DANYLO HALYTSKY LVIV NATIONAL MEDICAL UNIVERSITY

DEPARTMENT OF HISTOLOGY, CYTOLOGY AND EMBRYOLOGY

ILLUSTRATED STUDENT GUIDE

for practical classes (according to I.V. Almazov)

for medical students

LVIV 2023

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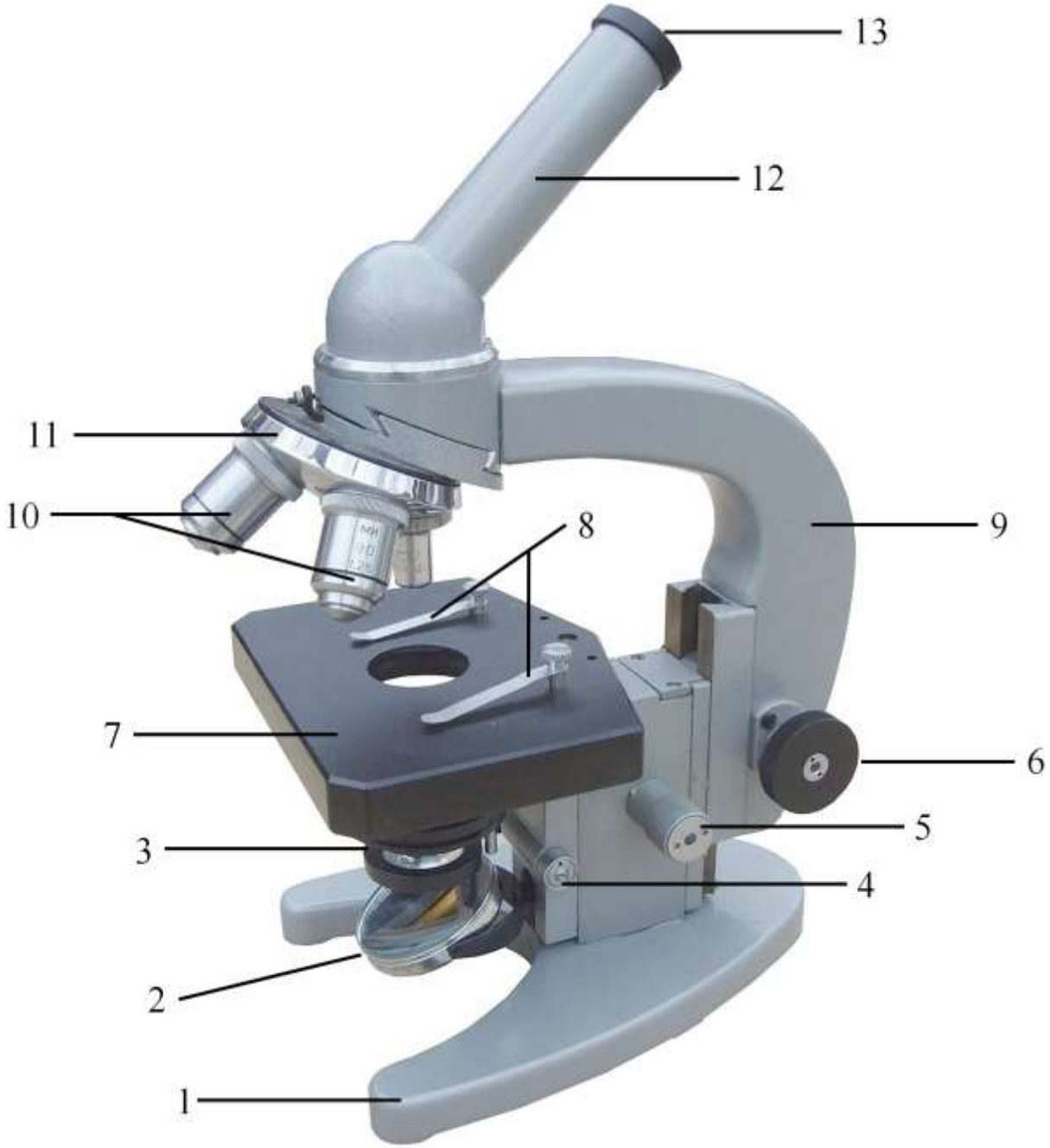
MICROSCOPE. HISTOLOGICAL TECHNIQUE



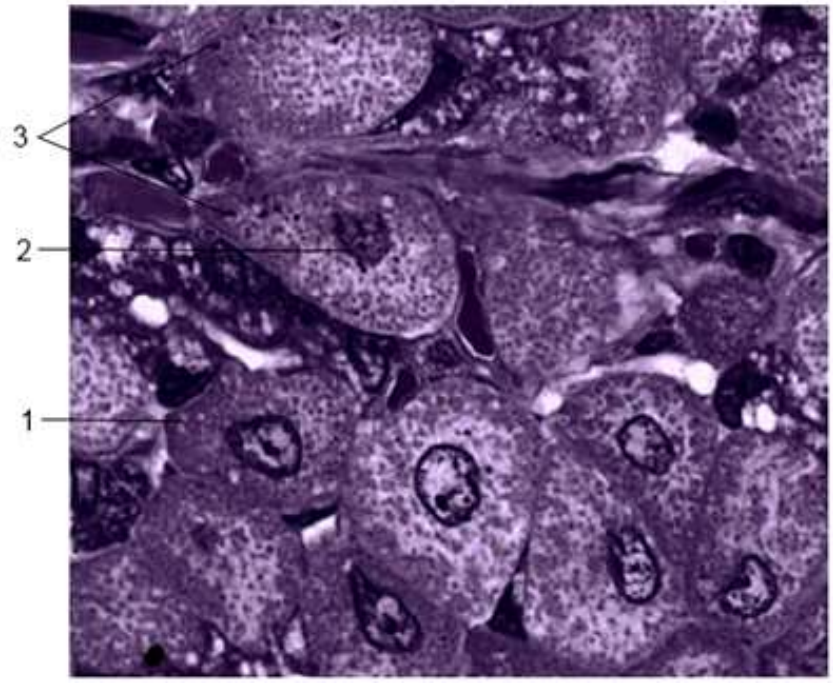
Designations:

1 – base; 2 – mirror; 3 – condenser with diaphragm; 4 – condenser adjustment; 5 –fine adjustment; 6 – coarse adjustment; 7 – specimen stage; 8 – stage clips; 9 – frame (arm); 10 – objectives; 11 – nosepiece; 12 – tube; 13 – eyepiece (ocular).

1. CYTOLOGY AND EMBRYOLOGY

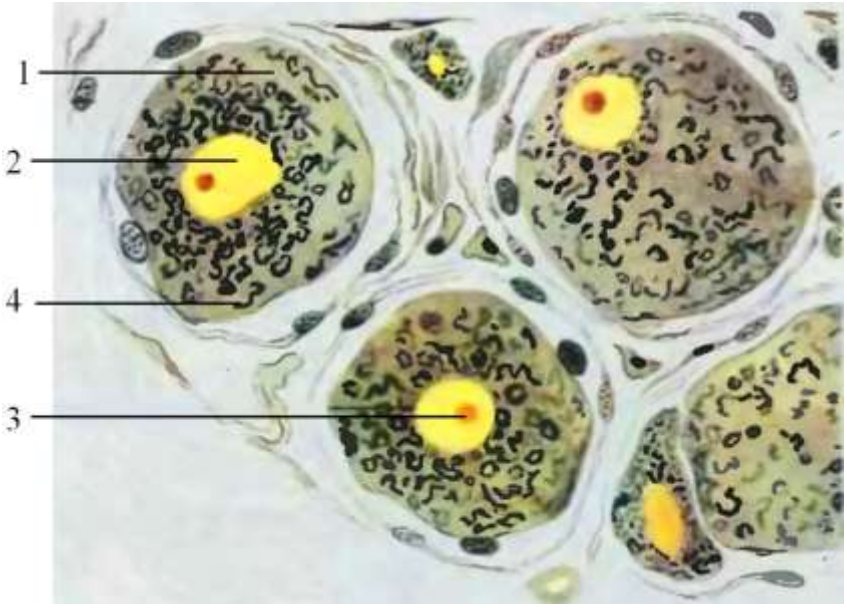
1.1. CYTOLOGY. NONCELLULAR STRUCTURES. GENERAL STRUCTURE OF THE CELL. SUPERFICIAL COMPLEX. CYTOPLASM. ORGANELLES, INCLUSIONS

Figure № 1. Mitochondria in liver cells. Iron hematoxylin. ×400.



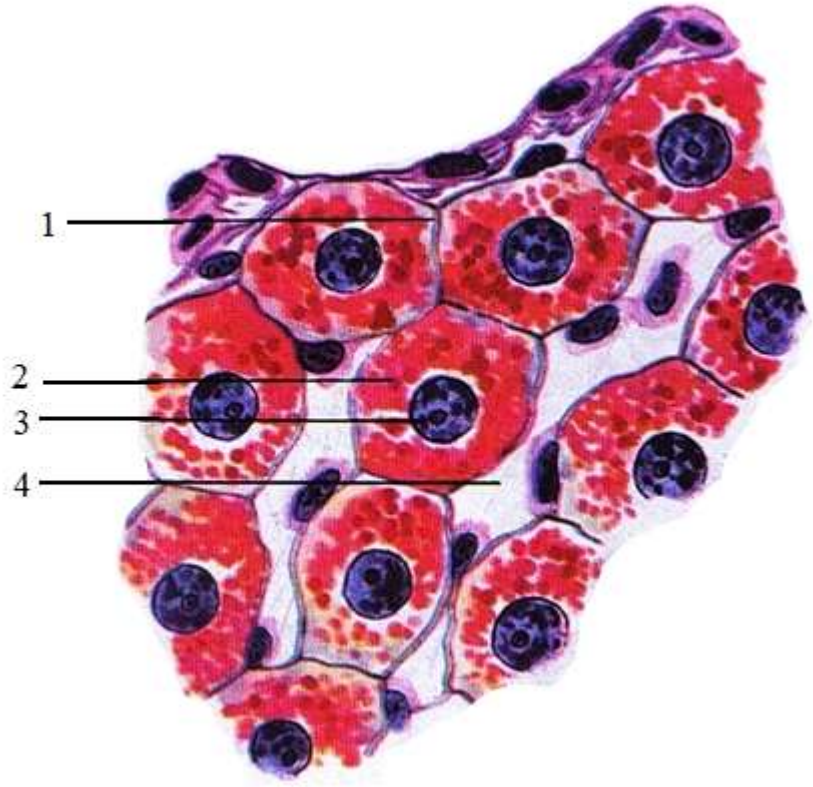
Designations:
1. Liver cells
2. Nucleus
3. Mitochondria

Figure № 2. Golgi apparatus in spinal ganglion cells. Silver impregnation. ×400.



