

Cartilage and Bone

四川大学组织学与胚胎学教研室

A specialized connective tissue

Hard Connective Tissue

I. cartilage (软骨)

Cartilage tissue

perichondrium (软骨膜)

dense connective tissue

**involves in nutrition ,defense ,
repair & cartilage growth**

Cartilage tissue

Cartilage t.

Cells——chondrocytes (软骨细胞)

**intercellular
substance**

ground sub.

fibers

Cartilage matrix(软骨基质)

(I) chondrocyte (软骨细胞)

Shape ——fusiform (young)

or ovoid (older)

**location——matrix cavity —— lacunae
(capsule)**

function——synthesize Cartilage matrix

chondrocyte have mitotic ability

—— **isogenous groups** 同源细胞群.

**these cells originated from mitotic
divisions of a single chondrocyte**

(II)Ground substance

solid -hard

main component ———

proteoglycans(basophilia)

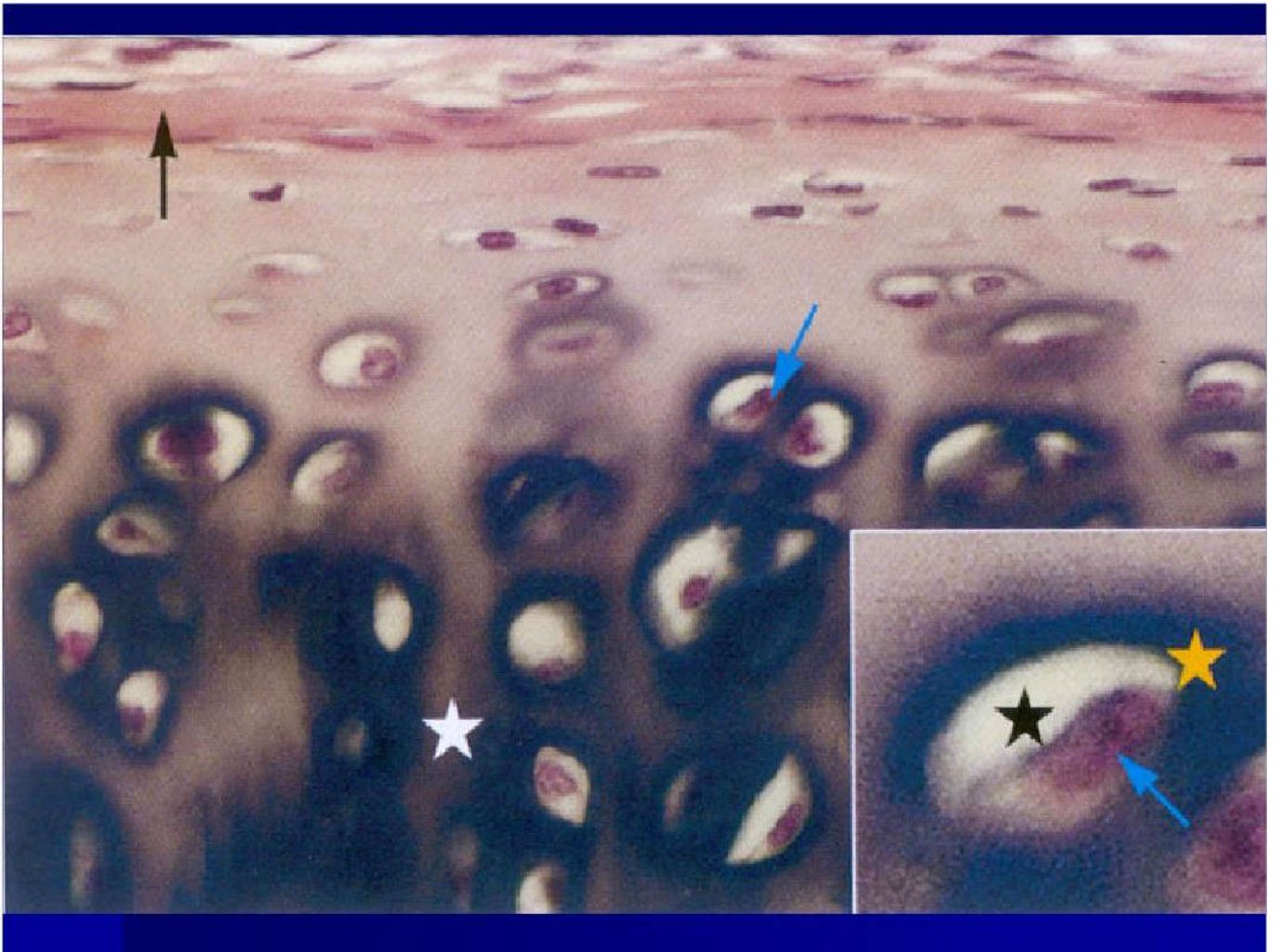
cartilage lacuna

—— **matrix cavities** (软骨陷窝)

cartilage capsule (软骨囊)

intense basophilia.

