



Bioarchaeology Workshops

Human skeletal remains: from Excavation to the Lab

Workshop 2

Lecture

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Human Osteology

1. General terminology

(Adapted from Marsches et al. 2005, *Human Osteology and Skeletal Radiology. An Atlas and Guide*, and from White et al. 2011, *Human Osteology*)

Planes of reference

<i>Sagittal</i>	A plane through the body from front to back that divides the body into left and right halves. Any planar slice through the body that parallels the sagittal plane is called a parasagittal plane; also called midsagittal, median, or midline
<i>Coronal</i>	A plane at right angles to the sagittal plane that divides the body into front and back halves; also called frontal
<i>Transverse</i>	A plane through the body perpendicular to the sagittal and frontal planes; also called horizontal
<i>Frankfort</i>	A plane running through the bottom of the left orbit (<i>orbitale</i>) and the upper margin of the left and right external auditory meati (<i>porion</i>); also called Frankfort Horizontal

Directional terms

<i>Superior</i>	Up, or toward the head; also called cranial for quadrupeds
<i>Inferior</i>	Down, or away from the head; also called caudal for quadrupeds
<i>Anterior</i>	Toward the front of the body; also called ventral for quadrupeds
<i>Posterior</i>	Toward the back of the body; dorsal for quadrupeds
<i>Medial</i>	Toward the midline of the body
<i>Lateral</i>	Away from the midline of the body
<i>Proximal</i>	Closest to an articular point; nearest the axial skeleton
<i>Distal</i>	Farthest from an articular point; away from the axial skeleton
<i>External</i>	Outer/outside
<i>Internal</i>	Inside
<i>Ectocranial</i>	The outer surface of the cranial vault
<i>Endocranial</i>	The inner surface of the cranial vault
<i>Superficial</i>	Closest to the surface
<i>Deep</i>	Farther from the surface
<i>Subcutaneous</i>	Below the skin
<i>Palmar</i>	The palm side of the hands
<i>Plantar</i>	The sole side of the foot
<i>Dorsal</i>	The top of the foot or back of the hand

2. Anatomical terminology

Terms involving shapes or locations of bones

<i>Pneumatic bones</i>	Bones that contain air-filled cavities lined by mucous membranes, e.g., the paranasal air sinuses, which are involved in the sinus headache
<i>Sesamoid bones</i>	These bones are formed within tendons and get their name from their supposed resemblance to a sesame seed. The largest sesamoid bone in the human body is the patella (the knee cap)
<i>Tabular bones</i>	These are simply bones with a flat shape such as the shoulder blade or the bones forming the roof or sides of the skull
<i>Tubular bones</i>	These are bones sometimes referred to as long bones. These bones are characterized by having an epiphysis at one or both ends plus a centrally located shaft containing a hollow marrow cavity

Terms involving raised areas on the surface of bones

<i>Articulation</i>	An area where two bones contact at a joint
<i>Boss</i>	A smooth, broad eminence
<i>Caput or head</i>	A rounded articular process, generally marked off by a narrower part, the neck. The word <i>capitulum</i> is used to denote a smaller articular swelling
<i>Condyle</i>	Is employed to describe a bony enlargement bearing an articular surface
<i>Crest or crista</i>	Either a prominent ridge-like border of a bone or a distinct linear elevation or ridge on a bone
<i>Eminence</i>	A rounded bulge on a bone
<i>Epicondyle</i>	A non-articular projection near a condyle
<i>Facet</i>	A small articular surface
<i>Hamulus</i>	A hook-shaped projection
<i>Head</i>	A large rounded articular end of a bone
<i>Line</i>	This usually refers to a slight ridge that runs a considerable distance along the surface of a bone
<i>Malleolus</i>	A rounded protuberance of the ankle
<i>Neck</i>	The section of a bone between the head and the shaft
<i>Process or processus</i>	A marked projection coming off the surface of a bone
<i>Ridge</i>	A linear bony elevation
<i>Spine or spina</i>	A slender or pointed projection coming off a bone
<i>Torus</i>	A bony thickening
<i>Trochanter</i>	A large tubercle
<i>Tubercle</i>	Refers to a blunt eminence
<i>Tuberosity</i>	Refers to a broad blunt elevation

Terms involving depressions and cavities on or in bones

<i>Alveolus</i>	A tooth socket
<i>Antrum or sinus</i>	Denotes air spaces within certain cranial bones
<i>Aperture</i>	This is sometimes used to distinguish the surface opening of a space within a bone
<i>Canal or canalis</i>	A perforation continued some distance to form a passage
<i>Cavity or cavum</i>	Applies to a closed space within a bone. For example, the marrow cavity
<i>Fontanelle</i>	A cartilaginous space between cranial bones of an infant
<i>Foramen</i>	A hole through a bone
<i>Fissure or fissure</i>	A narrow, slit-like aperture
<i>Fossa</i>	A deep open depression, whether formed by a single bone or by several bones
<i>Fovea</i>	A shallow pit on a bone
<i>Hiatus</i>	Sometimes used for a slit-like aperture
<i>Meatus</i>	A term used for certain passageways in the temporal bone and the passageways from the nasal cavity into the paranasal sinuses
<i>Sinus</i>	A cavity within a cranial bone
<i>Sulcus</i>	A long, wide groove
<i>Suture</i>	A fibrous, interlocking joint of the cranial bones

3. Skeletal anatomy

The human skeleton can be divided into several major sections.

