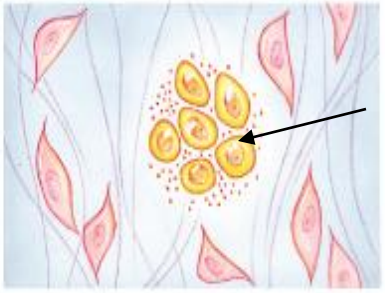
Intramembranous Ossification



osteoblast

① **An ossification center appears in the fibrous connective tissue membrane.**

- Selected centrally located mesenchymal cells cluster and differentiate into osteoblasts, forming an ossification center.

osteoblast

osteocyte

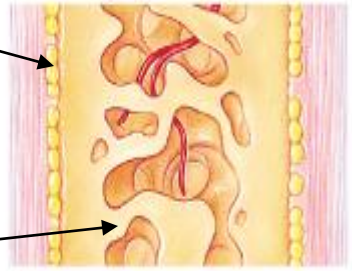
bone matrix

② **Bone matrix (osteoid) is secreted within the fibrous membrane.**

- Osteoblasts begin to secrete osteoid, which is mineralized within a few days.
- Trapped osteoblasts become osteocytes.

③ **Woven bone and periosteum form.**

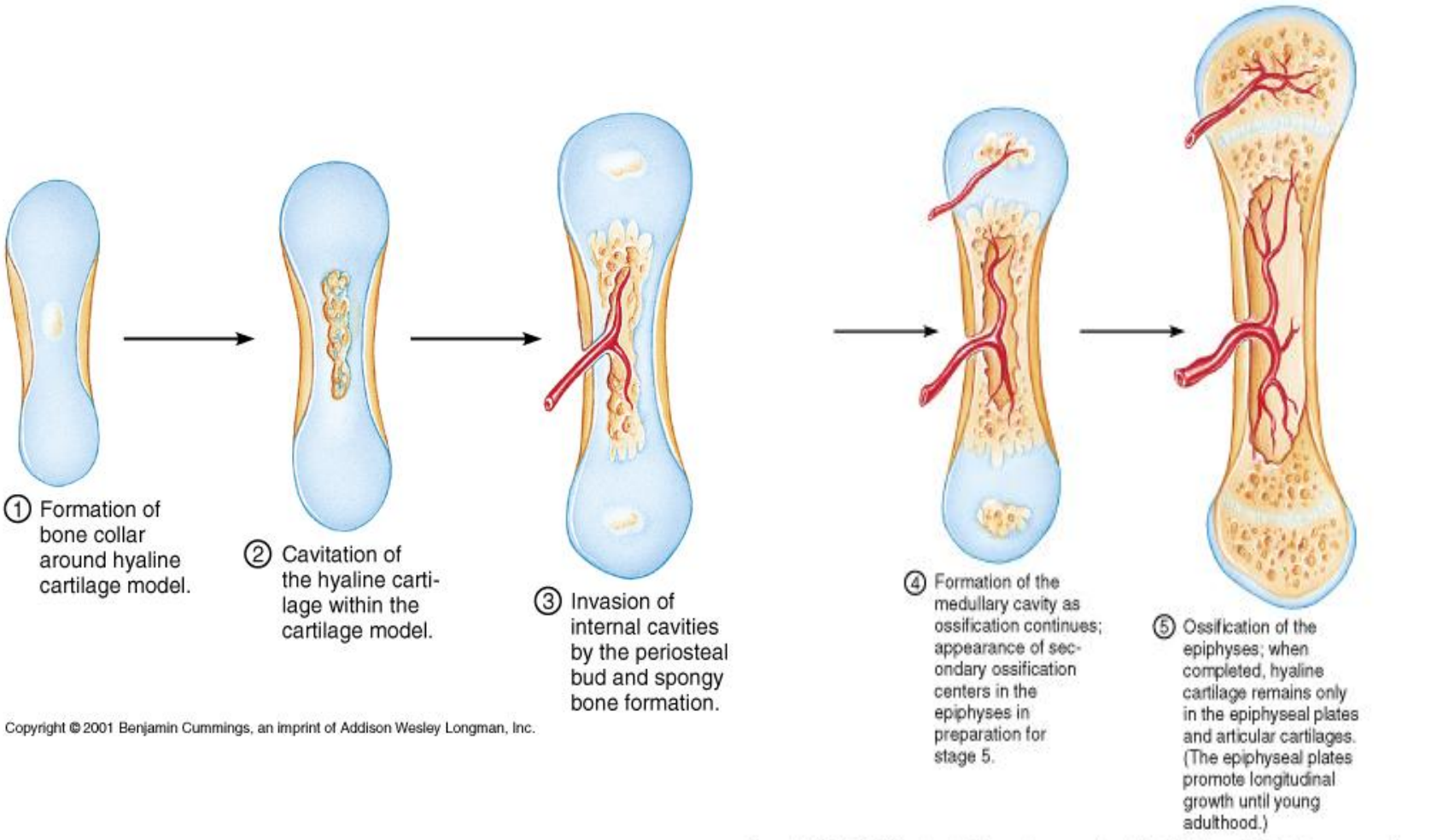
- Accumulating osteoid is laid down between embryonic blood vessels, which form a random network. The result is a network (instead of lamellae) of trabeculae (woven bone).
- Vascularized mesenchyme condenses on the external face of the woven bone and becomes the periosteum.



