PRACTICAL NO: 01

MICROSCOPY

BRIEF DESCRIPTION:

MICROSCOPE :

An instrument which can magnify the visual/photographic image of small objects is called microscope

MICROSCOPY :

The process of magnification of microorganisms for their microscopic examination is called microscopy

DESCRIPTION:

→ Microscope magnifies image (Magnification)
→ Separates image details (Resolution)
→ Makes the details of image visible to human

RESOLVING POWER:

It is a measure of capacity of microscope to clearly separate two points close together

IDENTIFICATION POINTS: (PARTS OF MICROSCOPE)

* Eye piece
* Stage
* Objective lenses
* Nose piece
* Base
* Ocular lenses

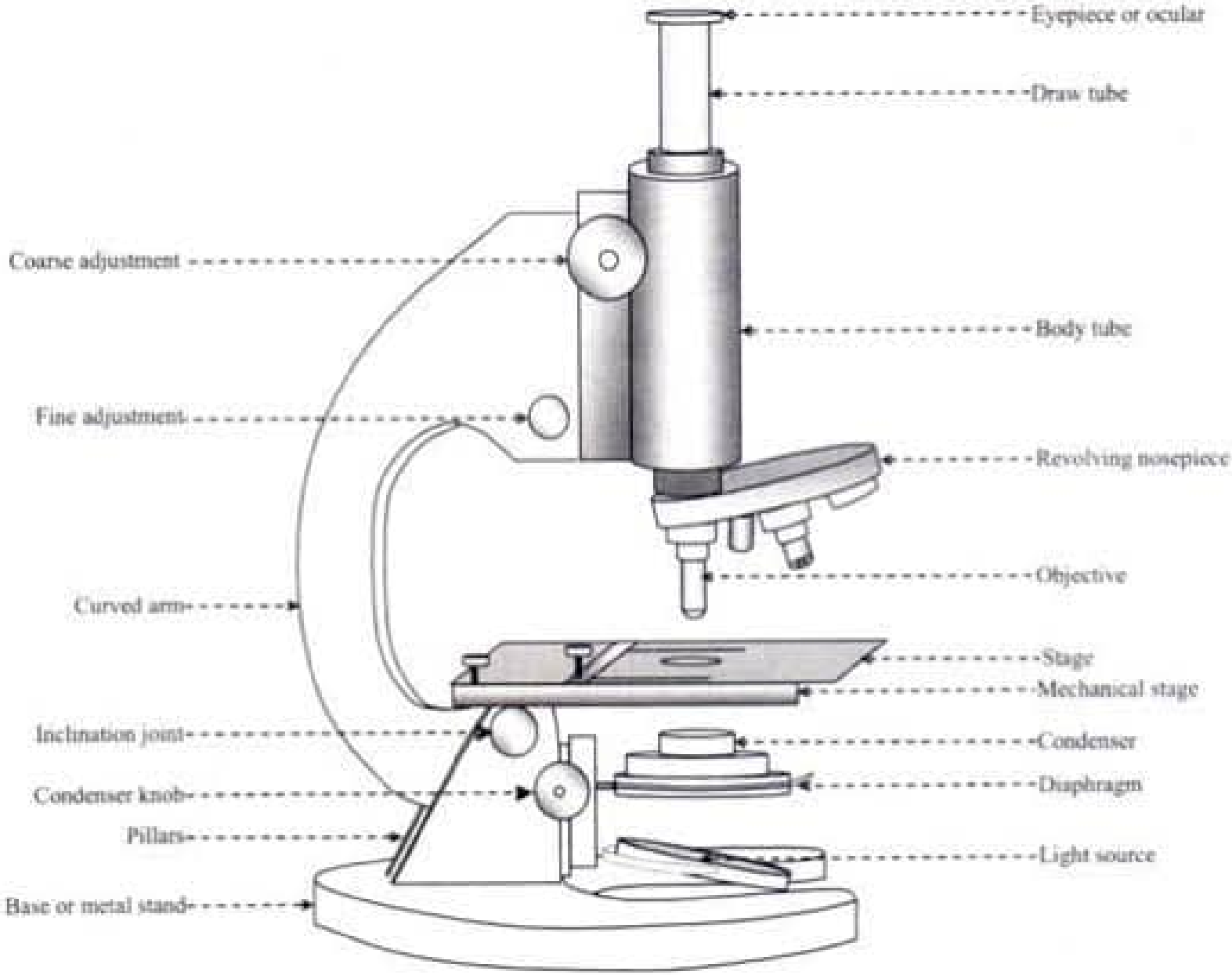


Figure 4.6: A compound microscope

PRACTICAL NO: 02

HUMAN CELL

BRIEF DESCRIPTION:

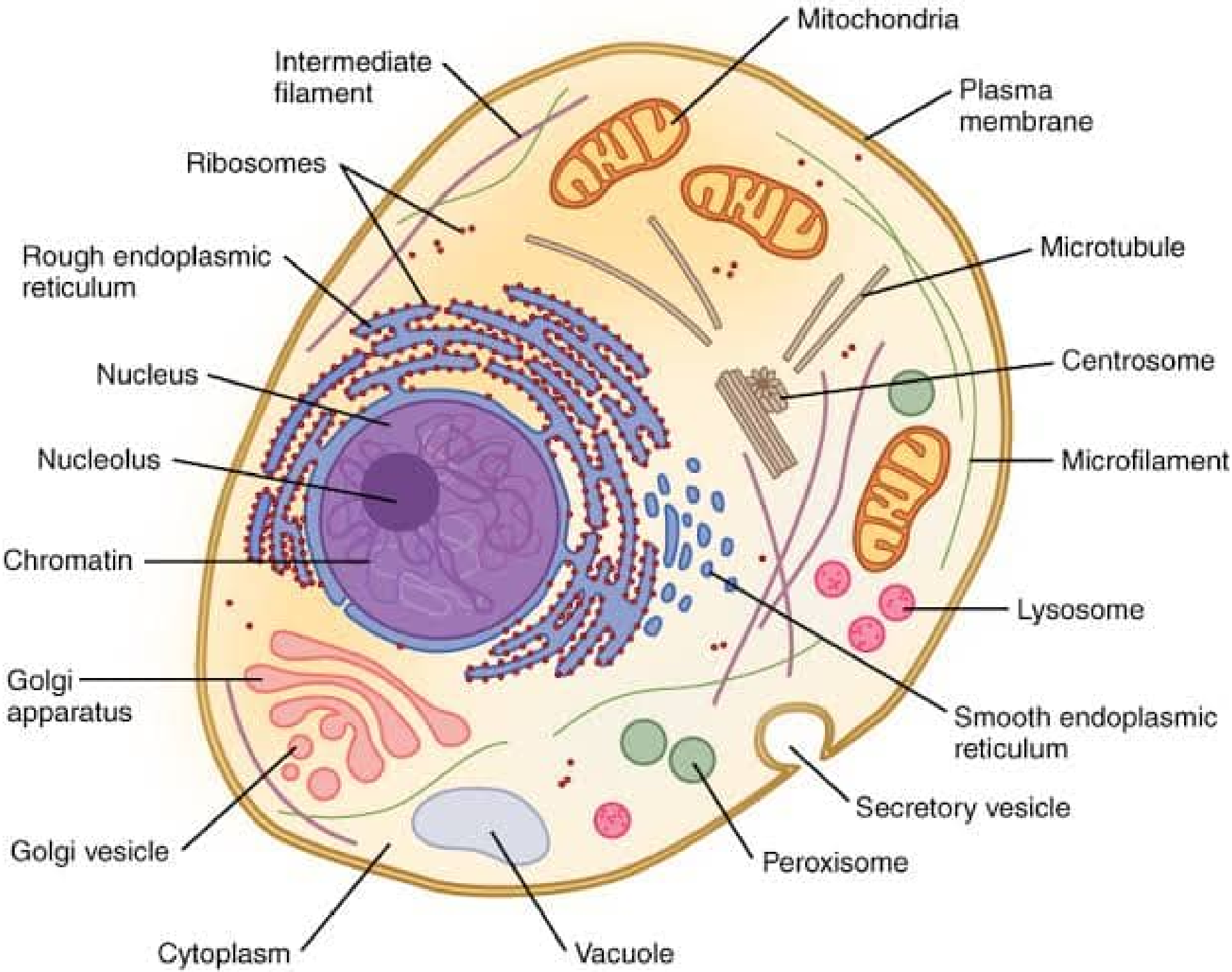
CELL

Cell is the basic structural and functional unit of all living organisms. It consist of cytosol, basic cell organelles and cell membrane

BASIC CELL ORGANELLES

* Golgi bodies
* Mitochondria
* Endoplasmic reticulum
* Nucleus
* Cytoskeleton
* Ribosomes
* Lysosomes
* Centrioles

IDENTIFICATION POINTS:



PRACTICAL NO: 03

EPITHELIAL CELLS

BRIEF DESCRIPTION:

* PSEUDOSTRATIFIED COLUMNAR CILIATED EPITHLIUM

All cells of pseudo stratified columnar epithelium rest on the basement membrane but all of them do not reach the free surface of epithelium

* TRANSITIONAL EPITHELIUM (UNSTRETCHED OR RELAXED)

In the undistended (i.e contracted) urinary bladder, the urothelium appears to consist of 6 or more layers of cells. The basal layer of epithelium consist of cuboidal cells. Over the basal layer are present several layer of polygonal cells.

IDENTIFICATION POINTS:

→ Pseudostratified epithelium tissue has two types of cells, tail columnar cells and short cells

PRACTICAL NO:

BRIEF DESCRIPTION:

* TRANSITIONAL EPITHELIUM (STRETCHED BLADDER)

Distension of urinary bladder stretches and flattens the epithelium. In fully distended (stretched) state, the transitional epithelium is seen to consist of only 2 or 3 layers. There is a basal layer of cuboidal cells over which are present one or two layer of large flat cells.

* STRATIFIED SQUAMOUS NON KERATINIZED EPITHELIUM

The stratified squamous non keratinized epithelium lines these slippery surface in the body which are subjected to abrasion but remain wet. The surface cells become flat but mostly become nucleated and their cell contains little or no cytoplasm

IDENTIFICATION POINTS:

Stratified squamous epithelium lines those surfaces which are subjected to wear and tear

PRACTICAL NO:

BRIEF DESCRIPTION:

* STRATIFIED SQUAMOUS KERATINIZED EPITHELIUM (PALM OF HAND)

→ Skin is covered with stratified squamous keratinized epithelium

→ outer layer, dead cells, stratum corneum

→ Stratum granulosum, stratum corneum, stratum basale are the outer layer

* STRATIFIED CUBOIDAL EPITHELIUM (EXCRETORY DUCT IN SALIVARY GLAND)

→ These cells have limited distribution and is seen only in few organs

→ Excretory ducts in the salivary glands and in the pancreas are lined with stratified cuboidal epithelium

IDENTIFICATION POINTS:

Stratified cells consist of two or more cell layers. These cellular layers are super imposed upon one another

PRACTICAL NO:

BRIEF DESCRIPTION:

* SIMPLE COLUMNAR EPITHELIUM

(SURFACE OF STOMACH)

→ They contain dark staining basal nuclei

→ Epithelium are in close contact with each other and are arranged in single row

→ Basement membrane separates surrounding epithelium

* SIMPLE SQUAMOUS EPITHELIUM

(Mesothelium Surrounding Small Intestine)

Cells appear flat, adhere tightly to each other, and form a sheet with a thickness of single cell layer.

IDENTIFICATION POINTS:

PRACTICAL NO:

BRIEF DESCRIPTION:

* SIMPLE CUBOIDAL EPITHELIUM

→ consist of single layer of cells closely packed together

→ sections made perpendicular shows that they have square shaped cells.

IDENTIFICATION POINTS:

Simple epithelia are also called unilaminar epithelia consisting of simple layer of cells. They have basal surface which rest on basement membrane and free surface lumen

FIGURE 2.6 ■ Pseudostratified columnar ciliated epithelium: respiratory passages–trachea. Stain: hematoxylin and eosin. High magnification.

