38.1D: Human Appendicular Skeleton

The appendicular skeleton supports the attachment and functions of the upper and lower limbs of the human body.

Learning Objectives

• Describe the bones and functions of the human appendicular skeleton

Key Points

• The human appendicular skeleton is composed of the bones of the upper limbs, the lower limbs, the pectoral girdle, and the pelvic girdle.
• The pectoral girdle acts as the point of attachment of the upper limbs to the body.
• The upper limb consists of the arm, the forearm, and the wrist and hand.
• The pelvic girdle is responsible for bearing the weight of the body and is responsible for locomotion; it is also responsible for attaching the lower limbs to the body.
• The lower limbs, including the thighs, legs, and feet, support the entire weight of the body and absorb the resulting forces from locomotion.

Key Terms

• **axial skeleton**: the bones of the head and trunk of an organism
• **appendicular**: of or pertaining to a limb or appendage
• **clavicle**: the collar bone; the prominent bone at the top of the chest between the shoulder and the neck
• **scapula**: either of the two large, flat, bones forming the back of the shoulder

• **articulate**: to form a joint or connect by joints

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**Human Appendicular Skeleton**

The human appendicular skeleton is composed of the bones of the upper limbs (which function to grasp and manipulate objects) and the lower limbs (which permit locomotion). It also includes the pectoral (or shoulder) girdle and the pelvic girdle, which attach the upper and lower limbs to the body, respectively.

Figure \(\PageIndex{1}\): **Appendicular skeleton**: The appendicular skeleton is composed of the bones of the pectoral limbs (arm, forearm, hand), the pelvic limbs (thigh, leg, foot), the pectoral girdle, and the pelvic girdle.
The Pectoral Girdle

The pectoral girdle bones, providing the points of attachment of the upper limbs to the axial skeleton, consists of the clavicle (or collarbone) in the anterior, as well as the scapula (or shoulder blades) in the posterior. The clavicles, S-shaped bones that position the arms on the body, lie horizontally across the front of the thorax (chest) just above the first rib.

![Clavicle and Scapula](image)

Figure \((\PageIndex{1})\): Pectoral girdle: (a) The pectoral girdle in primates consists of the clavicles and scapulae. (b) The posterior view reveals the spine of the scapula to which muscle attaches.

The scapulae are flat, triangular bones that are located at the back of the pectoral girdle. They support the muscles crossing the shoulder joint. The spine runs across the back of the scapula; it is a good example of a bony protrusion that facilitates a broad area of attachment for muscles to bone.

The Upper Limbs

The upper limbs contain 30 bones in three regions: the arm (shoulder to elbow), the forearm (ulna and radius), and the wrist and hand. The humerus is the largest and longest bone of the upper limb and the only bone of the arm. It articulates (joins) with the scapula at the shoulder and with the forearm at the elbow. The forearm, extending from the elbow to the wrist, consists of two bones: the ulna and the radius. The radius, located along the lateral (thumb) side of the forearm, articulates with the humerus at the elbow. The ulna, located on the medial aspect (pinky-finger side) of the forearm, is longer than the radius. It articulates with the humerus at the elbow. The radius and ulna also articulate with the carpal bones and with each other, which in vertebrates enables a variable degree of rotation of the carpus with respect to the long axis of the limb. The hand includes the eight bones of the carpus (wrist), the five bones of the metacarpus (palm), and the 14 bones of the phalanges (digits). Each digit consists of three phalanges, except for the thumb, which, when present, has only two.
The Pelvic Girdle

The pelvic girdle attaches to the lower limbs of the axial skeleton and is responsible for bearing the weight of the body and for locomotion. It is securely attached to the axial skeleton by strong ligaments. It also has deep sockets with robust ligaments to securely attach the femur to the body. The pelvic girdle is further strengthened by two large hip bones. In adults, the hip bones are formed by the fusion of three pairs of bones: the ilium, ischium, and pubis. The pelvis joins together in the anterior of the body the pubic symphysis joint and with the bones of the sacrum at the posterior of the body.

The Lower Limbs

The lower limbs consists of the thigh, the leg, and the foot. The bones of the lower limb are the femur (thigh bone), patella (kneecap), tibia and fibula (bones of the leg), tarsals (bones of the ankle), and metatarsals and phalanges (bones of the foot). The bones of the lower limbs are thicker and stronger than the bones of the upper limbs because of the need to support the entire weight of the body along with the resulting forces from locomotion.
The femur, or thighbone, is the longest, heaviest, and strongest bone in the body. The femur and pelvis form the hip joint at the proximal end. At the distal end, the femur, tibia, and patella form the knee joint. The patella, or kneecap, is a triangular bone that lies anterior to the knee joint; it is embedded in the tendon of the femoral extensors (quadriceps). It improves knee extension by reducing friction. The tibia, or shinbone, is a large bone of the leg that is located directly below the knee. The tibia articulates with the femur at its proximal end, with the fibula and the tarsal bones at its distal end. As the second largest bone in the human body it is responsible for transmitting the weight of the body from the femur to the foot. The fibula, or calf bone, parallels and articulates with the tibia. It is not weight-bearing, but acts as a site for muscle attachment while forming the lateral part of the ankle joint.

The tarsals are the seven bones of the ankle, which transmits the weight of the body from the tibia and the fibula to the foot. The metatarsals are the five bones of the foot, while the phalanges are the 14 bones of the toes.
metatarsals and the phalanges.

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