Science and Technology in Archaeology and Culture Research Center

Archaeological Science

CLASSROOM ACTIVITIES

The Cyprus Institute
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Structural Funds
of the European Union in Cyprus

This work has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 811068. In addition, this work was co-funded by the European Regional Development Fund and the Republic of Cyprus through the Research and Innovation Foundation (Project: EXCELLENCE/1216/0023).

Nicosia 2020

ISBN 978-9925-7759-0-3

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RATIONALE OF THIS GUIDE

Archaeological science adopts scientific techniques from different fields, such as biology, chemistry and geology, and applies them 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 booklet aims at filling.

The activities presented focus on familiarising students with basic methods in two broad fields:

- Bioarchaeology (the study of organic remains, such as human and animal bones, and plant remains)
- Archaeological materials and material culture (ceramics, glass, metals)

For each activity, we provide the age range of the students 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 forms to be copied and distributed to the class. In this way, the proposed activities can be used with minimal preparation and extra required materials.

A key to selected activities is given at the end of this booklet.

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 order to elucidate ancient lifeways.

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

1A.
HUMAN OSTEOARCHAEOLOGY

Digging up bones! (8-12 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.

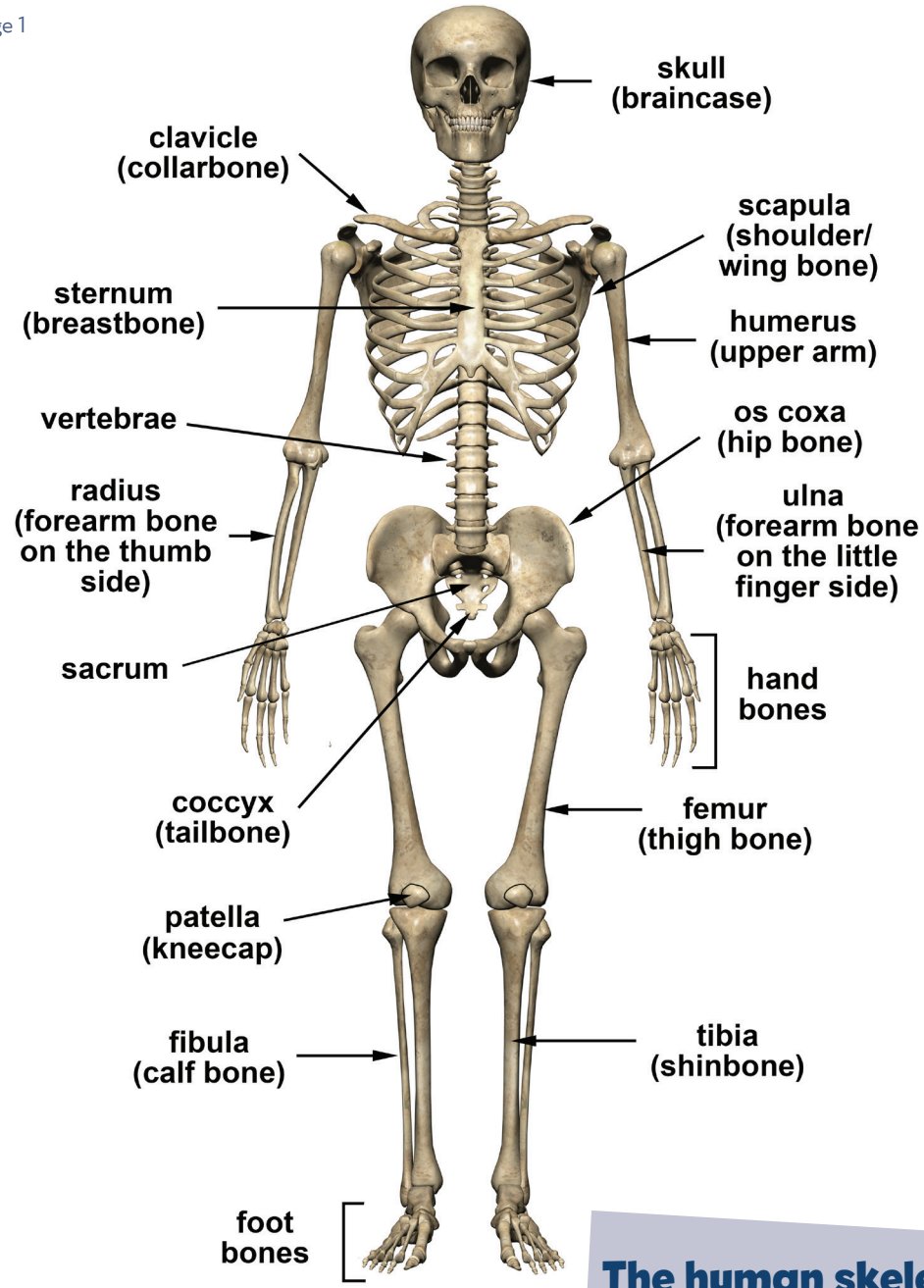
SUPPLIES

- Large transparent plastic box (e.g. 80x60x40 cm)
- Bone casts (or laminated bone drawings)
- Sand, potting soil & small pebbles
- Brushes and trowels
- String, paper tape & measuring tape
- Human skeleton graph (Image 1)
- 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 drawings - Image 2). Add a layer of sand with pebbles on top of it and place a few more casts/drawings. Add a final layer of sand and bury a few more casts/drawings.
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 recording form). 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.

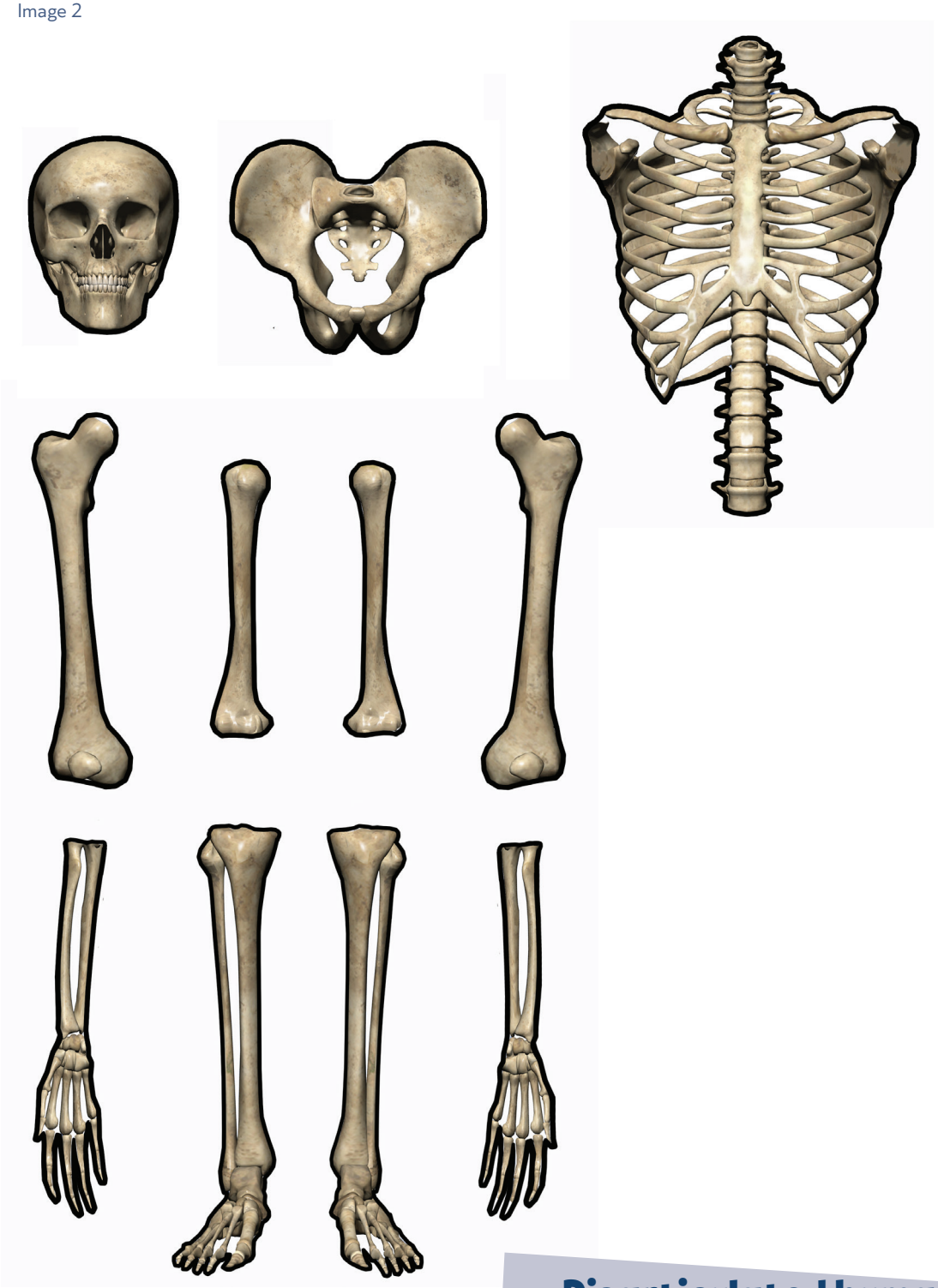
Image 1



The human skeleton

6. Advise the students to excavate per layer. Make sure they use the recording form and they map the location of each bone.
7. Discuss how the bones of the same individual may have been scattered across different 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 traces would they leave for future osteoarchaeologists?

