"*What them old bones can teach us….*"
The Hulton Abbey
Skeletal Digitisation Project
Tutor Only Copy

STAFFORDSHIRE UNIVERSITY

Open Educational Resources

The Higher Education Academy Physical Sciences Centre

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The Hulton Abbey Skeletal Digitisation Project
(HASDiP) by

Professor John Cassella
Department of Forensic and Crime Science
Faculty of Science
Staffordshire University
Mellor Building
College Road,
Stoke on Trent, ST4 2DE

Original HASDiP project in collaboration with

Dr Mary Lewis[1], Mr Roger Brown [2] and Mr Paul Lucking[3]

[1] Lecturer in Archaeology
Department of Archaeology
School of Human and Environmental Sciences
University of Reading,

[2] Senior Lecturer in Photography
Faculty of Arts, Media and Design
Staffordshire University

[3] Senior Lecturer
Entertainment Technology
Faculty of Computing, Engineering and Technology
Staffordshire University

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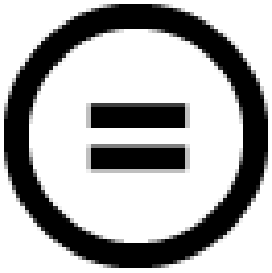

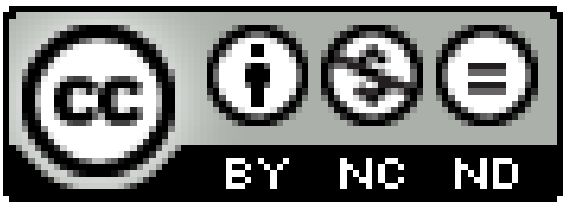

Tagging Information for Document

Title:	“What them old bones can teach us “
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Acknowledgments

Thanks go to Roger Brown - Senior Lecturer in Photography in the Faculty of Arts, Media and Design, Staffordshire University for the use of the images from the Hulton Abbey project.

Note:
The tutor information is in red text, this should *not* appear on the student copies and it is important that they do not see it.

What are these resources designed to do?

There is much skeletal material obtained from archaeological environments. These skeletons can offer a lot of new information about lifestyle, disease, diet, social interaction etc. They offer a unique teaching and learning opportunity to a wide diversity of students at many levels from Key Stage2 through to post - graduate students and even beyond into the professional qualifications.

It is difficult for a variety of reasons for this diverse group of students to gain access to the skeletal material and for those that do access it, there is a clear realisation, that the bones are friable and literally *turning to dust*.

There is clearly the opportunity to have access to skeletons as a valuable educational resource and also to have the added value of preserving the existing skeletal material that is very delicate and friable. There are some resources available to the archaeology community, but nothing of the scope that this project has aimed to achieve.

The pilot study recording human skeletal remains from Hulton Abbey, conducted by Staffordshire University has demonstrated that digital photography and bespoke computer software can be combined to offer a pedagogically and research user-friendly product, which can be made readily available to the benefit of the educational and research communities. It is particular interest to emerging scientific disciplines such as forensic science which suffer from a paucity of such resources.

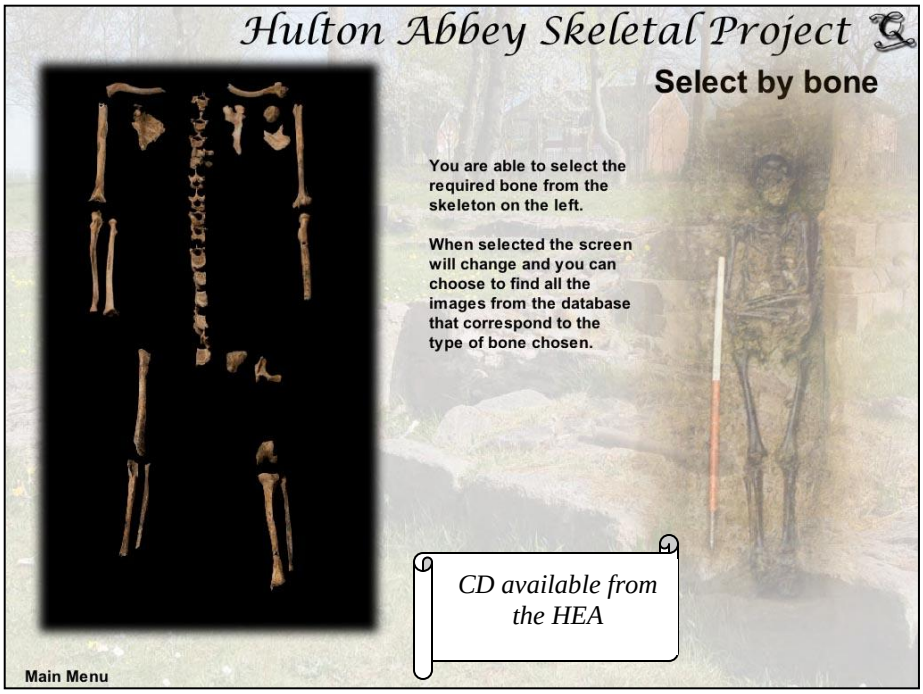
For students attempting to understand the wealth of information that the skeleton can teach us about the human form, the opportunity to work with real material is rare if not impossible. These activities below hope to facilitate some context of skeletal study by placing a rare abnormal specimen at the heart of these studies through comparison and contrast with the *normal*.

These suggested basic activities should be used in conjunction with the many excellent textbooks and journal articles on the subject. It is suggested that academic staff engage students in pre-reading to facilitate sufficient introductory knowledge to fully engage in these activities.

You can get free copy of the DVD from

http://www.heacademy.ac.uk/physsci/home/projects/digitisationproject

A Brief Introduction to Hulton Abbey



Hulton Abbey was a minor Cistercian monastery in North Staffordshire (England), founded in 1219 and finally dissolved in 1538. The final report on the archaeological excavations undertaken there between 1987 and 1994 was published as a book in 2005. In particular, the chapter house was uncovered and re-assessed and the eastern part of the church and north aisle were completely excavated, together with the eastern half of the nave. The excavations are described by area and chronological phase with detailed specialist reports including architectural stonework and decorated floor tiles. An extensive programme of sampling and analysis of pollen remains from burials was also completed. The remains of 91 individuals, mainly men but also women and children, are reported on in detail, with sections on abnormalities and pathology as well as medieval burial goods such as a wax chalice and wooden wands. Comparisons with other published monastic sites in the region help to place Hulton into a wider context.

The Hulton Abbey Skeletal Digitisation Project (HASDiP) resulted in the creation of a DVD resource. This basic resource contains the highest quality photographs in a bespoke software package. Also in this resource, is a journal article describing how the individual met his untimely and gruesome demise. This resource should be used alongside the suggested activities in this current resource. It will add the dimension of reality and applicability to the exercises to be undertaken. Gaining access to human remains (skeletal remains) is problematic for many reasons, however, there is much to be learned from them. This resource provides an opportunity for students to get access not only to human remains, but in this case see extremely fragile and rare remains. The skeletal digitisation project allows for samples of the skeletal material excavated from Hulton Abbey to be systematically and fully photographed.

Risk Assessments

All activities should be appropriate risk assessed by those staff responsible for the delivery of this material. No responsibility can be taken by the authors or funders of this material. Where appropriate, ethics requirements of the institution should also be considered.

Caution: Be aware that these images may upset some individuals

NOTE: Some students may find some of this material disturbing. Teaching staff should be aware of this and have appropriate strategies in place to cope with the varied *reactions* that may occur.

Are other sources of rare material digitised?

A key driver for digitisation is the ease with which fragile and inaccessible materials can be preserved and conserved by transferring the burden of use to a high-specification digital surrogate. For example an application devised by Armadillo Systems and promoted by the British Library has allowed the general public and researchers alike detailed interactive exploration of digitised rare books in quantities which would be unthinkable in the real world." There is often a question of whether material should be digitised just because it is rare or valuable or whether there should be demonstrable need.

"Respondents cited 'value for research and teaching' as the most prominent reasons for digitising material in the future. The most significant barrier to digitisation was, inevitably, lack of funding. Put simply, digitisation cannot happen without significant financial support, usually from an external body."

"All materials should be digitised to the highest specifications for flexibility and sustainability in the future, and interoperability and resource discovery in the present"

"There are strong currents of goodwill, enthusiasm for digital projects, and a desire to bring increasing volumes of material online, in the community, from users and providers alike. These must be tapped."

The full Loughborough University study can be found at: www.jisc.ac.uk/digitisation

Possible Generic Learning Outcomes for Users of the DVD Resource

Not only is the permanent preservation of the friable skeleton paramount, but so too, is the use of the digital resource by a variety of users for their ***own*** particular learning outcomes.

Ideally, those of you who utilise this digitised resource for their own educational/research purposes will have set learning outcomes which generically could include:

1. Understand and undertake the methods of producing accurate archaeological/anatomical drawings/photography
2. Understand and apply the requirements of archaeological/anatomical recording procedures.
3. Understand the forensic/scientific application of the knowledge to be gained form examining skeletal material that is <u>not</u> of an archeological timescale (i.e. from a criminal act).

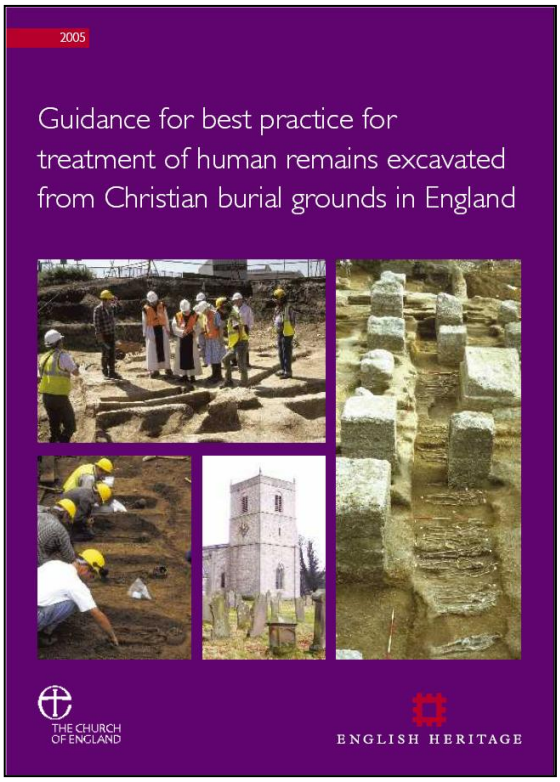
In addition, the following transferable skills could be developed and enhanced:

Critical thinking

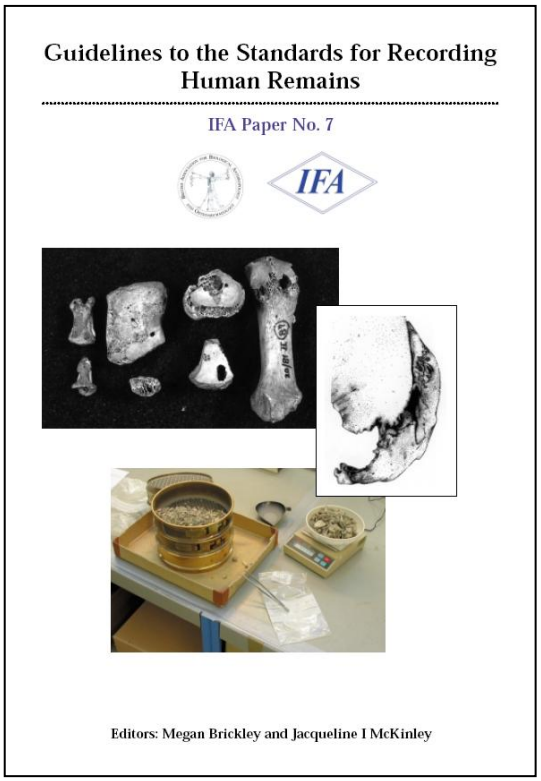
1. Team working and independent working
2. Communication skills, written and oral
3. Observational skills
4. Problem solving skills
5. Recognition, description and reporting skills
6. Accuracy in working and reporting
7. Analytical and practical skills
8. Numerical skills.
9. Enhanced visual literacy in the making, understanding and interpretation of forensic photography.

Other Sources of Information

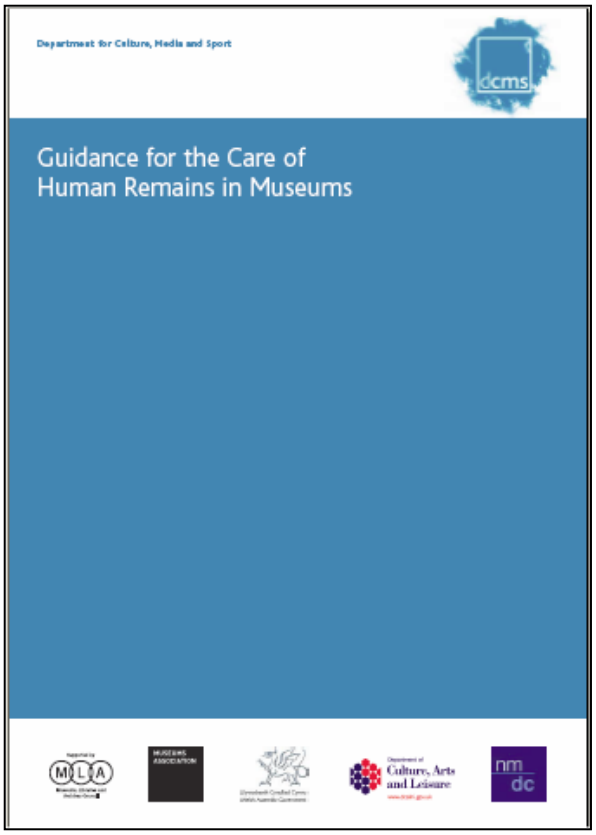
*www.**english-heritage**.org.uk/upload/**pdf**/16602_**HumanRemains**1.**pdf***



www.archaeologists.net/modules/icontent/inPages/docs/pubs/**human**remains.pdf



www.culture.gov.uk/images/.../Guidance**Human Remains**11Oct.pdf



Staff should also direct students to the BABAO site (British association for biological anthropology and osteoarchaeology) for their code of ethics *http://www.babao.org.uk/index/ethics-and-standards*

Teachers should also be aware of Quality Assurance Agency for Higher Education (QAA) benchmarking for anthropology which can be sourced as a PDF file at

http://www.qaa.ac.uk/academicinfrastructure/benchmark/honours/anthropology.asp

Activity # 1
Sensitivity of Handling Human Remains

Learning outcomes for this activity include:

1. **to appreciate the role of ethics in science**
2. **to appreciate Diversity issues in the UK**
3. **to understand how to apply these ethical principles in a laboratory-scientific environment**

Activity 1A

Why should we handle human bones in a sensitive manner? Discuss this as a group. Make some recommendations as a group for practice and policy of handling skeletal material in an educational/ research context.

Respect for the dead is a feature of most world religions; it is also upheld by many with no specific religious beliefs. The concept of respect for the dead should form the core of ethical treatment of human remains. Given that, in the great majority of archaeological cases, the individual wishes of the deceased cannot be known, or inferred other than in the broadest sense using the general tenets of Christian theology, the key relationship is between the living and the dead. Respectful treatment of ancient Christian human remains can therefore be defined as that which is in keeping with Christian beliefs concerning the status of the body and which would not be likely to cause significant offence to members of the general public, regardless of whether they hold strong religious views.

Taken from:
www.**english**- ***heritage***.org.uk/upload/***pdf***/16602_***HumanRemains***1.***pdf***

In general, the public shows a high degree of interest in scientific research on ancient human remains. This is apparent in the popularity of television programmes on archaeology featuring human remains, and of displays of human remains in museums and at ancient monuments. Archaeological excavations of burial sites are also popular with visitors.

Activity 1B

What are the benefits of handling and working with human skeletons? Discuss this as a group.

Research into our past is of the utmost importance: it helps us to understand ourselves better, and, perhaps, to learn from past experience. Excavated human remains and their context (including monuments, coffins and grave goods) are an important source of direct evidence about the past, providing a range of information including evidence for:

• demography and health
• diet, growth and activity patterns
• genetic relationships
• burial practice, and thus related beliefs and attitudes.

The study of buried human remains also provides valuable evidence of other kinds, including:

• increasing our understanding of diseases and their history, which may contribute to the treatment of disease
• contributing to the development of forensic science, to assist in identification of remains and prevent miscarriages of justice.

Taken from:
www.**english**- ***heritage****.org.uk/upload/****pdf****/16602_****HumanRemains****1.****pdf***

Notes to academic staff

- If you can access “The human bone manual”, By Timothy D. White, Pieter A. Folkens For Chapter 3 (page 21), Ethics in Osteology, this may be helpful in the discussions

- This material can be used to cross-inform upon aspects of teaching students how to deal with live victims and indeed bodies at crime scenes and accidents disasters etc.

Activity # 2
The Structure of the Human Skeleton

Learning outcomes for this activity include:

1. **To appreciate the numbers and varieties of bone types in the human body**
2. **To appreciate how to identify skeletal elements - whether they are whole, fragmented or disassembled from the *assemblage***
3. **To appreciate how measurement of bone parameters can inform on physical and social anthropology**

The Gross Anatomy of Bones,
Students will require a plastic-resin skeleton for these activities
Also: refer to the 'Hulton Abbey Skeleton' DVD for comparable bones structures

Activity 2A – use the images below for guidance

1. Classify bones according to shapes.
2. Identify any major types of bone markings.

B. Bone Shapes

1. Long bones
2. Flat bones
3. Sutural bones
4. Irregular bones
5. Short bones
6. Sesamoid bones

C. Bone Markings

D. Bone Structure,

a. diaphysis
b. epiphysis
c. metaphysis
d. marrow cavity
e. cortex

Activity 2B

Identify the bones of the axial and appendicular skeleton and their functions – tabulate them.

In studying individual bones, we are concerned with their *functions*, including which bones they connect or articulate with, and their *structures* and marks, including muscle and ligament attachments, and openings for nerves and blood vessels (foramina).

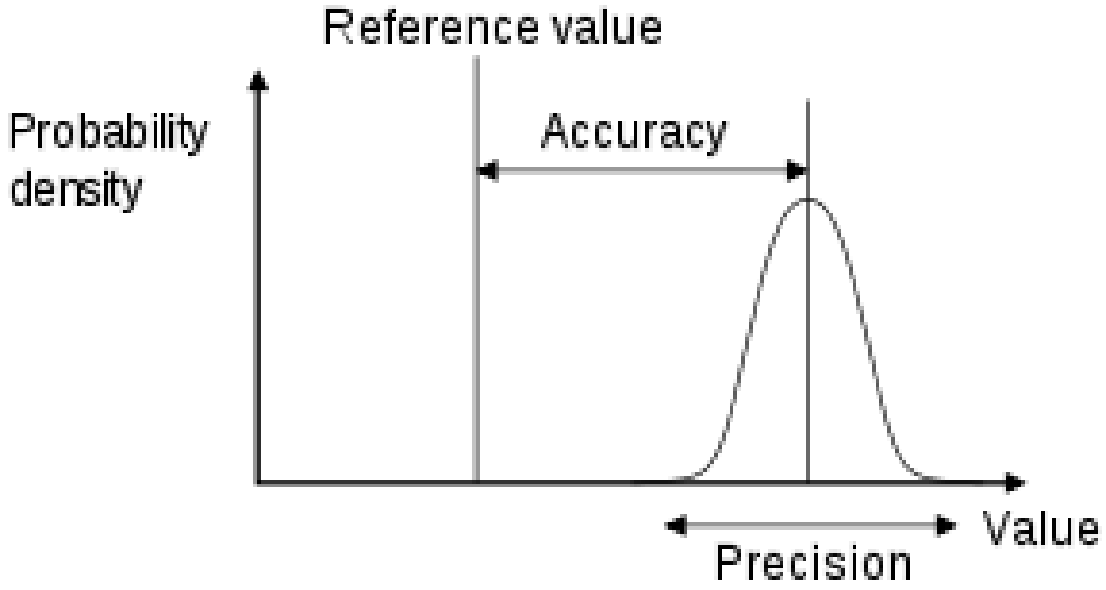
Make note on these and discuss in class.

Consider the pelvic bones and how they can be sued to differentiate between males and females. There are images of the pelvis in this document.

Measurements can be made of the bones to develop numerical skills and consider

- aspects of accuracy and precision in measurement
- variability in the human form

For example -the femur, shown below can be used to obtain a variety of measurements. These in turn can be sued to consider: ease of measurement and appropriate tool, **accuracy** and **precision**.



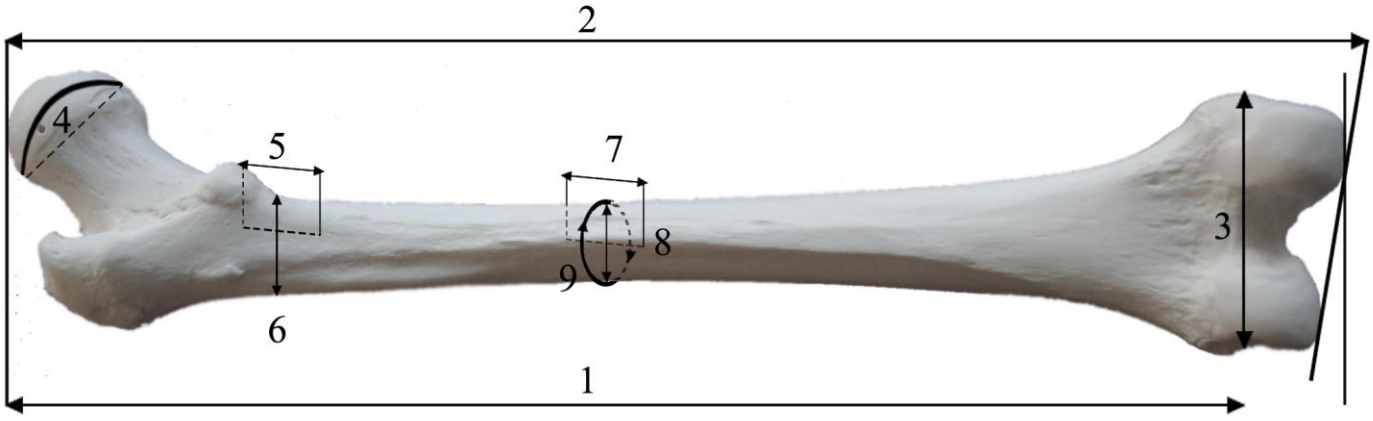
In the fields of engineering, industry and statistics, the **accuracy** of a measurement system is the degree of closeness of measurements of a quantity to its actual (true) value. The **precision** of a measurement system, also called reproducibility or repeatability, is the degree to which repeated measurements under unchanged conditions show the same results.[1] Although the two words can be synonymous in colloquial use, they are deliberately contrasted in the context of scientific method.

Accuracy indicates proximity of measurement results to the true value, precision to the repeatability or reproducibility of the measurement

A measurement system can be accurate but not precise, precise but not accurate, neither, or both. For example, if an experiment contains a systematic error, then increasing the sample size generally increases precision but does not improve accuracy. Eliminating the systematic error improves accuracy but does not change precision.

