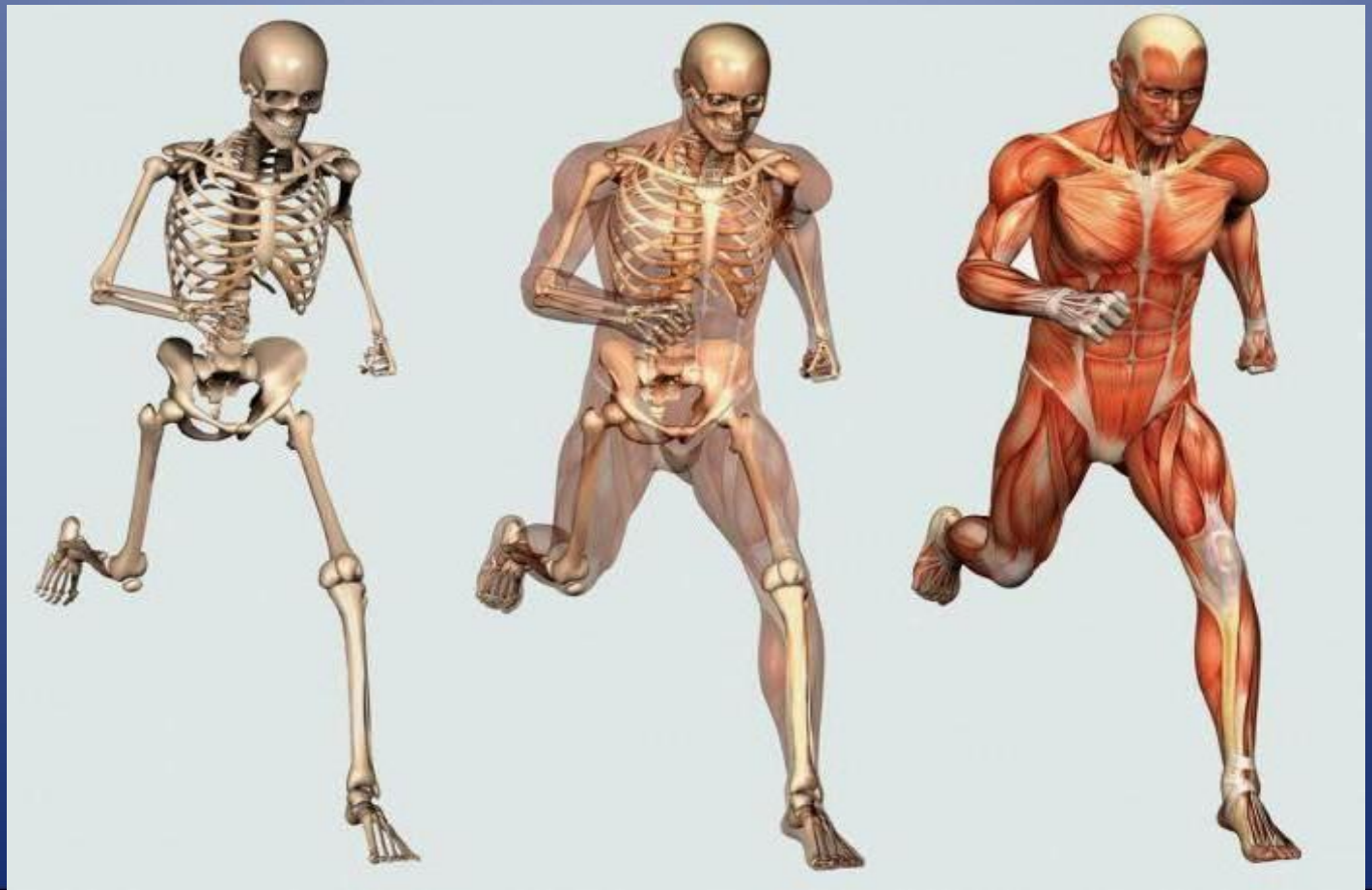
GENERAL OSTEOLOGY
DEVELOPMENT AND GROWTH OF BONES