Image 2



Disarticulated human bone drawings*

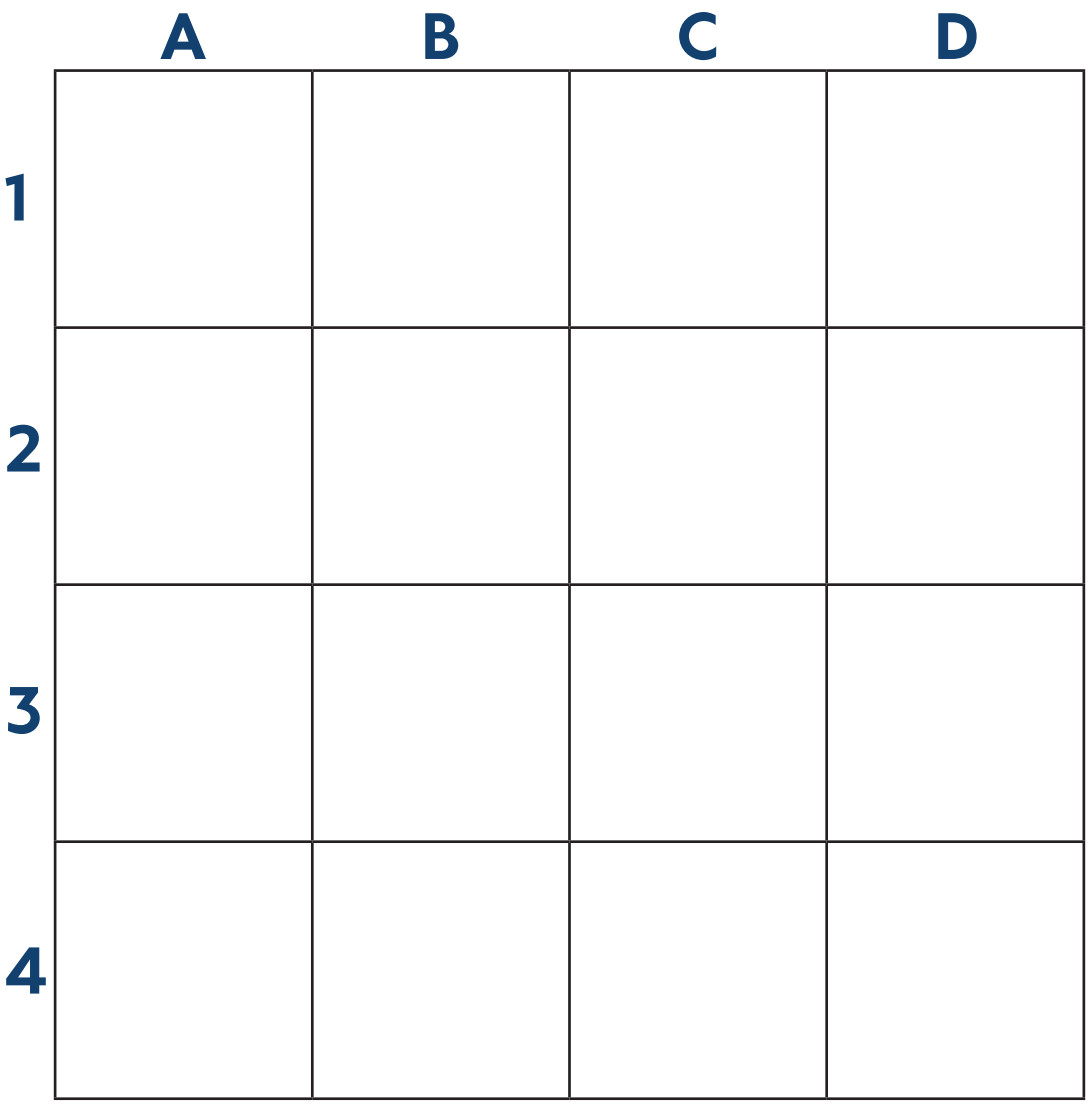
* to be scanned and printed in life size
(according to the height of the students participating)

EXCAVATION RECORD SHEET

Archaeologist's name: ..... Date: .....

FINDS LIST		
FIND	**GRID SQUARE**	**LAYER**

Excavation grid (squares in which we have divided our box)



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

1B.
HUMAN OSTEOARCHAEOLOGY

What bone is that? (9-12 yrs)

OBJECTIVES

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

SUPPLIES

- Plastic human skeleton model (or human skeleton graph)
- Disarticulated bone casts (or life-sized drawings 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 - Image 1) to the students and point to the main anatomical parts (e.g. skull, pelvis).
2. Print in life size the bones given in Image 2 and ask the students to identify each one. 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 printed 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.

1C.
HUMAN OSTEOARCHAEOLOGY

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.

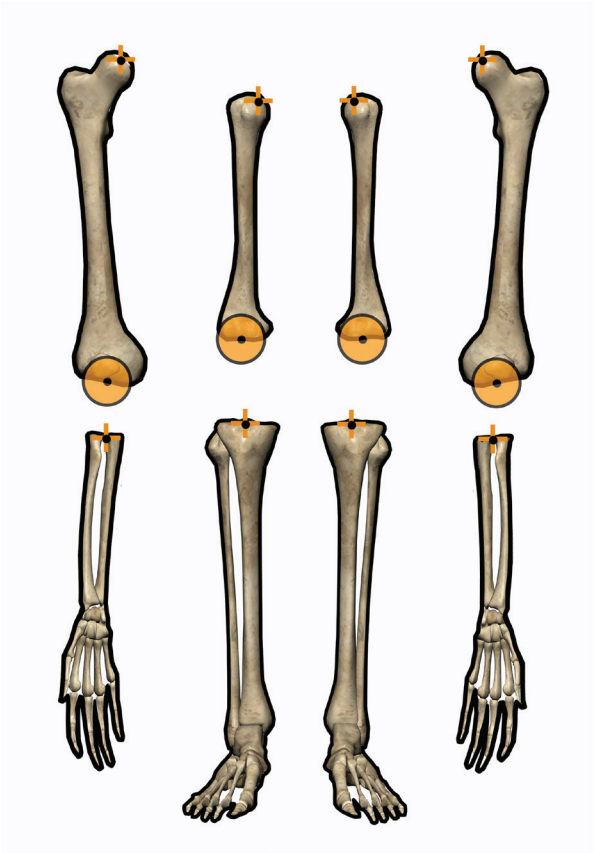
SUPPLIES

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

GUIDELINES

1. Ask the students to cut out the human bones (Image 3) and identify each bone using the provided human skeleton graph (Image 1).
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 to see directly how flexible the joints are. Now ask them to move the thoracic (middle) part of their spine so that they realise that their movements are very restricted.
5. Explain that joints are functionally divided into three categories (Image 4):
   - synarthrosis, which permits little or no mobility (e.g. cranial sutures)
   - amphiarthrosis, which permits slight mobility (e.g. intervertebral discs)
   - synovial joint, which allows a broad range of movements (e.g. shoulder)
6. Cut the human jigsaw in pieces and ask the students to assemble it (Image 5).
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).

Image 3



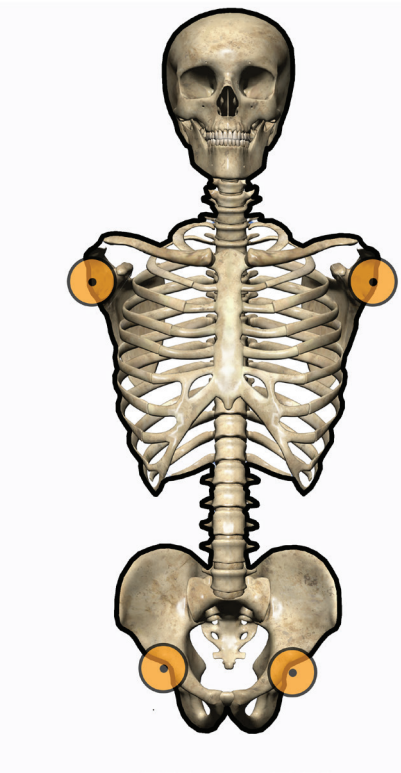
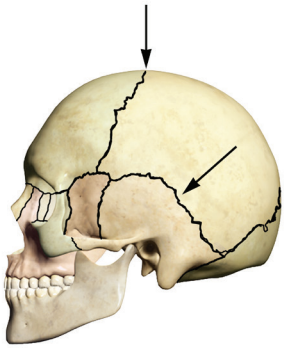
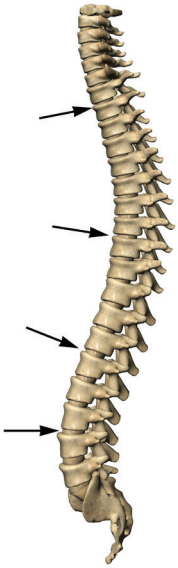


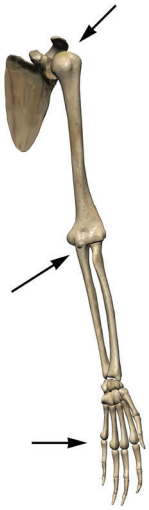
Image 4



synarthrosis
(cranial sutures)

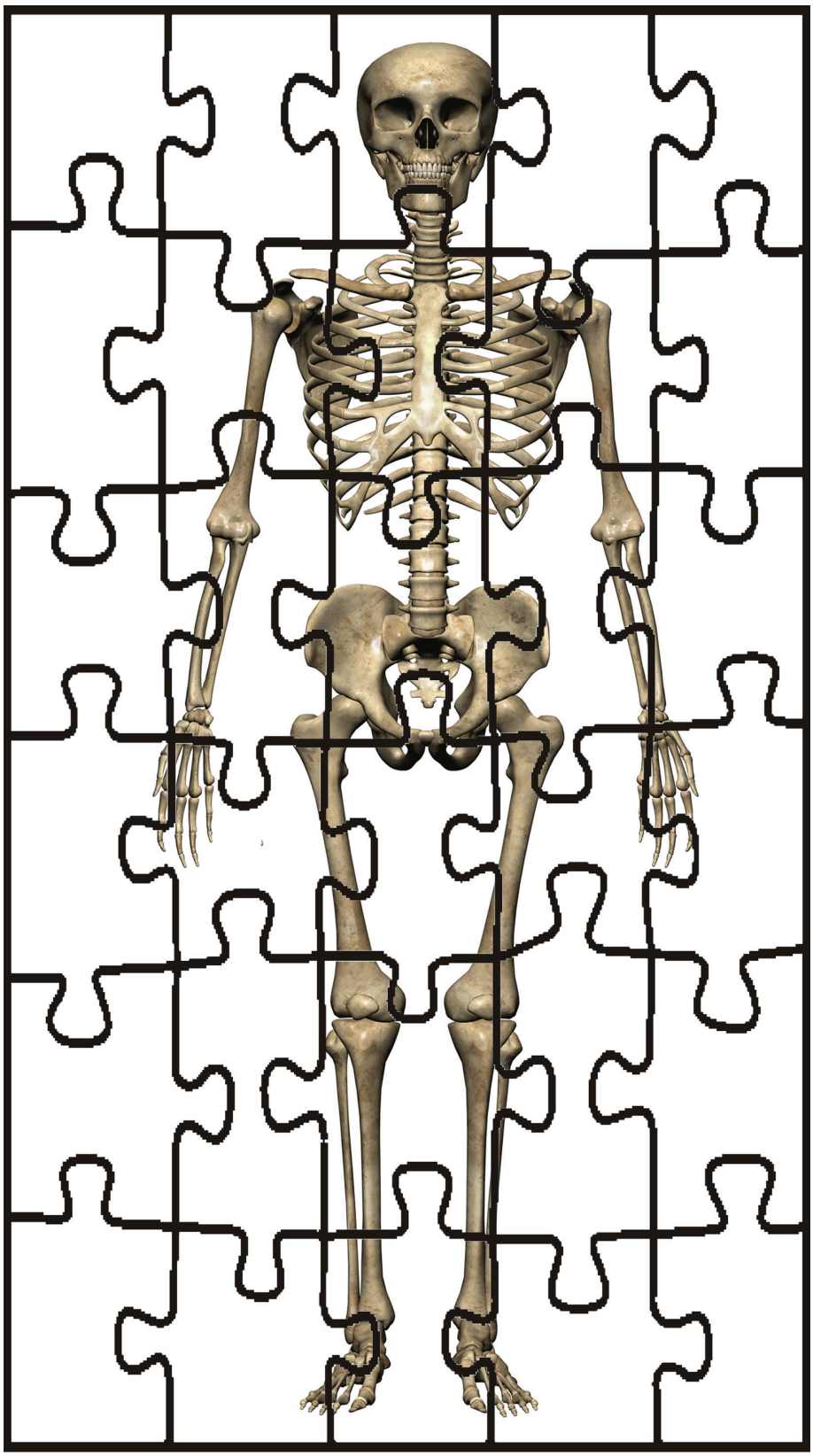


amphiarthrosis
(intervertebral discs)



synovial joints
(upper limb)

Image 5



1D.
HUMAN OSTEOARCHAEOLOGY

Is this John or Helen? (10-12 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 photos of such casts)
- Sketches of human cranial profiles
- Data collection form

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 to determine the sex of the skeleton.
2. Explain that differences between the male and female skull are largely due to the fact that men are more robust than women. 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.
3. Using male and female skull casts (or images), show each trait you will examine and how it is expressed in men and women (Image 6). Ask the students to touch their glabella, nuchal crest, and mastoid process (Image 7).
4. Divide the students in groups of 3-4 and assign one cranial profile sketch to each group (Image 8).
5. Give a recording form to each group and ask them to record the degree of expression of the traits they observe in their sketch.
6. 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'.
7. Ask the students if they see any other traits that are different between males and females based on the casts and/or the sketches. Can they think of any other way we can assess sex from the skeleton besides cranial morphology?