The **cranial skeleton** refers to the bones of the skull including the mandible, while the **postcranial skeleton** (or **infracranial skeleton**) refers to everything below the skull. The postcranial skeleton can be further subdivided into the **axial skeleton**, which consists of bones along and near the body's midline, and the **appendicular skeleton**, which consists of the bones of the limbs as well as their supporting structures where they connect with the axial skeleton.

Bones of the skull and associated features

Frontal bone	Bone comprising the frontmost portion of the neurocranium and the superior portions of the orbits
Frontal squama	The vertical portion making up the forehead
Horizontal portion	The portion comprising the orbital roofs
Superciliary arches	The bony tori over the orbits (also called the brow ridge)
Parietal bones	Paired bones forming the sides and roof of the cranial vault
Parietal eminence	The large, rounded eminence in the center of the bone
Meningeal grooves	Vascular grooves on the endocranial surface from the middle meningeal arteries
Temporal bones	Paired bones forming the lateral cranial vault and part of the cranial base; also house the auditory ossicles
Temporal squama	The vertical plate-like portion
Petrous pyramid	The dense endocranial portion
External auditory meatus (EAM)	The opening of the ear canal
Mastoid process	The roughened inferior projection
Auditory ossicles	Small bones housed in the temporal bone; each side has three - the malleus , incus , and stapes
Occipital bone	Bone forming the back of the cranial vault and base
Squamous portion	The vertical portion that is part of the cranial base
Basilar portion	The thick anterior/inferior projection
Foramen magnum	The large hole for the passage of the brain stem
External occipital protuberance	The variably pronounced projection on the posterior ectocranial surface
Occipital condyles	The articular surfaces for the first cervical vertebra
Maxillae	Paired bones forming a majority of the face
Alveolar process	The portion that holds the teeth
Alveoli	Holes for the roots of the teeth
Anterior nasal spine	Projection forming the inferior portion of the nasal aperture
Palatines	Paired L-shaped bones forming the posterior palate
Vomer	Small thin bone that divides the nasal cavity
Inferior nasal conchae	Paired bones forming the lateral walls of the nasal cavity
Ethmoid	Spongy bone located between the orbits
Lacrimal	Thin rectangular bones of the medial walls of the orbits
Nasals	Paired bones that form the bridge of the nose
Zygomatics	Paired bones of the cheeks
Sphenoid	Bone situated between the cranial vault and the face
Body	The robust portion on the midline
Greater wings	The laterally extending segments
Lesser wings	Posterior projections on the endocranial surface
Mandible	Lower jaw
Body	Thick anterior portion that holds the teeth

Ramus	Thin vertical portion that articulates with the cranial base
Sagittal suture	The articulation between the two parietal bones
Coronal suture	The articulation between the frontal and parietal bones
Lambdoidal suture	The articulation between the occipital and the parietals and temporals
Metopic suture	The articulation between the left and right frontal halves, only occasionally retained into adulthood
Basilar suture	The articulation between the sphenoid and the basilar portion of the occipital bone; also called the spheno-occipital synchondrosis
Nasal aperture	The hole for the nose, formed by portions of the nasal bones and maxillae
Orbits	The sockets for the eyes, formed by numerous cranial bones
Sinuses	Air pockets, located in the frontal, maxillae, ethmoid, and sphenoid bones
Temporal line	Raised line that anchors the temporalis muscle, which crosses the frontal and parietal bones
Temporomandibular joint	The joint where the temporal bones articulate with the mandible