④ **Bone collar of compact bone forms and red marrow appears.**

- Trabeculae just deep to the periosteum thicken, forming a woven bone collar that is later replaced with mature lamellar bone.
- Spongy bone (diploë), consisting of distinct trabeculae, persists internally and its vascular tissue becomes red marrow.

Endochondral Ossification



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Long Bone Active Areas

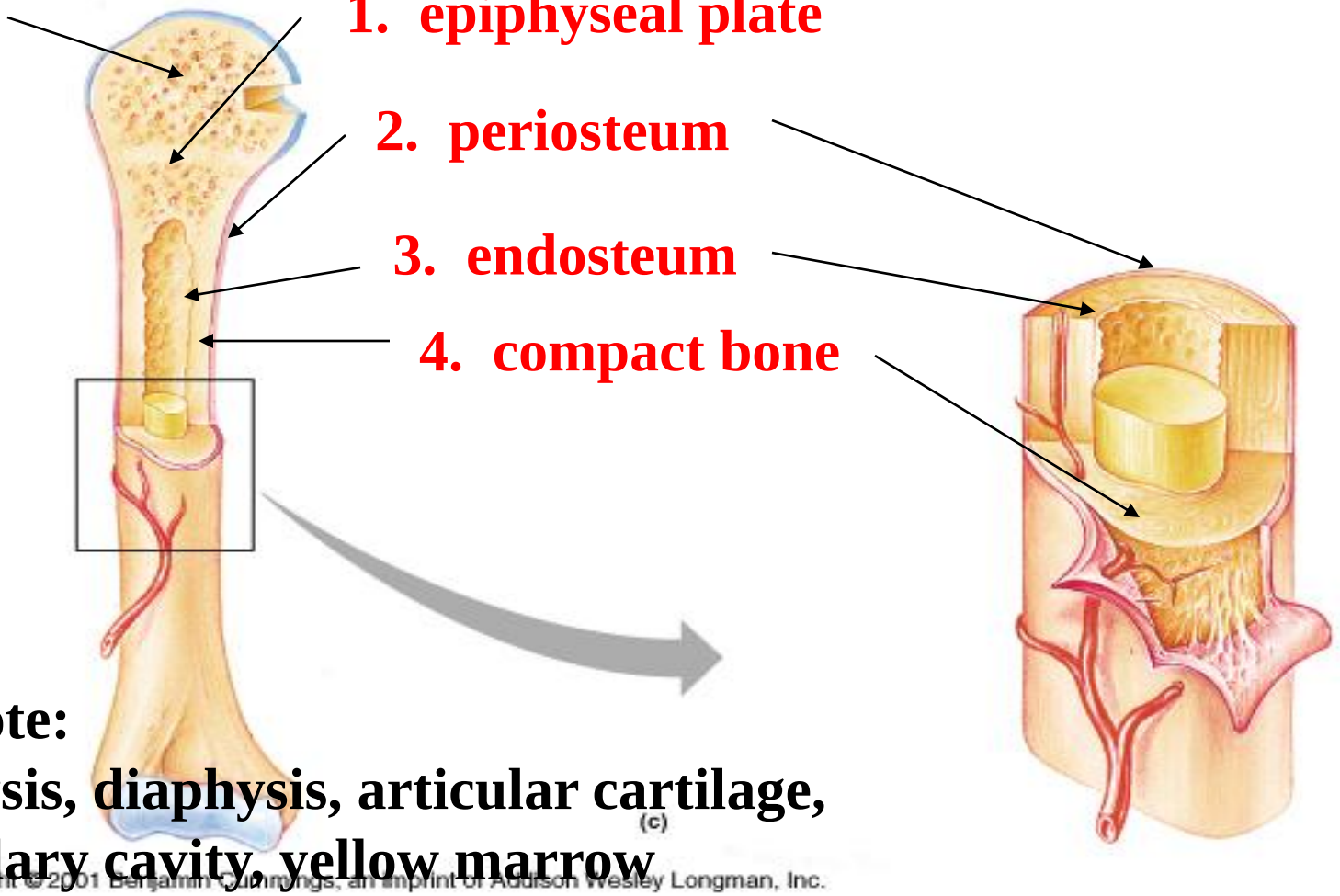
5. spongy bone

1. epiphyseal plate

2. periosteum

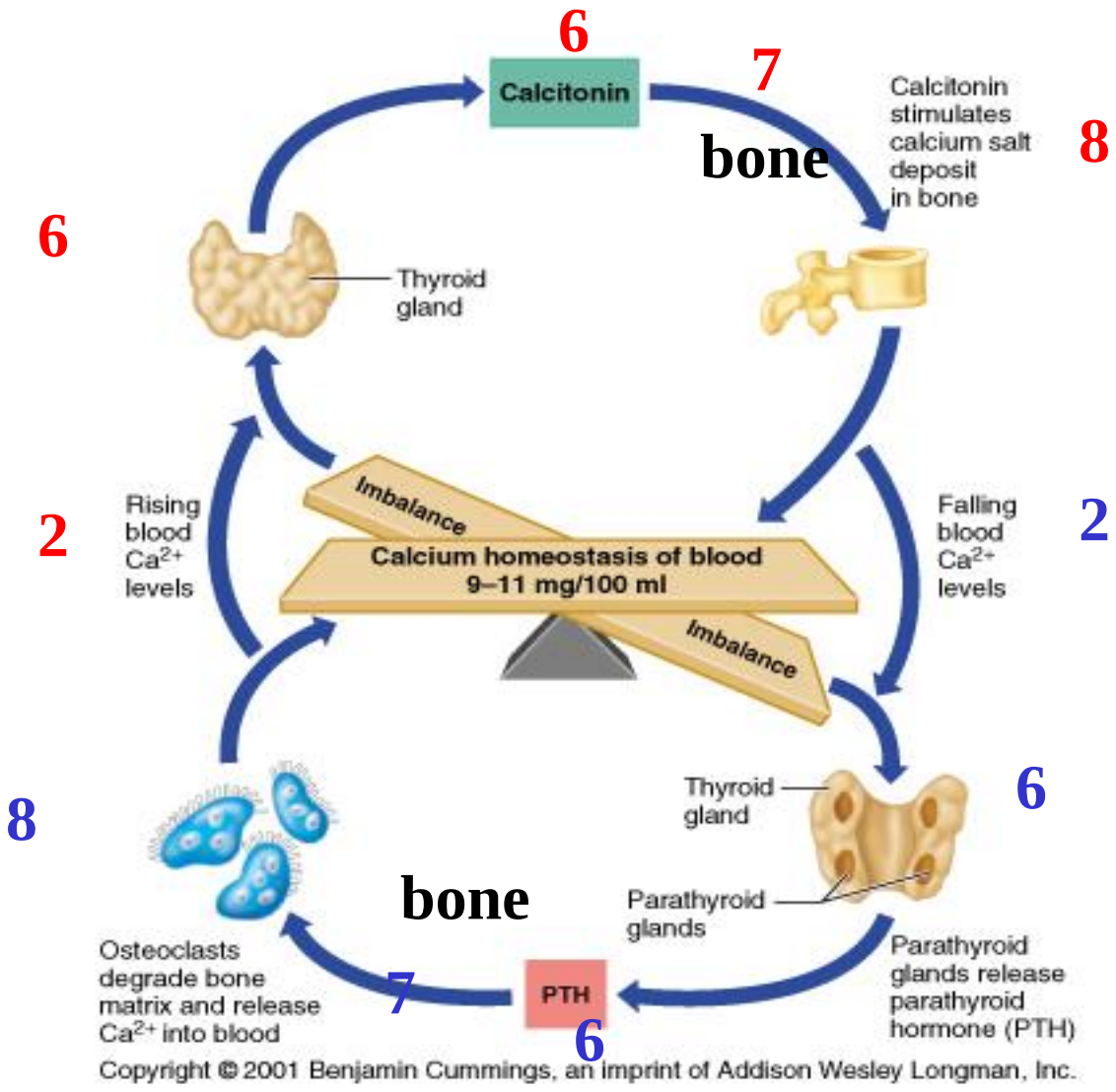
3. endosteum

4. compact bone



also note:
epiphysis, diaphysis, articular cartilage, medullary cavity, yellow marrow

Calcium Homeostasis Diagram



Fracture Repairs (2)

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Special Bone Arrangements

Uncollected Assignment:

- location, bone modifications, problems

- focus on these specific uses

1) **fontanels: delivery, brain growth**
2) **paranasal cavities: mucous, skull weight, speech/singing**
3) **foot arches: body weight, leverage**
4) **coxa: sexual differences, labor/delivery**
5) **sternum: red marrow sample**
6) **sacral hiatus: epidural anesthesia**