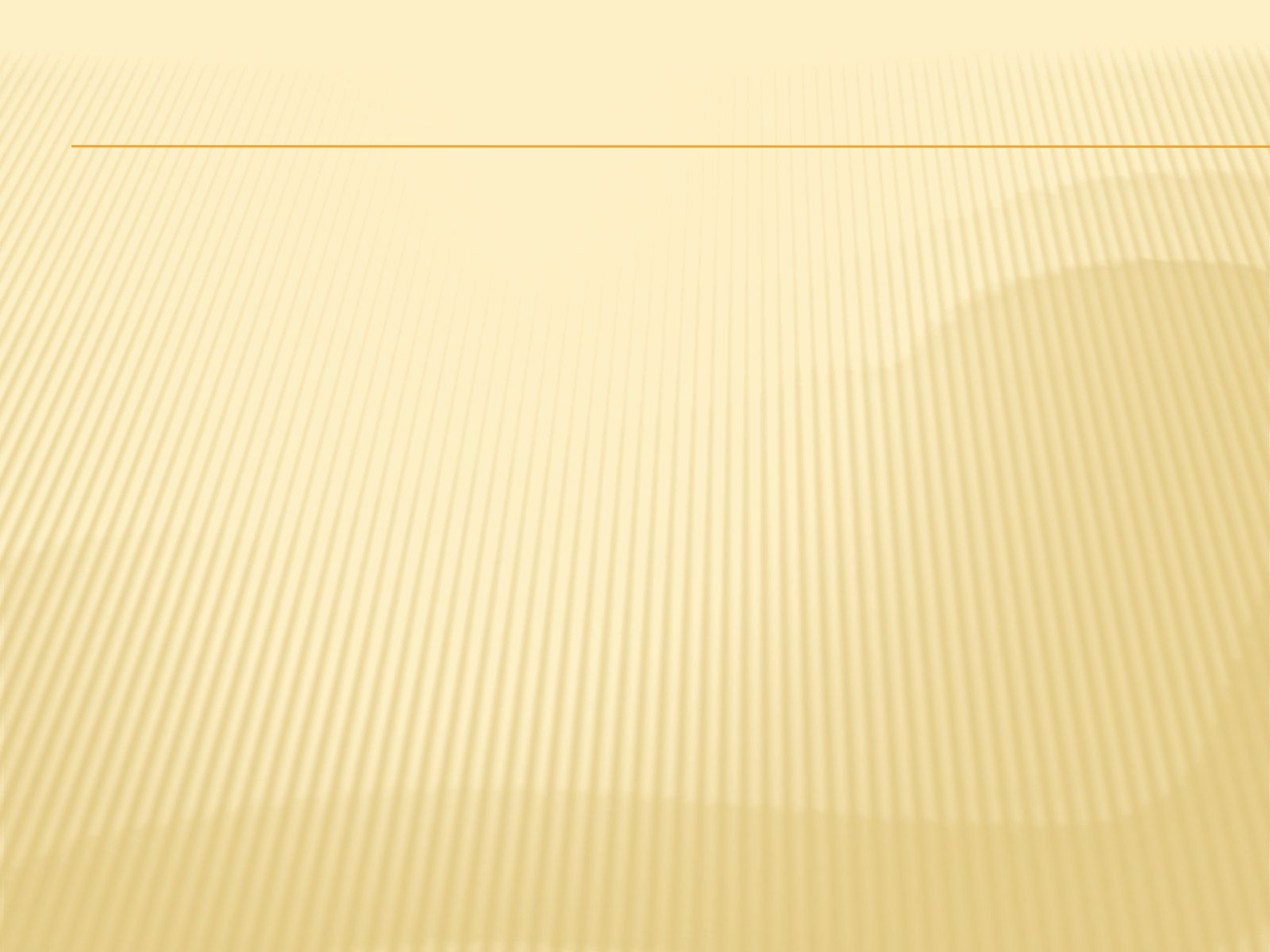