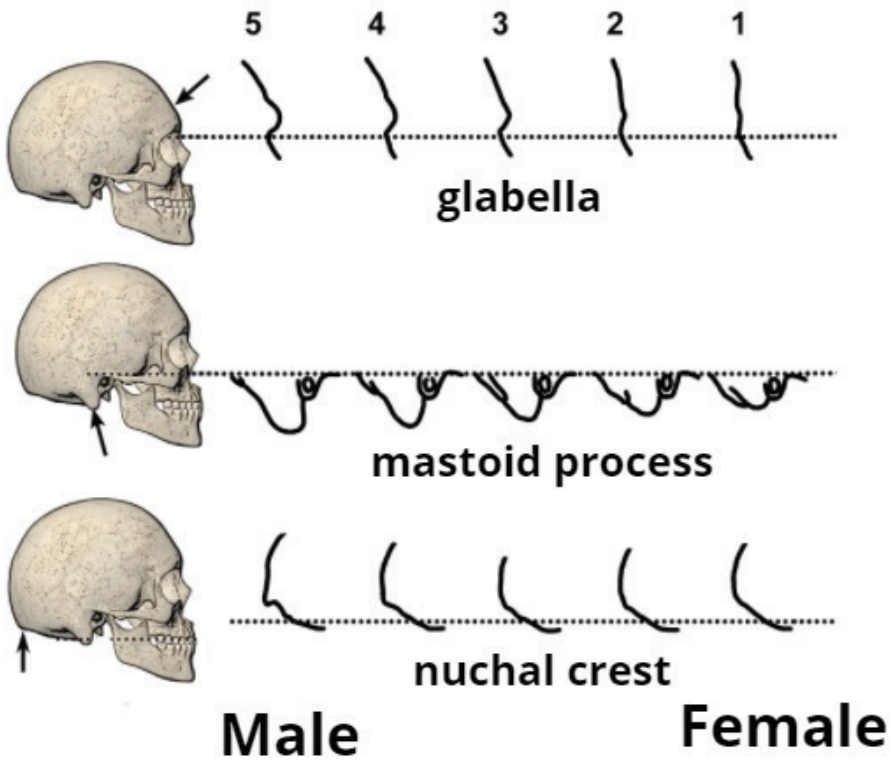
Image 6

MALE SKULL

FEMALE SKULL

Image 7

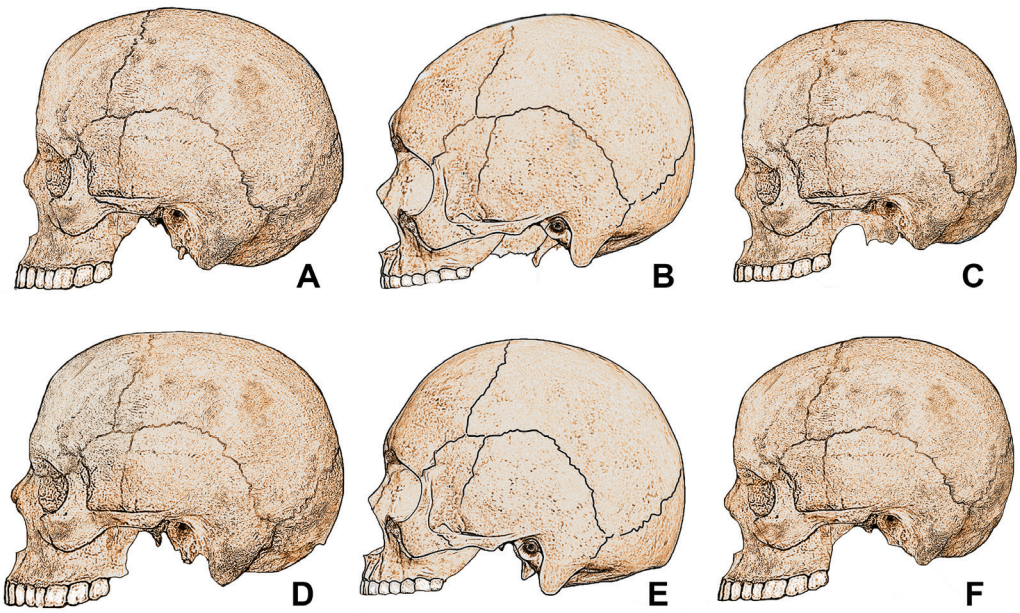
RECORDING SCHEME FOR CRANIAL SEXUALLY DIMORPHIC TRAITS



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

Image 8

ARE THE FOLLOWING CRANIA MALE OR FEMALE?



DATA COLLECTION FORM

SKELETON CODE	GLABELLA	MASTOID PROCESS	NUCHAL CREST	ESTIMATED SEX

1E.
HUMAN OSTEOARCHAEOLOGY

How old was this person at death? (10-12 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 they 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 (Image 9), that is, an atlas for dental formation and eruption based on modern European populations, estimate the age of the individual provided (Image 11).
4. Explain that for adults, we examine the degree of degeneration of different joins, mainly joints of the pelvis. The pubic symphysis is one of the main areas we examine.
5. Using the Suchey-Brooks method (Image 10), ask the students to estimate the age of the three individuals, the pubic symphyses of whom are depicted in Image 12.
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.