**newly formed matrix rich in GAG and
poor in fiber**



(III) Fibers

collagen or/and elastic fibers

—— acidophilia

(IV).Types of Cartilage

**According to the type of fiber in Cartilage matrix ,
Cartilage can be classified into——**

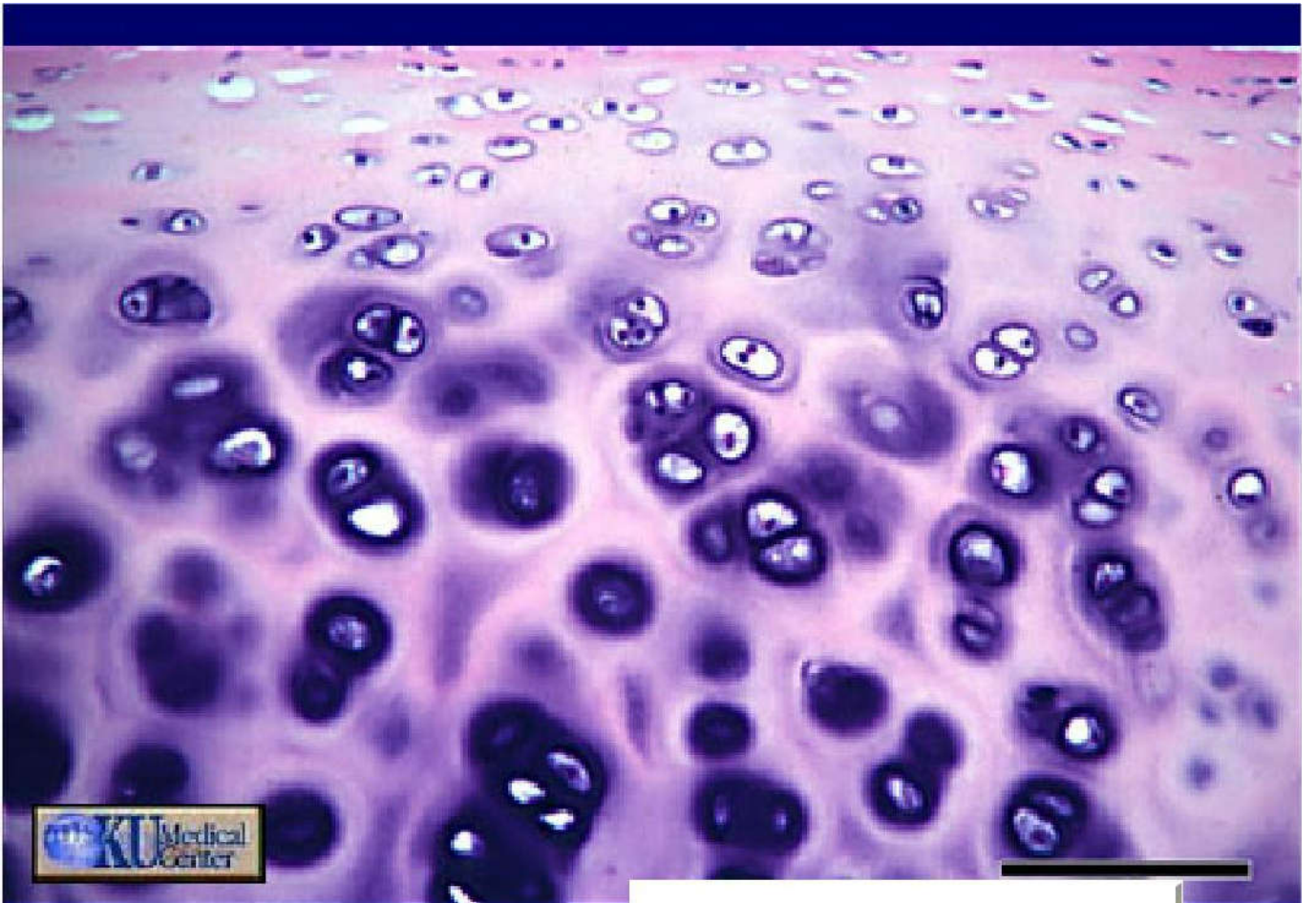
Hyaline cartilage 透明软骨

Elastic cartilage 弹性软骨

Fibrous cartilage 纤维软骨

1 Hyaline cartilage透明软骨

**a lot of ground substance
and collagen fibrils(type II)**



Hyaline cartilage

In the embryo, hyaline cartilage constitutes most of the temporary skeleton.

In the adult, it is the main type of cartilage.