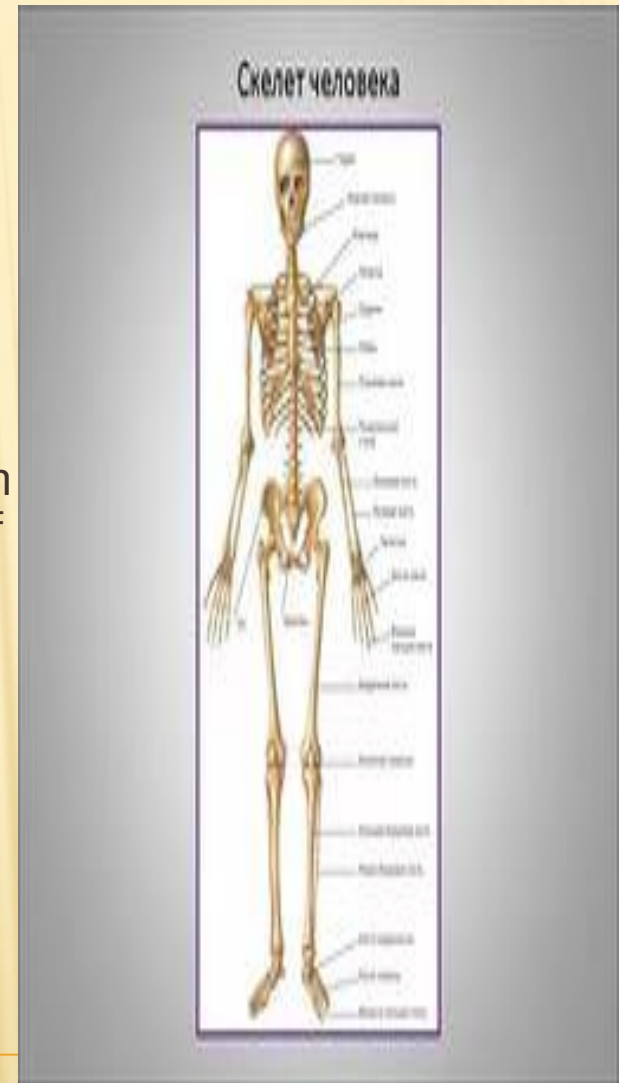