Adapted from: http://en.wikipedia.org/wiki/Accuracy_and_precision

Image Below Adapted from:
www.cleber.com.br/standard.html



Measurement #1. Femur: Maximum Length: distance from the most superior point on the head of the femur to the most inferior point on the distal condyles.

Measurement #2. Femur: Bicondylar Length: distance from the most superior point on the head to a plane drawn along the inferior surfaces of the distal condyles. *Comment*: Place both distal condyles against the vertical endboard while applying the movable upright to the femoral head).

Measurement #3. Femur Epicondylar Breadth: distance between the two most laterally projecting points on the epicondyles.

Measurement #4. Femur: Maximum Head Diameter: the maximum diameter of the femur head, wherever it occurs. *Instrument*: sliding caliper.

Measurement #5. Femur Anterior-Posterior (Sagittal) Subtrochanteric Diameter: distance between anterior and posterior surfaces at the proximal end of the diaphysis, measured perpendicular to the medial-lateral diameter. *Instrument* sliding caliper. *Comment*: be certain that the two subtrochanteric diameters are recorded perpendicular to one another.

Measurement #6. Femur: Medial-Lateral (Transverse) Subtrochanteric Diameter: distance between medial and lateral surfaces of the proximal end of the diaphysis at the point of its greatest lateral expansion below the base of the lesser trochanter. *Instrument* sliding caliper. *Comment*: be certain that the two subtrochanteric diameters are recorded perpendicular to one another.

Measurment #7. Femur Anterior-Posterior (Sagittal) Midshaft Diameter: distance between anterior and posterior surfaces measured approximately at the midpoint of the diaphysis, at the highest elevation of linea aspera. *Instrument*: sliding caliper. *Comment*: The sagittal diameter should be measured perpendicular to the anterior bone surface.

Measurement #8. Femur: Medial-Lateral (Transverse) Midshaft Diameter: distance between the medial and lateral surfaces at midshaft, measured perpendicular to the anterior-posterior diameter (#66). *Instrument*: sliding caliper.

Measurement #9. Femur: Midshaft Circumference: circumference measured at the level of the midshaft diameters (#7 and 8). If the linea aspera exhibits a strong projection which is not evenly expressed across a large portion of the diaphysis, then this measurement is recorded approximately 10 mm above the midshaft. *Instrument*: metal tape.

Activity 2C

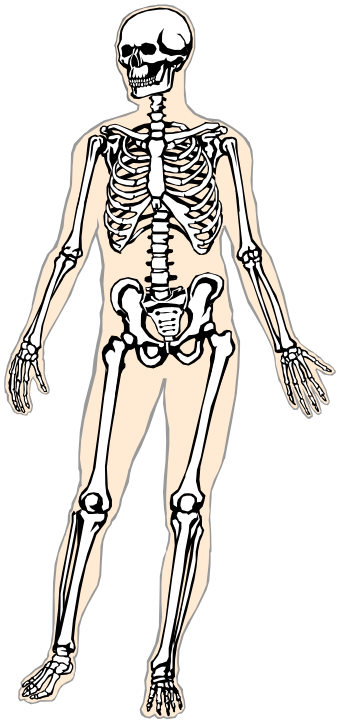
1. Identify the bones of the human cranium and face, and the significance of their markings.
2. Describe the differences between the skulls of infants, children and adults.

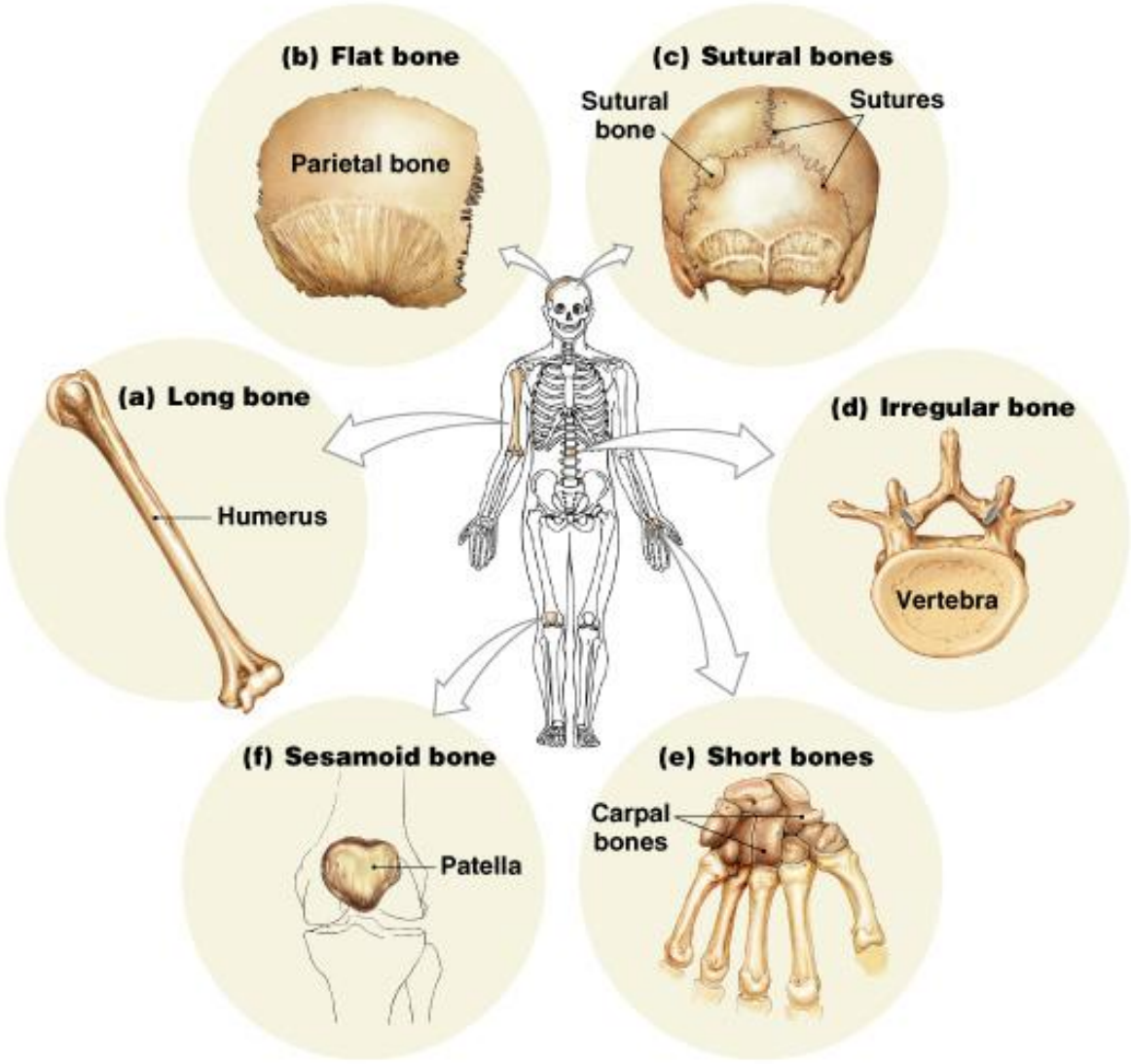
NOTE: This skeleton from Hulton Abbey does not possess a skull (see Dr Mary Lewis's paper on the DVD for and explain as to why this is).

You should be able to easily access a skull from your facility.

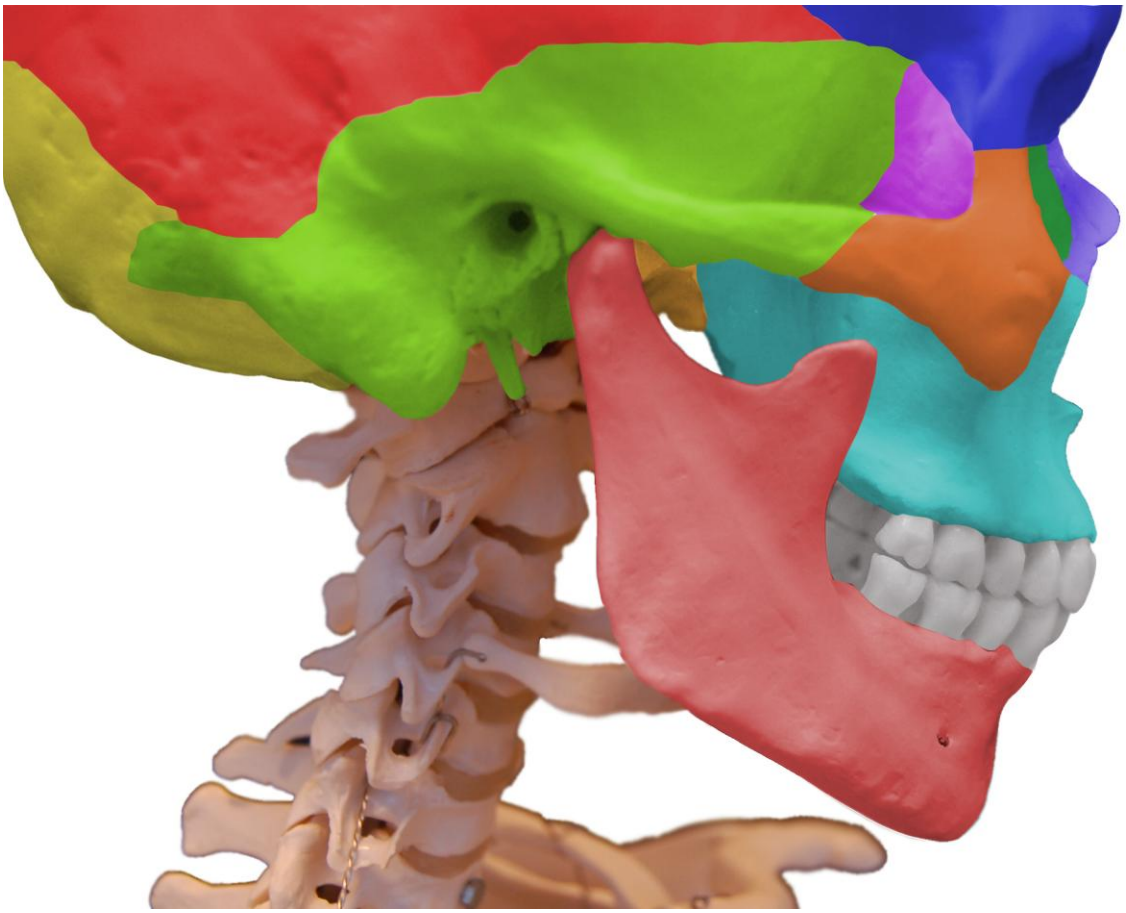
In case you do not have access to physical skulls, some have been attached in the appendices for you to print off. These skulls have undergone traumatic injury and offer the students an opportunity to see the effects of these. Get them to dicsuss the types of trauma that could result in these injuries.

A Traitors Death - The identity of a drawn, hanged and quartered man from Hulton Abbey, Staffordshire –
Dr Mary Lewis *Antiquity* 2008 82 113-124.

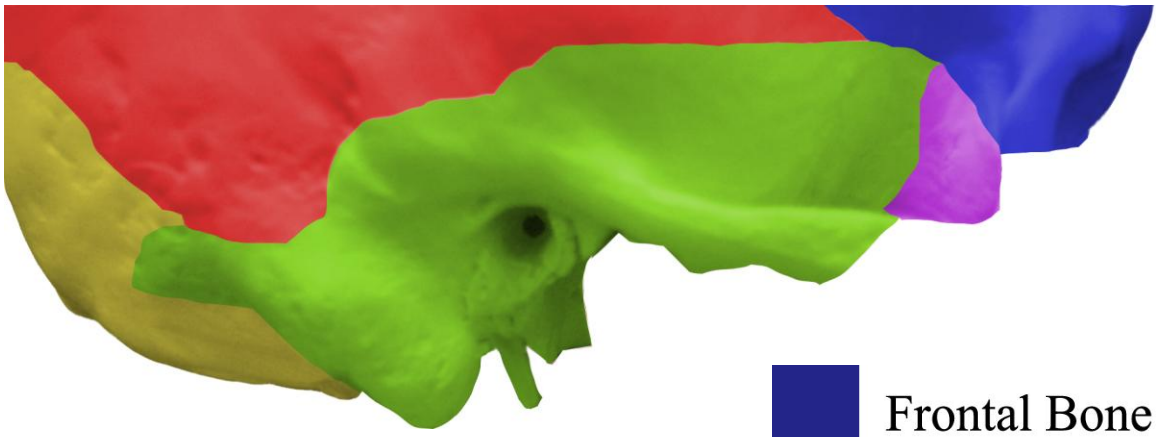




Fundamentals of Anatomy & Physiology, 7e
by Frederic H. Martini, Ph.D.



Mandible
Maxillary Bone
Zygomatic Bone
Vomer
Lacrimal Bone
Nasal Bone
Frontal Bone
Sphenoid
Temporal Bone
Parietal Bone
Occipital Bone



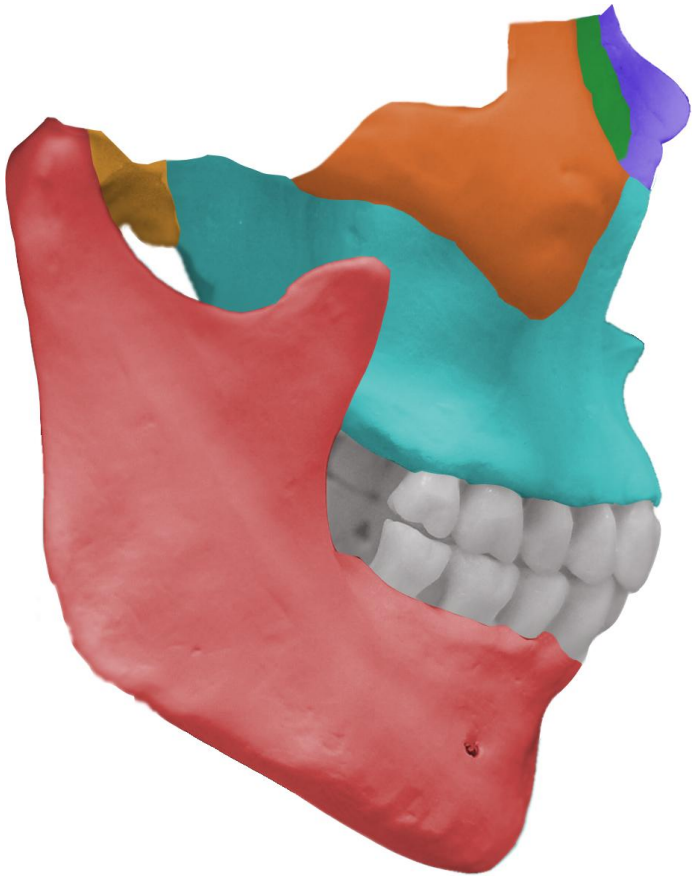
Frontal Bone

Sphenoid

Temporal Bone

Parietal Bone

Occipital Bone



Mandible

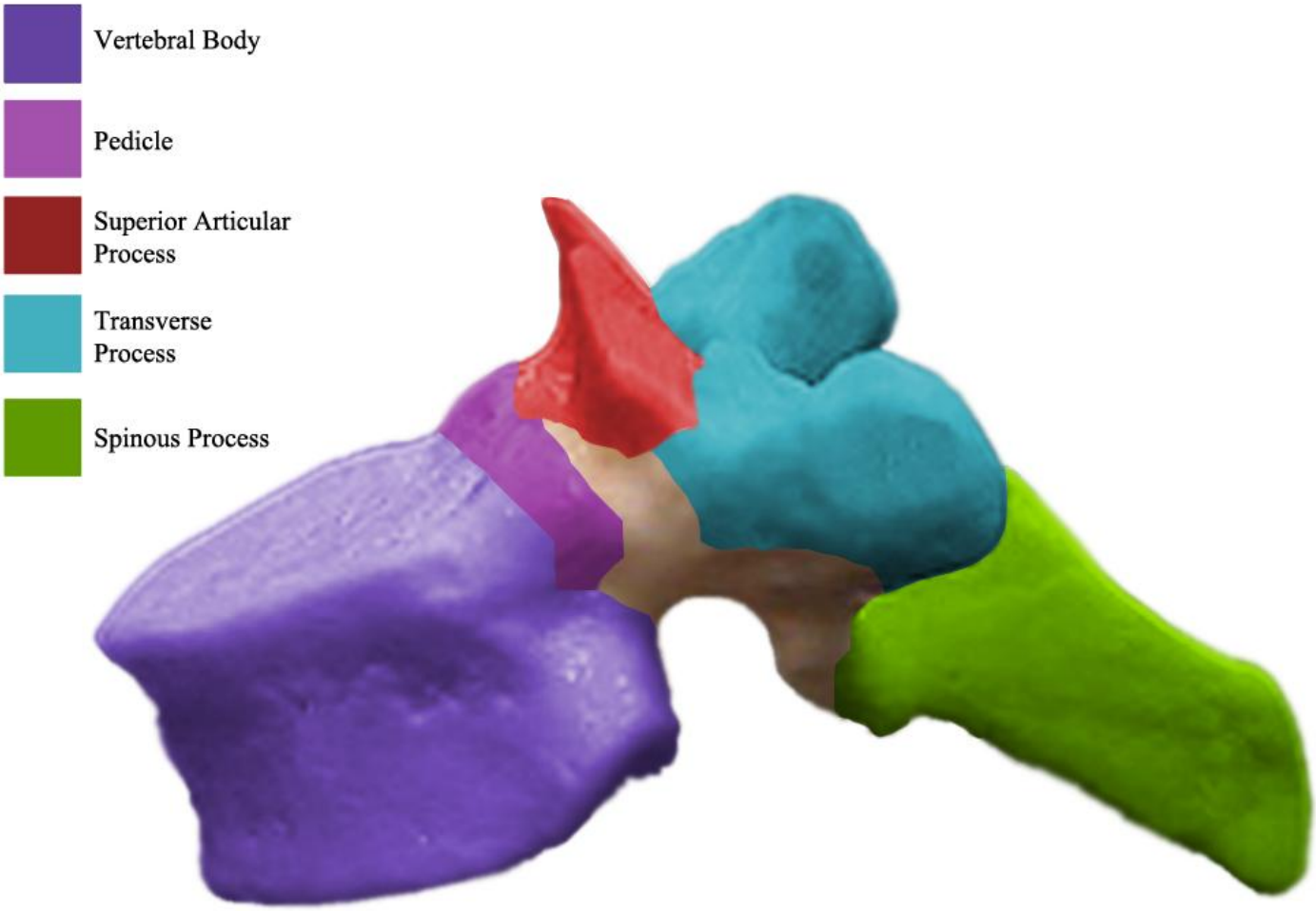
Maxillary Bone

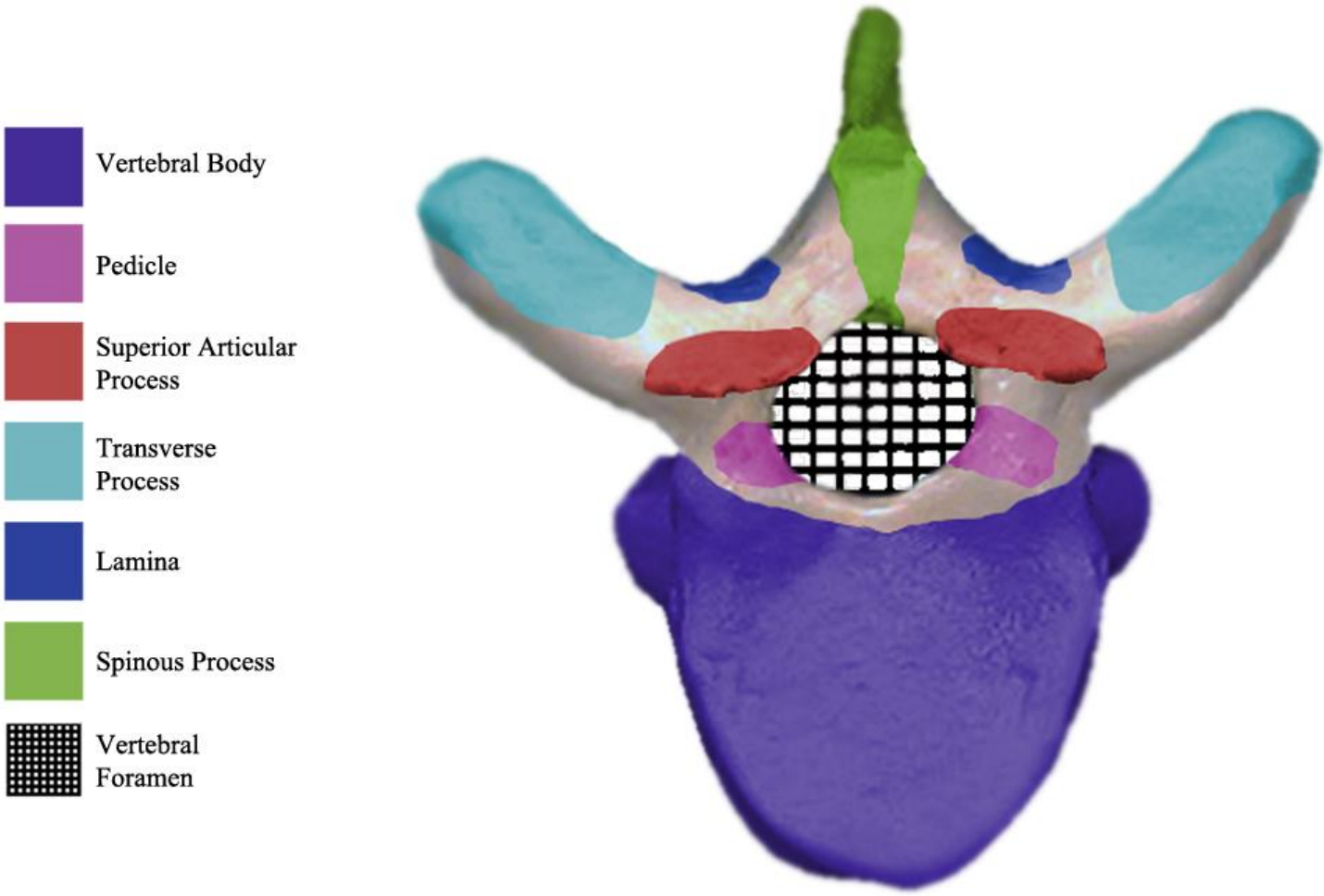
Zygomatic Bone

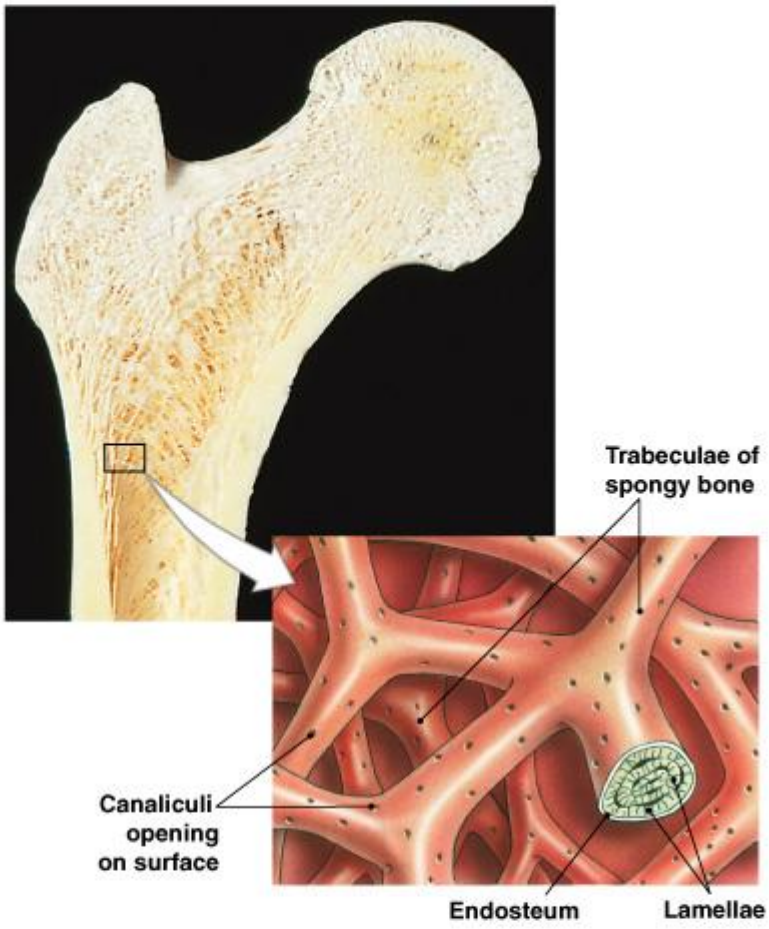
Vomer

Lacrimal Bone

Nasal Bone


Vertebral Body
Pedicle
Superior Articular Process
Transverse Process
Spinous Process