Olga R. Shangina, professor

Locomotion apparatus

Passive component *(bones)*

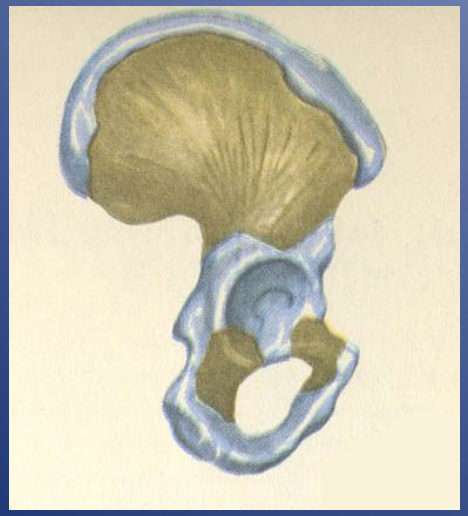
Active component *(muscles)*



SKELETON

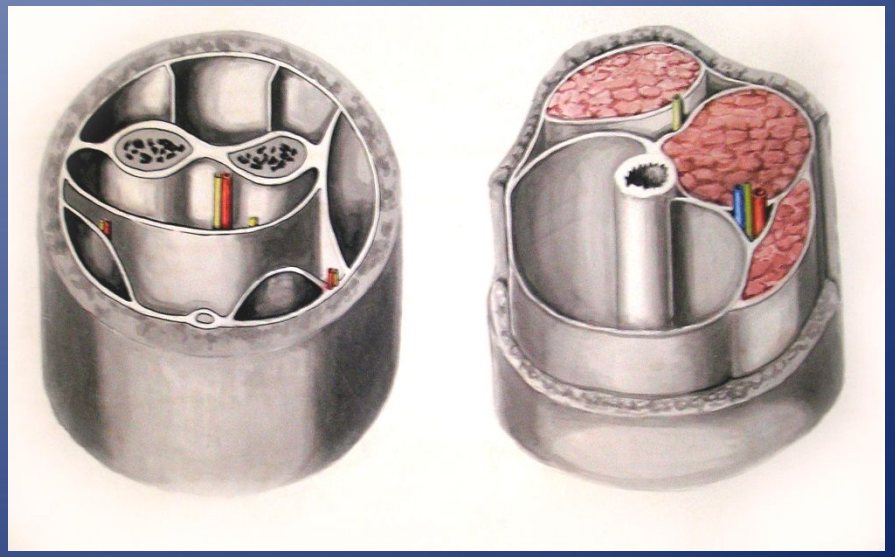
hard skeleton

bones,cartilages



soft skeleton

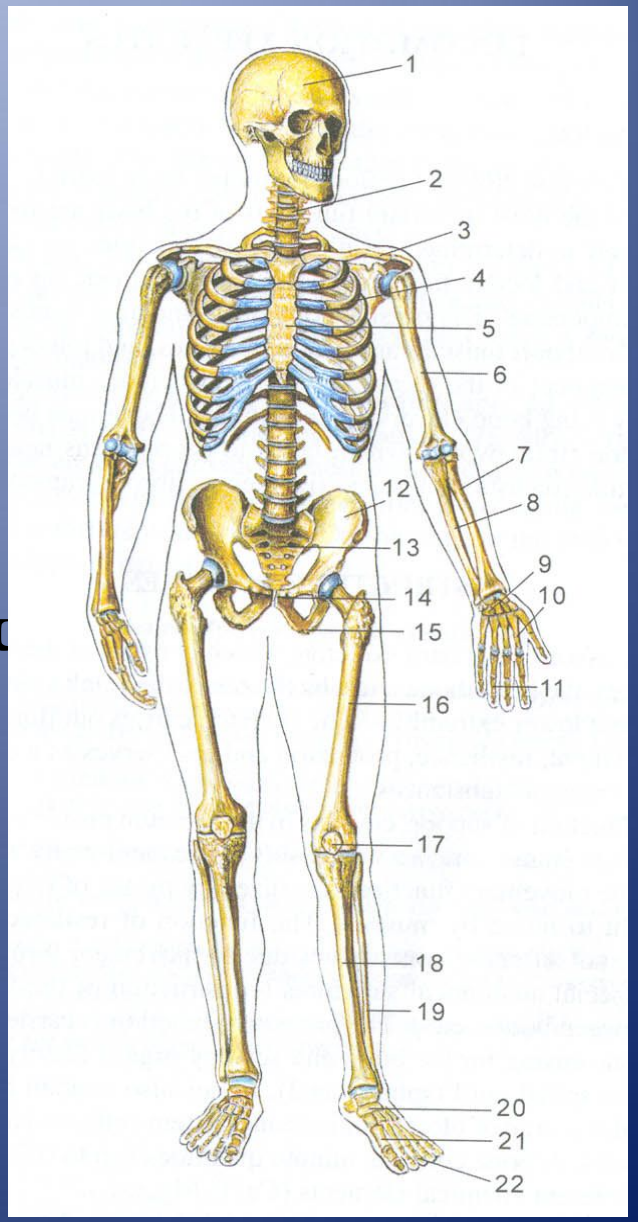
muscles, fascies, ligaments



THE MECHANICAL FUNCTIONS OF BONES

- support
- movement
- protection

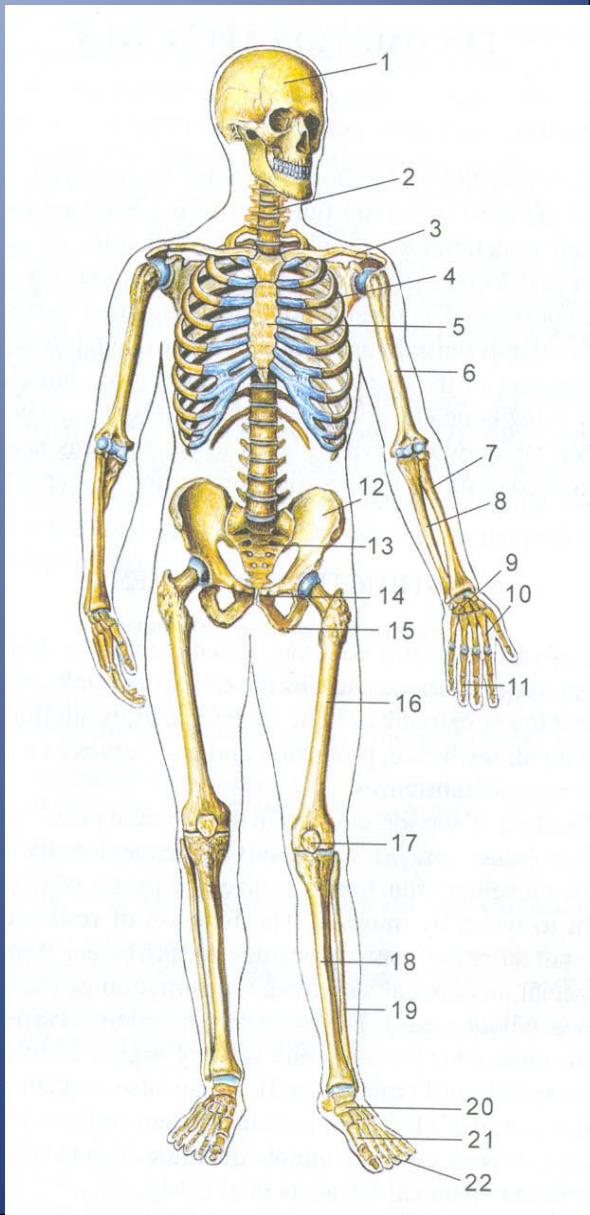
общая



THE SKELETON CONTAINS 206 BONES

- 36 unpaired bones

- 85 paired bones

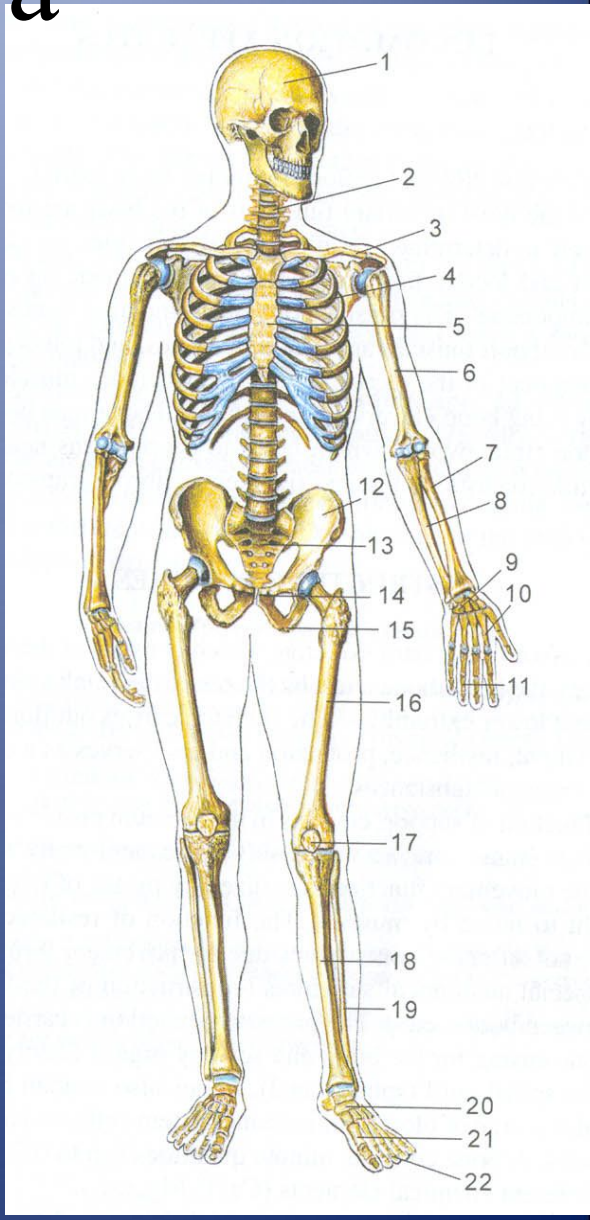


THE BIOLOGIC FUNCTIONS

Функции скелета

- bones contain bone marrow

- bones are a deport for mineral salts

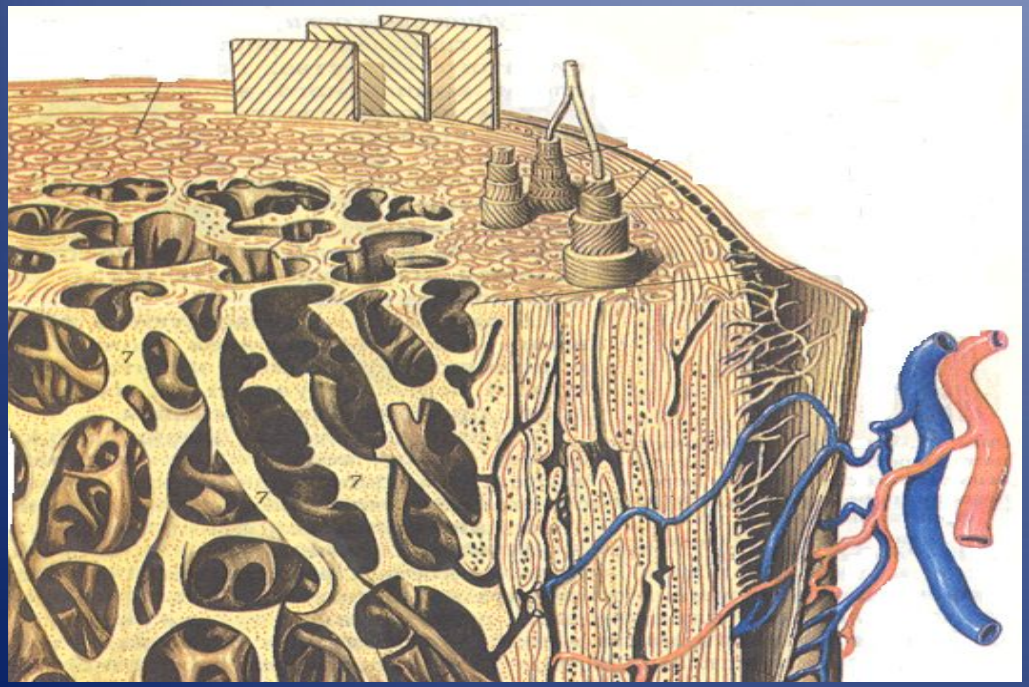


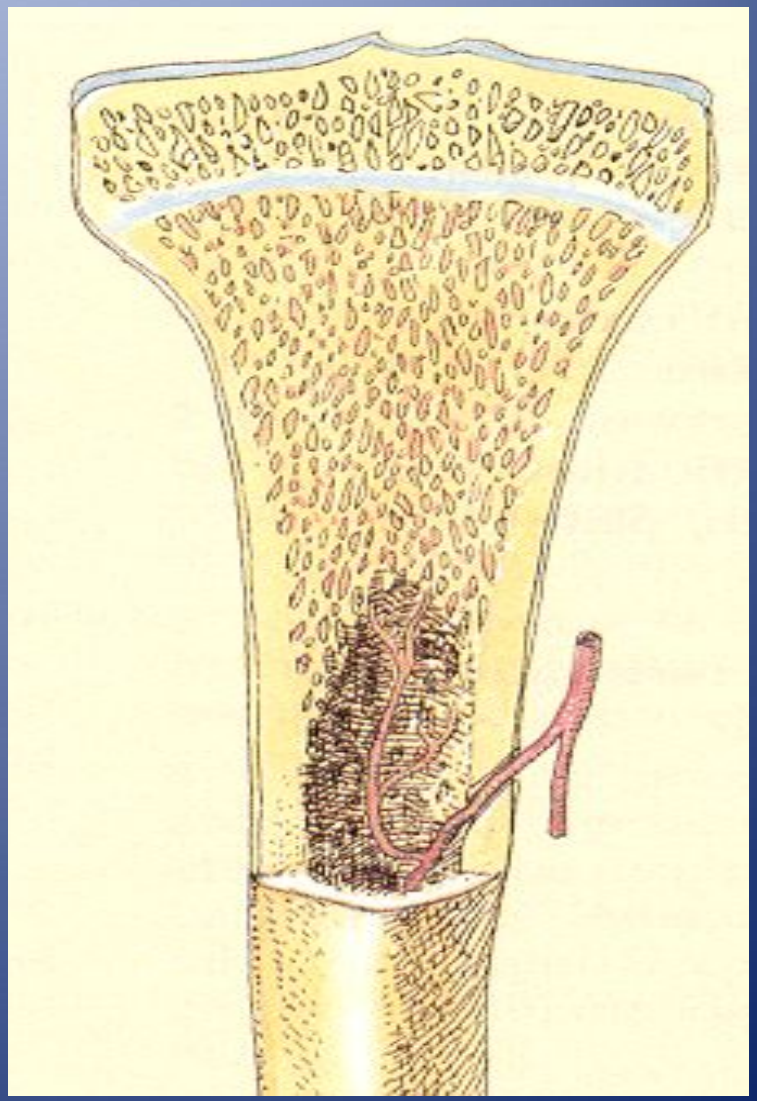
BONES CONSIST OF DIFFERENT KINDS OF TISSUES:

- osteal tissue
- periosteum
- bone marrow
- blood and lymphatic vessels
- nerves

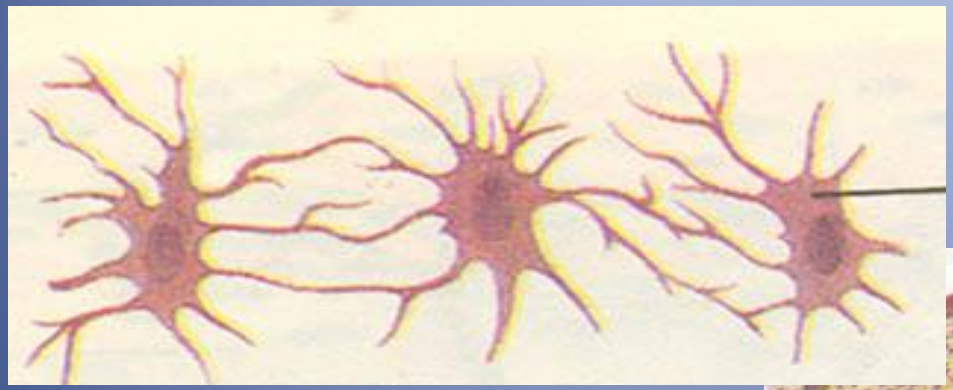
Ткани образующие кость:

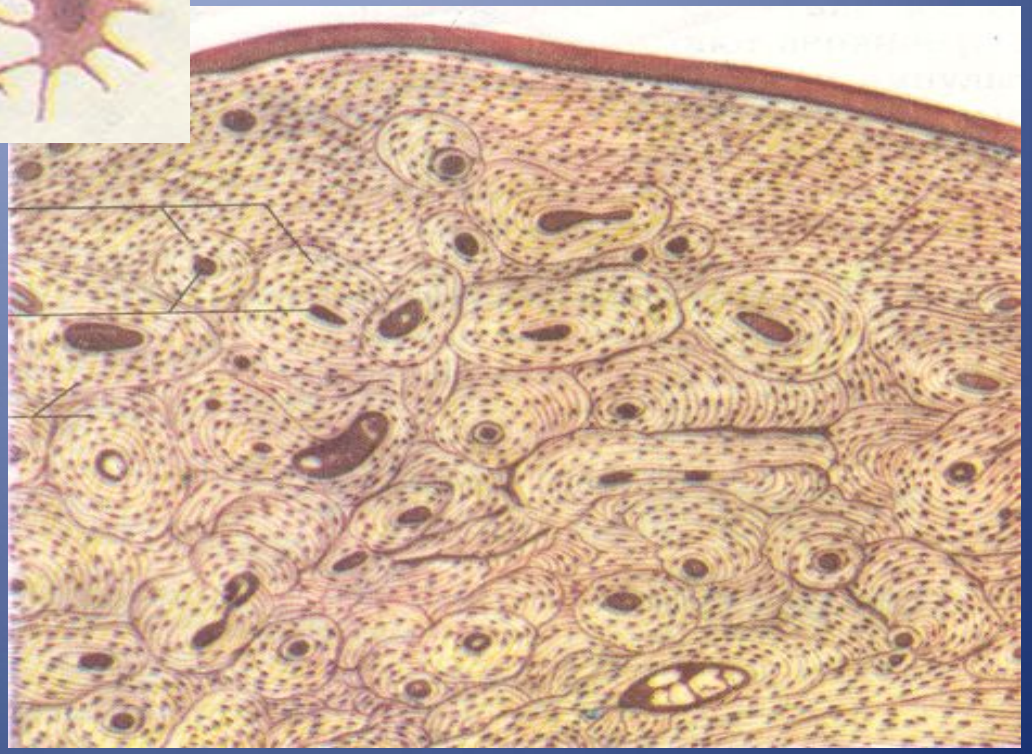
костная
хрящевая
кровь и лимфа
жировая ткань
гладкая мышечная ткань
нервная ткань





THE BONE CELLS





osteoblasts
osteocytes
osteoclasts

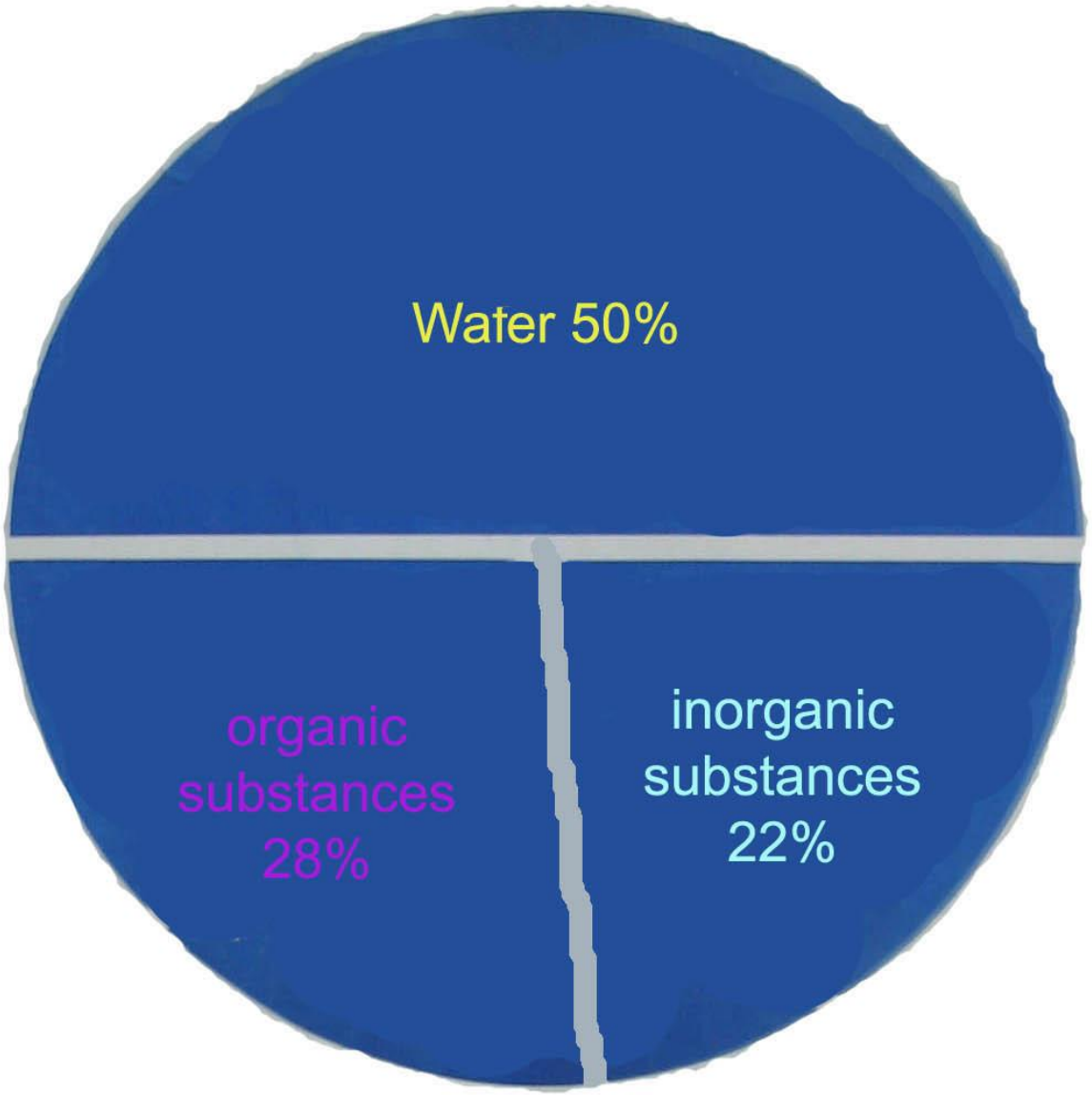
THE INORGANIC SUBSTANCES

- calcium
- magnesium
- phosphorus
- other elements

THE ORGANIC SUBSTANCES

one called «ossein»

