

As a postdoc, I was the first Latina to be hired into a faculty position in the School of Biological Sciences at the University of California, Irvine (UCI), nearly 20 years ago. Since 2017 UCI has been a Hispanic-serving institution, meaning it has an enrollment of at least 25% Latino students, yet in 2014–2019 only ~6% of my upper-division students had Spanish surnames.

In 2019, in my own scholarship I became curious and wanted to know how many Hispanic/Latino STEM teachers there are in California public schools, but I could

not find this information anywhere, so I started interviewing science teachers, including Gloria Ramirez-Haldeman, from my old high school. I hired a talented undergraduate computer science major, Dylan Rainbow, to help me analyze more than one million records from the California Department of Education. We found that teaching is the top profession for Latinas, and in California, 21% of public school teachers are Latino (Briscoe 2021a). However, only 3% of the 17% of California teachers who teach science, math, or computer science are Latino (evenly split between men and women), which is about the same proportion (2%–5%) of Latino faculty in ecology and evolutionary biology across all ranks nationally (Briscoe 2021a).

Butterfly research has recently helped me to see my hometown of Colton in a new light, freeing me from my early ambivalent feelings. Less than two miles from my high school, in a dusty, vacant lot located next to the railroad tracks that run alongside a freeway (fig. 3) and next to the cement plant where my ancestors worked, entomologists collected the type specimen of an endemic California butterfly (Emmel and Emmel 1998). The lesson I learned from this is that even in the most desolate-seeming urban spaces, there is precious diversity, both human and nonhuman, that derives from and requires nurturing, despite not having the stereotypical markers of distinction.

I wrote up my findings on Latino STEM teachers (Briscoe 2019), and afterward my mother, father, and I, along with a few friends and high school classmates, started a scholarship fund at my old high school for college-bound seniors (Tomboc 2021). Since 2020 we have awarded 26 scholarships to students, nearly all of whom are low income or very low income and who come from a high school that is 94% Hispanic and 94% economically disadvantaged (US News and World Report 2022). And for a butterfly book I have been researching and writing, I have also endeavored to interview butterfly scientists from diverse backgrounds, such as Jo'lene Saldivar, a first-generation US Air Force veteran, Colton High School alum, and current UCR graduate student who is studying the impact of fire on butterfly host plant communities in Southern California (fig. 4; Sheldon 2014; Harvard Forest 2021). Despite struggling with poverty in high school, similar to my grandmother and a majority of students attending Colton High School today—as well as “acting out,” which led to “less than stellar” grades—Jo'lene managed to follow her childhood curiosity about the natural world, obtain two bachelor's of science degrees, and win a prestigious National Science Foundation Graduate Research Fellowship to study plant-pollinator interactions (Saldivar et al. 2022).

In my own work running a lab, I have also endeavored to mentor and support the careers of a number of brilliant





**Figure 3:** Colton Dunes in Colton, California, is the collection locality of the type specimen of *Apodemia virgulti nigrescens* and one of the last remaining habitats of the endangered Delhi Sands flower-loving fly (*Rhaphiomidas terminatus abdominalis*). Photo credit: Adriana Briscoe.

scholars, such as Dr. Aide Macias-Muñoz, a Latina of Mexican origin and a first-generation English learner who, like my high school classmates, went to public school in California in a low-income district and then to the University of California, Berkeley, for university. To my delight, she was hired as a tenure-track faculty member in the Department of Ecology and Evolutionary Biology at the University of California, Santa Cruz, this spring, where she will run a lab studying eye evolution and regeneration in cnidarians (Macias-Muñoz et al. 2019a; Murad et al. 2021).

Dr. Macias-Muñoz joins a growing cohort of vibrant Latino faculty members in ecology and evolutionary biology. But this group, dynamic, strong, and inspirational though they are, is not yet large enough to serve as role models to the nearly 18.7% of people in the United States who identify as Hispanic or Latino (Jones et al. 2021), which is unfortunate since research has shown that having role models has a positive impact on retention in school, and it is undoubtedly the reason why I became a science professor.

There is so much we can do as educators to lift people up. So I want to end with a call to action on behalf of marginalized youth, BIPOC youth, and the children of immigrants, many of whom are Indigenous peoples displaced

from their homelands because of intensifying climate change (Hernandez 2021).

Here are some things that we as members of the ecology and evolutionary biology community can do to create a more just and diverse scientific workforce: (1) co-author articles with collaborators from the Global South so as to appropriately acknowledge their expertise and support their careers, including people who help collect specimens and who hold relevant permits (Ramirez Castañeda 2022); (2) cite the articles of people in the Global South even if they are in another language; (3) participate in middle school science programs, especially those for girls (Arbuckle 2013); (4) recruit underrepresented minority students from community colleges; (5) take a chance on students with less than stellar grades (their grades may be lower because they had to work through college); (6) pay undergraduates a stipend to do research, especially those seeking to become science teachers; (7) diversify faculty via hiring incentives and a willingness to grow your own talent—even one new faculty member of color makes a difference; and (8) leverage your resources, both material and intellectual, to help teachers by facilitating access to specimens and science materials.



**Figure 4:** Jo'lene Saldívar is a Latina scientist of Mexican descent from Colton, California, and a graduate of Colton High School. She served in the US Air Force prior to attending graduate school at the University of California, Riverside, where she studies host plant-insect interactions. Photos courtesy of Jo'lene Saldívar.

As an example of the latter, my colleague Dr. Rachel Martin, in UCI's Department of Chemistry, has partnered with the Corona Public Library to distribute physics and biology kits with step-by-step instructions in both Spanish and English (Martin Lab 2022). Even for people who do not know any Spanish, there are easy-to-use online translation programs available. Something as simple as offering a Spanish translation of a science experiment can open the doors to a career in STEM for English learner students.

If we could only increase the number of Latinos in STEM, we could help lift communities out of poverty, like my community back in Colton. Latina women are among the most underpaid in the United States (Corbett 2021), while the parents of scientists have higher incomes than even the parents of doctors (Bui 2014; Duffy et al. 2021). In addition, one in five people in the state of California is Latina, and Latinas in California earn only 42 cents for each dollar a white man is paid (Macias 2020). Over a 40-year period, the average wage gap for Latina women is \$1.7 million, which, in the words of Beatriz Acevedo, chief executive officer and cofounder of Suma Wealth, “in turn will rob America of trillions of dollars in taxes that they would otherwise be contributing to pay for schools, urban infrastructure, parks, hospitals, social security, etc. So when Latinas get paid less, America ultimately loses” (Macias 2020).

I would not have been able to evade these doleful statistics without all of the help I have received from the teacher role models in my life. I am excited to see how we can help others achieve similar things.

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