

Hips don't lie: Researchers find more accurate technique to determine sex of skeletal remains

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The new technique could also have significant benefits in the courtroom. Obviously the improved accuracy is important, but so is the fact that the method relies on quantifiable metric data -- not an opinion. This is an important distinction under the federal rules of evidence that govern what evidence can be submitted in criminal court. Credit: David Hunt, North Carolina State University

Research from North Carolina State University offers a new means of determining the sex of skeletal human remains - an advance that may have significant impacts in the wake of disasters, the studying of ancient remains and the criminal justice system.

Historically, forensic scientists have been able to determine the sex of [skeletal remains](#) by visually evaluating the size and shape of the pelvis, or os coxa. "This technique is accurate, but is not without its limitations,"

says Dr. Ann Ross, associate professor of sociology and anthropology at NC State and co-author of a paper describing the research.

"For example," Ross says, "when faced with fragmentary remains of the os coxa, it can be difficult to determine the deceased person's sex based solely on visual inspection. This can be a significant challenge when evaluating remains from disasters - such as plane crashes - or degraded remains in mass burials - whether the burials date from prehistory or 20th century political violence."

But Ross and her colleague Dr. Joan Bytheway have now used three-dimensional imaging technology to effectively quantify the specific characteristics of the os coxa that differentiate males from females. Bytheway is an assistant professor of [forensic science](#) at Sam Houston State University.

The researchers found more than 20 anatomical "landmarks" on the os coxa that can be used to determine a body's sex. Finding so many landmarks is important, Ross says, because it means that the sex of a body can be ascertained even if only a small fragment of the pelvis can be found. In other words, even if only 15 percent of the pelvis is recovered, it is likely that at least a few of the landmarks can be found on that fragment.

Here's how it would work: a forensic scientist would use a digitizer to create a 3-D map of the pelvic fragment and measure the relevant anatomical landmarks. The scientist could then determine the sex of the remains by comparing those measurements to the measurements listed in the paper by Bytheway and Ross.

"This technique also has the benefit of being significantly more accurate than traditional visual inspections," Ross says. While determining sex based on visual inspections of os coxa have an accuracy rate of

approximately 90 percent, the new technique from Ross and Bytheway has an accuracy rate of 98 percent or better. The researchers found, for example, that several anatomical landmarks commonly used in visual inspection to estimate sex are actually very poor indicators of sex.



The new technique for determining the sex of skeletal human remains based on examination of the pelvic bones is significantly more accurate than traditional visual inspections. Credit: David Hunt, North Carolina State University

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The researchers are planning to incorporate their findings into the National Institute of Justice's 3D-ID program. The 3D-ID program consists of software that allows forensic scientists to plug in data on skeletal remains and determine the sex and ancestral origin of those remains.

More information: The research, "A Geometric Morphometric

Approach to Sex Determination of the Human Adult Os Coxa," is published in the July issue of Journal of Forensic Sciences.

Provided by North Carolina State University

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