Vertebral Body
Pedicle
Superior Articular Process
Transverse Process
Lamina
Spinous Process
Vertebral Foramen



Fundamentals of Anatomy & Physiology, 7e
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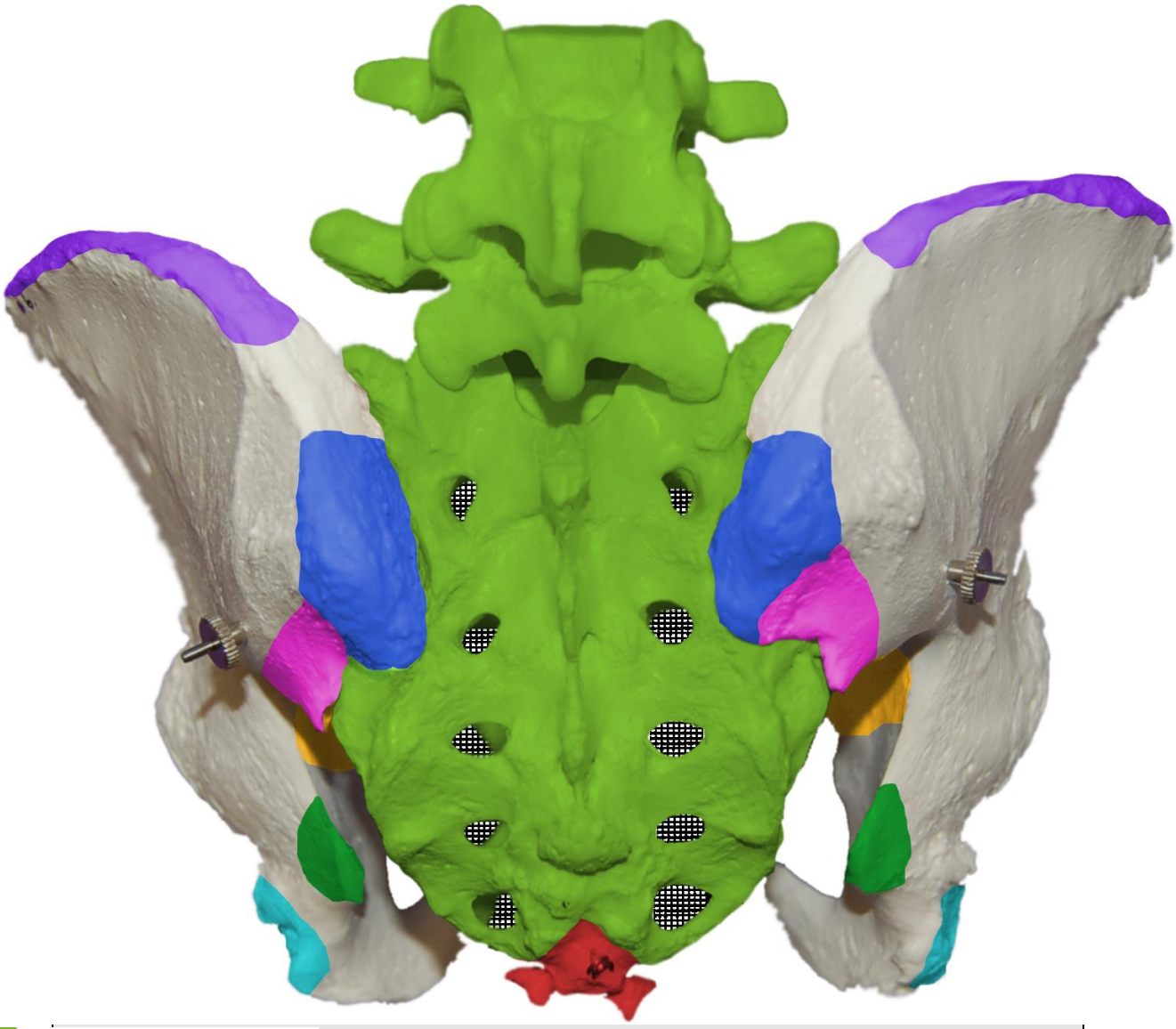
- Iliac Crest
- Iliac Fossa
- Arcuate Line
- Acetabulum
- Pubic Tubercle
- Sacroiliac Joint



Sacrum

Coccyx

Iliac Crest

Posterior Superior Iliac Spine

Posterior Inferior Iliac Spine

Greater Sciatic Notch

Ischial Spine

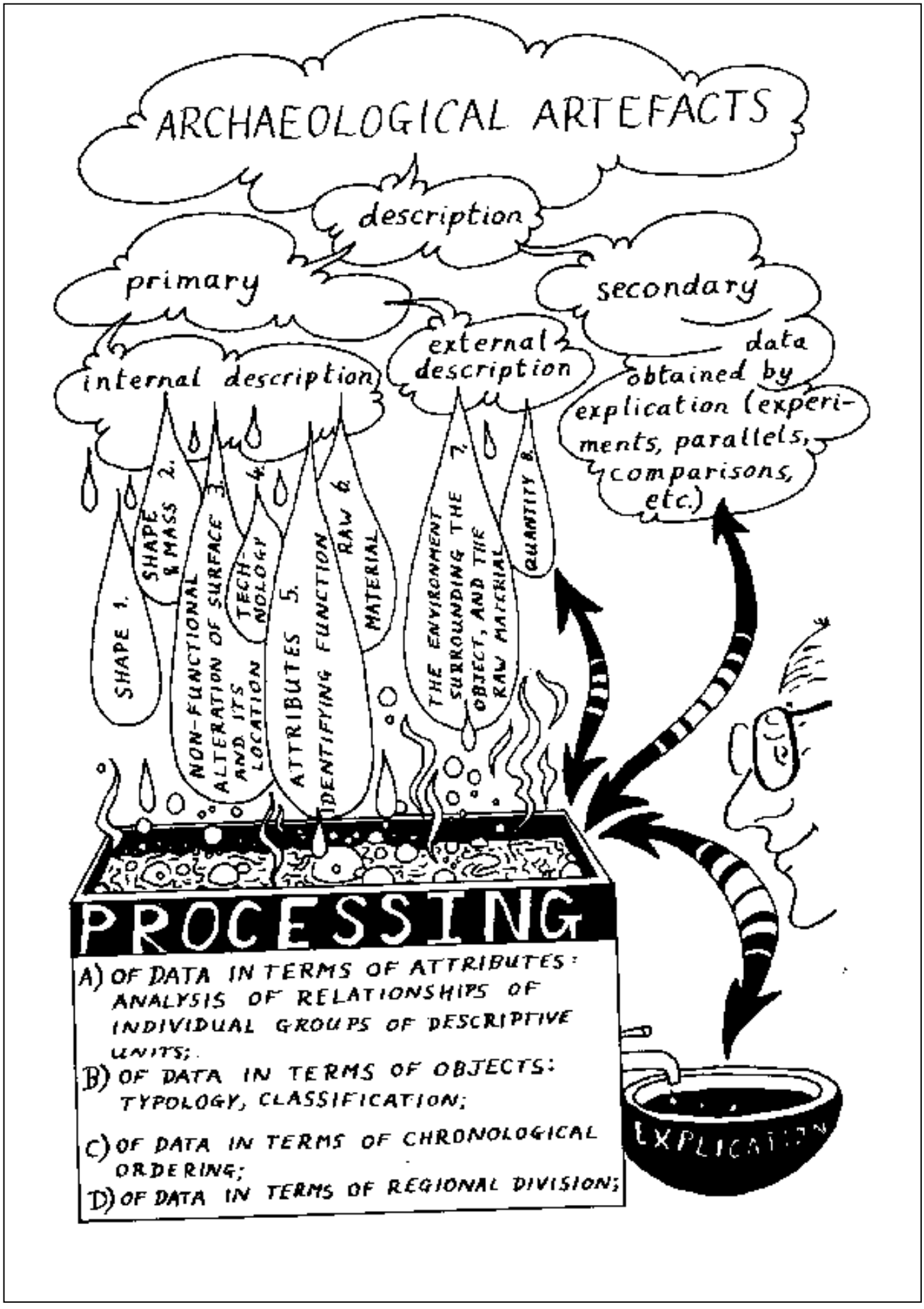
Ischial Tuberosity

Activity # 3
Basic aspects of Human Archaeology

Learning outcomes for this activity include:

1. **to understand the role of archaeology in informing on human history**
2. **to appreciate the complimentary roles of archaeology and anthropology**
3. **to appreciate the archaeology of the Hulton Abbey skeleton and how it was recovered**

Archaeology is simply the study of the material things of the past. There is over a century of jargon that can and will be applied, but in very simplest terms, archaeologists study stuff that is preserved so that we may decipher something of the culture, beliefs, and values of past societies. Archaeology is **ANTHROPOLOGY**, not really a sub-discipline, but perhaps a body of methods and teachniques that are applied to the analysis of **MATERIAL CULTURE** Malina and Vasicek 1990. Material culture is that whole domain of things made and used by people. Material culture studies embody analyses of technology, design, function, social organization, history, religion, ritual and belief. Archaeology as a discipline predicated on the analysis of a complex subject, has evolved a jargon or lexicon all its own. In these cartoons, reproduced from Malina and Vasicek (1990), the archaeologist attempts to sort out all the myriad jargon terms that have become shorthand referents to theories and concepts. All deal with what the archaeologist finds, and how the archaeologist constructs inferences. **ARTIFACTS** are things made, used, and modified by people.

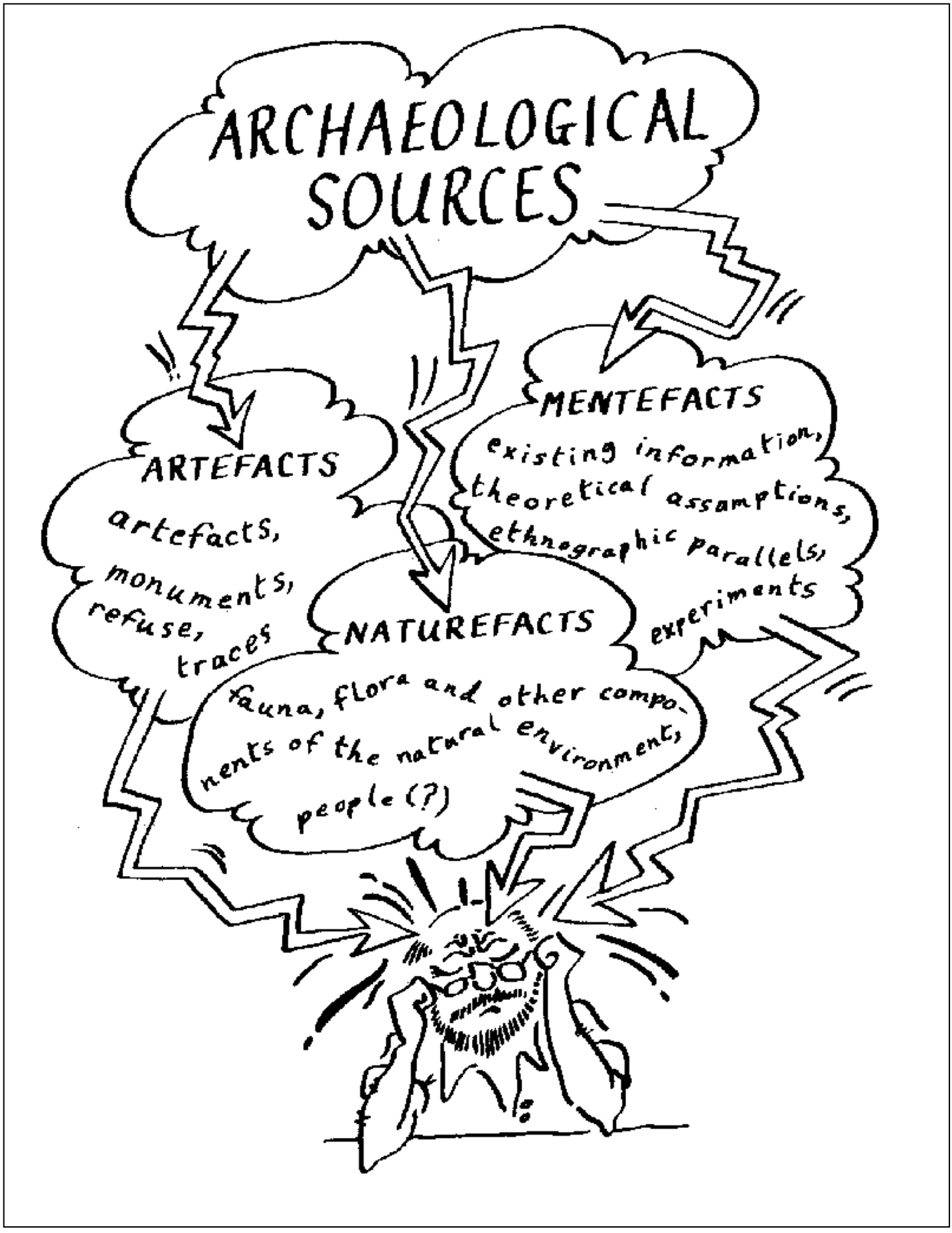

ARCHAEOLOGICAL ARTEFACTS
description
primary
secondary
internal description
external description
data obtained by explication (experiments, parallels, comparisons, etc.)
SHAPE 1.
SHAPE & MASS 2.
NON-FUNCTIONAL ALTERATION OF SURFACE 3.
TECHNOLOGY AND ITS LOCATION 4.
ATTRIBUTES 5.
IDENTIFYING FUNCTION
RAW MATERIAL 6.
THE ENVIRONMENT SURROUNDING THE OBJECT, AND THE RAW MATERIAL 7.
QUANTITY 8.
PROCESSING
A) OF DATA IN TERMS OF ATTRIBUTES: ANALYSIS OF RELATIONSHIPS OF INDIVIDUAL GROUPS OF DESCRIPTIVE UNITS;
B) OF DATA IN TERMS OF OBJECTS: TYPOLOGY, CLASSIFICATION;
C) OF DATA IN TERMS OF CHRONOLOGICAL ORDERING;
D) OF DATA IN TERMS OF REGIONAL DIVISION;
EXPLICATION

The term refers to tools, residues of tool manufacture, residues of processing plants and animals, and by-products of tool manufacture, processing, or other human activities.

NATUREFACTS are parts of plants or animals not modified by man, but indicative of man's physical environment. For example, seeds, plant parts or small animal remains found in an archaeological site can be analyzed to determine season of the year for man's occupation or indicate the climate and environment of a given period.

MENTEFACTS are the ideas and values that govern the creation of artifacts. Also called "mental templates" or "cognitive maps" or "cognitive frameworks," these structures are not beyond archaeological inference. Recognition of Mentefacts allows archaeologists to explore nonmaterial aspects of culture through analysis of the material manifestations of cultural needs and beliefs

Malina, J. and Z. Vasicek 1990 Archaeology yesterday & today. Cambridge: Cambridge University Press.


ARCHAEOLOGICAL SOURCES
ARTEFACTS
artefacts, monuments, refuse, traces
MENTEFACTS
existing information, theoretical assamptions, ethnographic parallels, experiments
NATUREFACTS
fauna, flora and other components of the natural environment, people (?)

Activity 3

In this you can work in a team as an archaeologist in a 'virtual' dig. Follow the directions of your tutor.

In this activity, you will dig for archaeological evidence but without getting your hands to dirty!

The instructor should divide the class into groups of 3-6 students.

Each group should be given a pre-prepared box of artefacts that ideally are possessions of the teacher.

Each group should then carefully examine and record the items in the box and seek to answer the following questions:

1. What do the items tell the group about their owner?

2. Does their context (i.e. being carefully stored in a box) change the perception of its value. Consider what 'value' means in this situation.

3. Consider how each of these items would be preserved or modified over a period of say 500 years *or more*.

4. Consider what traces would be left of these possessions after 500 years and what then could be determined about their owner from what was left behind.

This exercise should inform the class about

- the importance of objects preserved within the archaeological record,
- the importance of context within an archaeological framework,
- the effect of formation process.

Definitions

Formation process: humanly-caused or natural processes by which an archaeological site is modified during or after occupation and abandonment.

Activity # 4
Forensic - Pathological considerations of the Skeleton in the DVD Resource

Learning outcomes for this activity include:

1. To appreciate the importance of marking on bones in terms of pathological, forensic or archaelogical origins

2 To appreciate that bone can inform on pathological as well as its forensic history

3. To appreciate how the Hulton Abbey skeleton and its markings and pathologies can inform upon the life and death of an individual

Differential diagnosis between:

- Pathology
- Sharp force trauma
- Accidental versus inflicted injuries

Consider/appreciate that in both an archaeological and a forensic-criminal context that the whole skeleton may not be present.

What are possible reasons for this?

Dismemberment during life
Accidental loss of limbs during life
Disease or genetic abnormality
Animal predation post-mortem
Loss of material from a grave site as a natural process of decay

Activity 4A

Are there any obvious fractures/breaks in the Hulton Abbey bones on the CD – create a list/table and discuss within a group environment.

The major types of fractures are:

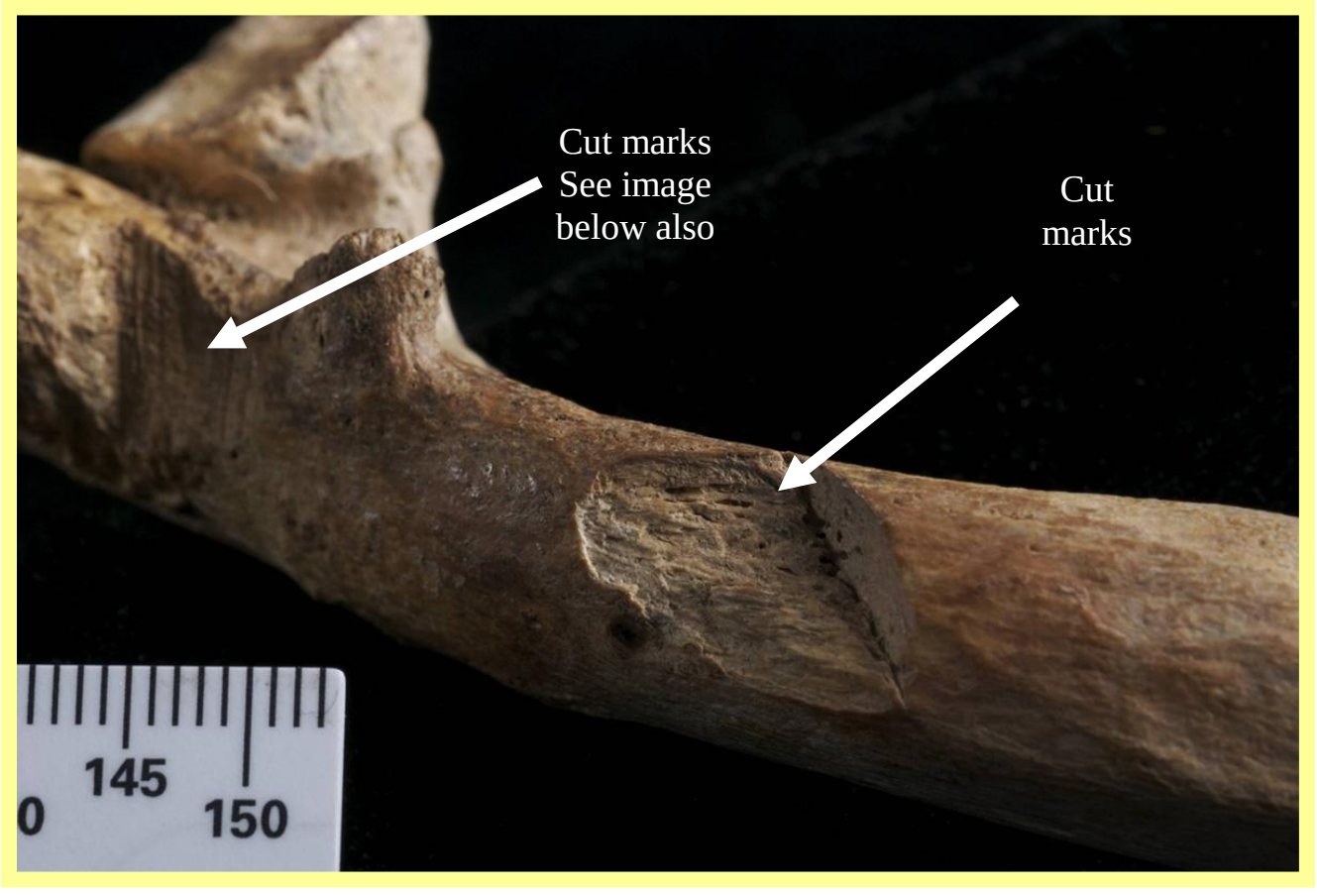
1. Pott's fracture
2. comminuted fractures
3. transverse fractures
4. spiral fractures
5. displaced fractures
6. Colles' fracture
7. greenstick fracture
8. epiphyseal fractures
9. compression fractures

