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SCIENCE AND TECHNOLOGY IN ARCHAEOLOGY AND CULTURE RESEARCH CENTER

ARCHAEOLOGICAL SCIENCE
CLASSROOM ACTIVITIES

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STARC in Action!

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1. Rationale of this guide

Archaeological science adopts scientific techniques from different fields, such as biology, chemistry and geology, to the study of the human past. Even though there are many books with archaeological activities for children available, these are restricted to archaeological excavation, typological methods and other 'traditional' archaeological approaches with minimal, if any, reference to archaeological science methods. This is the gap that the current guide aims at filling.

The activities presented focus on familiarising students with basic methods in two broad fields: a) bioarchaeology (the study of organic remains such as human and animal bones), b) archaeological materials and material culture (ceramics, glass, metals, coins and graffiti). The proposed activities are intended for students of different age. For each activity, we provide the age range of the children to be involved; however these ranges are only general approximations and it is up to the teacher to determine which students can participate in each activity or parts of the activity.

Basic information that the teachers/instructors should communicate to the students as part of each activity is provided, along with step-by-step instructions for the implementation of each activity, and printout forms. In this way, the proposed activities can be used by any teacher, with minimal preparation and extra required materials. The implementation of most activities takes between less than one hour to two hours. A key to selected activities is given at the end of this guide.

Through the proposed activities, the students are expected to develop:
- an understanding of the various methods available for reconstructing the human past, and
- critical thinking on how approaches from different disciplines can be used in combination in order to elucidate ancient lifeways.

For suggestions about how to improve this guide, please contact Efthymia Nikita (e.nikita@cyi.ac.cy)

2a. Human Osteoarchaeology activities: Digging up bones

10-13 yrs

Objectives

This activity will teach students the basic principles of excavation and it will highlight the fact that humans are often deposited in a grave in complex ways, following the rituals of different cultures.

Supplies

- Large transparent plastic box
- Bone casts (or laminated bone printouts)
- Sand, potting soil & small pebbles
- Brushes and trowels
- String, paper tape & measuring tape
- Human skeleton graph
- Excavation diary/recording form

Guidelines

1. Fill in the bottom of the plastic box with potting soil and add inside a few disarticulated bone casts (or laminated bone printouts). Add a layer of sand with pebbles on top of it and place a few more casts/printouts. Add a final layer of sand and bury a few more casts/printouts.

2. In the above process, make sure to include a few duplicate elements (e.g. two right humeri).

3. Show to the students the stratigraphy of the dig box through the walls of the transparent plastic box and explain that the lower layers (and their findings) are of an earlier date than layers higher up.

4. Stress that when we study multiple burials, the stratigraphic layers are often disturbed and we have the elements of many individuals mixed during different depositional episodes (i.e. the tomb was reopened several times, and the bones of earlier burials were often pushed to the side to make room for the new bodies).

5. Using string, paper tape and a measuring tape, divide the dig box in equal squares (see excavation record sheet). Explain that by designing a grid over the excavation site, you can document the location of each finding. Depending on the size of the box, use enough squares to get a good coverage of the 'excavation site' but at the same time, leave enough space for the students to excavate.
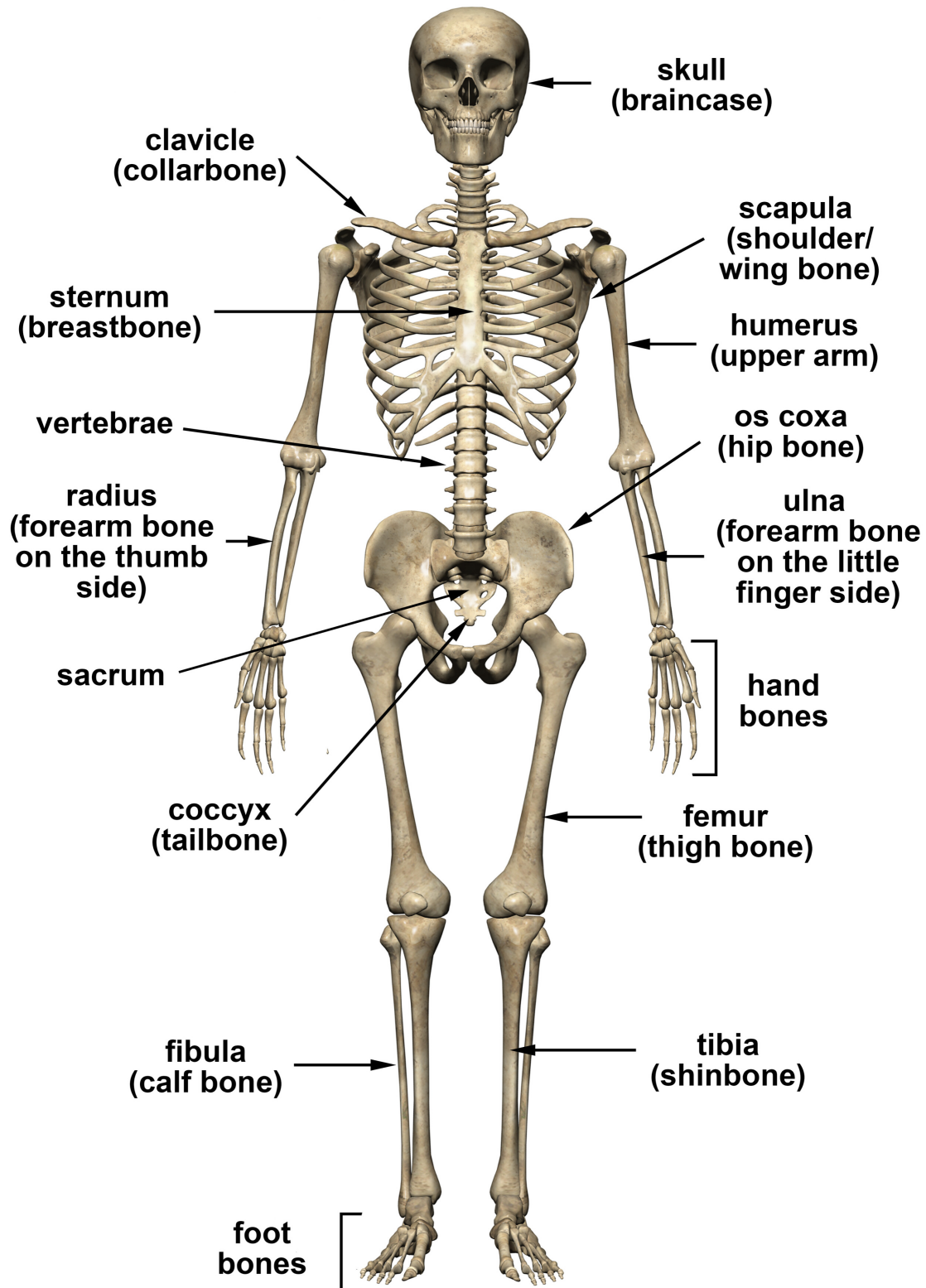
6. Advise the students to excavate per layer. Make sure they use the excavation record sheet to comment on the stratigraphy and map the location of each bone.

7. Discuss how the bones of the same individual have been scattered across layers because this was a disturbed burial. Explain that each layer represents a new reopening of the tomb to place inside new bodies.

8. Discuss with the students the funerary customs of their country and those of other countries. What trace would they leave for future osteoarchaeologists?

Human skeleton graph

- skull (braincase)
- clavicle (collarbone)
- scapula (shoulder/wing bone)
- sternum (breastbone)
- humerus (upper arm)
- vertebrae
- os coxa (hip bone)
- radius (forearm bone on the thumb side)
- ulna (forearm bone on the little finger side)
- sacrum
- hand bones
- coccyx (tailbone)
- femur (thigh bone)
- fibula (calf bone)
- tibia (shinbone)
- foot bones

2a. Human Osteoarchaeology activities: Digging up bones

Disarticulated human bone printouts
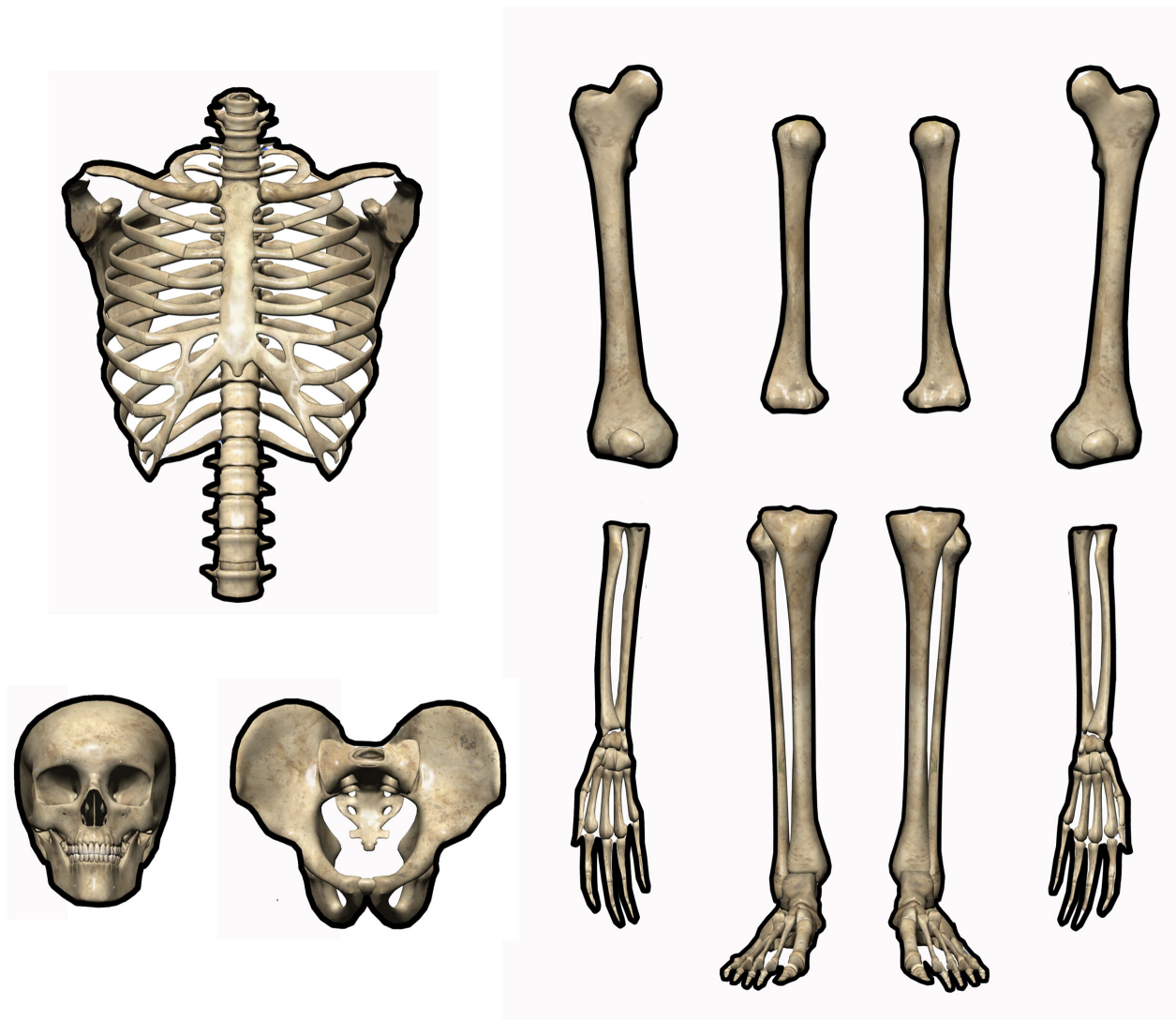
2a. Human Osteoarchaeology activities: Digging up bones

Excavation record sheet

Archaeologist's name: _____

Date: _____

Make sure to mark the location of each bone given in the Finds list on the grid that represents the excavation pit!

Finds list:

Find	Grid Square	Layer

2b. Human Osteoarchaeology activities: What bone is that?

10-14 yrs

Objectives

This activity will familiarise students with the different bones of the human skeleton, where each bone fits into their body, and their variation in size and shape.

Supplies

- Plastic human skeleton model (or human skeleton graph)
- Disarticulated bone casts (or life-sized printouts of human bones)
- Calipers and osteometric board (or measuring tape)
- Crayons, large roll of paper, blue tack

Guidelines

1. Show the human skeleton model (or graph) to the students and point to the main anatomical parts (e.g. skull, pelvis).

2. Ask the students to identify each disarticulated bone (Which bone is it? What side of the skeleton does it come from?)

3. Stress that the forearm consists of two bones (radius and ulna) and ask the students to palpate their forearm to see if they can feel each bone. Do the same for the tibia and fibula.

4. Divide the students into groups. One student from each group will lie down on the roll of paper and the others will use a crayon to trace around him/her.

5. Put the body outline on the wall and ask the students to place each printable bone in the correct anatomical position.

6. Ask the students to make a list of all the pairs of bones that look alike and may be easily mistaken for each other. For these bones, take measurements to see how they differ from each other not only in terms of their shape but also in terms of size.

Human skeleton graph

- skull (braincase)
- clavicle (collarbone)
- scapula (shoulder/ wing bone)
- sternum (breastbone)
- humerus (upper arm)
- vertebrae
- os coxa (hip bone)
- radius (forearm bone on the thumb side)
- ulna (forearm bone on the little finger side)
- sacrum
- hand bones
- coccyx (tailbone)
- femur (thigh bone)
- fibula (calf bone)
- tibia (shinbone)
- foot bones
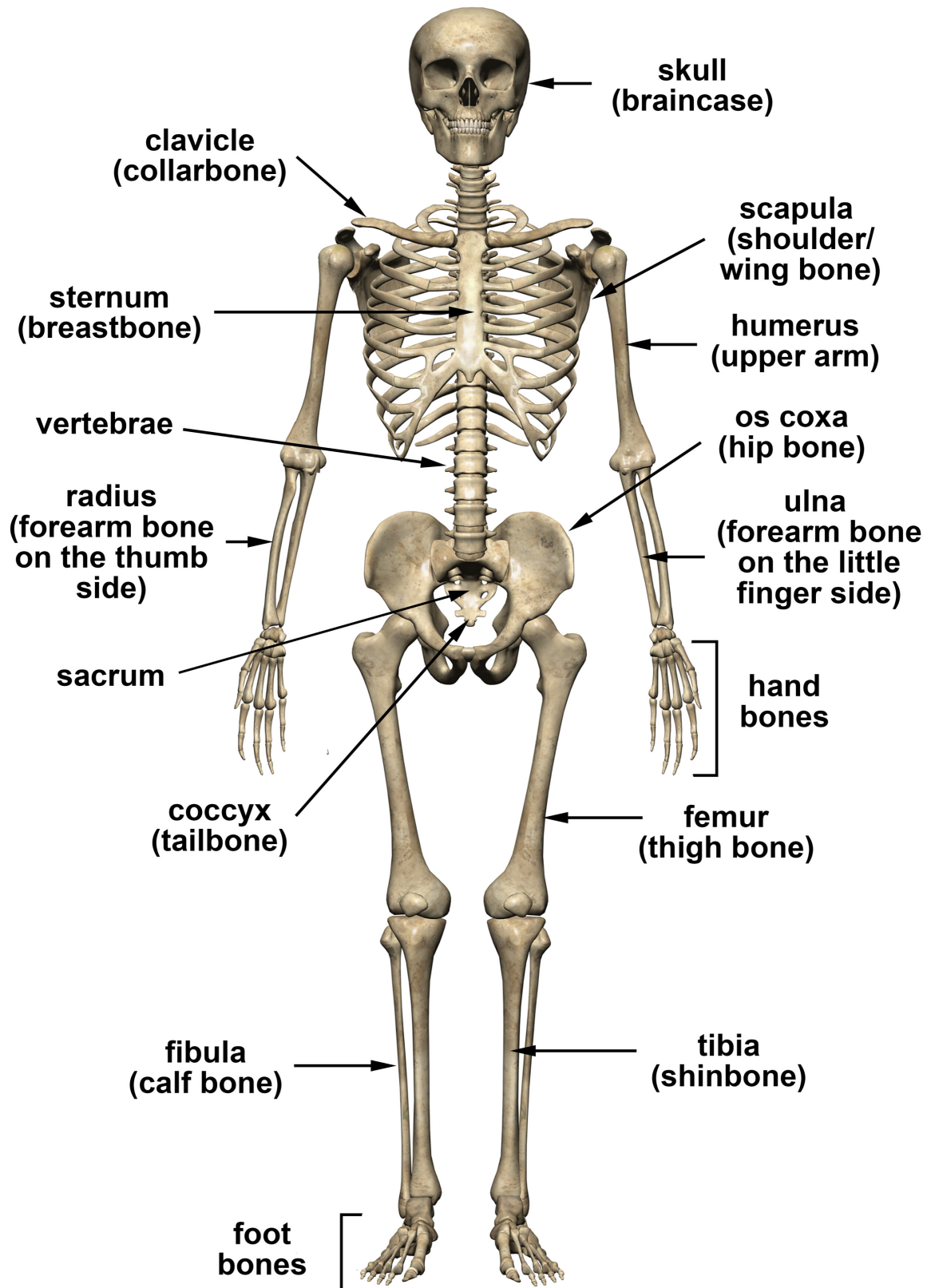
2b. Human Osteoarchaeology activities: What bone is that?