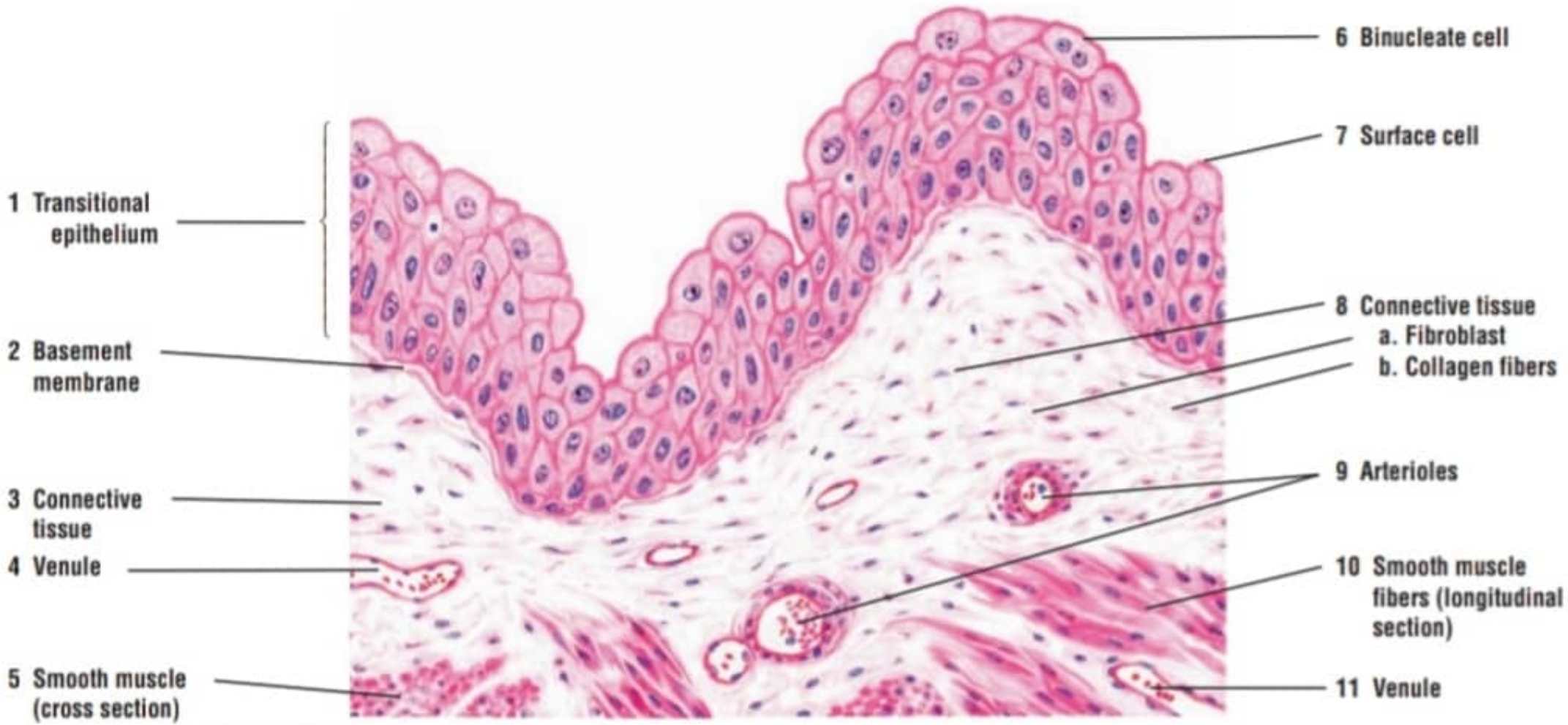


FIGURE 2.7 ■ Transitional epithelium: bladder (unstretched or relaxed). Stain: hematoxylin and eosin. High magnification.

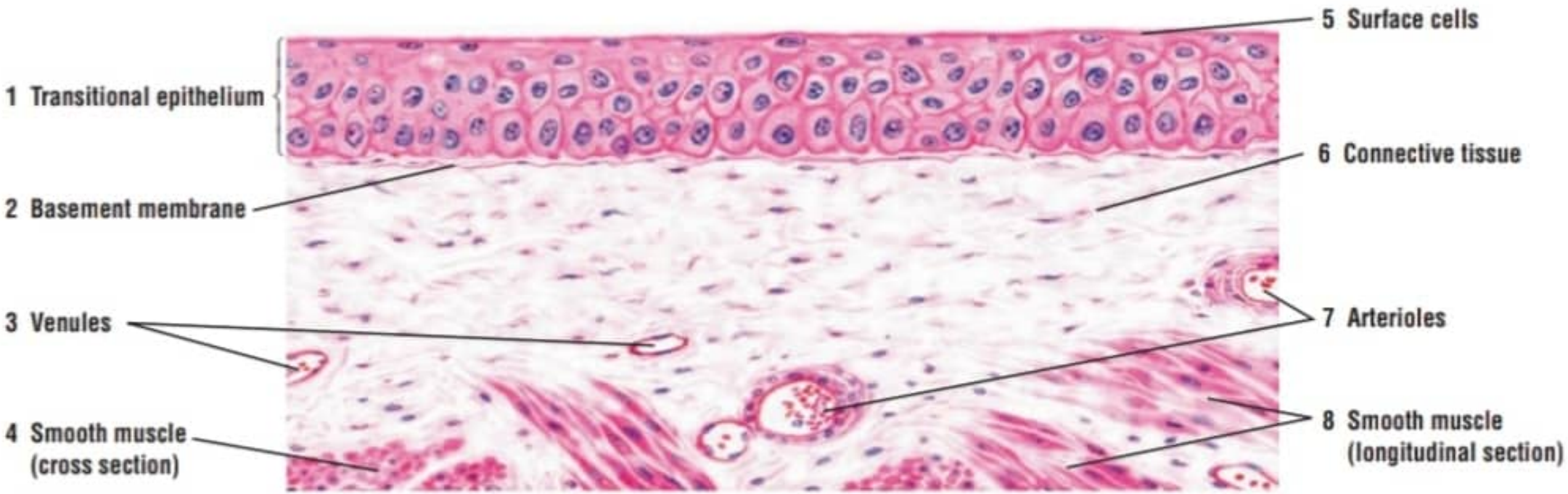


FIGURE 2.8 ■ Transitional epithelium: bladder (stretched). Stain: hematoxylin and eosin. High magnification.

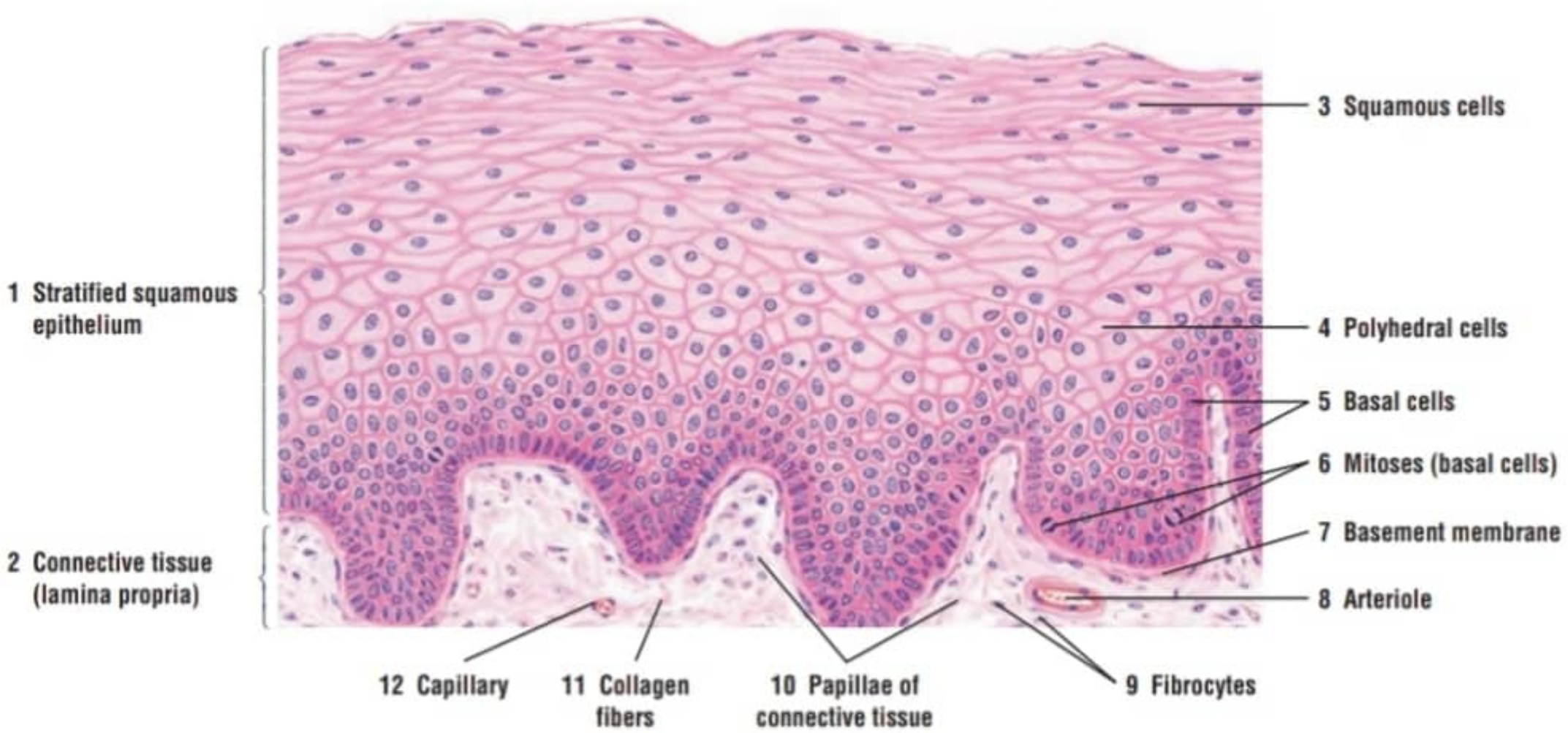


FIGURE 2.9 ■ Stratified squamous nonkeratinized epithelium: esophagus. Stain: hematoxylin and eosin. Medium magnification.

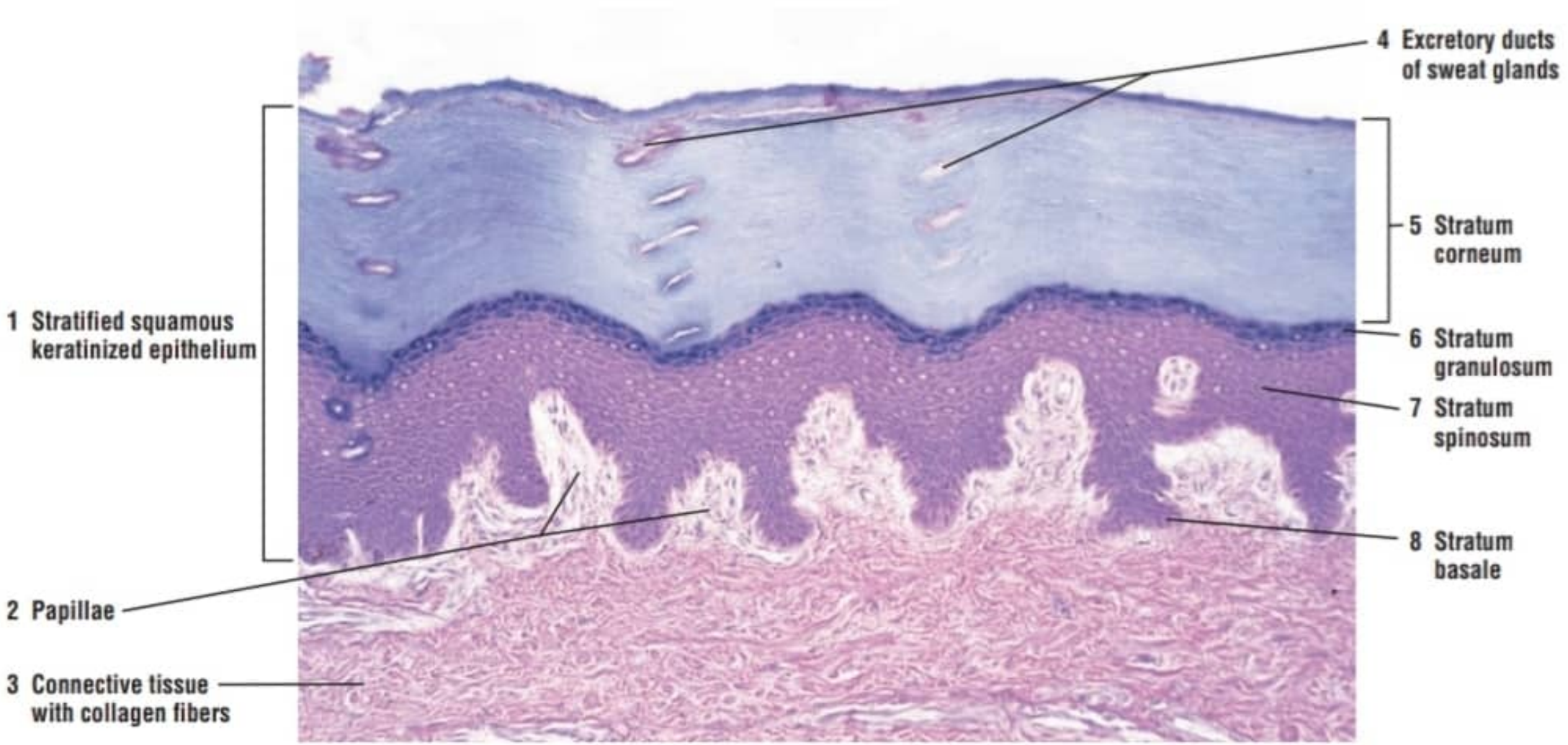


FIGURE 2.10 ■ Stratified squamous keratizined epithelium: palm of hand. Stain: hematoxylin and eosin. ×40.