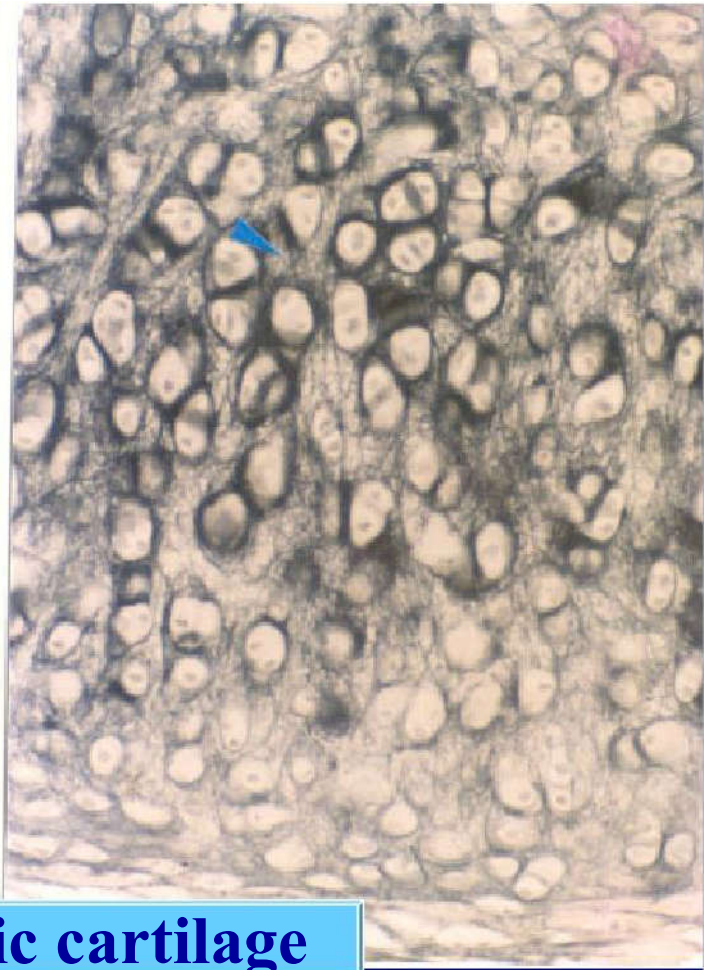
Walls of the respiratory passages

Ventral ends of the ribs

Articular cartilage

2 Elastic cartilage弹性软骨

contains an abundant network of elastic fibers



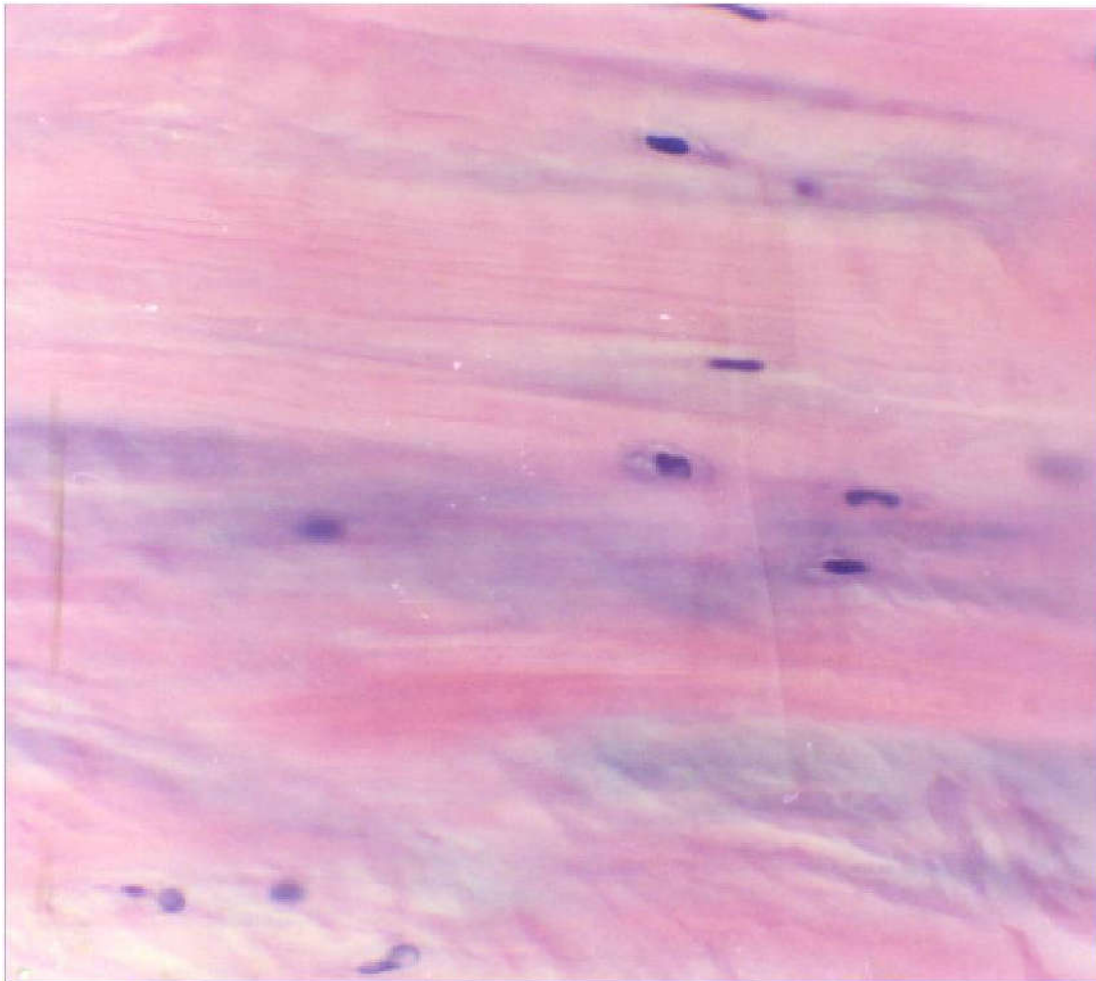
Elastic cartilage

**Auricle of the ear
epiglottis**

3 Fibrous cartilage纤维软骨

**a lot of collagen fiber bundles
and little bit of ground sub.**

Intervertebral disk



**Fibrous
cartilage**

II. Bone:

osseous tissue (骨组织):

periosteum & endosteum 骨膜

articular cartilage

bone marrow

Osseous tissue (骨组织):

- 1 . intercellular sub. ---
--- bone matrix(骨质)**
- 2 . Cells**

(I). Calcified intercellular sub.

—— **bone matrix** (*acidophilia, red in H.E*)

Organic component —— **resistance**

Inorganic component —— **hardness**

Organic Component:

**dense packed collagen fibers
ground sub.**

Inorganic Component:

**Calcium and phosphorus
hydroxyapatite crystal**

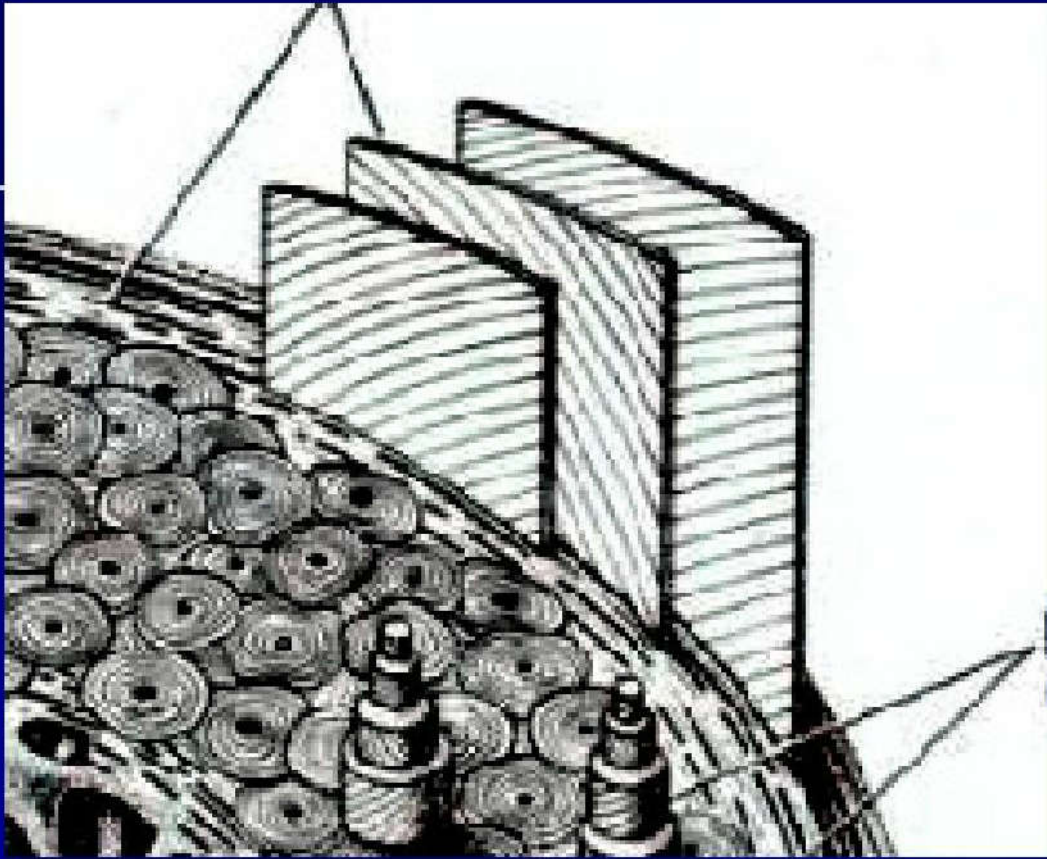
Bony Laminae —

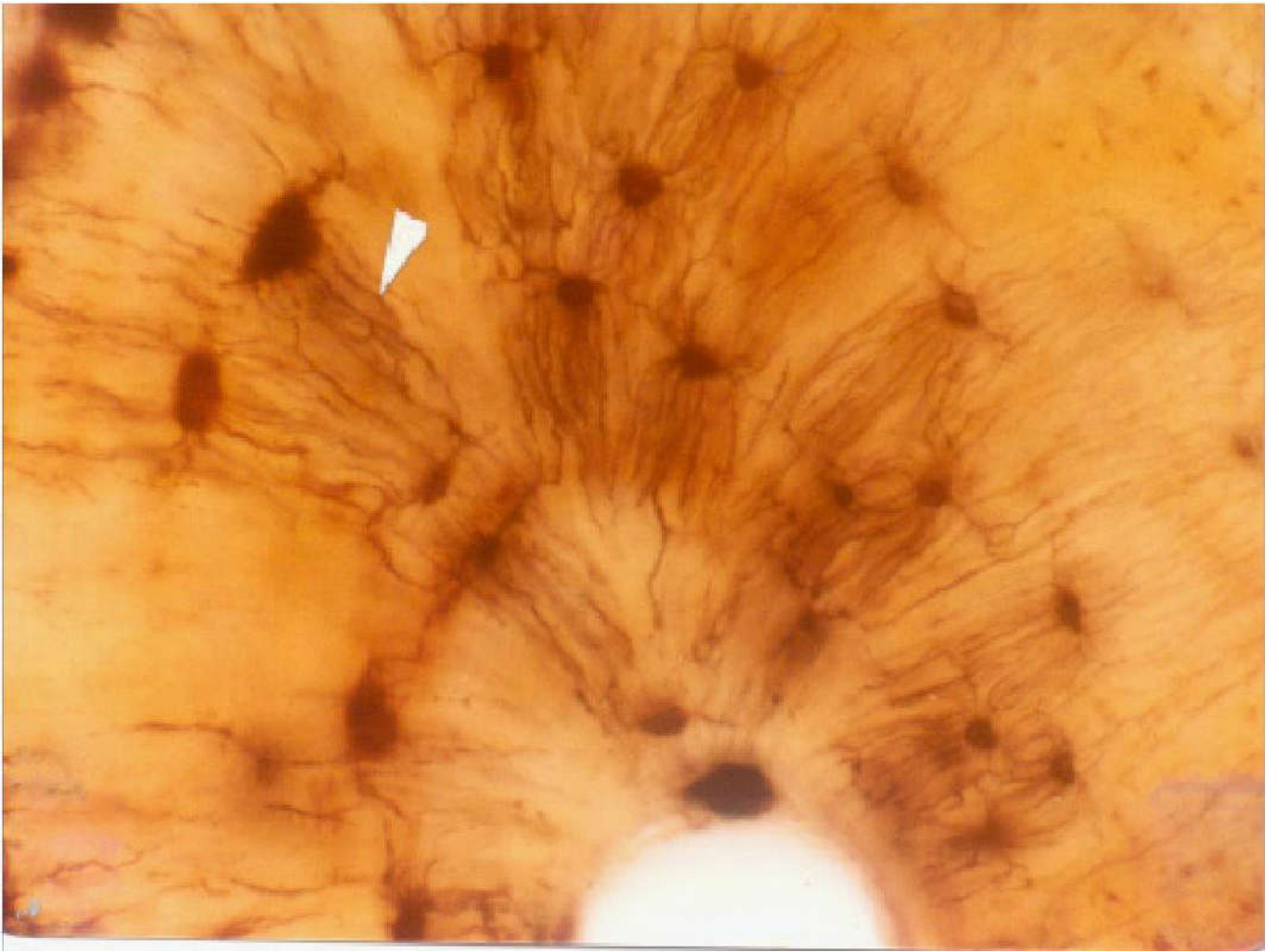
In adult, the bone matrix is arranged in laminae by the arrangement of fibers.

The collagen fibers are parallel inside a laminae,

but the direction is different from the nearby lamina,

making the osseous tissue more consistent than immature form.