Disarticulated human bone printouts*
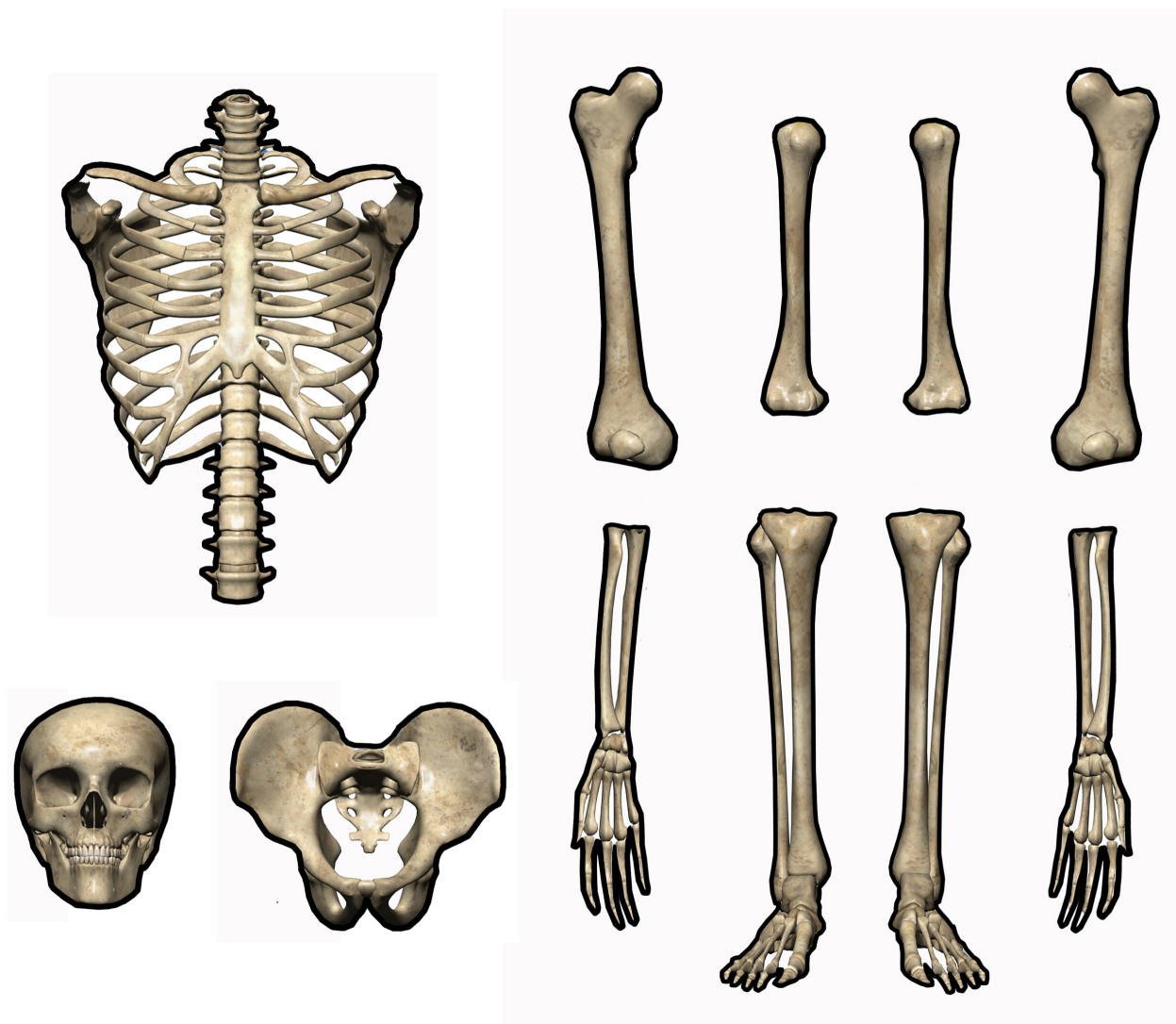
* to be printed in life size

2c. Human Osteoarchaeology activities: The Human Jigsaw

8-12 yrs

Objectives

The students will learn which bones articulate with each other and that different joints allow different degrees and types of movement. They will also become familiar with the overall shape of the human skeleton and the location of individual bones.

Supplies

- Cut-out human bones
- Fasteners, pair of scissors & hole puncher
- Human skeleton jigsaw

Guidelines

1. Ask the students to cut out the human bones and identify each bone using the provided human skeleton graph.

2. Using the hole puncher and fasteners, connect the parts of the skeleton.

3. Discuss how certain joints of the human body allow for extensive movement (e.g. the hip or the wrist), while others allow only very restricted movement between the articulated bones (e.g. the thoracic part of the spine).

4. Ask the students to make different movements with their arms (shoulder, elbow and wrist joints) to see directly how flexible these joints are. Now ask them to move the thoracic (middle) part of their spine so that they realise that their movements are much more restricted.

5. Explain that joints are functionally divided into three categories:
a) synarthrosis, which permits little or no mobility (e.g., cranial sutures),
b) amphiarthrosis, which permits slight mobility (e.g. intervertebral discs),
c) synovial joint, which allows a broad range of movements (e.g. shoulder).

6. Using a pair of scissors, cut the human jigsaw in pieces and ask the students to assemble it.

7. During the activity, stress how combinations of bones perform distinct functions (e.g. the bones of the pelvis -os coxa, sacrum and coccyx- support our body, facilitate locomotion, and protect our reproductive organs, the bones of the thorax - ribs, sternum- protect our heart and lungs).
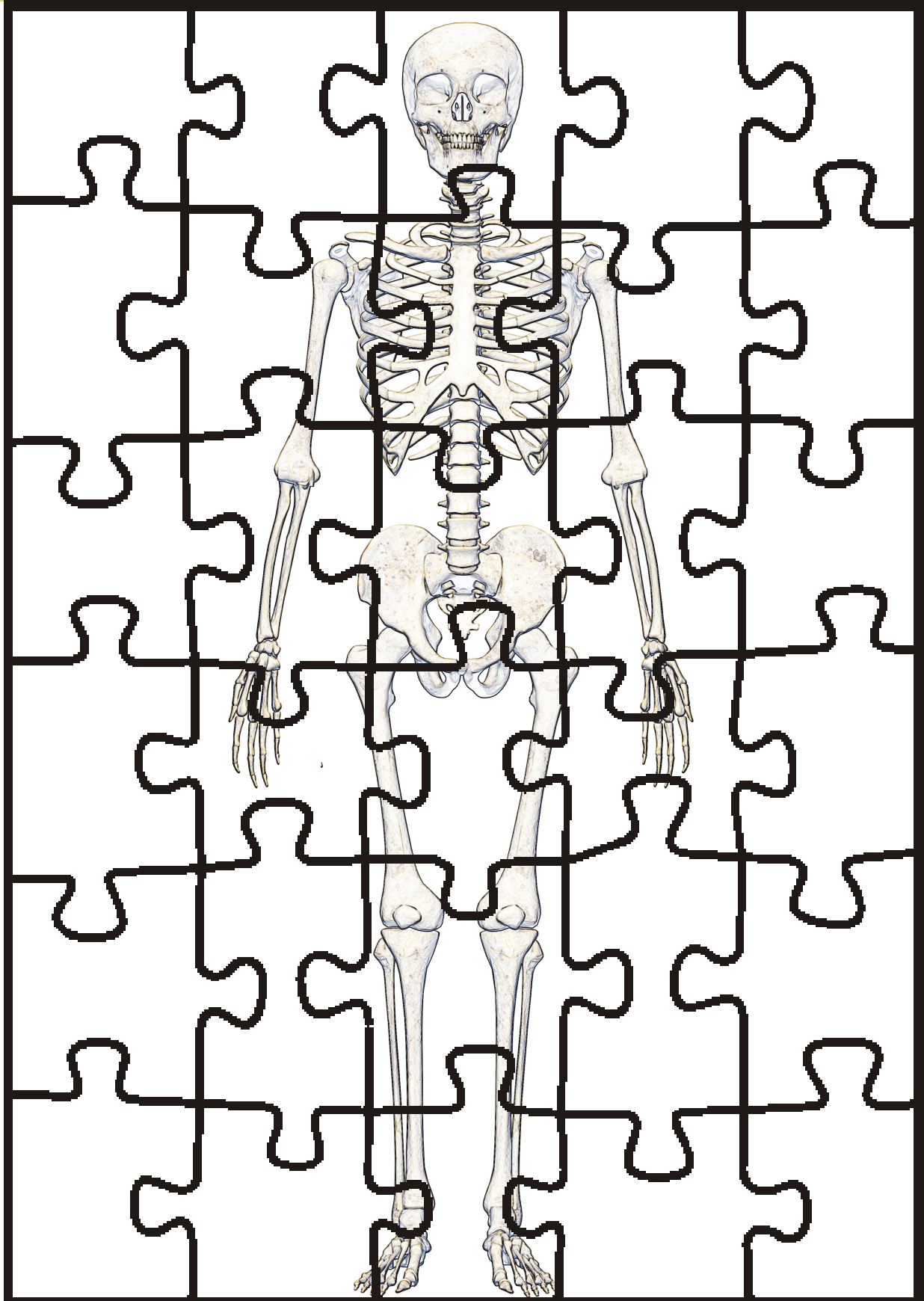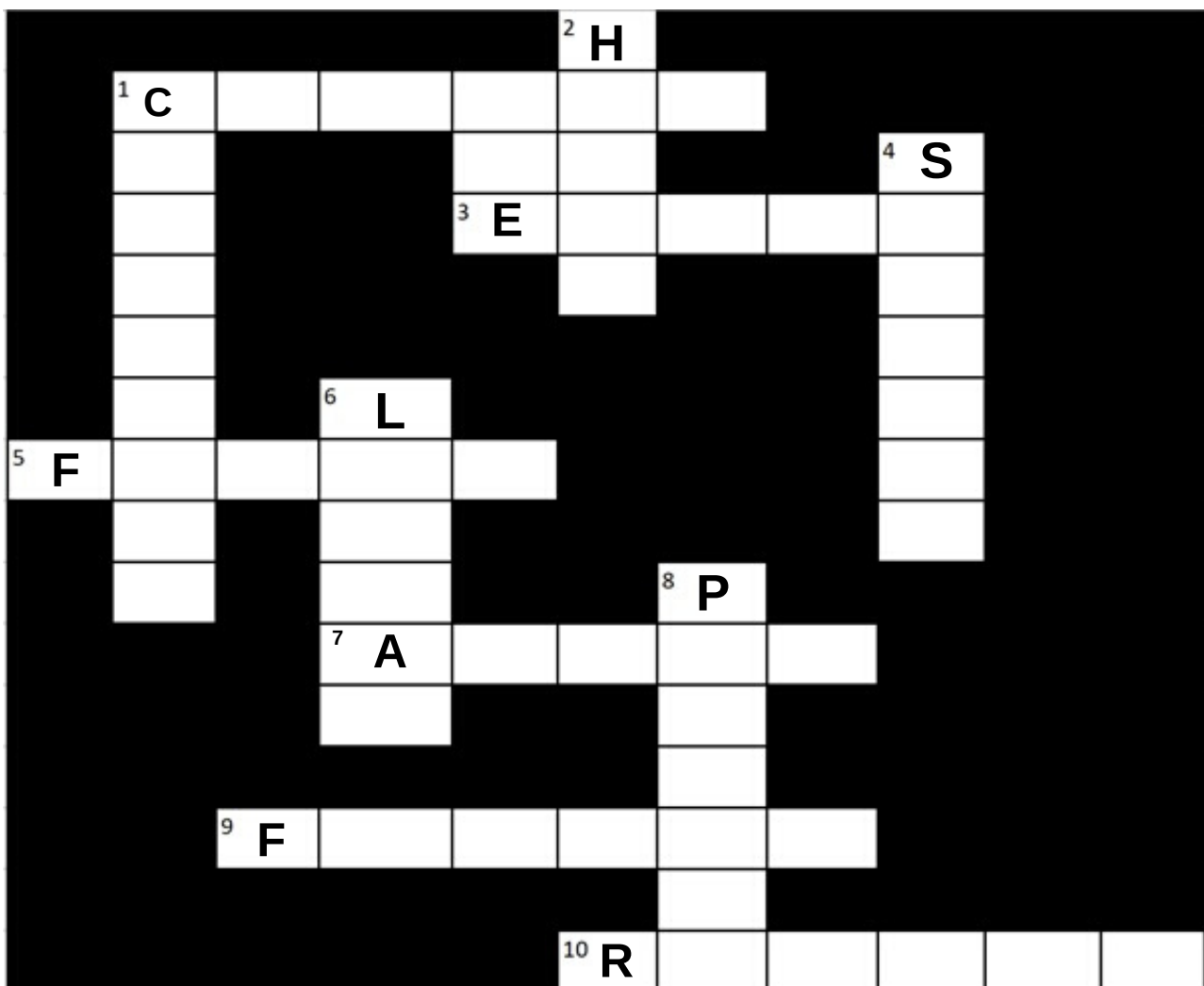
2d. Human Osteoarchaeology activities: Crossword/word search

8-15 yrs

Objectives

These activities will familiarise students with the names of the different bones and some additional properties of them.

Human skeleton crossword

Across

1 The human tail (or rather what's left of it!)
3 The number of carpals in each hand
5 The largest bone in the human skeleton
7 Our cranium rests on this vertebra
9 The bone that pairs with the tibia
10 The bone that pairs with the ulna

Down

1 The largest tarsal bone
2 The only bone that does not articulate with any others
4 The breastbone
6 The vertebrae at the lowest part of the spine
8 Our kneecap

Human skeleton word search

Find as many bones of the human skeleton as you can!

```
F  R  S  T  E  R  N  U  M  F  T  S  B  N
L  H  T  I  F  G  L  B  A  F  E  M  U  R
K  E  G  B  D  K  X  K  R  I  Z  K  J  S
Q  J  H  I  W  V  O  Y  T  B  N  T  J  V
T  H  R  A  D  I  U  S  G  U  F  S  L  O
H  Y  O  I  D  L  Q  R  B  L  Q  U  G  S
U  W  D  N  F  H  B  W  S  A  N  L  V  C
M  E  T  A  T  A  R  S  A  L  V  N  O  O
E  L  A  V  O  J  Z  P  H  A  L  A  N  X
R  H  L  F  R  K  M  A  S  Q  C  S  B  A
U  E  U  S  I  N  C  T  H  T  O  C  M  B
S  F  S  T  B  M  V  E  R  T  E  B  R  A
Q  Z  V  M  G  B  C  L  N  S  N  C  W  R
J  M  A  N  D  I  B  L  E  K  L  B  H  E
B  O  N  V  C  Z  S  A  C  R  U  M  V  N
```

2e. Human Osteoarchaeology activities: Is this John or Helen?

12-15 yrs

Objectives

This activity will teach students how and why the human skeleton differs between men and women.

Supplies

- Male and female skull casts (if not available, use images of such casts)
- Sketches of human cranial profiles
- Data collection form including scheme for recording skull traits

Guidelines

1. Explain to the students that men and women differ mainly in the morphology of the pelvis because this structure supports locomotion in men but locomotion **and** parturition in women. However, the pelvis is often not preserved in archaeological remains because it consists mainly of 'spongy bone', which makes it fragile. In such cases, the skull can be used instead.

2. Explain that differences between the male and female skull are largely due to the fact that men are more robust than women.

3. Explain that in order to tell if a person is male or female based on the skull, many traits need to be examined. If only one or two traits are observable (for example, in poorly preserved crania), sex diagnosis is tentative.

4. Using the male and female skull casts (or images), show each trait you will examine. Ask the students to touch their glabella, occipital protuberance, and mastoid process.

5. Divide the students in groups of 3-4 and assign one cranial sketch to each group.

6. Give a recording form to each group and ask them to record the degree of expression of the traits they observe in their sketch.

7. Stress that when we assess sex from skeletal remains, we can never be 100% sure of our results (unless we also run DNA analysis). Some traits may appear female and others male in the same skeleton, while others may exhibit a form intermediate between male and female. Thus, we record sex as 'female', 'probable female', 'indeterminate', 'probable male' and 'male'.

8. Ask the students if they see any other traits that are different between males and females based on the casts and/or the sketches.

9. Ask the students if they can think of any other way we can assess sex from the skeleton besides cranial morphology.

Typical male skull

Typical female skull

Recording scheme for cranial sexually dimorphic traits

FEMALE   MALE

glabella

mastoid process

nuchal crest

1 = Female
2 = Probable female
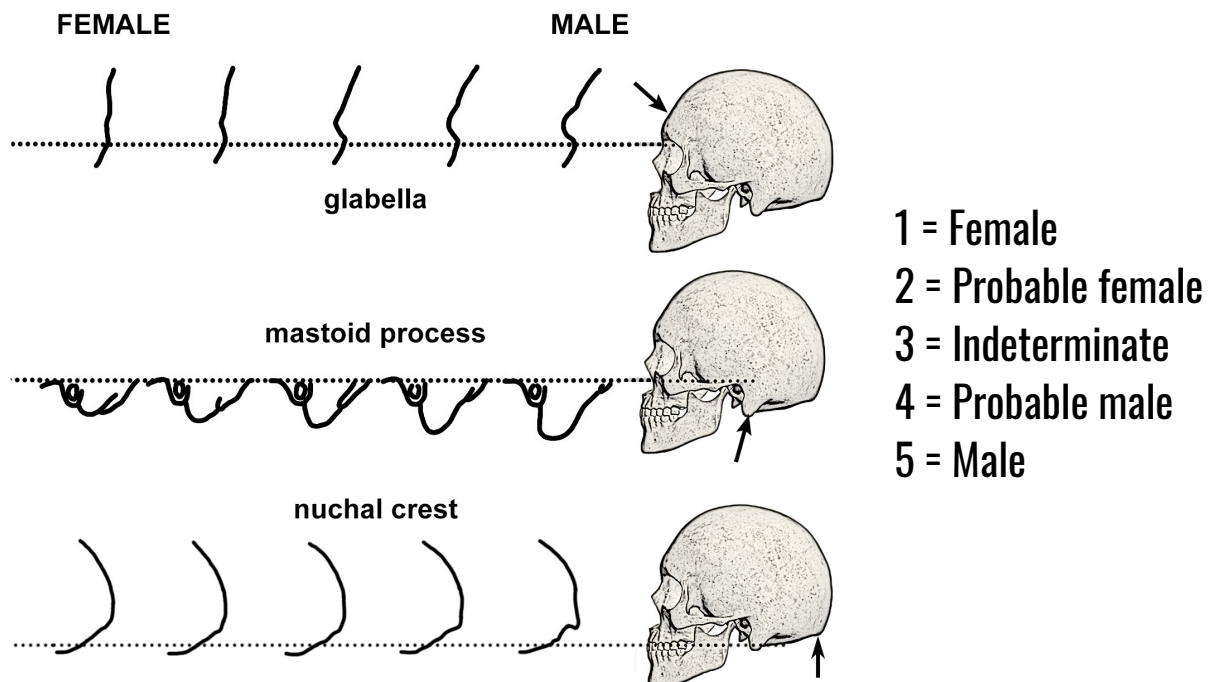3 = Indeterminate
4 = Probable male
5 = Male

Image adapted from Buikstra JE, Ubelaker DH (1994). Standards for data collection from human skeletal remains. Arkansas Archaeological Survey Research 44.

Are the following crania male or female?

A

B

C

D

E

F

DATA COLLECTION FORM

Skeleton No	Glabella	Mastoid process	Nuchal crest	Estimated sex

2f. Human Osteoarchaeology activities: How old was this person at death?

