

ZOOARCHAEOLOGY & FAUNAL ANALYSIS

PURPOSE

This course is an intensive introduction to the methods used to analyze animal bones from archaeological sites, and the procedures and theory used to interpret zooarchaeological data. The focus is on reaching a synthesis of taphonomy and zooarchaeology.

OBJECTIVES

The primary material to be taught will be basic identification of skeletal elements, the recognition of bone breakage patterns and bone modification such as cut marks and tooth marks, and the manipulation of this data for purposes of interpreting the formation processes of bone assemblages and reconstructing human behavior.

At the conclusion of the course, students are expected to:

- A. Be able to specifically identify mammalian bones, or groups of bones, by name - including isolated and fragmentary elements. Be able to identify segments of bones presented in fragments as proximal/distal, medial/lateral, superior/inferior, anterior/posterior. Be able to identify areas of bone growth and how these areas relate to age determination (i.e. epiphyseal closure).
- B. Understand of how zooarchaeology and faunal analysis fits into a general framework of anthropology, including its relationship with archaeology, paleontology, physical anthropology, and philosophy of science.
- C. Understand how research questions in zooarchaeology are developed and the inter-play between research design, methodology, and interpretation.
- D. Identify different types of surface modification at a microscopic level: namely, cutmarks, hammerstone percussion marks, carnivore tooth marks, and rodent gnawing. Be able to interpret these patterns in terms of site formation processes and agent of accumulation.
- E. Identify different patterns of weathering and bone breakage: namely, transverse/right; spiral/green; and intermediate. Be able to interpret these patterns in terms of site formation processes.
- F. Differentiate skeletal element counts such as NISP and MNE.
- G. Identify implications of human behavior based on mortality profiles.

FORMAT

Twenty hours of class work and twenty hour of laboratory work are required for this class. The suggested class format is approximately two hours of lecture and four hours of laboratory work per week. Lecture will also include time for discussion of assigned readings and an opportunity for students to present a case study from the Southwest and their opinions as to the effectiveness of the study in question. The laboratory section should be structured as an open work time where students work individually with the comparative faunal collections to familiarize themselves with mammalian skeletal remains from the Southwest. In addition to the lecture and laboratory times, students will hand in a one page summary of an article once a week.

PREREQUISITES

None - No prior training necessary, although it is recommended to have taken human osteology.

TEXTBOOK

Zooarchaeology Readings course handout(s)
Archaeology of Animals by Simon Davis

Useful books:

Vertebrate Taphonomy by R. Lee Lyman
Zooarchaeology by E.S. Reitz & E.S. Wing

RESOURCE MATERIAL

For students to derive a reasonable knowledge of mammalian skeletal anatomy and identify surface modification, it is recommended that they have access to a comparative collection of remains from the Southwest as well as a comparative taphonomic collection.

LABORATORY MATERIALS

- A. 10x hand lens
- B. Digital or hand drawn caliper 15cm
- C. Scale with accuracy of +/- 1 gram or +/- 0.1 grams (provided at laboratory)
- D. Microscope: stereo zoom minimum 20x capability (provided at laboratory)
- E. Analysis forms
- F. Labeling materials
- G. Drawing materials
- H. Comparative Faunal Collections (provided at laboratory as required)

COURSE OUTLINE

Lecture 1: Introduction: Taphonomy & Zooarchaeology

Differentiate the two fields and understand their respective roles in interpreting faunal assemblages; tie in to history and philosophy of science and development of zooarchaeology as a discipline.

Lecture 2: Subsistence Ecology & Human Behavior

Identify push-pull factors for human mobility and subsistence ecology. Discuss how the development of pastoralism can be addressed through faunal analysis.

Lecture 3: Identifying Basic Skeletal Anatomy & Dentition

Review from Lab 1 and emphasize dentition. Go through deciduous and adult dentition, dental formulas, and the growth and development of mammalian teeth. Emphasize tooth morphology and correlation with ecological niche.

Lecture 4: Quantitative Measures in Zooarchaeology

Discuss the differences between NISP, MNI, and MNE. Discuss pros and cons to each system of measure and what type of research situation best suits each measure.

Lecture 5: Identifying Surface Modification

Identify basic forms of surface modification: rodent, carnivore, and human. Describe each type and show examples of surface modification from comparative taphonomic collection.

Lecture 6: Interpreting Surface Modification

Review types of surface modification. Describe how different types of surface modification and the relative frequencies of surface modification type allow researchers to infer agent(s) of accumulation and site formation processes for zooarchaeological assemblages.

Lecture 7: Bone Breakage and Weathering

Describe different types of bone breakage and fracture angle - discuss implications for site formation processes.

Lecture 8: Mortality Profiles

Discuss implications of mortality profiles for zooarchaeologists to infer: 1) resource exploitation strategy and 2) process of domestication. Examples of aging based on comparative collection.