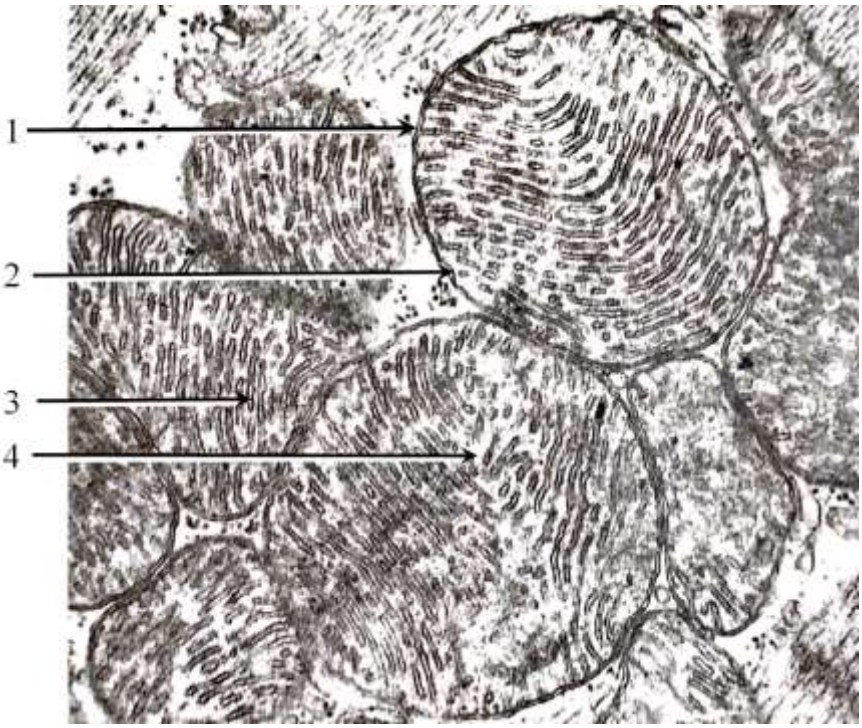
Designations:
1. Cytoplasm
2. Nucleus
3. Nucleolus
4. Golgi apparatus

Figure № 3. Glycogen inclusions in liver cells. Best's Carmine. ×900.



Designations:
1. Cytoplasm
2. Glycogen inclusion
3. Nucleus
4. Capillaries

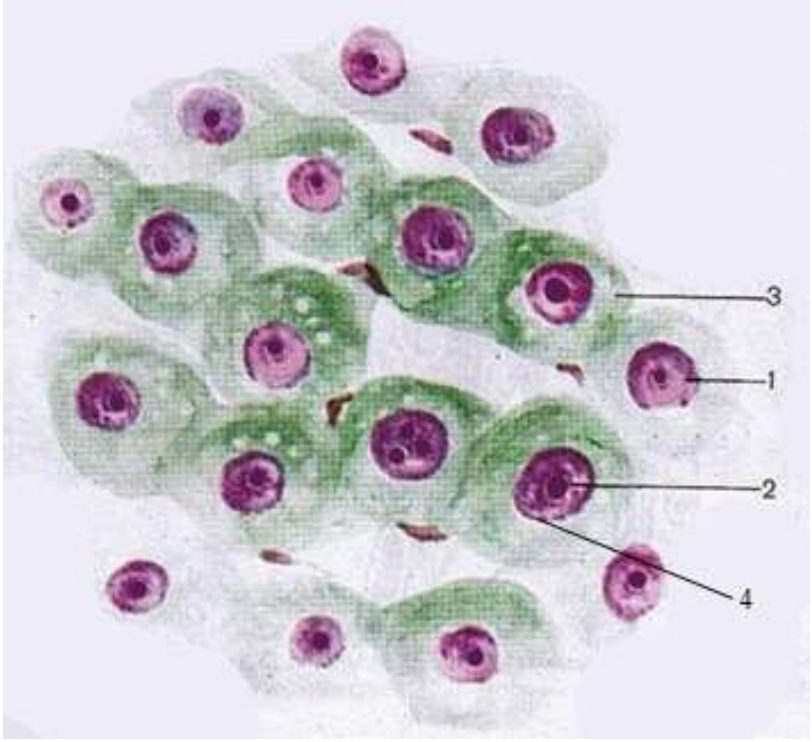
Figure № 4. Electron micrograph of mitochondria.



Designations:
1. Outer membrane
2. Inner membrane
3. Cristae
4. Matrix

1.2. NUCLEUS OF THE CELL. CELL REPRODUCTION. CELL AGING AND CELL DEATH

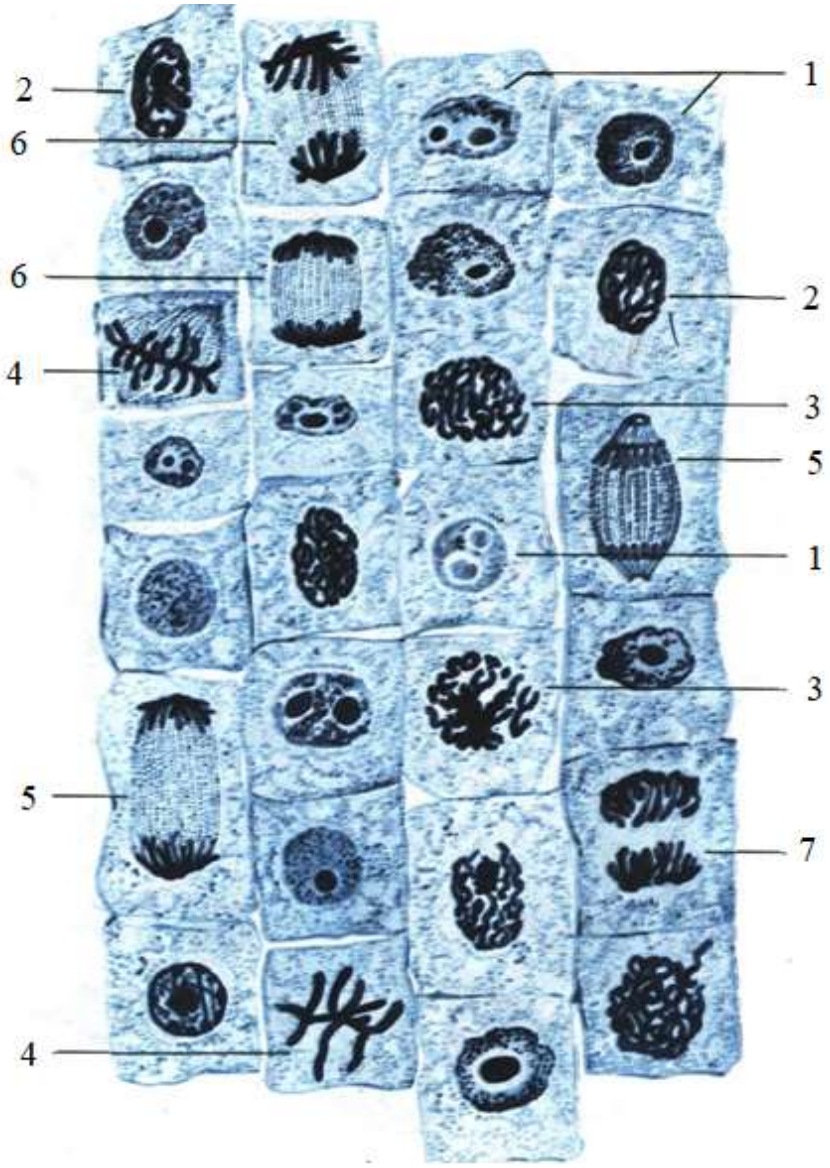
Figure № 1. Liver cell interphase nuclei with a small amount of heterochromatin. The Feulgen reaction. ×400.



Designations:

1. Nucleus
2. Nucleolus
3. Cytoplasm
4. Heterochromatin

Figure № 2. Mitosis in onion root tips. OsO_4 staining. ×400.