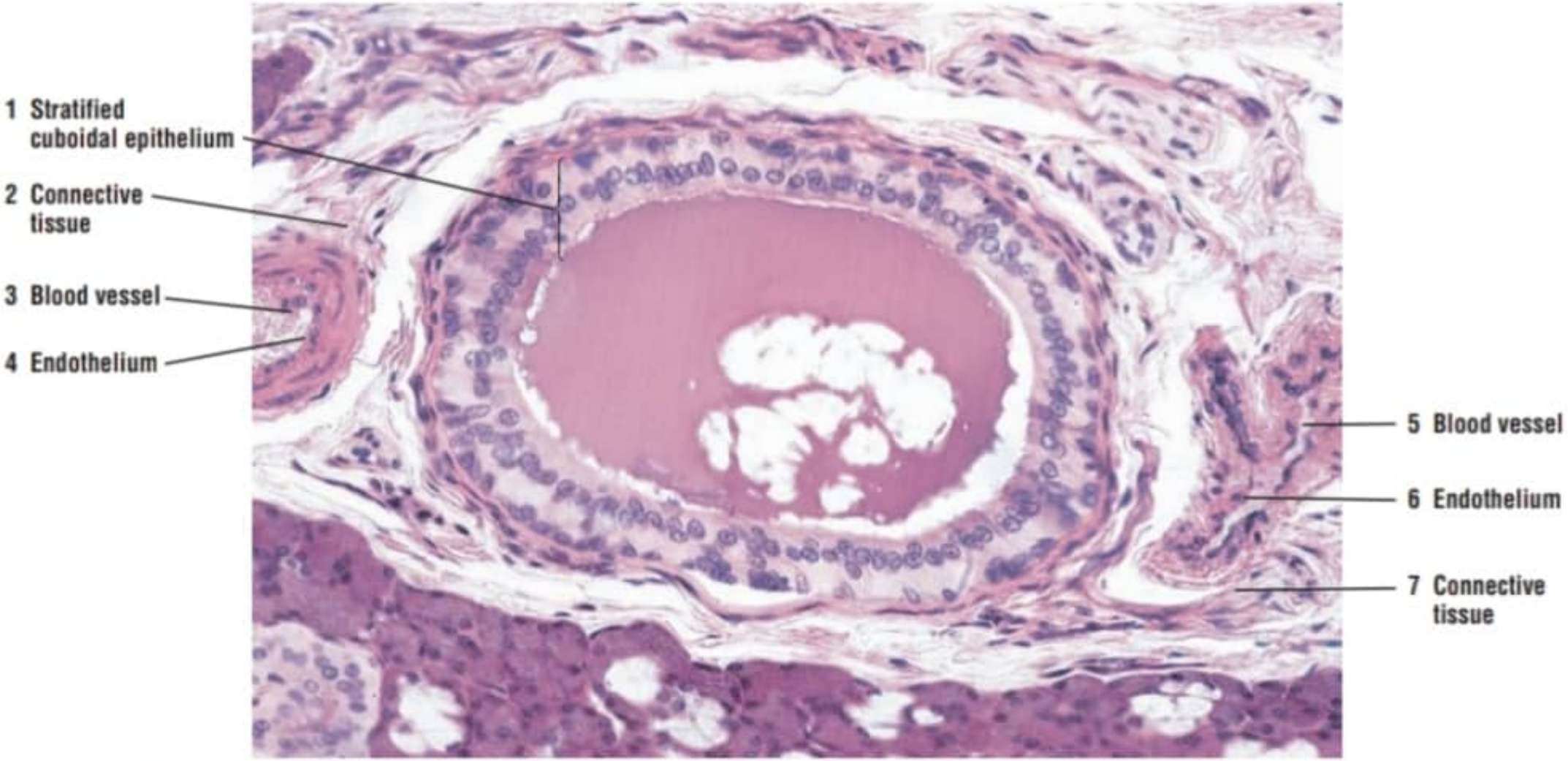


FIGURE 2.11 ■ Stratified cuboidal epithelium: excretory duct in salivary gland. Stain: hematoxylin and eosin. ×100.

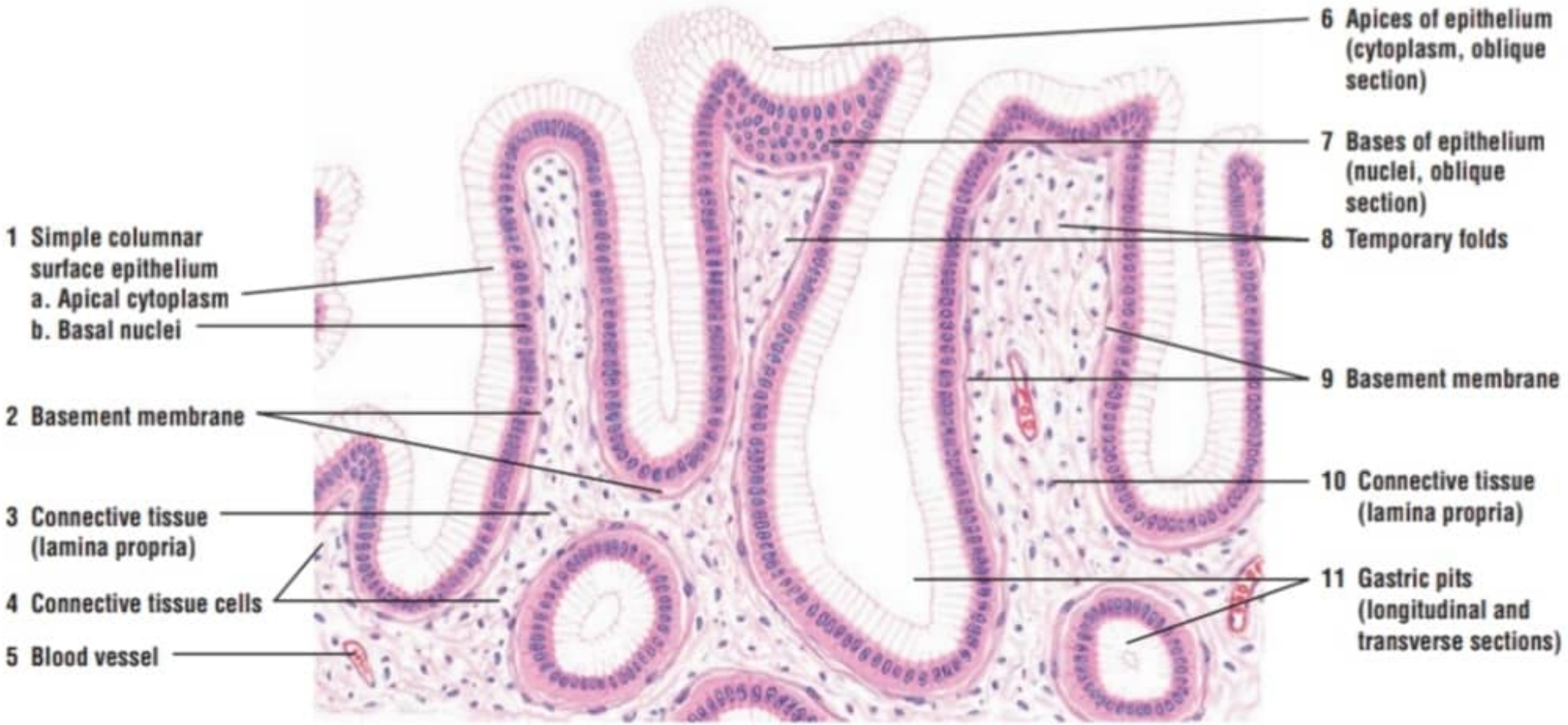
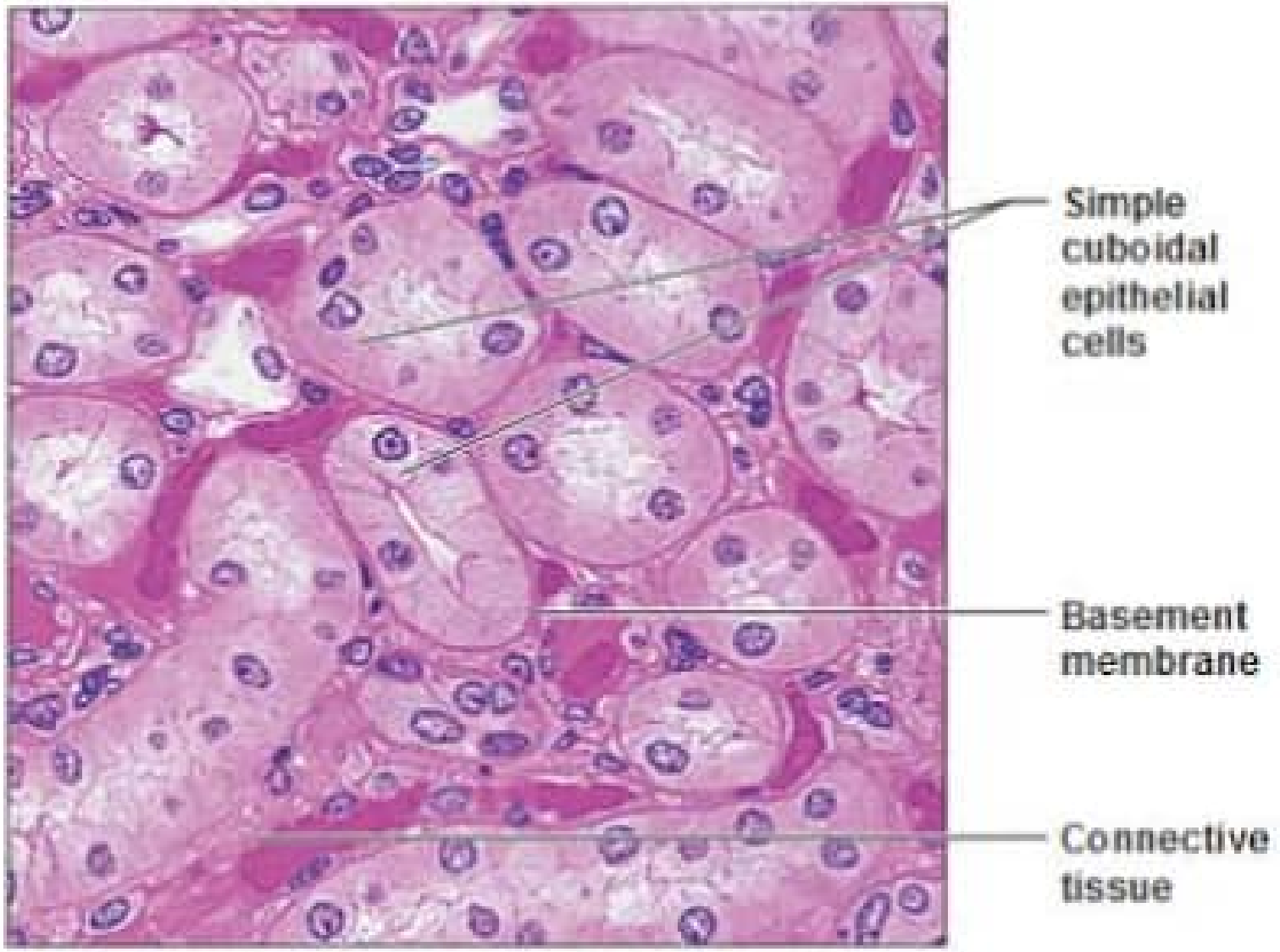


FIGURE 2.4 ■ Simple columnar epithelium: surface of stomach. Stain: hematoxylin and eosin. Medium magnification.



Photomicrograph: Simple cuboidal epithelium in kidney tubules (430×).

PRACTICAL NO: 04

LYMPHOID SYSTEM

BRIEF DESCRIPTION:

* THYMUS

Thymus is an encapsulated bilateral organ in the mediastinum. It is subdivided by connective tissue septa into connected ~~lobules~~ Lobes.

Lobes have peripheral region of cortex basophilic lymphocytes which are fairly densed and more characterized by scattered presence of distinct thymic corpuscles.

SPLEEN

The spleen is the largest lymphoid tissue in the body and the only one involved in the filtration of blood, making it an important organ in defense against blood-borne antigens. It is also main site of destruction of aged erythrocytes. The spleen is site of antigen production

IDENTIFICATION POINTS:

Thymus is a bi-lobed lymphoid organ enclosed by CT capsule which give rise to CT trabeculae

Spleen is a large lymphatic nodule having red and white pulp

PRACTICAL NO:

BRIEF DESCRIPTION:

* LYMPH NODE

Lymph nodes are bean-shaped encapsulated structures, generally 2-100 cm in diameter, distributed throughout the body along the course of the lymphatic vessels. The nodes are found in axilla (armpits) and groin, along the great vessels of neck and in large number in thorax and abdomen.

* PALATINE TONSILS

A paired palatine consist of aggregates of lymphatic nodules located in the oral cavity. The palatine tonsils are surrounded by a connective tissue capsule. As a result, the surface of palatine tonsils is covered by protected stratified squamous non-keratinized epithelium.

IDENTIFICATION POINTS:

* Lymph nodes: It consist of dense mass of lymphocytes aggregation, intermixed with dilated lymphocytic sinuses that contain lymph and are supported by a framework of fine reticular fibers.

FIGURE 9.8 ■ Thymus gland (sectional view). Stain: hematoxylin and eosin. High magnification.

