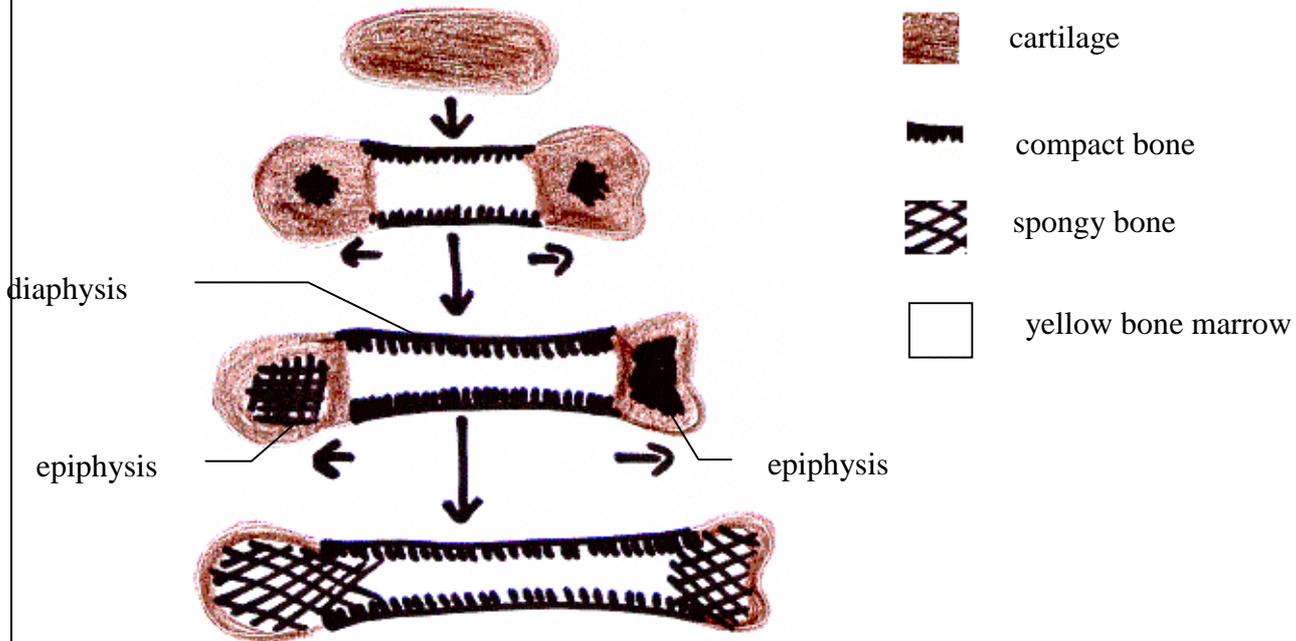




Bone Growth in Length



All bones are made from cartilage at first.

When a baby is born, most of the cartilage in the shaft of the bone (diaphysis) has already been turned into bone (**ossified**¹). A hollow room filled with yellow bone marrow has formed in the shaft.

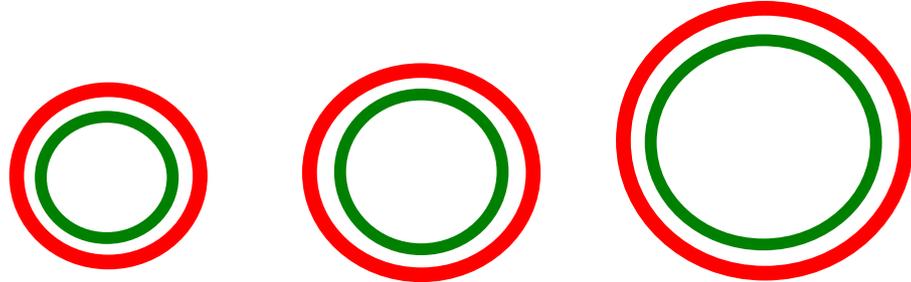
As the child grows the joint areas (epiphysis) become ossified with spongy bone.

Up to the age of 24 a small area of cartilage remains between joints and shaft of a bone. This is the so-called growth zone. Cartilage cells are produced by mitosis at the diaphysis end of the growth zone. The new cartilage cells become ossified quickly to maintain the stability of the shaft. In this process the epiphysis ends are pushed apart Thus the shaft grows in length..