12-15 yrs

Objectives

This activity will demonstrate how age-at-death can be assessed from human skeletal remains based on the degree of maturity of the skeleton for nonadults and the degree of degeneration of specific joints for adults.

Supplies

- Chart of dental development at different ages
- Outline of ageing method based on the pubic symphysis

Guidelines

1. Explain to the students that in order to assess an individual's age-at-death, we use different methods for nonadults and adults. For nonadults, we focus on the development of the teeth and the skeleton, while for adults, we focus on the degeneration of the skeleton. Stress that age estimation in nonadults is considered more accurate than in adults because the development of the skeleton is a better 'timed' process, whereas skeletal degeneration depends upon an individual's activity patterns, pathological status and other factors. Therefore, skeletal development is more strongly correlated with chronological age than skeletal degeneration.

2. Discuss with the students that even though both dental development and skeletal growth may be used in ageing nonadults, dental data are preferred because these appear to be less influenced by extrinsic factors, such as diet and disease. In contrast, individuals who suffer from malnutrition and/or infectious and other diseases often exhibit delayed maturation.

3. Using the London atlas, that is, an atlas for dental formation and eruption, based on modern European populations, estimate the age of the individual provided.

4. Explain that for adults, we examine the degree of degeneration of different joins, mainly joints at the pelvis. The pubic symphysis is one of the main areas we examine.

5. Ask the students to estimate the age of the three individuals, the pubic symphyses of whom are provided as sketches, using the Suchey-Brooks method.

6. Stress to the students that a limitation of all methods, whether for nonadults or adults, is that they have been developed based on modern populations and it is not clear to what extent they are appropriate for individuals in the past due to changes in lifestyle and the natural environment.
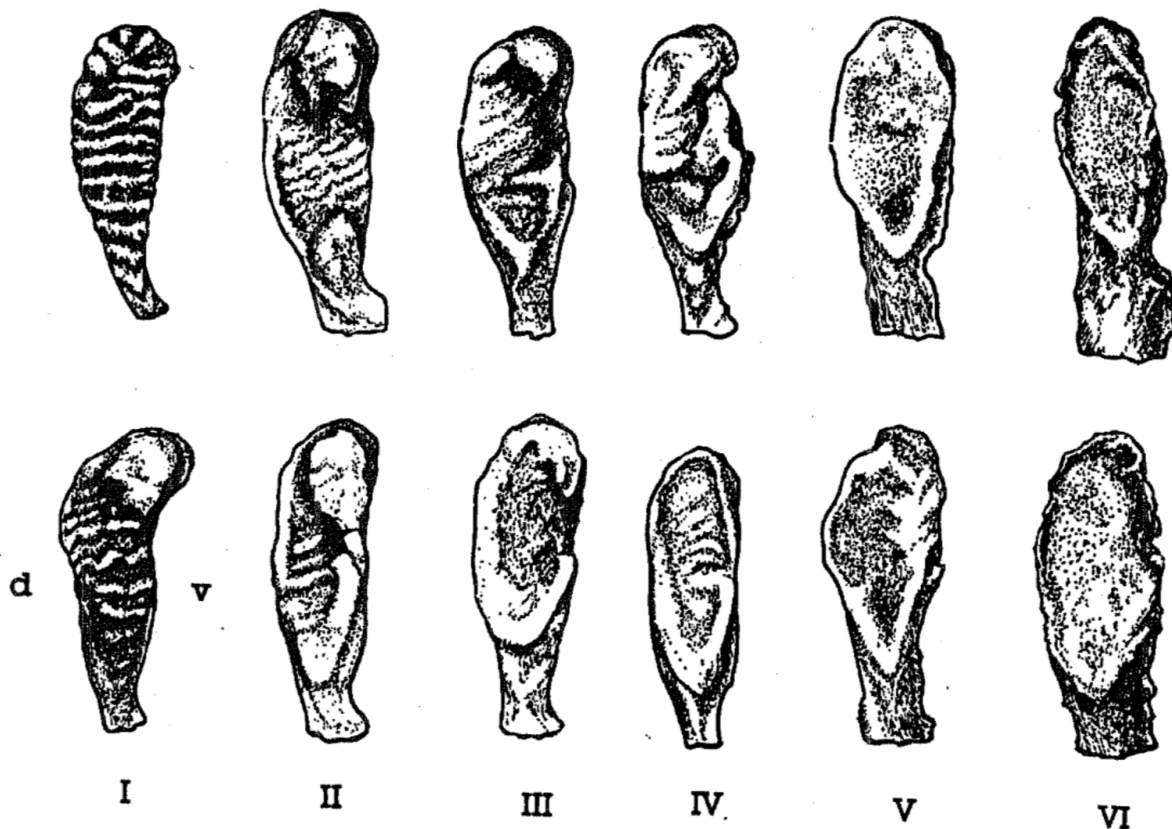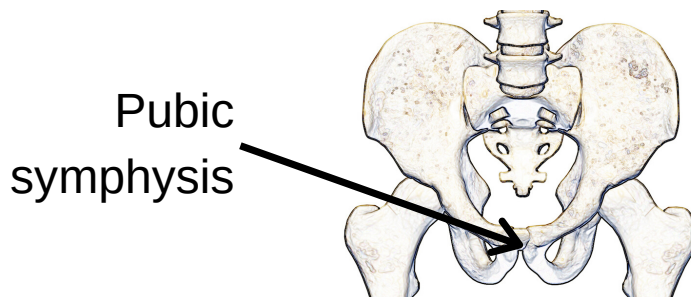
The London atlas

Atlas of Human Tooth Development and Eruption
Dr. Sakher J. AlQahtani
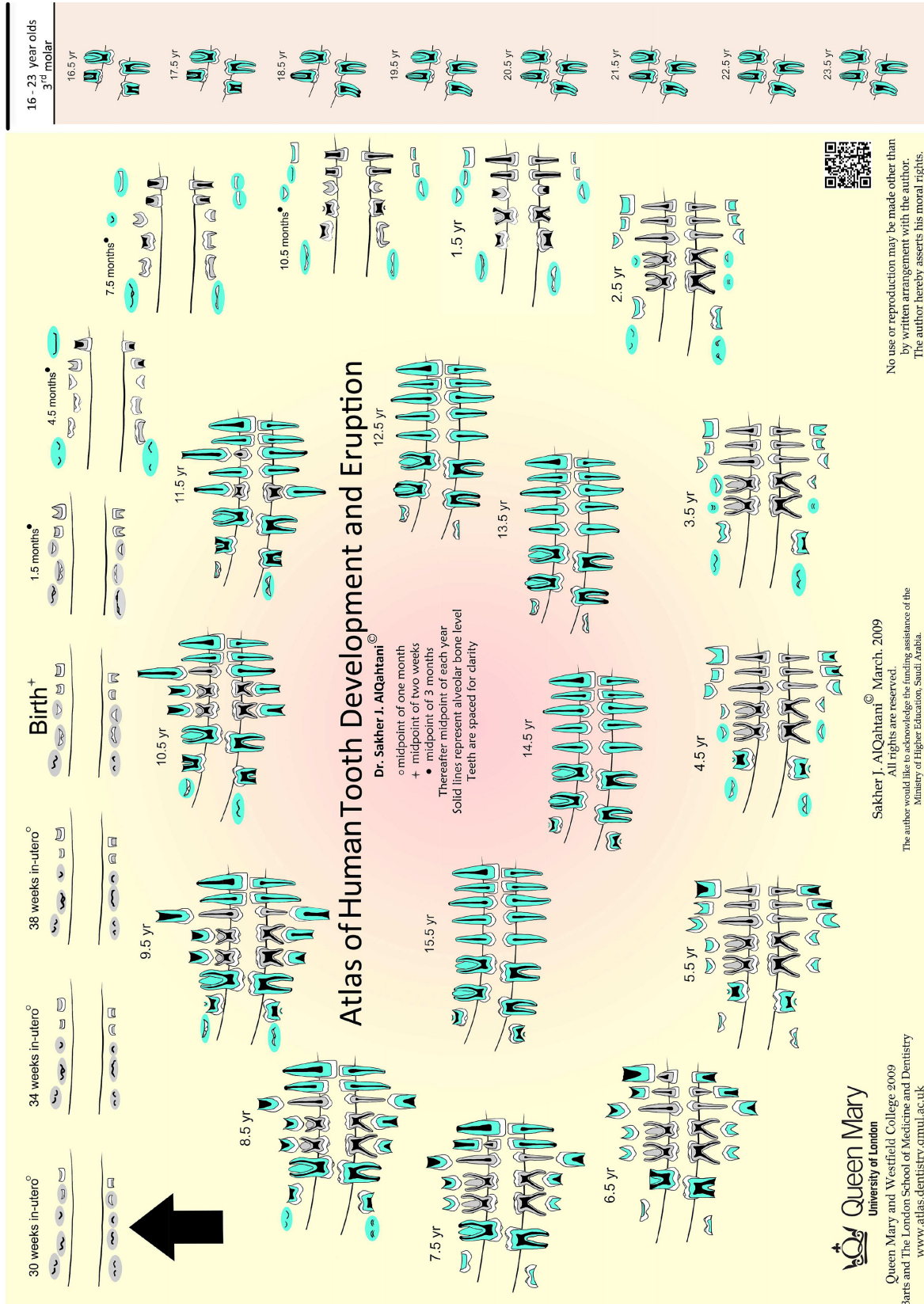
Suchey-Brooks method

Pubic symphysis

Phase	Female		Male	
	mean	standard deviation	mean	standard deviation
I	19.4	2.6	18.5	2.1
II	25.0	4.9	23.4	3.6
III	30.7	8.1	28.7	6.5
IV	38.2	10.9	35.2	9.4
V	48.1	14.6	45.6	10.4
VI	60.0	12.4	61.2	12.2

Brooks S, Suchey JM. 1990. Skeletal age 0etermination based on the os pubis: A comparison of the Acsádi-Nemeskéri and Suchey-Brooks methods. Human Evolution 5: 227-238.

What is the age of these individuals?*
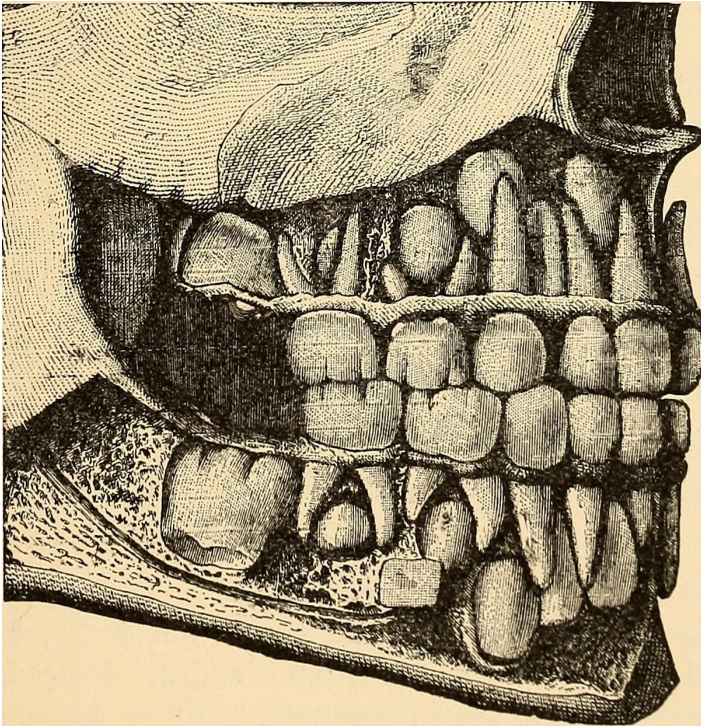
A

B

C

*Assume that all adults are male

2g. Human Osteoarchaeology activities: How tall were our ancestors?

12-15 yrs

Objectives

This activity focuses on metric variation among individuals. The students will learn how to estimate stature using multiple or single bones.

Guidelines

1. Ask the students to stand next to each other to witness how much variability there is in human stature. Highlight that their skeletons will also reflect this variability: shorter individuals will have shorter bones.

2. Explain that there are two methods in estimating stature from the skeleton. The 'anatomical method' involves measuring the length/height of all the bones that contribute to one's stature (cranium, vertebral column, femur, tibia, talus and calcaneus). These values are summed and then an extra value is added to correct for the absence of soft tissues. This method is the most accurate but it requires a very good preservation of the skeleton, which is rare in many archaeological samples. The second approach is called the 'mathematical method' and it is based on the high correlation between individual bones and stature (e.g. taller individuals will have larger long bones). In this method, we use equations from which we can predict stature from the measurements of specific elements. Many elements have been used for stature estimation but the femur and tibia give the most accurate results.

3. Give to the students the following maximum length measurements and ask them to estimate stature using the Ruff et al. (2012) equations:

- humerus: 31 cm
- radius: 23 cm
- femur: 43 cm
- tibia: 35 cm

Bone	Equation
Humerus	3.72 * maximum bone length + 44.86
Radius	4.46 * maximum bone length + 56.94
Femur	2.77 * maximum bone length + 40.50
Tibia	3.13 * maximum bone length + 50.11

Ruff CB et al. 2012. Stature and body mass estimation from skeletal remains in the European Holocene. American Journal of Physical Anthropology 148: 601-617.

4. Stress that it is very important to use equations that have been derived from populations ethnically as proximal as possible to the individual(s) under study. Also stress that most regression equations have been derived from modern groups and it is uncertain to what extent they are appropriate for archaeological samples given secular trends in human growth.

2h. Human Osteoarchaeology activities: Reconstructing activity from the skeleton

12-15 yrs

Objectives

This activity will highlight the fact that the skeleton, as a living tissue, responds to the various mechanical stresses applied on it either by forming new bone or by absorbing (resorbing) existing bone. The students will learn how they can assess activity patterns from the skeleton but also the limitations of relevant methods.

Supplies

- Sketches of muscle attachment sites for the radius.

Guidelines

1. Explain to the students that the skeleton is a living tissue, thus it responds to the different mechanical stresses applied on it. This means that when an individual performs a regular repetitive activity, the skeleton will deposit more bone tissue on the elements and sites where it is mostly needed in order to effectively withstand the increased mechanical stress. On the other hand, prolonged lack of activity (such as after a serious injury), will result in bone tissue getting resorbed.

2. Explain that one of the methods we use for activity reconstruction is focused on the sites where the muscles attach on the bones. In these sites, we observe variability among skeletons, with some individuals showing marked changes of the bone surface morphology in the form of new bone or loss of bone, while in other individuals these sites have a smooth surface.

Thus, it has been supported that pronounced changes suggest more active individuals.

3. Highlight that the relationship between levels of activity and muscle markings on the skeleton is actually very complex because an individual's age, body size, sex and other factors also affect greatly the morphology of the bone surface.

4. Ask the students to assess which of the two individuals given in the handouts appears to have engaged in more strenuous activities based on the morphology of the muscle markings on the upper limbs.

Muscle attachment sites on the radius
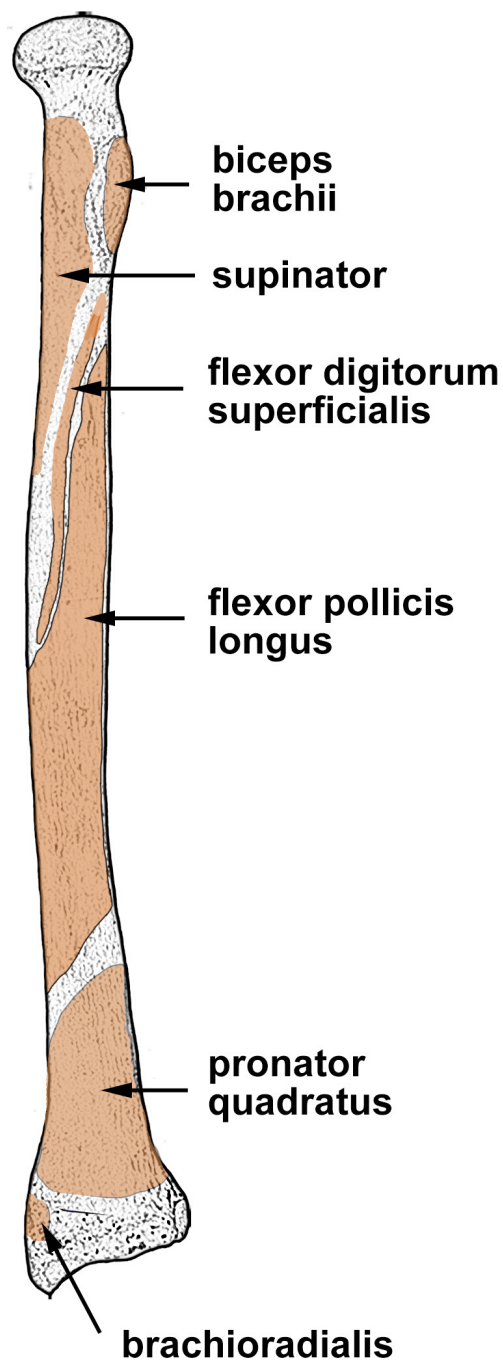
Which of these individuals appears to have been more active based on the biceps brachii morphology?

- biceps brachii
- supinator
- flexor digitorum superficialis
- flexor pollicis longus
- pronator quadratus
- brachioradialis

A

B

2i. Human Osteoarchaeology activities: How healthy were our ancestors?

12-15 yrs

Objectives

This activity will illustrate that the skeleton is a living tissue that may be affected by various diseases. The students will see how various pathological conditions may affect the human bones but also the limitations of identifying diseases from skeletal remains.

Supplies

- Images of 3D models of pathological bones

Guidelines

1. Ask the students if any of them has ever broken a bone. Explain that the skeleton is a living tissue and, as such, it can be affected by many different pathologies but also it can heal itself (as for example when a bone breaks).

2. Using the provided images of pathological bone models, explain that the skeleton has specific means of responding to different diseases: a) abnormal bone formation, b) abnormal bone loss, c) a combination of abnormal bone loss and formation, d) abnormal bone size, e) abnormal bone shape.

3. Discuss with the students the limitations that the above specific responses have in palaeopathological diagnosis (many different pathological conditions manifest in the same way in the skeleton, we need a good preservation of the entire skeleton in order to see all the elements affected by a pathological condition and potentially identify the disease causing these lesions).

4. Divide the students in groups and ask them to find information about medicine in ancient or modern traditional societies. Have a group discussion on how we could identify medical intervention in the past (e.g. evidence of surgery: trepanations, healing or healed trauma, demographic composition of an assemblage: few infant/childhood deaths & long lifespan etc.)