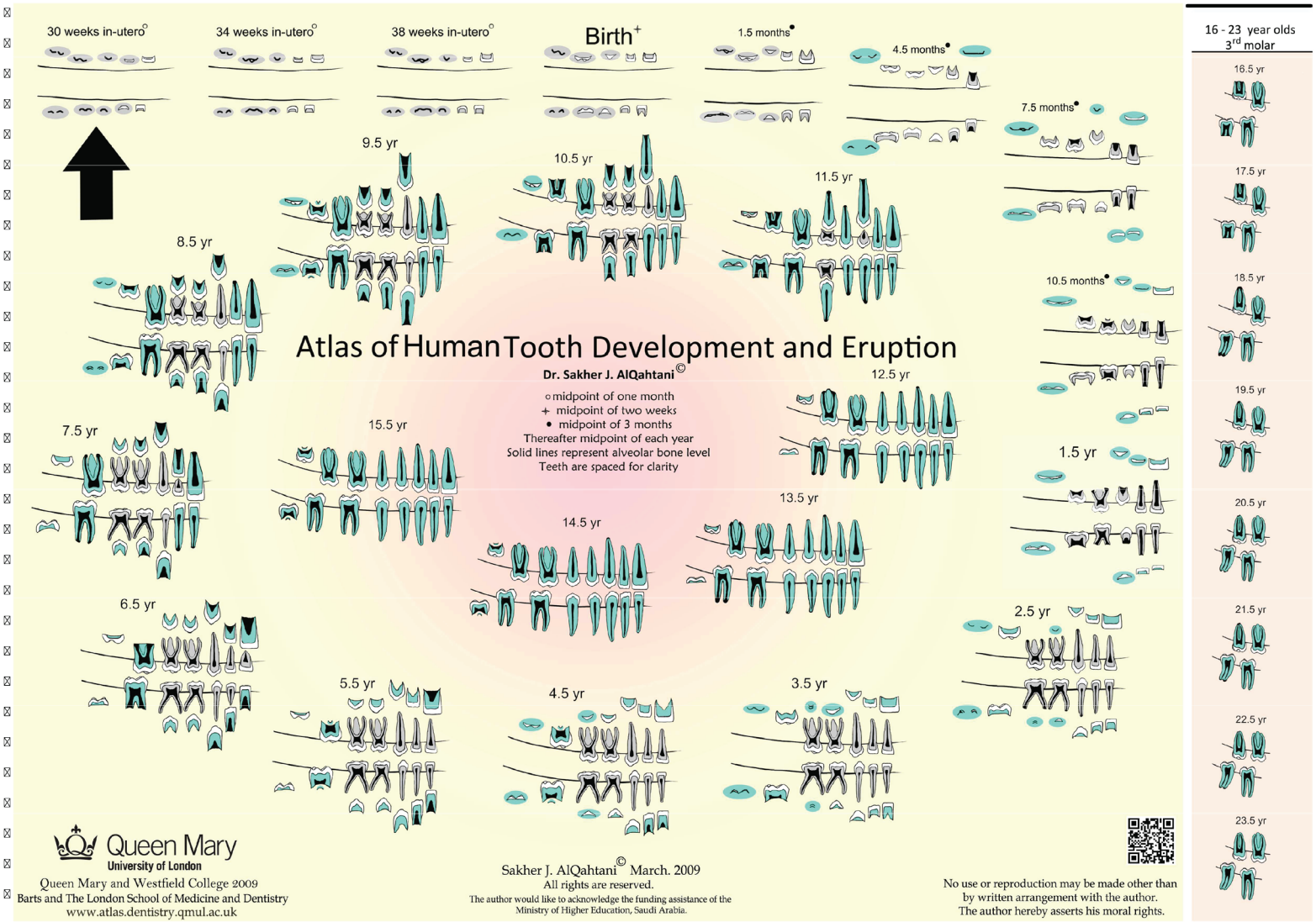

30 weeks in-utero°
34 weeks in-utero°
38 weeks in-utero°
Birth+
1.5 months•
4.5 months•
7.5 months•
10.5 months•
1.5 yr
2.5 yr
3.5 yr
4.5 yr
5.5 yr
6.5 yr
7.5 yr
8.5 yr
9.5 yr
10.5 yr
11.5 yr
12.5 yr
13.5 yr
14.5 yr
15.5 yr
Atlas of Human Tooth Development and Eruption
Dr. Sakher J. AlQahtani©
° midpoint of one month
+ midpoint of two weeks
• midpoint of 3 months
Thereafter midpoint of each year
Solid lines represent alveolar bone level
Teeth are spaced for clarity
16 - 23 year olds
3rd molar
16.5 yr
17.5 yr
18.5 yr
19.5 yr
20.5 yr
21.5 yr
22.5 yr
23.5 yr
Queen Mary
University of London
Queen Mary and Westfield College 2009
Barts and The London School of Medicine and Dentistry
www.atlas.dentistry.qmul.ac.uk
Sakher J. AlQahtani© March. 2009
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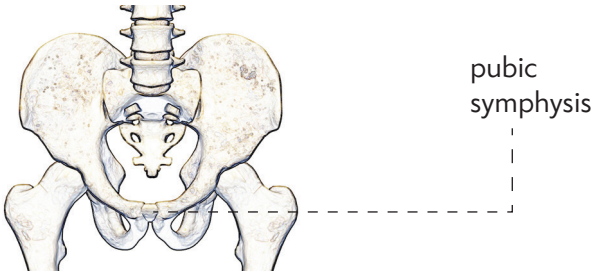
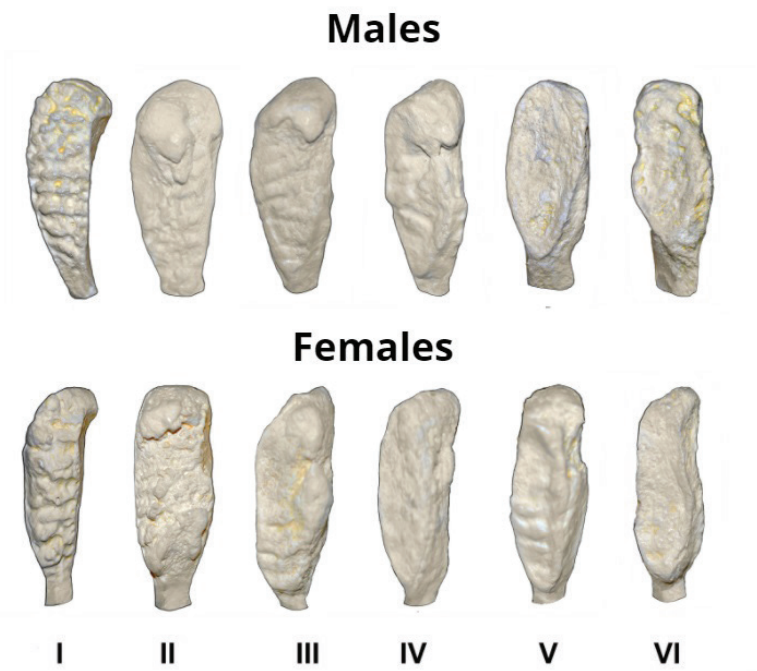
Image 10

SUCHEY-BROOKS METHOD

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





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

WHAT IS THE AGE OF THESE INDIVIDUALS?*

Image 11

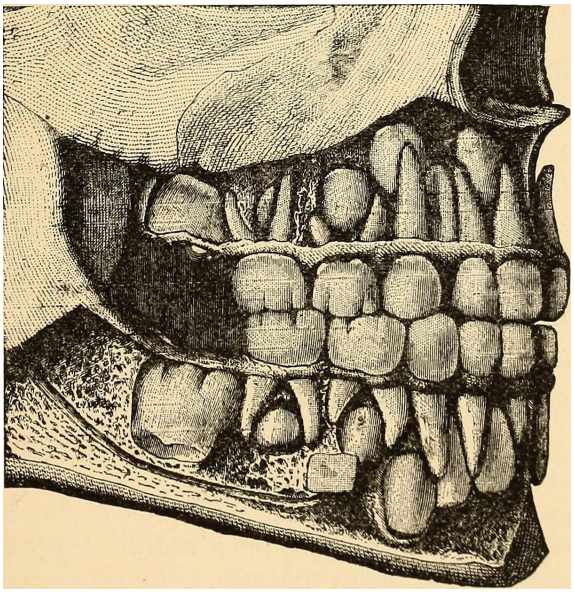


Image 12

A **B** **C**

* Assume that all adults are male

1F.
HUMAN OSTEOARCHAEOLOGY

How tall were our ancestors? (10-12 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 and the mathematical method. 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 with 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.

1G.
HUMAN OSTEOARCHAEOLOGY

Reconstructing activity from the skeleton (9-12 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 resorbing existing bone. The students will learn how they can assess activity patterns from the skeleton but also the limitations of relevant methods.

SUPPLIES

- Image of muscle attachment sites for the radius (Image 13)

GUIDELINES

1. Explain to the students that the skeleton is a living tissue, thus when an individual performs a 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 (Image 13). 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 Image 14 appears to have engaged in more strenuous activities based on the morphology of the muscle markings on the radius.

Image 13

MUSCLE ATTACHMENT SITES ON THE RADIUS

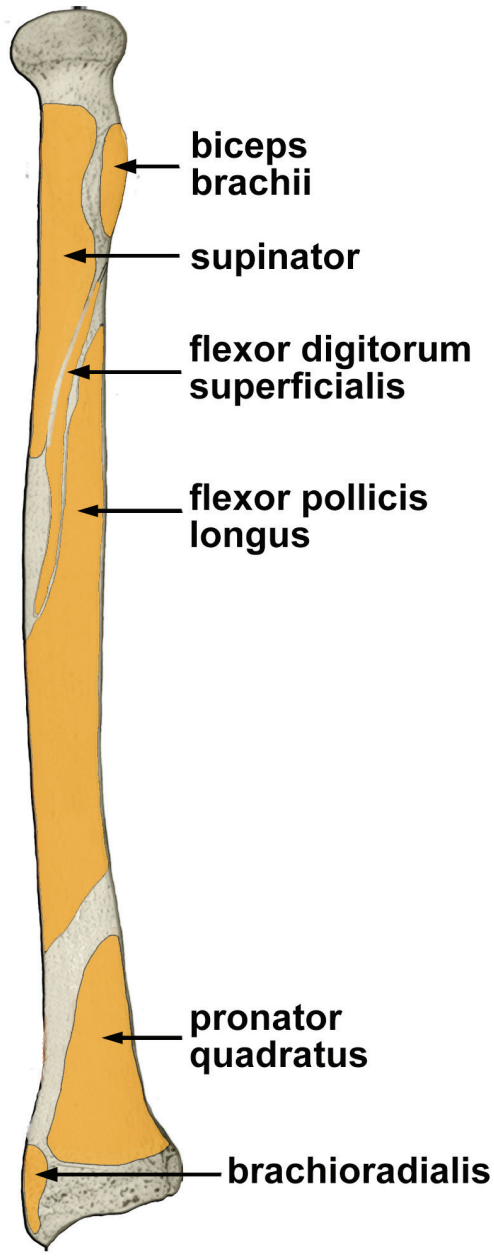


Image 14

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

1H.
HUMAN OSTEOARCHAEOLOGY

How healthy were our ancestors? (10-12 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

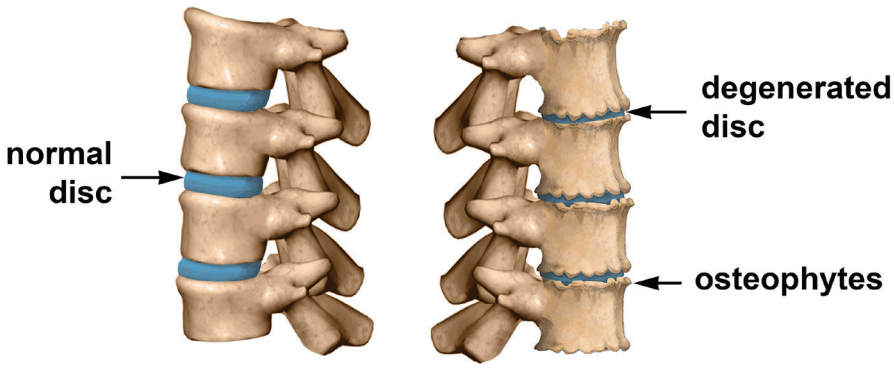
- Images of pathological bones

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 bones (Image 15), 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.
3. Discuss with the students the limitations that the above specific responses have in palaeopathological diagnosis (e.g. 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 time to reach their bones!

Image 15

ARTHRITIS



OSTEOMA

FRACTURED TIBIA

OSTEOMYELITIS

2A. ZOOARCHAEOLOGY

What bone is that? (8-12 yrs)

OBJECTIVES

This activity will teach students how animal remains are often deposited in archaeological layers, as well as general animal anatomy.

