



## **Sex Estimation - Pelvic Morphology**

### **Test No. 22-5511 Summary Report**

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Each digital sample pack consisted of five different pelvic bones in 3D-scan format. Participants were asked to estimate the sex of the bones (Items 1 – 5) and document any methodology used. Data were returned from 12 participants and are compiled into the following tables:

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This report contains the data received from the participants in this test. Since these participants are located in many countries around the world, and it is their option how the samples are to be used (e.g., training exercise, known or blind proficiency testing, research and development of new techniques, etc.), the results compiled in the Summary Report are not intended to be an overview of the quality of work performed in the profession and cannot be interpreted as such. The Summary Comments are included for the benefit of participants to assist with maintaining or enhancing the quality of their results. These comments are not intended to reflect the general state of the art within the profession.

Participant results are reported using a randomly assigned "WebCode". This code maintains participant's anonymity, provides linking of the various report sections, and will change with every report.

## Manufacturer's Information

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Each digital sample pack consisted of five different pelvic bones in 3D-scan format. Participants were asked to estimate the sex of the bones (Items 1 – 5) and document any methodology used.

### SAMPLE PREPARATION:

Pelvic bones, both articulated and disarticulated, were selected and scanned. The scans were then zipped and uploaded to the CTS Portal for download by test participants.

Item	Sex
Item 1	Male
Item 2	Male
Item 3	Female
Item 4	Male
Item 5	Female

## **Summary Comments**

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The Sex Estimation – Pelvic Morphology test was designed to allow participants to assess their proficiency in estimating the donor sex of pelvic remains. (Refer to the Manufacturer’s Information for preparation details).

Item 1 consisted of an articulated male pelvis. All participants estimated this item as being from a “Male” or “Probable Male” donor.

Item 2 consisted of an articulated male pelvis. All but one participant estimated this item as being from a “Male” or “Probable Male” donor. The remaining participant estimated Item 2 as being from a “Probable Female” donor.

Item 3 consisted of a disarticulated female pelvis. All participants estimated this item as being from a “Female” or “Probable Female” donor.

Item 4 consisted of a disarticulated male pelvis. A consensus was not achieved for this item. Three participants reported “Probable Female,” four participants reported “Male,” one participant reported “Probable Male,” and four participants reported “Inconclusive.” The participants that reported “Inconclusive” noted in their Additional Comments they faced difficulty observing sexually dimorphic characteristics of the item.

Item 5 consisted of a disarticulated female pelvis. A consensus was not achieved for this item. Five participants reported “Female,” three participants reported “Probable Female,” two participants reported “Probable Male,” and two participants reported “Inconclusive.”

The most commonly reported method used by participants was Klales, A.R., et al. (2012) followed by Buikstra, J.E. & Ubelaker, D.H. (1994). Six participants reported the use of other methodology not listed in this test.

# Examination Results For Item 1

What is the estimated sex of the bone represented in the submitted 3D scan (Items 1-5)?

TABLE 1a

WebCode	Estimated Sex	Methodology Used			
		Phenice, T.W. (1969)	Buikstra, J.E. & Ubelaker, D.H. (1994)	Klares, A.R., et al. (2012)	Other(s)
7WHAGT	Probable Male	✓	✓	✓	✓
9NMVC	Male		✓	✓	
A6RP3C	Male	✓		✓	
CLGWML	Male			✓	✓
EHY2K8	Probable Male	✓	✓		
G9MLR6	Male	✓	✓	✓	
P97H8H	Male	✓	✓		
PXCE8M	Male	No methodologies were reported by this participant.			
PXLALA	Male			✓	✓
U7HZTD	Probable Male	✓	✓		
WKC4B9	Probable Male	✓		✓	
X86D92	Male				✓

## Response Summary - Item 1

Participants: 12

What is the estimated sex of the bone represented in the submitted 3D scan (Items 1-5)?