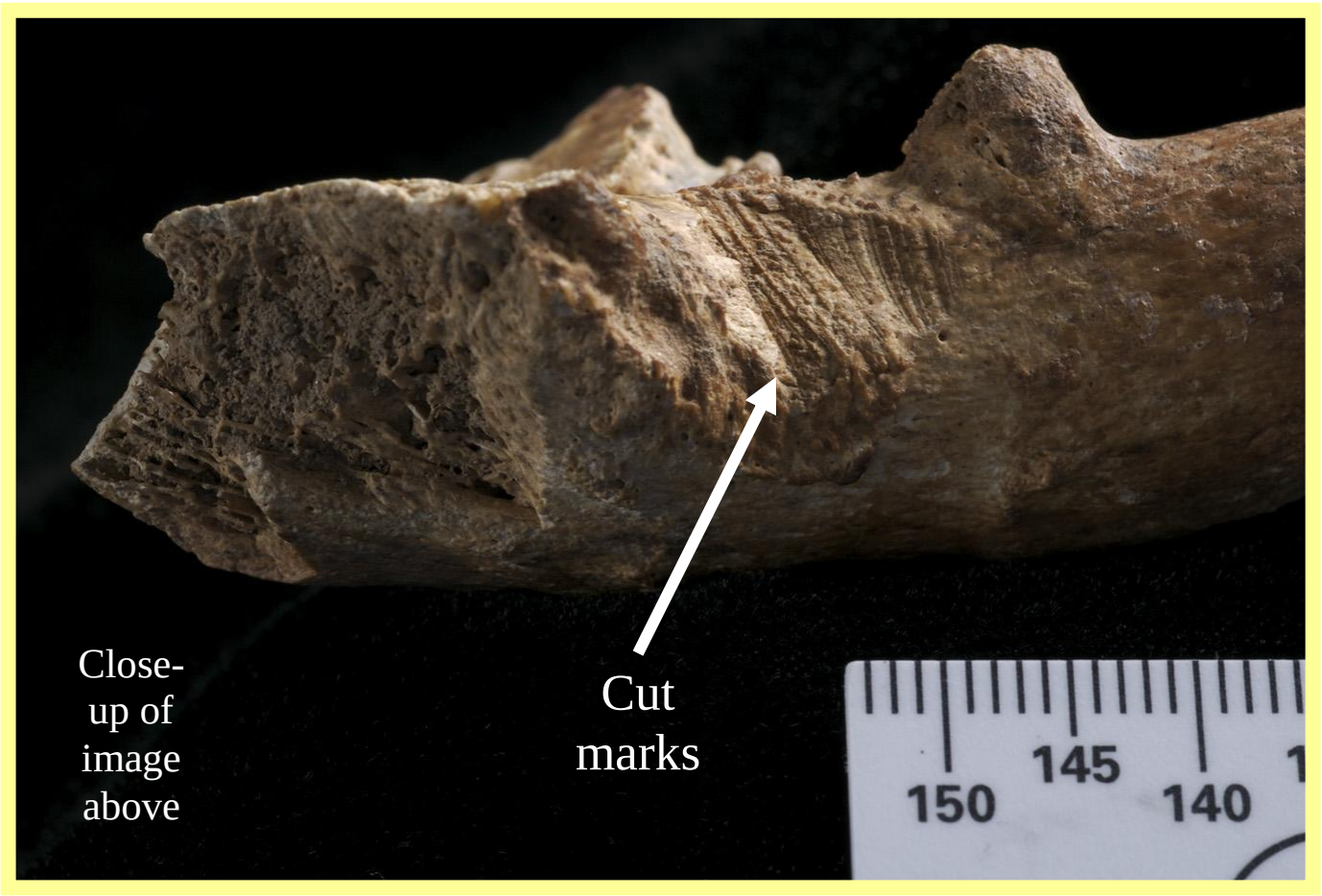
Activity 4B
Detail all/any of the injuries that you the can be observed on the bones of the skeleton in this DVD.

- Tabulate the injuries and discuss them as a class group.
- Read the Article by Dr Mary Lewis (the PDF file on the DVD) and compare your observations to those of the skeleton map showing the distribution of the injuries on **Page 116** of Dr Lewis's paper.
- You can use Dr Lewis's article to understand how this person lived and the social-political consequences that led to his death

A Traitors Death - The identity of a drawn, hanged and quartered man from Hulton Abbey, Staffordshire –
Dr Mary Lewis *Antiquity* 2008 82 113-124.

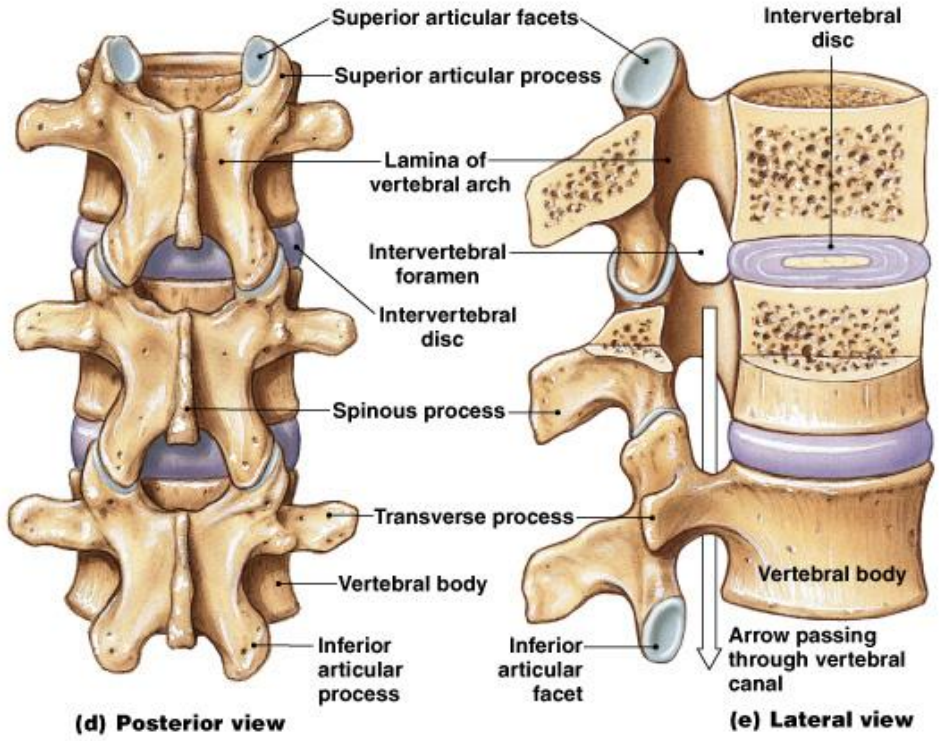
Here is the image of the clavicle which shows a number of injuries. Refer to the journal article by Dr Mary Lewis for details but allow the students to complete this exercise before they examine the paper for information about the types of injury.




Close-up of image above
Cut marks
150
145
140

Activity 4C

Students should be asked to draw some of the more complex images such as the one below (use images such as (a) superior view, (b) lateral and inferior view, (c) inferior view (d) posterior view (e) lateral view of the vertebrae in the drawings below). In doing so they should annotate the obvious anatomical/structural aspects and make any observations concerning the damage present for subsequent discussion within groups.



Fundamentals of Anatomy & Physiology, 7e
by Frederic H. Martini, Ph.D.

Students should be asked to work in teams to search the World Wide web for radiographic images of the following types of fracture

They can then discuss these fracture types

Activity 4C

You should work in teams to search the World Wide Web for radiographic images of the following types of fracture

1) Pott's fracture
2) Comminuted fractures
3) Transverse fractures
4) Spiral fractures
5) Displaced fractures
6) Greenstick fracture
7) Epiphyseal fracture
8) Compression fracture

Web sites such as:

http://orthopedics.about.com/od/brokenbones/a/fracturemenu.htm

are a good start

Types of Injury
Sharp Force Trauma [S.F.T.]

S.F.T. refers to any injury by any object which is pointed or has an edge. A 'cut' – often called an incised wound – occurs when a sharp-edged object is drawn across a surface such as skin or bone with enough pressure to cause an injury which may be longer than it is deep. Dependent upon the pressure and weight involved, any sharp weapon can incise, chop, dent, crush and of course cut.

The variations in skeletal wound presentation will result from the physical properties of the weapon involved and the biomechanical properties of the bone involved.

[*See: Spitz WU, 1993 Spitz and Fisher's medicolegal investigation of death: Guidelines for the application of pathology to crime investigation 3rd Edition Springfield Il: Charles C Thomas*]

Activity 4D – this is quite a difficult activity and students should be allowed to access text and given sufficient time [*1 week* + etc]

Differential diagnosis = the distinguishing of a disease **or condition** from others presenting similar symptoms

To assist in the differential diagnosis of skeletal trauma:

1) List the location of specific affected areas on bone, including the side/region/aspect.

2) Provide a description of:
    i. The number and types of fractures or defects
    ii. The presence of any abnormal bone shape, growth, or loss
    iii. The severity, state, and distribution of abnormal bone changes
3) Documentation of any radiographic evidence (fractures or weaponry).
4) Analysis of clothing (defects, tears, burning, or weaponry).
5) Estimation of the timing of fractures based on:
    i. Presence of bone reaction
    ii. Color of fractured edges
    iii. Shape of defect or cut mark
    iv. Size of affected area, defect, or cut mark
    v. Appearance of tissue bending
    vi. Location of affected area
    vii. Number of fractures or cut marks
6) Classification of any skeletal pathology by disease category

7) Estimation of the mechanism of injury, class of weapon and victim's position relevant to the direction of the force in relation to the point of impact.

An important question to ask is 'if the observation is normal' – ***if it is abnormal***, then a methodical approach should be used included a differential diagnosis giving credence to all possible manners of the injury.

Use the images form the Hulton Abbey DVD to look for the types of trauma.

Students can be guided through the following aspects

1) Inventory any/all affected bones.
2) List the location of specific affected areas on bone, including the side/region/aspect.
3) Provide a description of:
    - The number and types of fractures or defects
    - The presence of any abnormal bone shape, growth, or loss
    - The severity, state, and distribution of abnormal bone changes
4) Documentation of any radiographic evidence (fractures or weaponry).
5) Analysis of clothing – if any (defects, tears, burning, or weaponry).
6) Estimation of the timing of fractures based on:
    - Presence of bone reaction (remodelling)
    - Color of fractured edges
    - Shape of defect or cut mark
    - Size of affected area, defect, or cut mark
    - Appearance of tissue bending
    - Location of affected area
    - Number of fractures or cut marks
7) Classification of skeletal pathology by disease category (i.e. infectious, nutritional) and the specific mechanism (i.e., periostitis versus osteomylitis or scurvy versus anemia).
8) Estimation of the mechanism of injury, class of weapon, distance of fire or blast, and victim's position relevant to the direction of the force in relation to the point of impact.

Activity 4E

NOTE: Remember to complete an appropriate Risk Assessment

A variety of bovine bone is readily available from local butchers. Femurs and ribs bones (which are brad and flat) are useful for this activity.

You are asked to inflict a variety of injuries on these bones and to examine the similarities and differences that these injuries display.

Compare the injuries that you have inflicted on the bones with those of the skeleton in the CD supplied.

Try photographing the injuries you have inflicted on the bovine bone and compare you marks with those of the bones n the DVD.

Students can be asked to use these bones to inflict a series of different types of mark upon the bones using a variety of knives, saws, hammers etc and the draw, measure and photograph the injuries to compare and contrast the markings. Access to a dissecting microscope-type facility ideally with a digital camera will allow close-up examination of the resulting injuries for more accurate description.

Get the class to discuss the injuries and compare, contrast the marks

Also, to get the class discuss more obvious injuries, the images on the following pages can be considered – they are:

These images below of were taken at Staffordshire University Department of Foresnic and Crime Science – some of the descriptive material below has been adapted from the BoneClones website.

http://www.boneclones.com/index.html

Image #1 Impacted hip fracture, the anatomical neck of the femur is wedged into the cancellous bone of the proximal femur. A large bony callus encircles the break and the sagittal section clearly shows the nature of the fracture

Image #2 Fractured left femur following road traffic incident

Image #3 and 4 Radius and right innominate (*os coxae*) from adult human male. When long bones such as the radius and ulna are badly fractured, such as might occur in motor vehicle accidents, such injuries might require the intervention of a surgeon. Bone can be harvested from an uninjured site -- in this case, from the anterior aspect of the iliac crest. This bone was then stabilised in position with

either metallic plates or pins which were subsequently removed prior to death. The long bones and the innominate show significant signs of healing with irregular bony exostoses. These findings are of importance to forensic anthropologists or pathologists who are investigating a death, as they may be useful in the process of identifying a deceased body.


Image #1


Image #2


Image #3


Image #4

.Notes to Students

Sharp force trauma includes;

Incised wounds - caused by any implement/ object having a sharp edge. This can include knives and broken glass, for example.

Stab wounds - which are incised wounds where the length of injury on the surface is less than the depth of penetration into the body.

Slash wounds - which are incised wounds that are longer than they are deep.

Chop wounds - are caused by implements such as machetes, meat cleavers, swords, axes etc. They are often severe in nature, and can include extensive soft tissue and bone damage. They represent a combination of sharp and blunt force trauma; the sharpness of the cutting edge influences how clean the wound edges are.

The association of injuries to one another, the superimposition of defects or cut marks and the orientation provide essential information for estimating the type of weapon that may have been employed, the position of the victim relative to the assailant and relatives timings of the defect.

Aspects for documenting sharp force trauma to consider are:

- Shape of cut mark – linear or irregular
- Cross section of cut mark – V, semi-V or U shape
- Characteristics of walls of the defect, smooth or serrated
- Characteristics of the floor of the defect, smooth or serrated
- Depth of the feature, is it consistent throughout the cut mark
- Presence of the hilt (common in knife wounds) – usually in soft tissue
- Presence and shape of the defect
- Presence of associated fracture with the defect

(adapted from *Mays, The Archeology of Human Bones*)

You can bring aspects of numeracy and measurement into this activity by asking students to measure the ratio of the width to the depth in bladed instruments. Since they are proportional to the size of the blade, then the longer the blade, then the wider and deeper the groove. The width will always be greater than the depth due to lateral movements of the blade in any cutting stroke

Selected General Suggested Reading

This is by no means an exhaustive list, you are advised to search Amazon.co.uk for a comprehensive selection of forensic archaeology and anthropology textbooks; the internet is also a rich source of material.

The Pearson website has a range of useful resources

The Archaeology of Human Bones
Simon Mays. Routledge
ISBN-10: 0415174074

Identification of Traumatic Skeletal Injuries Resulting from Human Rights Violations and Modern Warfare: Identification of Injuries Resulting from Human Rights Abuse and Armed Conflict
Erin H. Kimmerle, Jose Pablo Baraybar
ISBN-10: 0849392691

The Human Bone Manual
Tim D. White, Pieter Arend Folkens. Academic Press
ISBN-10: 0120884674

The Archaeology of Disease
Charlotte Roberts, Keith Manchester. Cornell University Press
ISBN-10: 0801473888

Studies in Crime: Introduction to Forensic Archaeology
Carol Heron, John Hunter, Geoffrey Knupfer, Anthony Martin, Mark Pollard, Charlotte Roberts. Routledge
ISBN-10: 0415166128

The Forensic Anthropology Training Manual
Karen Ramey Burns, Prentice Hall
ISBN-10: 0130492930

Flesh and Bone: An Introduction to Forensic Anthropology
Myriam Nafte Carolina Academic Pr
ISBN-10: 1594603006

Introduction to Forensic Anthropology
Steven N. Byers Prentice Hall
ISBN-10: 0205512291

Forensic Osteology: Advances in the Identification of Human Remains, Second Edition by Kathleen J. Reichs (Editor) ISBN-10: 0398068046

Skills Developed	Evidenced by successful completion of activities:
Understanding of skeletal structure and function	2A, 2B, 2C 4A, 4B, 4C, 4D
Team working and independent working	1A, 1B, 4E Essentially all elements as directed by the tutor
Communication skills: written and oral	1A, 1B in particular
Observational skills	2A, 2B, 2C, 4A, 4B, 4C, 4E
Problem solving skills	All elements as directed by the tutor
Recognition, description and reporting skills	All elements of Activity 2 and of Activity 4
Accuracy in working and reporting	2A, 2B, 2C 4A, 4B, 4C, 4E
Analytical and practical handling skills	2A, 2B, 2C 4A, 4B, 4E
Numerical skills	All elements of Activity 2 and of Activity 4
Enhanced visual literacy in the making, understanding and interpretation of forensic photography	4C

Appendix

Traumatic Injuries to skulls (see also Activity 2c)

Using these images below, students may be asked to draw and then to describe the injuries. Use the text book by Erin H. Kimmerle, Jose Pablo Baraybar *or similar* or indeed or suitable web sites

Details of Skull Images Below

Note: all skulls were purchased from the excellent collection of BoneClones

http://www.boneclones.com/index.html

- all images of these skulls in this document were taken at Staffordshire University Department of Foresnic and Crime Science – some of the descriptive material on the next 2 pages has been adapted from the BoneClones website.

Image 1 of **Skull #1** machete wound

- All of the changes in this skull are the result of machete blows followed by submersion in the ocean for two weeks. The action of the water and sand ground the edges of the fractured bone to a smoother finish than expected for fresh bone injuries. The machete strikes caused all of the calvarial fractures, with loss of the comminuted fragments from the left side of the face and the left and right sides of the calvarium. Note the multiple linear chop-type fractures on the left temporo-occipital and left occipital regions. One of the fractures extends anteriorly across to the left mandibular condyle and coronoid process. The chop injuries are straight, and are oriented in different directions, and at different angles. This random orientation of the chop injuries is not consistent with the usual parallel strike marks from a boat propeller. The large number of strikes is also not consistent with the one or two strikes by a boat propeller on the head of a victim in the water.

Image 1 of **Skull #2** bullet wounding

Image 2 - same skull as **Skull#2**

- There are three small-caliber gunshot wounds of entrance at the left posterolateral aspect of the occipital bone. Two of these wounds overlap to create a figure-of-eight's appearance. Much of the squamous region of the right temporal bone is missing, as are portions of the bilateral superomedial orbital walls. Although both of these wounds may in fact be "blow out fractures", they may also represent (at least partially) damage resulting from the passage of the projectiles out of the head.

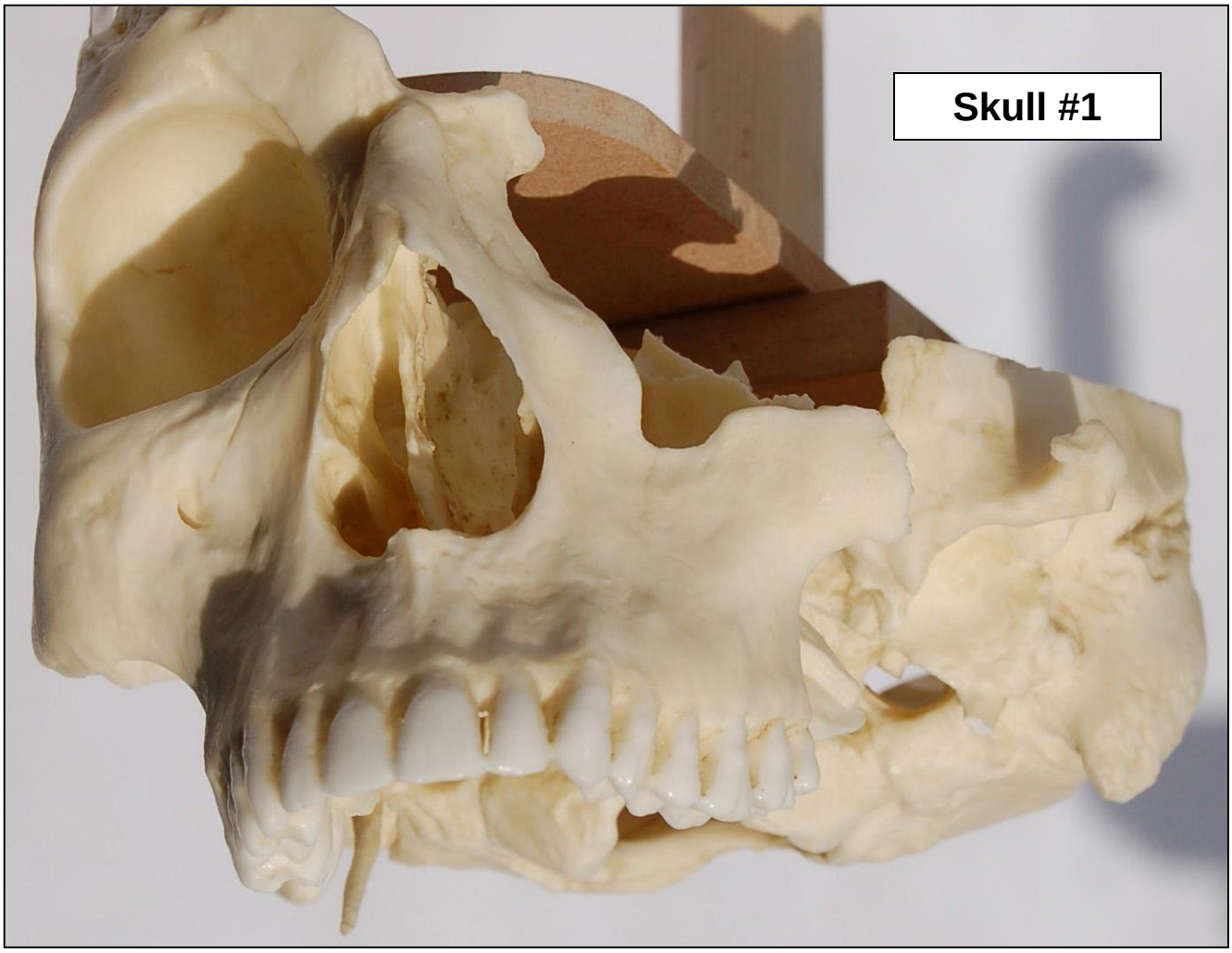
Image 1 of **Skull #3** 0.32 Calibre - entry wound above left eye

