



# Prototype

September

The Lemelson Center  
for the Study of Invention & Innovation

Smithsonian  
National Museum of American History



## Bittersweet Harvest by Peter Liebhold

On September 9, Secretary of Labor Hilda Solis came to the National Museum of American History to open a new exhibition, [Bittersweet Harvest: The Bracero Program 1942-1964](#). Chronicling an important but little-known chapter of American history, this traveling exhibition, developed in collaboration with the Smithsonian Institution Traveling Exhibition Service and the Smithsonian Latino Center, tells the moving story of America's largest guest-worker program.

Started as a temporary, emergency, wartime labor effort, the Bracero Program allowed Mexican nationals to come to the United States on short-term labor contracts. Over the twenty-three years of the program's existence, the men worked primarily in agriculture, toiling in the fields to cultivate and harvest crops such as cotton, citrus, lettuce, and sugar beets. The program was significant in size and effect, with 4.6 million contracts issued, or about 2 million individual workers coming to the United States (some men came more than once). Some people credited the program with saving American agriculture; others claimed it exploited the braceros and depressed wages for American farm workers. The work was grueling and the time spent away from home difficult, but the opportunity to earn money was real. The program was truly bittersweet.

[Read more ...](#)

Image: [Lettuce field/campo de lechugas](#), Salinas, California, 1956, from the Leonard Nadel Collection, National Museum of American History, Smithsonian Institution.



## Notes from the Director

In putting together my thoughts for Hispanic Heritage Month, I called on my old friend Dr. José (Joe) V. Martinez. Joe has worked for over three decades at the Department of Energy, first as research program manager in the department's Office of Science and now as senior science advisor in the same office. Joe hails from Arizona, earned his Ph.D. from Oregon State University, and completed postdoctoral work at Cornell University. As he rose through the U.S. higher-education system, he "couldn't help noticing how few Hispanics there are in the sciences and engineering." This led to a lifelong commitment to opening up opportunities in those fields for Latinos and other minorities. Among his many notable achievements in this area, Joe was a founder and past president of [SACNAS](#), the Society for the Advancement of Chicanos and Native Americans in Science.

The problems he faced were stark, as revealed by data from the U.S. census that show that only 13 percent of the Hispanic population age twenty-five and older currently hold a bachelor's degree or higher. Of those degrees, only small percentages--5 to 8--are in science or technical fields. Only 2 percent of U.S. Hispanics work in STEM (Science, Technology, Engineering, and Mathematics)-related jobs, compared to 5 percent of the total U.S. population.

Underlying these discouraging statistics are multiple disadvantages, ranging from poverty and language problems to poor education and lack of mentors. In truth, this is not just a problem for Hispanic Americans. America's future competitiveness and innovation will depend on its ability to draw Hispanics, who, according to the U.S. Census Bureau, are the fastest-growing and already the largest minority population, into the ranks of scientists and engineers. And, of course, out of this pool will come many of the nation's future inventors.

Despite these numbers, Joe Martinez remains optimistic. Well-meaning people can make all the difference, he believes. Early on he appreciated that mentors and positive role models were critical to developing a scientific career, and he detects a similar attitude among other Hispanics who have made successful careers in science, technology, and

medicine.

Take the case of Alfredo Quiñones-Hinojosa, today a top neurosurgeon at the Johns Hopkins University School of Medicine. (Read [an interview with him](#) in the *New York Times*.) After his family fell into poverty in the late 1980s, he made his way from his home in Mexicali, Mexico, to the U.S. border and, as he phrased it, "hopped the fence." He struggled as a young illegal immigrant in California, first as a farm laborer and then loading fish and sulfur onto freight cars. After being taken under the wing of a caring speech and debate coach at San Joaquin Delta Community College, however, his life took a dramatic turn. From there it was on to the University of California at Berkeley and Harvard Medical School, which, by the way, he found easy compared to working in the fields.