Designations:

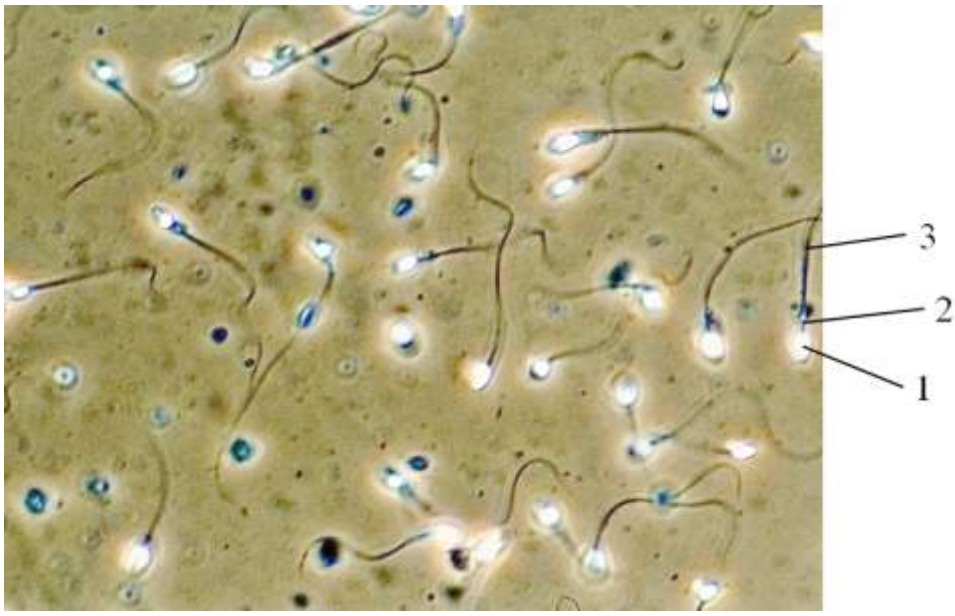
1. Interphase
2. Early prophase
3. Late prophase
4. Metaphase

5-6. Anaphase

7. Telophase

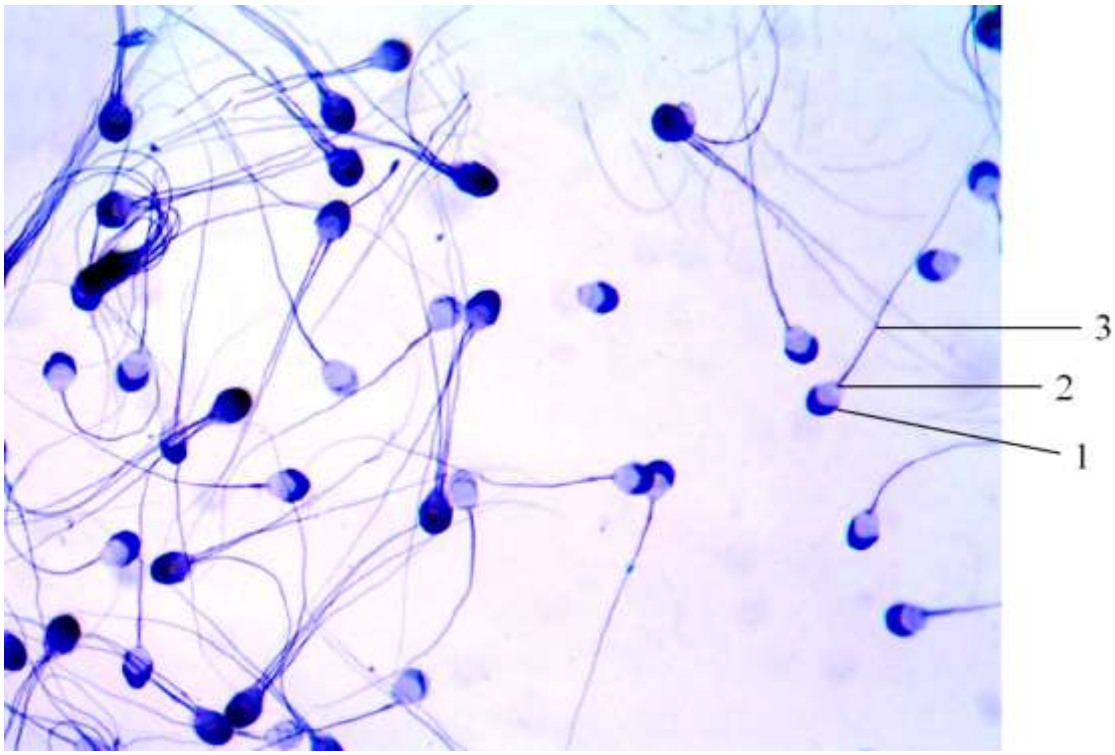
1.3. EARLY HUMAN EMBRYOGENESIS. PERIODS OF EMBRYOGENESIS. CHARACTERISTICS OF GAMETES. GAMETOGENESIS. FERTILIZATION

Figure № 1. Sperm smear, human. ×400.



Designations:
1. Head
2. Neck
3. Tail

Figure № 2. Sperm smear, guinea pig. Iron hematoxylin. ×400.

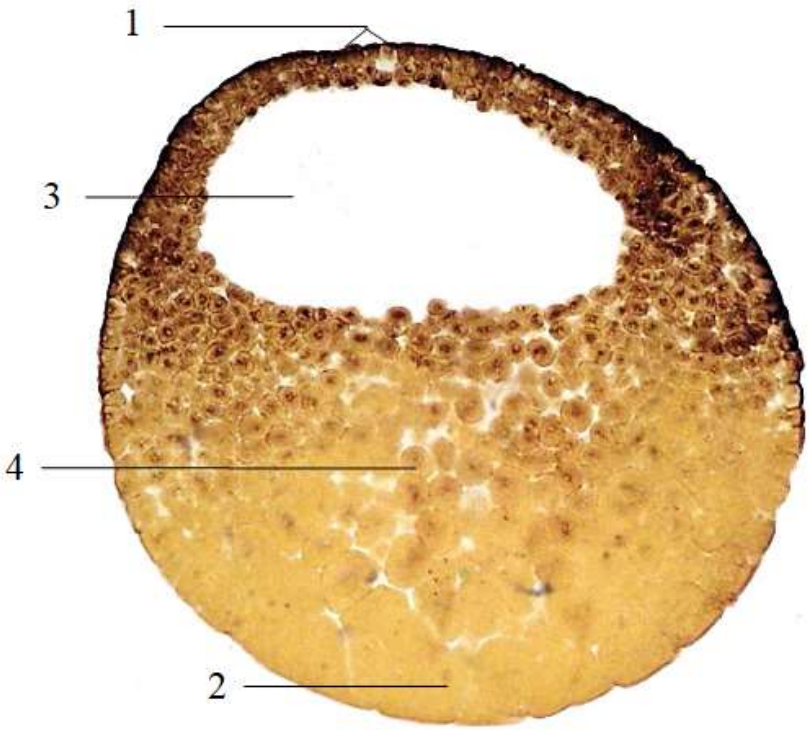


Designations:
1. Head with acrosome
2. Neck
3. Tail

Figure № 3. Ovary: Wall of the Mature Follicle. H&E ×400.

Designations:
1. Oocyte
2. Zona pellucida
3. Corona radiata
4. Cumulus oophorus
5. Antrum
6. Granulosa layer
7. Thecae interna

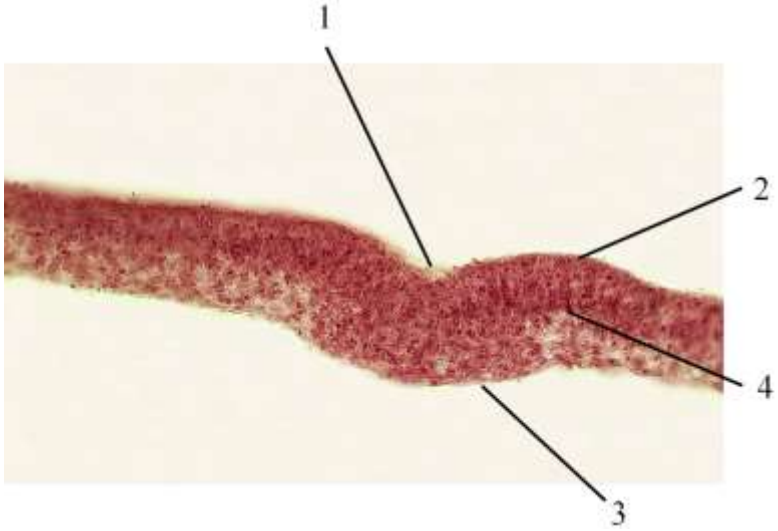
Figure № 4. The blastula of frog. Hematoxylin-picrofuxin. ×20.



Designations:
1. Animal pole
2. Vegetal pole
3. Blastocoel
4. Blastomeres

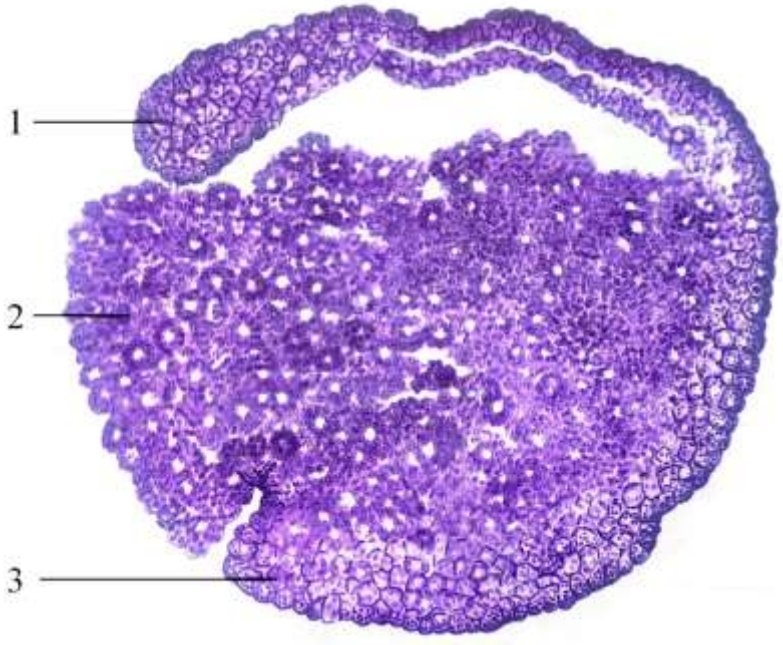
1.4. HUMAN EMBRYONIC DEVELOPMENT. CLEAVAGE. IMPLANTATION. GASTRULATION

Figure № 1. A cross-section of a chicken embryo at the stage of primitive streak. Hematoxylin. ×200.