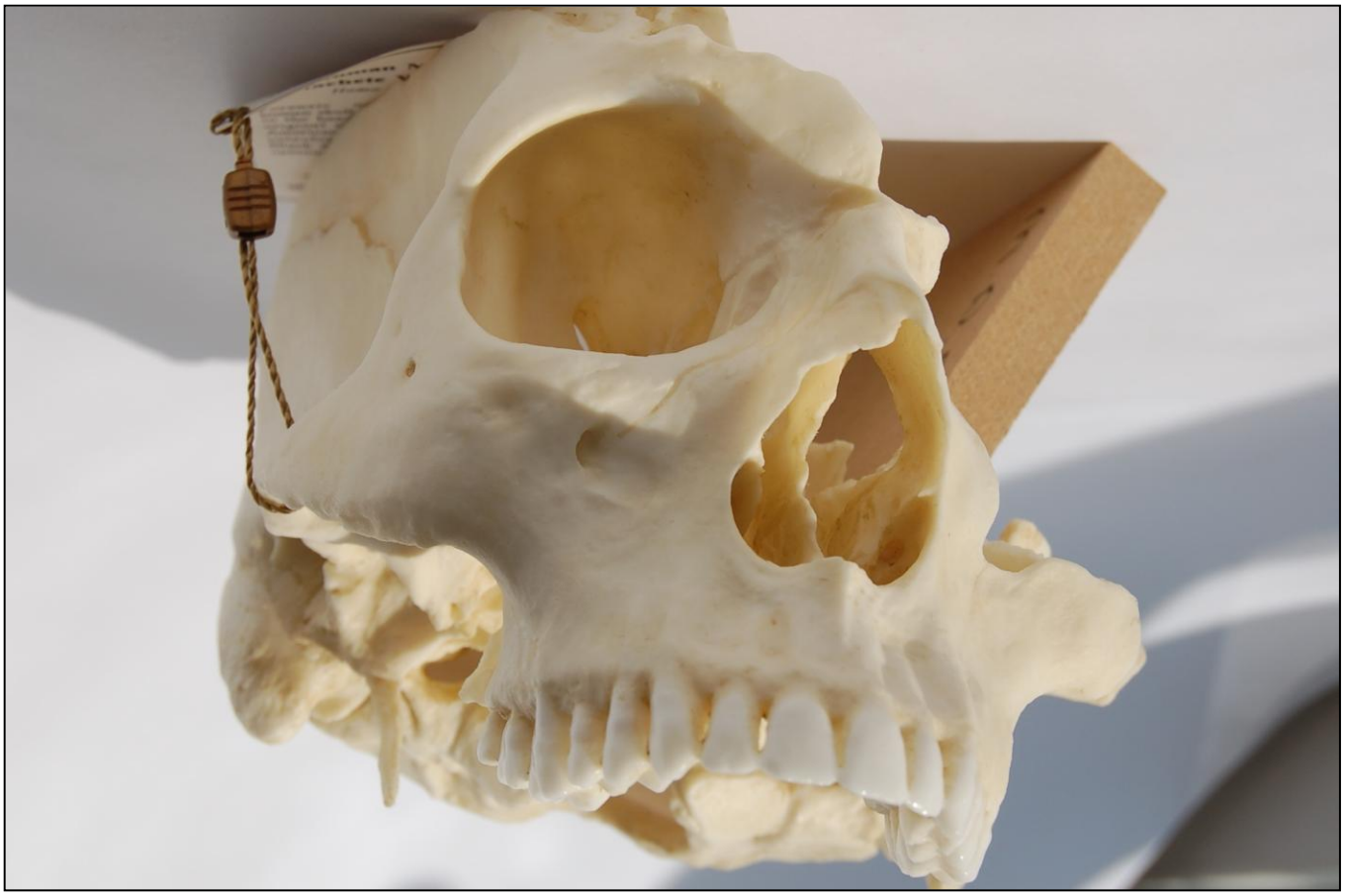
Image 2 of **Skull #3** - exit wound

- Human male skull with large caliber bullet wound to head. European male, 25 years of age, modern specimen. The appearance of projectile damage to bone is crucial to the differentiation of "entrance" and "exit" wounds. Typically, as a projectile like a bullet passes through a plate of bone (like that of the neurocranium), fragments of the bone follow. As such, there is a characteristic beveling (or open fanning) of the bone in the direction of projectile motion. Although not adequately visualized on the entrance wound of this specimen (without removing the calvarium), this phenomenon is beautifully illustrated in the exit wound of the left lateral occipital bone. Note also the radiating simple linear fracture which progresses obliquely and laterally away from the exit wound. Interestingly, the left orbital plate is not intact. This is important to recognize and consider for two reasons. Firstly, damage to bones in this region may be due to direct contact with the bullet, or the forces of gases expelled from the muzzle of a gun in hard contact with the head. Secondly, it may not be due to these factors at all, and may represent the violent secondary contact of the frontal lobes of the brain, thrust against this bony ridge when the brain is expanded and compressed by forces created with the rapid passage of a projectile through brain tissue.

Images 1 and 2 on same page of **Skull 4** showing entry and exit wounds from firearm discharge

Image 1 of **Skull 5 –** blunt force (hammer blow) trauma to skull above left eye socket


Skull #1




Skull #2

Skull #2


Skull #3


Skull #3
posterior
view


Skull #4


Skull #5

STUDENTS SHOULD ONLY SEE THIS NEXT PART OF THE DOCUMENT

THE TEXT IN ***RED*** IS FOR TUTOR GUIDANCE ONLY

“*What them old bones can teach us….*”
The Hulton Abbey
Skeletal Digitisation Project
Student Copy

Acknowledgements

This material is result of a previous project funded in 2008 by the Higher Education Academy
(see Page 5)

The Hulton Abbey Skeletal Digitisation Project
(HASDiP) by

Professor John Cassella
Department of Forensic and Crime Science
Faculty of Science
Staffordshire University
Mellor Building
College Road,
Stoke on Trent, ST4 2DE

Original HASDiP project in collaboration with

Dr Mary Lewis[1], Mr Roger Brown [2] and Mr Paul Lucking[3]

[1] Lecturer in Archaeology
Department of Archaeology
School of Human and Environmental Sciences
University of Reading,

[2] Senior Lecturer in Photography
Faculty of Arts, Media and Design
Staffordshire University

[3] Senior Lecturer
Entertainment Technology
Faculty of Computing, Engineering and Technology
Staffordshire University

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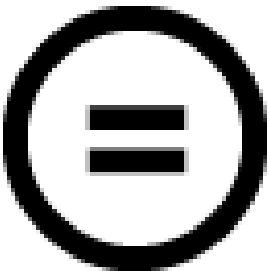
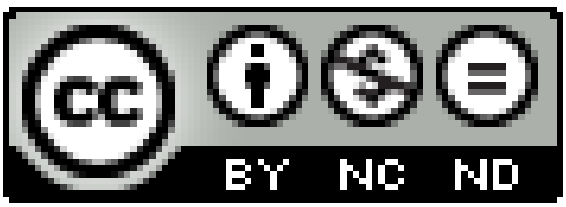




What are these resources designed to do?

There is much skeletal material obtained from archaeological environments. These skeletons can offer a lot of new information about lifestyle, disease, diet, social interaction etc. They offer a unique teaching and learning opportunity to a wide diversity of students at many levels from Key Stage2 through to post - graduate students and even beyond into the professional qualifications.

It is difficult for a variety of reasons for this diverse group of students to gain access to the skeletal material and for those that do access it, there is a clear realisation, that the bones are friable and literally *turning to dust*.

There is clearly the opportunity to have access to skeletons as a valuable educational resource and also to have the added value of preserving the existing skeletal material that is very delicate and friable. There are some resources available to the archaeology community, but nothing of the scope that this project has aimed to achieve.

The pilot study recording human skeletal remains from Hulton Abbey, conducted by Staffordshire University has demonstrated that digital photography and bespoke computer software can be combined to offer a pedagogically and research user-friendly product, which can be made readily available to the benefit of the educational and research communities. It is particular interest to emerging scientific disciplines such as forensic science which suffer from a paucity of such resources.

For students attempting to understand the wealth of information that the skeleton can teach us about the human form, the opportunity to work with real material is rare if not impossible. These activities below hope to facilitate some context of skeletal study by placing a rare abnormal specimen at the heart of these studies through comparison and contrast with the *normal*.

These suggested basic activities should be used in conjunction with the many excellent textbooks and journal articles on the subject. It is suggested that academic staff engage students in pre-reading to facilitate sufficient introductory knowledge to fully engage in these activities.

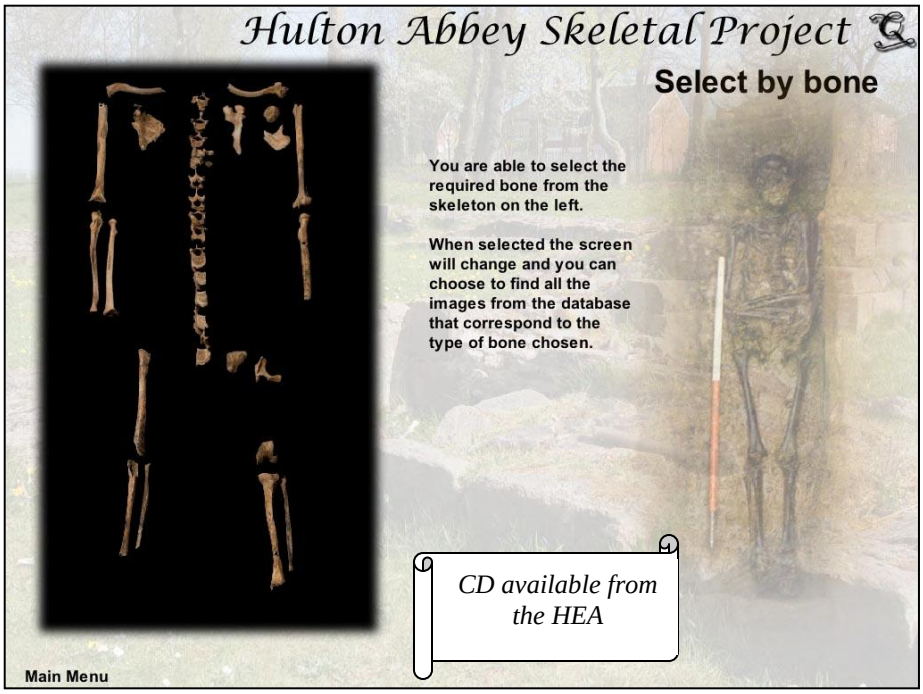
Acknowledgments

Thanks go to Roger Brown - Senior Lecturer in Photography in the Faculty of Arts, Media and Design, Staffordshire University for the use of the images from the Hulton Abbey project.

You can get **free copy** of the DVD from

http://www.heacademy.ac.uk/physsci/home/projects/digitisationproject

A Brief Introduction to Hulton Abbey



Hulton Abbey was a minor Cistercian monastery in North Staffordshire (England), founded in 1219 and finally dissolved in 1538. The final report on the archaeological excavations undertaken there between 1987 and 1994 was published as a book in 2005. In particular, the chapter house was uncovered and re-assessed and the eastern part of the church and north aisle were completely excavated, together with the eastern half of the nave. The excavations are described by area and chronological phase with detailed specialist reports including architectural stonework and decorated floor tiles. An extensive programme of sampling and analysis of pollen remains from burials was also completed. The remains of 91 individuals, mainly men but also women and children, are reported on in detail, with sections on abnormalities and pathology as well as medieval burial goods such as a wax chalice and wooden wands. Comparisons with other published monastic sites in the region help to place Hulton into a wider context.

The Hulton Abbey Skeletal Digitisation Project (HASDiP) resulted in the creation of a DVD resource. This basic resource contains the highest quality photographs in a bespoke software package. Also in this resource, is a journal article describing how the individual met his untimely and gruesome demise. This resource should be used alongside the suggested activities in this current resource. It will add the dimension of reality and applicability to the exercises to be undertaken. Gaining access to human remains (skeletal remains) is problematic for many reasons, however, there is much to be learned from them. This resource provides an opportunity for students to get access not only to human remains, but in this case see extremely fragile and rare remains. The skeletal digitisation project allows for samples of the skeletal material excavated from Hulton Abbey to be systematically and fully photographed.

Risk Assessments

All activities should be appropriate risk assessed by those staff responsible for the delivery of this material. No responsibility can be taken by the authors or funders of this material. Where appropriate, ethics requirements of the institution should also be considered.

Caution: Be aware that these images may upset some individuals

NOTE: Some students may find some of this material disturbing. Teaching staff should be aware of this and have appropriate strategies in place to cope with the varied *reactions* that may occur.

Are other sources of rare material digitised?

A key driver for digitisation is the ease with which fragile and inaccessible materials can be preserved and conserved by transferring the burden of use to a high-specification digital surrogate. For example an application devised by Armadillo Systems and promoted by the British Library has allowed the general public and researchers alike detailed interactive exploration of digitised rare books in quantities which would be unthinkable in the real world." There is often a question of whether material should be digitised just because it is rare or valuable or whether there should be demonstrable need.

"Respondents cited 'value for research and teaching' as the most prominent reasons for digitising material in the future. The most significant barrier to digitisation was, inevitably, lack of funding. Put simply, digitisation cannot happen without significant financial support, usually from an external body."

"All materials should be digitised to the highest specifications for flexibility and sustainability in the future, and interoperability and resource discovery in the present"

"There are strong currents of goodwill, enthusiasm for digital projects, and a desire to bring increasing volumes of material online, in the community, from users and providers alike. These must be tapped."

The full Loughborough University study can be found at: www.jisc.ac.uk/digitisation

Possible Generic Learning Outcomes for Users of the DVD Resource

Not only is the permanent preservation of the friable skeleton paramount, but so too, is the use of the digital resource by a variety of users for their ***own*** particular learning outcomes.

Ideally, those of you who utilise this digitised resource for their own educational/research purposes will have set learning outcomes which generically could include:

4. Understand and undertake the methods of producing accurate archaeological/anatomical drawings/photography
5. Understand and apply the requirements of archaeological/anatomical recording procedures.
6. Understand the forensic/scientific application of the knowledge to be gained form examining skeletal material that is <u>not</u> of an archeological timescale (i.e. from a criminal act).

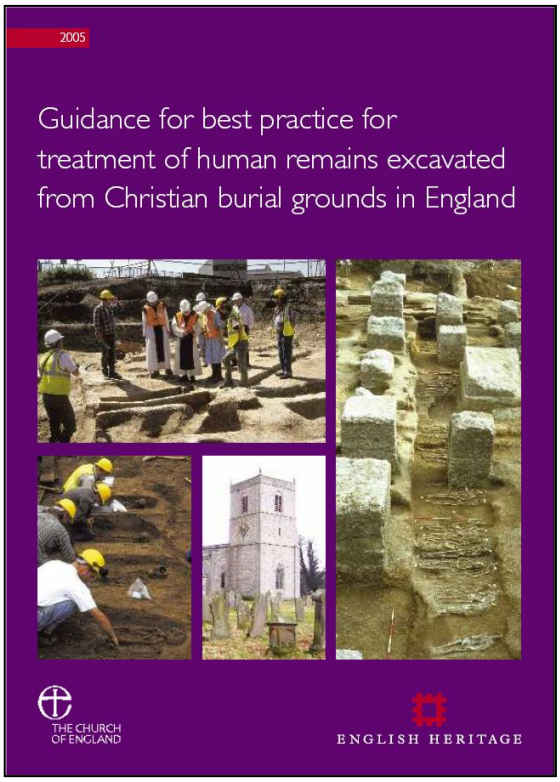
In addition, the following transferable skills could be developed and enhanced:

Critical thinking

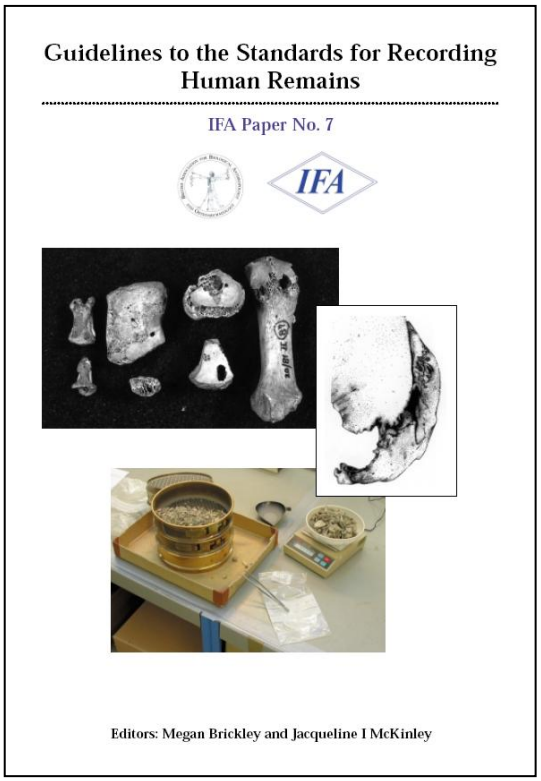
10. Team working and independent working
11. Communication skills, written and oral
12. Observational skills
13. Problem solving skills
14. Recognition, description and reporting skills
15. Accuracy in working and reporting
16. Analytical and practical skills
17. Numerical skills.
18. Enhanced visual literacy in the making, understanding and interpretation of forensic photography.

Other Sources of Information

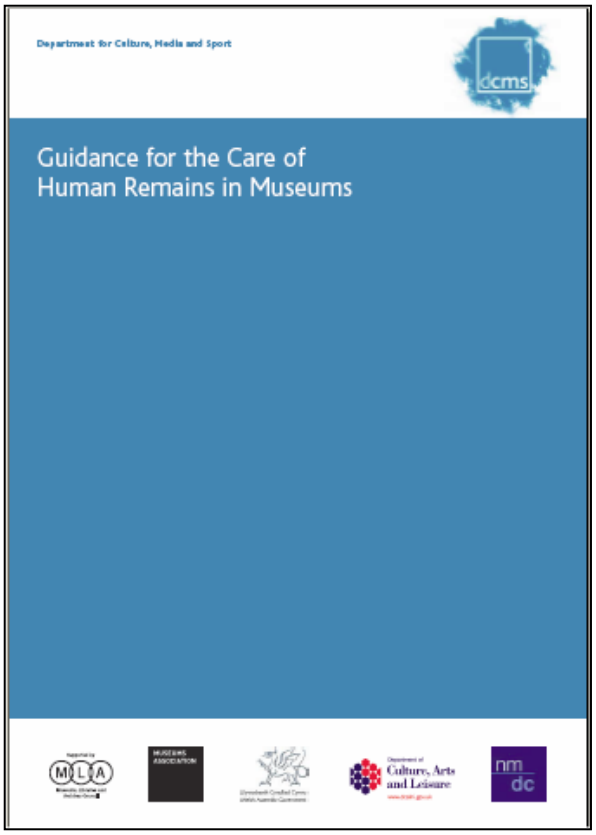
*www.**english-heritage**.org.uk/upload/**pdf**/16602_**HumanRemains**1.**pdf***



www.archaeologists.net/modules/icontent/inPages/docs/pubs/**human**remains.pdf



www.culture.gov.uk/images/.../Guidance**Human Remains**11Oct.pdf



Staff should also direct students to the BABAO site (British association for biological anthropology and osteoarchaeology) for their code of ethics *http://www.babao.org.uk/index/ethics-and-standards*

Teachers should also be aware of Quality Assurance Agency for Higher Education (QAA) benchmarking for anthropology which can be sourced as a PDF file at

http://www.qaa.ac.uk/academicinfrastructure/benchmark/honours/anthropology.asp

Activity # 1
Sensitivity of Handling Human Remains

Learning outcomes for this activity include:

1. to appreciate the role of ethics in science
2. to appreciate Diversity issues in the UK
3. to understand how to apply these ethical principles in a laboratory- scientific environment

Activity 1A

Why should we handle human bones in a sensitive manner? Discuss this as a group. Make some recommendations as a group for practice and policy of handling skeletal material in an educational/ research context.

In general, the public shows a high degree of interest in scientific research on ancient human remains. This is apparent in the popularity of television programmes on archaeology featuring human remains, and of displays of human remains in museums and at ancient monuments. Archaeological excavations of burial sites are also popular with visitors.

Activity 1B

What are the benefits of handling and working with human skeletons? Discuss this as a group.

Research into our past is of the utmost importance: it helps us to understand ourselves better, and, perhaps, to learn from past experience. Excavated human remains and their context (including monuments, coffins and grave goods) are an important source of direct evidence about the past, providing a range of information including evidence for:

• demography and health
• diet, growth and activity patterns
• genetic relationships
• burial practice, and thus related beliefs and attitudes.

The study of buried human remains also provides valuable evidence of other kinds, including:

• increasing our understanding of diseases and their history, which may contribute to the treatment of disease
• contributing to the development of forensic science, to assist in identification of remains and prevent miscarriages of justice.

Sourced and adapted from:

www.**english**- ***heritage****.org.uk/upload/****pdf****/16602_****HumanRemains****1.****pdf***

Activity # 2
The Structure of the Human Skeleton

Learning outcomes for this activity include:

1. To appreciate the numbers and varieties of bone types in the human body
2. To appreciate how to identify skeletal elements - whether they are whole, fragmented or disassembled from the *assemblage*
3. To appreciate how measurement of bone parameters can inform on physical and social anthropology

The Gross Anatomy of Bones,

Activity 2A –

1. Classify bones according to shapes.
2. Identify any major types of bone markings.

B. Bone Shapes

1. Long bones
2. Flat bones
3. Sutural bones
4. Irregular bones
5. Short bones
6. Sesamoid bones

C. Bone Markings

D. Bone Structure,

a. diaphysis
b. epiphysis
c. metaphysis
d. marrow cavity
e. cortex

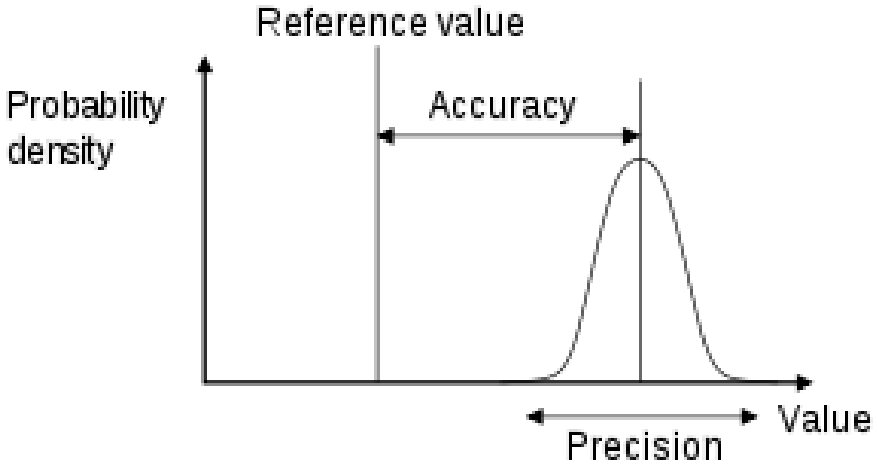
Activity 2B

Identify the bones of the axial and appendicular skeleton and their functions – tabulate them.

In studying individual bones, we are concerned with their *functions*, including which bones they connect or articulate with, and their *structures* and marks, including muscle and ligament attachments, and openings for nerves and blood vessels (foramina).

Make note on these and discuss in class.

Consider the pelvic bones and how they can be sued to differentiate between males and females. There are images of the pelvis in this document.