5. Explain to the students the 'Osteological Paradox': Imagine that we have two groups of skeletons. The skeletons of group A have bones riddled with pathological lesions, whereas those of group B do not exhibit any lesions. We would assume that the individuals in group A were more 'sick' than those of group B, but this is wrong! Many diseases (e.g. infectious diseases) affect first the soft tissues and take time to reach the skeleton. Thus, the individuals who have skeletal lesions (group A) survived the disease long enough for it to get to their bones, whereas it is possible that the individuals in group B were so frail that they passed away before the disease had the time to reach their bones!

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2i. Human Osteoarchaeology activities: How healthy were our ancestors?

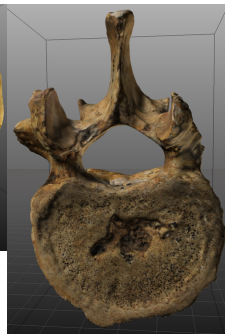## Degenerative Joint Disease

Arthritis on lumbar vertebra
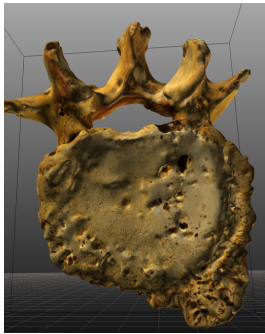
Digitised Diseases (accessed 14/02/2019)
http://www.digitiseddiseases.org/mrn.php?mrn=1249

Knee arthritis

Digitised Diseases (accessed 14/02/2019)
http://www.digitiseddiseases.org/mrn.php?mrn=1256
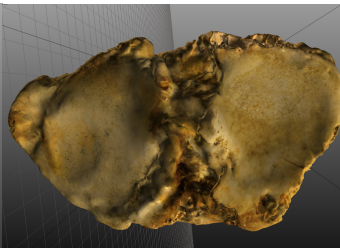
Schmorl's node

Digitised Diseases (accessed 14/02/2019)
http://www.digitiseddiseases.org/mrn.php?mrn=0157

Developmental Disease

Spina bifida
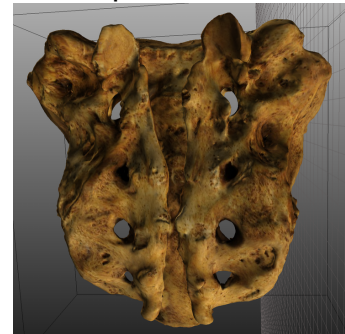
Digitised Diseases (accessed 14/02/2019)
http://www.digitiseddiseases.org/mrn.php?mrn=0539

Dental Disease

Dental caries

Digitised Diseases (accessed 14/02/2019)
http://www.digitiseddiseases.org/mrn.php?mrn=1211
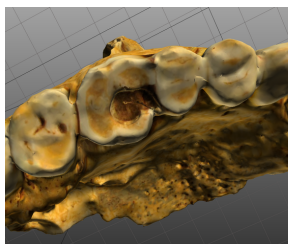
Apical granuloma/cyst

Digitised Diseases (accessed 14/02/2019)
http://www.digitiseddiseases.org/mrn.php?mrn=0597

Neoplasms

Osteoma

Digitised Diseases (accessed 14/02/2019)
http://www.digitiseddiseases.org/mrn.php?mrn=1226
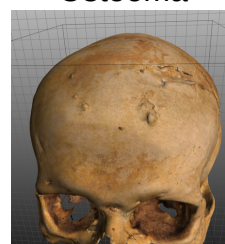
Osteoclastoma

Digitised Diseases (accessed 14/02/2019)
http://www.digitiseddiseases.org/mrn.php?mrn=R1004
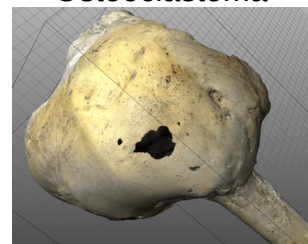
Trauma

Trepanation

Digitised Diseases (accessed 14/02/2019)
http://www.digitiseddiseases.org/mrn.php?mrn=1020
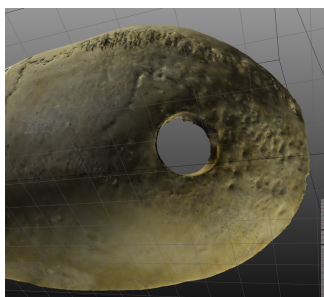
Fractured radius

Digitised Diseases (accessed 14/02/2019)
http://www.digitiseddiseases.org/mrn.php?mrn=0155

Infectious Disease

Treponemal disease

Digitised Diseases (accessed 14/02/2019)
http://www.digitiseddiseases.org/mrn.php?mrn=0068
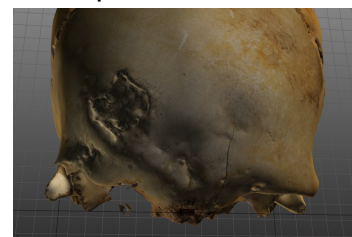
Osteomyelitis (fibula)
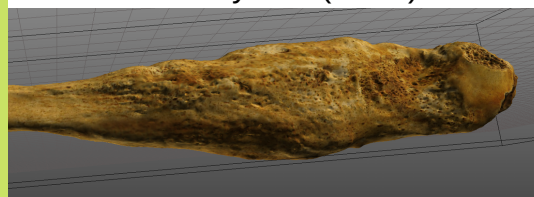
Digitised Diseases (accessed 14/02/2019)
http://www.digitiseddiseases.org/mrn.php?mrn=1209

3a. Glass activities: Let's make a glass vessel!

10-14 yrs

Objectives This activity will teach students how ancient glass vessels were made.

Supplies
- Casts of various types of vessels
- Gypsum for casting
- Painting brushes and water colours
- Wooden sticks

Guidelines

1. Explain to the students that the earliest glass vessels were formed around a core.

2. Explain that in the current exercise you will use gypsum instead of molten glass.

3. Mix gypsum with water in the right proportions to make an easy to cast solution.

4. Make casts of (half) vessels using various thermoplastic materials appropriate for mould making or use clay for artists.

5. Cast the gypsum solutions in the moulds. Make sure to place a wooden stick inside first so that the finished products can be easily removed from the cast once dry.

6. Once dry, use water colours to decorate the vessels: Use deep blue, turquoise and amber for the main body, and white, yellow and turquoise for the decorations.

7. Let the students experiment with different decorative patterns (feather, festoons, zig-zag, straight).

8. In the end, the students can keep their artefact as a souvenir.

3a. Glass activities:
Let's make a glass vessel!

Vessel Typology Examples

amphoriskos

https://www.pinterest.com/pin/56372407833546
2028/

oinochoe

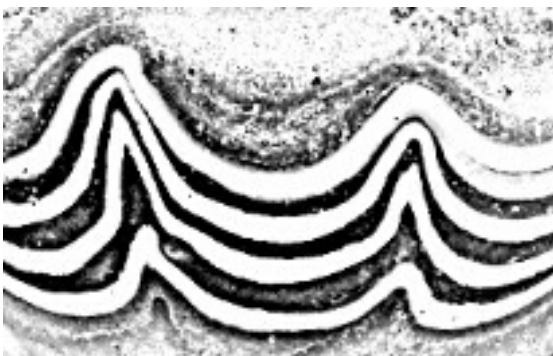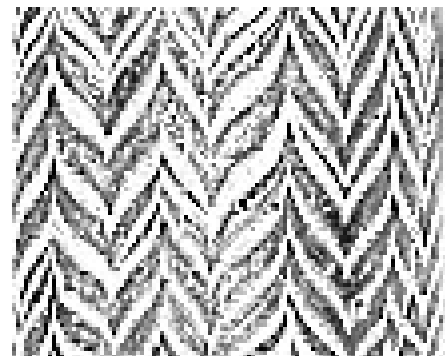https://frideslameris.nl/detail/post/11997

alabastron

https://www.christies.com/lotfinder/lot_details.asp
x?
from=salesummery&intobjectid=6009453&sid=42
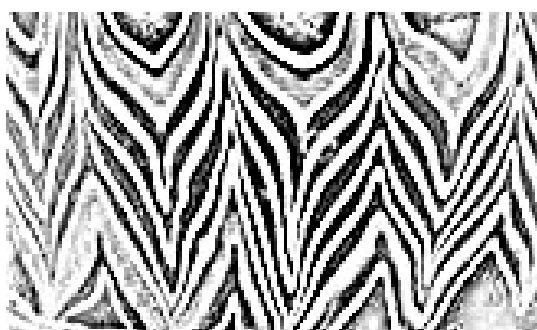0a30de-2ed5-403d-83d6-718d52c69e2c&lid=4

Decoration Examples

festoon

zig-zag

feather

3b. Glass activities: How did they do it?

13-15 yrs

Objectives — This activity will familiarise students with the ancient techniques used in glass-making and their end products.

Match the techniques with the corresponding vessels

1. Glass blowing

a.
http://www.sassonancientart.com/artwork_show_291_archive.html

2. Mosaic

b.
https://www.cmog.org/artwork/portrait-inlay-pharaoh-akhenaten

3. Casting

c.
https://www.pinterest.ru/pin/87960998946314162/

4. Cast blowing

d.
https://www.metmuseum.org/art/collection/search/245200

5. Slumping/sagging technique

e.
https://www.worthpoint.com/worthopedia/antique-ancient-roman-glass-face-1817404706

6. Core forming

f.
https://www.sandsoftimedc.com/collections/ancient-roman-glass-for-sale-sands-of-time-antiquities/products/rg204

3c. Glass activities: How did they do it (again)?

11-15 yrs

Objectives   This activity will familiarise students with the most common tools used in ancient glass working.

Block
https://www.cmog.org/article/tools-glassmaker

Tweezers
https://www.cmog.org/article/tools-glassmaker

Jacks
https://www.cmog.org/article/tools-glassmaker

Straight shears
https://www.cmog.org/article/tools-glassmaker

Diamond shears
https://www.cmog.org/article/tools-glassmaker

Paddle
https://www.cmog.org/article/tools-glassmaker

Pincer
https://www.dgsoldiertalk.com/pincer-tweezer.html

Blowpipe
https://warehouse13.fandom.com/wiki/Glassblowing_Tube

Mold
https://blog.cmog.org/2015/12/03/how-its-made-grape-blow-mold/

Pontil
https://www.worthpoint.com/worthopedia/
blowpipe-pontil-rod-pair-dorothy-427778274

Mandrel
https://www.devardiglass.com/makingbeadsPII.htm

Marver
https://commons.wikimedia.org/wiki/File:Cristacolor22.JPG
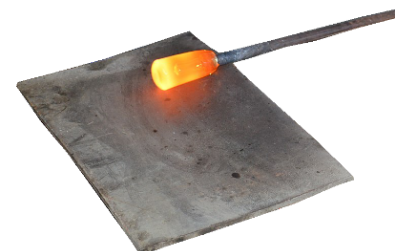
3c. Glass activities:
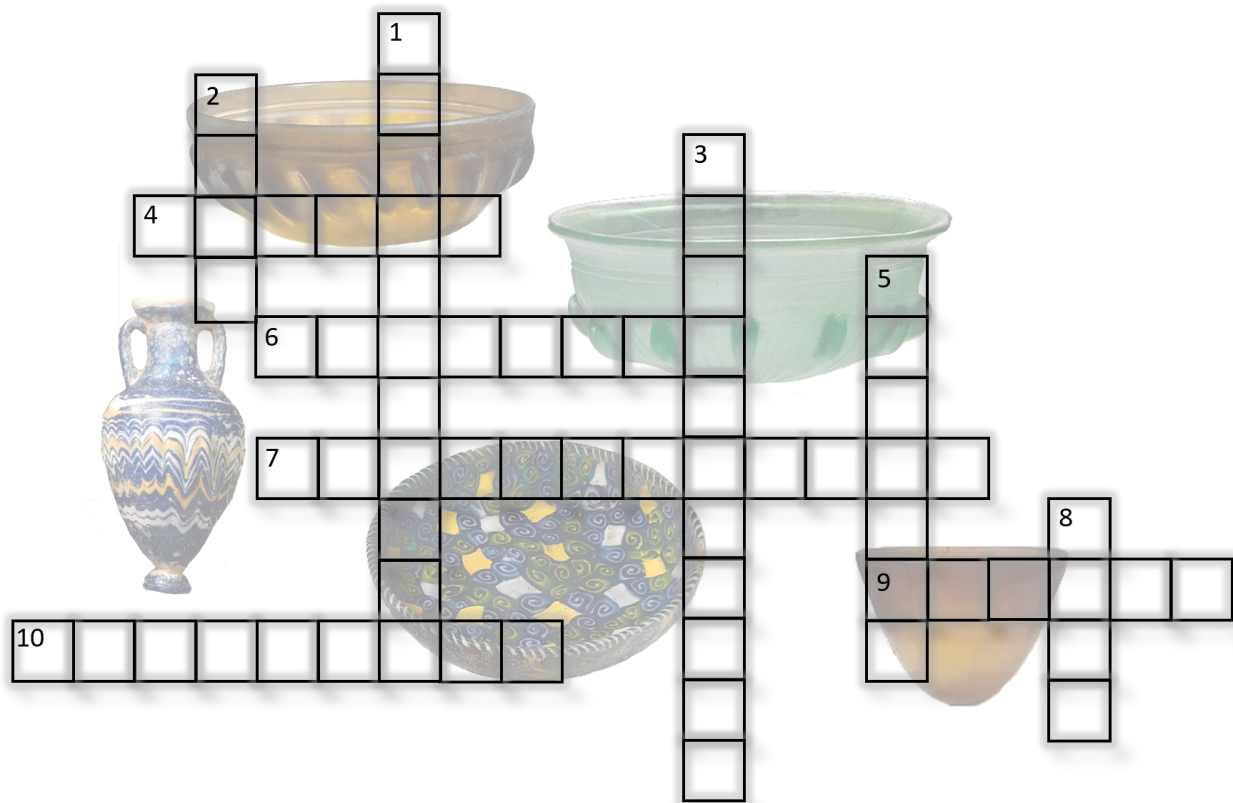# How did they do it (again)?

Find the tools

```
S   U   N   H   U   B   R   F   B   H   B   D   X   W   H   L   B
S   D   F   G   I   W   G   C   P   G   R   D   C   B   M   Q   Z
T   L   S   M   T   R   X   V   N   O   Q   P   J   I   T   R   Q
G   T   J   K   E   Z   W   B   E   Y   N   L   Z   T   B   Z   D
N   Y   K   V   H   U   B   R   F   Q   E   T   S   Z   L   V   I
V   U   R   K   W   S   J   R   P   R   S   R   I   V   O   Z   A
W   A   P   F   Z   V   R   T   D   X   E   V   V   L   C   V   M
M   J   U   V   T   C   M   N   G   Z   W   Q   S   M   K   S   O
O   W   V   C   V   U   A   N   E   G   D   X   W   H   T   P   N
L   G   J   B   G   M   N   E   C   Z   N   K   L   Z   R   Z   D
D   Z   A   U   Z   B   W   M   B   R   D   X   W   H   S   W   S
I   G   C   L   G   T   M   A   V   Z   N   P   T   G   H   T   H
K   T   K   W   T   W   Z   F   T   B   L   O   W   P   I   P   E
G   D   S   G   D   X   W   H   N   M   T   C   I   T   R   V   A
O   J   V   L   J   I   T   R   H   U   B   R   F   Z   F   T   R
P   X   K   S   T   R   A   I   G   H   T   S   H   E   A   R   S
P   R   Q   W   S   G   J   I   T   R   V   F   H   K   L   T   W
```

14-15 yrs

Down

1. This region is credited with the invention of glass.
2. Glass first appeared as …
3. The earliest glass vessels were formed with the … technique.
5. Raw materials are fused in the …
8. Main raw material for glassmaking.

Across

4. The flux used to fuse the main raw material for producing glass.
6. Tool used during Roman period and Late Antiquity in glass working.
7. A Roman vessel usually is made with the … technique.
9. Glass is coloured blue with …. mineral.
10. Used to imitate lapis lazuli (two words).

4a. Ceramics activities: The potter's workshop

8-15 yrs

Objectives

This activity will familiarise students with some of the techniques used to produce ceramic vessels

Supplies

- Clay & clay modelling tools
- Small bowls

Guidelines

1. Explain to the students that our ancestors used many techniques to create pots. Divide them in groups, give each student some clay, and ask each group to use a specific technique to create a pot:

- Coiling: take a piece of clay and roll it between your hands or on a flat surface creating a snake-like roll. Repeat the operation several times and then place the coils one on top of the other creating the wall of the pot. For better adhesion of the coils, keep the surface wet and press it with your hands. At the end, use a finger or a small pebble (or a clay-tool) to smooth the surface.

- Pinching: take a piece of clay and make a sphere. Press your thumb in the middle of the ball and use your other fingers to pinch the walls and give the shape of a pot, thinning the walls as desired.

- Molding: take a piece of clay and flatten it. Place the flat clay piece on an upside-down bowl, which will be used as a cast. Press the clay onto the surface of the bowl and cut off the excess. Do not make the wall of the pot too thin, or it will not keep its shape when you remove the bowl!

2. With the coiling technique, you can create a handle and attach it to the wall of the pot.

3. Decorate the surface with geometric motives like lines, circles, spirals etc. You can also decorate the surface with natural objects, like shells.

4. Set the pot to dry. To avoid cracks, the clay has to dry slowly. Put it in a dry and warm environment but not directly under the sun.

Pottery forming techniques

Coiling

https://www.claycraft.co.uk/how-to/coiling-for-beginners/

Pinching

https://www.pinterest.com/pin/432556739196117617/

Molding

http://www.glynnislessing.com/blog/?p=1051

5a. Archaeometallurgy activities: Memory cards

13-14 yrs

Objectives
The students will learn the properties of metals commonly used in antiquity and how these made them preferable for making different objects.

Supplies
Print-out cards of raw metals and finished metal objects

Guidelines

1. Explain to the students that different metals have different properties (e.g. hardness, density, electrical and thermal conductivity, melting point) and these were largely known to our ancestors, who used different metals to produce different objects.

2. Divide the students in groups and ask each group to find the properties of a specific metal (e.g. iron, gold, copper, lead), and present them to the other groups.