Designations:
1. Primitive streak
2. Ectoderm
3. Endoderm
4. Mesoderm

Figure № 2. Gastrulation in frog. Hematoxylin-picrofuxin. ×20.



Designations:
1. Dorsal lip
2. Yolk plug
3. Ventral lip

2. GENERAL HISTOLOGY

2.1. CONCEPTION ABOUT TISSUES. CLASSIFICATION OF TISSUES. EPITHELIAL TISSUES. MORPHOLOGY AND CLASSIFICATION OF GLANDS

Figure № 1. Simple cuboidal epithelium, kidney, human. H&E. ×400.

Designations:

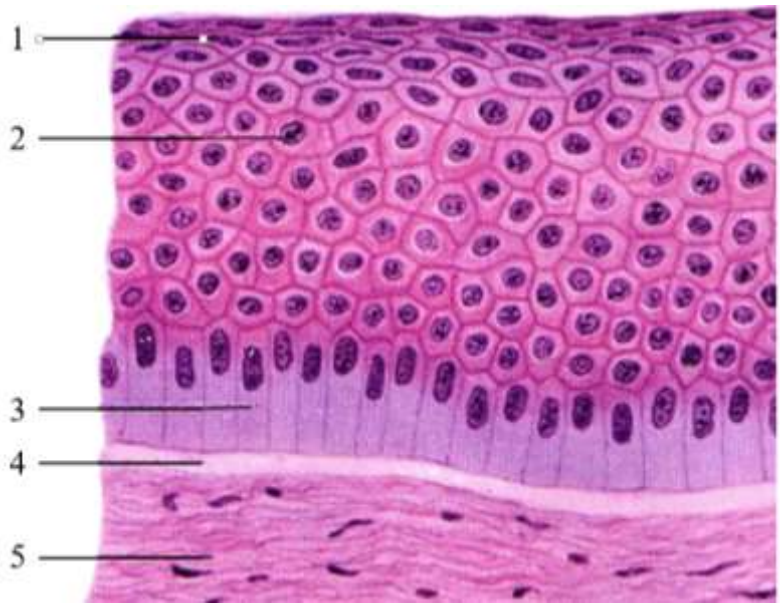
1. Basal pole
2. Apical pole
3. Cuboidal epithelial cells
4. Basement membrane
5. Simple squamous epithelium
6. Nucleus
7. Lateral surface

Figure № 2. Simple columnar epithelium, kidney, human. H&E. ×400.

Designations:

1. Columnar epithelial cells
2. Basement membrane
3. Connective tissue with blood vessels

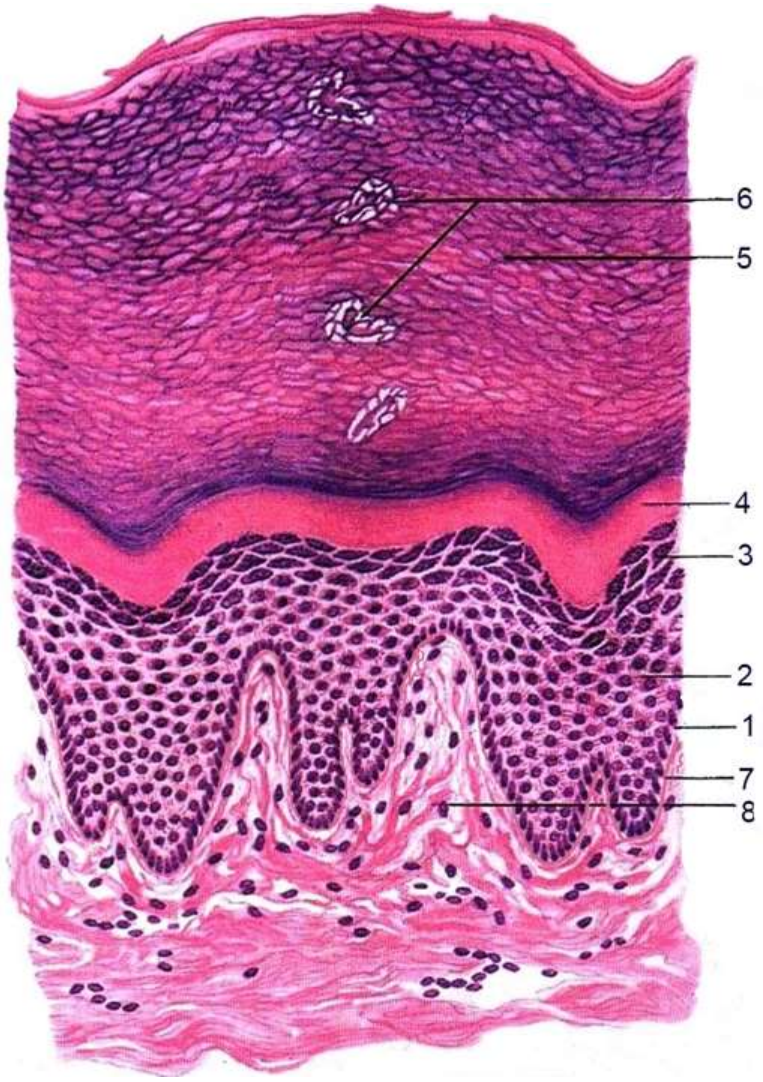
Figure № 3. Stratified squamous nonkeratinized epithelium, cornea. H&E. ×400.



Designations:

1. Flattened cells of the surface layer
2. Stratum spinosum
3. Stratum basale
4. Basement membrane
5. Connective tissue

Figure № 4. Stratified squamous keratinized epithelium, thick skin. H&E. ×280.

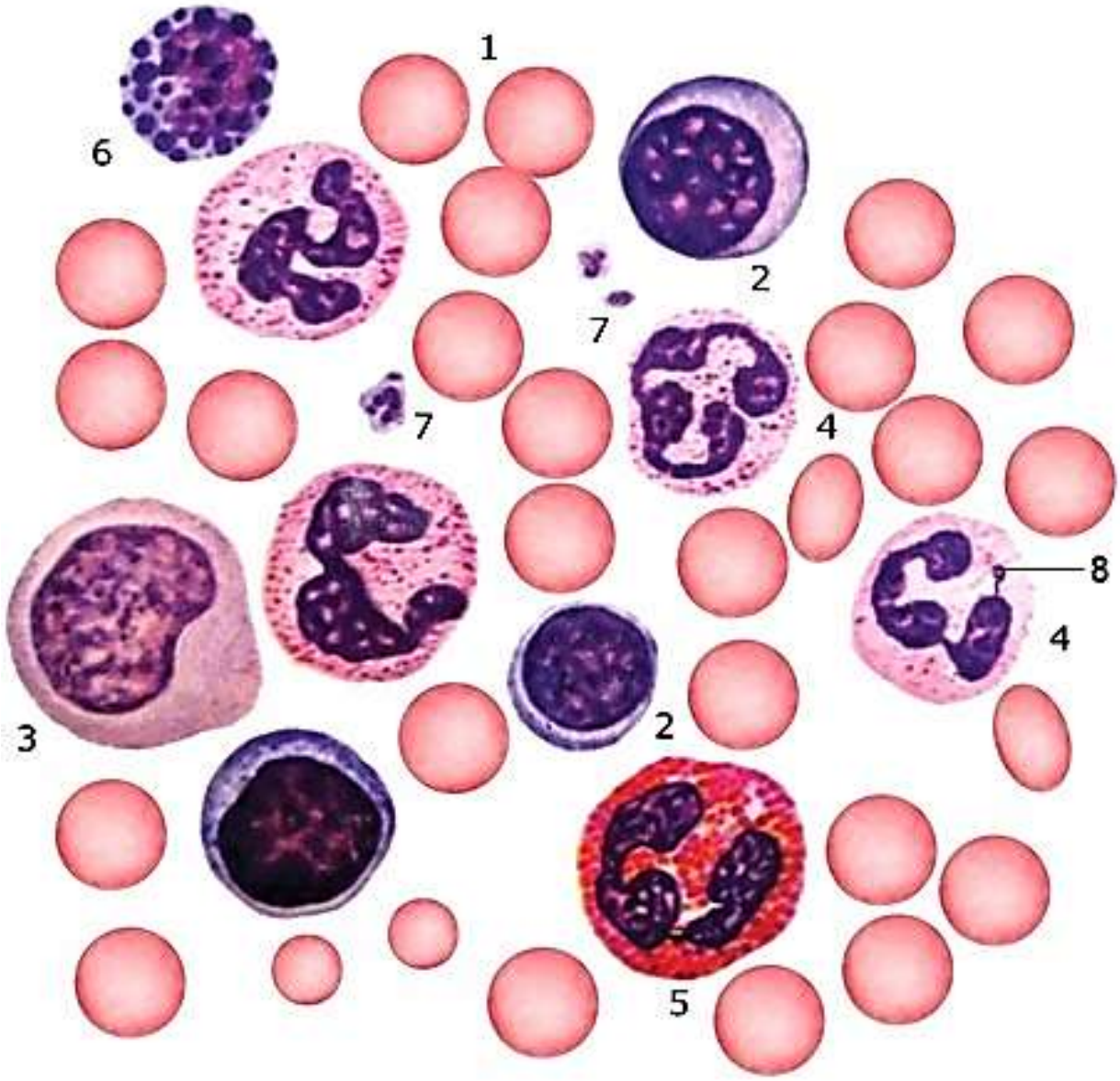


Designations:

1. Stratum basale
2. Stratum spinosum
3. Stratum granulosum
4. Stratum lucidum
5. Stratum corneum
6. Sweat gland duct
7. Basement membrane
8. Connective tissue

2.2. BLOOD AND LYMPH. HEMATOPOESIS. WHITE BLOOD CELLS COUNT

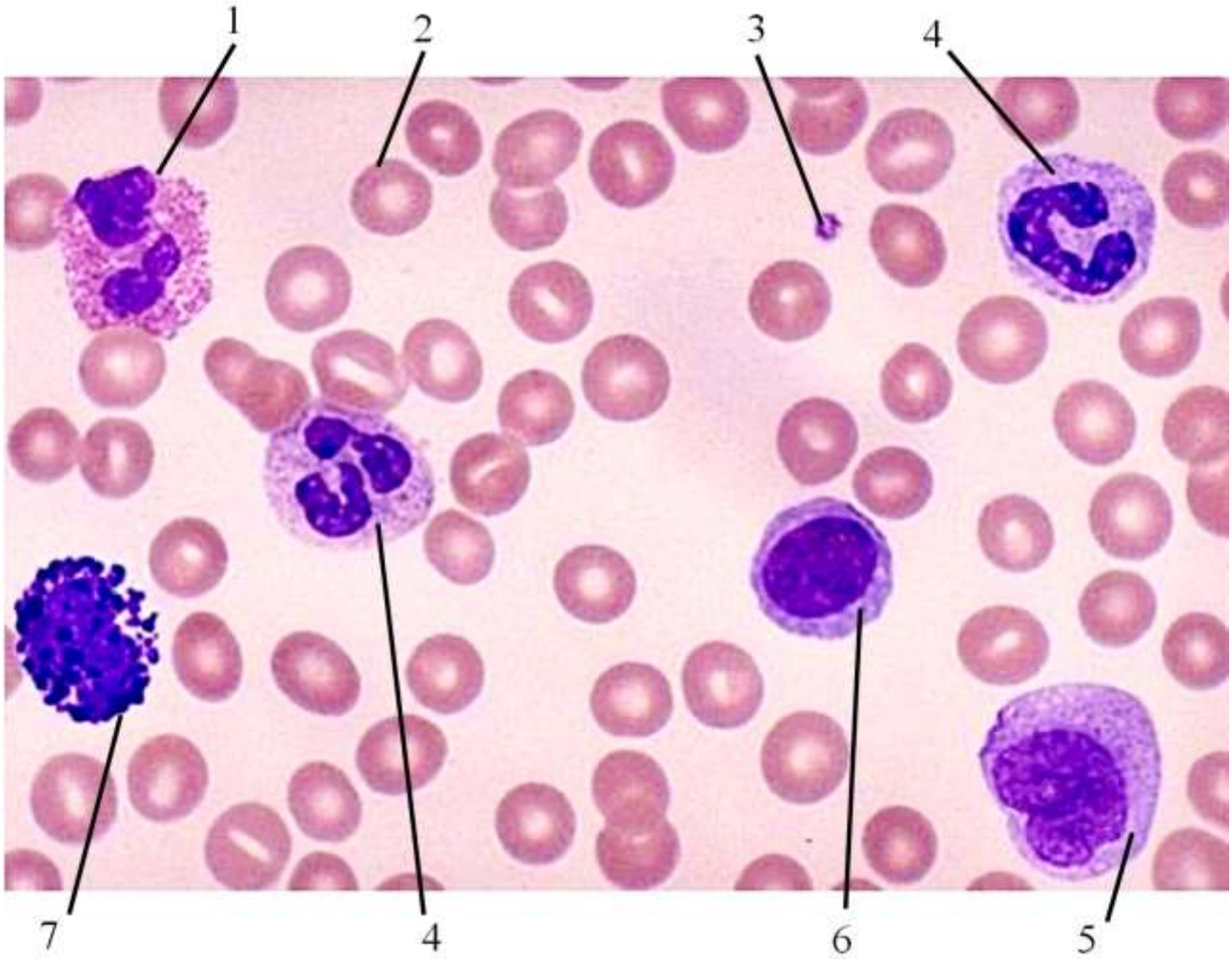
Figure № 1. Human blood smear. Romanowsky-Giemsa staining. ×900.



Designations:

1. Erythrocytes (red blood cells)
2. Lymphocytes (small and big)
3. Monocyte
4. Neutrophils
5. Eosinophil
6. Basophil
7. Platelets
8. Barr body

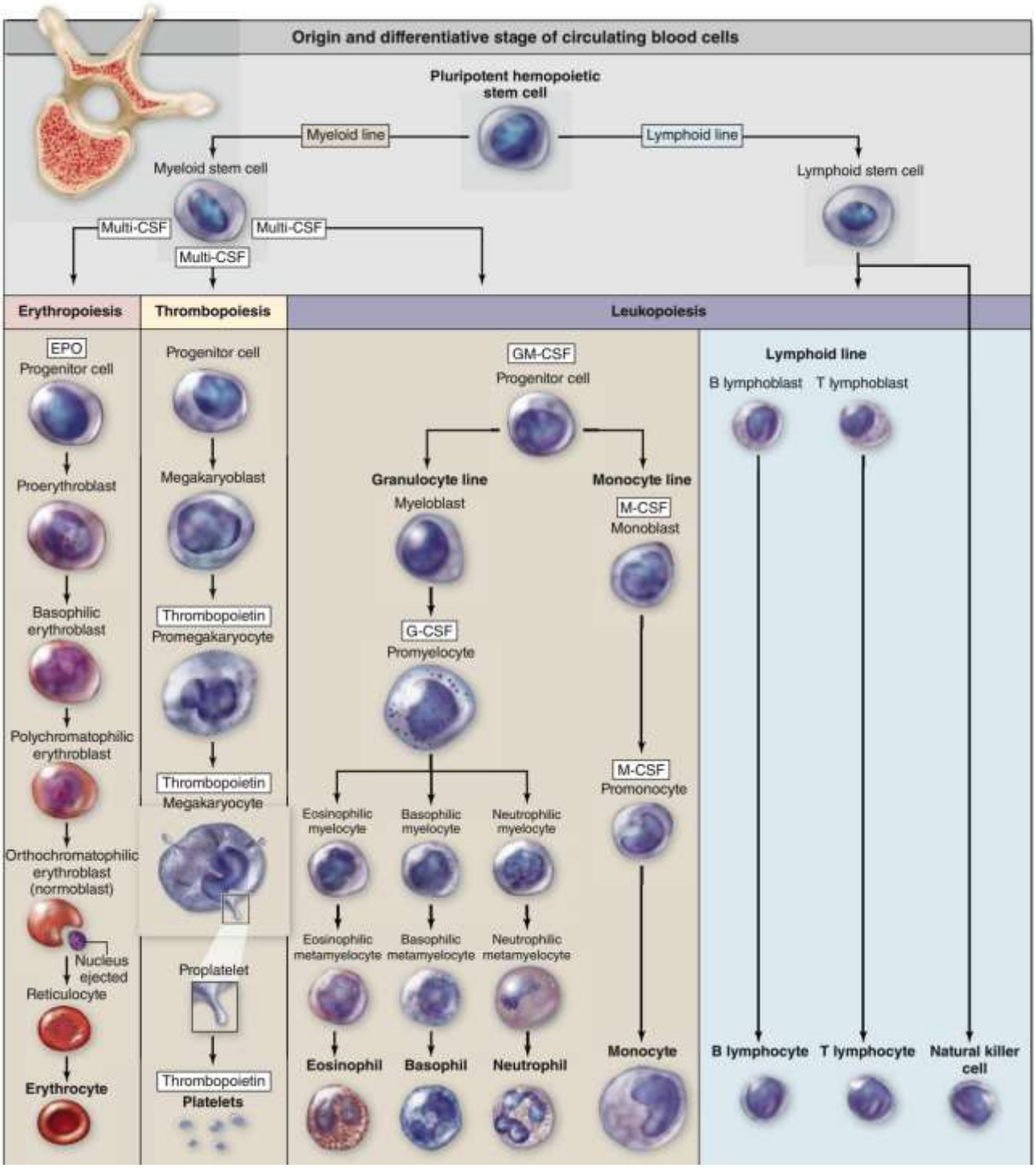
Figure № 2. Human blood smear. Romanowsky-Giemsa staining. ×600.



Designations:

1. Eosinophil
2. Erythrocytes (red blood cells)
3. Platelets
4. Neutrophils
5. Monocyte
6. Lymphocyte
7. Basophil

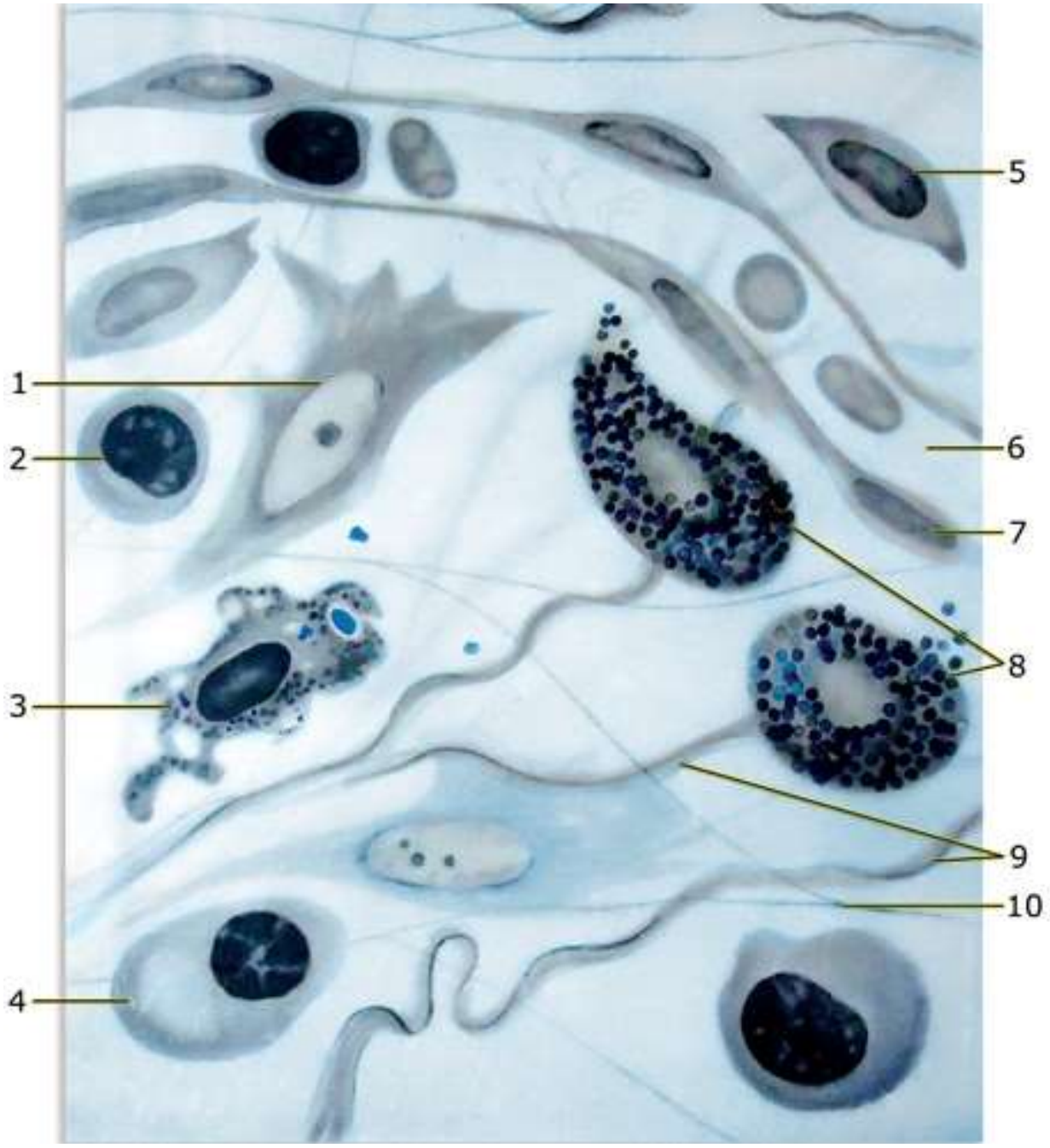
Scheme № 1. Origin and differentiative stages of blood cells (Junqueira's Basic Histology: Text and Atlas, Sixteenth Edition 14th Edition, 2016).



EPO – erythropoietin, GM-CSF – granulocyte-macrophage colony-stimulating factor, G-CSF – granulocyte colony-stimulating factor, M-CSF – monocyte colony-stimulating factor.

2.3. CONNECTIVE TISSUES. CLASSIFICATION. CELLS OF LOOSE CONNECTIVE TISSUE. NONCELLULAR STRUCTURES

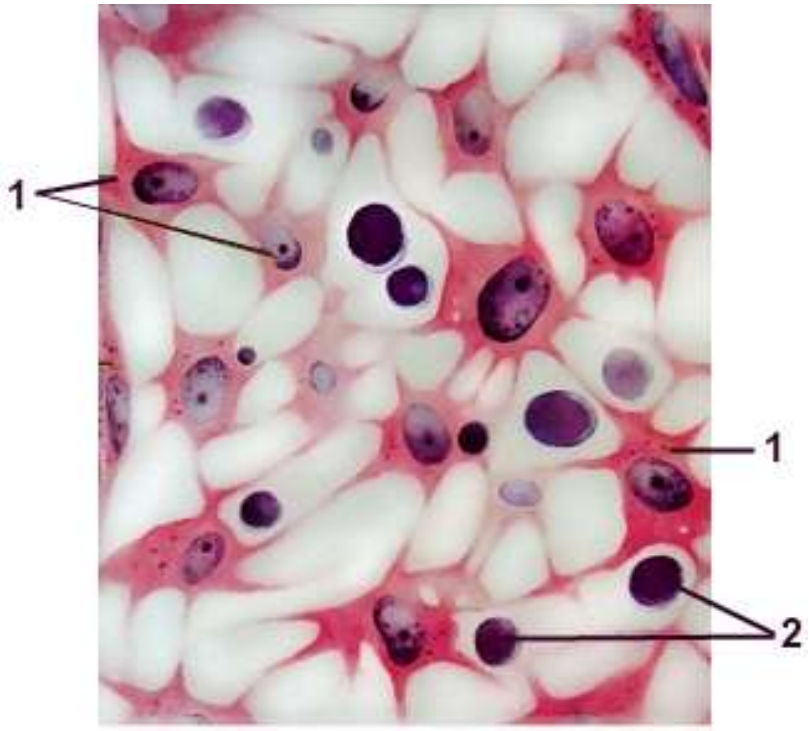
Figure № 1. Loose connective tissue, film spread. Iron hematoxylin. ×400.



Designations:

1. Fibroblast
2. Lymphocyte
3. Macrophage
4. Plasma cell
5. Adventitial cell
6. Blood vessel
7. Endothelial cells
8. Mast cells
9. Collagen fibers
10. Elastic fibers

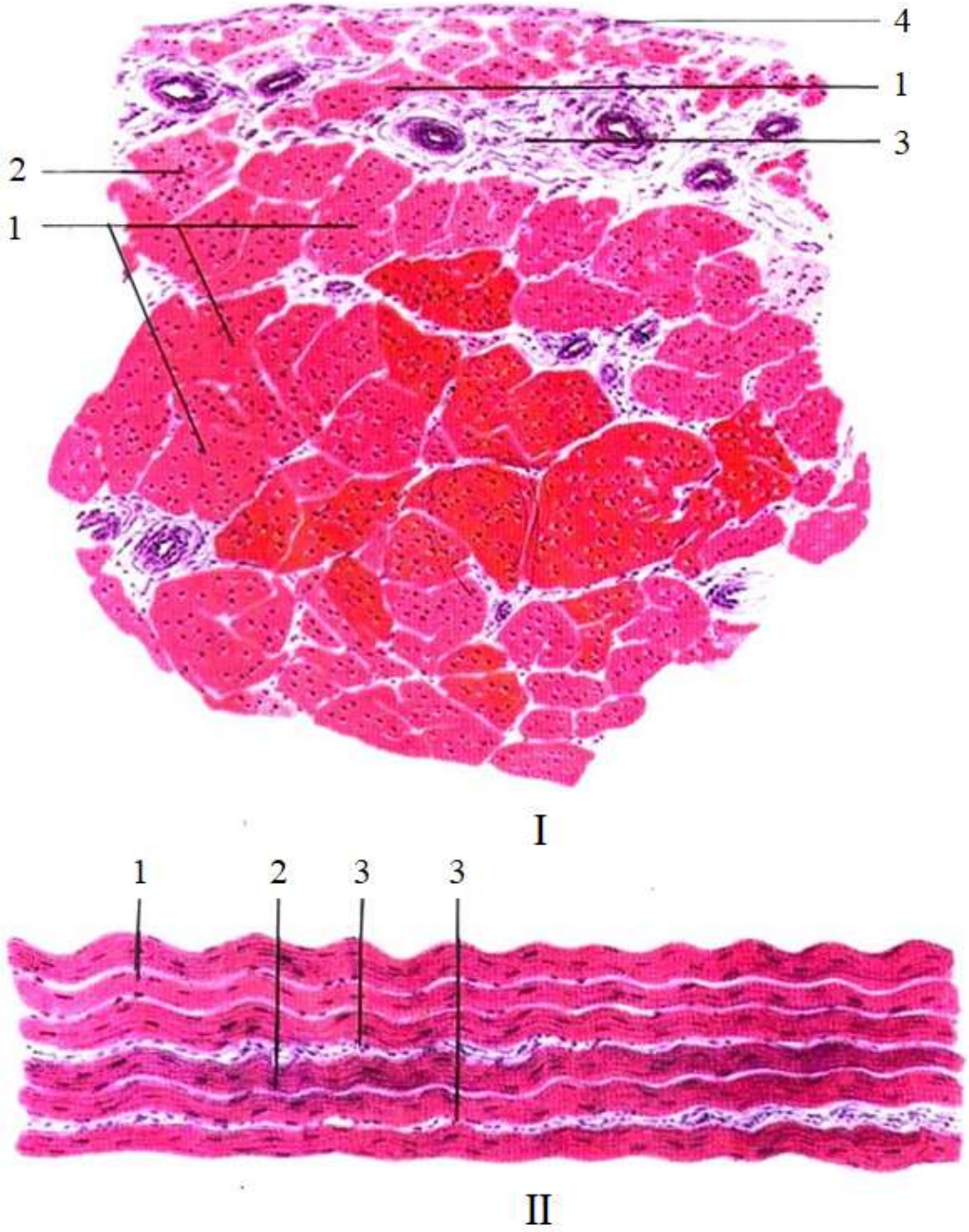
Figure № 2. Reticular tissue, lymph node. H&E. ×400.



Designations:

1. Reticular cells
2. Lymphocytes

Figure № 3. Dense regular connective tissue, tendon. H&E. ×80.