(II). Cells : 4 types

1. Osteocyte (mature cell)

Stellate-like, with processes,

cell body in lacunae,

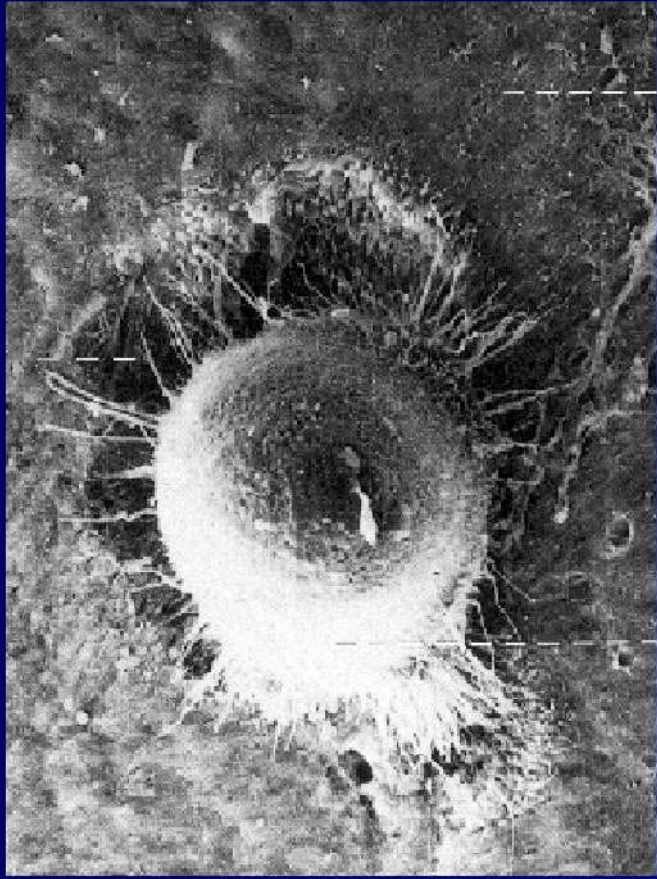
processes in canaliculi,

Function —

maintenance the bone matrix



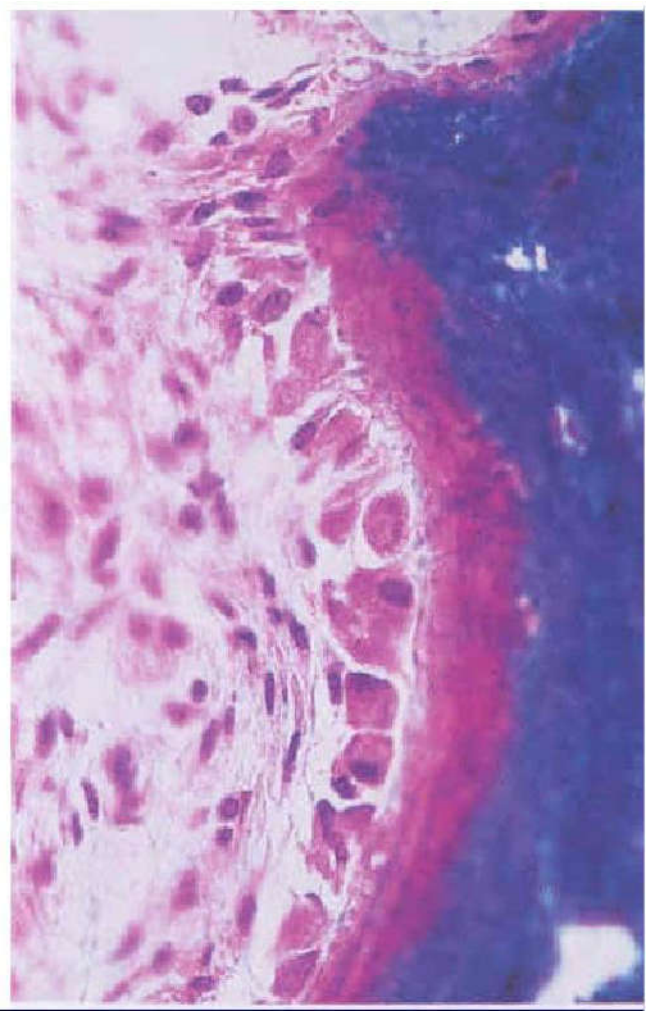
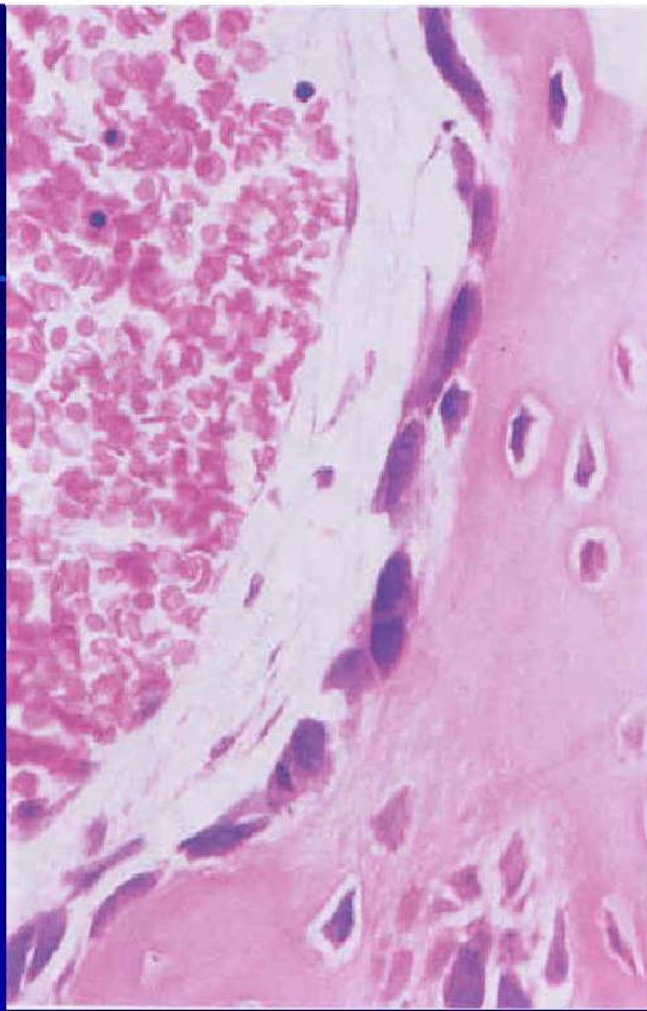
图 5-6 骨细胞超微结构模式图