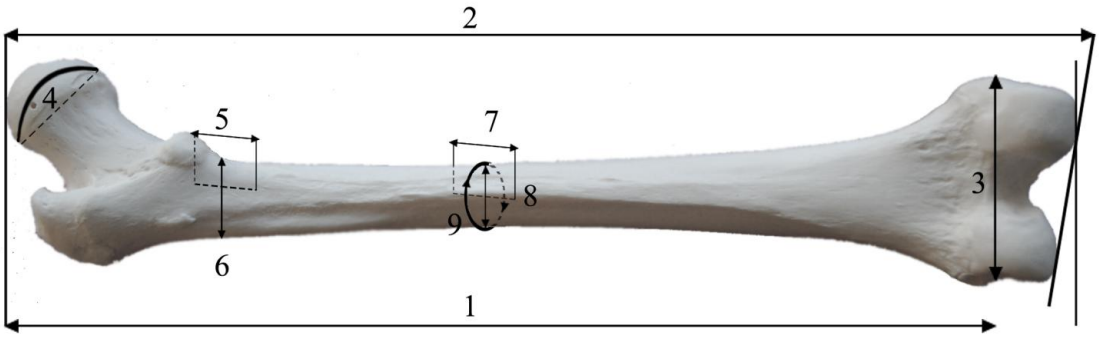
In the fields of engineering, industry and statistics, the **accuracy** of a measurement system is the degree of closeness of measurements of a quantity to its actual (true) value. The **precision** of a measurement system, also called reproducibility or repeatability, is the degree to which repeated measurements under unchanged conditions show the same results.[1] Although the two words can be synonymous in colloquial use, they are deliberately contrasted in the context of scientific method.

Accuracy indicates proximity of measurement results to the true value, precision to the repeatability or reproducibility of the measurement

A measurement system can be accurate but not precise, precise but not accurate, neither, or both. For example, if an experiment contains a systematic error, then increasing the sample size generally increases precision but does not improve accuracy. Eliminating the systematic error improves accuracy but does not change precision.

Adapted from: http://en.wikipedia.org/wiki/Accuracy_and_precision

Image Below Adapted from:
www.cleber.com.br/standard.html



Measurement #1. Femur: Maximum Length: distance from the most superior point on the head of the femur to the most inferior point on the distal condyles.

Measurement #2. Femur: Bicondylar Length: distance from the most superior point on the head to a plane drawn along the inferior surfaces of the distal condyles. *Comment*: Place both distal condyles against the vertical endboard while applying the movable upright to the femoral head).

Measurement #3. Femur Epicondylar Breadth: distance between the two most laterally projecting points on the epicondyles.

Measurement #4. Femur: Maximum Head Diameter: the maximum diameter of the femur head, wherever it occurs. *Instrument*: sliding caliper.

Measurement #5. Femur Anterior-Posterior (Sagittal) Subtrochanteric Diameter: distance between anterior and posterior surfaces at the proximal end of the diaphysis, measured perpendicular to the medial-lateral diameter. *Instrument* sliding caliper. *Comment*: be certain that the two subtrochanteric diameters are recorded perpendicular to one another.

Measurement #6. Femur: Medial-Lateral (Transverse) Subtrochanteric Diameter: distance between medial and lateral surfaces of the proximal end of the diaphysis at the point of its greatest lateral expansion below the base of the lesser trochanter. *Instrument* sliding caliper. *Comment*: be certain that the two subtrochanteric diameters are recorded perpendicular to one another.

Measurment #7. Femur Anterior-Posterior (Sagittal) Midshaft Diameter: distance between anterior and posterior surfaces measured approximately at the midpoint of the diaphysis, at the highest elevation of linea aspera. *Instrument*: sliding caliper. *Comment*: The sagittal diameter should be measured perpendicular to the anterior bone surface.

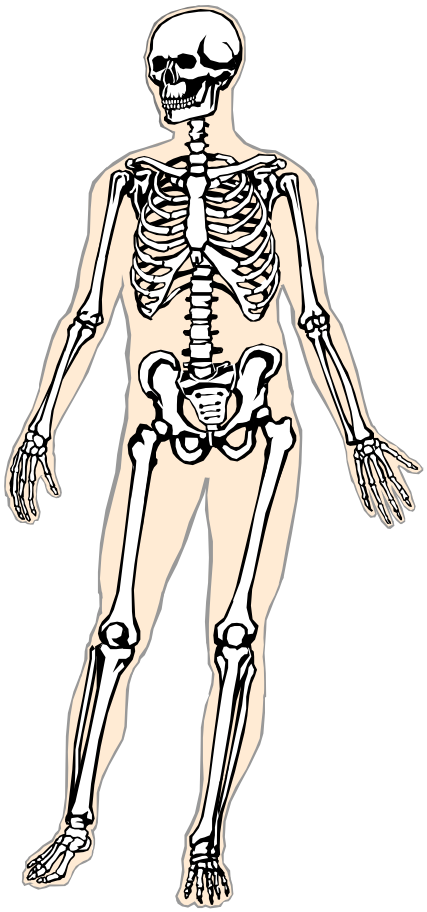
Measurement #8. Femur: Medial-Lateral (Transverse) Midshaft Diameter: distance between the medial and lateral surfaces at midshaft, measured perpendicular to the anterior-posterior diameter (#66). *Instrument*: sliding caliper.

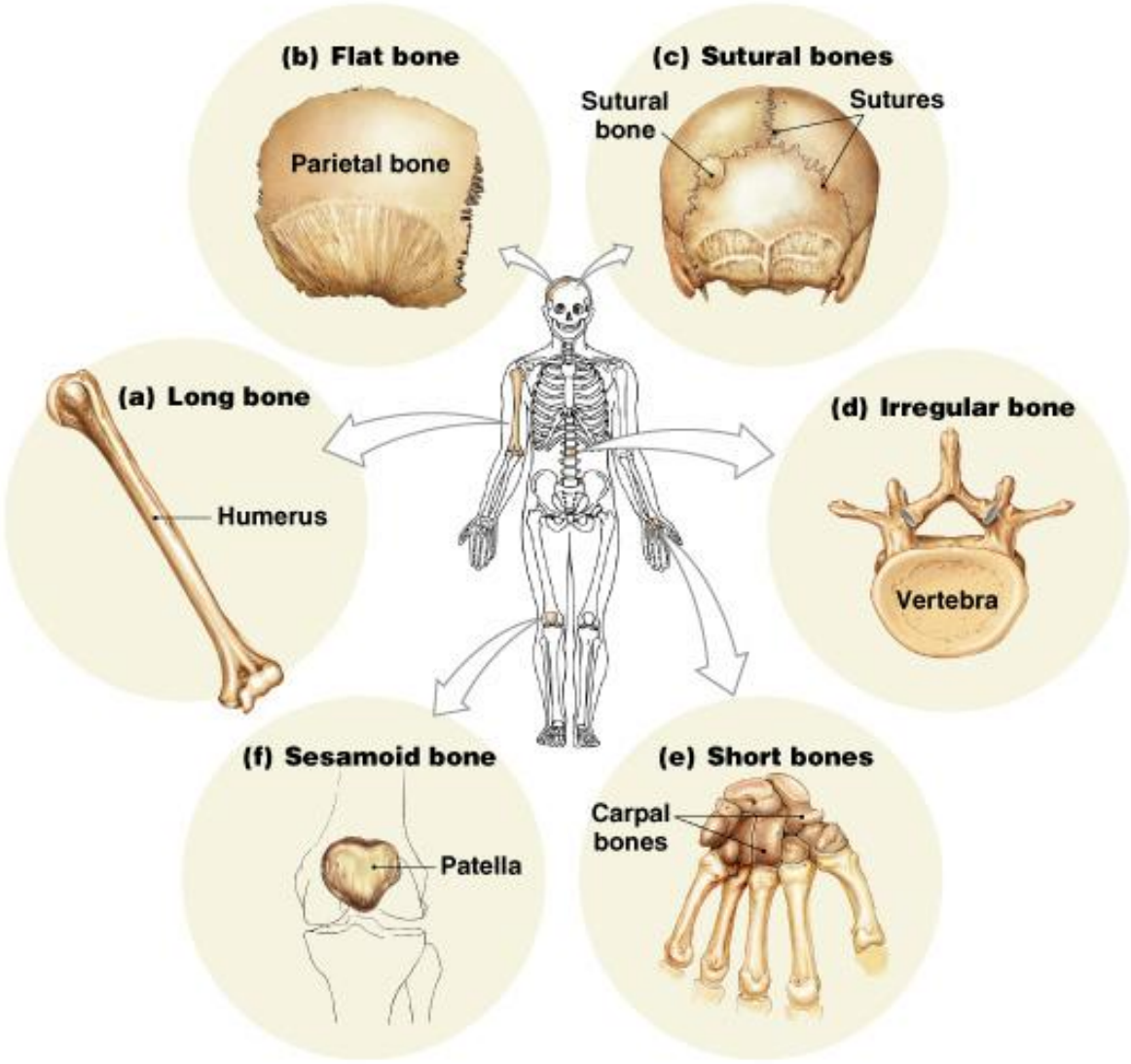
Measurement #9. Femur: Midshaft Circumference: circumference measured at the level of the midshaft diameters (#7 and 8). If the linea aspera exhibits a strong projection which is not evenly expressed across a large portion of the diaphysis, then this measurement is recorded approximately 10 mm above the midshaft. *Instrument*: metal tape.

Activity 2C

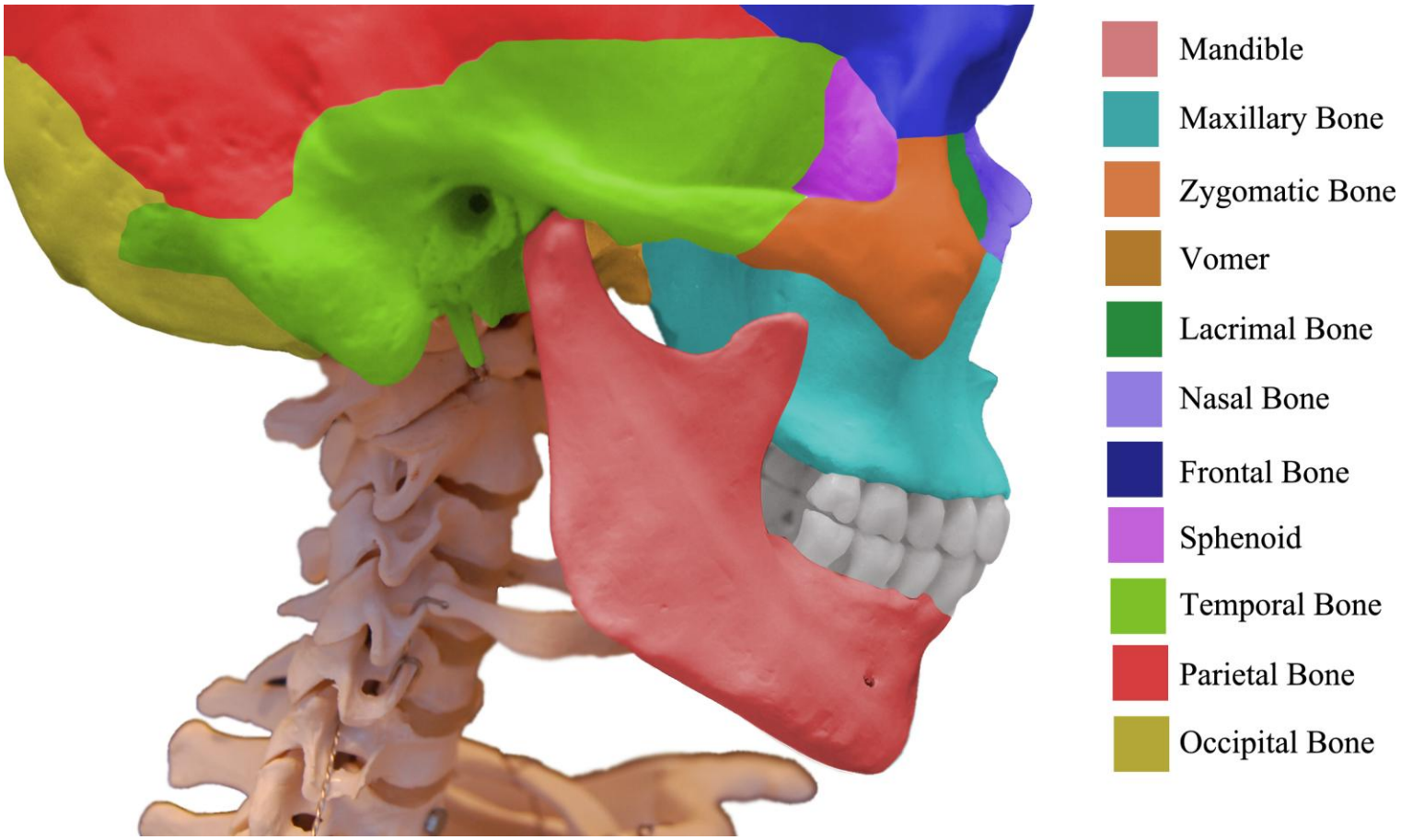
3. Identify the bones of the human cranium and face, and the significance of their markings.
4. Describe the differences between the skulls of infants, children and adults.

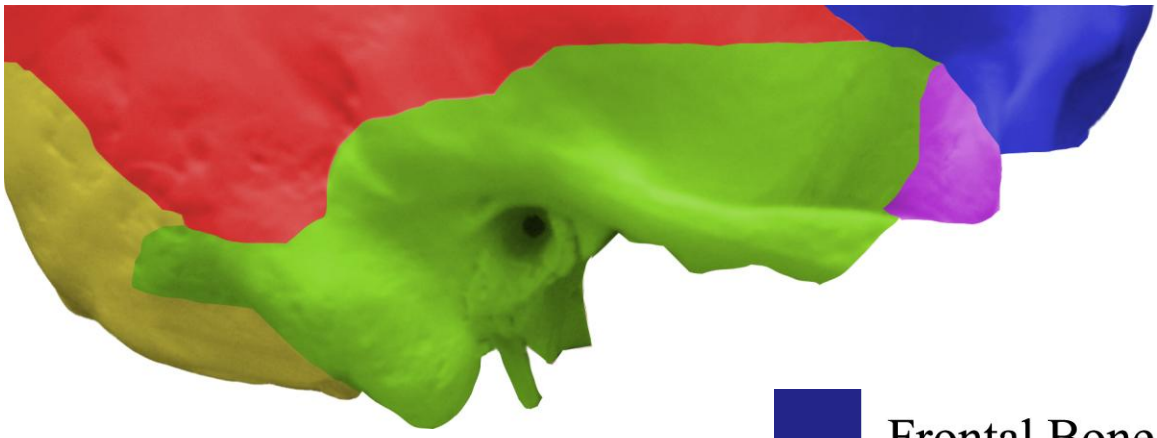
A Traitors Death - The identity of a drawn, hanged and quartered man from Hulton Abbey, Staffordshire –
Dr Mary Lewis *Antiquity* 2008 82 113-124.





Fundamentals of Anatomy & Physiology, 7e
by Frederic H. Martini, Ph.D.


Mandible
Maxillary Bone
Zygomatic Bone
Vomer
Lacrimal Bone
Nasal Bone
Frontal Bone
Sphenoid
Temporal Bone
Parietal Bone
Occipital Bone