Estimated Sex	Total Participants	Phenice, T.W. (1969)	Buikstra, J.E. & Ubelaker, D.H. (1994)	Klares, A.R., et al. (2012)	Other(s)
Female	0 (0.00%)	0	0	0	0
Probable Female	0 (0.00%)	0	0	0	0
Male	8 (66.67%)	3	3	5	3
Probable Male	4 (33.33%)	4	3	2	1
Inconclusive	0 (0.00%)	0	0	0	0

## Examination Results For Item 2

*What is the estimated sex of the bone represented in the submitted 3D scan (Items 1-5)?*

TABLE 1b

WebCode	Estimated Sex	Methodology Used			
		Phenice, T.W. (1969)	Buikstra, J.E. & Ubelaker, D.H. (1994)	Klares, A.R., et al. (2012)	Other(s)
7WHAGT	Male	✓	✓	✓	✓
9NMVC	Probable Male		✓	✓	
A6RP3C	Male	✓		✓	
CLGWML	Male			✓	✓
EHY2K8	Male	✓	✓		
G9MLR6	Male		✓	✓	
P97H8H	Male	✓			
PXCE8M	Male	<i>No methodologies were reported by this participant.</i>			
PXLALA	Male			✓	✓
U7HZTD	Probable Male	✓	✓		
WKC4B9	Probable Male	✓	✓		
X86D92	Probable Female				✓

Response Summary - Item 2		Participants: 12				
<i>What is the estimated sex of the bone represented in the submitted 3D scan (Items 1-5)?</i>						
Estimated Sex	Total Participants	Phenice, T.W. (1969)	Buikstra, J.E. & Ubelaker, D.H. (1994)	Klares, A.R., et al. (2012)	Other(s)	
Female	0 (0.00%)	0	0	0	0	
Probable Female	1 (8.33%)	0	0	0	1	
Male	8 (66.67%)	4	3	5	3	
Probable Male	3 (25.00%)	2	3	1	0	
Inconclusive	0 (0.00%)	0	0	0	0	

## Examination Results For Item 3

What is the estimated sex of the bone represented in the submitted 3D scan (Items 1-5)?

TABLE 1c

WebCode	Estimated Sex	Methodology Used			
		Phenice, T.W. (1969)	Buikstra, J.E. & Ubelaker, D.H. (1994)	Klares, A.R., et al. (2012)	Other(s)
7WHAGT	Female	✓	✓	✓	✓
9NMVC	Female		✓	✓	
A6RP3C	Female	✓		✓	
CLGWML	Female			✓	✓
EHY2K8	Female		✓	✓	
G9MLR6	Female		✓	✓	
P97H8H	Female	✓	✓		
PXCE8M	Female	<i>No methodologies were reported by this participant.</i>			
PXLALA	Female			✓	✓
U7HZTD	Female		✓		✓
WKC4B9	Probable Female			✓	
X86D92	Female				✓

### Response Summary - Item 3

Participants: 12

What is the estimated sex of the bone represented in the submitted 3D scan (Items 1-5)?

Estimated Sex	Total Participants	Phenice, T.W. (1969)	Buikstra, J.E. & Ubelaker, D.H. (1994)	Klares, A.R., et al. (2012)	Other(s)
Female	<b>11 (91.67%)</b>	<b>3</b>	<b>6</b>	<b>7</b>	<b>5</b>
Probable Female	<b>1 (8.33%)</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>
Male	<b>0 (0.00%)</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
Probable Male	<b>0 (0.00%)</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
Inconclusive	<b>0 (0.00%)</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

## Examination Results For Item 4

What is the estimated sex of the bone represented in the submitted 3D scan (Items 1-5)?

TABLE 1d

WebCode	Estimated Sex	Methodology Used			
		Phenice, T.W. (1969)	Buikstra, J.E. & Ubelaker, D.H. (1994)	Klares, A.R., et al. (2012)	Other(s)
7WHAGT	Probable Female		✓	✓	✓
9NMVVC	Probable Female		✓	✓	
A6RP3C	Male	✓		✓	
CLGWML	Male			✓	✓
EHY2K8	Inconclusive		✓	✓	
G9MLR6	Male	✓	✓	✓	
P97H8H	Probable Female	✓	✓		
PXCE8M	Inconclusive	No methodologies were reported by this participant.			
PXLALA	Inconclusive			✓	✓
U7HZTD	Inconclusive		✓		✓
WKC4B9	Probable Male	✓		✓	
X86D92	Male				✓

### Response Summary - Item 4

Participants: 12

What is the estimated sex of the bone represented in the submitted 3D scan (Items 1-5)?