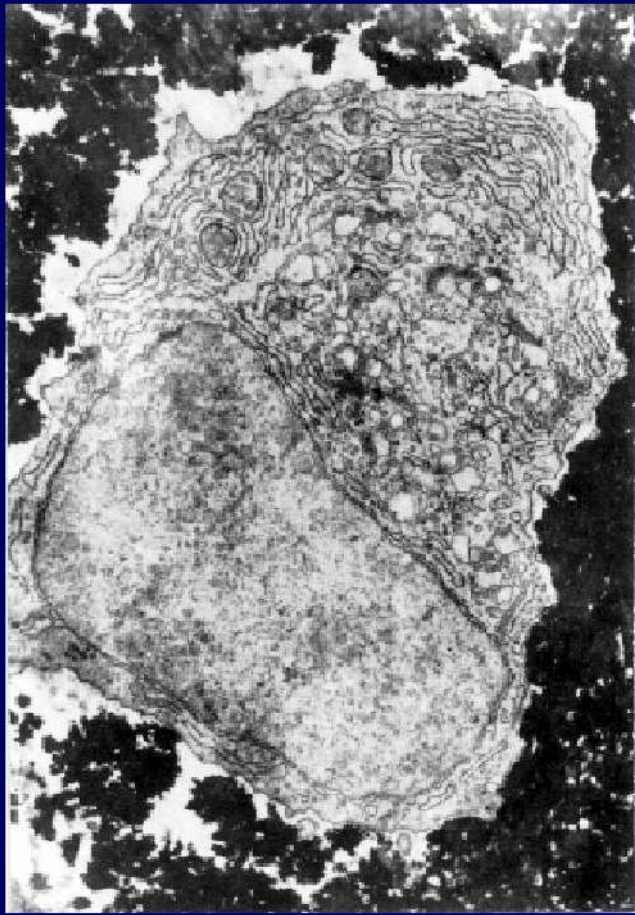




2. Osteoblast (bone matrix forming cell)

**produce organic components of
bone matrix.**





Osteoid:

produced by osteoblast

**newly formed uncalcified
intercellular substance**

osteoid+inorganic component

—— bone matrix

osteoblast embeded in bone matrix

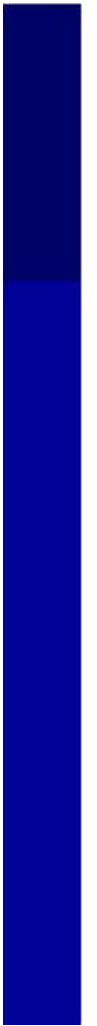
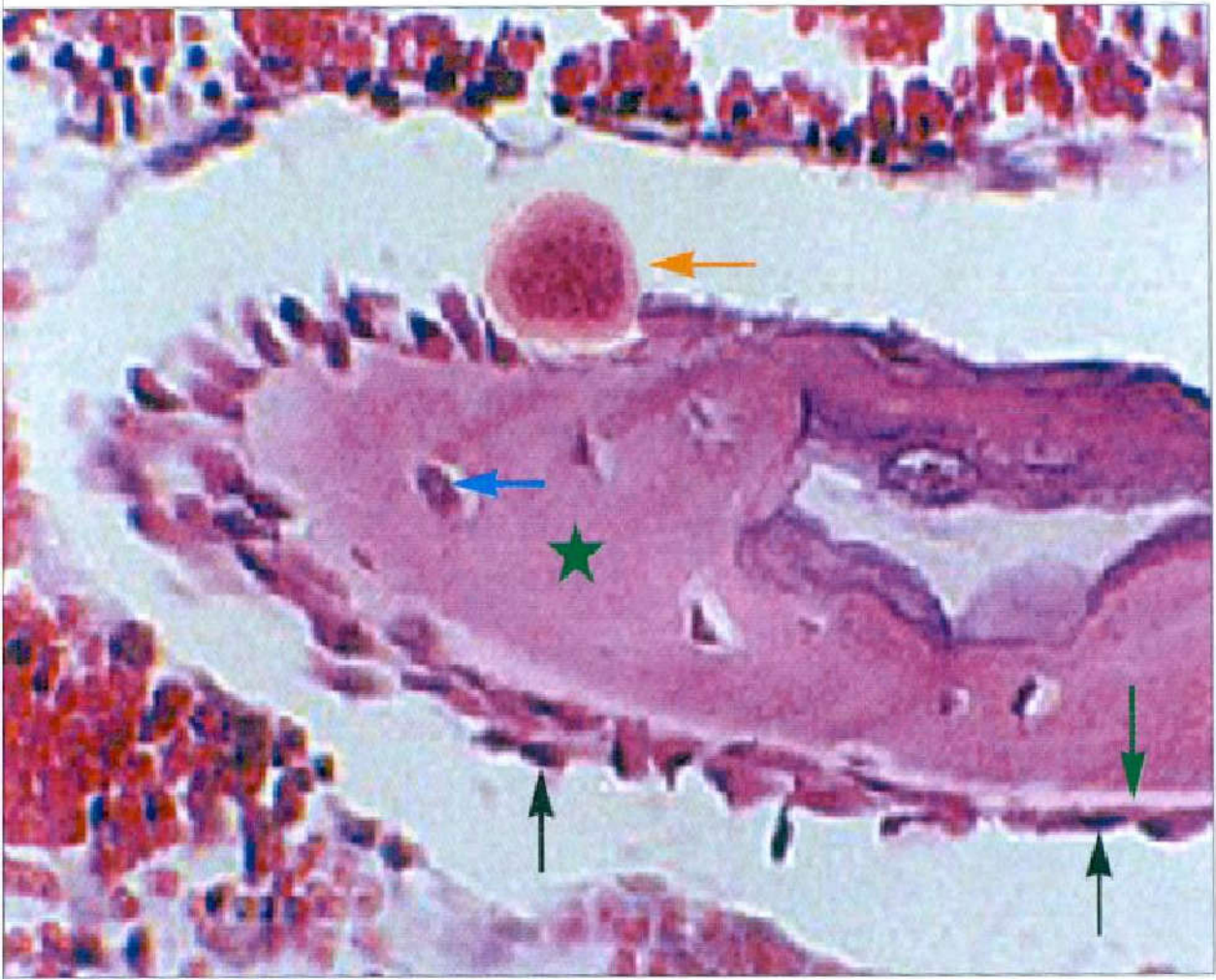
——osteocyte

