

SKELETONS: Museum of Osteology

Forensic Pathology: Human Skulls

Teacher Resource

Grade Levels: 9th – 12th Grade

9th -12th Grade Oklahoma Academic Standards (OAS)

HS-LS3-1 Heredity: Inheritance and Variation of Traits

Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.

HS-LS3-2 Heredity: Inheritance and Variation of Traits

Make and defend a claim based on evidence that inheritable genetic variations may result from: (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors.

6.GM.3.2

Solve problems in various real-world and mathematical contexts that require the conversion of weights, capacities, geometric measurements, and time within the same measurement systems using appropriate units.

Program Overview:

Forensic Pathology: Human Skulls is a lab based program focusing on the deviation from a healthy or normal structure or function to reveal an abnormality, illness, or malformation of the human skull. After a basic introduction to skull osteology, pathology, and lab procedures, students will break-up into teams using a variety of tools from their forensic science kit to evaluate and document key evidence to support their results. They will then defend their findings to the class. Museum quality replicas of human skulls are used in this program.

Learning Objectives:

- Participants will successfully identify various pathological signatures to the skull and associated dentition.
- Participants will successfully utilize forensic measuring instruments to perform their evaluation.
- Participants will successfully work as teams in a lab environment—to document the expressed symptoms, research these symptoms, and communicate their findings to the class.

Background:

In this program, forensic pathology is the process of analyzing defects to the human skull and associated dentition that are the result of a disease or illness. Detailed cranial/dental measurements; knowledge of pathology signature/patterns; and comprehensive documentation are essential to forensic pathology.

Vocabulary:

- Forensic Science
- Pathology
- Frontal Bone
- Parietal Bone
- Occipital Bone
- Temporal Bone
- Squamous
- Nasal Bone
- Maxillary Bone
- Palatine
- Sagittal Suture
- Coronal Suture
- Squamosal Suture
- Lambdoidal Suture
- Bregma
- Lambda
- Orbit
- Occipital Condyle

- Foramen Magnum
- Zygomatic Arch
- Supra-orbital Ridge
- Mandible
- Incisor
- Canine
- Premolar
- Molar
- Mastoid Process
- Occipital Protuberance
- Sphenoid Bone
- Vomer
- Infraorbital/Supraorbital Foramen
- Mental Foramen
- Styloid Process
- Pterygoid process (medial/lateral)
- Wormian Suture
- Wormian Bone
- External Auditory Meatus
- Concha
- Adenoma
- Growth Hormone
- Craniosynostosis
- Achondroplasia
- Mutation
- Attrition
- Toxicology
- Ballistics
- Trace evidence
- Serology
- DNA technology
- Prognathism

Reference: visit the SKELETONS: Museum of Osteology Education web page at:
<http://skeletonmuseum.com/education>

Recommended Reading:

Baker, Brenda J. Dupras, T., and Tocheri, M. W.
 2005 *The Osteology of Infants and Children*. Texas A&M University Press

Fairgrieve, Scott I.
 1999 *Forensic Osteological Analysis: A Book of Case Studies*. Charles C Thomas Publisher.

Gilbert, B. Miles
 1990 *Mammalian Osteology*. Missouri Archaeological Society, Columbia, MO.

Guy, J. F.
 2009 *Learning Human Anatomy: A Laboratory Text and Workbook*. Prentice Hal

White, Tim
 1999 *Human Osteology*. Academic Press. Burlington, MA.

While at SKELETONS:

- Visit the Pathology Exhibit and have students point out various types of bone and skull pathology.
- At the Pathology Exhibit, discuss the various bone cells and the role they play in the bone remodeling process.
- Discuss how certain bone pathologies would influence skull and bone growth from birth to adulthood.
- Discuss sexual dimorphism in humans while visiting the Pathology Exhibit and Primate Exhibit.
- Have your students discuss the scientific approach they would use to evaluate the human skull for various types of abnormalities.