The **skeleton** (from Greek σκελετός, *skeletós* "dried up" is the body part that forms the supporting structure of an organism. There are several different skeletal types: the exoskeleton, which is the stable outer shell of an organism, the endoskeleton, which forms the support structure inside the body, the hydroskeleton, and the cytoskeleton.

The endoskeleton is the internal support structure of an animal, composed of mineralized tissue and is typical of vertebrates. Endoskeletons vary in complexity from functioning purely for support (as in the case of sponges), to serving as an attachment site for muscles and a mechanism for transmitting muscular forces. A true endoskeleton is derived from mesodermal tissue. Such a skeleton is present in echinoderms and chordates.

# SKELETON



# ENDOSKELETON

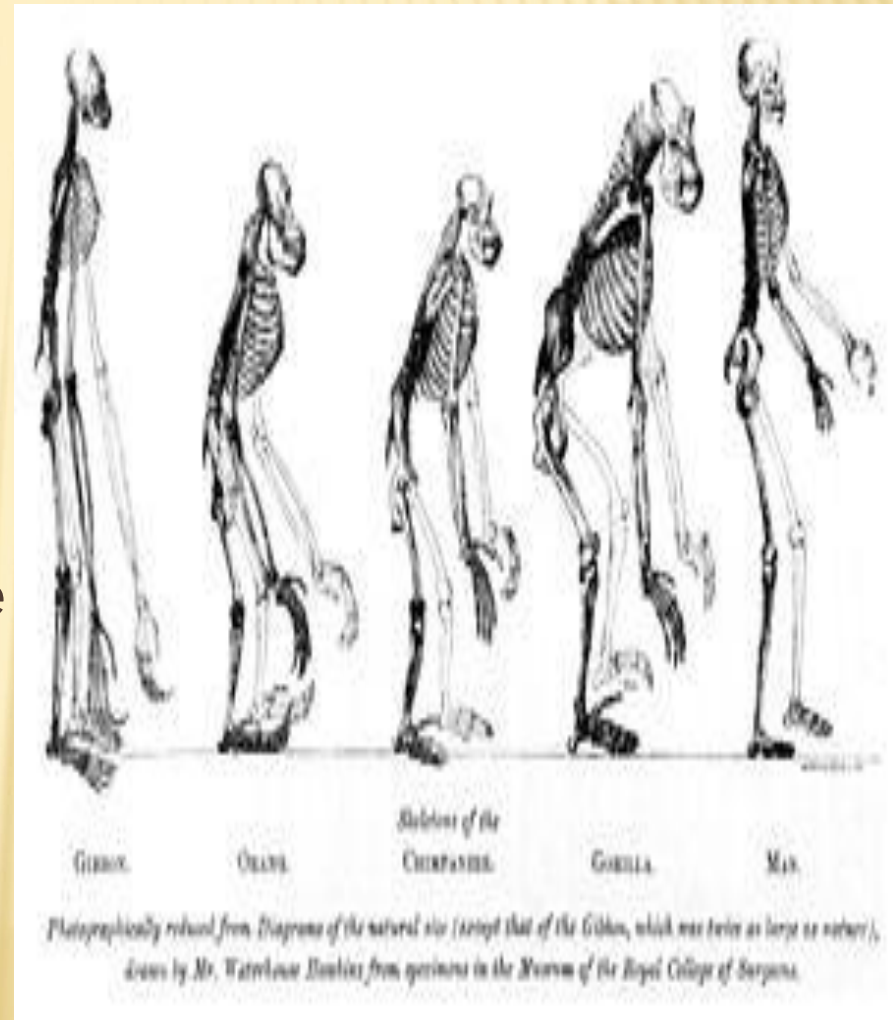
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Exoskeletons are external, and are found in many invertebrates; they enclose and protect the soft tissues and organs of the body. Some kinds of exoskeletons undergo periodic moulting as the animal grows, as is the case in many arthropods including insects and crustaceans. Exoskeletons are made of different materials including chitin (in arthropods), calcium compounds (in stony corals and mollusks) and silicate (for diatoms and radiolarians.)

The exoskeleton of insects is not only a protection but also serves as a surface for muscle attachment, as a watertight protection against drying and as a sense organ to interact with their environments. The shell of mollusks also performs all of the same functions, except that in most cases it does not contain sense organs.



An external skeleton can be quite heavy in relation to the overall mass of an animal, so on land, organisms that have an exoskeleton are mostly relatively small. Somewhat larger aquatic animals can support an exoskeleton because weight is less of a consideration underwater. The southern giant clam, a species of extremely large saltwater clam in the Pacific Ocean, has a shell that is massive in both size and weight. Syrinx aruanus is a species of sea snail with a very large shell.



The cytoskeleton (gr. *kytos* = cell) is used to stabilize and preserve the form of the cells. It is a dynamic structure that maintains cell shape, protects the cell, enables cellular motion (using structures such as flagella, cilia and lamellipodia), and plays important roles in both intracellular transport (the movement of vesicles and organelles, for example) and cellular division.





A hydrostatic skeleton is a semi-rigid, soft tissue structure filled with liquid under pressure, surrounded by muscles. Longitudinal and circular muscles around their body sectors allow movement by alternate lengthening and contractions along their lengths. A common example of this is earthworm



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The endoskeletons of echinoderms and some other soft-bodied invertebrates such as jellyfish and earthworms are also termed hydrostatic; a body cavity the coelom is filled with coelomic fluid and the pressure from this fluid acts together with the surrounding muscles to change the organism's shape and produce movement.

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The skeleton of the echinoderms, which include, among other things, the starfish, is composed of calcite and a small amount of magnesium oxide. It lies below the epidermis in the mesoderm and is within cell clusters of frame-forming cells. This structure formed is porous and therefore firm and at the same time light. It coalesces into small calcareous ossicles (bony plates), which can grow in all directions and thus can replace the loss of a body part. Connected by joints, the individual skeletal parts can be moved by the muscles.