Estimated Sex	Total Participants	Phenice, T.W. (1969)	Buikstra, J.E. & Ubelaker, D.H. (1994)	Klares, A.R., et al. (2012)	Other(s)
Female	0 (0.00%)	0	0	0	0
Probable Female	3 (25.00%)	1	3	2	1
Male	4 (33.33%)	2	1	3	2
Probable Male	1 (8.33%)	1	0	1	0
Inconclusive	4 (33.33%)	0	0	0	0

## Examination Results For Item 5

*What is the estimated sex of the bone represented in the submitted 3D scan (Items 1-5)?*

TABLE 1e

WebCode	Estimated Sex	Methodology Used			
		Phenice, T.W. (1969)	Buikstra, J.E. & Ubelaker, D.H. (1994)	Klares, A.R., et al. (2012)	Other(s)
7WHAGT	Inconclusive		✓	✓	✓
9NMVVC	Female		✓	✓	
A6RP3C	Female	✓		✓	
CLGWML	Female			✓	✓
EHY2K8	Female		✓	✓	
G9MLR6	Probable Male	✓	✓		
P97H8H	Probable Male	✓	✓		
PXCE8M	Probable Female	<i>No methodologies were reported by this participant.</i>			
PXLALA	Female			✓	
U7HZTD	Probable Female		✓		✓
WKC4B9	Probable Female	✓		✓	
X86D92	Inconclusive				✓

### Response Summary - Item 5

Participants: 12

*What is the estimated sex of the bone represented in the submitted 3D scan (Items 1-5)?*

Estimated Sex	Total Participants	Phenice, T.W. (1969)	Buikstra, J.E. & Ubelaker, D.H. (1994)	Klares, A.R., et al. (2012)	Other(s)
Female	5 (41.67%)	1	2	5	1
Probable Female	3 (25.00%)	1	1	1	1
Male	0 (0.00%)	0	0	0	0
Probable Male	2 (16.67%)	2	2	0	0
Inconclusive	2 (16.67%)	0	0	0	0



## Other Methodology Results

TABLE 2

WebCode	Other Methodology Used
7WHAGT	Biological sex for item 4 was estimated as probable female based on the readily visible morphological traits. Specific interpretation of was precluded due to the presence of significant degenerative changes to a diagnostic trait(s). Biological sex for item 5 was estimated as inconclusive due to the presentation of diagnostic morphological traits which were clearly consistent with male or female biological sex.
CLGWML	The sex estimation for each adult human pelvic bone was established through the analysis of morphological traits. The methodology used included the application of techniques developed by Bruzeck et al (2017) and MorphoPASSE A. Kales A. (2015). <a href="http://projects.pacea.u-bordeaux.fr/logiciel/DPS2/dps2.html">http://projects.pacea.u-bordeaux.fr/logiciel/DPS2/dps2.html</a> . <a href="https://morphopasse.shinyapps.io/morphoPASSE/">https://morphopasse.shinyapps.io/morphoPASSE/</a> . Additionally, the shape of the pubic bone (quadrangular for female versus triangular for males), the shape of the subpubic area (concave for female vs convex for male) and the presence/absence of a ventreal arc (females vs males) were evaluated when possible.
PXCE8M	Perceived mirror image for pelvic inlet in item 3 - 5. Pelvic arch, Morphology, Sciatic notch, obturator foramen.
PXLALA	Gestalt evaluation of morphology (bad practice).
U7HZTD	Other methods used were: Kales AR. MorphoPASSE: the Morphological Pelvis and Skull Sex Estimation Database. Version 1.0. Topeka, KS: Washburn, University, 2018. Milner GR. Determination of skeletal age and sex: A manual prepared for the Dickson Mound Reburial Team. Dickson Mounds Museum, Lewiston, Illinois, 1992.
X86D92	Acsadi and Nemeskeri (1970, WEA, Workshop of European Anthropologists)