3. Cut out the cards and ask the students to match the ancient artefacts with the metal they were made of.

4. Discuss why a specific metal (or combination of metals) was chosen for each artefact.

5a. Archaeometallurgy activities: Memory cards

Print-out cards

Cu	Copper Prehispanic Bell	Pb
Roman Lead Ingot	Ag	Athenian Silver coin
Fe_3O_4	Viking Iron Sword	Au
Gold Mask of Agamemnon	Cu + Sn	Riace bronzes

6a. Ancient coins activities: Let's make a coin

10-15 yrs

Objectives	This activity will build the students' observational skills in relation to the characteristics of ancient coins.

Supplies	• Image of ancient coin • Paper • Colour pencils

Guidelines

1. Explain to the students that the invention of coins initially met the commercial and practical needs of ancient peoples. Gradually, coins also started depicting and legitimizing those in power. Thus, coins are a primary source of historical, religious, and societal information. The first coins were issued in the late 7th-early 6th century BC in Lydia (western coast of Asia Minor).

2. Divide the students into groups of two.

3. Show the coin only to one member of each pair and ask him/her to try and describe it as accurately as possible to the team member who is not allowed to see it.

4. The team member not allowed to see the coin must listen carefully and try to draw the coin based on the description he/she receives.

As a variant of this activity, divide the class in groups, ask all students to observe a coin projected on the wall and write down ten words that are related to what they see. The members of each team then have to decide which ten words they will keep (among all the words each of them has compiled) and how to use these ten words to create a new coin.

Examples of ancient coins

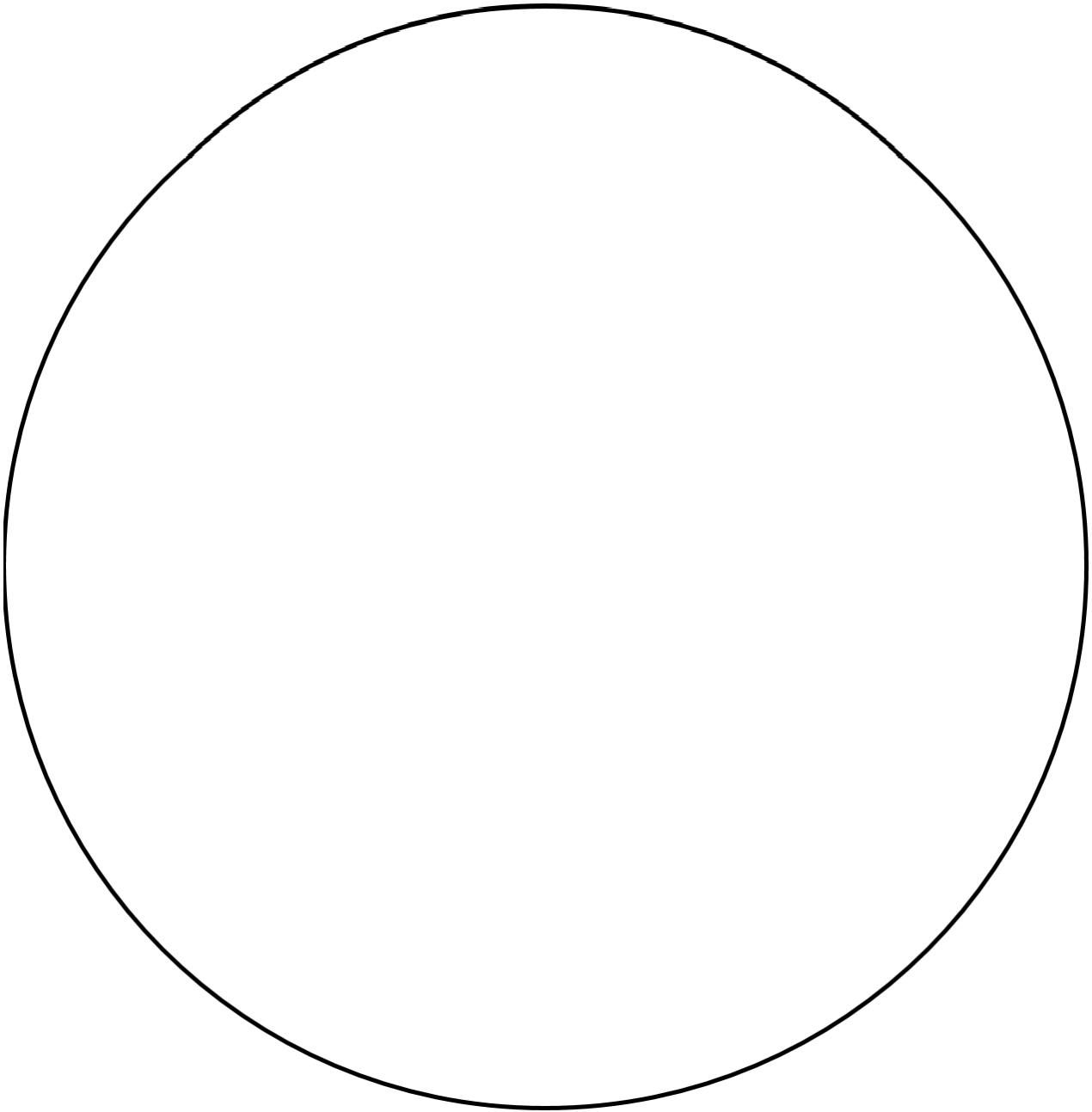Upper left: AR Gros. James II, 1460-1473 (1977-01-04 /Obverse Side)
Upper right: AR Gros. Hugh IV, 1324-1359 (1999-03-26/Obverse Side)
Lower left: AR Marcello. Giovanni Mocenigo, 1478-1485. (1999-05-17/Obverse Side)
Lower right: AR Didrachm. Lysandros, 380-370 BC (1993-01-01/Obverse Side)

6a. Ancient coin activities:
Let's make a coin

Coin template

7a. Ancient graffiti activities: Trace the graffiti

10-15 yrs

Objectives	This activity will enhance the students' observational skills and teach them how archaeologists trace ancient graffiti.

|	
Supplies	• Graffiti poster • Markers • Plastic sheets/tracing paper of different size

Guidelines

1. Explain to the students that the word 'graffiti' is from the Italian word 'graffito/graffiato' that means 'scratched', indicating the primary technique of making them. Despite that, graffiti also includes inscriptions made with any kind of colours or pigments. What characterizes graffiti is their position that uses objects or surfaces (i.e. walls, furniture, etc.) not intended for writing. The history of graffiti can be traced from prehistory, with the so-called Rock Art, until the present days with the Street Art. Along the human history, graffiti have expressed different content, but they have always been a free and spontaneous way of expression.

2. Print one of the provided graffiti images in large size (ideally A0) and place it on a wall.

3. Give a plastic sheet/tracing paper to each student to trace what they see on part of the A0 graffiti poster.

4. Unite the tracing papers of all students to recreate the original graffiti.

5. Discuss how accurately the final copy represents the original graffiti. Which parts of the graffiti were harder to trace and why?

As a variant of this activity, ask multiple students to trace the same area of the graffiti poster and then superimpose the tracing papers to see how similar or not they are. Again, discuss which parts of the graffiti were harder to replicate.

7a. Ancient graffiti activities: Trace the graffiti

Graffiti examples
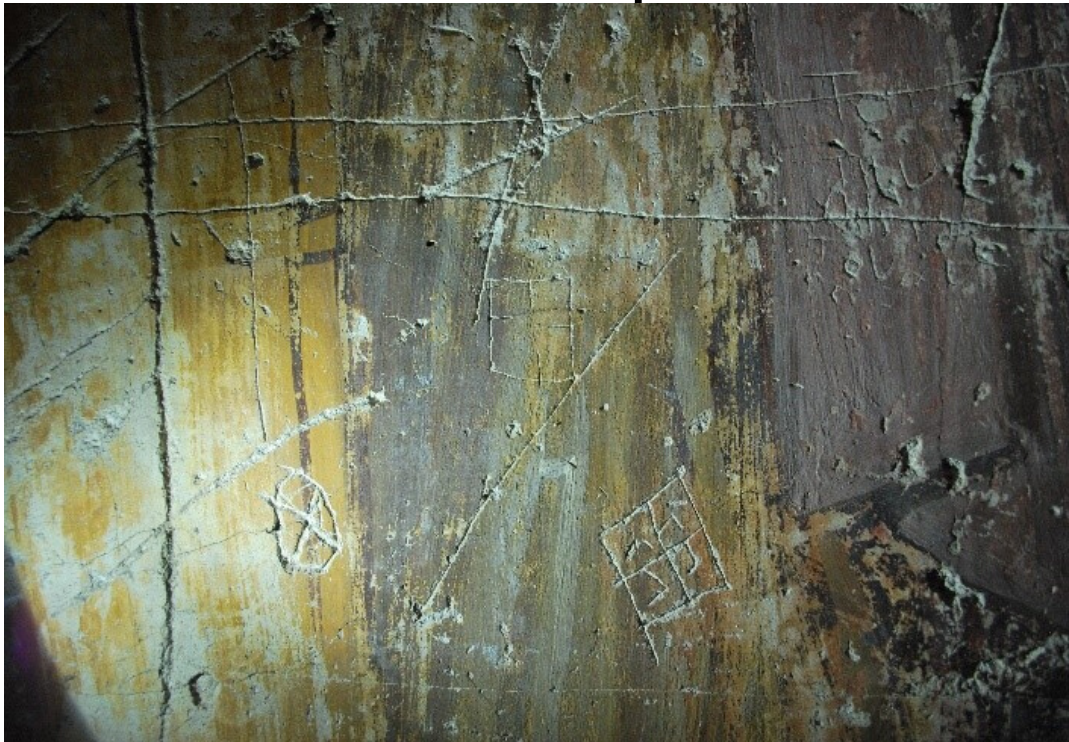
Agios Georgios Teratziotis, Avgorou, Cyprus (top) - Panagia tis Stasousa, Larnaca area Cyprus (bottom)
Both photos by Dr Mia Trentin, with the kind permission of the Department of Antiquities

7a. Ancient graffiti activities: Trace the graffiti

Graffiti examples

Agios Georgios Teratziotis, Avgorou, Cyprus (top) - Archangelos Michail, Choli, Cyprus (bottom)
Both photos by Dr Mia Trentin, with the kind permission of the Department of Antiquities

8a. Zooarchaeology activities: What bone is that?

10-14 yrs

Objectives

This activity will teach students how animal remains are often deposited in archaeological layers, in addition to general animal anatomy.
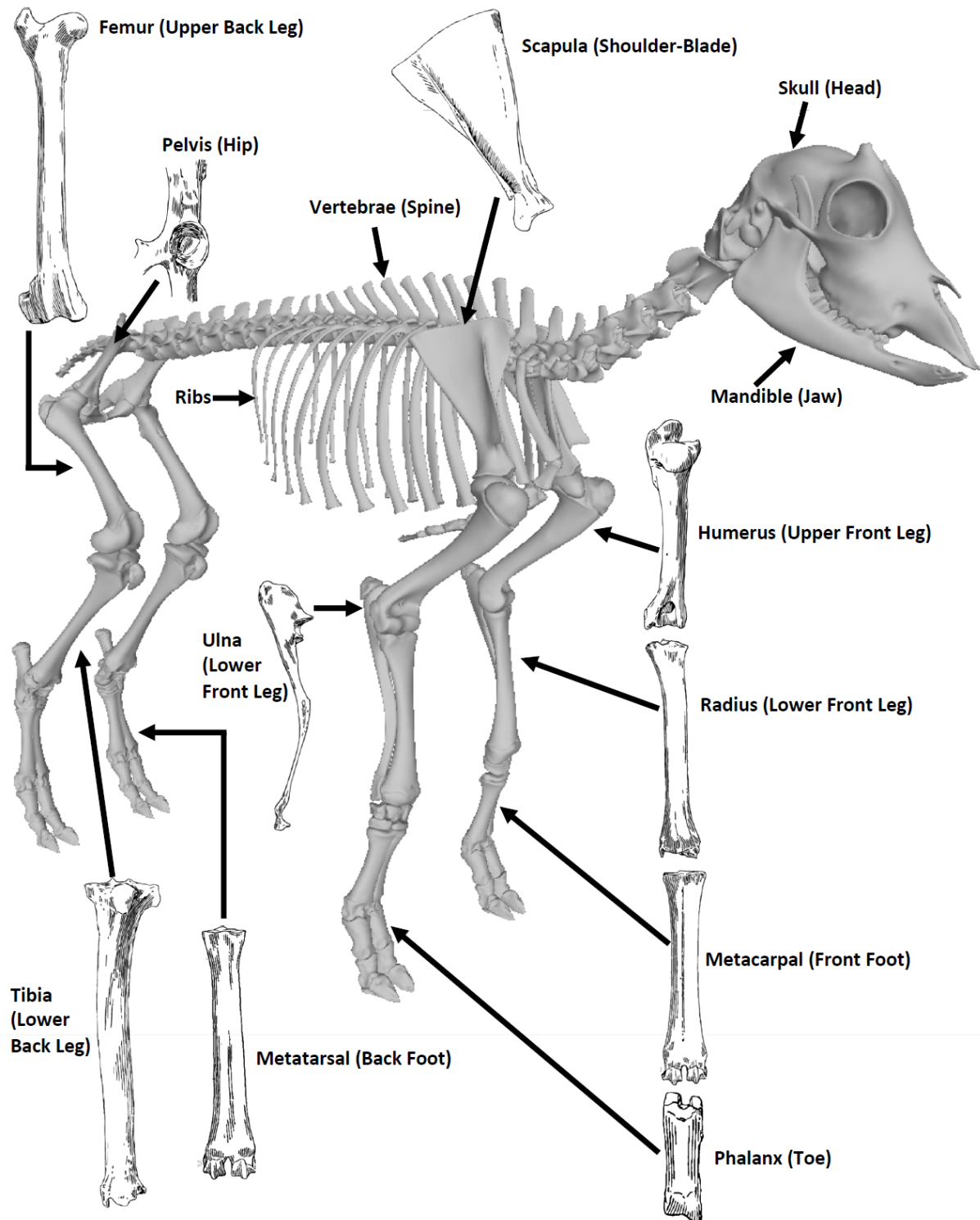
Supplies

Same as in activity 2a. Human Osteoarchaeology activities: digging up bones.

Guidelines

1. Explain to the students that animal remains from archaeological layers are often waste after consumption (just like modern rubbish). However, in different ancient societies, pets (e.g. dogs) can be sometimes buried just like humans.

2. Also explain that many animal bones recovered from archaeological layers are usually fragmented into many pieces (after consumption), and this is why we have to sort them out, just like a puzzle.

3. Explain that the bones of mammals share the same function, thus, they have a common shape.

4. Ask the students to have a brief look at the general anatomy of the goat image provided below and compare it with the human skeleton. Follow up by asking the students if they can separate any particular goat bone from a human one.

5. Activity 1. Ask the students to identify the four bones provided.

6. Activity 2. Print out the dog skeleton outline and the individual bones provided below. Ask the students to cut and place each individual bone in the correct anatomical position on the outline.

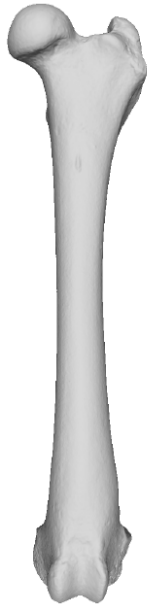# 8a. Zooarchaeology activities: What bone is that?

General goat anatomy

Femur (Upper Back Leg)

Scapula (Shoulder-Blade)

Skull (Head)

Pelvis (Hip)

Vertebrae (Spine)

Ribs

Mandible (Jaw)

Humerus (Upper Front Leg)

Ulna (Lower Front Leg)

Radius (Lower Front Leg)

Tibia (Lower Back Leg)

Metatarsal (Back Foot)

Metacarpal (Front Foot)

Phalanx (Toe)

https://sketchfab.com/3d-models/imnh-r-1299-juv-mountain- goat-0775ed8f6c544f4cb5c8d2be57c71d00; Schmid, E., 1972. Atlas of animal bones.Elsevier.

8a. Zooarchaeology: What bone is that?

Activity 1. Identify each individual dog bone given in the following images
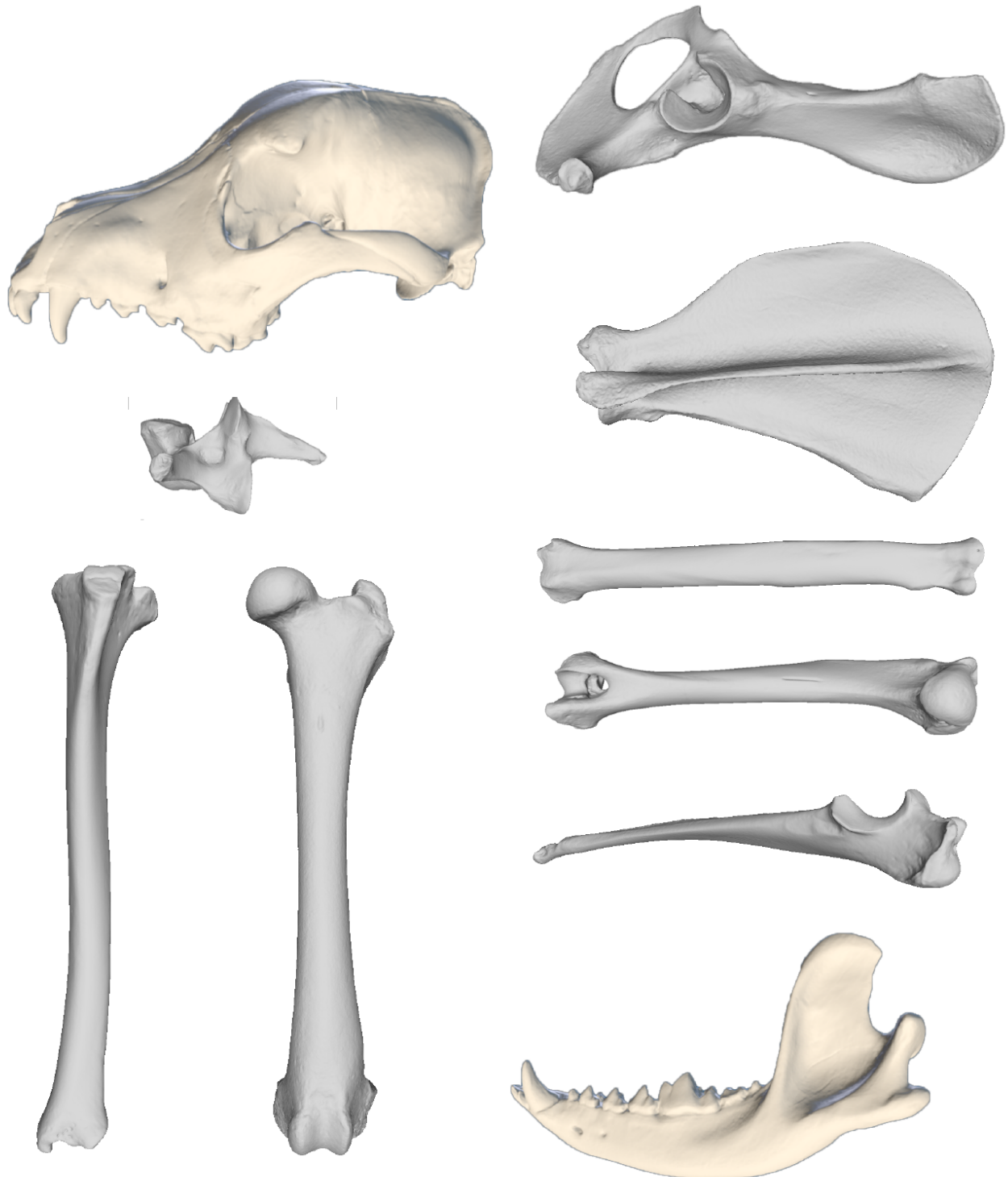
a.

b.

c.

d.