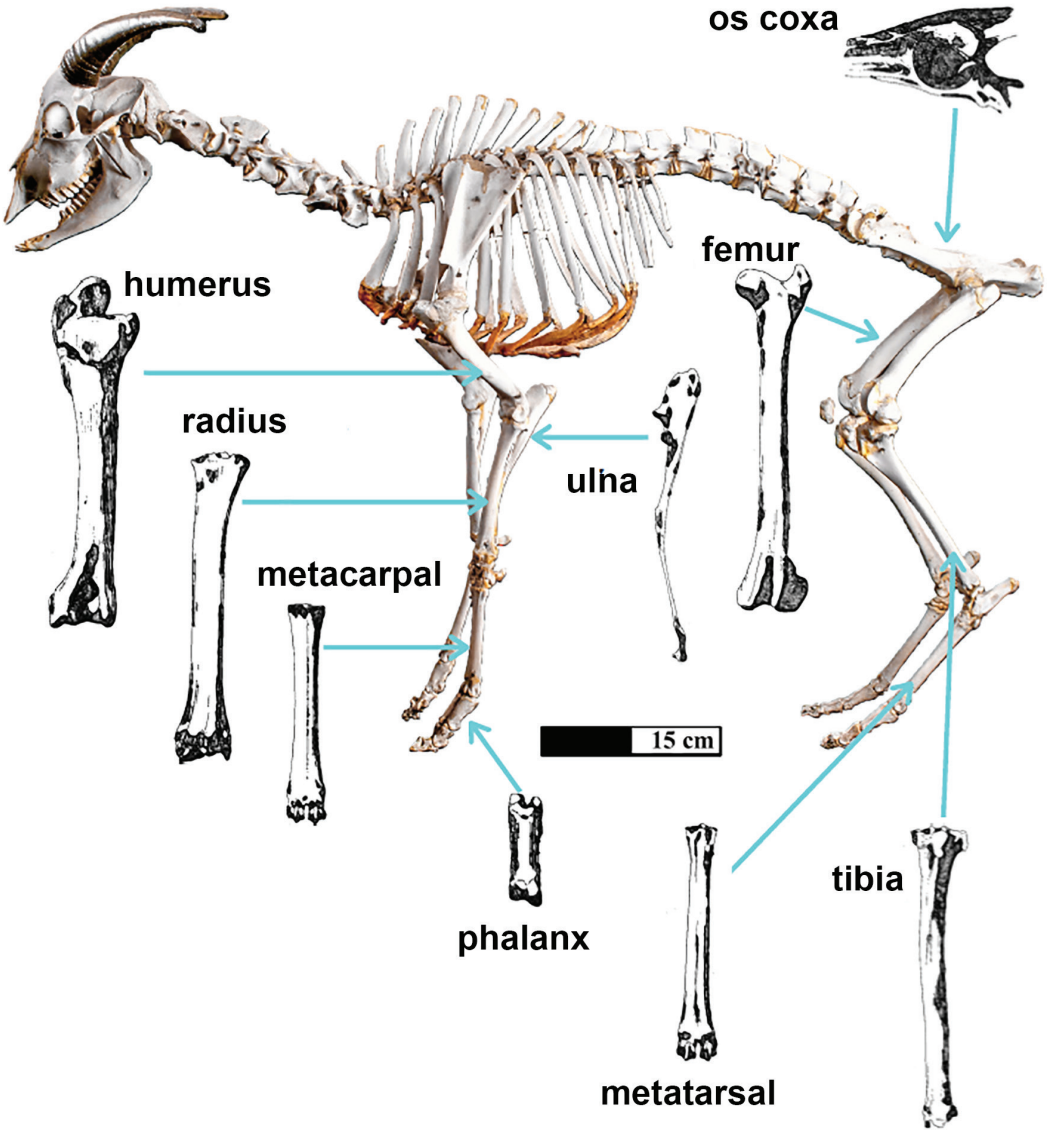
SUPPLIES

- Image of goat skeleton with individual bones
- Image of dog skeleton
- Sketches of dog 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 when making 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 look at the goat skeleton provided in Image 16 and compare it with the human skeleton (Image 1). Follow up by asking which bones they consider most likely to confuse between a goat and a human.
5. Given the similarity in the skeleton of different mammals, ask the students to identify the dog bones provided in Image 17 using the goat skeleton as a model.
6. Print out the dog skeleton in Image 18 and the individual bones provided in Image 17. Ask the students to cut and place each individual bone in the correct anatomical position on the general dog skeleton.

Image 16



The goat skeleton

Image 17

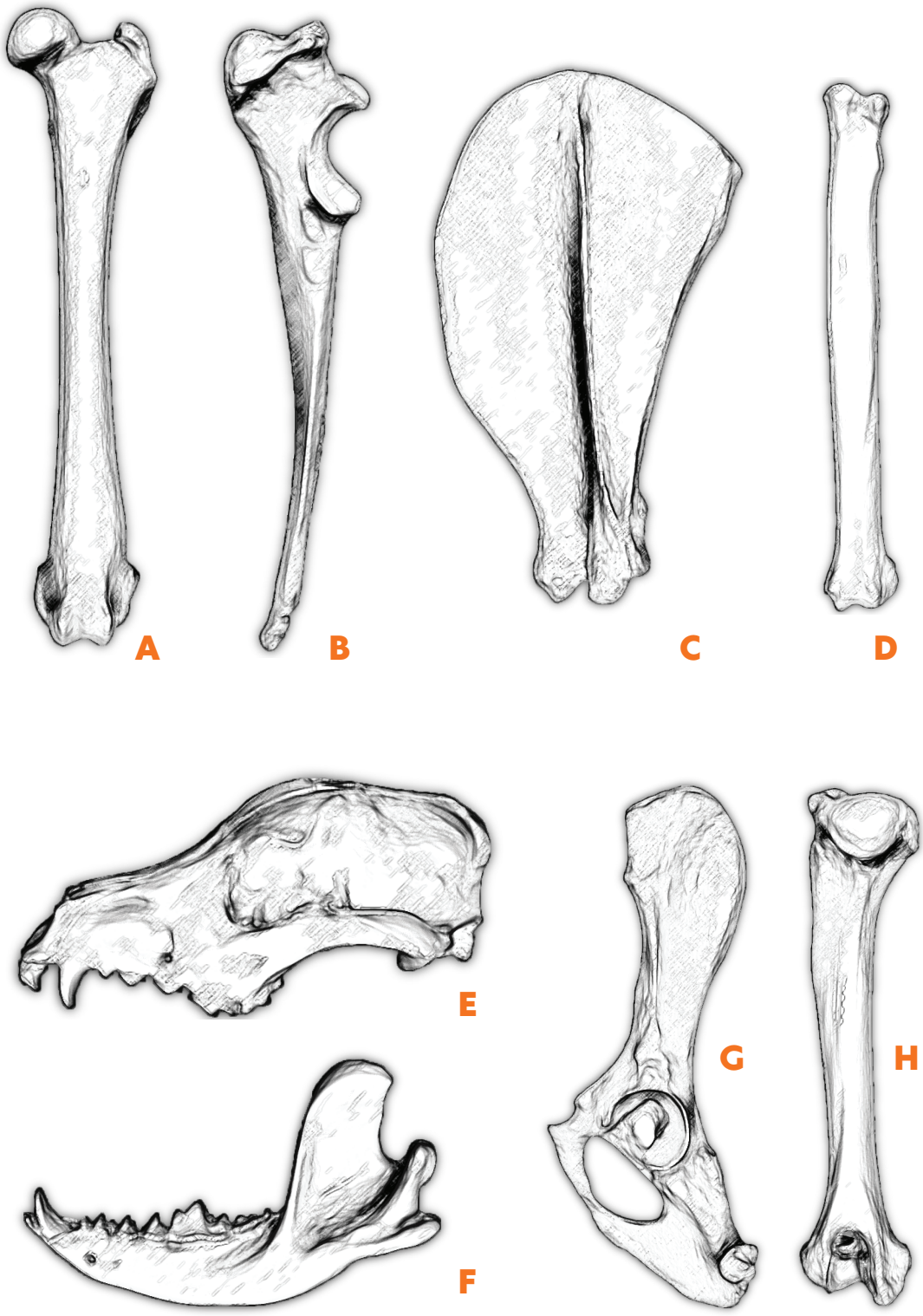
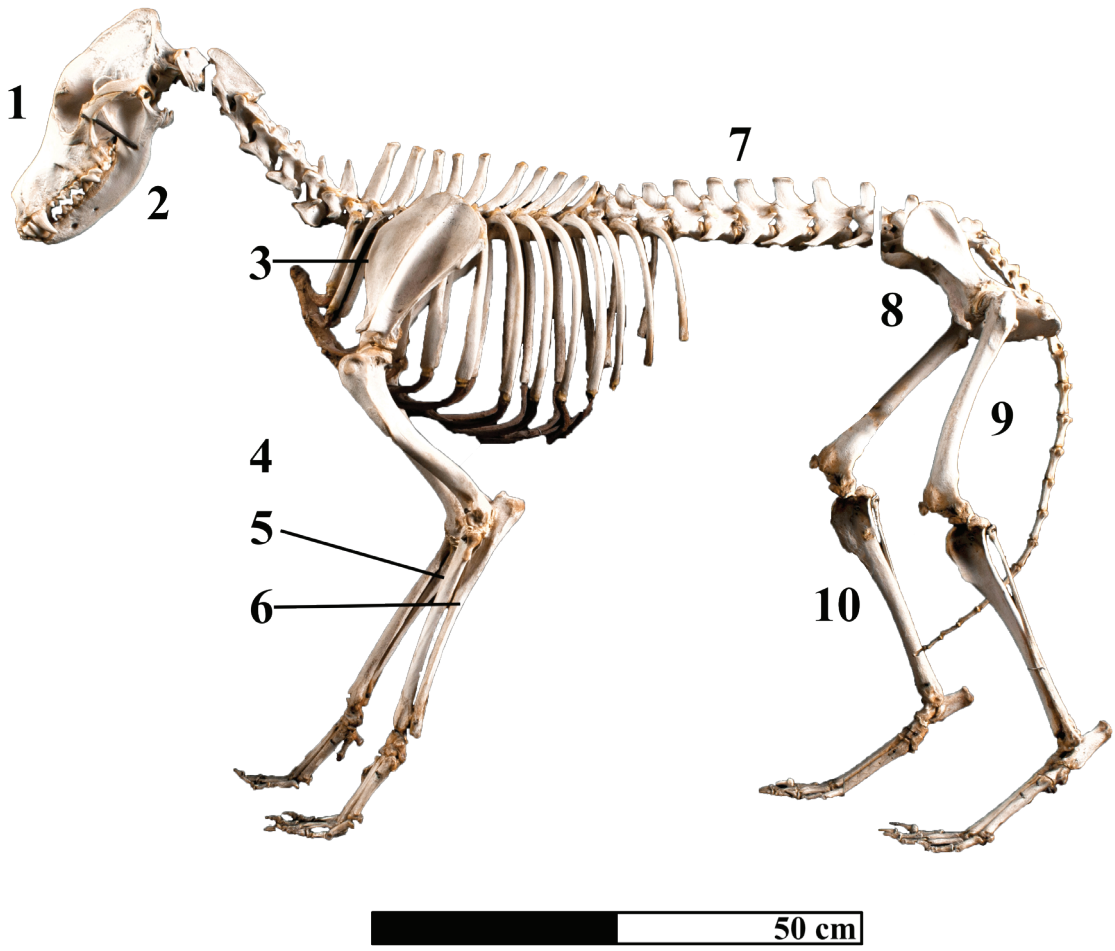


Image 18



The dog skeleton

2B. ZOOARCHAEOLOGY

Identifying animal tracks (9-12 yrs)

OBJECTIVES

This activity will teach students how to differentiate between the tracks of various domesticated and wild animals.

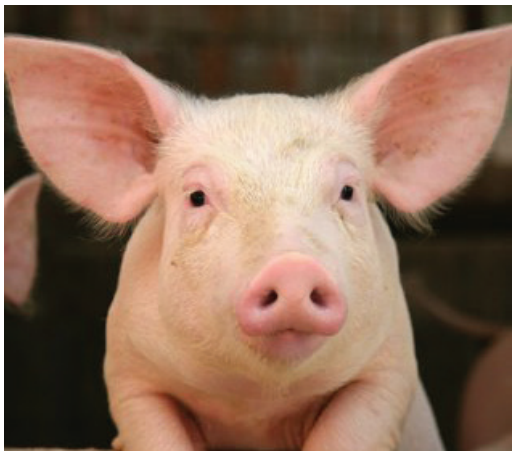
SUPPLIES

- Images of various animal tracks

GUIDELINES

1. Explain to the students that the tracks left behind by different animals vary from each other, thus we can identify which animals went by just from the tracks they left. Such tracks may survive for thousands of years under the right circumstances: e.g. if we step in muddy soil, then the mud dries under the sun, and subsequently it gets buried under sand or more mud.
2. Explain that when it comes to herbivorous animals (and some omnivores), we can group different species according to their 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, they leave claw prints as part of their track (Image 19).
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 in the following pages.
5. Ask the students to match the animals with their track marks given in Images 19, 20 and 21.