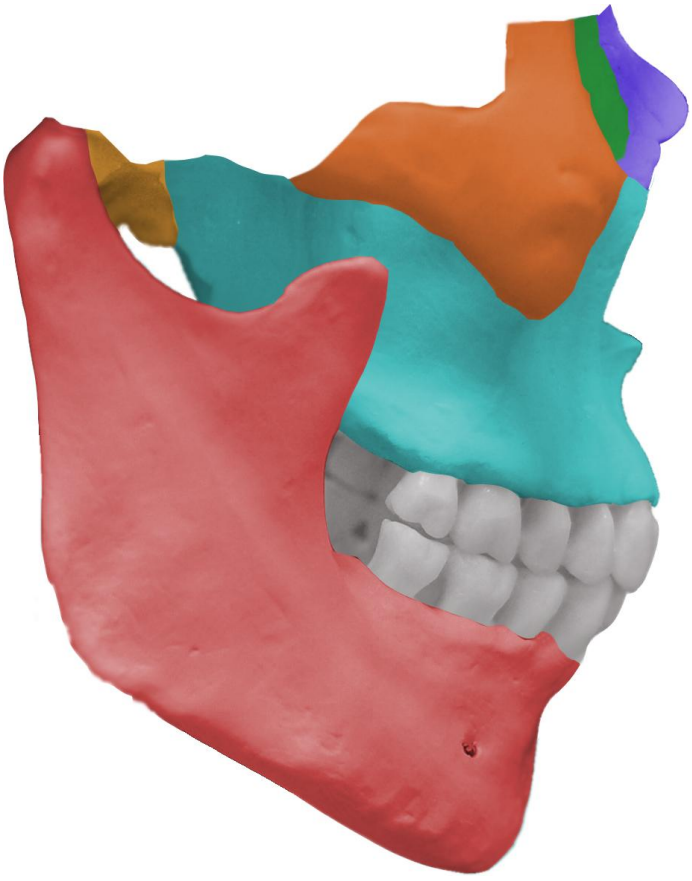
Frontal Bone

Sphenoid

Temporal Bone

Parietal Bone

Occipital Bone



Mandible

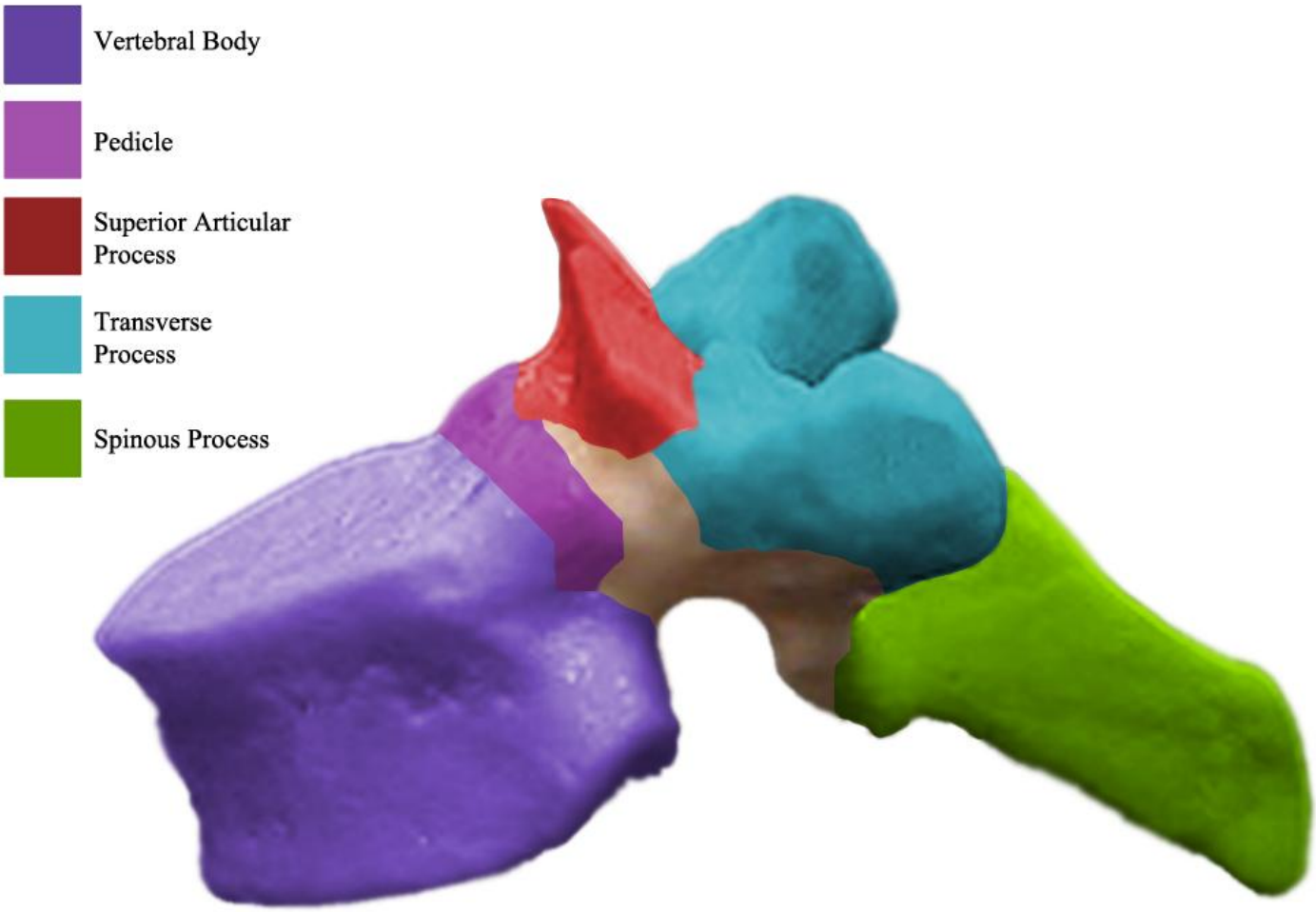
Maxillary Bone

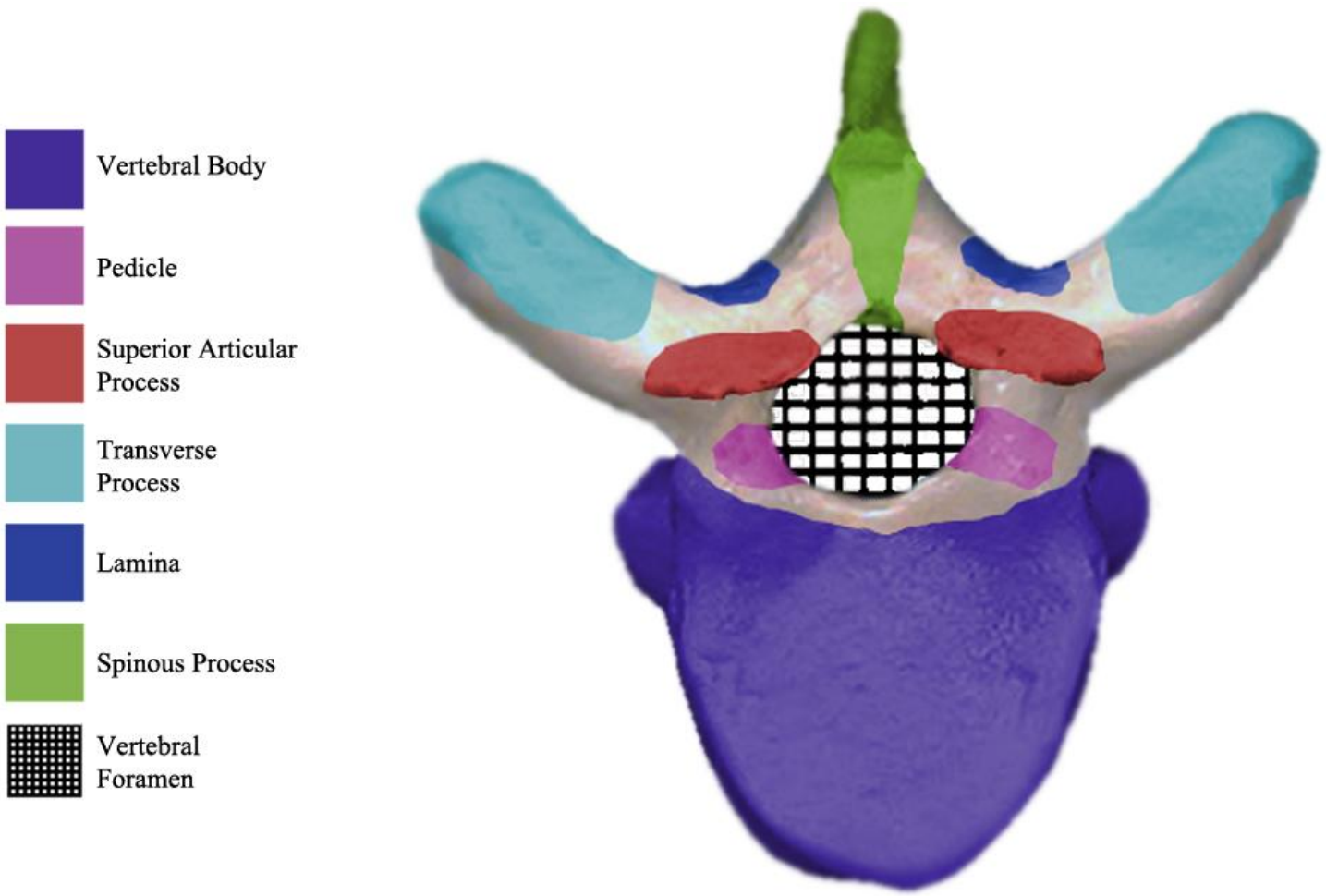
Zygomatic Bone

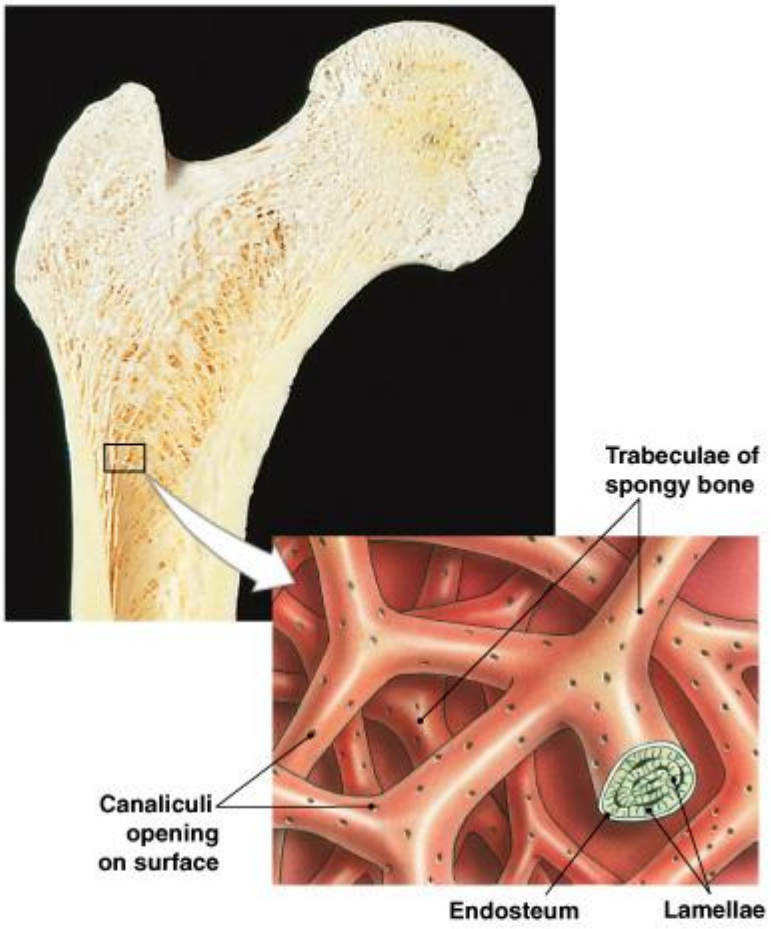
Vomer

Lacrimal Bone

Nasal Bone


Vertebral Body
Pedicle
Superior Articular Process
Transverse Process
Spinous Process


Vertebral Body
Pedicle
Superior Articular Process
Transverse Process
Lamina
Spinous Process
Vertebral Foramen



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Iliac Crest

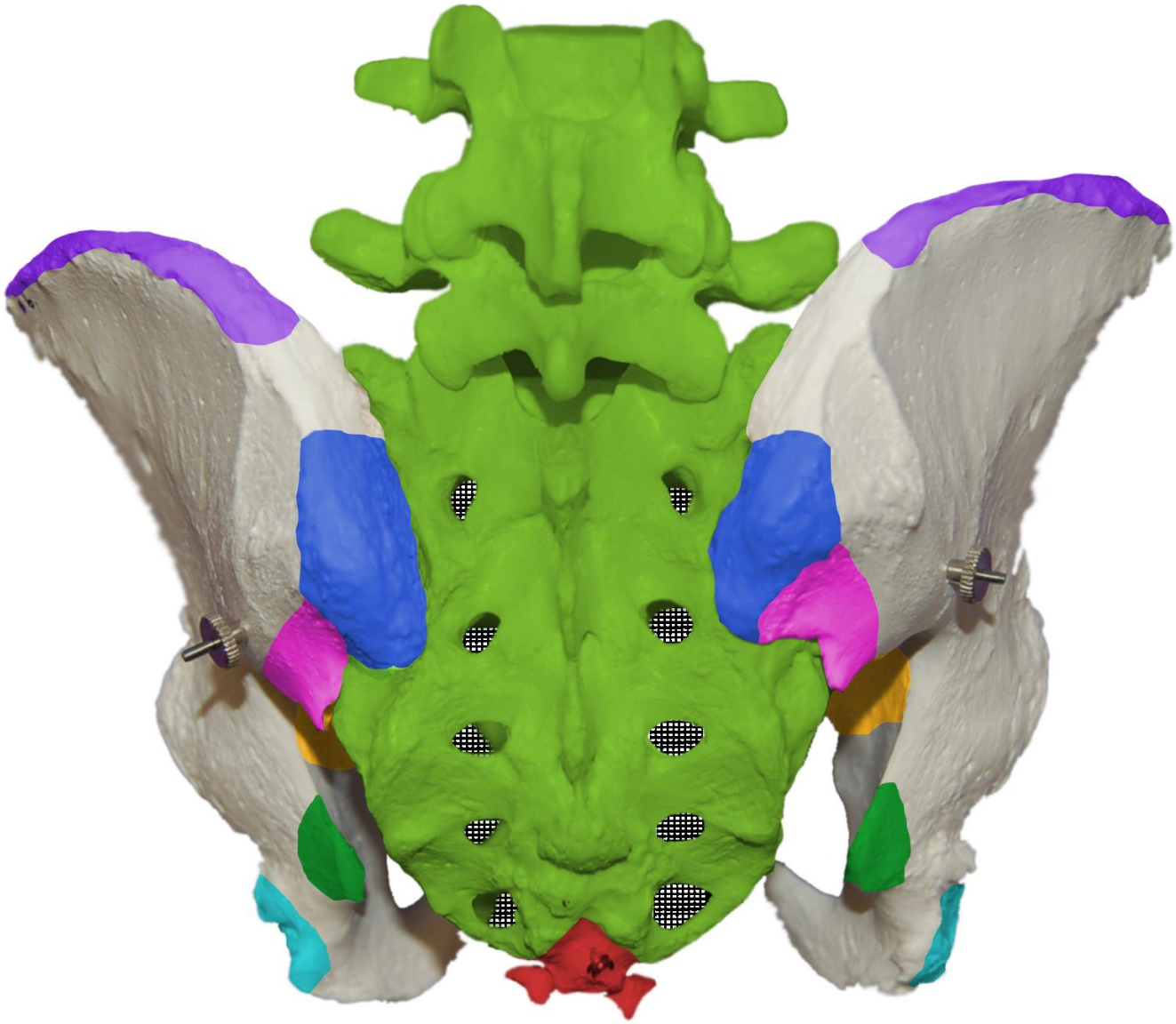
Iliac Fossa

Arcuate Line

Acetabulum

Pubic Tubercle

Sacroiliac Joint



Sacrum

Coccyx

Iliac Crest

Posterior Superior Iliac Spine

Posterior Inferior Iliac Spine

Greater Sciatic Notch

Ischial Spine

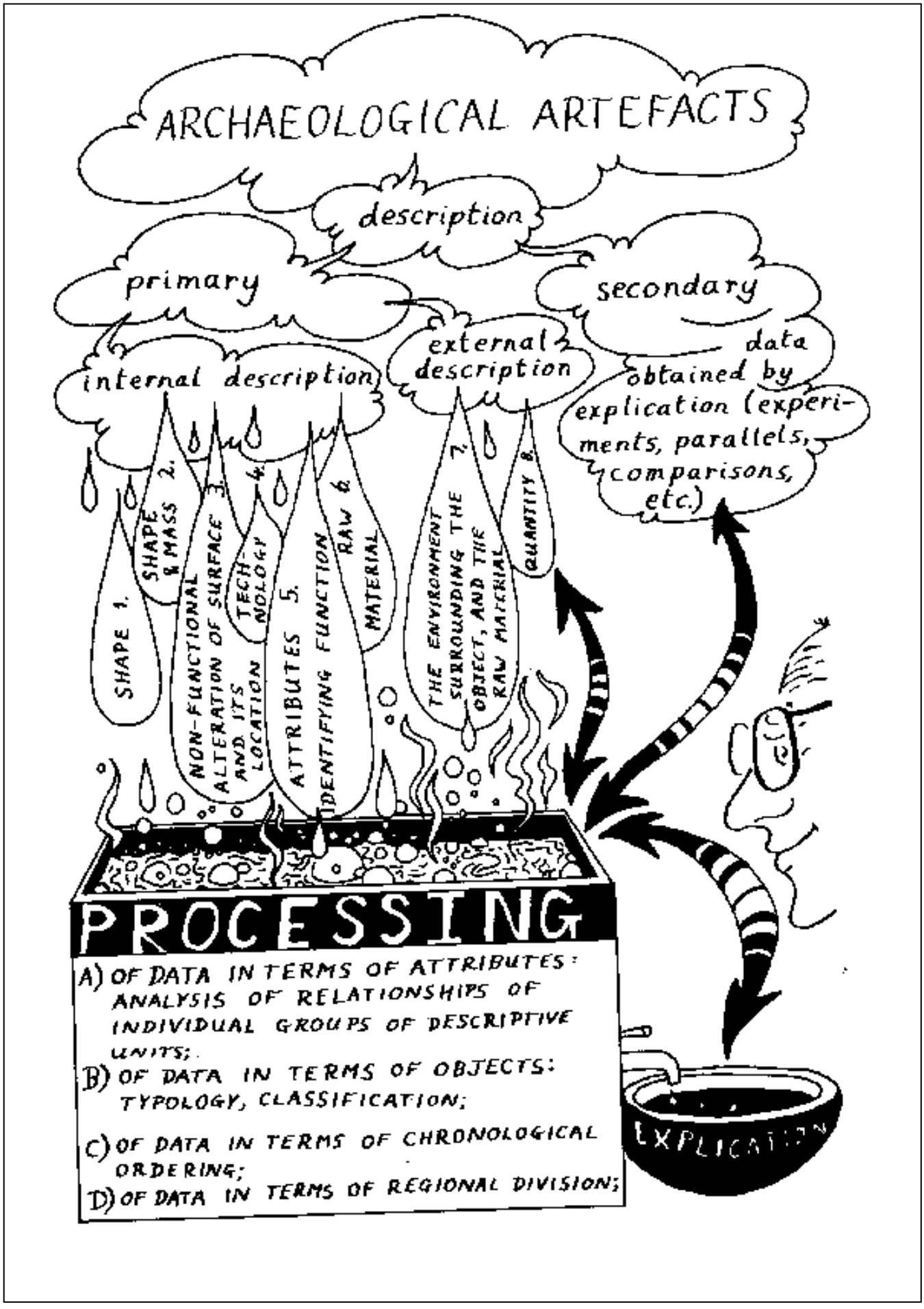
Ischial Tuberosity

Activity # 3
Basic aspects of Human Archaeology

Learning outcomes for this activity include:

1. **to understand the role of archaeology in informing on human history**
2. **to appreciate the complimentary roles of archaeology and anthropology**
3. **to appreciate the archaeology of the Hulton Abbey skeleton and how it was recovered**

Archaeology is simply the study of the material things of the past. There is over a century of jargon that can and will be applied, but in very simplest terms, archaeologists study stuff that is preserved so that we may decipher something of the culture, beliefs, and values of past societies. Archaeology is **ANTHROPOLOGY**, not really a sub-discipline, but perhaps a body of methods and teachniques that are applied to the analysis of **MATERIAL CULTURE** Malina and Vasicek 1990. Material culture is that whole domain of things made and used by people. Material culture studies embody analyses of technology, design, function, social organization, history, religion, ritual and belief. Archaeology as a discipline predicated on the analysis of a complex subject, has evolved a jargon or lexicon all its own. In these cartoons, reproduced from Malina and Vasicek (1990), the archaeologist attempts to sort out all the myriad jargon terms that have become shorthand referents to theories and concepts. All deal with what the archaeologist finds, and how the archaeologist constructs inferences. **ARTIFACTS** are things made, used, and modified by people.

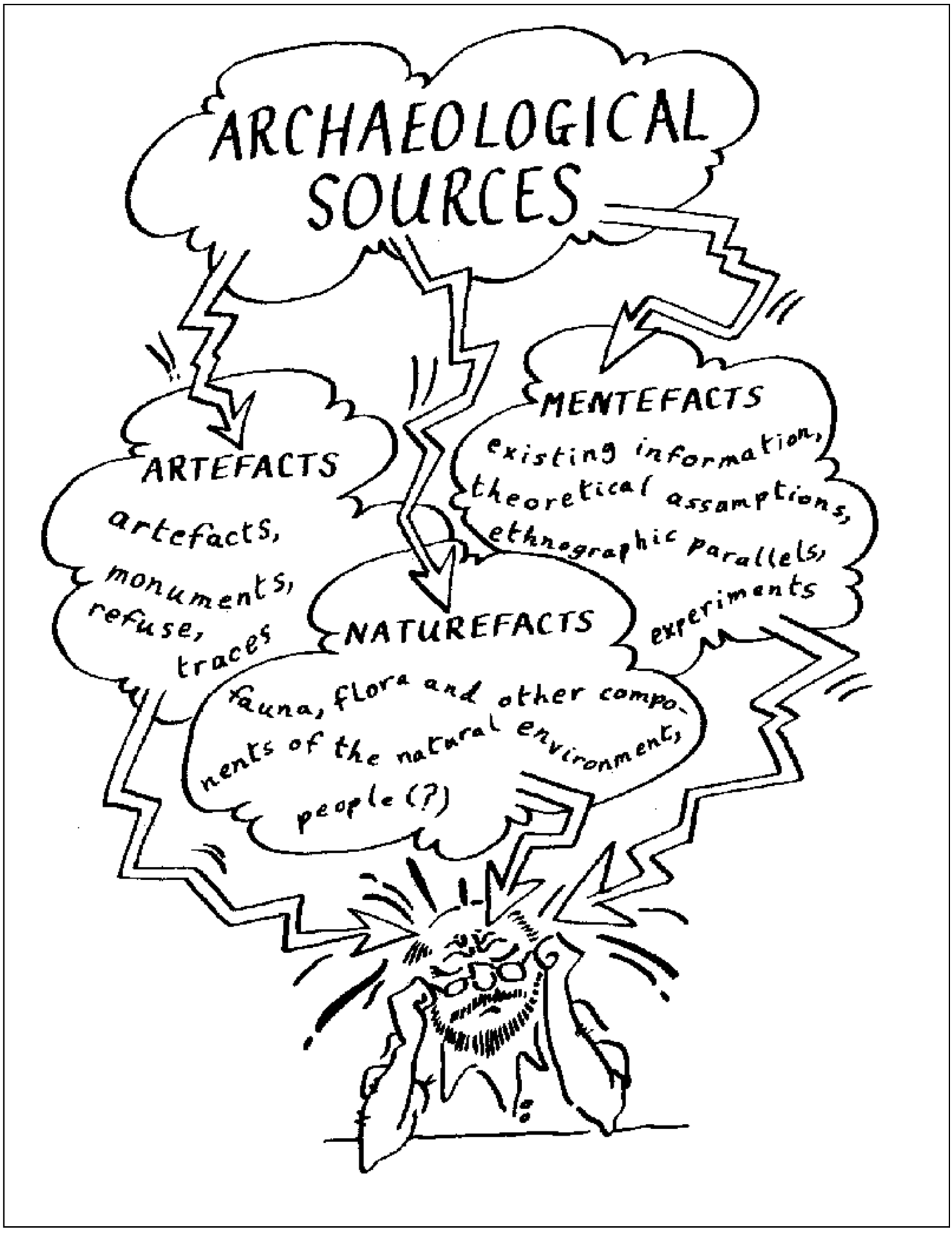

ARCHAEOLOGICAL ARTEFACTS
description
primary
secondary
internal description
external description
data obtained by explication (experiments, parallels, comparisons, etc.)
SHAPE 1.
SHAPE & MASS 2.
NON-FUNCTIONAL ALTERATION OF SURFACE 3.
TECHNOLOGY AND ITS LOCATION 4.
ATTRIBUTES 5.
IDENTIFYING FUNCTION
RAW MATERIAL 6.
THE ENVIRONMENT SURROUNDING THE OBJECT, AND THE RAW MATERIAL 7.
QUANTITY 8.
PROCESSING
A) OF DATA IN TERMS OF ATTRIBUTES: ANALYSIS OF RELATIONSHIPS OF INDIVIDUAL GROUPS OF DESCRIPTIVE UNITS;
B) OF DATA IN TERMS OF OBJECTS: TYPOLOGY, CLASSIFICATION;
C) OF DATA IN TERMS OF CHRONOLOGICAL ORDERING;
D) OF DATA IN TERMS OF REGIONAL DIVISION;
EXPLICATION

The term refers to tools, residues of tool manufacture, residues of processing plants and animals, and by-products of tool manufacture, processing, or other human activities.

NATUREFACTS are parts of plants or animals not modified by man, but indicative of man's physical environment. For example, seeds, plant parts or small animal remains found in an archaeological site can be analyzed to determine season of the year for man's occupation or indicate the climate and environment of a given period.

MENTEFACTS are the ideas and values that govern the creation of artifacts. Also called "mental templates" or "cognitive maps" or "cognitive frameworks," these structures are not beyond archaeological inference. Recognition of Mentefacts allows archaeologists to explore nonmaterial aspects of culture through analysis of the material manifestations of cultural needs and beliefs

Malina, J. and Z. Vasicek 1990 Archaeology yesterday & today. Cambridge: Cambridge University Press.


ARCHAEOLOGICAL SOURCES
ARTEFACTS
artefacts, monuments, refuse, traces
MENTEFACTS
existing information, theoretical assamptions, ethnographic parallels, experiments
NATUREFACTS
fauna, flora and other components of the natural environment, people (?)

Activity 3

In this you can work in a team as an archaeologist in a 'virtual' dig. Follow the directions of your tutor.

In this activity, you will dig for archaeological evidence but without getting your hands to dirty!

The instructor should divide the class into groups of 3-6 students.

Each group should be given a pre-prepared box of artefacts that ideally are possessions of the teacher.

Each group should then carefully examine and record the items in the box and seek to answer the following questions:

1. What do the items tell the group about their owner?

2. Does their context (i.e. being carefully stored in a box) change the perception of its value. Consider what 'value' means in this situation.

3. Consider how each of these items would be preserved or modified over a period of say 500 years *or more*.

4. Consider what traces would be left of these possessions after 500 years and what then could be determined about their owner from what was left behind.

This exercise should inform the class about

- the importance of objects preserved within the archaeological record,
- the importance of context within an archaeological framework,
- the effect of formation process.

Definitions

Formation process: humanly-caused or natural processes by which an archaeological site is modified during or after occupation and abandonment.

Activity # 4
Forensic - Pathological considerations of the Skeleton in the DVD Resource

Learning outcomes for this activity include:

1. To appreciate the importance of marking on bones in terms of pathological, forensic or archaelogical origins

2 To appreciate that bone can inform on pathological as well as its forensic history

3. To appreciate how the Hulton Abbey skeleton and its markings and pathologies can inform upon the life and death of an individual

Differential diagnosis between:

- Pathology
- Sharp force trauma
- Accidental versus inflicted injuries

Consider/appreciate that in both an archaeological and a forensic-criminal context that the whole skeleton may not be present.

What are possible reasons for this?

Activity 4A

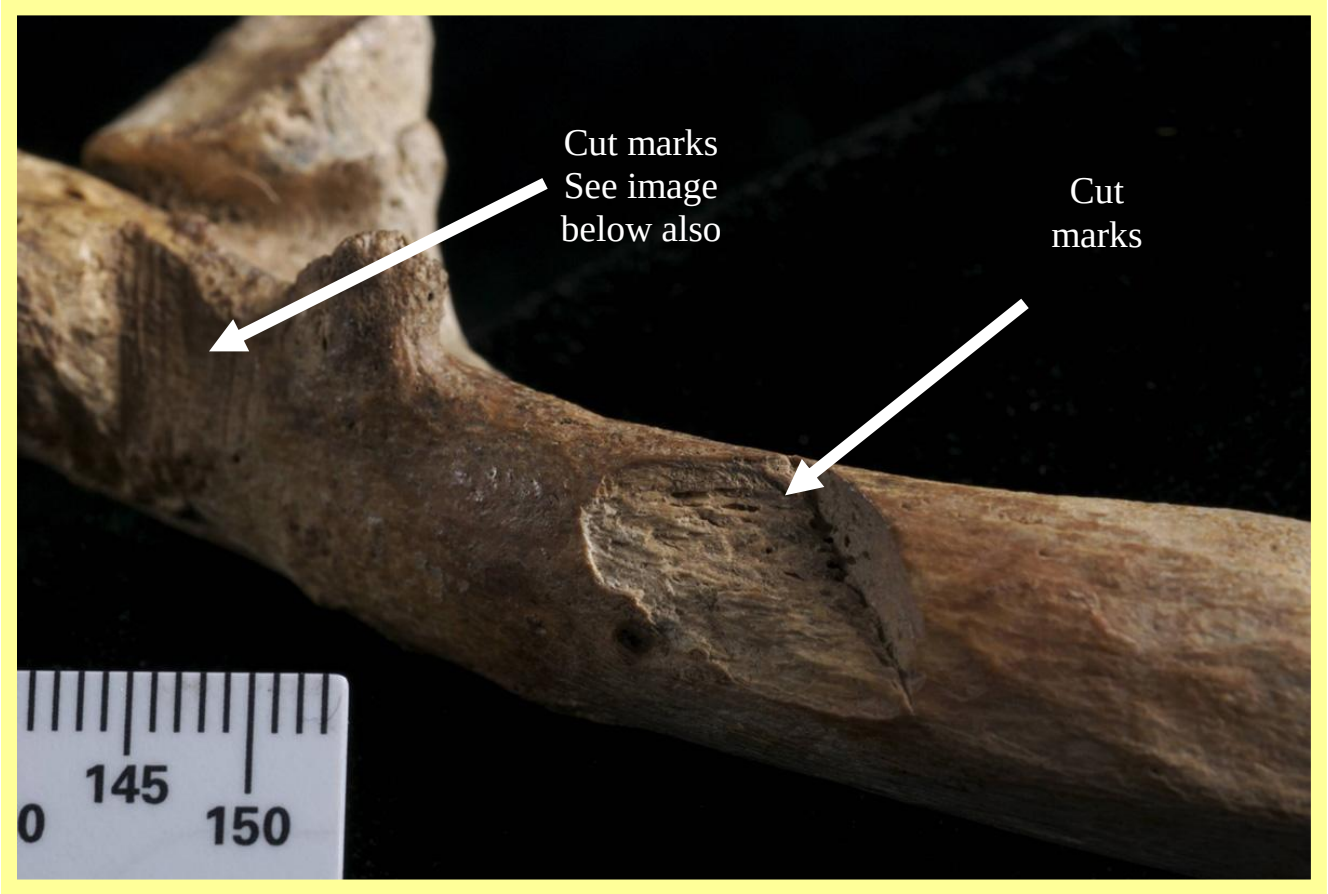
Are there any obvious fractures/breaks in the Hulton Abbey bones on the CD – create a list/table and discuss within a group environment.