Dog skeleton
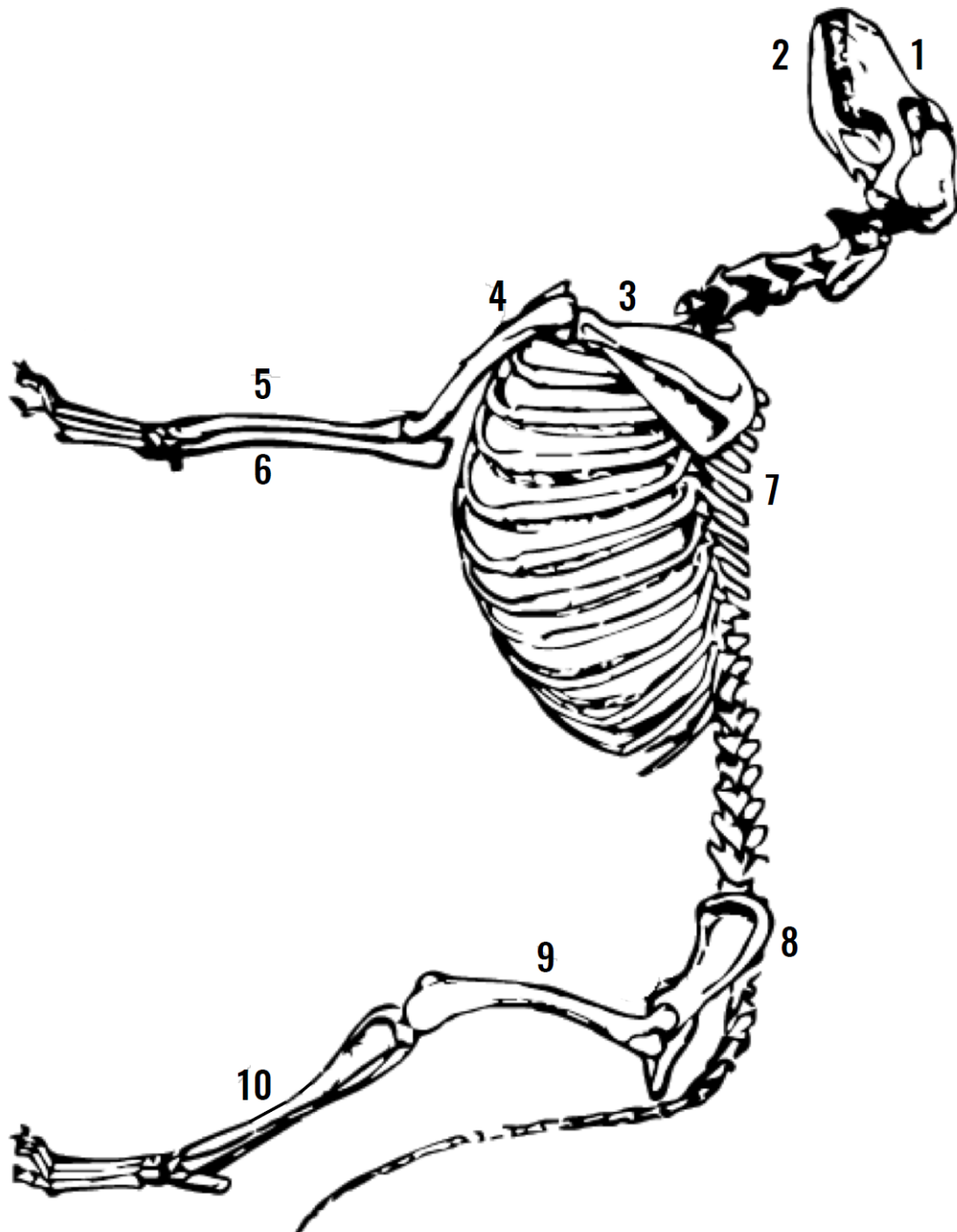
8a. Zooarchaeology:
What bone is that?

Exercise 2. Print, cut, and then place the bone print-outs in anatomical position according to the numbered outline provided above*.

Objectives

This activity will teach students how to differentiate between various tracks of domesticated animals in addition to some selected wild animals.

Supplies

• Images of various animal tracks.

Guidelines

1. The study of animal tracks informs us about the activity and behavior (e.g. predator or prey) of animals. Explain to the students that the easiest way to identify a certain group of animals is by counting the number of digits (or toes) followed by the size and shape of the tracks left behind.

2. Explain that when it comes to herbivorous animals (and some omnivores), we can group different species according to the number of digits (or toes) as follows: a) Artiodactyls (even-toed) have an even number of digits usually represented by two- or four-toes (e.g. sheep/goat, cattle, deer, pig/wild-boar, giraffe, camel, hippopotamus); b) Perissodactyls (odd-toed) have an uneven or odd number of digits usually represented by one- or three-toes (e.g. horse, rhinoceros, tapir). Carnivores are not grouped according to the number of digits they have, but rather based on different physical characteristics.

Even so, most carnivores have four or five digits. For example, all felines (cats, tigers, lions) and canids (e.g. dogs, wolves, foxes) have four digits. Their paw prints can be differentiated by the presence of claw marks because unlike felines, canids cannot retract their claws and, therefore, leave claw prints as part of their track.

3. Stress that species with similar environmental requirements, diets, and behaviors (e.g. sheep/goat, pig/wild-boar) will have similar skeletons, therefore, they produce very similar animal tracks.

4. Ask the students who own pets to check the paw print of their cat or dog and compare it to the track outlines provided below.

5. Ask students to take a look at the animal tracks provided below and connect the seven paw prints with the animals they belong to.

8b. Zooarchaeology activities: Identifying animal tracks
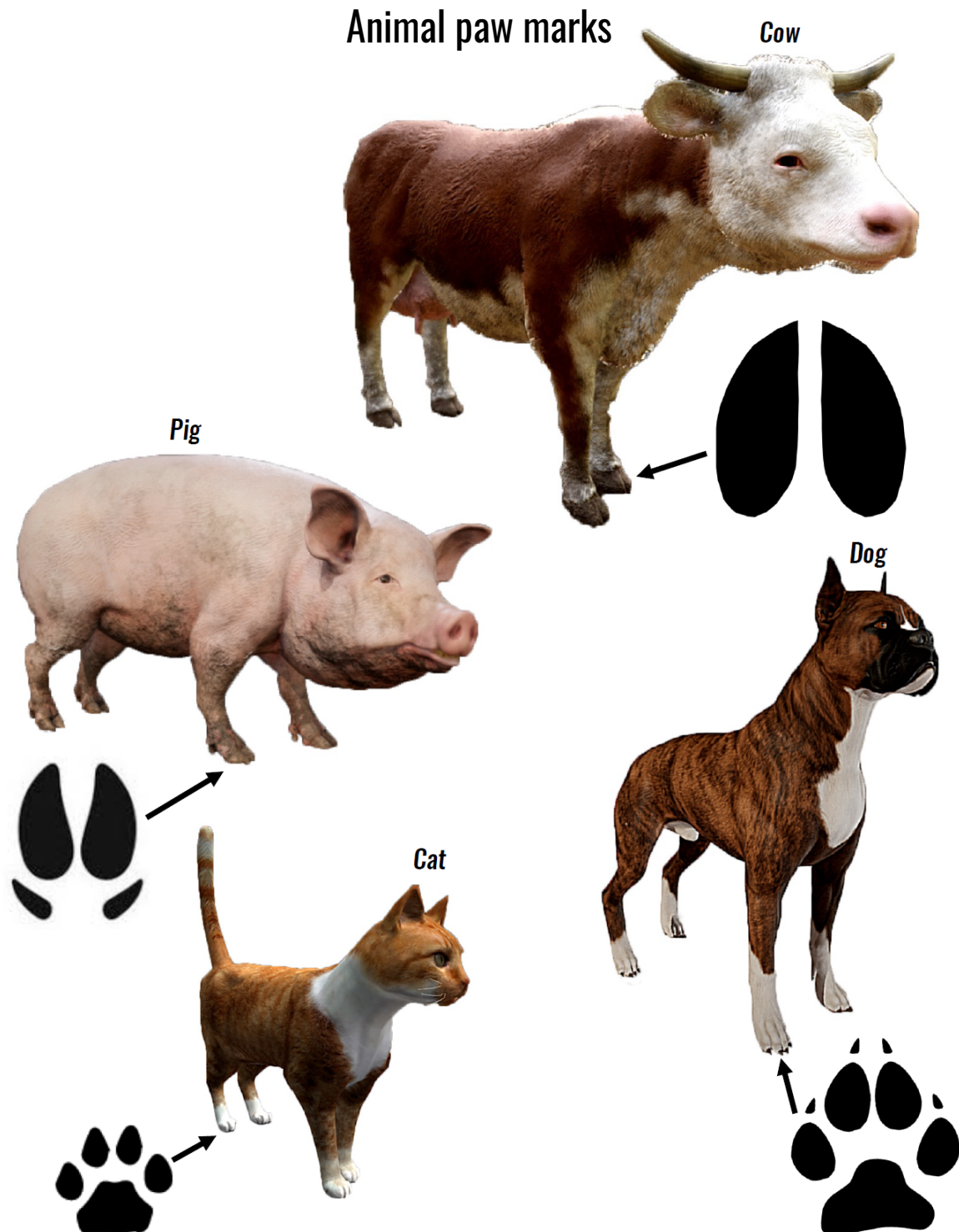
Animal paw marks

Cow

Pig

Dog

Cat

8b. Zooarchaeology activities: Identifying animal tracks

Draw a line to connect the animal with its track

Wild Boar

Deer

Tiger

Fox

Continue to next page

8b. Zooarchaeology activities: Identifying animal tracks

Draw a line to connect the animal with its track

Hippopotamus

Bear

Rhinoceros

Objectives

This activity will teach students how to differentiate between herbivorous, omnivorous, and carnivorous domesticated animals based on their teeth.

Supplies

• Animal skull(s) or skull casts (if not available, use image of such skulls).
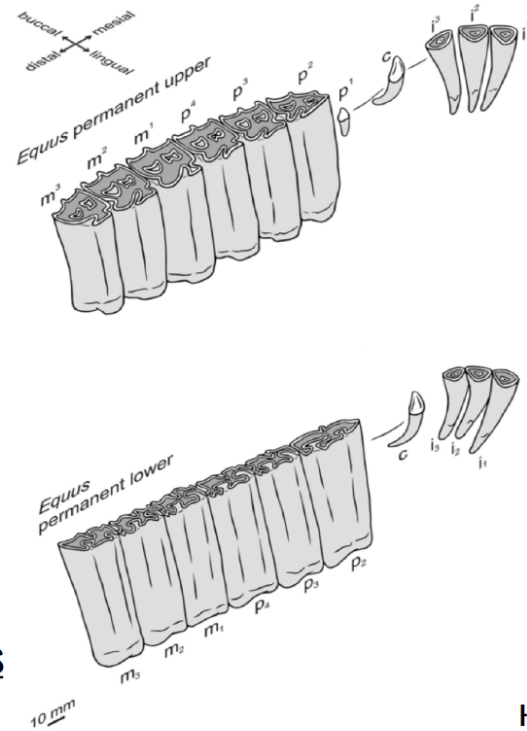• Chart of domesticated animals' dental sequence.

Guidelines

1. Explain to the students that there are thousands of animal species, so zoologists need to classify these animals into different groups to better understand their place in the animal kingdom. It is possible to group animals together based on what they eat and, incidentally, by the shape of their teeth.

2. Explain that there are three main types of animal classifications based on the shape and function of teeth: a) herbivores: plant-eating animals (e.g. sheep-goat, deer, horses) that have pronounced front teeth, ideal for cutting plants. Their cheek teeth are large, wide, and flat, suited for grinding and chewing fibrous plants. b) omnivores: plant- and meat-eating animals (e.g. pigs, humans) that have medium-sized front teeth, also intended to cut, scissor-like canine teeth for tearing, and rounded semi-flat cheek teeth for grinding and crushing.

c) carnivores: meat-eating animals (e.g. dogs, cats, minks) that have very small and less developed front teeth. Their cheek teeth are sharp for cutting and shearing.

3. Stress that it is often difficult to differentiate between domestic animals and their wild ancestors (e.g. pigs and wild boars) due to the high resemblance in dental morphology. Also state that even though sheep-goat and cow teeth have comparable morphology, they can be discriminated. However, for the sake of this activity, they are treated as a single group.

4. Using the dental sequence and shape of teeth as per the sketches provided, species of the main domestic animals can be identified.

5. Ask the students to recognise the six animals, aided by the material provided below.
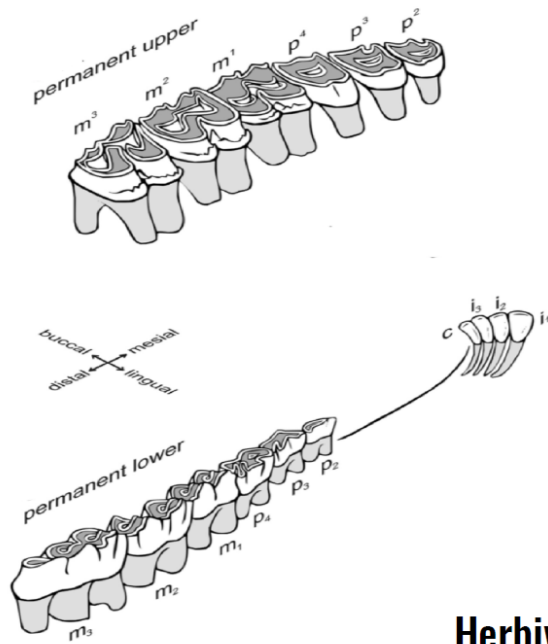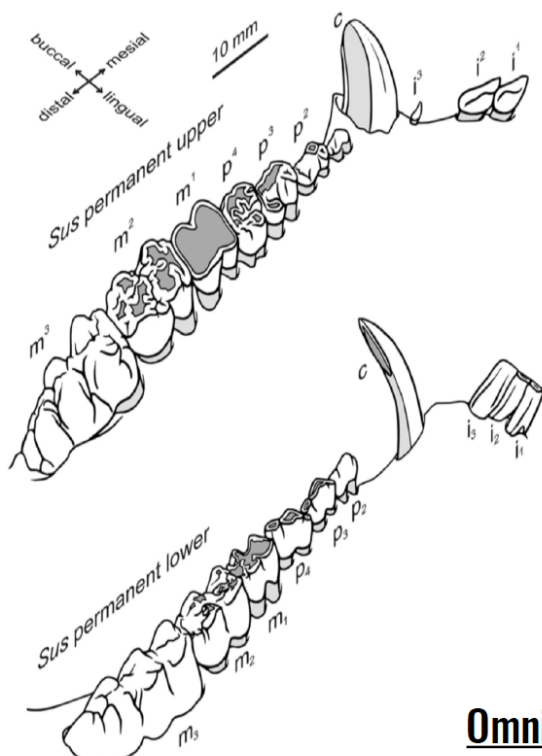
Herbivores

Sheep/Goat/Cattle

Horse
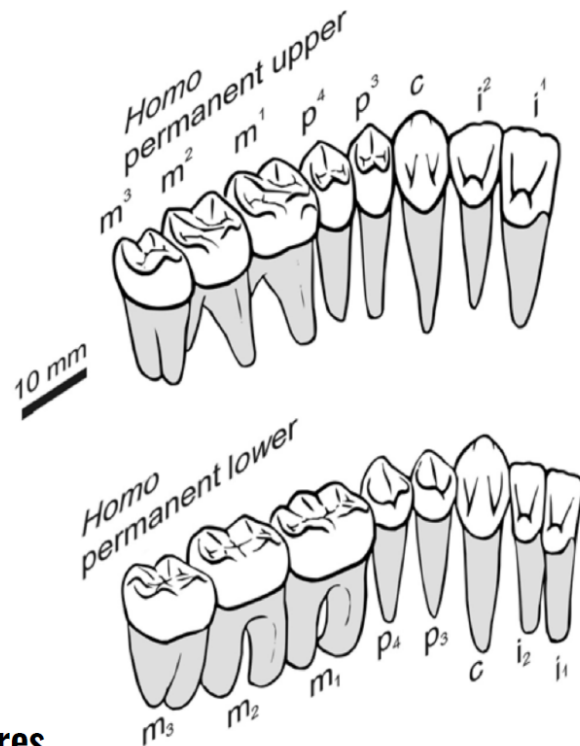
10 mm

Omnivores

Pig

Human

Images by Hillson, S. (2005). Teeth. Cambridge University Press.