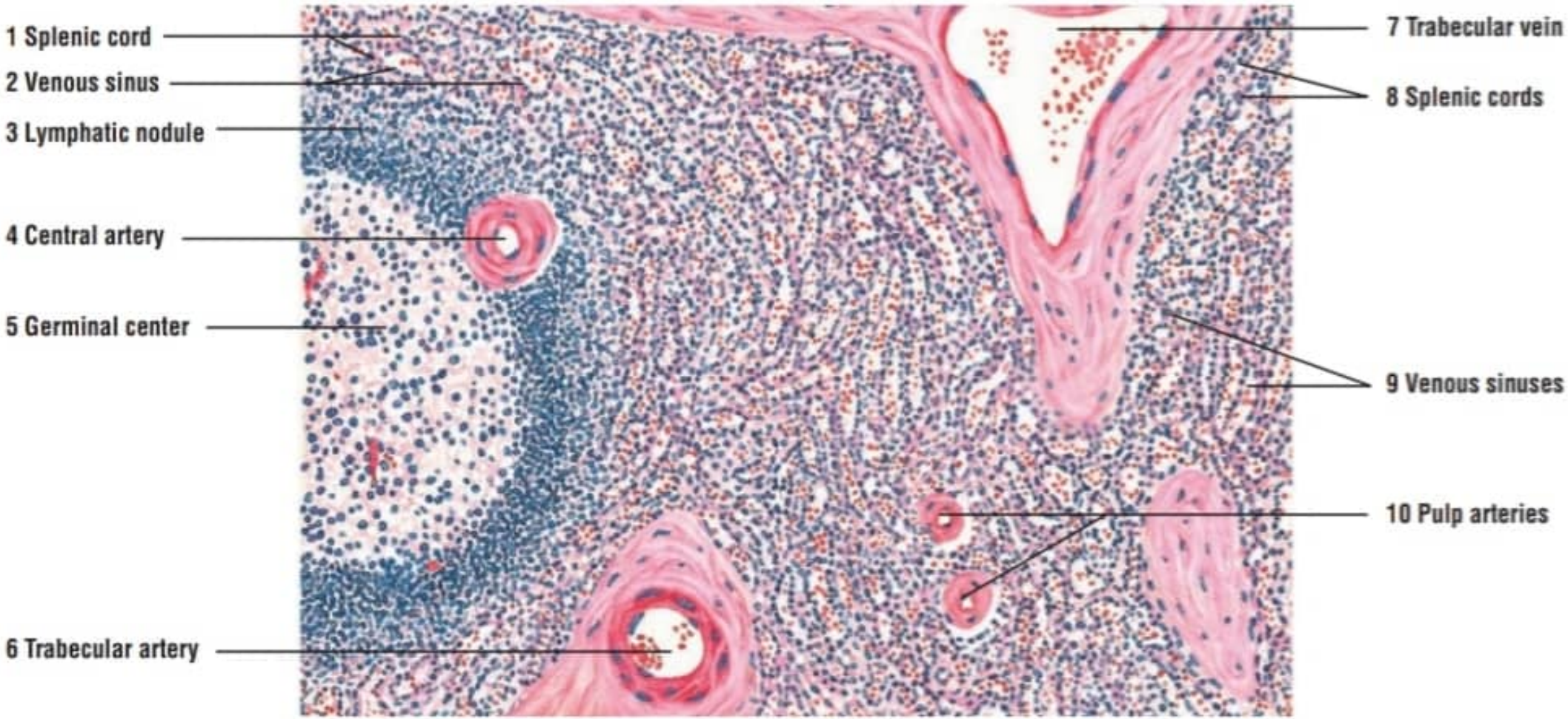


FIGURE 9.11 ■ Spleen: red and white pulp. Stain: hematoxylin and eosin. Medium magnification.

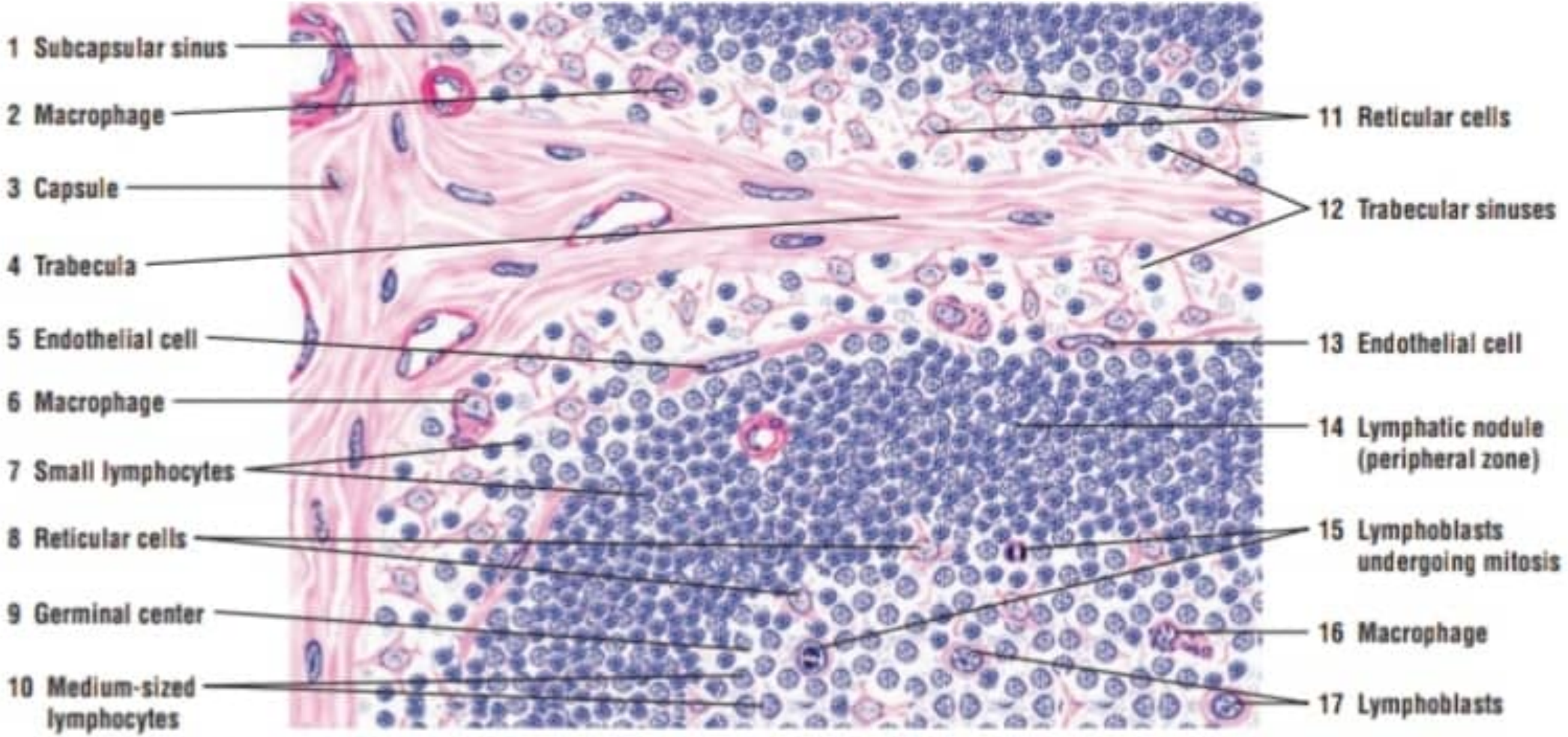


FIGURE 9.4 ■ Lymph node: subcortical sinus, trabecular sinus, reticular cells, and lymphatic nodule. Stain: hematoxylin and eosin. High magnification.

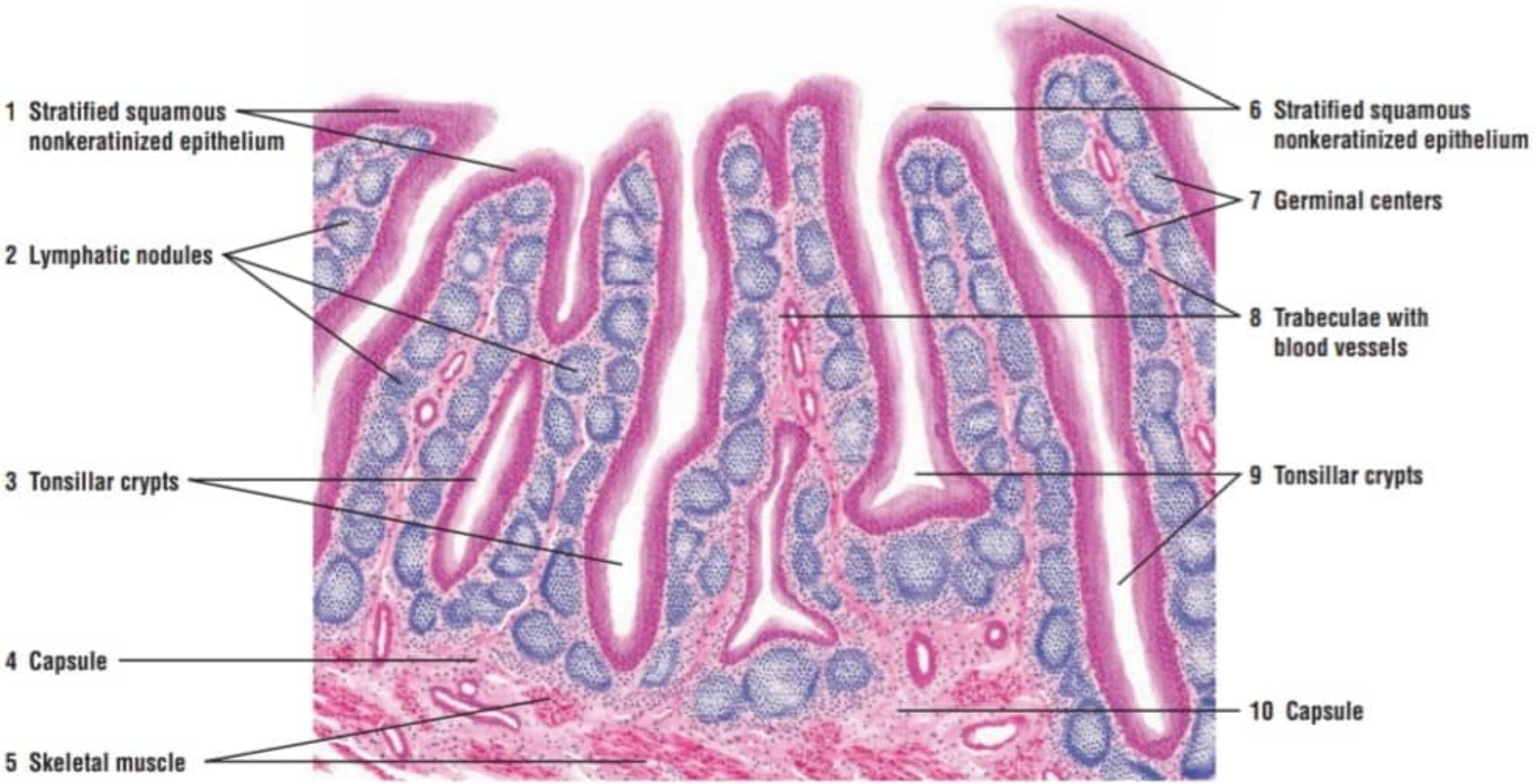


FIGURE 9.13 ■ Palatine tonsil. Stain: hematoxylin and eosin. Low magnification.

PRACTICAL NO: 05

CONNECTIVE TISSUE

BRIEF DESCRIPTION:

* LOOSE CONNECTIVE TISSUE

The pink collagen fibers are the thickest, largest and the most numerous fibers. In this connective tissue preparation, collagen fibers course in all directions

* DENSE IRREGULAR CONNECTIVE TISSUE

It has collagen producing fibroblast cells. Collagen fibers shows very random and irregular orientation. Adjacent to the region of dense irregular connective tissue, there is an adipose tissue

* ADIPOSE TISSUE

Large accumulation of flat cells. The connective tissue which surrounds the adipose tissue is covered by simple squamous epithelium called mesothelium

IDENTIFICATION POINTS:

*Loose Connective Tissues consist of network of fibers

*Dense Irregular Connective Tissue: random and irregular orientation of collagen fibers

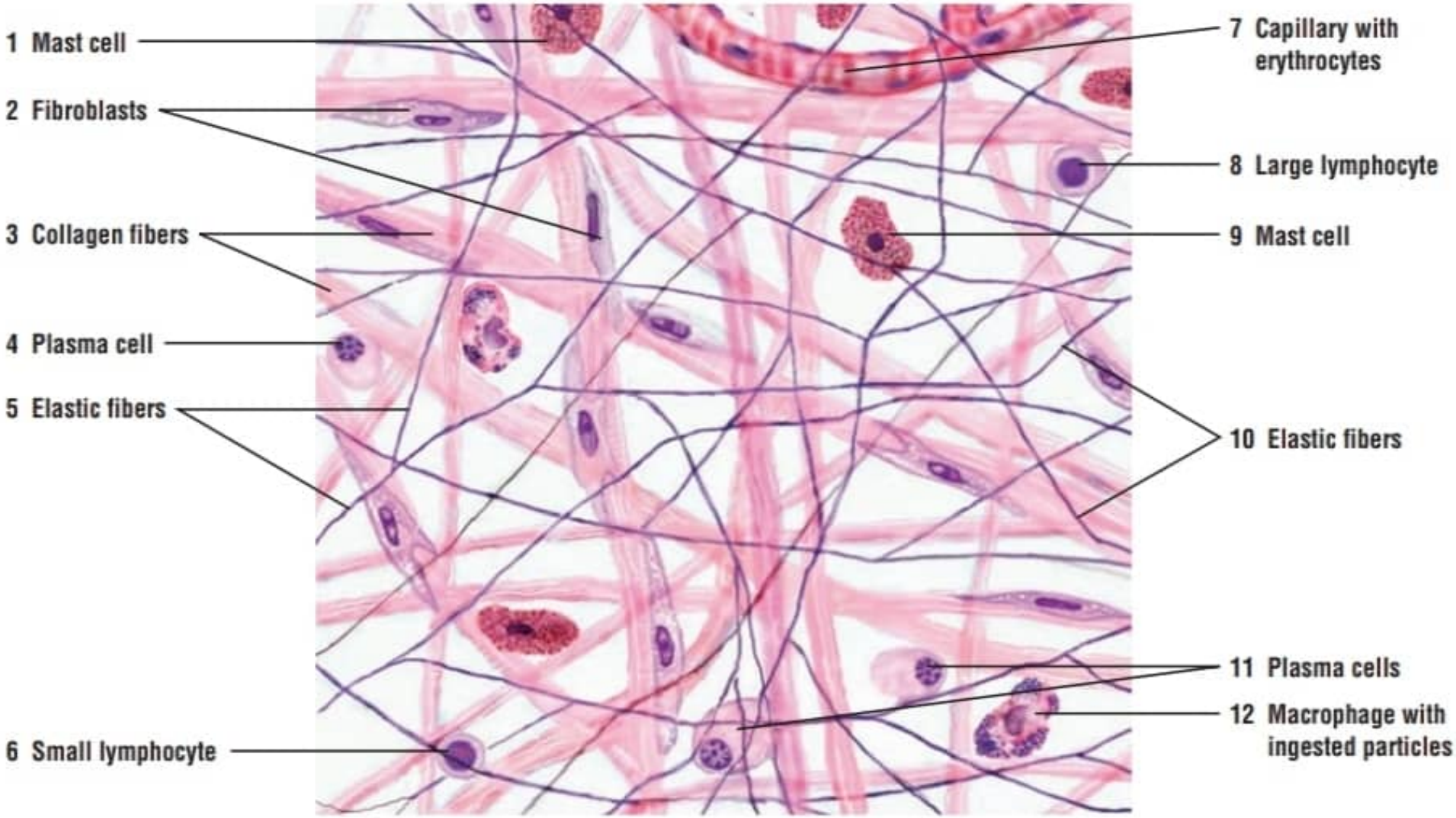


FIGURE 3.1 ■ Loose connective tissue (spread). Stained for cells and fibers. High magnification.