¹ to ossify = to turn into bone material (verknöchern)



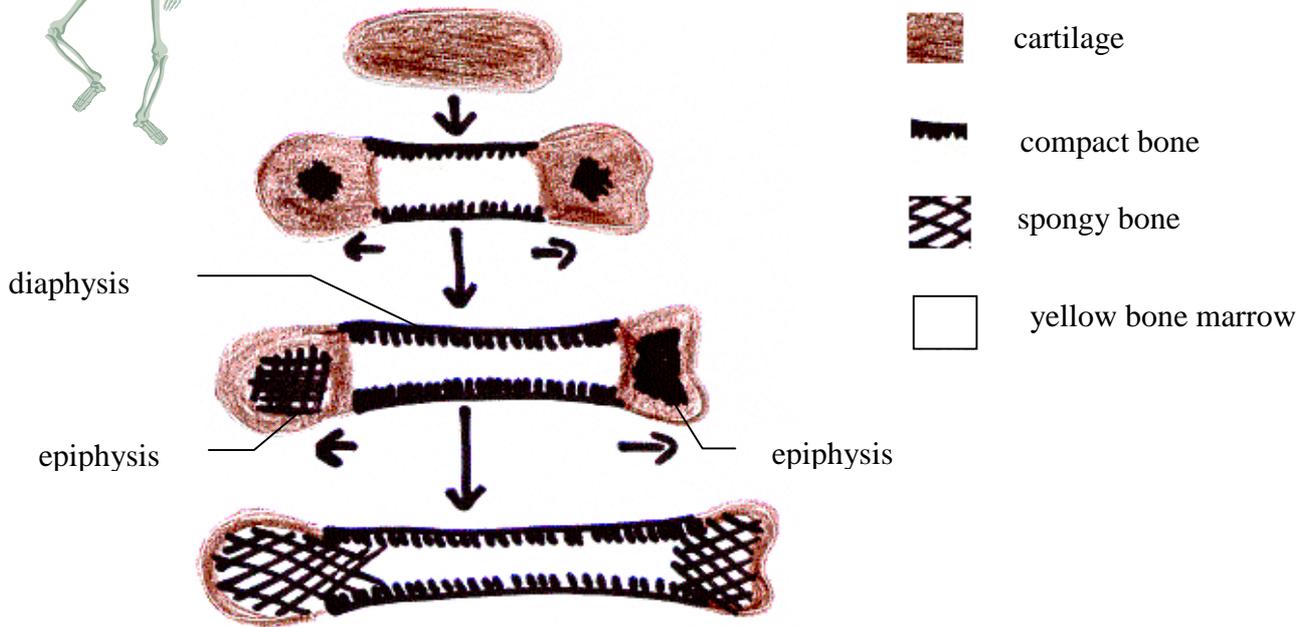
Bone Growth in Diameter



The diameter of a long bone is increased by the construction of new bone on the outside and the destruction of bone on the inside. Even after bones have reached their adult shapes and sizes, old bone is continually destroyed and new bone is formed in its place. Worn and injured bones are replaced in the same way.

Specialized cells called **osteoclasts** are responsible for the destruction (or resorption) of bone tissue on the inside. They are formed from blood cells built in the red bone marrow.

Osteoblasts, are the cells that form new bone. They also come from the bone marrow. Osteoblasts work in teams to build bone. They produce new bone material on the outer surface. The work of the osteoclasts and osteoblasts must be carefully balanced. If too much new bone tissue is formed on the outside, the bones become abnormally thick and heavy. If too much material is broken down on the inside, the bones become breakable.

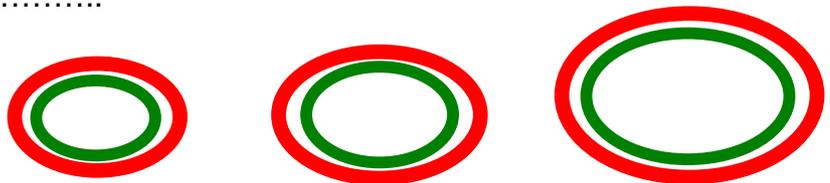


Bone Growth

A baby's bones are not fully when it is born. Most of the ends of the limb bones still consist of, but are gradually turned into

Up to the age of 24 there remains an area of between the and of a limb bone. This so-called produces new cartilage cells by The cartilage is by bone material. The are pushed apart. Thus the bone

The diameter of a long bone is increased by the of new bone on the and the of on the inside. formed from blood cells built in the red bone marrow break down bone material while osteoblasts The carefully balanced work of these two types of cells prevent the bones from



to become too heavy - to ossify[®] - cartilage (2x) - to grow in length - construction - diaphysis - epiphysis - destruction - outside - growth zone - epiphyses (2x) - spongy bone - mitosis - osteoclasts - to produce new bone material

[®] to ossify = to turn into bone material (verknöchern)