Lecture 9: Basic Graphs, Databases, Simple Statistics & Curation of Faunal Material

Students learn how recording sheets and databases are constructed for recording zooarchaeological observations on an assemblage and work to design their own database and data entry forms. Discuss effective and ineffective ways to summarize data. Discuss

curation of faunal material.

Lecture 10: Zooarchaeological Case Studies

Students present case studies for zooarchaeological and faunal analyses from a geographic or temporal region of interest.

(Examples of possibilities are found in the attached references section.) Students should summarize the articles, dissect the author's argument, and explain how effectively they think the author communicates his/her argument.

Lab 1: Identifying Basic Skeletal Anatomy

Basic bones of the mammalian skeleton: cranial (frontal, parietal, occipital, temporal, maxilla), mandible, dentition, vertebral column (atlas, axis, cervical, thoracic, lumbar), rib, humerus, radius, ulna, innominate, femur, tibia, metapodials. Also introduce anatomical terminology. Students begin sketches of comparative material labeling the bones and anatomical orientations of their sketches.

Lab 2: Site Material & Comparative Collection

Students begin to examine the archaeological material and sort by skeletal element. Sorting by skeletal element helps to become more proficient at identifying bones. Students use comparative collection as a guide for sorting by skeletal element.

Lab 3: Site Material & Comparative Collection; Identifying Surface Modification

Lab 4: Site Material & Comparative Collection; Identifying Surface Modification

Students continue to work through the archaeological material, using the comparative collection as a guide. Students continue to identify surface modification from the comparative collection and on the archaeological assemblage.

Lab 5: Databases, Basic Graphs, & Simple Statistics; Site Material & Comparative Collection

Students continue to work through the archaeological material, using the comparative collection as a guide. Also, students design and begin to implement their database design for analyzing archaeological collection.

LISTS OF TERMS USED IN ZOOARCHAEOLOGY

Physical Landmark Terms

Anterior vs. posterior

Appendicular skeleton: pelvic and pectoral girdles and extremities

Axial skeleton: cranium, vertebrae, ribs, sternum

Canal: tunnel, as in the sacral canal

Cranial vs. caudal

Condyle: rounded eminence, as on the proximal tibia

Crest: a sharp border, as in the sacral or iliac crests

Dorsal vs. ventral

Diaphysis: shaft of long bones

Digitigrade: phalanges only touch ground during locomotion

Epiphysis: articular end

Flat bones: for protection and muscle support, such as scapula, skull (not weight bearing)

Foramen: hole, as in the obturator foramen, or nutrient foramina

Fossa: depression, as in the acetabular fossa, iliac fossa, olecranon fossa, and radial fossa

Head: a smooth rounded eminence for articulation as on the humerus and femur

Incisure: a notch, as in the greater sciatic notch of pelvis, or the acetabular notch

Irregular bones: vertebrae, maxilla, etc.

Lateral vs. medial

Lip: margin of a groove, crest, or line

Long bones: sustain weight, provide muscle attachments, such as the radius, or femur

Metaphysis: line of fusion

Pectoral girdle

Pelvic girdle

Proximal vs. distal

Process: projection, as in the coronoid process of the ulna, styloid process of the cranium,

coracoid process of the scapula, and transverse processes of vertebrae

Plantigrade: podials, metapodials, and phalanges touch the ground

Ridge: long spine

Sinus: cavity lined with mucus membrane

Short bones: compact bones with limited motion such as phalanges, metacarpals and metatarsals

Spine: a sharp prominence, such as the neural spine, or acromion spine

Sulcus: a groove, as in the medial epicondyle and trochlea of humerus

Suture: junction between bones, particularly of the skull

Symphysis: where bones come together, as in the pubic or mandibular symphyses

Trochanter: a large prominence for muscle attachments, as in the greater and lesser trochanters of the femur

Trochlea: pulley-like articulation, such as on the distal humerus

Unguligrade: only the last phalanx touches the ground

Skeletal Elements

Skull:

Dentary/mandible, Maxilla, Premaxilla, Nasal, Frontal, Parietal, Squamosal/Temporal, Occipital, Zygomatic Arch (Jugal), Incisor, Canine, Premolar, Molar, Endocranium, Vomer, Hyornandibular, Operculum, Preoperculum, Articular, Cleithrum, Otolith, Quadrate

Axial

Centrum, Cervical, Thoracic, Lumbar, Caudal, Sacrum, Atlas, Axis, Urostyle, Pygostyle

Axial Skeleton

Humerus, Radius, Ulna, Femur, Tibia, Metapodials, Patella, Podials, Calcaneus, Astragalus, Carpometacarpus, Tarsometatarsus, Tibiotarsus, Phalanx

Pectoral Girdle

Coracoid, Scapula, Furculum, Sternum, Clavicle

Pelvic Girdle

Synsacrum, Ilium, Ischium, Pubis, Acetabulum

Other

Epiplastron, Entoplastron, Hyoplastron, Hypoplasrron, Xiphiplastron, Peripheral, Costal, Nuchal, Neural, Pygal

Reading References

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