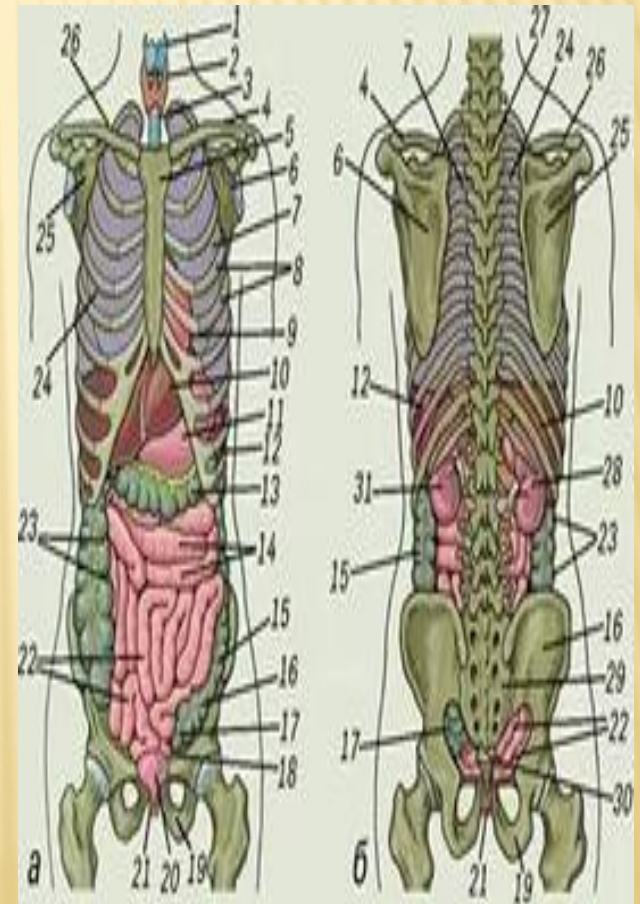


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# VERTEBRATES

In most vertebrates, the main skeletal component is referred to as bone. Another important component is cartilage which in mammals is found mainly in the joint areas. In other animals, such as the cartilaginous fishes, which include the sharks, the skeleton is composed entirely of cartilage. The segmental pattern of the skeleton is present in all vertebrates (mammals, birds, fish, reptiles and amphibians) with basic units being repeated. This segmental pattern is particularly evident in the vertebral column and the ribcage. Bones in addition to supporting the body also serve, at the cellular level, as calcium and phosphate storage.





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The skeleton, which forms the support structure inside the fish is either made of cartilage as in the (Chondrichthyes), or bones as in the (Osteichthyes). The main skeletal element is the vertebral column, composed of articulating vertebrae which are lightweight yet strong. The ribs attach to the spine and there are no limbs or limb girdles. They are supported only by the muscles. The main external features of the fish, the fins, are composed of either bony or soft spines called rays, which with the exception of the caudal fin (tail fin), have no direct connection with the spine. They are supported by the muscles which compose the main part of the trunk.