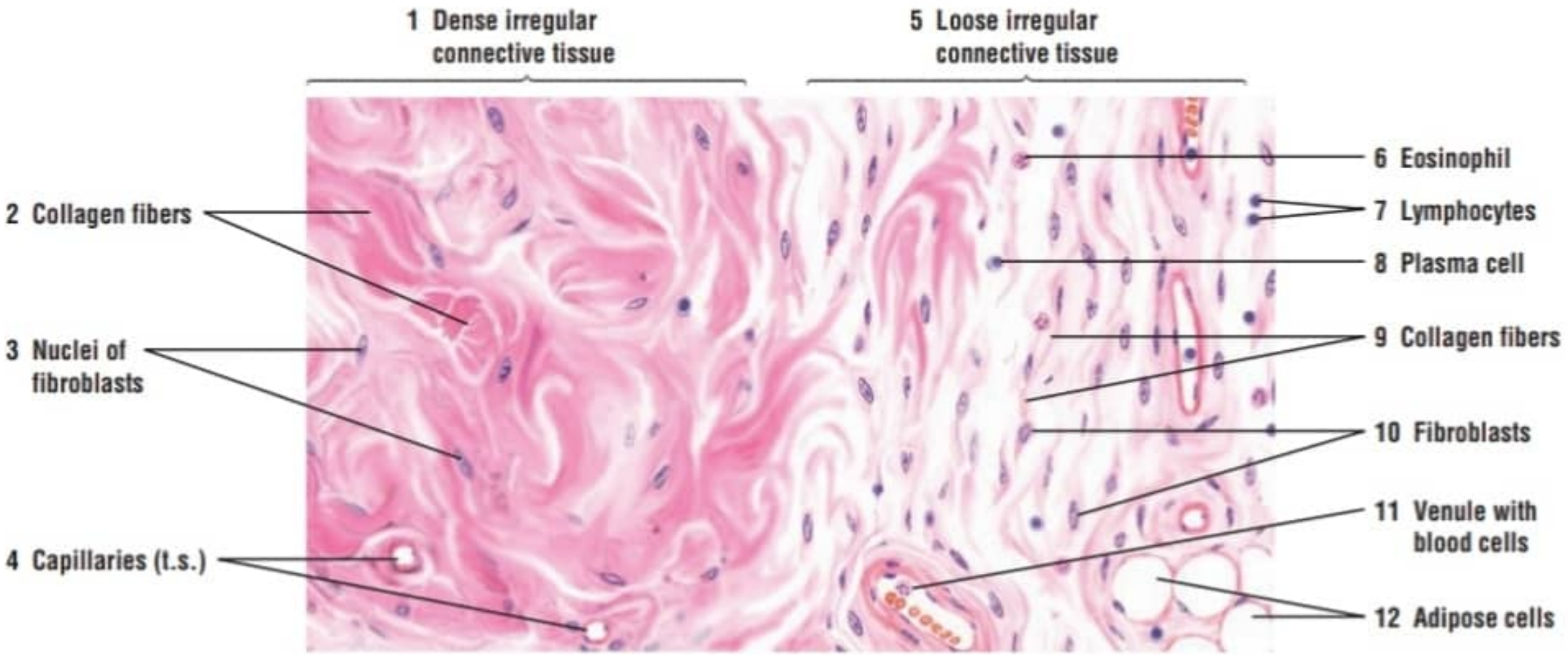


FIGURE 3.6 ■ Dense irregular and loose irregular connective tissue. Stain: hematoxylin and eosin. High magnification.

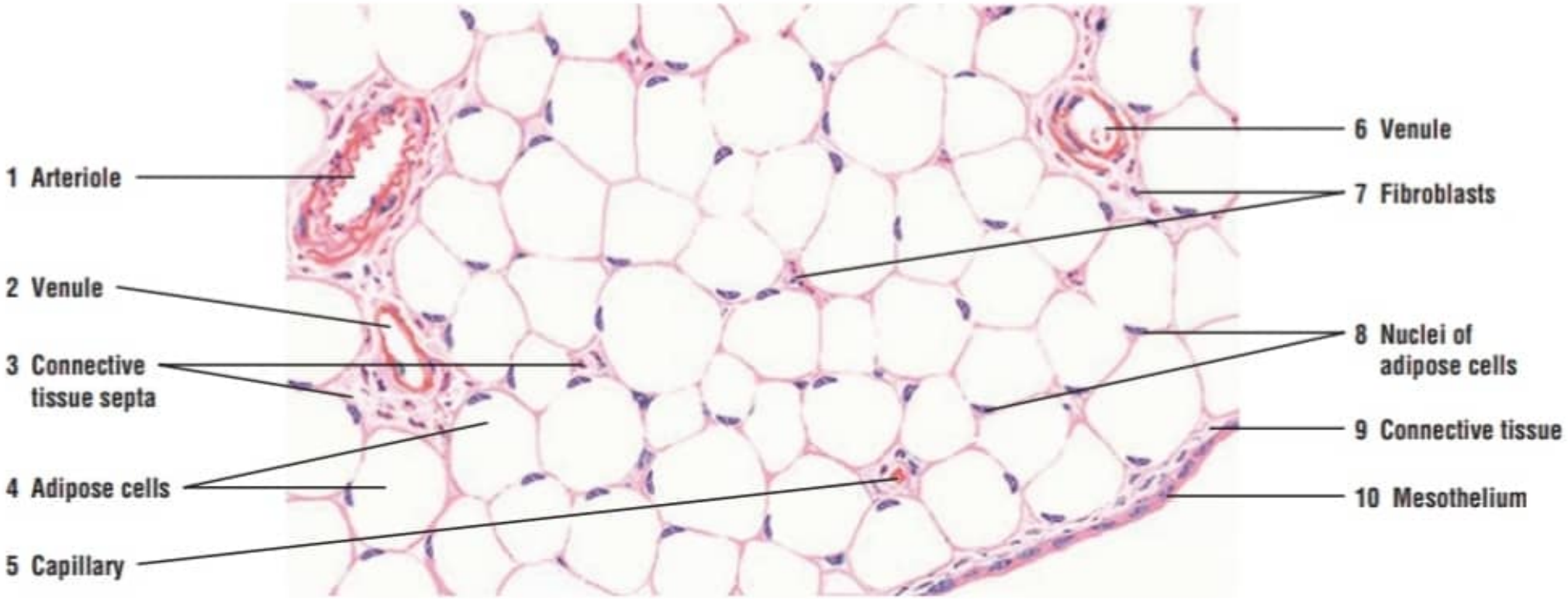


FIGURE 3.11 ■ Adipose tissue in the intestine. Stain: hematoxylin and eosin. Medium magnification.

PRACTICAL NO: 06

CARTLAGE

BRIEF DESCRIPTION:

* ELASTIC CARTLAGE

It differs from hyaline cartilage by presence of numerous elastic fibers in the matrix. There are larger chondrocytes in the lacunae

* HYALINE CARTILAGE

Chondrocytes are present in isogenous groups. The fibers are not visible in microscope.

* FIBROCARTILAGE

The chondrocytes frequently exhibit parallel arrangement i-e columns of cells are seen. Bundles of fibers are visible in fibrocartilage

IDENTIFICATION POINTS:

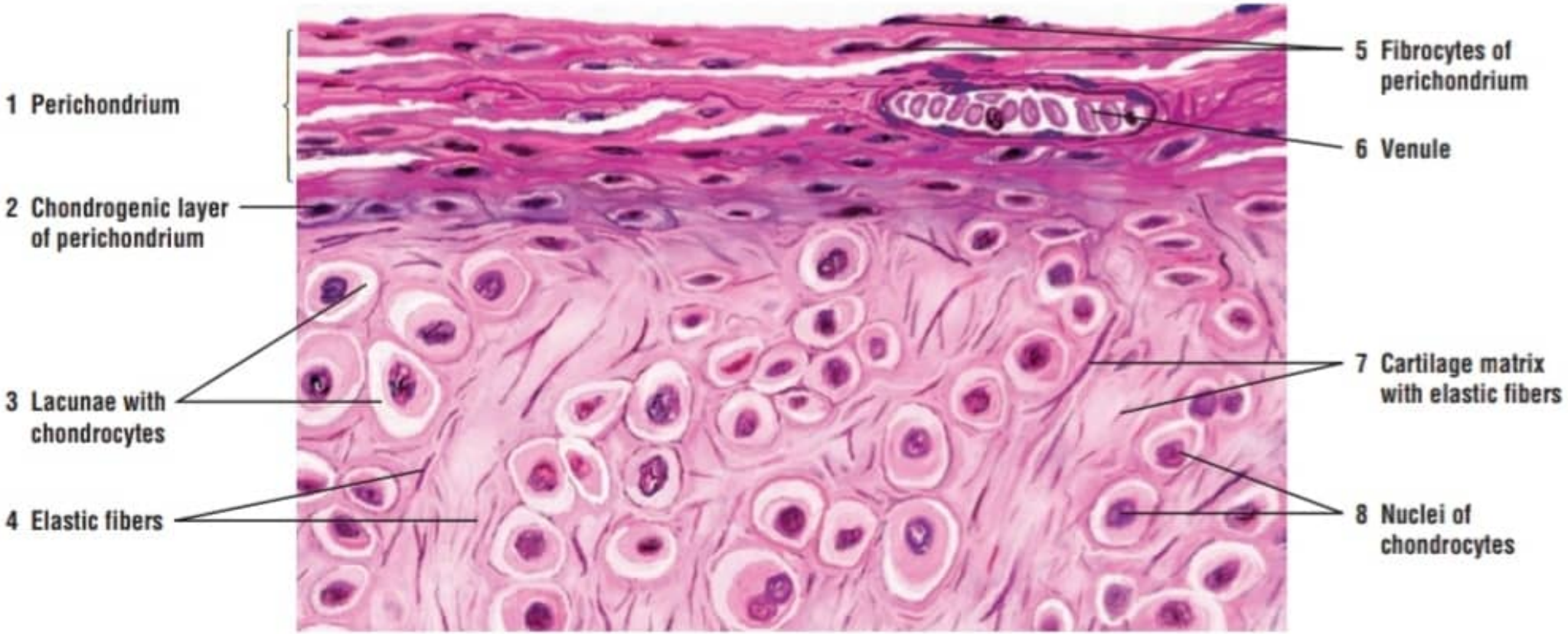


FIGURE 4.5 ■ Elastic cartilage: epiglottis. Stain: silver. High magnification.

FIGURE 4.2 ■ Hyaline cartilage and surrounding structures: trachea. Stain: hematoxylin and eosin. Medium magnification.