CHEMICAL COMPOSITION OF BONES

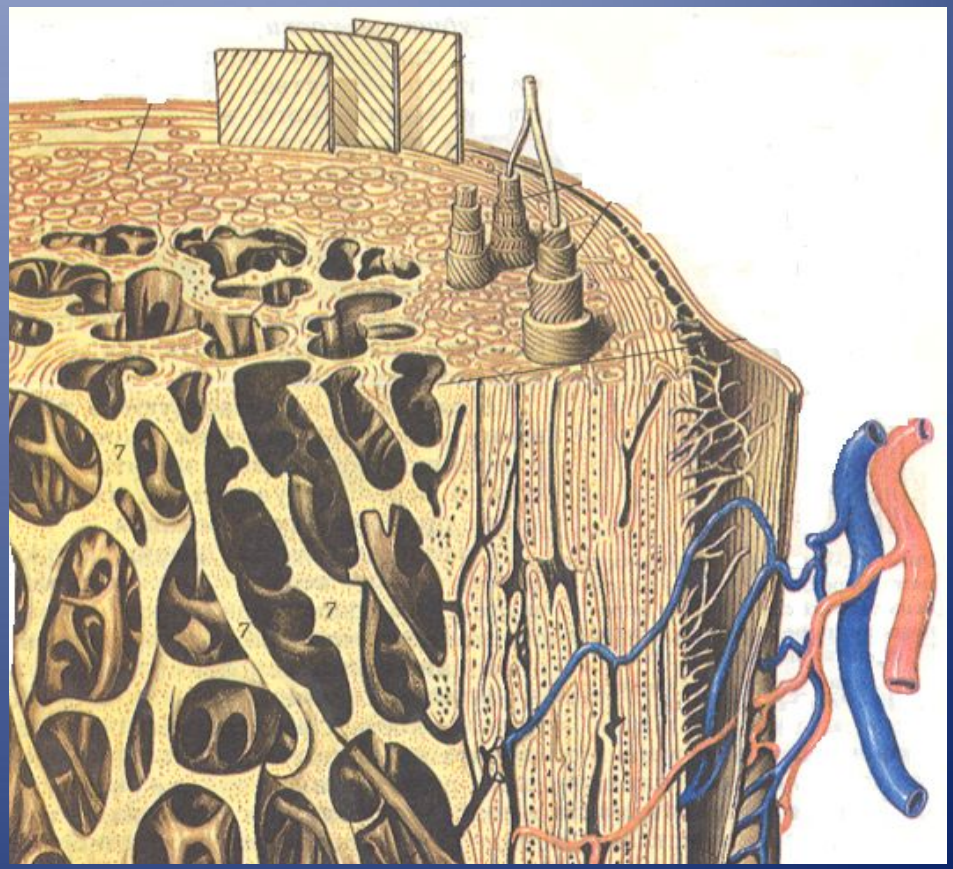


PROPERTIES OF BONE

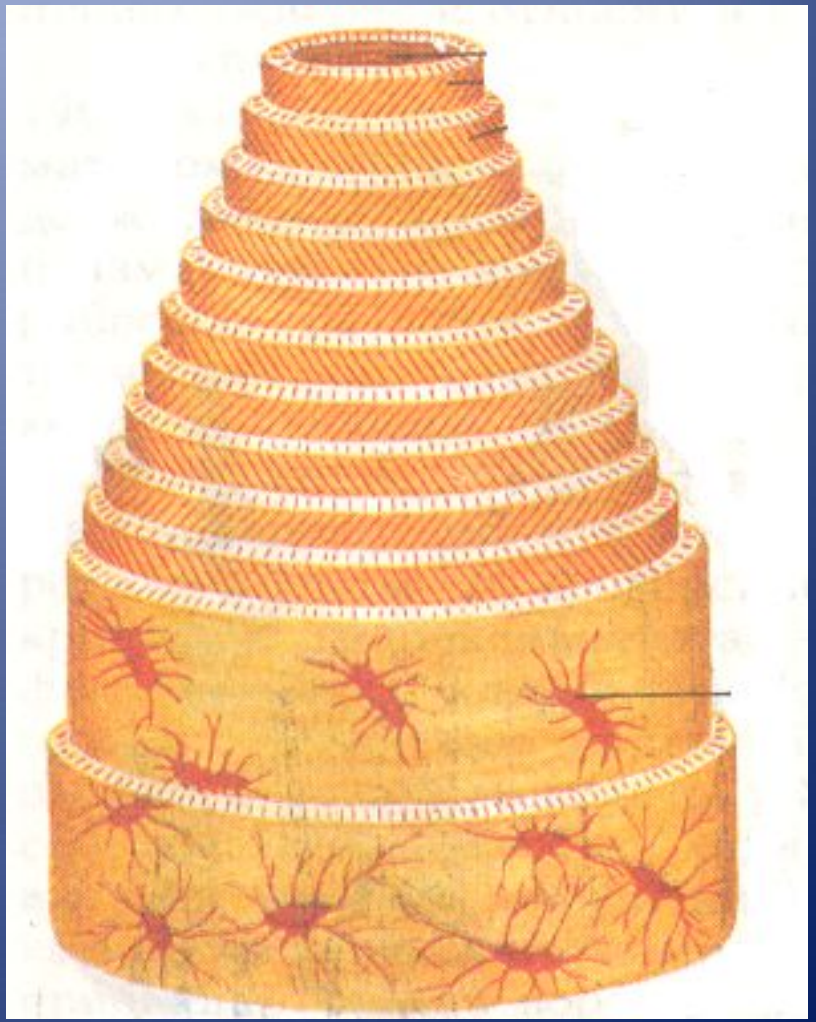
- resilience
- strength
- Электропроводимость
- Звукопроводимость
- Прочие