## Additional Comments

TABLE 3

WebCode	Additional Comments
7WHAGT	Due to my unfamiliarity with this three-dimensional Acrobat application, measurements of the subpubic angle were taken using OnlineProtractor, an online application which has been used by others (Mohd Ali et al. 2019) with accurate results. OnlineProtractor was one of two methods compared for the subpubic angle measurement from reconstructed three-dimensional pelvic models. Even under Bright Light, the models were difficult to examine. The pelvic model in File 1 was the most visually conducive to examination and analysis.
9NMVVC	The articulated pelvises for Items 1 and 2 limited visualisation of the ventral arc and subpubic concavity (Klales et al, 2012).
EHY2K8	Item 4 is estimated to be inconclusive as the morphology of the greater sciatic notch and preauricular sulcus are characteristic of female and the subpubic concavity could be scored as '2' in the Klales et al method, however the ischiopubic ramus ridge could be scored as a 3 or 4 and the osteophytes make it difficult to reliably assess the ventral arc.
PXLALA	Item 4: Inconclusive; I need the Klales et al. statistics to provide a probability. Additional issues: 1) Buikstra and Ubelaker (1994) is not a method. They republished the Phenice (1969) traits and added the "greater sciatic notch" and the "preauricular sulcus" as regions that can be scored; however, these additional two traits were not tested/validated in their publication (i.e., there are no references). 2) The Klales et al. traits on Item 2 cannot be adequately visualized no matter what lighting is used. It is too dark. 3) The resolution of the pubic bone in Image 3 is too poor to adequately assess the ventral arc.
U7HZTD	Completion of this proficiency test requires deviations from typical procedures in that (1) sex estimation would not typically be performed based on imagery; rather, it would be requested to examine the bone directly, and (2) the file/bone configurations for some items do not allow proper orientation of the bone to use preferred methods, so in order to complete the test, methods that are not generally preferred due to being less reliable and less contemporary are used here. Inconclusive was selected for Item 4 because: Preferred methods (Klales 2018) could not be used because it was unclear if holes/missing data were real or artifacts. Features that could be assessed were not pronounced.
WKC4B9	Item #2: Patchy on rotation, would not refill. Could not zoom in close enough to view details required by Phenice or Klales. Item #3: Image is too smooth, cannot visual necessary detail. Estimation based solely on 'shape' of Os pubis. Item #4: Same as 3, item patch, wouldn't refill upon rotation and zoom. Hard to apply references suggested.

-End of Report-  
(Appendix may follow)

## Test No. 22-5511: Sex Estimation - Pelvic Morphology

DATA MUST BE SUBMITTED BY **Dec. 12, 2022, 11:59 p.m. EST** TO BE INCLUDED IN THE REPORT

Participant Code: U1234A

WebCode: BLJ4AN

The Accreditation Release section can be accessed by using the "Continue to Final Submission" button above. This information can be entered at any time prior to submitting to CTS.

### **Scenario:**

Using morphological characteristics, please estimate the sex of each adult, human pelvic bone provided in 3D-scan format. Please record the method(s) used during analysis. Each 3D-scanned item (Items 1-5) represents a separate, independent case. To access the evidence files, download the .zip file provided below. Open each item file using Adobe Acrobat (please note: you may need to enable 3D-viewer options). To manipulate the scan, click once on the bone and wait for 3D-scan tools to load. Once loaded, you may rotate the bone, adjust background color settings and extra lighting settings to perform your analysis.

### **Items Submitted (Sample Pack SE):**

Items 1-5: 3D scans

To verify a complete and accurate download, the hash value for the downloaded .ZIP file is as follows:

22-5511 Sex Estimation - Pelvic Morphology.zip MD5 hash value: 73f1deaa964162229b402c9ba22a6bfd

22-5511 Sex Estimation - Pelvic Morphology.zip SHA1 hash value: e28eb76fb1e69e5d5975dbc361daf4eb7786b628

**1.) What is the estimated sex of the bone represented in the submitted 3D scan (Items 1-5)?**

Note: For each item, record all methodology used for analysis. Select "Other" if method(s) used is not present in provided list.