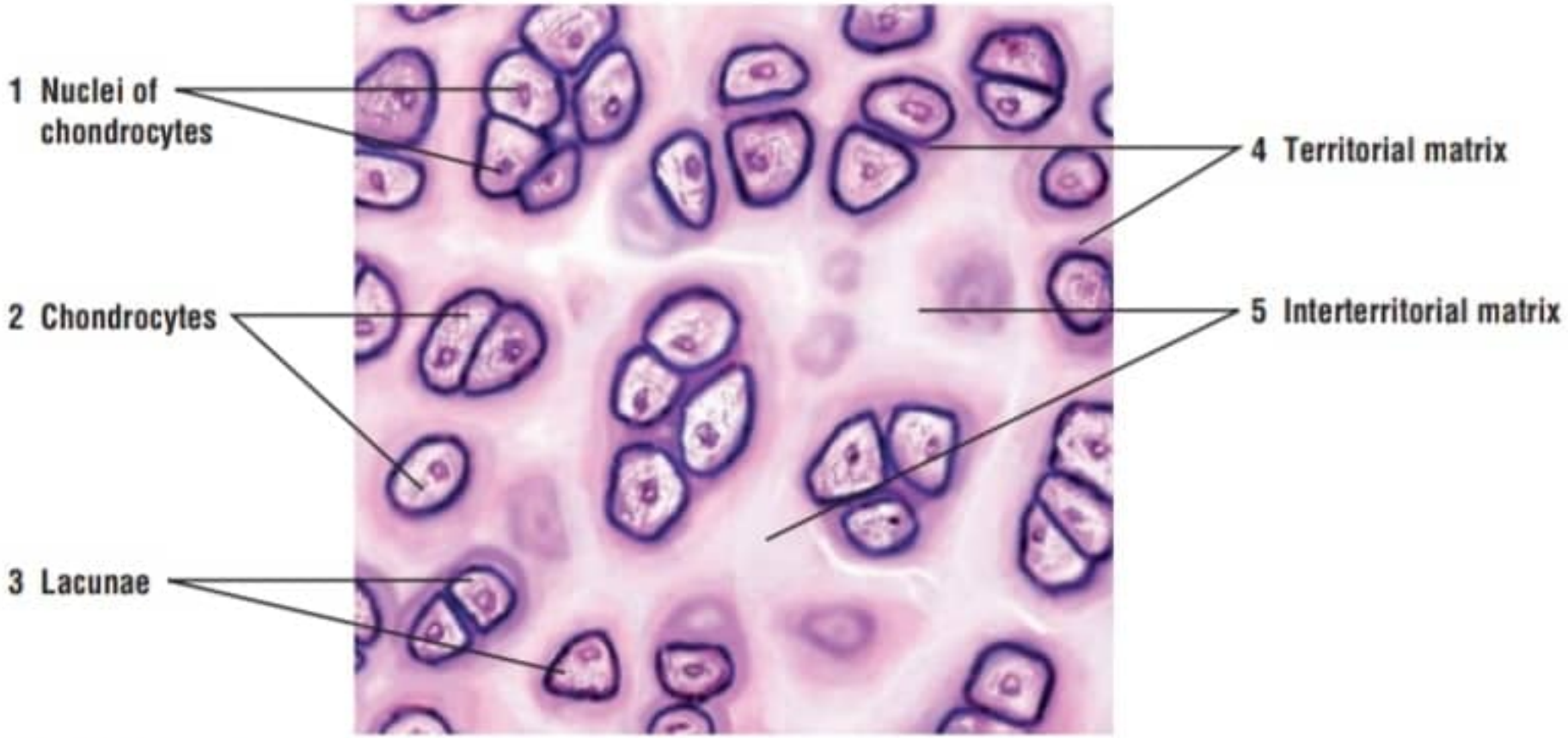


FIGURE 4.3 ■ Cells and matrix of mature hyaline cartilage. Stain: hematoxylin and eosin. High magnification.

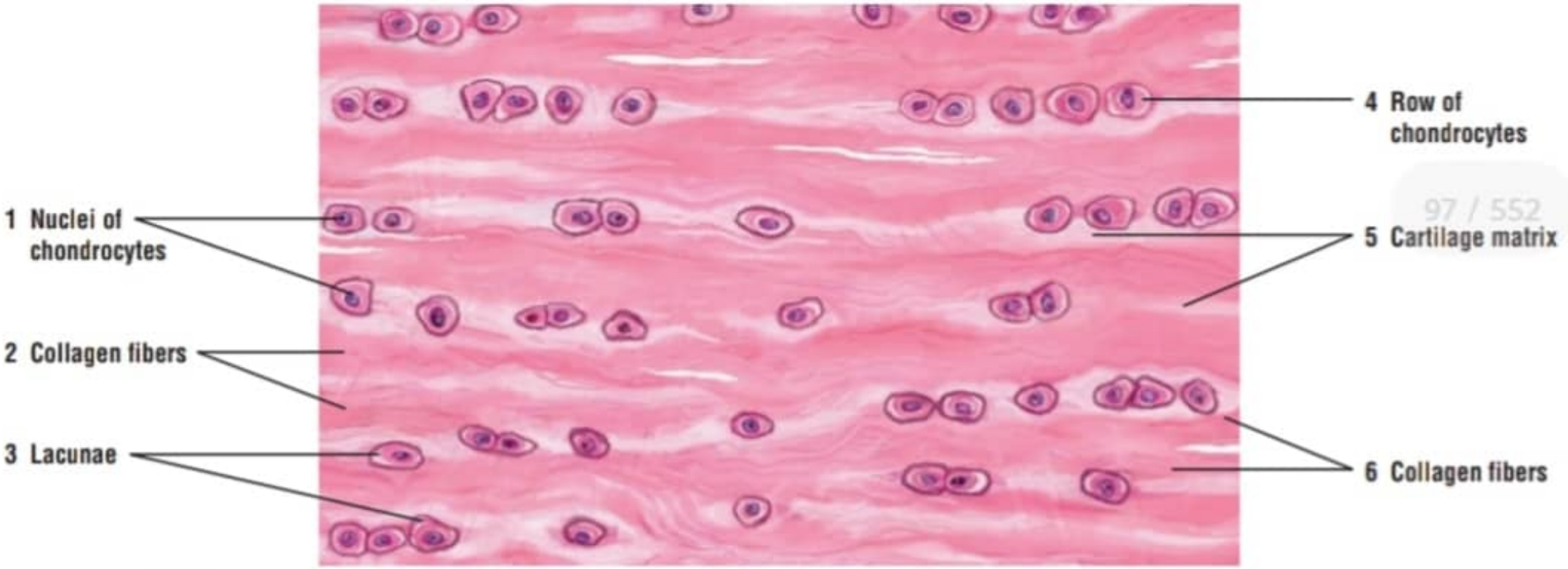


FIGURE 4.7 ■ Fibrous cartilage: intervertebral disk. Stain: hematoxylin and eosin. High magnification.

PRACTICAL NO: 07

BONE

BRIEF DESCRIPTION:

* COMPACT BONE

The structural unit of a compact bone matrix are the osteons (Haversian systems). Each osteon consist of layers of concentric lamellae arranged around a central (Haversian) canal.

* SPONGY BONE

Cancellous bone is composed of numerous bony trabeculae. Bone matrix contains numerous osteocytes in lacunae.

IDENTIFICATION POINTS:

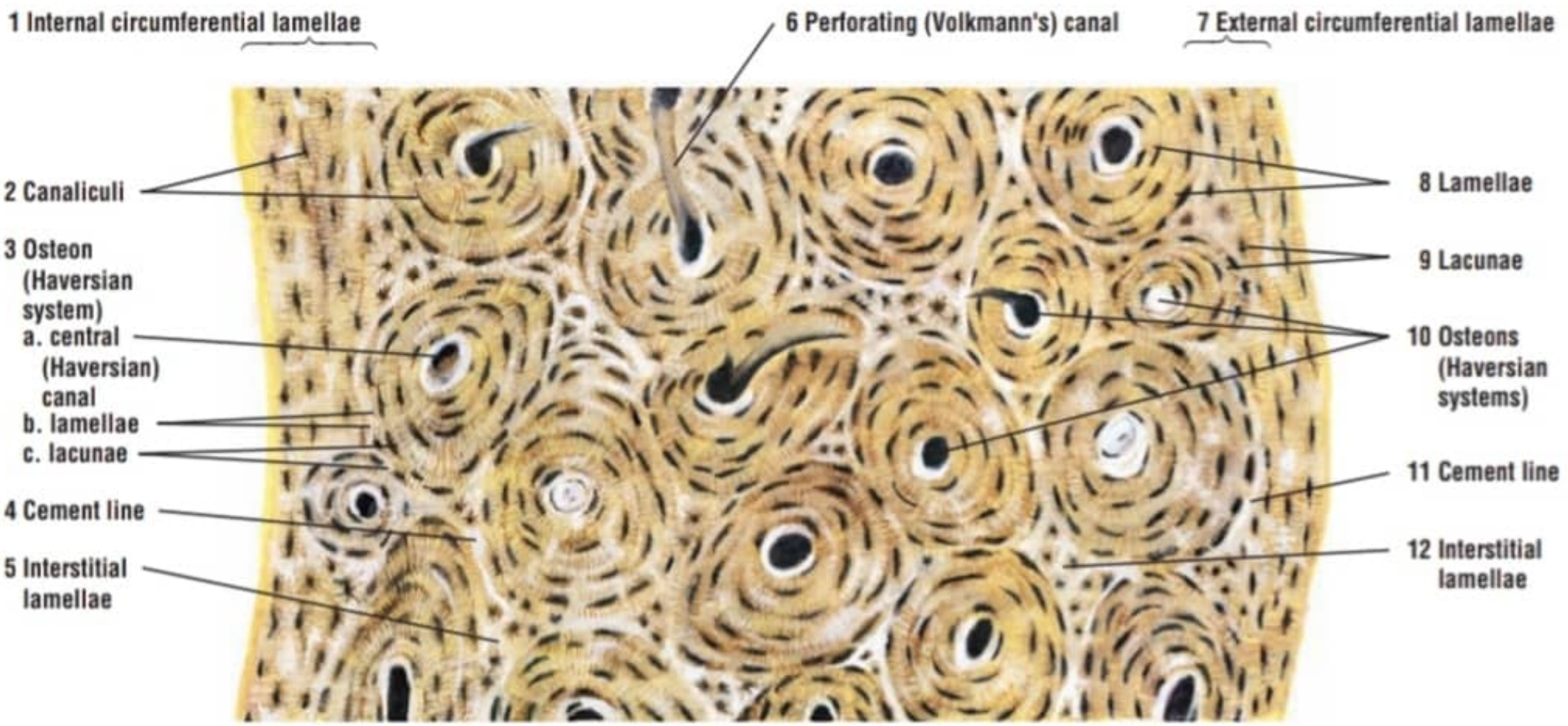


FIGURE 4.17 ■ Dry, compact bone: ground, transverse section. Low magnification.

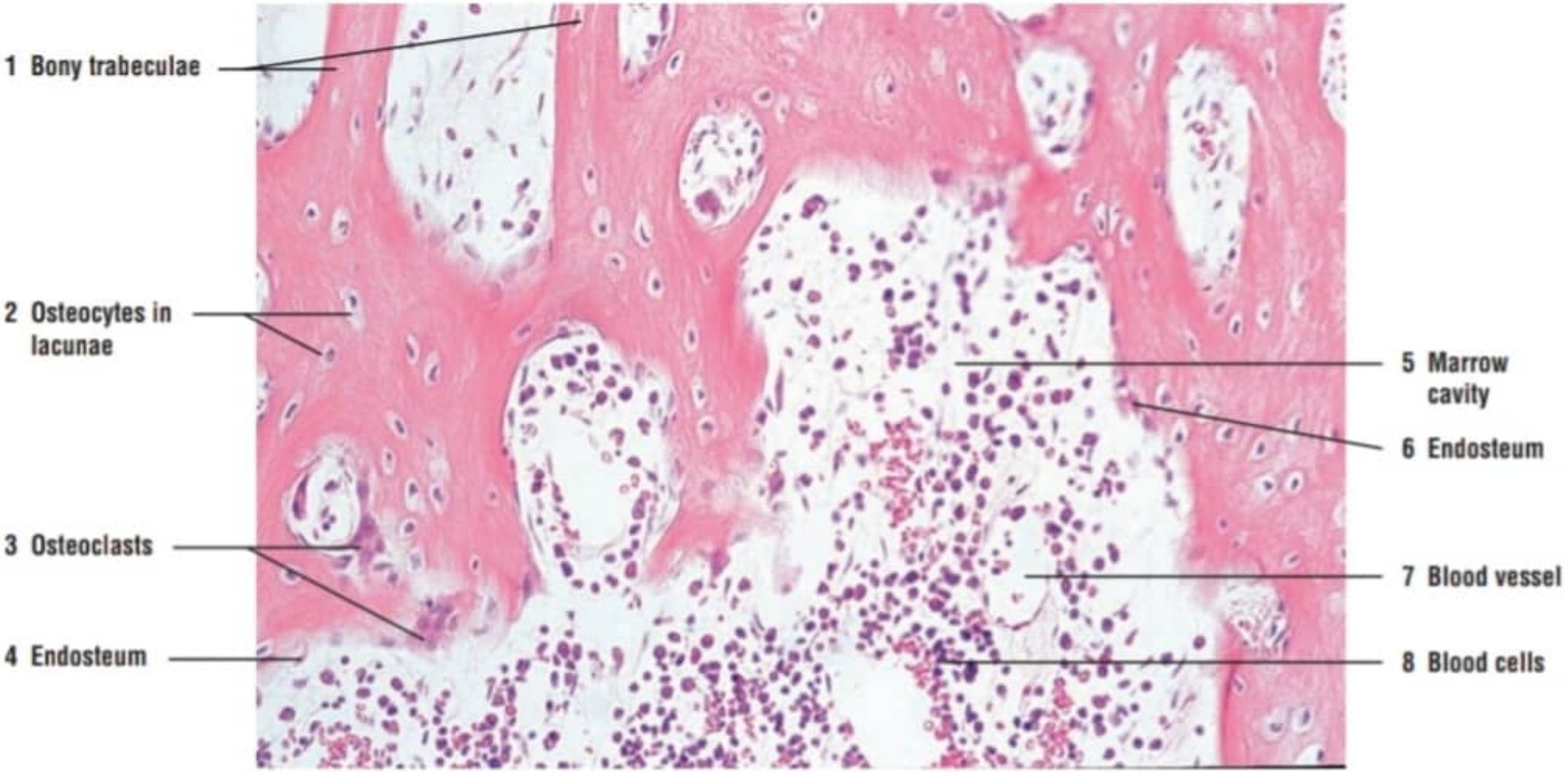


FIGURE 4.16 ■ Cancellous bone: sternum (decalcified bone, transverse section). Stain: hematoxylin and eosin. ×64.

PRACTICAL NO: 08

MUSCLES

BRIEF DESCRIPTION:

* CARDIAC MUSCLE

They exhibit distinct cross striations because of regular arrangements of actin and myosin filamenents in the sarcomere. Cardiac muscle also exhibit only one or two central nuclei

* SKELETAL MUSCLE

The muscle fibers of skeletal muscles are visible as tiny myofibrils. There are multiple cross striations and visible peripheral nuclei. Surrounding each skeletal muscle fibers is a thin layer of connective tissue endomysium

IDENTIFICATION POINTS:

* Cardiac Muscle - Striations, short but branched fibers, intercalated discs
* Skeletal Muscle - Long fibers, nuclei at periphery

PRACTICAL NO:

BRIEF DESCRIPTION:

* SMOOTH MUSCLES

Smooth muscle fibers also contain actin and myosin filaments; however, they are not arranged in the regular cross-striated patterns. These muscle fibers appear smooth and non-striated. The muscle fibers are small and spindle shaped and contain a single central nucleus.

