



Human vs Non-Human Bone Origin Determination

Test No. 22-5501 Summary Report

Each sample set consisted of digital images of five different bones of unknown origin. Participants were asked to determine if each bone was of human origin or of non-human origin. Data were returned from 42 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

Each sample pack consisted of several digital images (2-4) of five different bones. Participants were asked to determine which of the bones (Items 1 through 5) were human in origin and which were of non-human animal origin.

SAMPLE PREPARATION:

Bones from a variety of species were selected and photographed. Photographs of several representative perspectives were chosen for each bone. These images were digitally resized to scale, placed in a template (frame), and adjusted for consistency of color and contrast. The images were then zipped and uploaded to the CTS Portal for download by test participants.

Item	Source
1	Cow, Metapodial
2	Deer, Coxa
3	Deer, Scapula
4	Human, Adult Humerus
5	Human, Adult Rib

Summary Comments

The Human vs Non-Human Bone Origin Determination test was designed to allow participants to assess their proficiency in determining whether a bone was of human origin or non-human origin. Items 1, 2, and 3 were of non-human origin, and Items 4 and 5 were of human origin (Refer to the Manufacturer's Information for preparation details).

Of the 42 responding participants, all identified Items 1, 2, and 3 as being of non-human origin, and Item 4 as being of human origin. A total of 33 participants (78.6%), identified Item 5 as being of human origin and nine participants (21.4%) reported "Inconclusive." Of these nine participants, the most common factor for reporting "Inconclusive" was the condition of the bone. This specific bone was described as having tissue present and/or being damaged. Other participants further remarked that the human rib is morphologically similar to many other species.

Examination Results

What is the origin of the bone represented in the submitted photographs (Items 1-5)?

TABLE 1

WebCode	Item 1	Item 2	Item 3	Item 4	Item 5
2JJXPW	Non-Human	Non-Human	Non-Human	Human	Human
2X2QD3	Non-Human	Non-Human	Non-Human	Human	Human
67KJXQ	Non-Human	Non-Human	Non-Human	Human	Human
69QL4T	Non-Human	Non-Human	Non-Human	Human	Inc
76M8VU	Non-Human	Non-Human	Non-Human	Human	Human
7AJWDM	Non-Human	Non-Human	Non-Human	Human	Inc
8ZR6V	Non-Human	Non-Human	Non-Human	Human	Human
99YWAN	Non-Human	Non-Human	Non-Human	Human	Inc
9AUFBP	Non-Human	Non-Human	Non-Human	Human	Human
AJRVFM	Non-Human	Non-Human	Non-Human	Human	Human
ATGNLP	Non-Human	Non-Human	Non-Human	Human	Human
BLVAP	Non-Human	Non-Human	Non-Human	Human	Human
BN2D9L	Non-Human	Non-Human	Non-Human	Human	Human
D949TM	Non-Human	Non-Human	Non-Human	Human	Human
EBKRDH	Non-Human	Non-Human	Non-Human	Human	Human
EEKXXG	Non-Human	Non-Human	Non-Human	Human	Human
FEFXBL	Non-Human	Non-Human	Non-Human	Human	Human
FHYZEJ	Non-Human	Non-Human	Non-Human	Human	Inc
FUEPCN	Non-Human	Non-Human	Non-Human	Human	Human
FZY6MF	Non-Human	Non-Human	Non-Human	Human	Human
G77WPL	Non-Human	Non-Human	Non-Human	Human	Human

TABLE 1

WebCode	Item 1	Item 2	Item 3	Item 4	Item 5
GVLWJ	Non-Human	Non-Human	Non-Human	Human	Human
HAYCFK	Non-Human	Non-Human	Non-Human	Human	Human
HDGEHG	Non-Human	Non-Human	Non-Human	Human	Human
HZRFRE	Non-Human	Non-Human	Non-Human	Human	Human
K3BB7J	Non-Human	Non-Human	Non-Human	Human	Inc
LN7DXC	Non-Human	Non-Human	Non-Human	Human	Human
LR7NTC	Non-Human	Non-Human	Non-Human	Human	Human
M6A76C	Non-Human	Non-Human	Non-Human	Human	Human
N3E966	Non-Human	Non-Human	Non-Human	Human	Inc
NHWX9F	Non-Human	Non-Human	Non-Human	Human	Human
NKX4JC	Non-Human	Non-Human	Non-Human	Human	Human
NVEN39	Non-Human	Non-Human	Non-Human	Human	Human
NX9CL6	Non-Human	Non-Human	Non-Human	Human	Inc
PJYFF8	Non-Human	Non-Human	Non-Human	Human	Inc
QP6CY8	Non-Human	Non-Human	Non-Human	Human	Human
RGRFUZ	Non-Human	Non-Human	Non-Human	Human	Human
RJCQ7B	Non-Human	Non-Human	Non-Human	Human	Human
VQ2DWZ	Non-Human	Non-Human	Non-Human	Human	Human
WQY8N3	Non-Human	Non-Human	Non-Human	Human	Human
YFNMFQ	Non-Human	Non-Human	Non-Human	Human	Inc
YUQUY6	Non-Human	Non-Human	Non-Human	Human	Human