Bones of the axial skeleton and associated features

Hyoid bone	U-shaped bone of the anterior neck
Sternum	Breastbone
Manubrium	The wide, superior portion of the sternum
Corpus sterni	The thin central portion of the sternum
Xiphoid	The variably fused inferior tip of the sternum
Vertebrae	Bones of the spinal column
Body	The anterior and primary weight-bearing portion
Vertebral arch	The posterior portion, enclosing the spinal cord
Vertebral foramen	The hole through which the spinal cord passes; comprises the body and the vertebral arch
Spinous process	The most posterior projection
Transverse process	The laterally directed projections
Articular facets	Projections for articulation with adjacent vertebrae
Cervical vertebrae	The most superior vertebrae in the spinal column, normally seven total
Atlas	The first (most superior) cervical vertebra, which articulates with the occipital bone
Axis	The second cervical vertebra, which forms a pivot with the atlas
Transverse foramen	Foramen through the transverse process
Thoracic vertebrae	The middle vertebrae in the spinal column, normally 12 total
Costal fovea	Articular facets for the ribs
Lumbar vertebrae	The most inferior vertebrae in the spinal column, normally five total
Mammillary process	Superior projection for the articular facets
Sacrum	The most inferior portion of the spinal column and the posterior portion of the pelvis, formed from five fused sacral segments
Coccyx	The variably fused 3–5 segments of the vestigial tail
Ribs	Long slender bones of the rib cage, normally 12 on each side or 24 total
Head	The most proximal portion, which articulates with the thoracic vertebral body
Shaft	The curved main part of the rib
Sternal end	The most anterior portion which articulates with the costal cartilage
Vertebral column	Comprises the cervical, thoracic, and lumbar vertebrae as well as the sacrum and coccyx
Rib cage	The protective structure formed by the 24 ribs

Bones of the upper limb and associated features

Clavicle	S-shaped bone that articulates with the sternum and scapula; also called the collar bone
Scapula	Flat, triangular-shaped bone; also called the shoulder blade
Spine	The raised posterior ridge
Acromion process	The lateral most projection of the spine
Coracoid process	The anterolateral projection
Glenoid fossa	Shallow cavity that articulates with the humerus
Humerus	The bone of the upper arm
Head	Rounded portion that articulates with the scapula
Greater and lesser tubercles	Blunt eminences on the anterior aspect of the proximal humerus
Deltoid tuberosity	Eminence on the lateral shaft for insertion of the deltoid muscle
Trochlea	Spool-shaped distal region, for articulation with the ulna
Olecranon fossa	Posterior hollow, articulates with the olecranon process
Radius	The lateral bone of the forearm
Head	Rounded proximal end, for articulation with the humerus
Radial tuberosity	Eminence on the proximal anteromedial for insertion of the biceps muscle
Styloid process	The sharp projection on distal end
Ulnar notch	Concave articulation with the ulna
Ulna	The medial bone of the forearm
Olecranon process	The proximal projection, which is the insertion for the triceps muscle
Styloid process	The sharp projection on the distal end
Carpals	The eight bones of the wrist, consisting of the scaphoid, lunate, triquetral, pisiform, trapezium, trapezoid, capitate, and hamate
Metacarpals	The five bones of the hand
Manual phalanges	The bones of the fingers; on each side there are five proximal phalanges, four intermediate phalanges, and five distal phalanges (singular: phalanx)
Shoulder girdle	Supporting structure of the upper limb, consisting of the clavicle and scapula
Elbow	The joint between the humerus and the radius/ulna
Sesamoid bone	Accessory bone of the hand or wrist
Nutrient foramen	Present on the anterior surfaces the humerus, radius, and ulna; provides passage for vascular supply

Bones of the lower limb and associated features

Innominate	Hip bone; also called the os coxa
Ilium	The blade-like superior portion
Ischium	The posteroinferior portion
Pubis	The anterior portion
Acetabulum	The round hollow, which forms the hip socket and articulates with the femoral head
Greater sciatic notch	Wide notch on the ilium
Pubic symphysis	The anterior surface where the left and right innominates meet
Auricular surface	The posterior surface of the ilium, which articulates with the sacrum
Femur	The bone of the upper leg
Femoral head	The round proximal part that articulates with the innominate
Linea aspera	The raised ridge on the posterior shaft
Condyles	The large protrusions on the posterior distal portion
Trochanters	Blunt prominences on the proximal posterior surface
Patella	The knee cap

Tibia	The major of the two lower leg bones; also called the shin bone
Tibial tuberosity	The roughened area on the anterior surface of the proximal end
Medial malleolus	The projection on the medial surface of the distal end
Anterior crest	The sharp ridge forming the shin
Fibula	The smaller, lateral bone of the lower leg
Malleolus	The projection on the lateral surface of the distal end
Tarsals	The seven bones of the ankle, consisting of the talus, calcaneus, navicular, cuboid, medial cuneiform, intermediate cuneiform, and lateral cuneiform
Metatarsals	The five bones of the foot
Pedal phalanges	The bones of the toes; on each side there are five proximal phalanges, four intermediate phalanges, and five distal phalanges
Pelvic girdle	Supporting structure of the lower limb, consisting of the innominates
Knee	The joint between the femur and tibia and also including the patella
Sesamoid bone	Accessory bone of the foot or ankle
Nutrient foramen	Present on the posterior surfaces the femur, tibia, and fibula; provides passage for vascular supply