# HUMAN

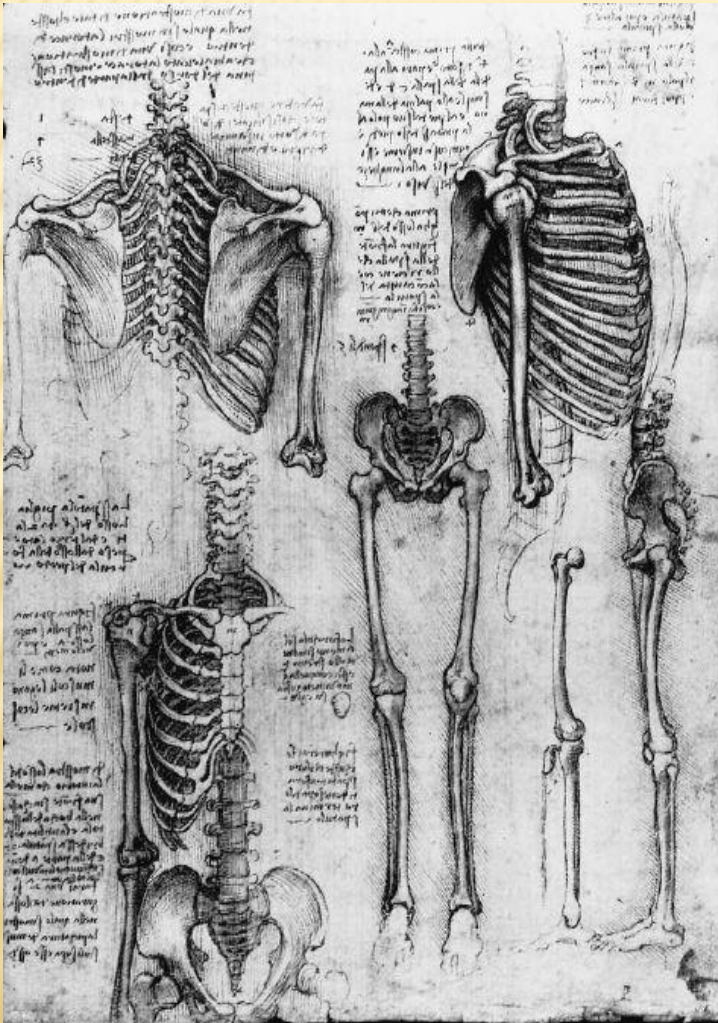
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The human skeleton consists of both fused and individual bones supported and supplemented by ligaments, tendons, muscles and cartilage. It serves as a scaffold which supports organs, anchors muscles, and protects organs such as the brain, lungs, heart and spinal cord. Although the teeth do not consist of tissue commonly found in bones, the teeth are usually considered as members of the skeletal system.<sup>[citation needed]</sup> The biggest bone in the body is the femur in the upper leg, and the smallest is the stapes bone in the middle ear. In an adult, the skeleton comprises around 14% of the total body weight,<sup>[5]</sup> and half of this weight is water.

Fused bones include those of the pelvis and the cranium. Not all bones are interconnected directly: There are three bones in each middle ear called the ossicles that articulate only with each other. The hyoid bone, which is located in the neck and serves as the point of attachment for the tongue, does not articulate with any other bones in the body, being supported by muscles and ligaments.

There are 206 bones in the adult human skeleton, although this number depends on whether the pelvic bones (the hip bones on each side) are counted as one or three bones on each side (ilium, ischium, and pubis), whether the coccyx or tail bone is counted as one or four separate bones, and does not count the variable wormian bones between skull sutures. Similarly, the sacrum is usually counted as a single bone, rather than five fused vertebrae. There is also a variable number of small sesamoid bones, commonly found in tendons. The patella or kneecap on each side is an example of a larger sesamoid bone. The patellae are counted in the total, as they are constant. The number of bones varies between individuals and with age - newborn babies have over 270 bones<sup>[6][7][8]</sup> some of which fuse together. These bones are organized into a longitudinal axis, the axial skeleton, to which the appendicular skeleton is attached.<sup>[9]</sup>

The human skeleton takes 20 years before it is fully developed. In many animals, the skeleton bones contain marrow, which produces blood cells.



There exist several general differences between the male and female skeletons. The male skeleton, for example, is generally larger and heavier than the female skeleton. In the female skeleton, the bones of the skull are generally less angular. The female skeleton also has wider and shorter breastbone and slimmer wrists. There exist significant differences between the male and female pelvis which are related to the female's pregnancy and childbirth capabilities. The female pelvis is wider and shallower than the male pelvis. Female pelvises also have an enlarged pelvic outlet and a wider and more circular pelvic inlet. The angle between the pubic bones is known to be sharper in males, which results in a more circular, narrower, and near heart-shaped pelvis.



# BONE

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Bones are rigid organs that form part of the endoskeleton of vertebrates. They function to move, support, and protect the various organs of the body, produce red and white blood cells and store minerals. Bone tissue is a type of dense connective tissue. Bones have a variety of shapes with a complex internal and external structure they are also lightweight, yet strong and hard. One of the types of tissue that makes up bone tissue is mineralized tissue and this gives it rigidity and a honeycomb-like three-dimensional internal structure. Other types of tissue found in bones include marrow, endosteum and periosteum, nerves, blood vessels and cartilage. There are 206 bones in the adult human body and 270 in an infant.