

# Death on the Border

*A graduate student's promising technique offers hope of closure for loved ones*

By JENNIFER McNULTY

**C**HELSEY ANN JUAREZ'S father was a young man when he crossed the border from Mexico into the United States. He was lucky: He survived. Today, his daughter devotes herself to helping the families of those who don't.

Juarez, a doctoral candidate in forensic anthropology at UC Santa Cruz, is developing a method to help authorities identify the remains of those who perish on the border, anonymous and far from home.

Identifying the dead is a grim and largely thankless task. Few migrants carry identification, and the number who die is growing as the U.S. crackdown on illegal immigration redirects the flow from San Diego east to a deadly stretch of isolated desert. "U.S. immigration policies haven't reduced the number of people trying to enter the country illegally—they have just changed where they try to cross," says Juarez.

Dehydration, heatstroke, hypothermia, and snake bites claim the lives of many. No one knows exactly how many have died trying to enter the United States from Mexico, but estimates range from 5,000

to 10,000 since 1985. The remains of one out of three have never been identified.

Authorities in border towns are overwhelmed. More than 450 people lost their lives last year, and both Arizona and New Mexico declared states of emergency and appealed for federal help managing the remains of those who don't survive the crossing. One medical examiner had to buy a \$150,000 refrigerated trailer to store bodies until he could take DNA samples and compile a profile of each individual.

**F**OR CHELSEY JUAREZ, the tragedy of lost lives is compounded by the fact that most families never learn the fate of their loved ones. She wants to change that.

Most who cross the border are Mexican—56 percent, compared to 24 percent from Central and South America. Mexicans who head for El Norte come primarily from the southern and central agricultural states of Jalisco, Michoacan, Guanajuato, Veracruz, and Oaxaca, where job opportunities are scarce. It turns out that variations in the soil chemistry of those states may shorten the path to identifying those who don't survive.

Juarez has borrowed a technique from archaeologists to identify the "soil signatures" of individual regions. Just as archaeologists are able to match ceramic shards to their place of origin by analyzing the chemistry of soils, pottery, and glazes, Juarez hopes to match human remains to their place of birth by examining teeth. Strontium, an element similar to calcium, is absorbed by bones and teeth, providing a "signature" of the soil where a child spends his or her first years.

By collaborating with dental clinics that serve Mexican immigrants in northern California, Juarez has so far collected more than 50 donated teeth from volunteers. Patients provide essential biographical information, including their age, sex, and place of birth, and Juarez utilizes the latest technology to analyze the isotope "signatures" of each tooth. That information is enabling her to build a database of soil profiles across Mexico.

The amount of variation in soil makeup will determine just how fine-grained her map will be. But the results look promising enough to have attracted the attention of Mexican officials when Juarez presented

her work at the Binational Health Symposium in Salinas in 2004. Currently, the Mexican Consulate relies mostly on old photographs, sketches, and family descriptions when contacting medical examiners in border states on behalf of relatives searching for lost loved ones.

Juarez credits her father, the man who crossed the border in search of a better life 30 years ago, with encouraging her schooling. Now a legal citizen living in California's Central Valley, Juarez's father is a mechanic. "He and my mom didn't have any other kids," she says. "They got divorced when I was two years old." Juarez wears the mantle of high-achieving only child with ease.

After earning an undergraduate degree from UC Davis, Juarez spent a year analyzing artifacts and slave remains recovered from a former plantation in Louisiana. The experience hooked Juarez on forensic science—and brought her to UCSC to work with Alison Galloway, one of the leading forensic anthropologists in the country.

"This technique has never been applied systematically to a forensic collection," says Galloway, who sees enormous potential in the project, which ultimately will



Chelsey Juarez

entail analyzing nearly 300 teeth. "Border crossers are so similar in sex and age that our biological profiles inevitably describe a large number of people—we have hundreds of males aged 20 to 40." With Juarez's data, Mexican officials could work within

specific regions to get the word out on local television, radio, and newspapers about a death, eventually enabling U.S. authorities to return remains to survivors.

Northern Californians may be removed by geography from the crisis of border

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issues, says Juarez, but border communities face the stark realities every day. Even as Border Patrol officers scour the desert for bodies, volunteers from churches and non-governmental organizations have organized to provide rescue services to save those on the brink of dehydration. "In the Southwest, you can't turn your back on it," says Juarez.

According to the Immigration and Naturalization Service (INS), border deaths increased from 270 in 2001 to 463 in 2005, the highest number in a decade, despite tripling the number of Border Patrol agents under the Patriot Act of 2001.

When U.S. authorities cracked down on the Tijuana–San Diego border, they assumed the harsh desert to the east would provide a natural boundary. "They never imagined people would try to cross there, but they were wrong," says Juarez. During the 12-month period that ended in October 2005, the vast majority of deaths were concentrated in Arizona and Texas, where 261 and 140 people died, respectively, compared to only 49 deaths in California and 13 in New Mexico.

Critical of immigration policies she believes have contributed to the rising death toll, Juarez is now preparing for law school. "As a forensic scientist, my job is to provide justice to the deceased," says Juarez. "But I've realized I need to expand into the world of policy to make the kind of broader changes that are needed."