IDENTIFICATION POINTS:

* Smooth muscles - spindle shaped cells, no striation, single nucleus, fibers in different directions

FIGURE 6.10 ■ Cardiac muscle in longitudinal section. Stain: hematoxylin and eosin. High magnification.

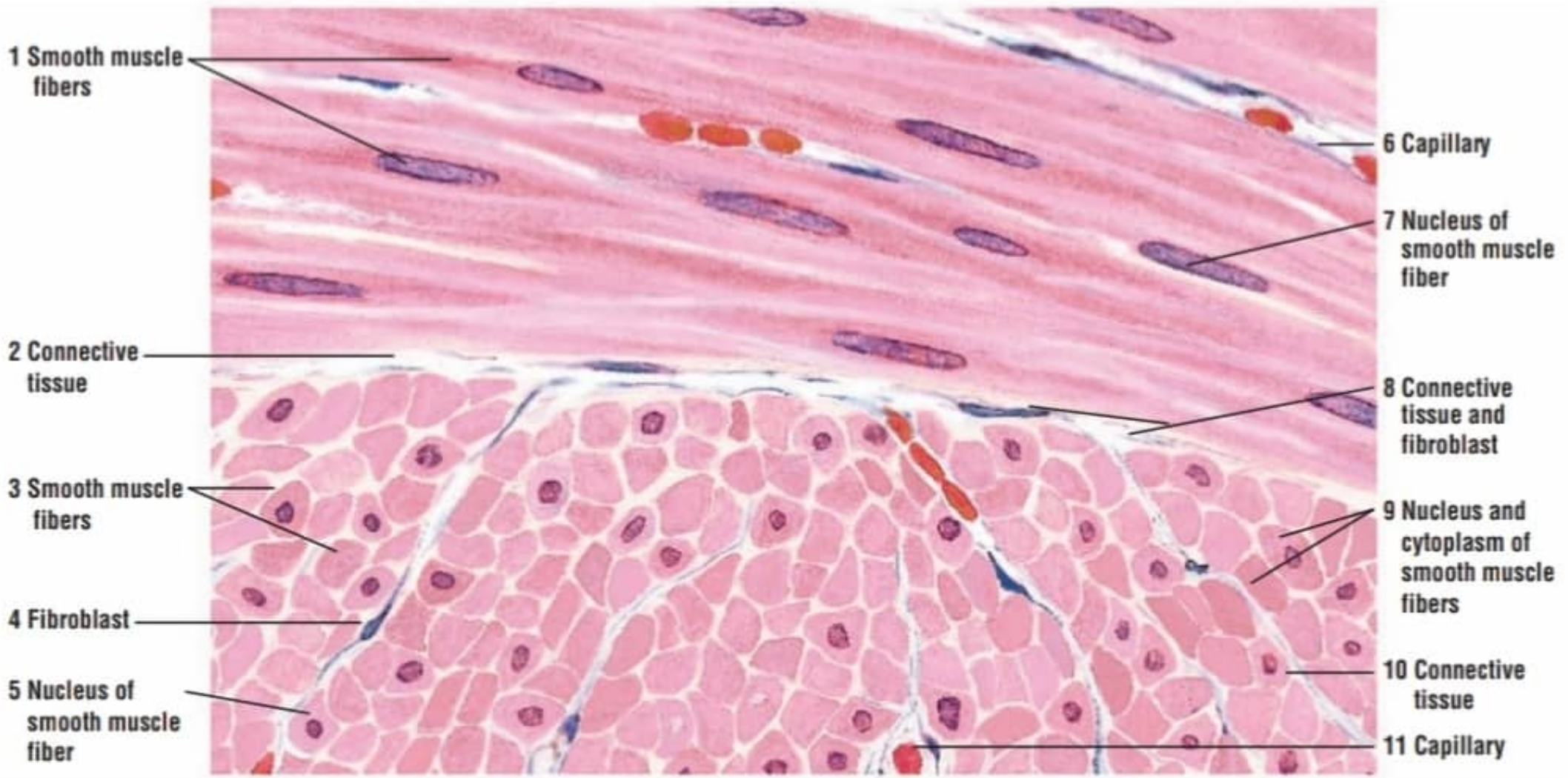


FIGURE 6.11 ■ Longitudinal and transverse sections of smooth muscle in the wall of the small intestine. Stain: hematoxylin and eosin. High magnification.

FIGURE 6.3 ■ Skeletal muscles, nerves, axons, and motor end plates. Stain: silver. High magnification.

PRACTICAL NO: 09

SKIN

BRIEF DESCRIPTION:

The skin is the largest integumentary organ of the body composed of two layers. The epidermis above and the dermis below. These two layers are adherent to each other.

The epidermis exhibits a stratified squamous epithelium and a thin layer of keratinized cells called stratum corneum.

The narrow zone of irregular, light-staining connective tissue directly below the epidermis is the papillary layer of the dermis.

The deeper reticular layer comprises the bulk of the dermis and consist of dense irregular connective tissue.

IDENTIFICATION POINTS:

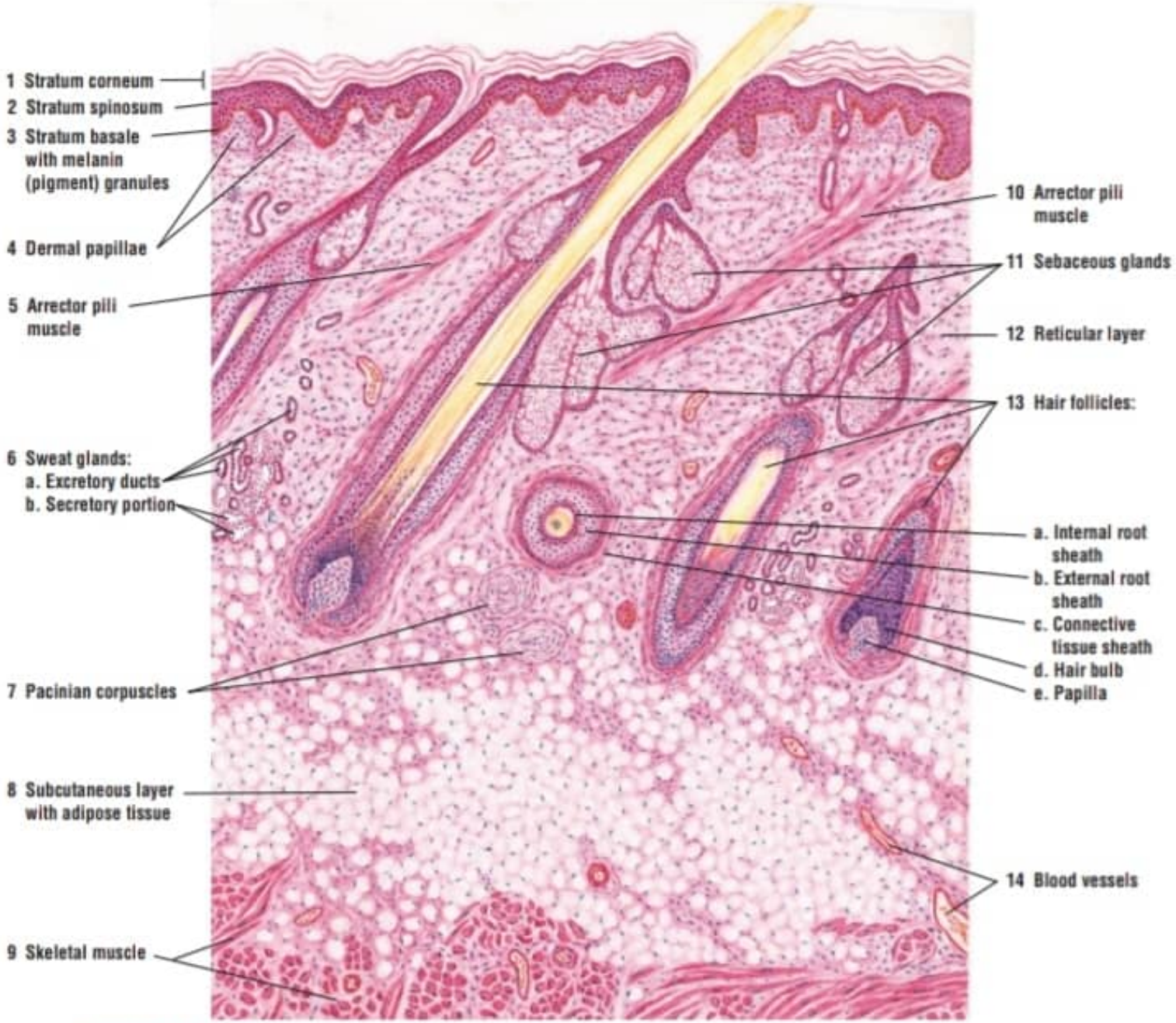


FIGURE 10.2 ■ Skin: epidermis, dermis, and hypodermis in the scalp. Stain: hematoxylin and eosin. Low magnification.

PRACTICAL NO: 10

BLOOD VESSELS

BRIEF DESCRIPTION:

* ARTERIES

These vessels carry blood away from the heart. It has three layers: tunica intima, tunica media, tunica externa. The wall of artery is much thicker than the wall of vein. The tunica intima is stained dark because of the thick internal elastic lamina. The smooth muscle fibers of tunica media are arranged in circular pattern and has darks strands of elastic fibers

* VEINS

Vein also has three layers but tunica media is thinner as compared to that of artery but internal diameter of vein is larger as compared to artery of same size.

IDENTIFICATION POINTS:

* Artery - thicker regular layer
* Vein - thinner irregular Layer

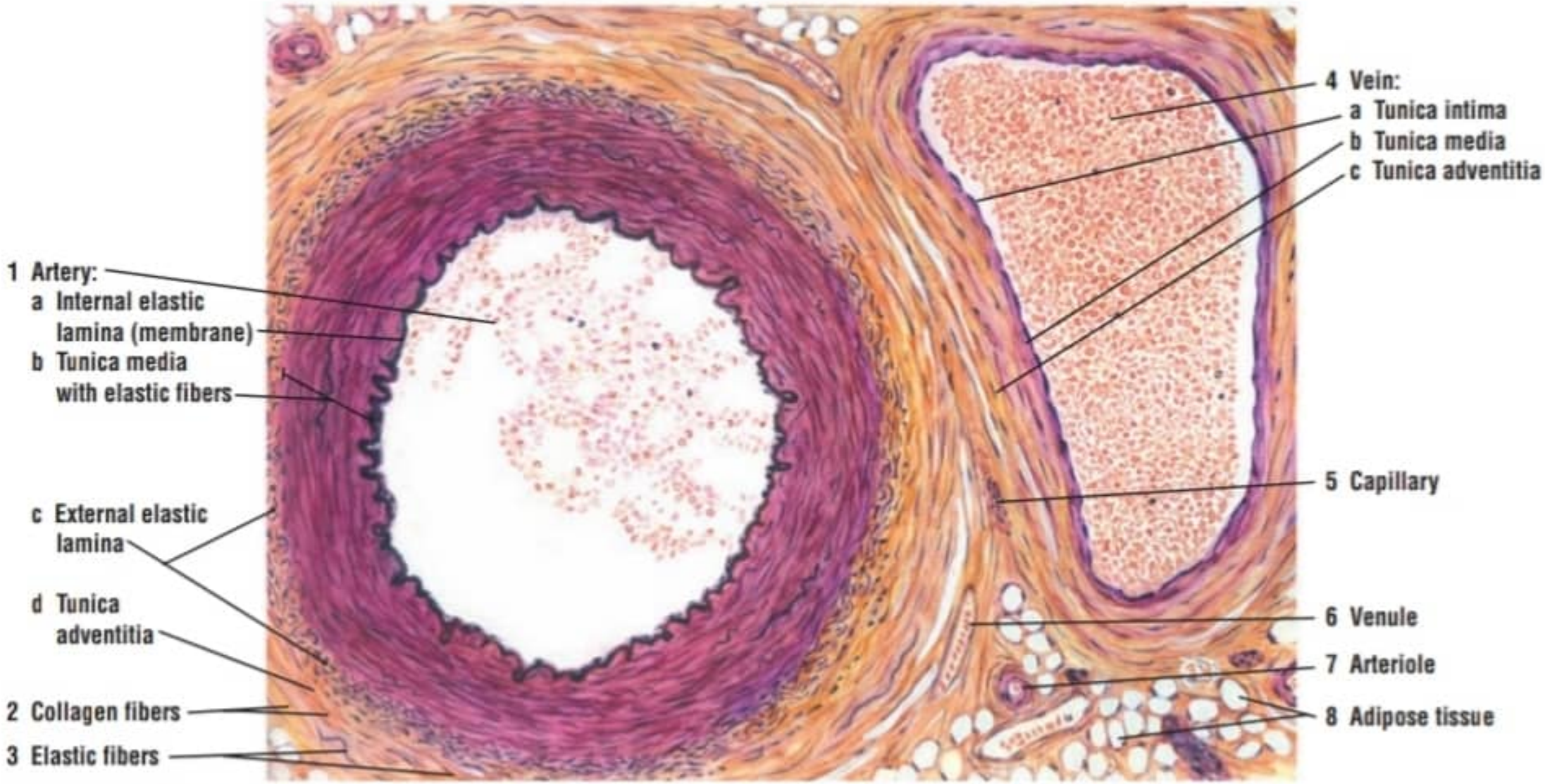


FIGURE 8.2 ■ Muscular artery and vein (transverse section). Stain: elastic stain. Low magnification.