[Astronaut José Hernández](#) also started out as a migrant worker, spending much of his childhood traveling with his family between Mexico and Stockton, California. His inspiration was Franklin Chang-Díaz, raised in Costa Rica and the first Hispanic American to travel in space. "I was always interested in science and engineering," Hernández recalls, but hearing stories about Chang-Díaz turned his gaze upward. Along the way, he earned degrees in electrical engineering and worked at the Department of Energy's Lawrence Livermore National Laboratory, where he helped develop a digital mammography imaging system for the early detection of breast cancer. While applying to the astronaut corps, he came before a review board, where he finally met the man who inspired him in the first place, Franklin Chang-Díaz. The chain of command had become a chain of inspiration. Here perhaps is one key to bringing the untapped wealth of Hispanic American talent to the center of American engineering and innovation, where it both belongs and needs to be.

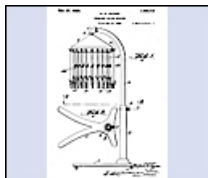
Best regards till next month,  
*Arthur Molella*  
Jerome and Dorothy Lemelson Director



### Have You Seen?

Since its founding in 1995, the Lemelson Center has brought students, Museum visitors, and inventors together in our Innovative Lives program series. And some of those inventors are really out of this world--like Ellen Ochoa, the first Hispanic woman astronaut. Find out more about her life and work in the [Innovative Lives section of our website](#).

*Image: Astronaut Ellen Ochoa, STS-110 mission specialist, looking through the window of the Destiny laboratory on the International Space Station as she views portions of the space shuttle Atlantis and the Canadarm2 in 2002. [Courtesy of NASA Marshall Space Flight Center](#).*



### Trivia Challenge

In each edition of *Prototype*, we offer a question about an invention or inventor that you and your friends and family can try to answer. Sometimes the answer can be found on the Lemelson Center's website, where you can also learn a little more about the subject. Email your answer to us at [prototype@si.edu](mailto:prototype@si.edu) along with your name and mailing address. Each month we'll select winners randomly to receive a small prize from the Center.

Thank you to everyone who entered the August challenge and congratulations to Zoe J. of Louisville, Kentucky, and Elena M. of San Ramon, California, who, among others, knew that Marjorie Stewart Joyner invented a permanent waving machine that allowed a hairdo to stay set for days. Joyner, the granddaughter of slaves, became the first African American graduate of a Chicago beauty school and opened her own salon in 1916. Three years later, she became national supervisor for more than 200 beauty colleges owned by Madam C.J. Walker, the first African American female millionaire. To learn more, [visit our website](#).

**This month's question:** Who invented the AcceleGlove--and what does it do?

*Image: Drawing of Joyner's permanent waving machine from her [U.S. patent 1,693,515, 1928](#).*



### From the Archives

Ripped from the headlines: Ochoa arrested for smuggling arms!



Victor Ochoa dead! Col. Ochoa on trial! Gen. Ochoa attacks a ranch in Mexico and takes everything except money! These sensational statements were everyday news for Victor Leaton Ochoa (ca. 1850–ca. 1945). Born in Chihuahua, Mexico, Ochoa later moved to Presidio del Norte, Texas (on the Rio Grande River), and became a

United States citizen in 1889. Ochoa married Amanda Cole and they had one son, Steve Ochoa. A dreamer, partisan, arms smuggler, editor of Spanish-language newspapers (such as the *Hispano American*), and inventor, Victor Ochoa was a much-wanted Mexican revolutionist.

Ochoa was bitterly opposed to the dictatorship of Porfirio Díaz, the president of Mexico from 1876 to 1880 and from 1884 to 1911. He became involved in the fight by Mexican rebels in the early 1890s to overthrow Díaz (some consider Ochoa to be the originator of the revolt). Díaz ultimately issued a \$50,000 reward for Ochoa "dead or alive." Ochoa's participation in Mexican revolutionary activities led to his arrest in 1894 for supplying and hiring Mexican dissidents in El Paso, Texas, thus violating U.S. neutrality laws. As a result of these flagrant violations, a federal warrant was issued for Ochoa's arrest. The Texas Rangers and the U.S. Marshals Service sought him. In October 1894, Pecos County sheriff A. J. Royal and Texas Ranger James W. Fulgham arrested Ochoa while rounding up suspected horse thieves. He was put in the Pecos County Jail, from which he promptly escaped. He was eventually captured and returned to El Paso. Ochoa was ultimately sentenced to two years in federal prison at Kings County Penitentiary in Brooklyn.