<b>Item 1</b>	Female <input type="radio"/>	Probable Female <input type="radio"/>	Male <input type="radio"/>	Probable Male <input type="radio"/>	Inconclusive* <input type="radio"/>
<b>Method(s) Used</b>	Phenice, T.W. (1969) <input type="checkbox"/>	Buikstra, J.E. & Ubelaker, D.H. (1994) <input type="checkbox"/>		Klales, A.R., et al. (2012) <input type="checkbox"/>	Other(s) <input type="checkbox"/>
<b>Item 2</b>	Female <input type="radio"/>	Probable Female <input type="radio"/>	Male <input type="radio"/>	Probable Male <input type="radio"/>	Inconclusive* <input type="radio"/>
<b>Method(s) Used</b>	Phenice, T.W. (1969) <input type="checkbox"/>	Buikstra, J.E. & Ubelaker, D.H. (1994) <input type="checkbox"/>		Klales, A.R., et al. (2012) <input type="checkbox"/>	Other(s) <input type="checkbox"/>
<b>Item 3</b>	Female <input type="radio"/>	Probable Female <input type="radio"/>	Male <input type="radio"/>	Probable Male <input type="radio"/>	Inconclusive* <input type="radio"/>
<b>Method(s) Used</b>	Phenice, T.W. (1969) <input type="checkbox"/>	Buikstra, J.E. & Ubelaker, D.H. (1994) <input type="checkbox"/>		Klales, A.R., et al. (2012) <input type="checkbox"/>	Other(s) <input type="checkbox"/>
<b>Item 4</b>	Female <input type="radio"/>	Probable Female <input type="radio"/>	Male <input type="radio"/>	Probable Male <input type="radio"/>	Inconclusive* <input type="radio"/>
<b>Method(s) Used</b>	Phenice, T.W. (1969) <input type="checkbox"/>	Buikstra, J.E. & Ubelaker, D.H. (1994) <input type="checkbox"/>		Klales, A.R., et al. (2012) <input type="checkbox"/>	Other(s) <input type="checkbox"/>
<b>Item 5</b>	Female <input type="radio"/>	Probable Female <input type="radio"/>	Male <input type="radio"/>	Probable Male <input type="radio"/>	Inconclusive* <input type="radio"/>
<b>Method(s) Used</b>	Phenice, T.W. (1969) <input type="checkbox"/>	Buikstra, J.E. & Ubelaker, D.H. (1994) <input type="checkbox"/>		Klales, A.R., et al. (2012) <input type="checkbox"/>	Other(s) <input type="checkbox"/>

\*Should an item(s) be marked "Inconclusive", please document the reason in the Additional Comments section of this data sheet.

**2.) Methodology Continued**

Note: Utilize this section to provide any additional notes on methods used or to list any methods used that were not provided above. Any additional formatting applied in the free form space below will not transfer to the Summary Report and may cause your information to be illegible. This includes additional spacing and returns that present your responses in lists and tabular formats.

**3.) Additional Comments**

## RELEASE OF DATA TO ACCREDITATION BODIES

The Accreditation Release is accessed by pressing the "Continue to Final Submission" button online and can be completed at any time prior to submission to CTS.

CTS submits external proficiency test data directly to ASCLD/LAB, ANAB, and/or A2LA. Please select one of the following statements to ensure your data is handled appropriately.

- This participant's data is intended for submission to ASCLD/LAB, ANAB, and/or A2LA. (Accreditation Release section below must be completed.)
- This participant's data is not intended for submission to ASCLD/LAB, ANAB, and/or A2LA.

Have the laboratory's designated individual complete the following steps **only if your laboratory is accredited in this testing/calibration discipline** by one or more of the following Accreditation Bodies.

**Step 1: Provide the applicable Accreditation Certificate Number(s) for your laboratory.**

ANAB Certificate No.   
(Include ASCLD/LAB Certificate here)

A2LA Certificate No.

**Step 2: Complete the Laboratory Identifying Information in its entirety.**

Authorized Contact Person and Title

Laboratory Name

Location (City/State)