Image 19



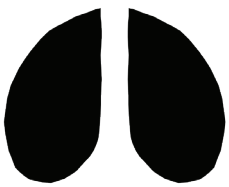
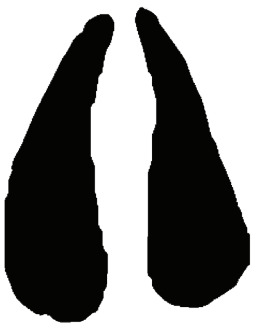


Image 20



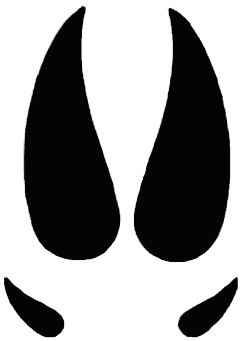


Image 21

2C. ZOOARCHAEOLOGY

Identifying domestic animals (10-12 yrs)

OBJECTIVES

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

SUPPLIES

- Photographs of domesticated animals' dentition

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. One way of grouping animals together is based on what they eat and, thus, 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 (Image 22):
   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 their high resemblance in dental morphology.
4. Divide the students into three groups and ask each group to describe the teeth of the herbivore, omnivore and carnivore given in Image 22 (one animal per group).
5. Ask the students to check out their own teeth in the mirror and describe the similarities and differences from those of the animals given in Image 22.

Image 22

SHEEP – HERBIVORE

PIG – OMNIVORE

CAT – CARNIVORE

2D. ZOOARCHAEOLOGY

Butchery and gnawing marks (10-12 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
- Image of animal gnawing marks

GUIDELINES

1. Explain to the students that the analysis of the traces of butchering activities can inform us on animal husbandry and diet (meat consumption).
2. Explain that there are two typical butchery marks associated with the dismemberment of animal carcasses:
   a) Chop mark: broad, deep, and outspread streak (Image 23)
   b) Cut mark: a line that is quite straight with sharp edges (Image 24)
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 (Image 25)
4. Ask the students to identify the butchery marks in Image 26.
5. Ask them if they think there are other types of butchery marks that can be recorded on animal bones. What tools do we use to prepare and eat meat?
6. Ask the students if they think there are alterations other than butchery and gnawing marks that can affect animal bones.

Image 23

CHOP MARK

Image 24

CUT MARKS

Image 25

CARNIVORE TOOTH MARKS

Identify the butchery marks

Image 26

2E. ZOOARCHAEOLOGY

Jigsaw (8-12 yrs)

Cut the pieces of the puzzle and assemble the fox skull (Image 27)

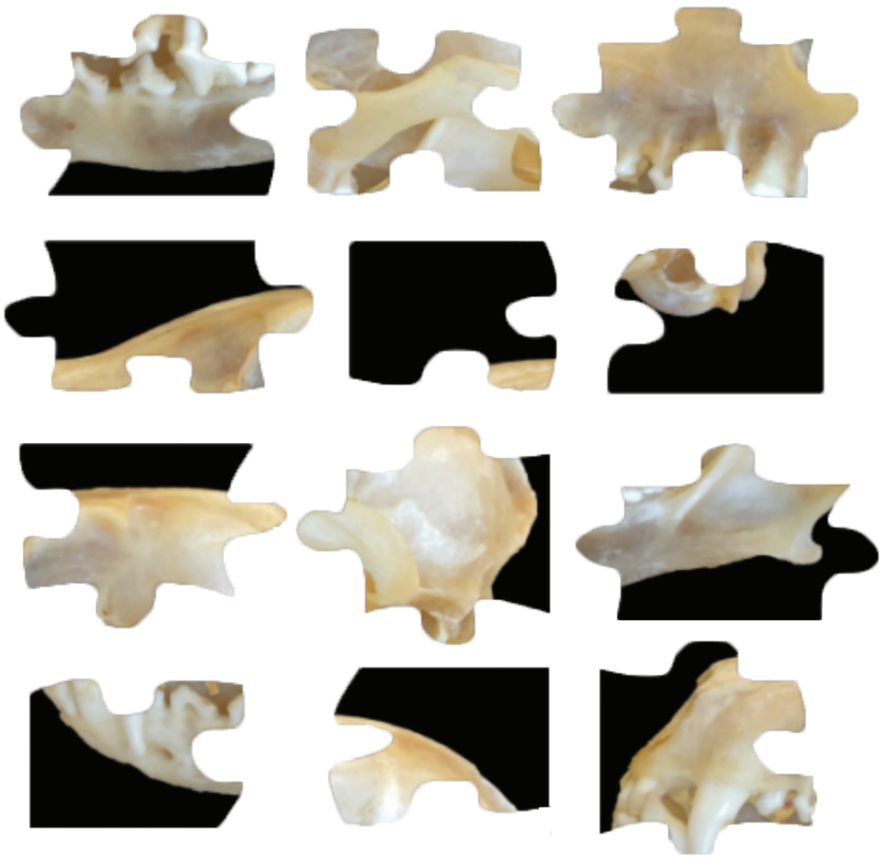


Image 27

3A. ARCHAEOBOTANY

What did our ancestors eat? (8-12 yrs)

OBJECTIVES

This activity will teach students how we retrieve plants in ancient excavations and why their study is important.

SUPPLIES

- Burned/charred seeds
- Soil
- Glass with water

GUIDELINES

1. Explain to the students that humans in the past were originally hunter-gatherers. About 10,000 years ago they started cultivating plants and domesticating animals, so they gradually developed agriculture and husbandry.
2. Stress that archaeobotany is the scientific field that examines ancient plants in order to draw information regarding past diet and economy. A serious issue is that plants are organic remains, thus in order to be preserved through time, they need to be charred.
3. Explain that plants may be burned intentionally or accidentally. For example, some seeds may fall in fire while we cook, households (with all their contents) may be set alight during warfare, while plants may also be burned during various rituals, as offerings.
4. Ask the students to think of other circumstances under which plants in the past may have gotten burned, so that they are preserved for contemporary study.
5. Imagine a burned pea. Ask the students how likely they think it would be for archaeologists to spot a burned pea while excavating. Explain that during an excavation, archaeobotanists use a method called 'flotation' in order to retrieve plant remains.
6. Demonstrate in a simple manner how flotation works: place a small amount of soil and burned seeds inside a glass with water and wait for a few minutes. What happens?

3B. ARCHAEOBOTANY

Identifying ancient seeds (10-12 yrs)

OBJECTIVES

This activity will teach students how to identify different seeds.

SUPPLIES

- Seeds (burned and unburned)
- Tweezers
- Magnifying glass
- Seed atlas

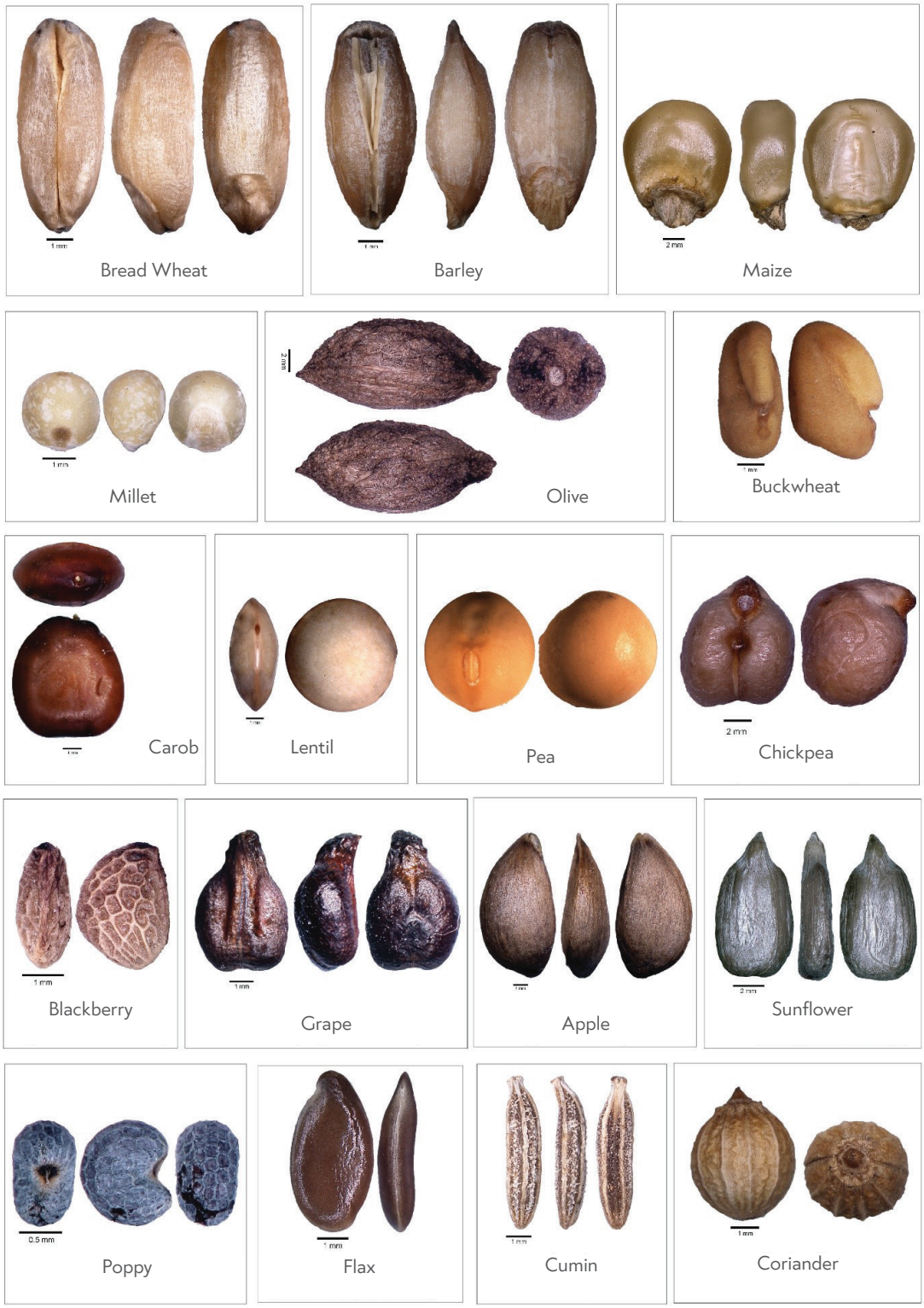
GUIDELINES

1. As we saw in the previous activity, in order for ancient seeds to be preserved, they should have been burned. Nonetheless, their exposure to high temperatures produces various morphological changes. Ask the students to compare the morphology of burned seeds to that of unburned seeds. What differences do they observe? Could they identify to which plants the burned seeds belong if they had not known in advance?
2. Ask the students to draw one of the unburned seeds. Then, ask them to modify their drawing so that it depicts the corresponding burned seed.
3. Encourage the students to become amateur archaeobotanists, examine the seeds under a magnifying glass, and sort them according to their size and shape.
4. Using the seed atlas (Image 28), can they match the burned seeds given in Image 29 to the plants they come from? Can they possibly identify any of the seeds they sorted in the previous step of this activity using the atlas?
5. Make a list of the characteristics of each seed that could be used in order to differentiate it from the others.