10 mm
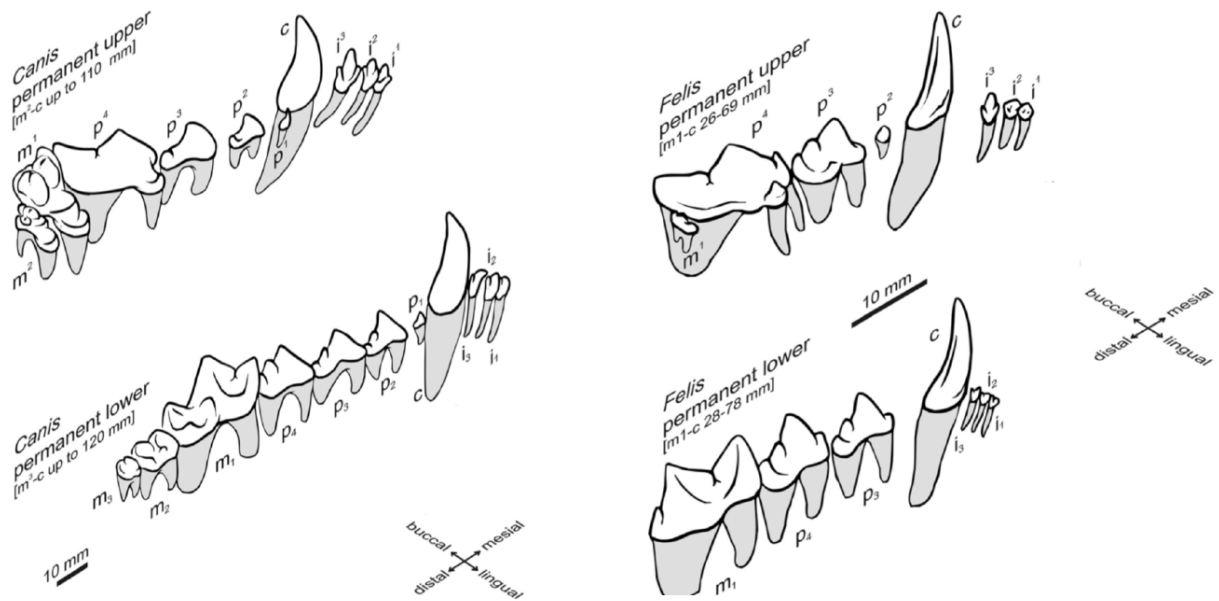
Carnivores

Dog   Images by Hillson, S. (2005). Teeth. Cambridge University Press.   **Cat**

Identify the species of the domesticated animal and determine whether it is an herbivore, omnivore, or carnivore from the following photographs

a.

b.

Answer: _____   Answer: _____

c.

d.

Answer:

Answer:

e.

f.

Image by 3D4Medical.com,LLC. 2014. Essential Skeleton 4.
[Mobile app] [accessed 28 Mar. 2019]

8d. Zooarchaeology activities: Butchery and gnawing marks

12-15 yrs

Objectives

This activity will teach students how to identify different types of butchery and animal-gnawing marks left on zooarchaeological material.

Supplies

- Images of different types of butchery marks.
- Images of different types of animal gnawing.

Guidelines

1. Explain to the students that the analysis of the traces of butchering activities can inform us on animal husbandry, diet, production, crafts, and social structure.

2. Explain that there are two typical butchery marks associated with the dismemberment of animal carcasses: a) Chop-mark: produced by a sharp implement, such as an axe or a cleaver, usually directed at dividing the carcass, removing flesh, and bone marrow. Chop-marks produce a broad, deep, and outspread streak, b) Cut-mark: produced by a sharp implement, such as a knife, usually directed at severing skin, flesh, and tendons. Cut-marks leave a line that is quite straight with sharp edges. See the images in the following pages for examples.

3. Explain that animal traces of modification on bones can be identified as gnawing. Evidence of gnawing on bones indicates the presence of scavenging animals and their access to waste in an archaeological site. There are two typical marks associated with gnawing: a) Rodent gnawing: paired, shallow, and flat-bottomed grooves on the bone, b) Carnivore-gnawing: furrows, pits, punctures, and irregular scars on bones. See the images in the following pages for examples.

4. Ask the students if they think there are other types of butchery marks that can be recorded on animal bones.

5. Ask the students if they think there are alterations other than butchery- and gnawing-marks that can affect animal bones.

6. Ask the students to identify any butchery and/or gnawing-marks on the four photographs of animal bones.

8d. Zooarchaeology activities: Butchery and gnawing marks

Chop-Marks
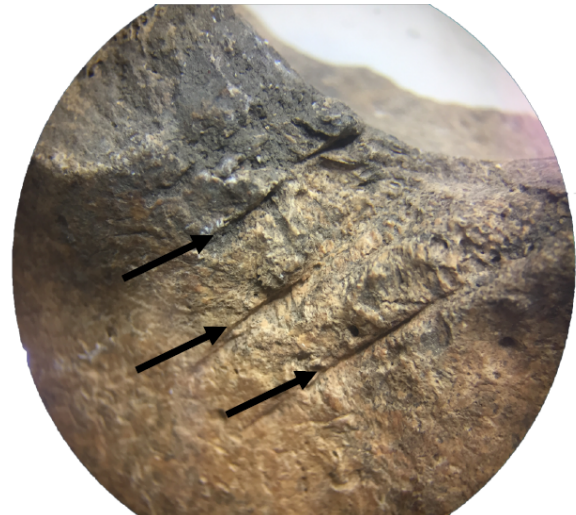
Cut-Marks
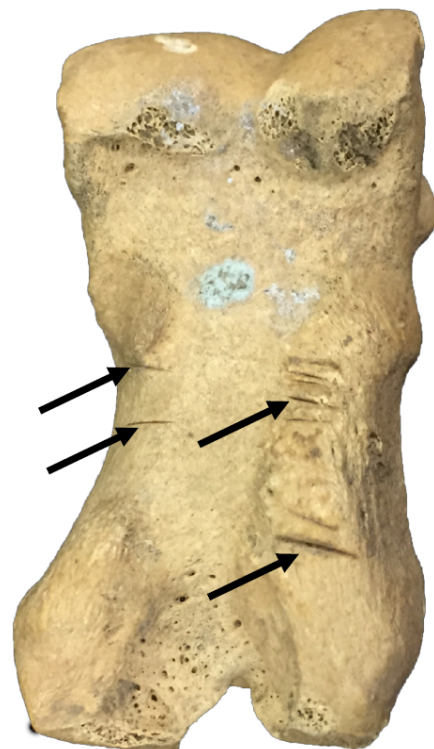
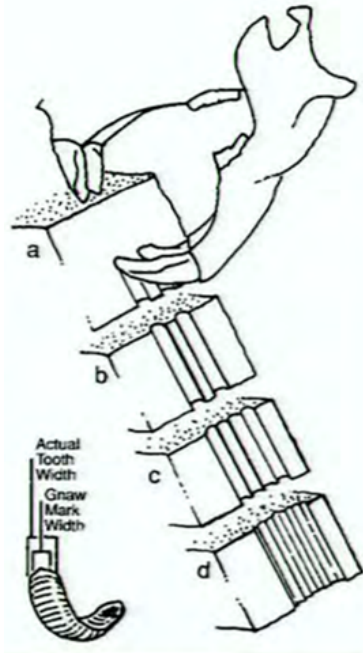# 8d. Zooarchaeology activities: Butchery and gnawing marks

Image by Haglund, W. D. (1997b). Rodents and Human Remains. In W. D. H. a. M. H. Sorg (Ed.), Forensic Taphonomy: The Postmortem Fate of Human Remains (pp. 404-414). United States of America: CRC Press LLC.
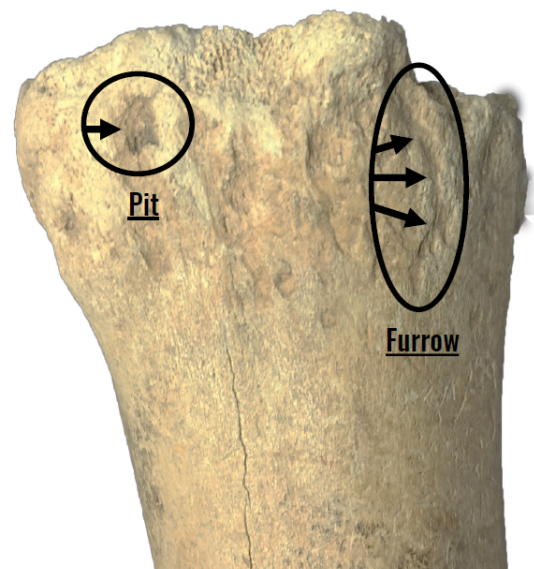

Image by Klippel, W.E. and Synstelien, J.A., 2007. Rodents as taphonomic agents: bone gnawing by brown rats and gray squirrels. Journal of Forensic Sciences 52: 765-773.
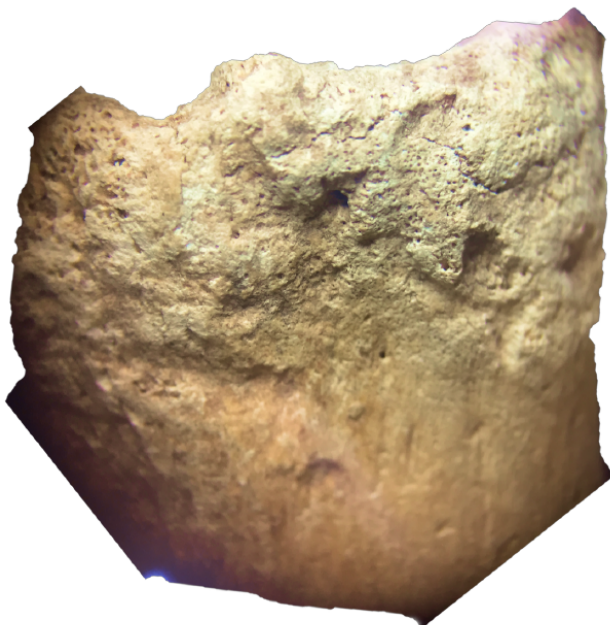
Carnivore Gnawing

Pit

Puncture

Pit

Furrow

Identify and highlight the type of butchery- and/or gnawing-mark in the following photographs

Answer:

Answer:

Answer:

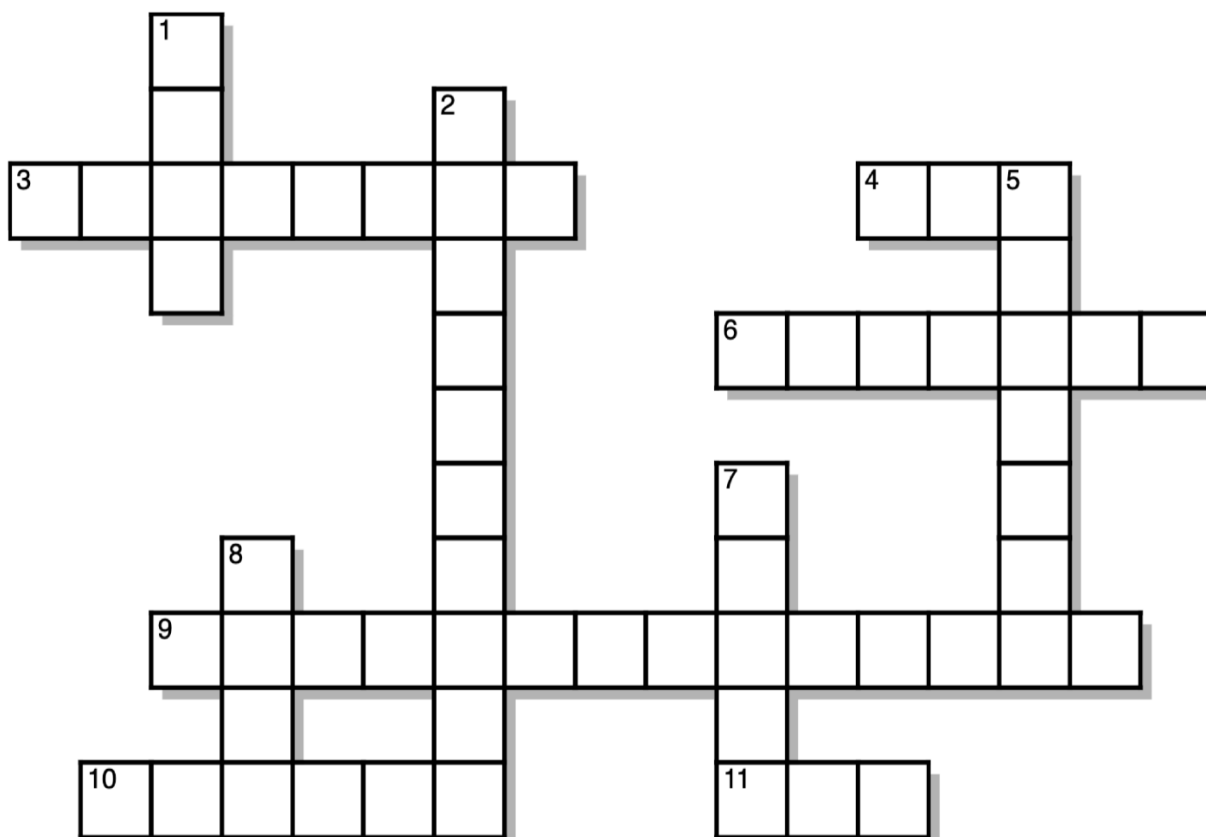Answer:

8e. Zooarchaeology activities: Animal puzzles

10-15 yrs

Objectives This activity will familiarize students with some terminology, concepts, and animals commonly discussed in zooarchaeology.

Zooarchaeology crossword

Across

3 What animal is the ancestor of pigs?
4 What kind of domesticated carnivore can be found in archaeological sites (hint: man's best friend).
6 A man made alteration that can be observed on bones as a result of removing skin or tendons.
9 The study of animal remains from archaeological sites.
10 Herbivorous animals that eat plants and have one digit per foot (hint: runs very fast).
11 What kind of domesticated omnivore is usually found in archaeological sites? (hint: it often appears pink)

Down

1 What animal is the ancestor of dogs?
2 Type of animals that have razor-sharp cheek teeth (meat-eaters).
5 What is the term used to describe teeth marks left behind on bones through the process of mastication?
7 Herbivorous animals that eat plants and have two digits per foot(hint: they look like goats).
8 How many digits does the pig have in one foot?

8e. Zooarchaeology activities: Animal puzzles

Find all the listed taxonomic classifications

```
Y  C  A  R  N  I  V  O  R  A  B  J  W  A
A  G  R  H  C  E  R  V  I  D  A  E  L  Q
R  A  O  D  P  D  E  Z  S  C  X  Y  V  I
T  I  E  L  T  R  L  A  E  U  T  Q  N  X
I  T  A  G  O  Z  O  T  D  C  I  S  D  C
O  N  D  F  R  E  A  M  A  I  E  D  H  G
D  E  I  Q  E  C  A  D  O  C  U  I  A  E
A  D  V  R  E  L  O  H  T  G  R  Q  A  E
C  O  O  A  N  S  I  I  C  O  A  D  E  R
T  R  B  D  S  D  V  D  P  R  I  L  Q  Y
Y  N  V  I  B  O  R  T  A  N  A  G  X  D
L  Y  R  T  R  K  E  J  A  E  J  O  Q  P
A  E  M  A  K  R  V  C  T  Y  M  B  O  D
P  R  X  N  A  M  P  G  N  M  J  W  M  Z
```

Zooarchaeology	Equidae
Artiodactyla	Felidae
Bovidae	Insectivora
Canidae	Lagomorpha
Carnivora	Perissodactyla
Cervidae	Rodentia
Cetacea	Suidae

8e. Zooarchaeology activities: Animal puzzles

Solve this elephant skull puzzle by cutting and piecing it together!

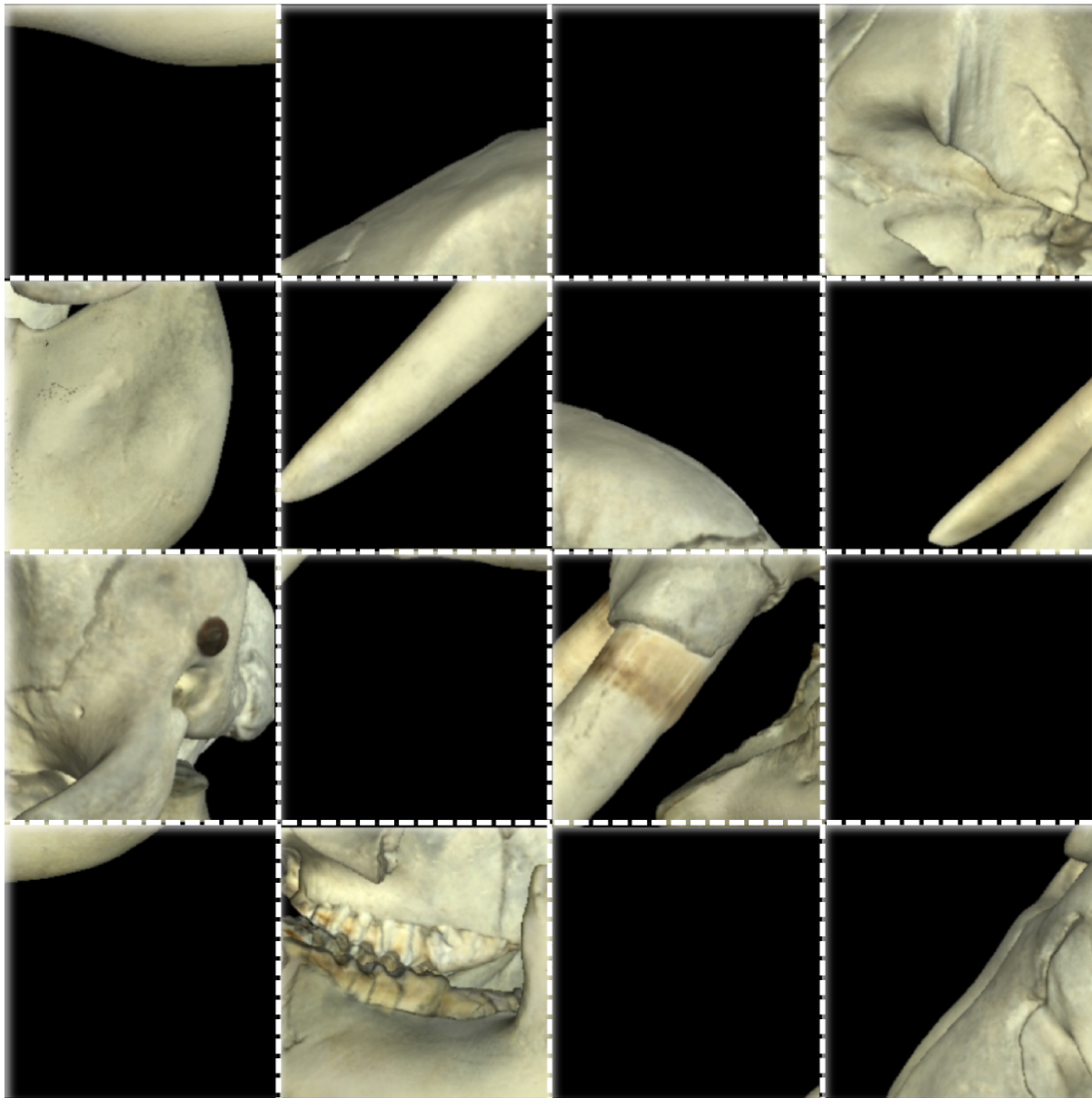**Now that you have a good idea on the study of bones and material culture, let's see how this information can be combined in order to interpret past behaviours...**

Assume that during an archaeological excavation, you discovered a tomb. Inside the tomb you found:
1) *a human skeleton*,
2) *a coin*,
3) *a sword* and
4) *a small pile of fragmented bones*.
So many questions to be answered but at the same time so much valuable information to be extracted from your findings!