ВИДЫ КОСТНЫХ ПЛАСТИНОК

- ЦИЛИНДРИЧЕСКИЕ
- ВСТАВОЧНЫЕ
- ГЕНЕРАЛЬНЫЕ

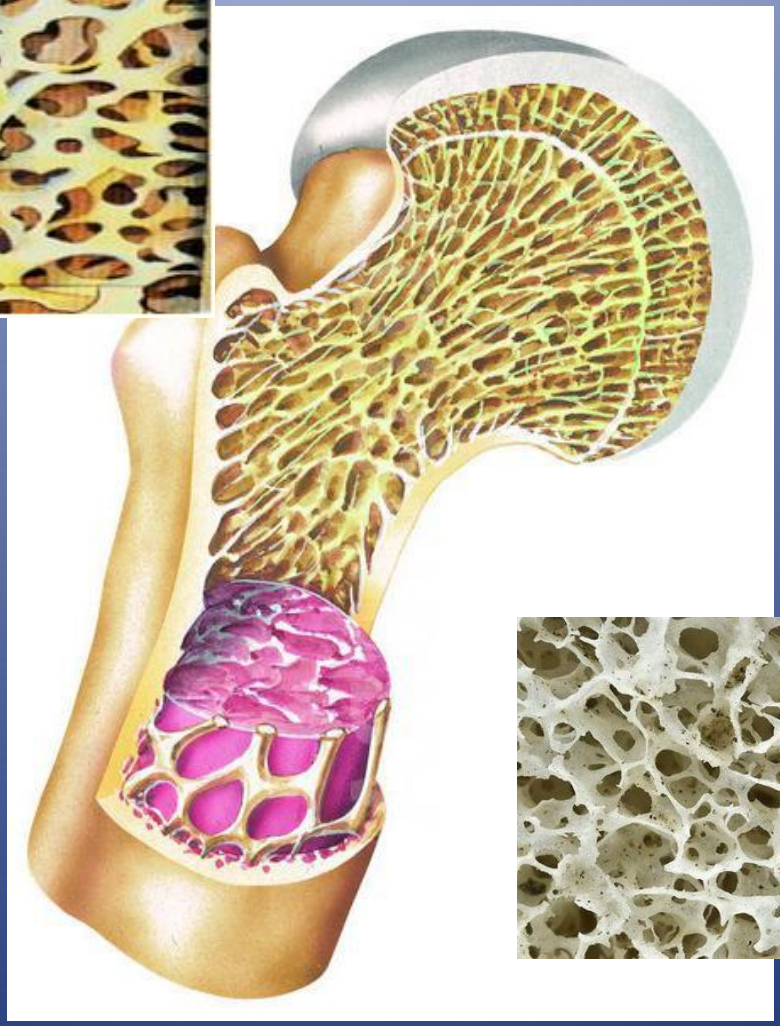


OSTEON

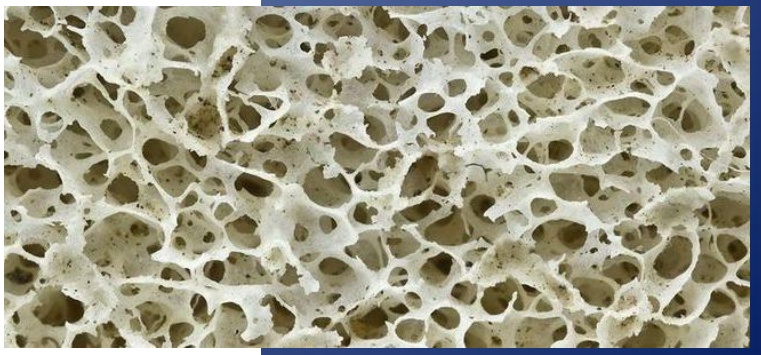


BONE TISSUE

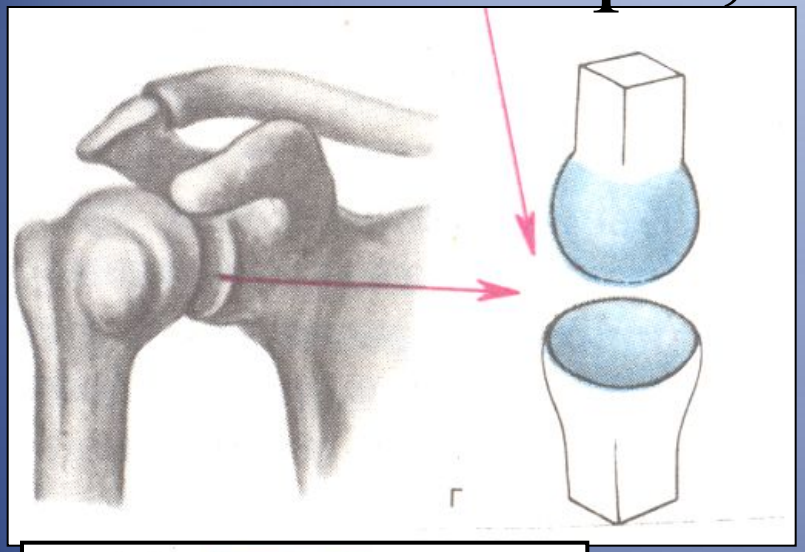
compact

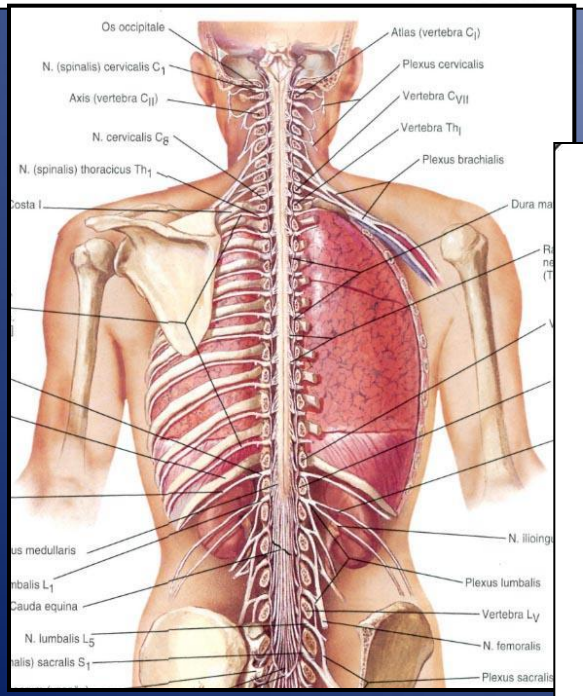


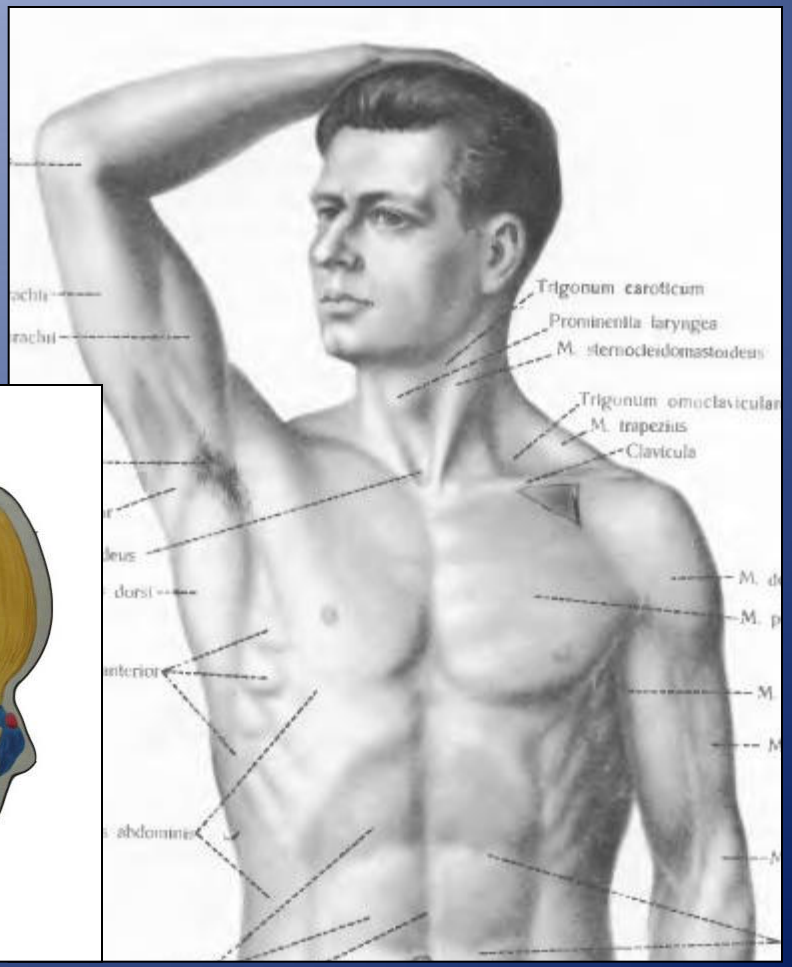
spongy



Факторы, влияющие на внешнюю структуру костей





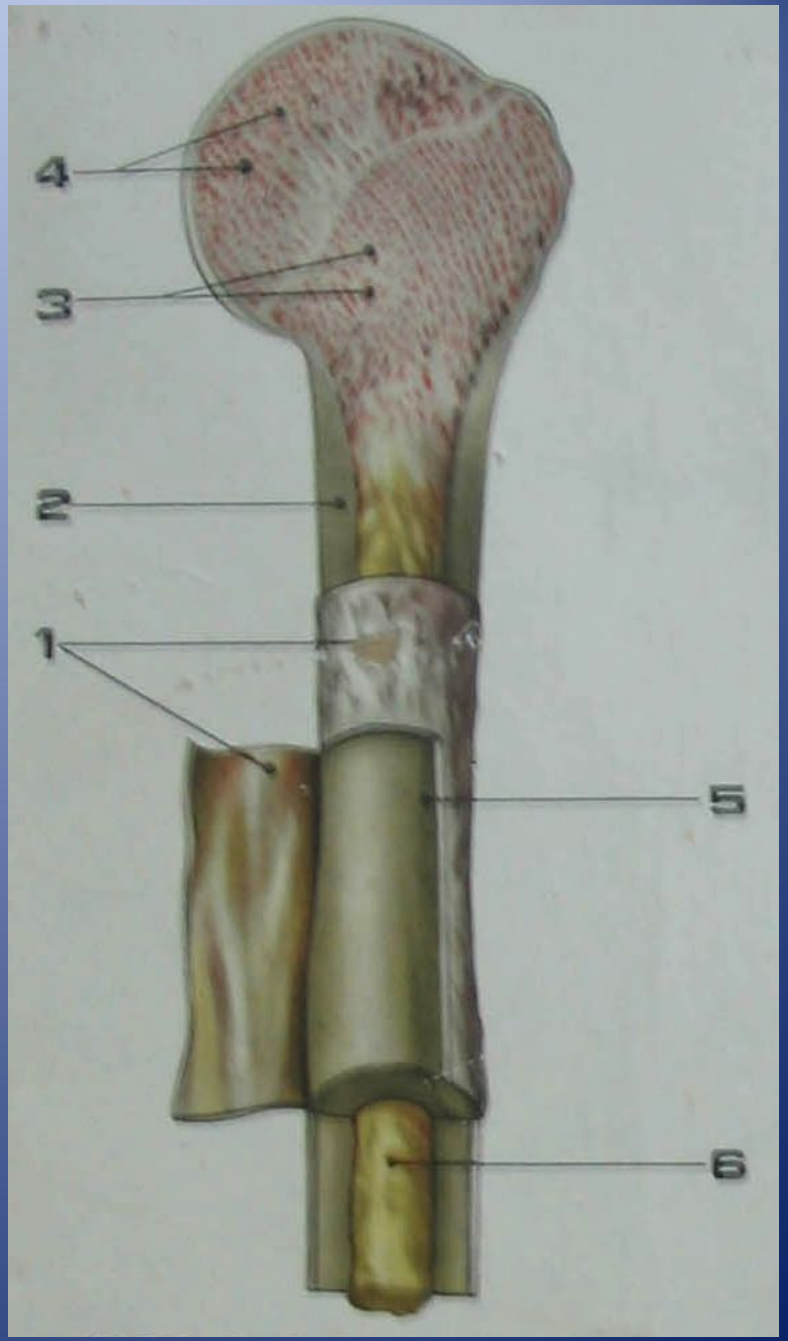


Факторы, влияющие на внутреннюю структуру костей

- возраст
- пол
- питание
- образ жизни (спорт, вредные привычки и др.)
- профессия
- и другие причины