Designations:

I. Cross section

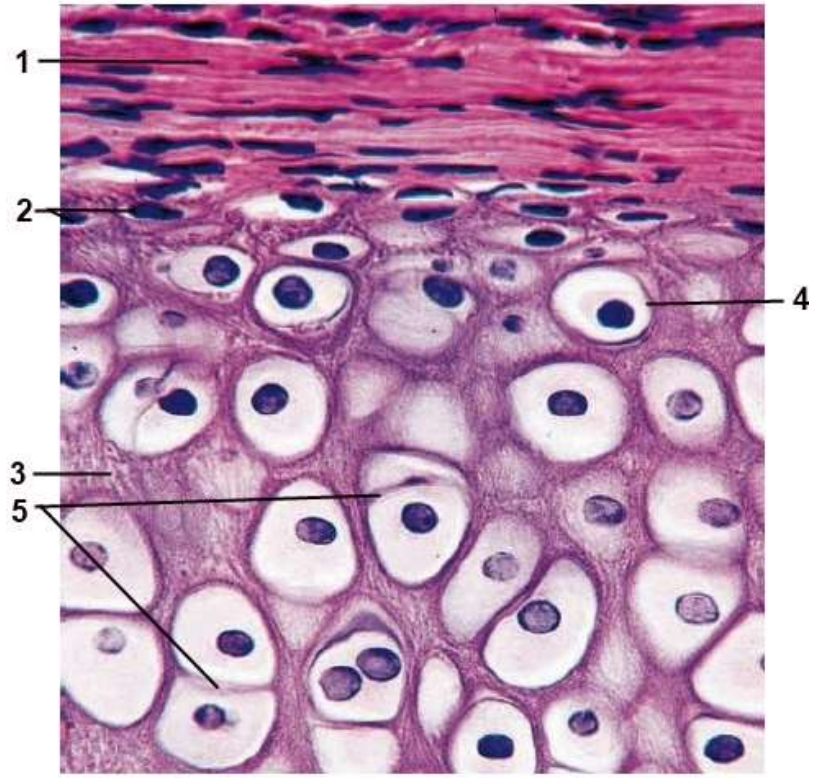
1. Bundles of collagen fibers
2. Fibrocytes
3. Loose connective tissue (endotendineum)
4. Outer connective tissue sheath (peritendineum)

II. Longitudinal section

1. Parallel bundles of collagen fibers
2. Fibrocytes
3. Loose connective tissue (endotendineum)

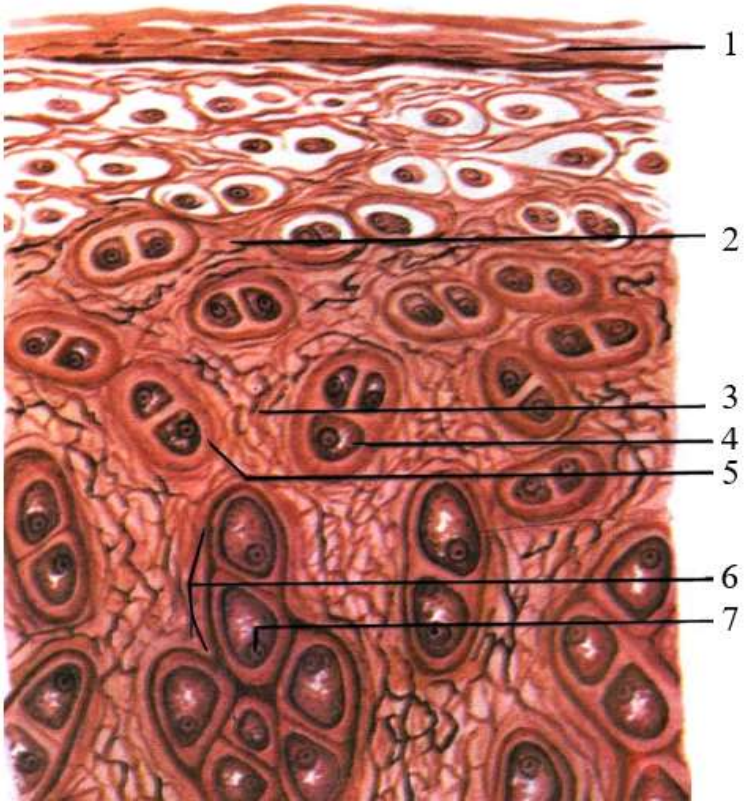
2.4. SKELETAL CONNECTIVE TISSUES. CARTILAGE

Figure № 1. Hyaline cartilage, trachea. H&E. ×280.



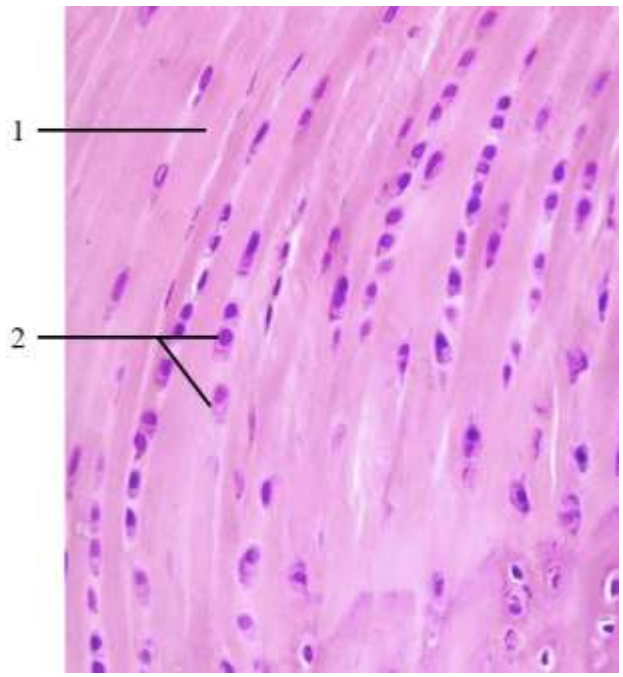
Designations:
1. Perichondrium
2. Chondroblasts
3. Interterritorial matrix
4. Lacuna with chondrocyte
5. Isogenous groups

Figure № 2. Elastic cartilage, external ear. Orcein staining. ×400.



Designations:
1. Perichondrium
2. Matrix
3. Elastic fibers
4. Chondrocyte
5. Lacuna
6. Isogenous group
7. Nucleus of chondrocyte

Figure № 3. Fibrocartilage. H&E. ×280.



Designations:

1. Bundles of collagen fibers
2. Chondrocytes

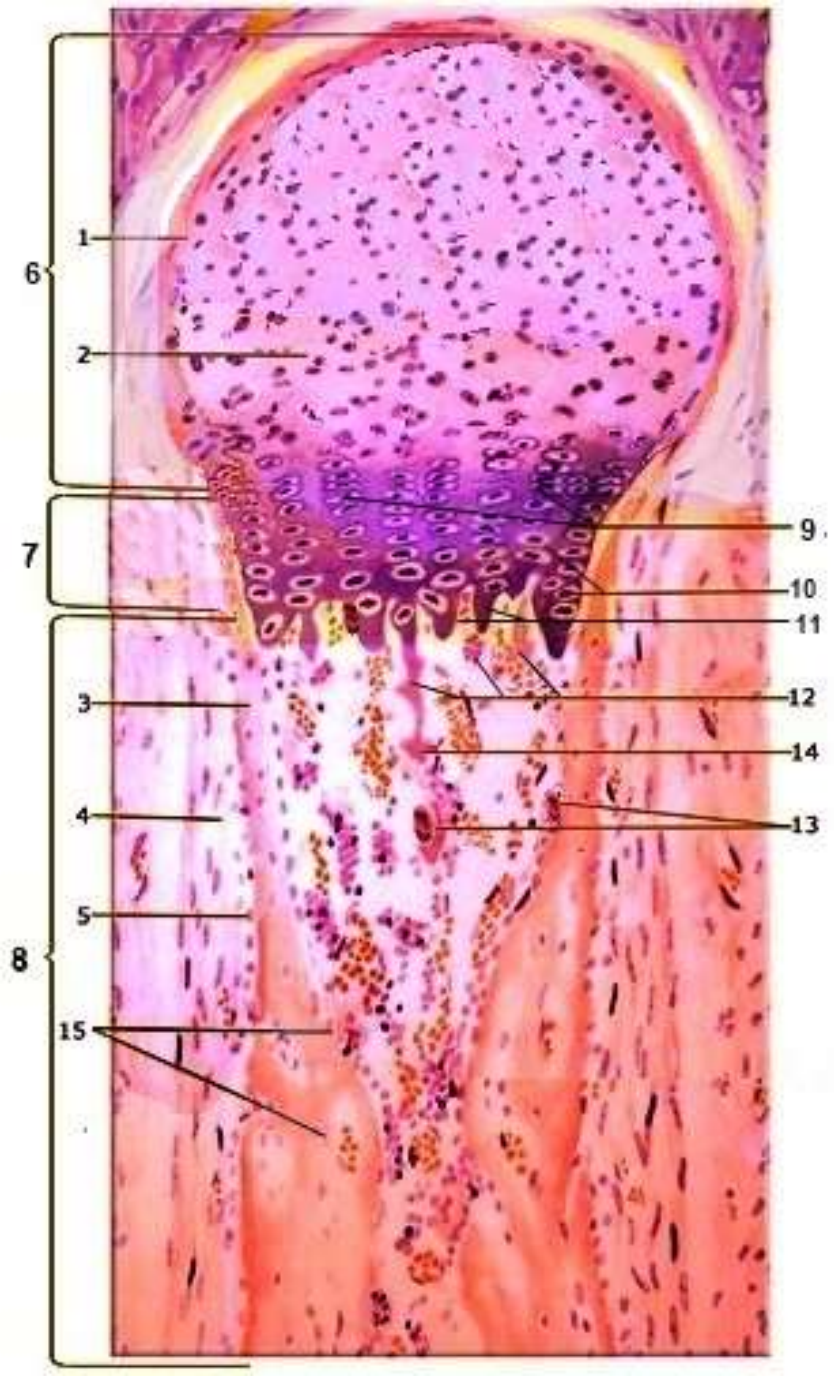
2.5. SKELETAL CONNECTIVE TISSUES. BONE

Figure № 1. A cross-section of a long bone diaphysis. Thionin& picrofuchsin. × 80.