Questions:
- What is the date of the tomb?

- Was the individual buried inside a soldier, as the sword would suggest, or not? Don't forget that funerary practices do not always reflect the identity of the deceased (for example, maybe the skeleton belonged to a woman, who was buried with her husband's word, or maybe the woman had been a warrior herself!)

- Does the pile of fragmented bones consist of human remains or not? If yes, the tomb had been used to bury at least two individuals (we don't know yet how many skeletons are represented in the pile), who received very different burial treatment: one was buried and left undisturbed while the other was manipulated after death so that very few bones remained and in very poor condition. If the pile consists of animal bones, then the animals were placed inside the tomb as part of the funerary ritual and may give us interesting information about the mortuary practices in the past.

Let's get some answers

- What is the date of the tomb?

Coins often provide useful information on dating. For example, Roman coins frequently depict an Emperor and mention his post and achievements. Combining this information with historical evidence, we can find the date of the coins. The coin from the tomb you excavated looks like this:

https://www.forumancientcoins.com/numiswiki/view.asp?key=Constantine%20and%20Propaganda

On one side the coin depicts the bust of Emperor Constantine the Great (CONSTANTINVS MAX AVG), while the one side depicts two soldiers. From historical sources, we know that this emperor ruled the entire Roman empire from 324 to 337 AD*, thus the tomb likely belongs to this date. Remember of course that the coin may have been added in the tomb at a later date or it may be much older than the burial (for example, the living relatives of the deceased may have kept it for some reason for many generations before placing it in the tomb).

*An expert on ancient coins (numismatist) could narrow down the date to 333 - 335 AD.

Let's get some answers

- Was the individual buried in the tomb a soldier?

If the deceased were a soldier, the skeleton must belong to a male rather robust individual. Regarding his age, he may have died young in the battlefield or due to hardship during the various missions (e.g. malnutrition, infectious diseases) or from other causes. However, he may have survived to an older age. Here are some bones from the skeleton you excavated, which will help you explore these issues:

Sex: The morphology of the cranium, with the pronounced glabella, mastoid process and nuchal crest, clearly support that the individual is male.

Age: The morphology of the pubic symphysis falls at phase V of the Suchey-Brooks method, suggesting that the individual died at the age of 45.6 years (plus/minus 10.4 years).
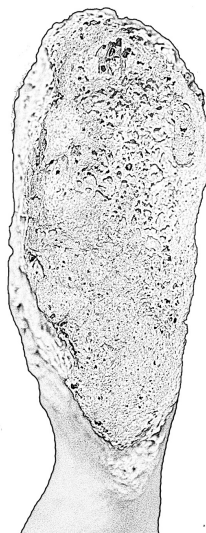
Activity levels: The muscle attachment sites at the humerus show new bone formation and porosity, so the individual used his arms in strenuous activities.
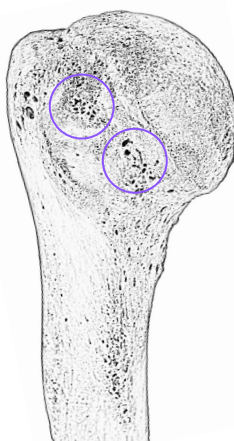
Pathology: The humerus shows shoulder arthritis (porosity and new bone tissue). This relates to the age of the individual, but also supports increased activity levels.
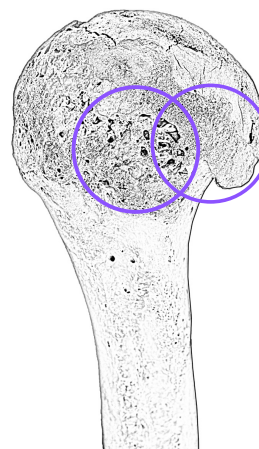
The skeleton shows that the deceased was a man, regularly involved in activities that stressed his arms; he died young but not too young. Thus, he may have been a soldier, but we need more data to say so beyond any doubt.

Let's get some answers

*- Does the pile of fragmented bones consist of human remains or not?*

The pile of remains you have found may give interesting information regarding the mortuary ritual. If they are human, they show that multiple individuals were buried together. If they are animal bones, they show that animals were consumed by the living during the burial ritual or they were deposited with the deceased as a symbolic meal or as a companion in his post-mortem trip. Of course, depending on the cultural norms, the presence of animal bones in a tomb may have many other interpretations.

Here is the bone pile from the tomb you excavated:

http://zooarch.illinoisstatemuseum.org

Many of the fragments are so small that it is impossible to tell if they belong to a human or an animal. However, all the fragments that preserve some anatomical evidence, belong to domesticated goat, sheep and pig. Therefore, this pile appears to contain the remains of animals that were eaten as part of the burial ritual or were placed in the tomb as a symbolic meal for the deceased.

https://www.archaeologypodcastnetwork.com/animals
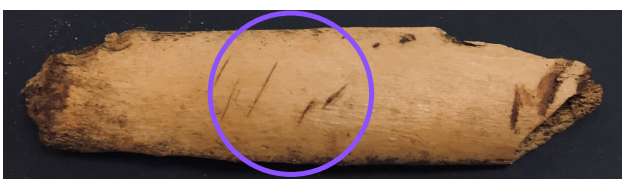
Looking closer at each bone, you identify cut marks on some of them. This supports the theory that the animals had been consumed during the funeral, which is also in line with historical data that a ritual feast took place at the end of Roman funerals.

Human osteoarchaeology activities: Key

Activity: What bone is that?

Across: 1. coccyx, 3. eight, 5. femur, 7. atlas, 9. fibula, 10. radius
Down: 1. calcaneus, 2. hyoid, 4. sternum, 6. lumbar, 8. patella

Activity: Human skeleton word search
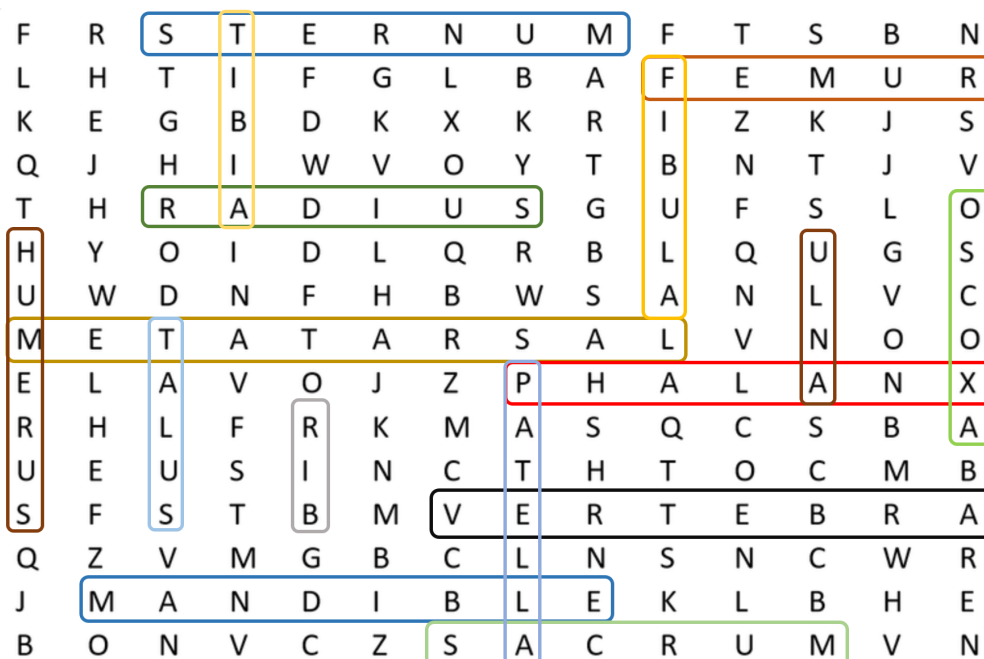
Activity: Is this John or Helen?
A - Female
B - Male
C - Female
D - Male
E - Male
F - Female

Activity: How old was this person at death?
Dental development: approx. 5.5 years
Pubic symphysis:

A - 61 ± 12.2 years (phase VI)

B - 18.5 ± 2.1 years (phase I)

C - 28.7 ± 6.5 years (phase III)

Activity: How tall were our ancestors?
Humerus: 160.18 cm
Radius: 159.52 cm
Femur: 159.61 cm
Tibia: 159.66 cm

Activity: Reconstructing activity from the skeleton

Individual B

Glass activities: Key

Activity: How did they do it?

1-f
2-d
3-b
4-e
5-c
6-a

Activity: Crossword

Across
4. Natron.
6. Blowpipe.
7. Glassblowing.
9. Cobalt.
10. Blue glass.

Down
1. Mesopotamia.
2. Bead.
3. Coreforming.
5. Furnace.
8. Sand.

Activity: How did they do it (again)?

S	U	N	H	U	B	R	F	B	H	B	D	X	W	H	L	B
S	D	F	G	I	W	G	C	P	G	R	D	C	B	M	Q	Z
T	L	S	M	T	R	X	V	N	O	Q	P	J	I	T	R	Q
G	T	J	K	E	Z	W	B	E	Y	N	L	Z	T	B	Z	D
N	Y	K	V	H	U	B	R	F	Q	E	T	S	Z	L	V	I
V	U	R	K	W	S	J	R	P	R	S	R	I	V	O	Z	A
W	A	P	F	Z	V	R	T	D	X	E	V	V	L	C	V	M
M	J	U	V	T	C	M	N	G	Z	W	Q	S	M	K	S	O
O	W	V	C	V	U	A	N	E	G	D	X	W	H	T	P	N
L	G	J	B	G	M	N	E	C	Z	N	K	L	Z	R	Z	D
D	Z	A	U	Z	B	W	M	B	R	D	X	W	H	S	W	S
I	G	C	L	G	T	M	A	V	Z	N	P	T	G	H	T	H
K	T	K	W	T	W	Z	F	T	B	L	O	W	P	I	P	E
G	D	S	G	D	X	W	H	N	M	T	C	I	T	R	V	A
O	J	V	L	J	I	T	R	H	U	B	R	F	Z	F	T	R
P	X	K	S	T	R	A	I	G	H	T	S	H	E	A	R	S
P	R	Q	W	S	G	J	I	T	R	V	F	H	K	L	T	W

Archaeometallurgy activities: Key

Activity: Memory cards

Cu - Copper Prehispanic bell

Pb - Roman lead ingot

Ag - Athenian silver coin

Fe3O4 - Viking iron sword

Au - Gold mask of Agamemnon

Cu + Sn - Riace bronzes
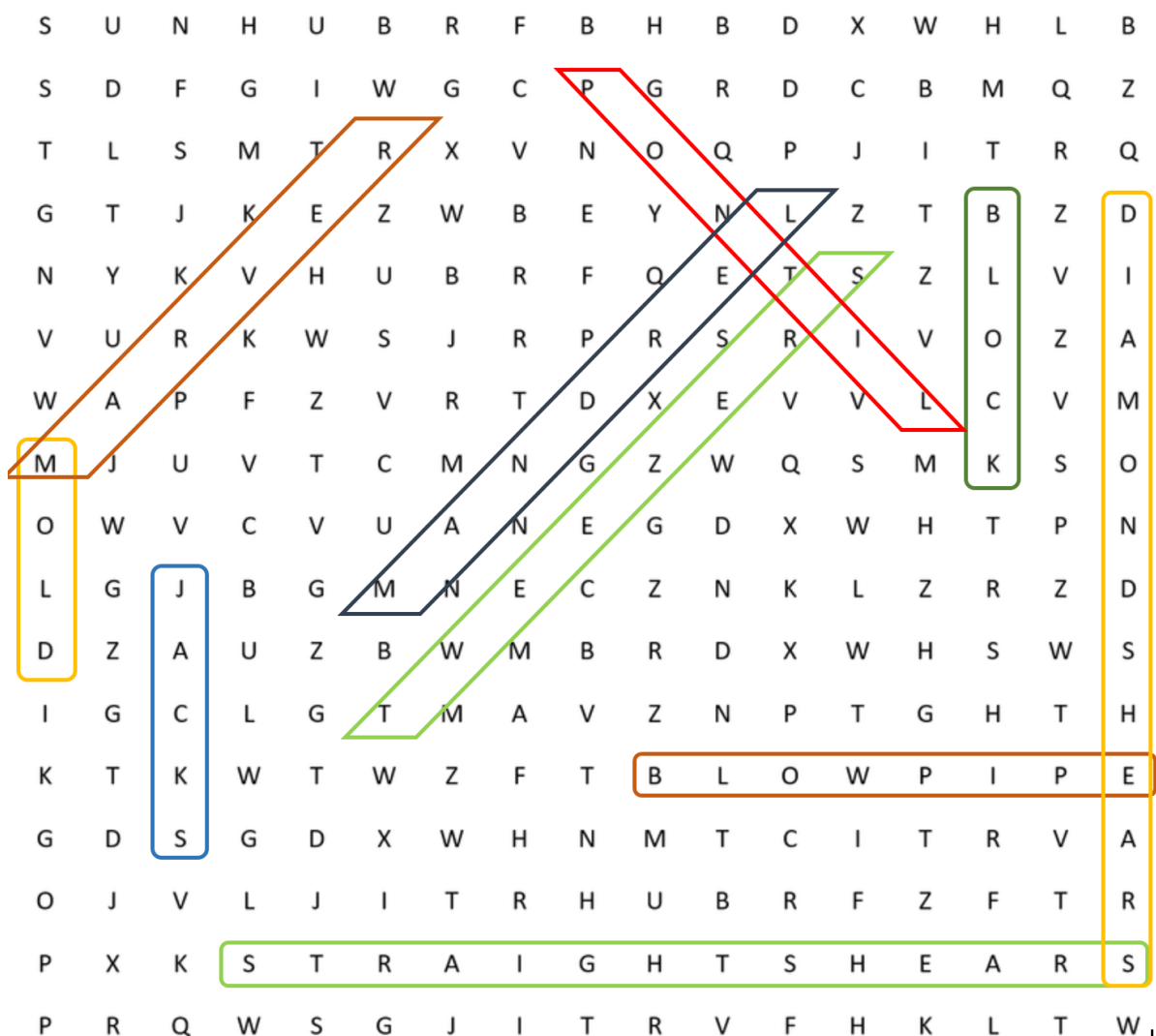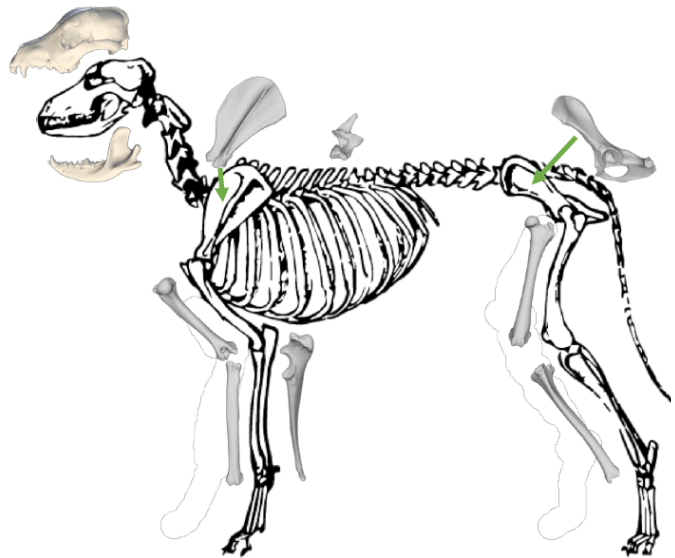
Zooarchaeology activities: Key

Activity: What bone is that? Exercise 1

a. Femur
b. Ulna
c. Scapula
d. Radius

Activity: What bone is that? Exercise 2

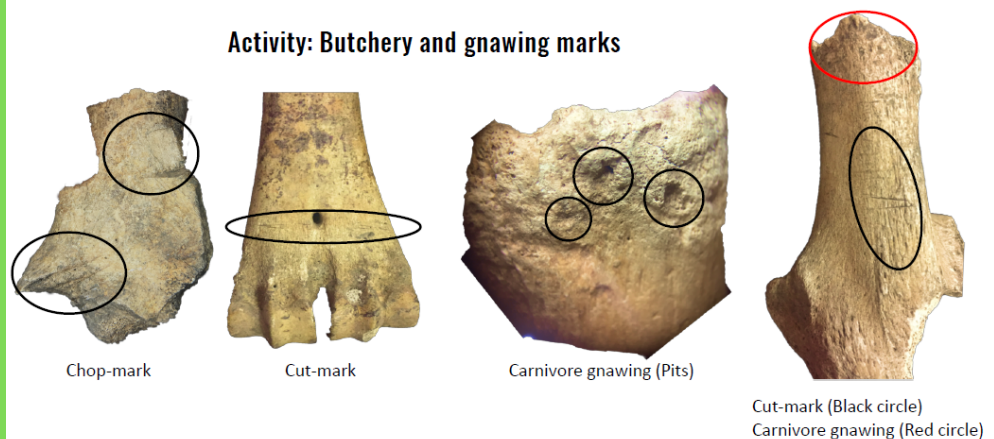## Activity: Identifying animal tracks

Activity: Identification of domestic animals

a. Cat
b. Pig
c. Sheep/Goat
d. Dog
e. Horse
f. Human

Activity: Butchery and gnawing marks

Chop-mark   Cut-mark   Carnivore gnawing (Pits)

Cut-mark (Black circle)
Carnivore gnawing (Red circle)

Zooarchaeology activities: Answer key

Activity: Animal puzzles

STARC in Action!

Snapshots from STARC activities for children, organised in the context of sCYence FAIR 2019