Draw a non-burned seed and then modify your drawing so that it depicts the corresponding burned seed

Image 28

SEED ATLAS



Match the seeds to the plants they originate from.

Image 29

LENTIL

FLAX

CHICKPEA

POPPY

BARLEY

GRAPE

4A. CERAMICS

The potter's workshop (8-12 yrs)

OBJECTIVES

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

SUPPLIES

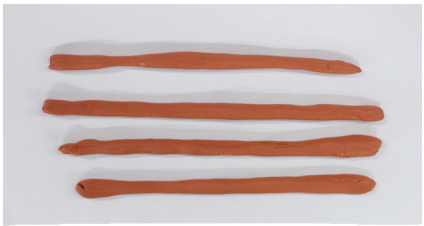
- Clay & clay modelling tools
- Small bowls

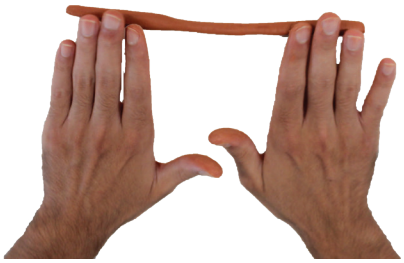
GUIDELINES

1. Explain to the students that our ancestors used many techniques to create pots (Image 30). 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 (coil). Repeat the operation several times and then place the coils one on top of the other to create the walls 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 sphere 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 walls of the pot too thin, or it will not preserve its shape when you remove the bowl!
2. Decorate the surface with geometric motives such as lines, circles, spirals etc. You can also decorate the surface with natural objects, such as shells.
3. Set the pot to dry. To avoid cracks, the clay has to dry slowly. Leave it in a dry and warm environment but not directly under the sun.

Image 30

POTTERY MAKING TECHNIQUES





A

B

C

COILING

A

B

C

PINCHING

MOLDING

4B. CERAMICS

Putting the pieces together (7-12 yrs)

OBJECTIVES

This activity will teach students the basic principles of conservation of archaeological objects. In particular, the students will learn how to put together ancient ceramics, which are often found broken in many pieces. In addition, they will see how the shape of pots is linked to their function.

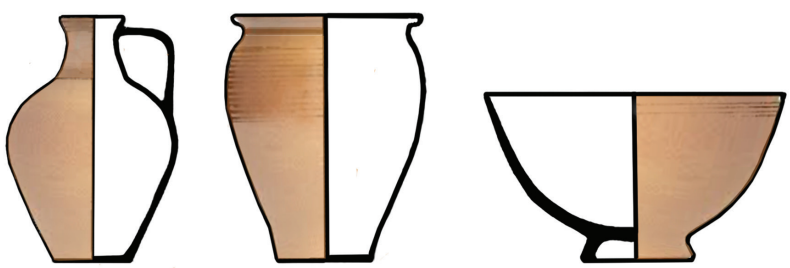
SUPPLIES

- Broken ceramic pots (mugs, plates etc.)
- Glue
- Masking tape

GUIDELINES

1. Ask the students to separate the ceramics pieces by colour, thickness and other characteristics (e.g. clay texture).
2. Encourage the students to glue the pieces belonging to the same pot together, using masking tape to keep the pieces together until the glue dries.
3. Explain that the pots we see in museums have usually been found by archaeologists broken in many pieces. However, specialists called conservators put the pieces together and reconstructed the original shape of the pots.
4. Discuss with the students how the shape of the pots is directly linked to their function. Ask them to think of the shape of common pots they use at home (mugs, cups, plates, jugs, glasses etc.)
5. Stress that our ancestors also used many different types of pots depending on their needs, as can be seen for example in Image 31:

Image 31



jug cooking pot bowl

4C.
CERAMICS

Exploring the properties of clay! (8-12 yrs)

OBJECTIVES

This activity will teach students the properties of clay, offering hands-on experience and the opportunity to work directly with this raw material. The students will comprehend the importance of ceramics in past everyday life and their multiple uses by ancient societies.

SUPPLIES

- Two (or more) types of clay, preferably of different colour, texture and plasticity
- Organic and inorganic materials (e.g. straw, grass, sand)
- Bowls with water
- Pens, pencils
- Cat stencil design

GUIDELINES

1. Introduce clay and its material properties. Explain its significance for everyday life especially in the past (see info in the following pages).
2. Ask the class to brainstorm about different types of ceramic objects and their use in everyday life (see info in the following pages).
3. Ask the students to select a combination of materials and mix them in order to produce a new "fabric". In the process, they should note the changes they observe in the texture, plasticity and hardness of the original clay(s) and the new fabric.
4. Using the fabric that they have produced, students should make a cat figurine, using a stencil (Image 32) to shape it on a flat layer of clay. Subsequently, they can design the various parts of the cat using pens or pencils.
5. The students should present their cat in front of the class, describing the combination of materials they have used, how the properties of the raw clay have changed after mixing, as well as the difficulties they encountered while creating the figurine. What would they do differently, if they had to do it again?

Cat Stencil

Image 32

CLAY AND ITS PROPERTIES

Clays are naturally occurring fine-grained earthy materials. They are inexpensive and easily available in the environment and can be found on or near the surface of the earth. When they are mixed with water, they become plastic and easy to shape. When they are fired, they become hard, long lasting and hard wearing. Fired clays are called ceramics, or pottery or terracotta. Ceramics have high melting points; they are thermally conductive and chemically inert. There are various types of clays in nature and they vary considerably from area/region to area/region. Depending on the function of the final product, the craftsperson/potter can alter the properties of the raw material to meet the functional requirements of the final ceramic object. So, the craftsperson can mix different types of clay or add organic or inorganic materials, such as straw, grass, shell, sand, even dung.

Usually the added material changes the degree of plasticity of the raw clay, and affects the hardness, strength and toughness of ceramics (mechanical properties). The potter makes a series of closely linked technological choices while making a ceramic object, and these decisions form part of a ceramic tradition that has evolved through the years, even centuries, with a lot of experience and experimentation, so that the final product can correspond efficiently to its put use. For example, if the clay is used for the production of finely incised vessels, the presence and size of the inclusions in the clay might obstruct the tool of the craftsperson to move easily on the surface of the clay object for the creation of incised decoration.

CERAMIC OBJECTS USED IN THE PAST AND PRESENT

- Drinking cups
- Plates
- Cooking pots
- Pans
- Bins
- Storage vessels and boxes
- Transport containers
- Pipes
- Sarcophagi
- Lamps
- Figurines
- Statuettes
- Production moulds
- Ladles
- Crucibles
- Toys
- Floor and wall tiles
- Bricks
- Artificial teeth
- Mosaics
- Bathtubs
- Sinks
- Toilets
- Hot bottles
- Writing tablets
- Loom-weights
- Spindle whorls
- Benches
- Seats, etc

4D.
CERAMICS

Decoding ancient writing with the use of clay tablets (8-12 yrs)

OBJECTIVES

This activity will introduce clay to students as a means of expression and, in particular, clay tablets as the most ancient and popular writing medium.

SUPPLIES

- Hieroglyphics chart
- Small balls of clay (the clay should be damp)
- Small bowls with water
- Small wooden sticks with pointed tips (alternatively pens or pencils)

GUIDELINES

1. Provide to the students introductory information regarding clay and its properties, as well as its extensive use as a means of expression and a medium for writing in ancient societies (see info below).
2. Offer introductory information on hieroglyphics and explain how this ancient writing system works (see info in the following page, Image 33).
3. Divide the students in pairs; each pair should take two balls of clay and two styli (pointed wooden sticks).
4. Each pair should mould their clay balls in order to shape them into tablets.
5. Using the styli, the students should inscribe their names in hieroglyphics on the first tablet, and two words of their choice, again in hieroglyphics, on the second tablet.
6. Ask the students to switch their tablets with other pairs and try to decipher the words on the tablets that they were given.

CLAY AS A WRITING MEDIUM

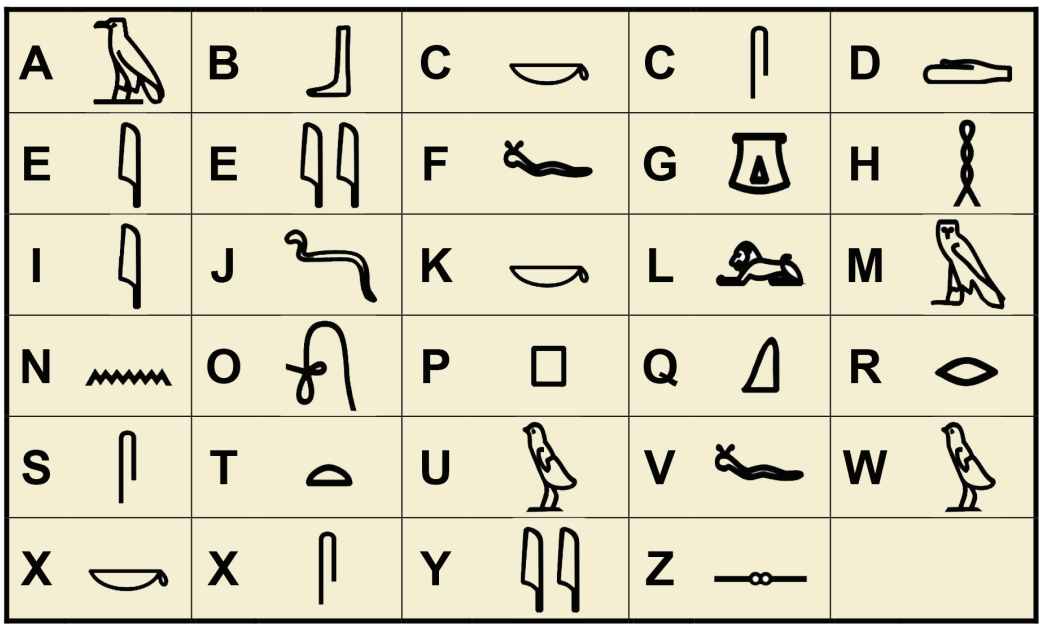
Clay is an inexpensive material that can be easily found. When mixed with water, clay becomes plastic, it can be shaped into different forms, and it can be incised using a pointed tool. For these reasons, clay was used as a writing medium in antiquity, usually in the form of flat pieces that are called tablets. Reeds, wooden sticks, or more elaborate ivory and metal styli (or any tool with a sharp tip), were used for inscribing on the clay tablets. The clay should be damp, so that its surface is soft enough to allow the tip of the stylus to mark the clay. Once the clay tablets were dried hard in

the sun, they became long-lasting archives that survived until our days. Most writing systems have been deciphered but some of them are still a mystery to us, such as the early Cypriot script. The first writing systems were used to record past communities' produce, and in effect they were economic records. Not everyone was literate in the ancient world, so often these records were written by scribes.