Response SummaryParticipants: **42***What is the origin of the bone represented in the submitted photographs (Items 1-5)?*

	<u>Item 1</u>	<u>Item 2</u>	<u>Item 3</u>	<u>Item 4</u>	<u>Item 5</u>
Human	0 (0.0%)	0 (0.0%)	0 (0.0%)	42 (100.0%)	33 (78.6%)
Non-Human	42 (100.0%)	42 (100.0%)	42 (100.0%)	0 (0.0%)	0 (0.0%)
Inconclusive	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	9 (21.4%)

Additional Comments

TABLE 2

WebCode	Additional Comments
69QL4T	For Item 5, there are no visible features that are inconsistent with human origin. However, (1) there is debris (apparent tissue) adhering to and partially obscuring the bone surface, and (2) it is my (and my laboratory's) position that because of similarities between many species' ribs, it determinations can rarely be certain for ribs based on photographs, and conclusions should therefore be conservative. Direct examination would be preferable for making a conclusion. Also, it took about 40 minutes to download the files. Do they need to be this size/resolution?
7AJWDM	Item 5a & 5b: Tissue still attached to skeletal element. Element in fair condition, with visible damage observed to sternal end. WATB soil present in marrow space of element at sternal end. General shape and size consistent with both human and non-human morphology. Head of rib does not appear consistent with human anatomy, however angle of photographs do not accurately demonstrate full extent. Tubercle present on neck and consistent with human and non-human morphology. Element is overall consistent with human. Recommendation for further photographs of element from more angles, or submit the skeletal element for further analysis.
99YWAN	5) The rib does have the size and morphology of a human rib, however without any context behind the find and with the soft tissue obscuring the view of most surfaces, I wouldn't want to say 100% that it is a human in case there is an animal with a similar sized rib. I would probably request it to be sent into the lab for a more detailed examination.
BN2D9L	Item 1: Animal metacarpal bone. Metacarpal body fusion and pun nodal surfaces at both ends are not in line with the characteristics of human bones. Item 2: Animal hip bone. The hip bone is narrow and long, the hip bone and ischium are underdeveloped, and there is no ear surface, which is inconsistent with the human hip bone. Item 3: Animal scapula. The scapula is slender, the glenoid is vertical to the scapular ridge, and the acromion is not significant, which is significantly different from the human scapula. Item 4: Left human humerus. The length and width of humerus and the anatomical structures of humeral head, olecranon fossa and medial and lateral epicondyle are in line with human characteristics. Item 5: Right human costal bone. The length, width and curvature of ribs conform to human characteristics.
FHYZEJ	Item 5 is a probable human rib, however, the amount of adhering soft tissue should be removed to properly evaluate muscle attachments and articulations. Furthermore, the adhering tissue is making it difficult to evaluate the shape and deepness of the costal groove. While the morphology (shape and size) is compelling for human origin, ribs can often be tricky to evaluate in photographs especially when the head of the rib is not examined in multiple angles.
GVLMWJ	Ver easy
K3BB7J	Although Item 5 is consistent with the morphology of a human rib, it was marked as "Inconclusive" because the presence of desiccated tissue (and possibly other material) obscures closer examination of rib anatomy, i.e., tubercle; head; and cranial and caudal edges. Zooming in on the images results in increased pixelation; but the ability to clean the element and manipulate it physically rather than through only viewing photographs of it could contribute to a more definitive conclusion.
M6A76C	The correct assignation of the Order to which the non-human specimens represented by items 1 to 3, is dependent on the ability of evaluating the real bones, owing to the fact that this determination is solely based on photographs, the assigned Orders are mere suggestions. Item 1. Compatible with a metacarpal of an specimen of Artiodactyla (cow or similar). Item 2. Right innominate (hip bone or os coxae) that seems compatible with a

