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# Bone Specialist On Call

## A Smithsonian anthropologist applies his expertise to cases of missing children and disaster victims

By Michael Kernan

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The skeleton of a child, 10 to 12 years old, had been found in the desert near Las Vegas, Nevada, and forensic experts had composed a picture of a likely face that matched the skull. The local medical examiners thought the victim was a girl, going partly by the denim shorts and other material found with the body, so the computer reconstruction had long hair and girlish features.

The picture was sent out to police all over the country. Nobody responded.

Then Las Vegas authorities sent the skull to the National Center for Missing and Exploited Children in Arlington, Virginia. Steve Loftin, one of the center's age-progression specialists, called in David Hunt from the Smithsonian's National Museum of Natural History. Hunt, an expert in skeletal biology who has considerable experience in forensic anthropology, spent several hours examining the skull—taking measurements, studying the teeth, the nasal opening, the shape of the eye socket, assessing the overall morphology.

"I began looking at the skull," Hunt said, "and in a way it was lucky I didn't have the clothing and other external evidence that the police had, so I wasn't biased. Something about the shape of the head and the dental development suggested it was a boy's."

That was in September 1998. Last June the case was aired on TV's *America's Most Wanted*. The girlish version, shown first, caught the attention of a man whose 10-year-old son had been missing three years, but he dismissed it because the child was assumed to be a female. Then the show put up an alternative, the center's computer reconstruction of a boy, based on Hunt's analysis.

"The father's heart sank to the floor," Loftin told me. It was the lost boy come to life, overbite and all. Dental records confirmed the match, and another sad and baffling case was solved.

What amazes me is the number of unidentified skeletons found every year in fields and forests around the country. This was the seventh case of the year for Loftin's department, but police attending seminars at the center say that many more human remains are waiting in station storage rooms all over America for someone to put a name to them.

"Hunt is a gold mine resource to the center," Loftin said. "We can't thank him enough."

Sensing that the Las Vegas skull was that of a boy was no mere hunch for Hunt. He has worked with thousands of human remains over the past 20

years—modern, historic, pre-Columbian, prehistoric — and this skull struck him, from certain features, as more likely male.

"In forensic skeletal analysis we use methodologies that are commonly used in archaeological investigations," he explained. A vast forensic database of skeletal measurements at the University of Tennessee aids in the analysis of the gender and ethnicity of a subject.

"Anthropologists avoid the term 'race,' but law enforcement agencies still refer to four main population groups: white, black, Asian and Hispanic."

Some differences among the groups show up in bone lengths, but most appear in the cranial structure. "A long-headed Nordic skull, for instance, would look quite different from a Hispanic one," Hunt said. "But now there is a lot more genetic interaction, an effect of our transient and mobile society, so you get a blending of these features."

In addition to overall size and shape, there are other variances in skulls. From the nasal aperture you can tell about how wide the nose was, and if the nasal bridge (the spot between the eyes where the nose begins) is preserved, it can suggest a large or small nose. The nasal spine, a bony projection at the base of the aperture, might indicate whether a nose hooked down or turned up.

"Many of these features are literally just skin deep," Hunt said. "The next stage is one of my specialties, craniometric analysis, which is the study of skull measurements. You put about 80 measurements into a computer to get an analytical model that best fits one of the main population groups."

Subtle deformations of bone can even hint at an adult's occupation, as constant use of a certain muscle will literally pull the bone it is attached to, misshaping it slightly and creating, for example, a heel spur.

But how do you go about identifying a child, say one who was abducted as an infant and is found at age 7?

"First of all, you need to understand what happens when the baby fat goes away," Hunt said. "Children grow at different rates, with spurts at various times. At 4 to 6 years they have big heads because the brain case is larger than the face. Then around the third grade, the face starts growing and pretty soon a kid has a bigger face."

Teeth are also a major clue to age, he said. "In the first grade kids lose their front baby teeth, and their permanent ones begin coming in. The teeth of Hispanics tend to grow in four to six months sooner than those of whites.

"Then the mandible (lower jaw) grows and the maxillary (upper jaw) grows," Hunt continued. "By the fifth or sixth grade, the molars are coming in. When you look at photographs of kids that age, many seem to have pointy chins. It's because their lower faces are growing."

Other very noticeable changes occur again between 12 and 14, when the brain case expands and the body length increases, while the facial growth slows down. These changes are heavily influenced by sex hormones. "Before the sex hormones kick in," Hunt said, "it's very difficult to identify a child's sex from the skeleton."

One problem facing experts like Hunt is the shortage of identified skeletons of children to study. "Understandably, few families choose to donate their children's remains for scientific research," Hunt said.

A sad business. But the center also finds live children among the almost 6,000 active cases in its files. Fortunately, the great majority of them are rescued alive. About a million children under 18 disappear every year in America, most of them for only a short time: runaways, kids abducted by parents, kids abducted by strangers, and some who are just lost.

Age-progression specialists like Steve Loftin can take a snapshot of a toddler and, on a computer screen, make the child look older ( [Smithsonian](#), October 1995). The expert begins by stretching the child's image on the computer. To mature the face, he merges it with childhood photographs of the parents at the current age of the missing child, borrowing certain features, bringing out the cheekbones, thinning down baby fat and

lengthening the jaw. The results can be startlingly accurate and have proved invaluable in rescuing missing children.

Long ago David Hunt knew he was going to be an anthropologist. "I remember reading those articles in *National Geographic* as a kid in the '60s about Louis and Mary Leakey, the excavations in Africa and Europe — they all fascinated me."

At the University of Illinois he soon found his niche in the study of bones, specifically human osteology and skeletal biology. After receiving his master's degree and doctorate in physical anthropology at the University of Tennessee, Hunt joined the Museum of Natural History staff in 1990.

"It was the ability to derive a synopsis of the life of prehistoric humans from their remains that made me decide to pursue this career," he said. "It's all a big jigsaw puzzle."

It really is. People get buried six feet deep, and the weight of the dirt distorts the skeleton, crushing the skull so that it has to be reconstructed before study can get under way. Even a casket sooner or later will let in water and collapse.

Working on historical cases is interesting, but applied forensics, in which researchers try to match skulls with photographs of actual people, is often more rewarding.

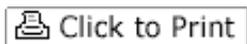
Hunt and his Smithsonian colleagues are on call in the wake of plane crashes and other disasters. They have helped identify bodies in the Oklahoma City bombing, the Waco fire and the mass graves of Bosnia and Croatia.

After the Mississippi and Missouri rivers flooded in 1993, and water destroyed cemeteries, washing caskets from the earth and hopelessly jumbling them, Hunt was called in. Working with FBI fingerprint specialists and pathologists and dentists, he helped identify bodies for reinterment.

"You don't want to say the work is satisfying, that sounds kind of weird, but I feel I need to return something to the community with my specialized training. Hopefully, my work will help connect people with missing loved ones."

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