

Pre-Columbian mummy lays TB debate to rest

Talk to an anthropologist about the history of disease in the Americas, and you'll find it split into two eras: before and after the "Columbian contact." Some diseases, such as measles and smallpox, fit neatly into one of these categories. Others, such as tuberculosis (TB) and syphilis, have taken longer to sort out.

Now, genetic traces of TB infection in a thousand-year-old mummy from Peru provide "final and unequivocal evidence" that Europeans did not introduce the disease into the Americas, says Arthur C. Aufderheide of the University of Minnesota School of Medicine at Duluth.

His team of researchers extracted DNA from what appeared to be encapsulated TB lesions in a lung and lymph node of the mummified woman, one of 650 bodies unearthed in 1990 at a burial area near the town of Ilo in southern Peru. They used a laboratory technique called polymerase chain reaction to examine the fragmented, ancient DNA.

This enabled them to identify and copy small, infrequent sequences of DNA that reflect the genetic signature of tuberculosis. The team found a gene sequence identical to a sequence in modern TB, they report in the March 15 PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES.

"Ancient DNA is so fragmented and there's so little there," says Wilmar L. Salo, a member of the Minnesota team, that it is often hard to copy. "It's possible that the small segment we looked at — which is the target of choice for identifying modern TB — [has scarcely varied] over the last 1,000 years. If we knew exactly how much variation there is, then we might be able to track [the course of] TB outbreaks."

Anthropologists at the beginning of the century believed that TB, like measles, had been introduced to the New World by European explorers because it spread so widely and rapidly among the Native American population.

"Now we know that TB is what's called a 'flash epidemic' or 'herd disease,'" says Aufderheide. "Anyone of any race that's forced to be on the move and settled in very crowded conditions would be just as susceptible."

In the 1970s, physical anthropologists began finding pre-Columbian bone lesions that looked like those left by TB. They then found acid-fast bacteria — which turn the same color as tuberculosis bacteria when exposed to a particular stain — in lesions on the spinal column of a pre-Columbian child. But these bone lesions could have been caused by fungi, and the bacteria could simply have been present in the soil.

"We started with the wrong idea and slowly oozed over to the right one," said Aufderheide. "This DNA evidence should remove the last of the doubters."

More tests are needed to confirm these findings, says George J. Armelagos of Emory University in Atlanta. "It's hard to keep things from getting contaminated," he says. "I think they're probably right, but I don't think that these new techniques are going to solve all our problems."

Physical anthropologist Della Collins Cook of Indiana University in Bloomington is more hopeful. "[DNA analysis] is a very new approach to paleopathology," she points out. The technique is applicable to other illnesses as well, and identification of DNA in older material could

elucidate the progression of epidemics, she adds.

Genetic tests may prove useful for paleontologists looking at diseases in nonhuman remains (SN: 1/20/90, p.40). Aufderheide thinks such tests may also enable anthropologists to find diseases that don't leave physical traces.

As for tuberculosis, says physical anthropologist John W. Verano of the National Museum of Natural History in Washington, D.C., "If you think of the skeletal evidence as the body found at the scene of the crime and the bacterial analyses as the smoking gun, then finding this DNA link is like finding the gun and testing for ballistics and fingerprints."

— D. Christensen

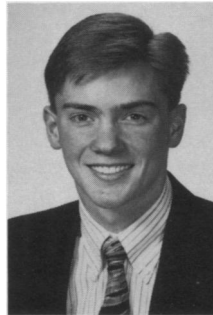
Recycling plastic: An award-winning idea

Projects that reuse plastic, clone proteins, and explore how children learn science garnered the top three prizes this week in Washington, D.C., at the Westinghouse Science Talent Search, sponsored by Westinghouse Electric Corp. in partnership with Science Service.

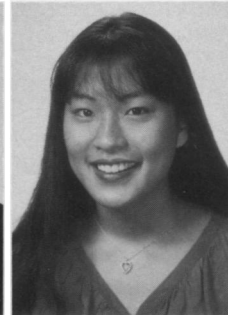
Forrest Newell Anderson, 18, of Helena (Mont.) H.S. won first place and a \$40,000 scholarship for his 2-year engineering project designing and making furnaces that recycle plastic. His system can handle different types of polymers at once, so consumers would not have to separate their plastic garbage, he says. Moreover, the plastic decomposes into material that industry could use to make lubricants, for example. Anderson hopes to patent the technology.

The judges awarded second place and a \$30,000 scholarship to aspiring physician Jennifer Yu-Fe Lin, 17, of Hunter College H.S. in New York City for her cell-growth research. Lin cloned growth factor receptor-binding protein 2 (Grb2), which acts as a go-between for hormone messengers and cells, and discovered that it binds to human insulinlike growth factor 1 receptors. Such results improve understanding of the uncontrolled cell growth related to cancer, she says.

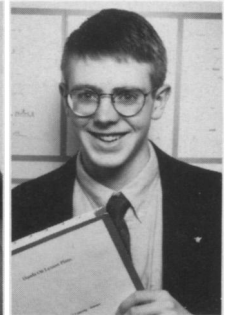
Third-place winner John Laurence Staub, 19, of Sisseton (S.D.) H.S. studied how third-graders learn science. "A lot of my classmates failed in science, so I wanted to know why," he says. Staub needed to do an experiment that made use of his small town's resources, which don't include expensive equipment, so he designed and helped teach two versions of a 4-week science curriculum. Both provided similar information, but one featured hands-on learning and the other



Anderson



Lin



Staub



Contestants met with President Clinton and Vice President Gore.

Photos: Westinghouse Electric Corp.

more rote learning. His results "suggest hands-on is probably more useful," he says. He garnered a \$20,000 scholarship.

Three students received \$15,000 scholarships. Fourth-place winner Robert Christopher Sarvis, 17, of Thomas Jefferson H.S. for Science and Technology in Alexandria, Va., looked for mathematical patterns in a square lattice. Fifth-place winner Steven Daniel Sherman, 18, of Winona (Minn.) Senior H.S. studied aircraft wing tips' effects on fuel efficiency. Sixth place went to Flora Tartakovsky, 17, of Bronx (N.Y.) H.S. of Science for her research on liver disease.

Four students won \$10,000 scholarships: Janos Zahajszky, 17, of Canton (Mass.) H.S.; Jennifer Melissa Kalish, 17, of Bryn Mawr School in Baltimore; Margaret Chalmers Bothner, 17, of Falmouth (Mass.) H.S.; and Jamel Lamonté Oeser-Sweat, 17, of Martin Luther King Jr. H.S. in New York City. The remaining 30 finalists received \$1,000 each.

— T. Adler