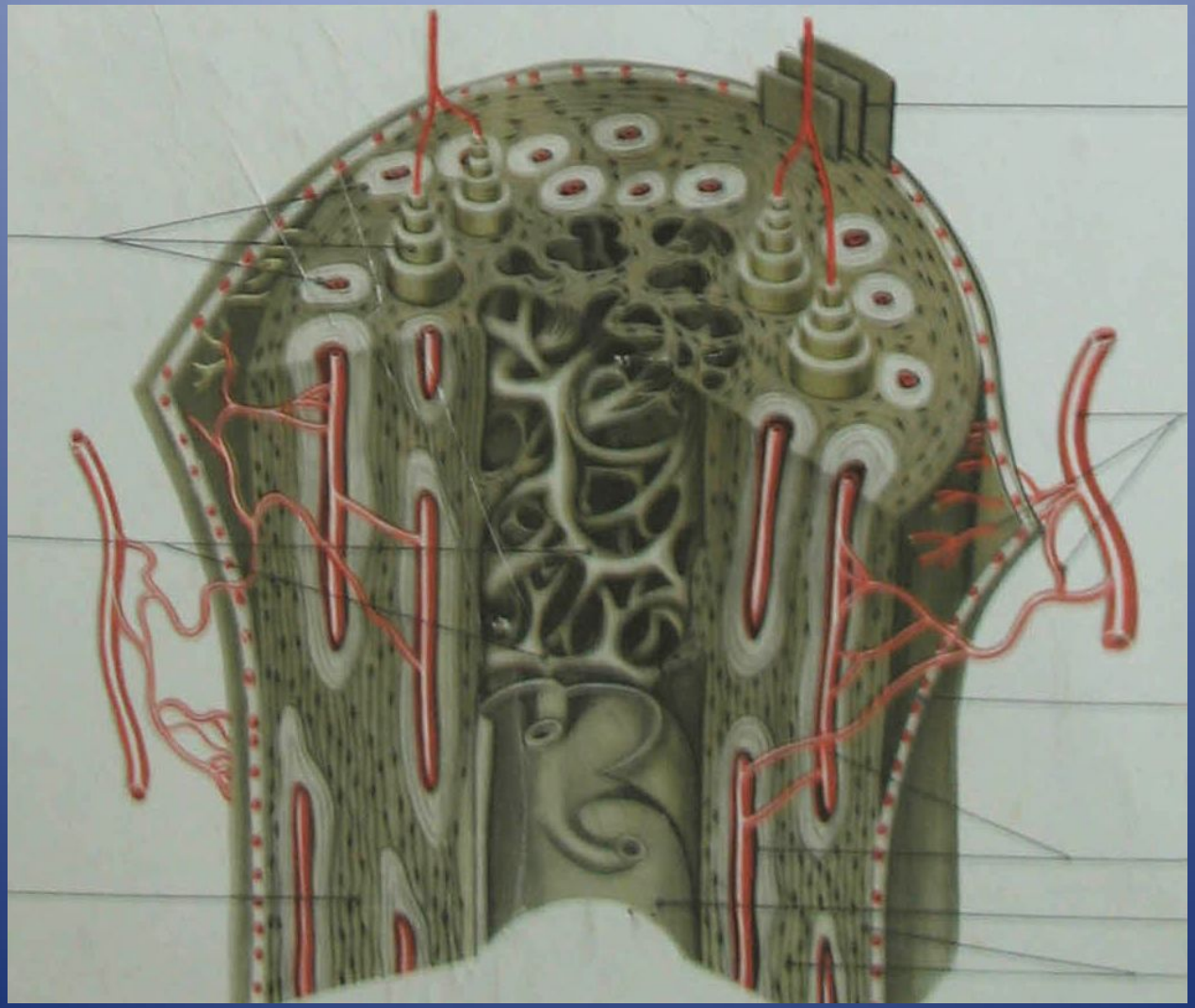
THE BONE MARROW

- red bone marrow
- yellow bone marrow



Периост

Эндост



THE PRINCIPLES OF CLASSIFICATION OF BONES

- the shape
- the structure
- the development
- the function

BONES ARE DIVIDED INTO:

-tubular *(long, short)*
-spongy *(long, short)*
-flat
-mixed
-pneumatic

CLASSIFICATION OF BONES BY THE STRUCTURE

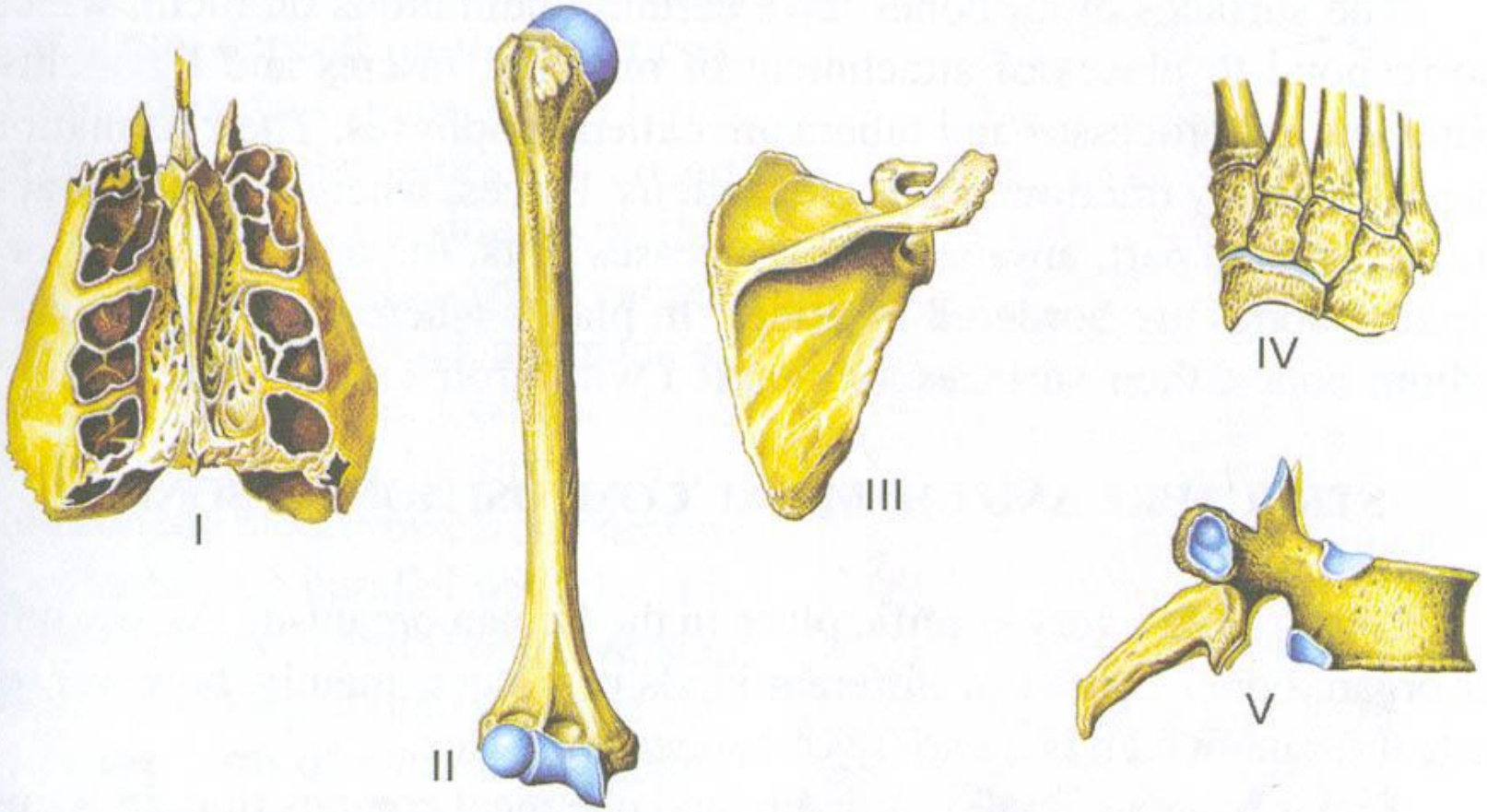
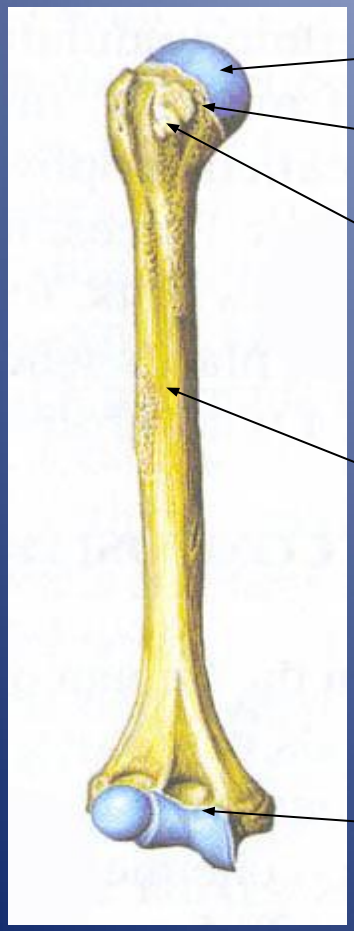


Fig. 34. Types of bones.

I-pneumatized bone (ethmoidal bone); II — long bone; III — flat bone; IV — shot (spongy) bones; V — irregular bone.

THE PARTS OF THE TUBULAR BONES:

LONG ***SHO T***



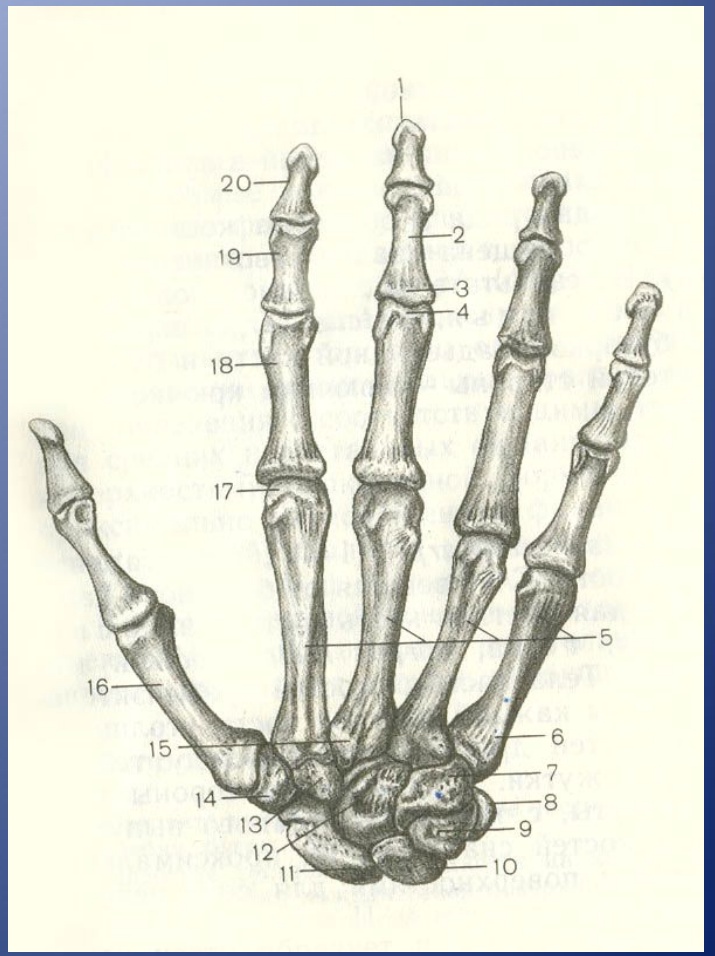
epiphysis
the proximal

metaphysis

apophyses

diaphysis

epiphysis
the distal



TWO KINDS OF CELLS TAKE PART IN FORMING OF BONES

-OSTEOBLASTES
-OSTECLASTES

THESE CELLS ARE CONTAINED IN THE DEEP LAYER OF:

-THE PERIOSTEUM
-THE PERICHONDRIUM

THERE ARE 4 WAYS OF OSSIFICATION

-INTRAMEMBANOUS
-PERICHONDRAL
-ENDOCHONDRAL
-PERIOSTEAL

THE STAGES OF DEVELOPMENT OF BONES

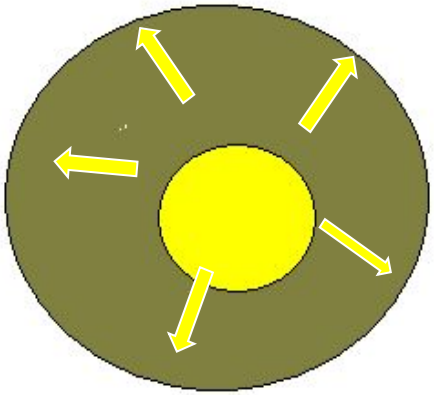
1. *CONNECTIVE TISSUE*
2. *CARTILAGE TISSUE*
3. *OSTEAL TISSUE*

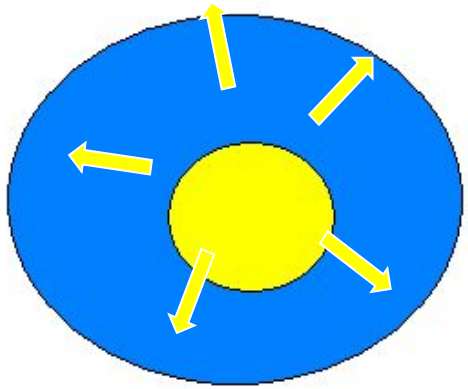
SECONDARY BONES PASS 3 STAGES

PRIMARY BONES PASS 2 STAGES
(CONNECTIVE TISSUE AND OSTEAL TISSUE)