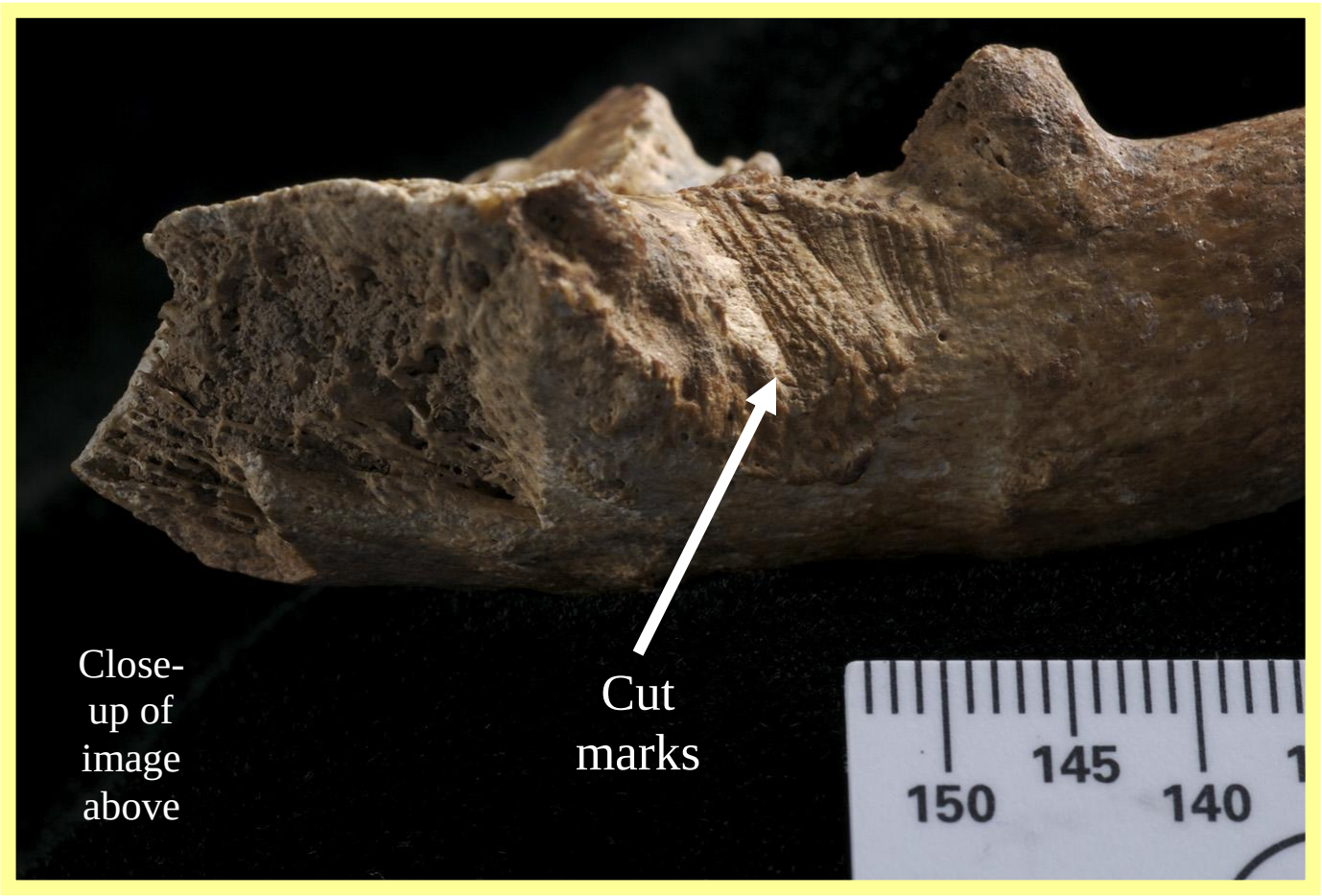
Activity 4B

Detail all/any of the injuries that you the can be observed on the bones of the skeleton in this DVD.

- Tabulate the injuries and discuss them as a class group.
- Read the Article by Dr Mary Lewis (the PDF file on the DVD) and compare your observations to those of the skeleton map showing the distribution of the injuries on **Page 116** of Dr Lewis's paper.
- You can use Dr Lewis's article to understand how this person lived and the social-political consequences that led to his death

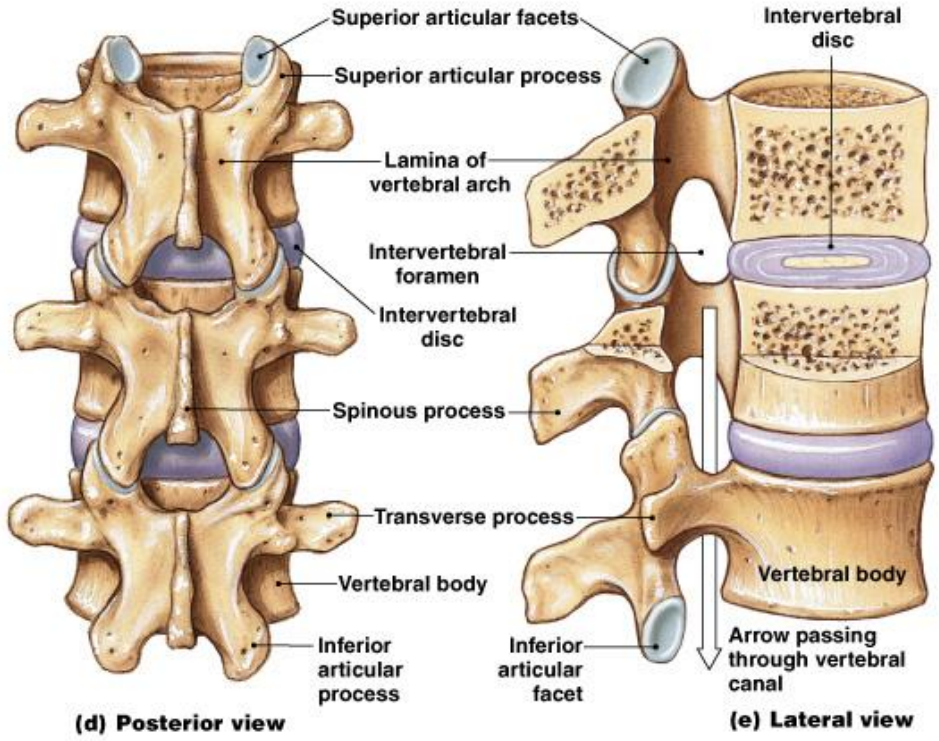
A Traitors Death - The identity of a drawn, hanged and quartered man from Hulton Abbey, Staffordshire –
Dr Mary Lewis *Antiquity* 2008 82 113-124.




Close-up of image above
Cut marks
150
145
140

Activity 4C

Students should be asked to draw some of the more complex images such as the one below (use images such as (a) superior view, (b) lateral and inferior view, (c) inferior view (d) posterior view (e) lateral view of the vertebrae in the drawings below). In doing so they should annotate the obvious anatomical/structural aspects and make any observations concerning the damage present for subsequent discussion within groups.



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Activity 4C

You should work in teams to search the World Wide Web for radiographic images of the following types of fracture

9) Pott's fracture
10) Comminuted fractures
11) Transverse fractures
12) Spiral fractures
13) Displaced fractures
14) Greenstick fracture
15) Epiphyseal fracture
16) Compression fracture

Web sites such as:

http://orthopedics.about.com/od/brokenbones/a/fracturemenu.htm

are a good start

Types of Injury
Sharp Force Trauma [S.F.T.]

S.F.T. refers to any injury by any object which is pointed or has an edge. A 'cut' – often called an incised wound – occurs when a sharp-edged object is drawn across a surface such as skin or bone with enough pressure to cause an injury which may be longer than it is deep. Dependent upon the pressure and weight involved, any sharp weapon can incise, chop, dent, crush and of course cut.

The variations in skeletal wound presentation will result from the physical properties of the weapon involved and the biomechanical properties of the bone involved.

[*See: Spitz WU, 1993 Spitz and Fisher's medicolegal investigation of death: Guidelines for the application of pathology to crime investigation 3rd Edition Springfield Il: Charles C Thomas*]

Activity 4D –

Differential diagnosis = the distinguishing of a disease **or condition** from others presenting similar symptoms

To assist in the differential diagnosis of skeletal trauma:

8) List the location of specific affected areas on bone, including the side/region/aspect.

9) Provide a description of:
   i. The number and types of fractures or defects
   ii. The presence of any abnormal bone shape, growth, or loss
   iii. The severity, state, and distribution of abnormal bone changes
10) Documentation of any radiographic evidence (fractures or weaponry).
11) Analysis of clothing (defects, tears, burning, or weaponry).
12) Estimation of the timing of fractures based on:
   i. Presence of bone reaction
   ii. Color of fractured edges
   iii. Shape of defect or cut mark
   iv. Size of affected area, defect, or cut mark
   v. Appearance of tissue bending
   vi. Location of affected area
   vii. Number of fractures or cut marks
13) Classification of any skeletal pathology by disease category
14) Estimation of the mechanism of injury, class of weapon and victim's position relevant to the direction of the force in relation to the point of impact.

An important question to ask is ‘if the observation is normal’ – ***if it is abnormal***, then a methodical approach should be used included a differential diagnosis giving credence to all possible manners of the injury.

Use the images form the Hulton Abbey DVD to look for different types of trauma.

Activity 4E

NOTE: Remember to complete an appropriate Risk Assessment

A variety of bovine bone is readily available from local butchers. Femurs and ribs bones (which are brad and flat) are useful for this activity.

You are asked to inflict a variety of injuries on these bones and to examine the similarities and differences that these injuries display.

Compare the injuries that you have inflicted on the bones with those of the skeleton in the CD supplied.

Try photographing the injuries you have inflicted on the bovine bone and compare you marks with those of the bones n the DVD.

The class should discuss the injuries and compare, contrast the marks

The class can discuss more obvious injuries, the images on the following pages can be considered –


Image #1


Image #2


Image #3


Image #4

.Notes to Students

Sharp force trauma includes;

Incised wounds - caused by any implement/ object having a sharp edge. This can include knives and broken glass, for example.

Stab wounds - which are incised wounds where the length of injury on the surface is less than the depth of penetration into the body.

Slash wounds - which are incised wounds that are longer than they are deep.

Chop wounds - are caused by implements such as machetes, meat cleavers, swords, axes etc. They are often severe in nature, and can include extensive soft tissue and bone damage. They represent a combination of sharp and blunt force trauma; the sharpness of the cutting edge influences how clean the wound edges are.

The association of injuries to one another, the superimposition of defects or cut marks and the orientation provide essential information for estimating the type of weapon that may have been employed, the position of the victim relative to the assailant and relatives timings of the defect.

Aspects for documenting sharp force trauma to consider are:

- Shape of cut mark – linear or irregular
- Cross section of cut mark – V, semi-V or U shape
- Characteristics of walls of the defect, smooth or serrated
- Characteristics of the floor of the defect, smooth or serrated
- Depth of the feature, is it consistent throughout the cut mark
- Presence of the hilt (common in knife wounds) – usually in soft tissue
- Presence and shape of the defect
- Presence of associated fracture with the defect

(adapted from *Mays, The Archeology of Human Bones*)

Selected General Suggested Reading

This is by no means an exhaustive list, you are advised to search Amazon.co.uk for a comprehensive selection of forensic archaeology and anthropology textbooks; the internet is also a rich source of material.

The Pearson website has a range of useful resources

The Archaeology of Human Bones
Simon Mays. Routledge
ISBN-10: 0415174074

Identification of Traumatic Skeletal Injuries Resulting from Human Rights Violations and Modern Warfare: Identification of Injuries Resulting from Human Rights Abuse and Armed Conflict
Erin H. Kimmerle, Jose Pablo Baraybar
ISBN-10: 0849392691

The Human Bone Manual
Tim D. White, Pieter Arend Folkens. Academic Press
ISBN-10: 0120884674

The Archaeology of Disease
Charlotte Roberts, Keith Manchester. Cornell University Press
ISBN-10: 0801473888

Studies in Crime: Introduction to Forensic Archaeology
Carol Heron, John Hunter, Geoffrey Knupfer, Anthony Martin, Mark Pollard, Charlotte Roberts. Routledge
ISBN-10: 0415166128

The Forensic Anthropology Training Manual
Karen Ramey Burns, Prentice Hall
ISBN-10: 0130492930

Flesh and Bone: An Introduction to Forensic Anthropology
Myriam Nafte Carolina Academic Pr
ISBN-10: 1594603006

Introduction to Forensic Anthropology
Steven N. Byers Prentice Hall
ISBN-10: 0205512291

Forensic Osteology: Advances in the Identification of Human Remains, Second Edition by Kathleen J. Reichs (Editor) ISBN-10: 0398068046

Skills Developed	Evidenced by successful completion of activities:
Understanding of skeletal structure and function	2A, 2B, 2C 4A, 4B, 4C, 4D
Team working and independent working	1A, 1B, 4E Essentially all elements as directed by the tutor
Communication skills: written and oral	1A, 1B in particular
Observational skills	2A, 2B, 2C, 4A, 4B, 4C, 4E
Problem solving skills	All elements as directed by the tutor
Recognition, description and reporting skills	All elements of Activity 2 and of Activity 4
Accuracy in working and reporting	2A, 2B, 2C 4A, 4B, 4C, 4E
Analytical and practical handling skills	2A, 2B, 2C 4A, 4B, 4E
Numerical skills	All elements of Activity 2 and of Activity 4
Enhanced visual literacy in the making, understanding and interpretation of forensic photography	4C

Appendix

Traumatic Injuries to skulls (see also Activity 2c)

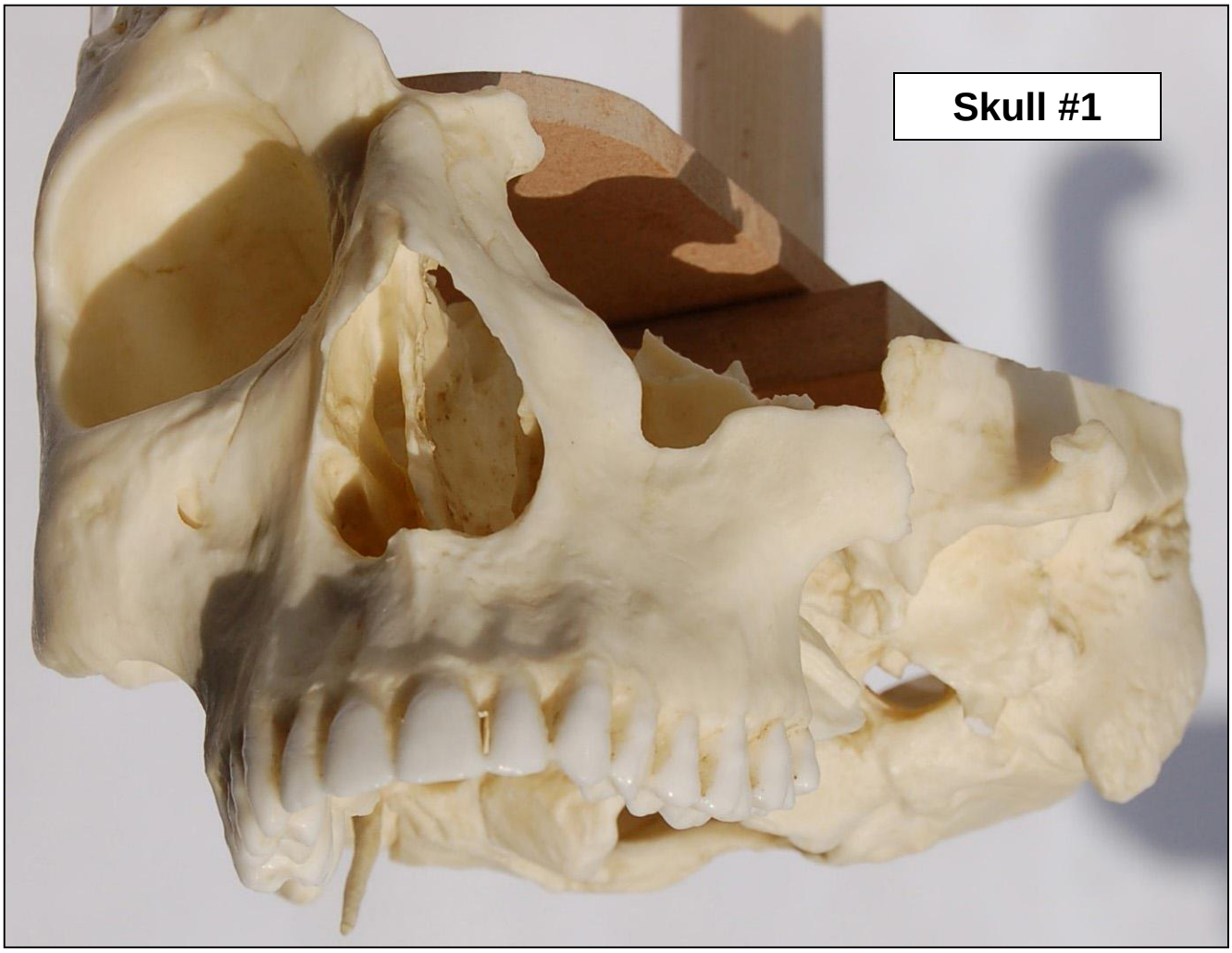
Using these images below, students may be asked to draw and then to describe the injuries. Use the text book by Erin H. Kimmerle, Jose Pablo Baraybar *or similar* or indeed or suitable web sites

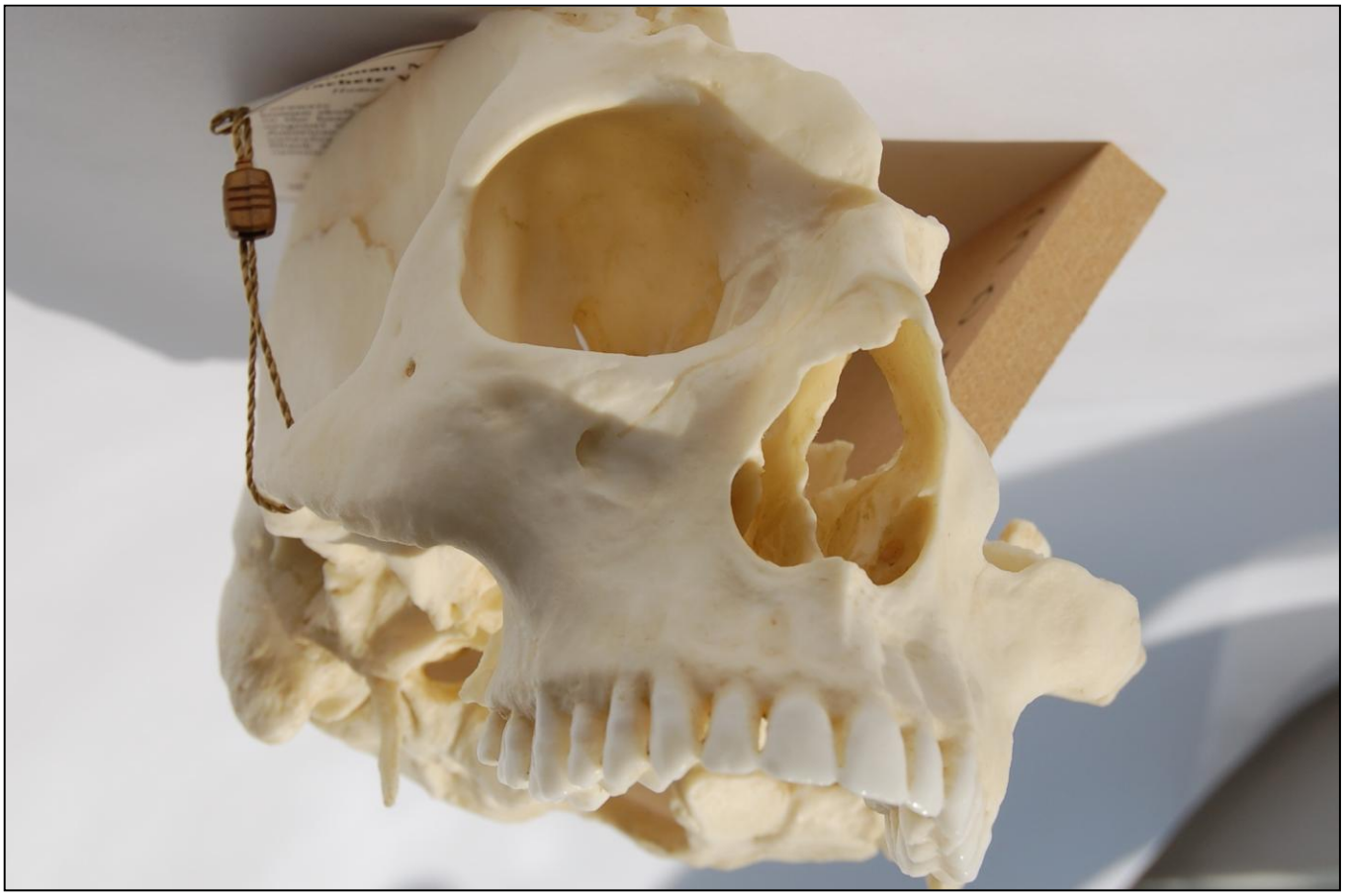
Details of Skull Images Below

Note: all skulls were purchased from the excellent collection of BoneClones

http://www.boneclones.com/index.html

- all images of these skulls in this document were taken at Staffordshire University Department of Foresnic and Crime Science – some of the descriptive material on the next 2 pages has been adapted from the BoneClones website.


Skull #1




Skull #2

Skull #2


Skull #3


Skull #3
posterior
view


Skull #4

Skull #5

End of Document