3. Osteoclast (bone matrix breaking cell)

destruction, resorption of bone matrix

LM : *multinucleated, giant,
acidophilic cell.*

EM : *lysosomes, endocytotic vacuoles,
ruffled border.*





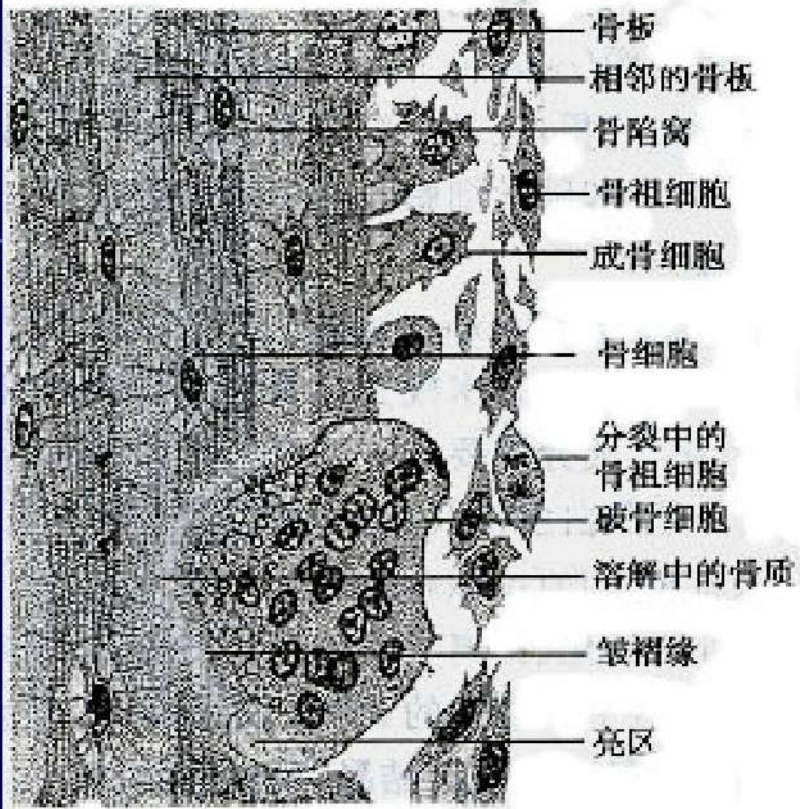


图 5-5 骨组织的骨板和各种细胞

(III) Classification of Osseous tissue

spongy bone

compact bone

1.Spongy bone

at epiphyses mainly

**bony trabeculae connect each other
forming network**

Areas with numerous cavities

fill with bone marrow

2.Compact bone

at diaphysis (shaft)

Dense areas without cavities

III .Bone——Structure of long bone

Bone { diaphysis
epiphyses
periosteum & endosteum
articular cartilage
bone marrow

diaphysis

mainly consist of Compact bone
form 3 types of lamellar system——

(1)Circumferential L.——

inner & outer

(2)Haversian System——Osteon

(3)Interstitial L.