PRACTICAL NO: 11

RESPIRATORY GLANDS

BRIEF DESCRIPTION:

* LUNGS

In lungs, intrapulmonary bronchi are present. Their histology is similar to trachea and extra pulmonary bronchi. C-shaped cartilagenous rings of hyaline cartilage is replaced by cartilage plates.

The wall of intrapulmonary bronchi can be identified by the presence of hyaline cartilage. Lungs also contain lymphatic nodules, alveoli, alveolar sac, respiratory and terminal bronchi.

There are trabeculae containing blood vessels.

IDENTIFICATION POINTS:

→ Intrapulmonary bronchi containing cartilage plates

→ Alveolar duct, alveolar sac, terminal alveoli

PRACTICAL NO:

BRIEF DESCRIPTION:

* TRACHEA

Trachea has incomplete C-shaped cartilagenous rings. It is lined by pseudostratified ciliated columnar epithelium. Smooth muscle named trachialis muscle is present. The submucosa has glands. Trachea has hyaline cartilage

* EPIGLOTTIS

Epiglottis have leaf like folds. It is lined by two epithelium types: pseudo stratified ciliated columnar epithelium and patches of stratified squamous non-keratinized epithelium. Sub mucosa is absent while elastic cartilage is present

IDENTIFICATION POINTS:

* Trachea - Pseudostratified ciliated columnar epithelium and hyaline cartilage
* Epiglottis - Pseudostratified ciliated columnar and Stratified squamous non-keratinized epithelium, elastic cartilage

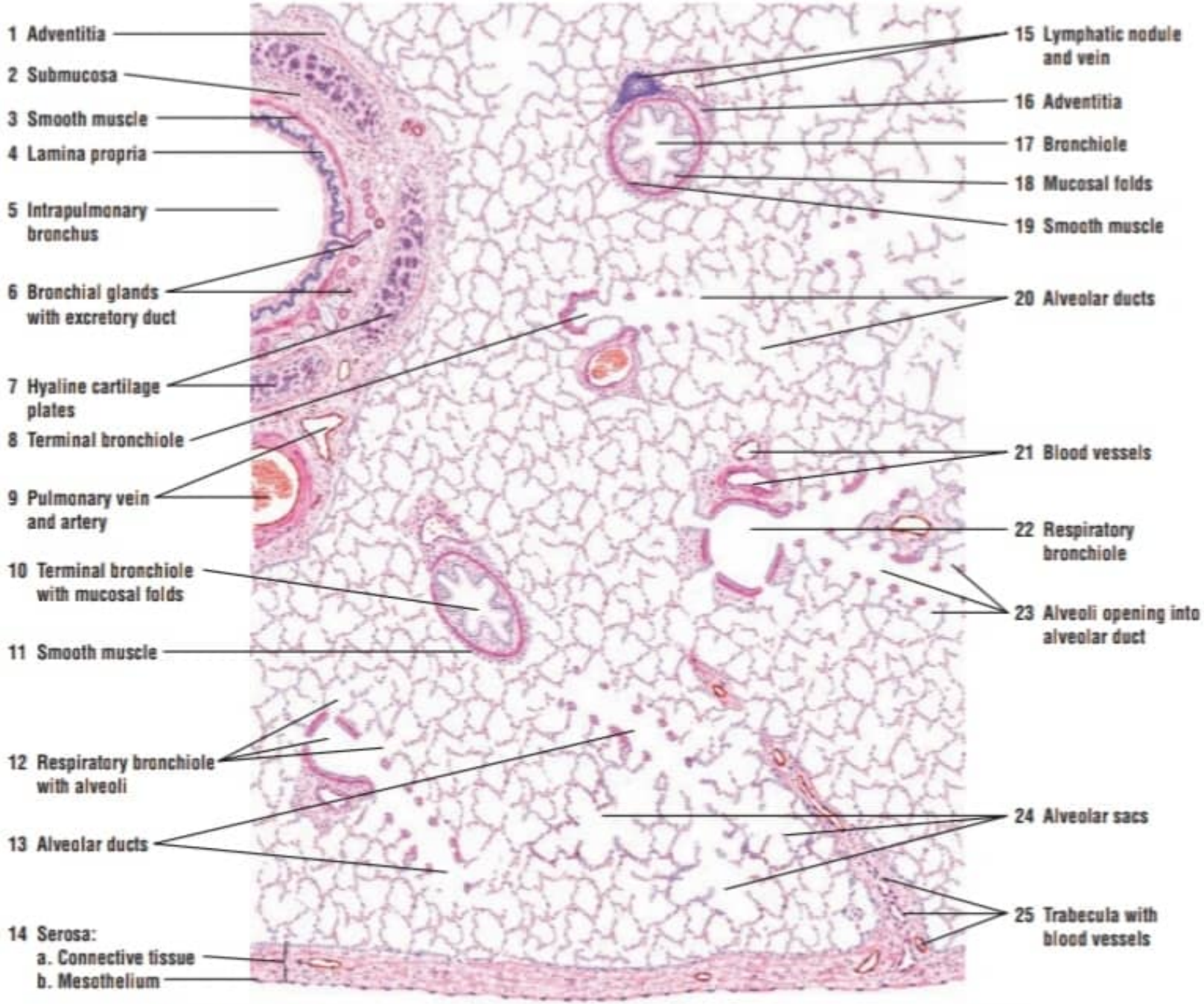


FIGURE 15.8 ■ Lung (panoramic view). Stain: hematoxylin and eosin. Low magnification.

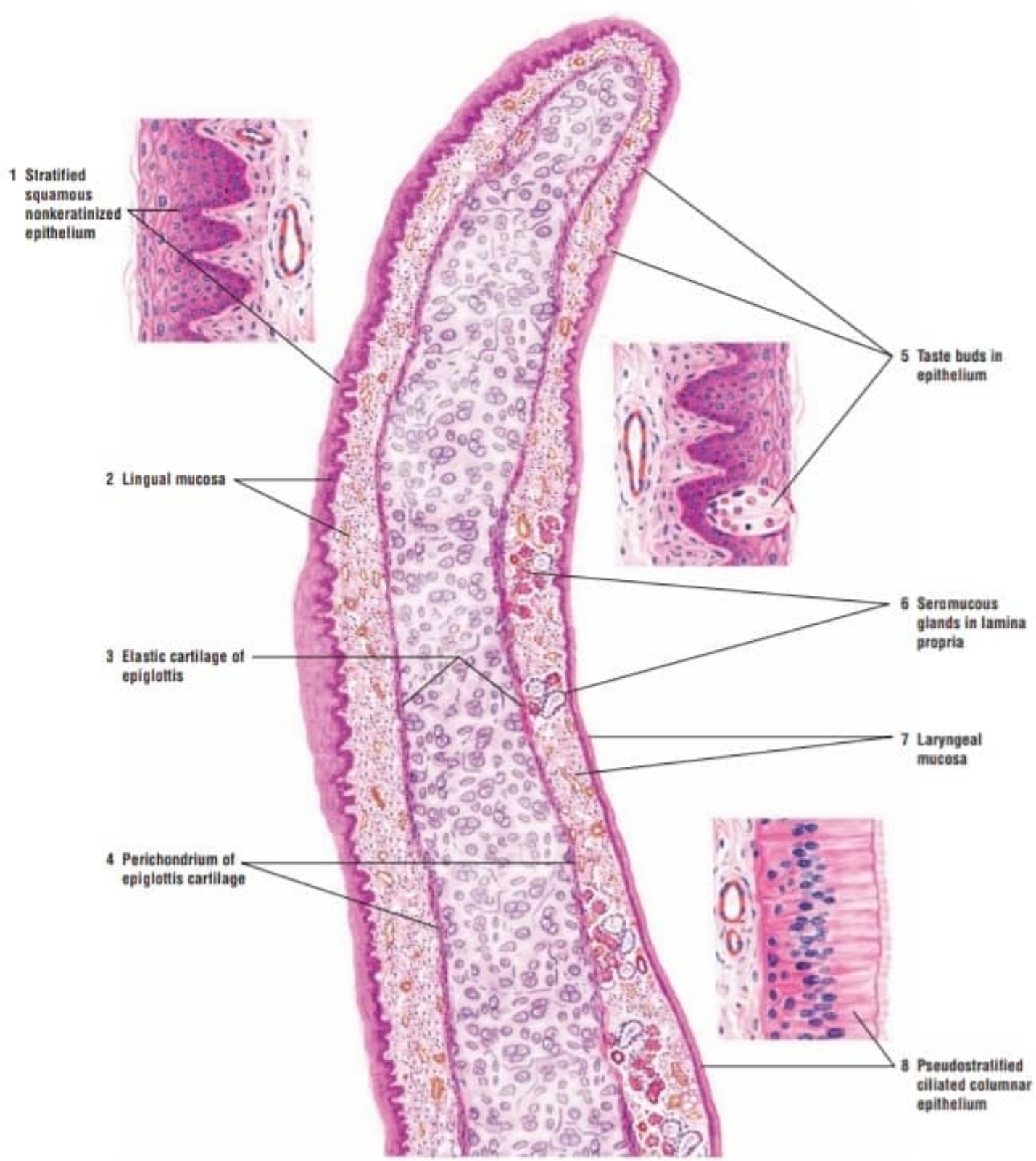
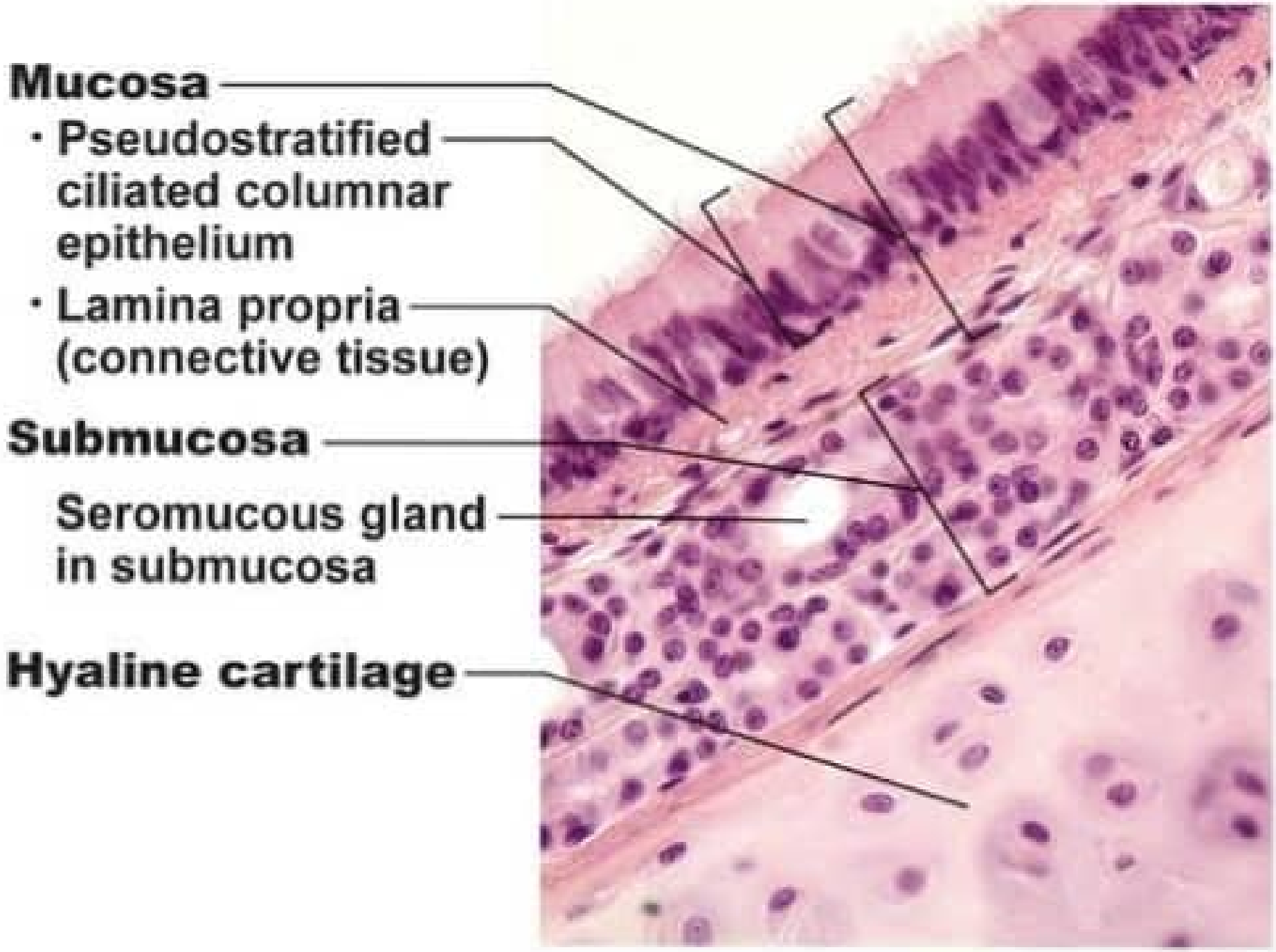


FIGURE 15.4 ■ Epiglottis (longitudinal section). Stain: hematoxylin and eosin. Low magnification. Insets: high magnification.



(b) Photomicrograph of the tracheal wall (320x)