TABLE 2

WebCode	Additional Comments
	specimen of Artiodactyla (sheep, deer or similar). Item 3. Right scapula compatible with a specimen of Artiodactyla (sheep, deer or similar). Item 4. Human left humerus. Item 5. Human rib from the right side that seems to correspond to a superior rib.
N3E966	Bone 5A-5C- Skeletal element is bona fide, not a cast. Rib. Due to the condition of the distal end and photos not showing the distinct features of the proximal end I am unable to determine if this is human or non-human with any certainty, has both human and non-human elements. I would request more photos or submission of the rib for detailed analysis. If unable to submit, then further photos required with macro images of distal and proximal ends. In this case I would seek external expertise to verify my determination as - inconclusive without further images.
NX9CL6	Item 5. The bony element presented as Item 5, does appear to be a human rib however due to the adhering tissue and variation in shape of the head of the rib depicted in the image, I would request this be sent through to the mortuary for a physical examination rather than provide the advice from an image only. Therefore as this is a proficiency test, I have provided the answer as inconclusive.
PJYFF8	While Item 5 appears to be consistent with human morphology, 'inconclusive' was selected due to (1) the similarity of rib morphology across many species, and (2) the presence of apparent adhering tissue obscuring key areas of diagnostic morphology. In a real case context where material was adhering to or otherwise preventing direct visual observation of portions of the bone in a photograph, it would be requested that the photographer remove the debris to the extent possible to permit a more thorough assessment, or else submit the bone to the laboratory for removal of the debris and/or direct examination. Moreover, it is the opinion of our laboratory's experts that it would rarely if ever be possible to make definitive conclusions regarding the origin of ribs from photographs, and that such assessments should be reported conservatively until the rib can be examined directly.
YFNMFQ	BONE 5: Possibly juvenile human rib, INCONCLUSIVE. Quality of image is poor, unable to zoom in clearly as image goes blurry. Lack of certain views/aspects prevents zooming in to fully identify landmarks or view surfaces closely. Bone is in poor condition. Sternal end damaged, cannot zoom in clearly to examine end. Shaft is damaged, images do not show landmarks, is out of focus and over exposed in areas. Generally the head is consistent with human, although it appears to lack articular surfaces, however views provided preclude further assessment or closer examination and it may be that the head is damaged (or not fully developed). Neck of rib does not appear to be flattened towards the tubercle, rib curvature is hooked, rib base diameter is approx 15.5cm, possibly indicating it is a juvenile human rib (2nd or 3rd). Tubercle appears to be approx 4cms from head of rib (although that area appears damaged), which considering its overall size may reflect the fact it is not human (primate perhaps?) or juvenile (all articular surfaces not yet fully developed?). I would need to examine this bone in person in order to make a determination as to human/non-human.

-End of Report-
(Appendix may follow)

Test No. 22-5501: Human vs Non-Human Bone Origin Determination

DATA MUST BE SUBMITTED BY **March 14, 2022, 11:59 p.m.** TO BE INCLUDED IN THE REPORT

Participant Code: U1234A

WebCode: VDDBAZ

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:

In five unrelated cases, photographs of bones have been submitted for analysis to determine whether they are human or non-human in origin. Each Item (1-5) below represents a separate, independent case.

Items Submitted (Sample Pack HNH):

Item 1: Images 1a, 1b

Item 2: Images 2a, 2b

Item 3: Images 3a, 3b

Item 4: Images 4a, 4b

Item 5: Images 5a, 5b, 5c

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

22-5501 Human vs Non-Human.zip MD5 hash value: cd8c21ed2e3c663c45111e126084ed2a

22-5501 Human vs Non-Human.zip SHA1 hash value: 3d596b95106a99816b80ab7eacb3da4a05e1cac9

1.) What is the origin of the bone represented in the submitted photographs (Items 1-5)?

- | | | | |
|---------------|-----------------------------|---------------------------------|-------------------------------------|
| <i>Item 1</i> | Human <input type="radio"/> | Non-Human <input type="radio"/> | Inconclusive* <input type="radio"/> |
| <i>Item 2</i> | Human <input type="radio"/> | Non-Human <input type="radio"/> | Inconclusive* <input type="radio"/> |
| <i>Item 3</i> | Human <input type="radio"/> | Non-Human <input type="radio"/> | Inconclusive* <input type="radio"/> |
| <i>Item 4</i> | Human <input type="radio"/> | Non-Human <input type="radio"/> | Inconclusive* <input type="radio"/> |
| <i>Item 5</i> | Human <input type="radio"/> | Non-Human <input type="radio"/> | Inconclusive* <input type="radio"/> |

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

Please note: 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.

2.) 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)