So how does a revolutionary become an inventor? I'm not sure where or how Ochoa's transition occurred, but there is documentation that shows he was as committed to inventing as he was to his revolutionary ideals. Ochoa was known to be residing in the New York City and Paterson, New Jersey, areas in the late 1890s. His issued patents list him at New York, New Jersey, and Texas addresses. Ochoa also worked with Watson E. Coleman, a solicitor of patents in Washington, D.C. Coleman helped Ochoa file for and obtain patents in other countries such as Czechoslovakia, France, Germany, Great Britain, Japan, Mexico, Netherlands, Poland, and Spain. Ochoa's patents include a magnetic brake (U.S. patent 867,147); a reversible motor (U.S. patent 718,508); a rail magnetic brake (U.S. patent 873,587); a windmill (U.S. patent 1,319,174); and a wrench (U.S. patents 1,417,196 and 1,454,333). It is clear that Ochoa also had a strong interest in aviation. He created the "Ochoaplane" around 1910. He designed it with an automobile in mind, and it included collapsible wings so that it could be housed in a garage or barn. He also incorporated the International Airship Company in Paterson, New Jersey, presumably to manufacture his "airships."

At some point, Ochoa was imprisoned at the United States Penitentiary in Leavenworth, Kansas. In a September 17, 1917, letter written from Leavenworth, Ochoa asked the Naval Consulting Board to consider the use of metal wings constructed in such a manner that they fold back and over the body of the airship. Ochoa called this his fluttering wing machine. Ochoa's letter is deliberate and he writes, "There was no desire on my part of abandoning this and three other patents that at this time went to issue. At that time I was taken sick with consumption and my struggle for life then became my sole purpose and then there arose other circumstances, over which I had no control, to prevent my taking them out."

The papers of Victor L. Ochoa include correspondence, patents, newspaper clippings, photographs, and undated typescripts for an article, "The Making of an American," and for a short story, "The Cycle of Life, or Professor Mimo Abas: The Wise Man of the Land of Moctezuma." For more information about the collection, contact Alison Oswald at [oswald@si.edu](mailto:oswald@si.edu).

*Alison Oswald, Lemelson Center Archivist*

*Image: Victor Ochoa in Mrs. A. S. Addis's photographic studio, Chihuahua, Mexico, undated. From the Victor L. Ochoa Papers, ca. 1894–1945, Archives Center, National Museum of American History.*



### Inventive Ideas for Schools and Families

In 1956, a Chicano named Ron Aguirre installed the first hydraulic system in a car. The hydraulic pumps that Aguirre used were military surplus from World War II fighter planes. This application of technology allowed for lifting and lowering of cars, and gave rise to lowriding--a form of cultural expression that emerged from working-class Chicano communities. [Check out this activity](#) and

learn how to build your own lowrider!

*Image: Pimp Juice, 2007, fully customized 1993 Cadillac Fleetwood lowrider. Courtesy of Deitch Projects, New York.*



## Mark Your Calendars for the *Places of Invention* Symposium!

On November 6–7, the Lemelson Center will present a symposium on *Places of Invention* as part of its New Perspectives on Invention and Innovation series. Whether it's Edison's laboratory or Silicon Valley, both scholars and the public have long been curious about inventors and the places in which they work. The *Places of Invention* symposium will feature scholars, inventors, and practitioners who will explore how invention and innovation are fostered--or hindered--by physical environments. Why do particular places or regions become known as centers of invention? What factors spark the creation of hot spots of innovation? What is the role of the individual inventor in this story? Why does one place succeed while another one fails?

The *Places of Invention* symposium kicks off with a keynote address by Dr. Bradford Parkinson, a co-winner of the 2003 [Draper Prize](#) for the concept and development of the Global Positioning System--GPS. For the full symposium schedule, [visit the Lemelson Center website](#).

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**Contact us at [prototype@si.edu](mailto:prototype@si.edu).**

General Smithsonian Visitor Information: 202-633-1000

or see more online:

[Lemelson Center website](#)

[National Museum of American History Frequently Asked Questions](#)

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