Hieroglyphics are one of the first writing systems in the whole world. They were used in ancient Egypt, as early as 5000 years ago and until the 5th century AD. This was a very complicated way of writing, and learning it required many years of study and practice. The scribes did not always follow specific rules, but there was a lot of creativity and personal aesthetics embedded in writing. Hieroglyphic signs were used in two main ways; some represent entire words or concepts, and others can be read as one or more consonants, as Egyptians didn't usually write vowels. They are written from right-to-left or left-to-right, and it's the direction of faces in signs shaped like animals and people that tell you in which direction the inscription should be read. If the writing is in a column, then it runs from top to bottom.

Image 33

HIEROGLYPHICS CHART



Disclaimer
The widely distributed hieroglyphics charts, such as the one provided here, are modern conventions simply to facilitate the general public in understanding the use of this writing system.

5A. ARCHAEOMETALLURGY

Why this and not that? (10-12 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

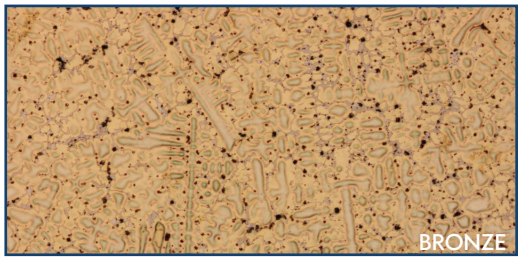
- Print-out images of raw metals and finished metal objects

GUIDELINES

1. Explain to the students that metals have specific properties different from other materials such as stone, ceramics, wood or bone. They are much heavier, and can be melted, cast and hammered into shape. Also, different metals have different properties such as colour, density, hardness, sound, and value. Our ancestors knew these properties well and used them carefully to produce different objects, from jewellery and coins to tools, weapons, vessels and architectural items.
2. Divide the students in groups and ask each group to find the properties and typical uses of a specific metal (e.g. iron, gold, copper, lead, silver), and present them to the other groups.
3. Cut out the raw materials and finished objects given in Image 34 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.

Print-out images

Image 34



6A. GLASS

Let's make a vessel! (10-12 yrs)

OBJECTIVES

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

SUPPLIES

- Casts of various types of vessels (you can easily make these using clay)
- Gypsum
- 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 activity you will use gypsum instead of glass and you will reverse the process, that is, you will create a core using a mould.
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 (Image 35). Try to experiment making different types of vessels (Image 36).
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. Encourage the students to experiment with different decorative patterns (feather, festoons, zig-zag, straight lines - Image 37).

Image 35

Image 36

VESSEL TYPOLOGY EXAMPLES

A

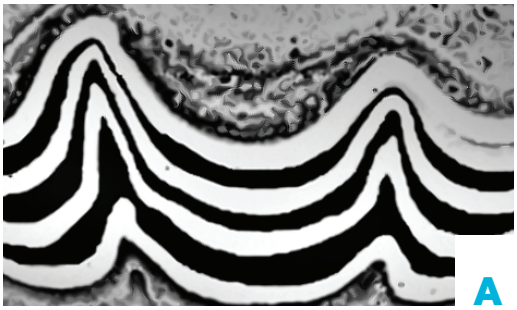
B

C

A = Amphoriskos
B = Oinochoe
C = Alabastron

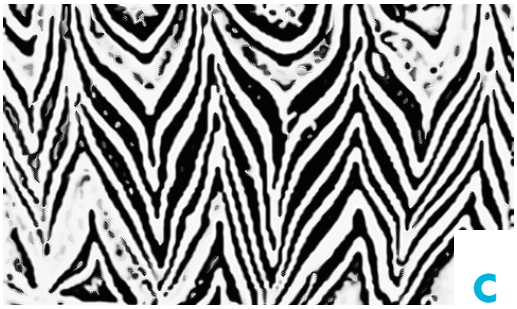
Image 37

DECORATION EXAMPLES



A

B



C

A = Festoon
B = Zig-zag
C = Feather

6B.
GLASS

How did they do it? (10-12 yrs)

Match the techniques with the corresponding vessels
(see information on the following page)

A

B

C

1. GLASS BLOWING
2. MOSAIC

3. CASTING
4. MOULD BLOWING

5. SLUMPING/SAGGING
6. CORE FORMING

D

E

F

CONSTRUCTION TECHNIQUES

GLASS BLOWING

The object is formed by passing air through a metal blowpipe at the lower end of which there is a mass of hot glass. The hot glass expands like bubble gum, and blown vessels are usually thin with tall necks.

MOULD BLOWING

The glass vessel is formed by blowing into a concave or specially shaped mould. Usually this technique produces objects with complicated decorations, such as faces.

MOSAIC

A glass object is created using pre-prepared pieces of coloured glass. These pieces are placed close together and then they are heated so that they fuse. The final glass object is usually a multi-coloured bowl.

CASTING

A glass object is formed through the use of an open mould. The mould may take various shapes and is filled with molten glass. This technique is mostly used to create pendants and decorative elements.

SLUMPING/SAGGING

Glass vessels are produced by heating a glass disk on top of a convex mould. The glass disk gradually takes the shape of the mould, due to its weight, which pulls the glass downwards. This technique is used primarily to create conical shaped vessels.

CORE FORMING

Glass vessels are shaped around a core. Usually the glass is further decorated with glass stripes of various colours, mainly yellow, white, and turquoise, and various motifs, such as zig-zag, festoon, and straight lines. The vessels produced by core forming were used mainly as perfume containers and were small in size.

KEYS

HUMAN OSTEOARCHAEOLOGY

Is this John or Helen?

A. Female

B. Male

C. Female

D. Male

E. Male

F. Female

How old was this person at death?

DENTAL DEVELOPMENT
~ 5.5 yrs

PUBIC SYMPHYSIS
A
61.2 +/- 12.2 yrs
(phase VI)

B
18.5+/- 2.1 yrs
(phase I)

C
28.7 +/- 6.5 yrs
(phase III)

How tall were our ancestors?

Humerus: 160.18 cm

Radius: 159.52 cm

Femur: 159.61 cm

Tibia: 159.66 cm

Reconstructing activity from the skeleton

Individual B

ZOOARCHAEOLOGY

What bone is that?

A. Femur

B. Ulna

C. Scapula

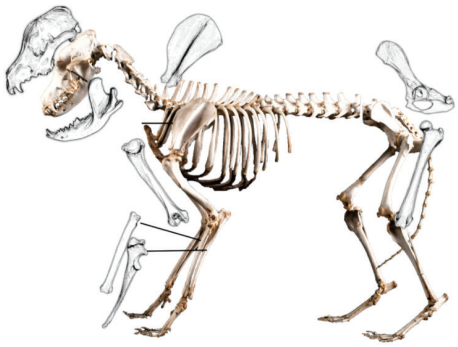
D. Radius

E. Cranium

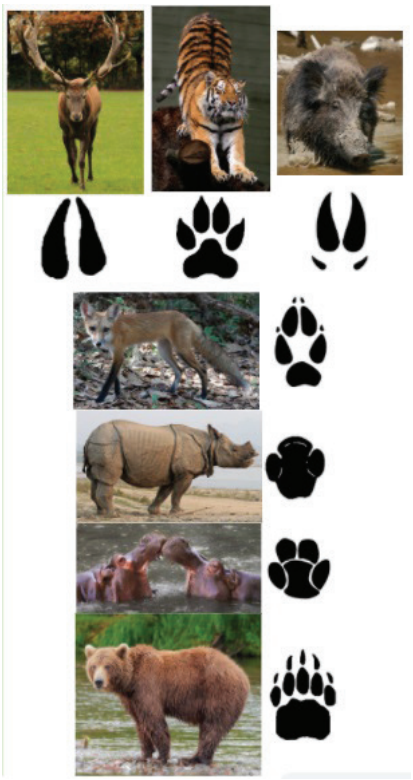
F. Mandible

G. Os coxa

H. Humerus

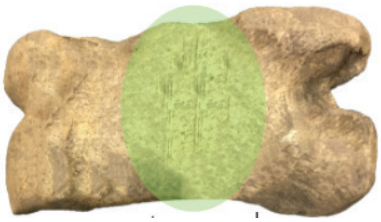


Match the animals with their tracks



Identify the cut marks

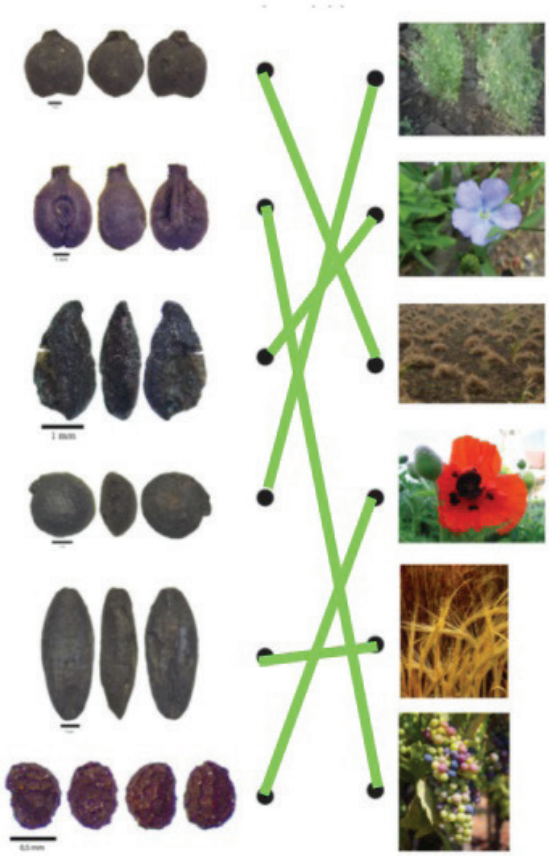
chop mark



cut mark

saw mark

ARCHAEOBOTANY



KEYS

ARCHAEOMETALLURGY

Lead

Bronze

Silver

Copper

Gold

Iron

GLASS

How did they do it?

1-F

2-D

3-B

4-E

5-C

6-A

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Osteoarchaeology: Is this John or Helen?

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Osteoarchaeology: How old was this person at death?

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- **Alabastron:** adapted from https://www.christies.com/lotfinder/lot_details.aspx?from=salesummery&intobjectid=6009453&sid=420a30de-2ed5-403d-83d6-718d52c69e2c&lid=4
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Snapshots from STARC activities for children, organised in the context of sCYence FAIR 2019

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Nikita E, Karligkioti A, Lee H. 2020. EXCAVATION AND STUDY OF COMMINGLED HUMAN SKELETAL REMAINS. The Cyprus Institute. DOI: 10.5281/zenodo.3634990
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Nikita E, Karligkioti A. 2020. BASIC GUIDELINES FOR THE EXCAVATION AND STUDY OF HUMAN SKELETAL REMAINS. The Cyprus Institute. DOI: 10.5281/zenodo.3634985
https://zenodo.org/record/3634986#.X8d8Bs0zY2w

ISBN 978-9925-7759-0-3