TYPES OF OSSIFICATION

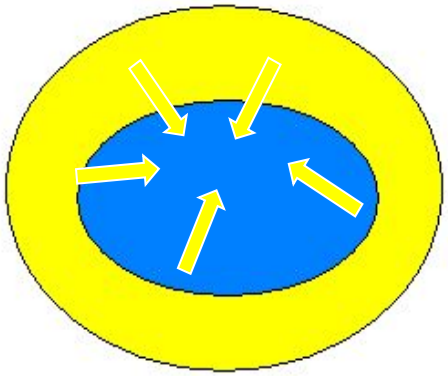
ENDOCHONDRAL

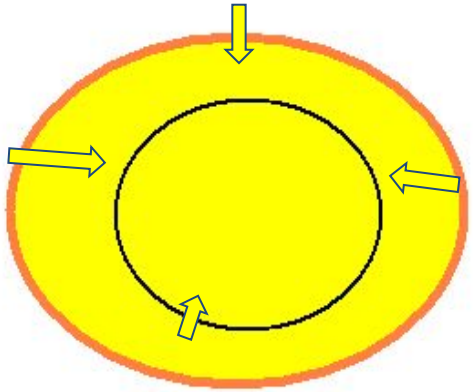




INTRAMEMBANOUS

PERIOSTEAL



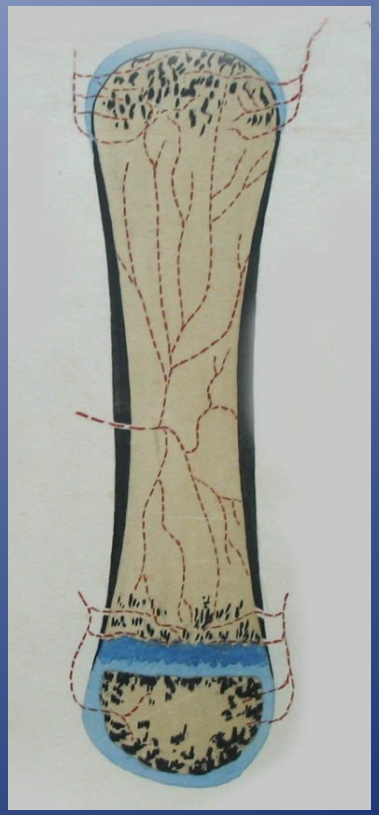


PERICHONDRAL

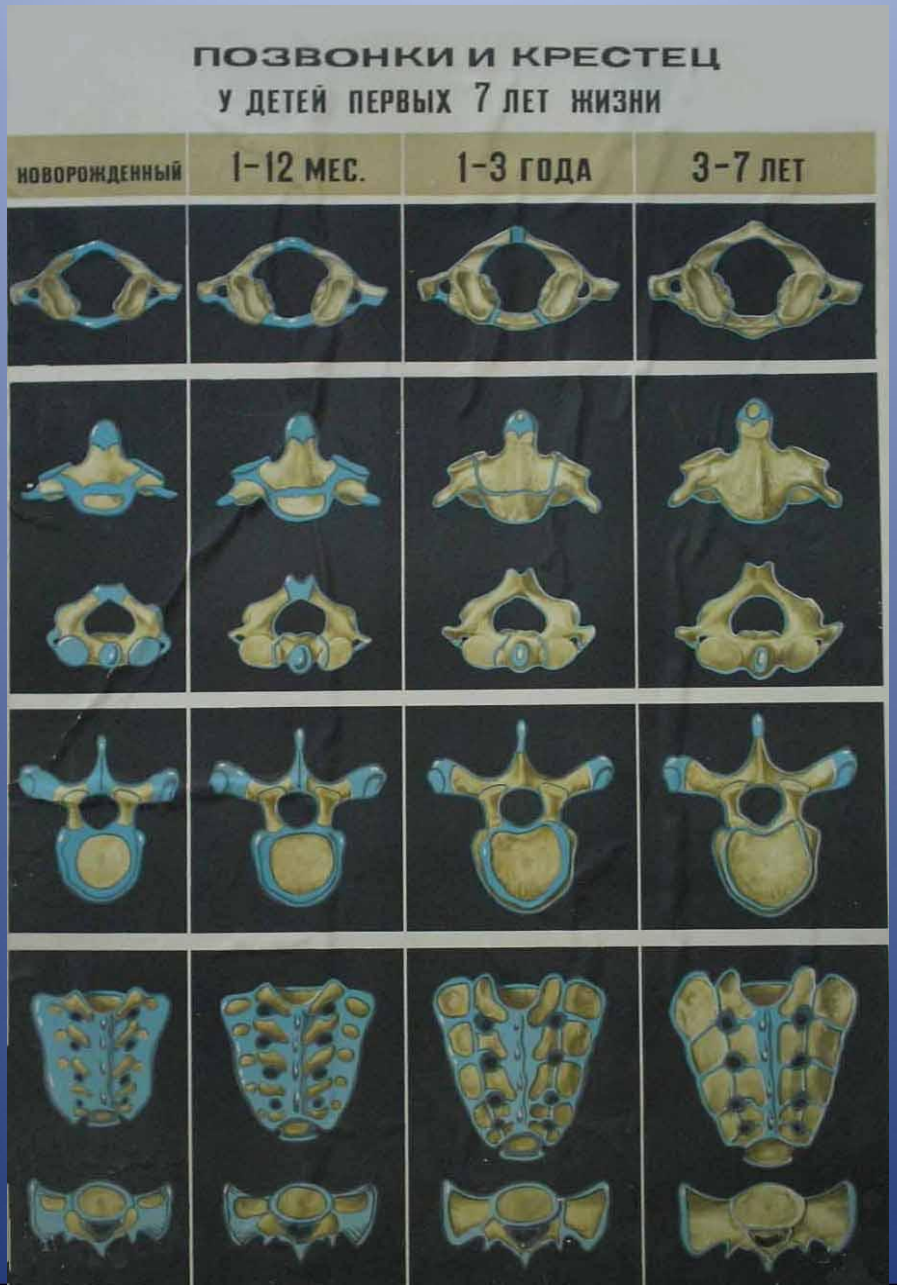
GROWTH OF BONE

in width is provided by the periosteum

in length is provided by the metaphysial cartilage



DEVELOPMENT OF THE BONES OF THE TRUNK



VARIANTS AND ANOMALIES in development

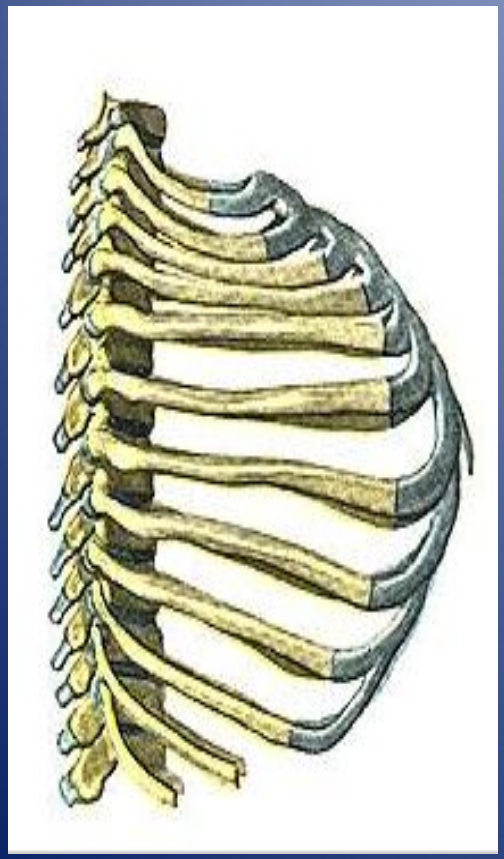
VERTEBRAE

-SPINA BIFIDA LATERALIS
-SPINA BIFIDA POSTERIOR
-SACRALIZATION
-LUMBARIZATION

VARIANTS AND ANOMALIES IN DEVELOPMENT

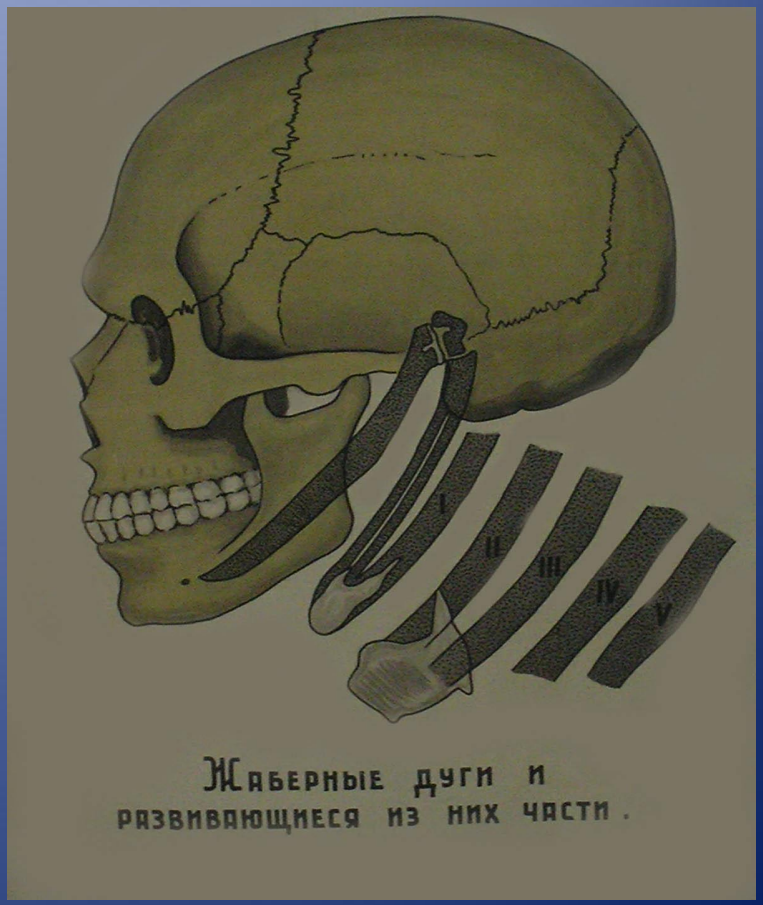
RIBS

CERVICAL RIBS
LUMBAR RIBS
MERGIG NEIGHBOUR RIBS
SPLITTING RIBS



DEVELOPMENT OF THE BONES OF SKULL

- THE PRIMARY BONES – DEVELOP INTROMEMBRANOUS WAY
- THE SECONDARY BONES – DEVELOP ENDOCHONDRAL WAY
- BONES DEVELOPING FROM THE VISCERAL ARCHES



SKULL OF NEWBORN

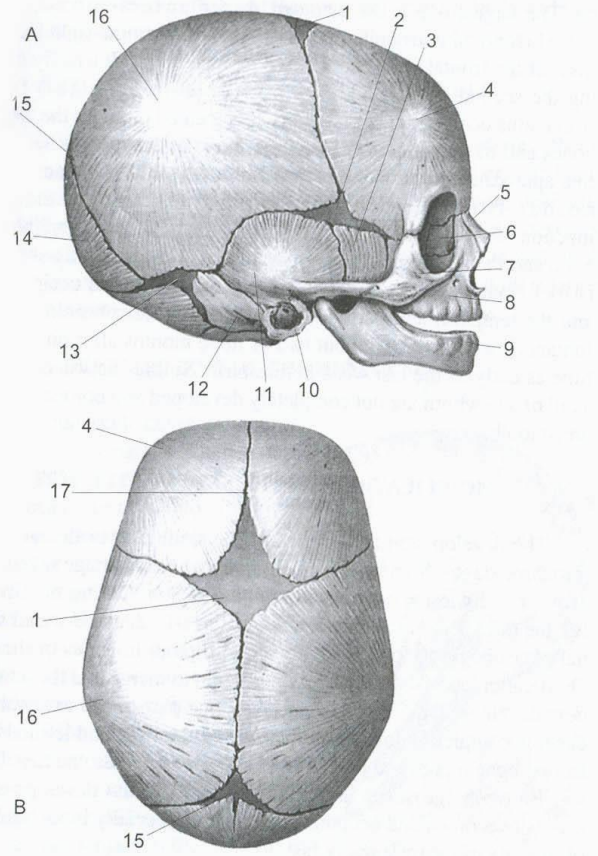
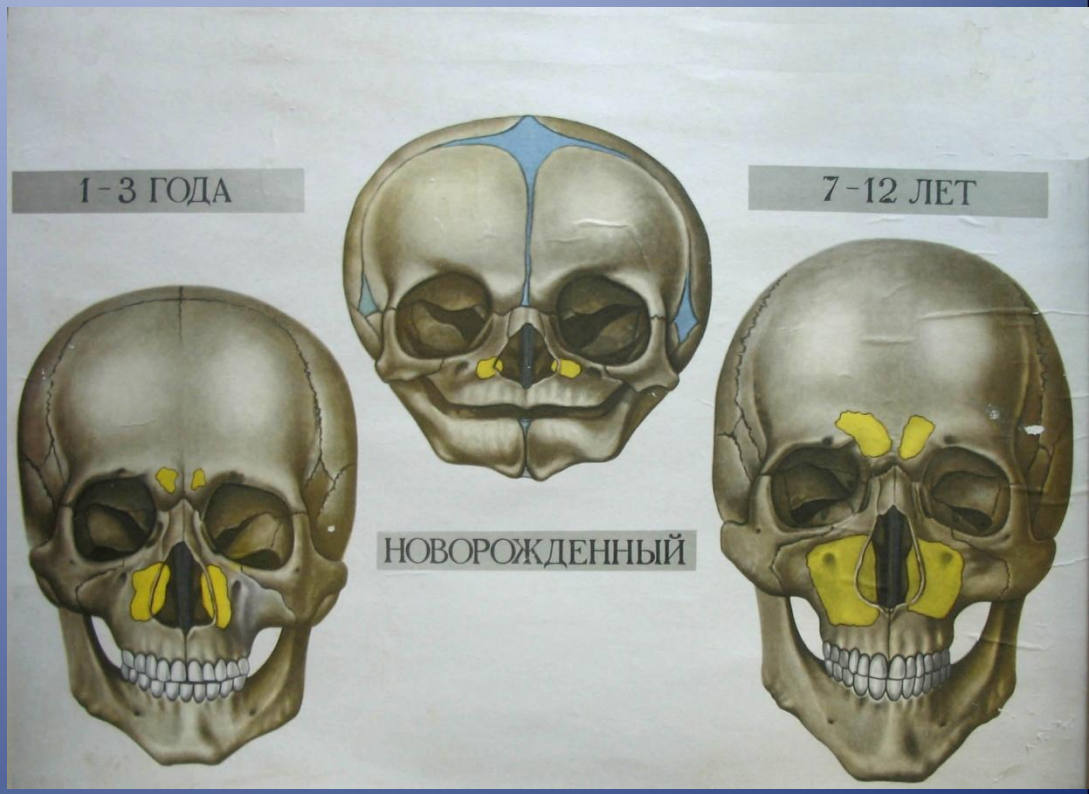


Fig. 58. Cranium of newborn. Lateral aspect (A) and superior aspect (B).

1 — anterior fontanelle; 2 — sphenoidal fontanelle; 3 — greater wing of sphenoidal bone; 4 — frontal tuber; 5 — nasal bone; 6 — lacrimal bone; 7 — zygomatic bone; 8 — maxilla; 9 — mandible; 10 — tympanic ring of temporal bone; 11 — squamous part of temporal bone; 12 — lateral part of occipital bone; 13 — mastoid fontanelle; 14 — squamous part of occipital bone; 15 — posterior fontanelle; 16 — parietal tuber; 17 — frontal suture.



ANOMALIES OF THE SKULL

- ABSENCE OF THE VAULT OF THE SKULL
- ABSENCE OF THE FACIAL SKULL
- ABSENCE OR UNDERDEVELOPED OF MANDIBULE
- CLEFT PALATE (PALATINUM FISSUM)
- TOWER SKULL