Designations:

1. Periosteum
2. External circumferential lamellae
3. Haversian canals
4. Anastomoses between osteon canals
5. Volkmann's canal
6. Osteocytes
7. Bone matrix
8. Osteons
9. Interstitial lamellae
10. Inner circumferential lamellae
11. Endosteum
12. Bone marrow cavity

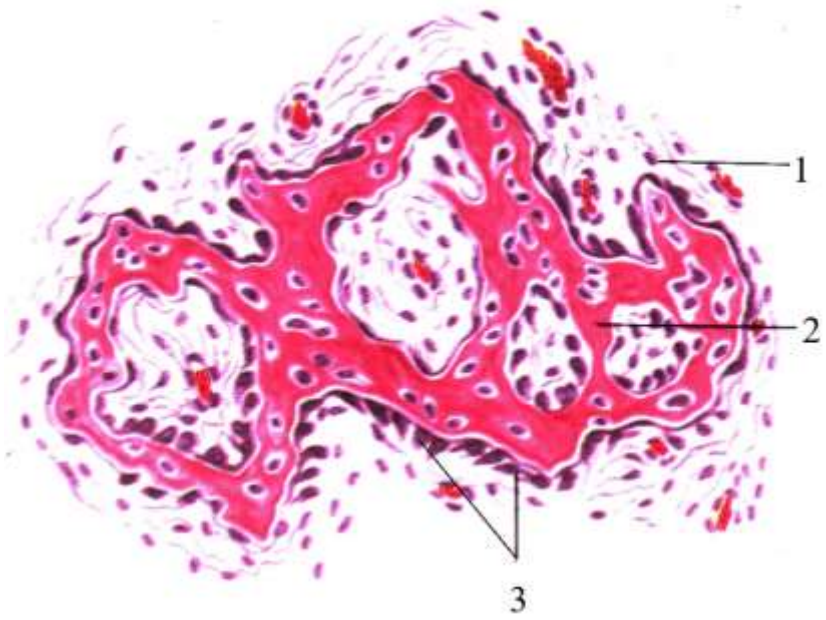
Figure № 2. Endochondral ossification. H&E. × 80.



Designations:

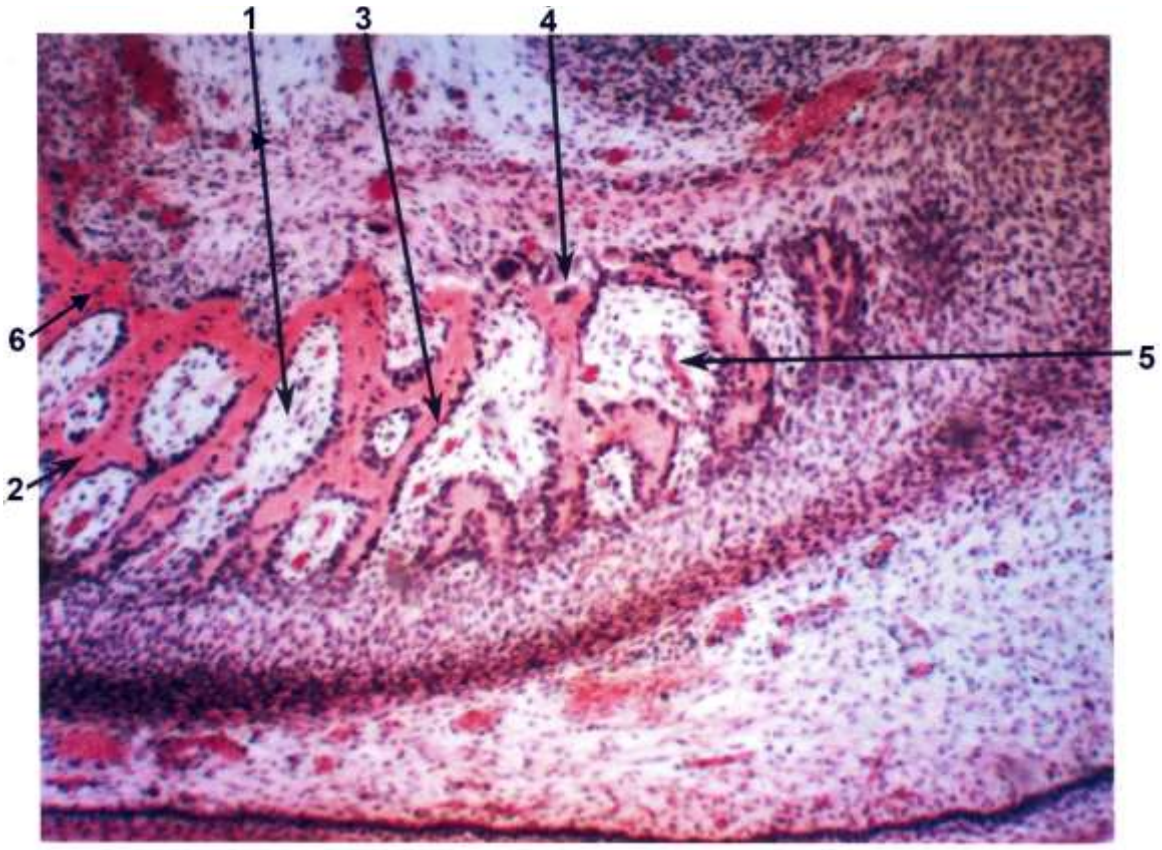
1. Perichondrium
2. Zone of reserve (or resting) cartilage
3. Bone collar
4. Periosteum
5. Osteoblasts
6. Epiphysis
7. Epiphyseal plate
8. Diaphysis
9. Zone of proliferation
10. Zone of hypertrophy
11. Zone of calcified cartilage and resorption
12. Zone of ossification
13. Osteoclasts
14. Bone trabeculae
15. Primary ossification center

Figure № 3. Intramembranous ossification. H&E. × 400.



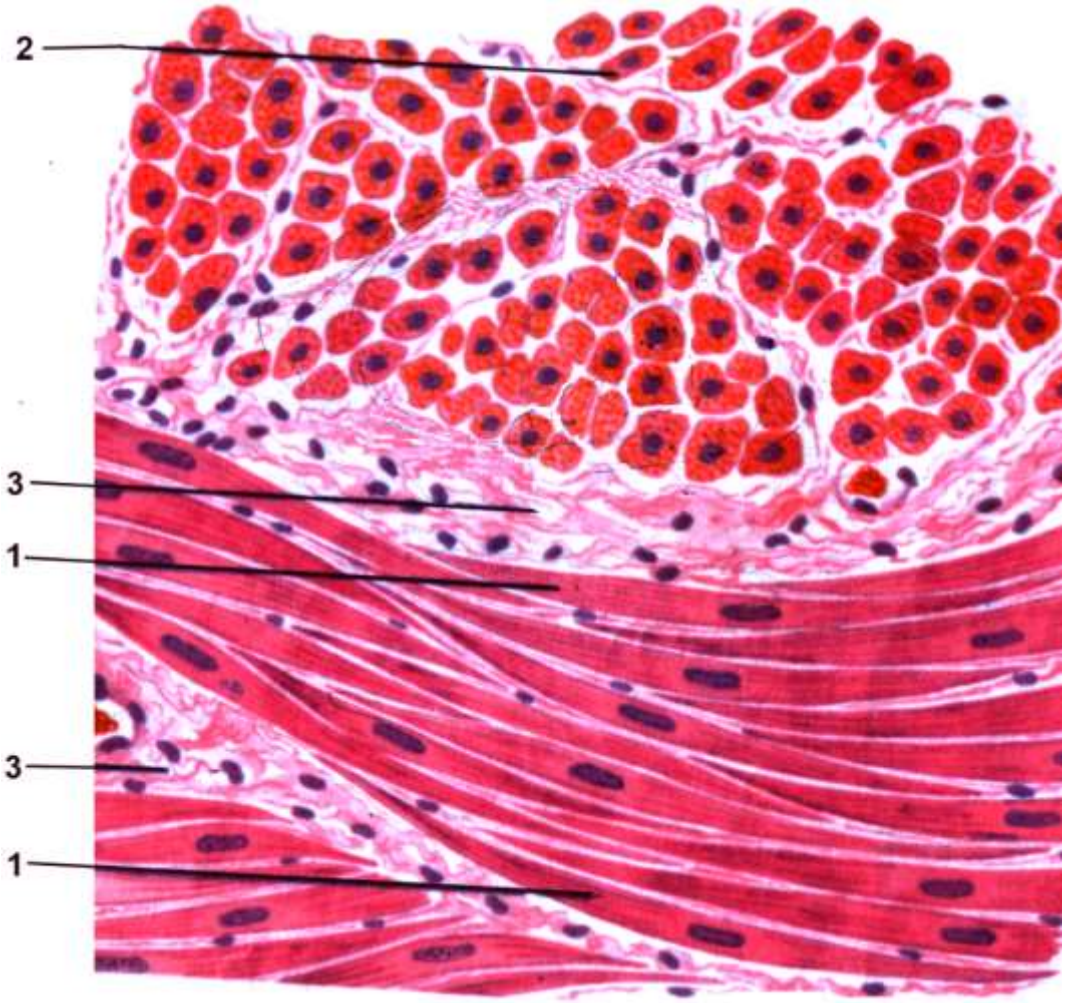
Designations:

1. Condensed mesenchyme
2. Bone spicules
3. Osteoblasts
4. Osteoclasts
5. Blood vessels
6. Osteocytes



2.6. SPECIALIZED TISSUES. MUSCLE TISSUES

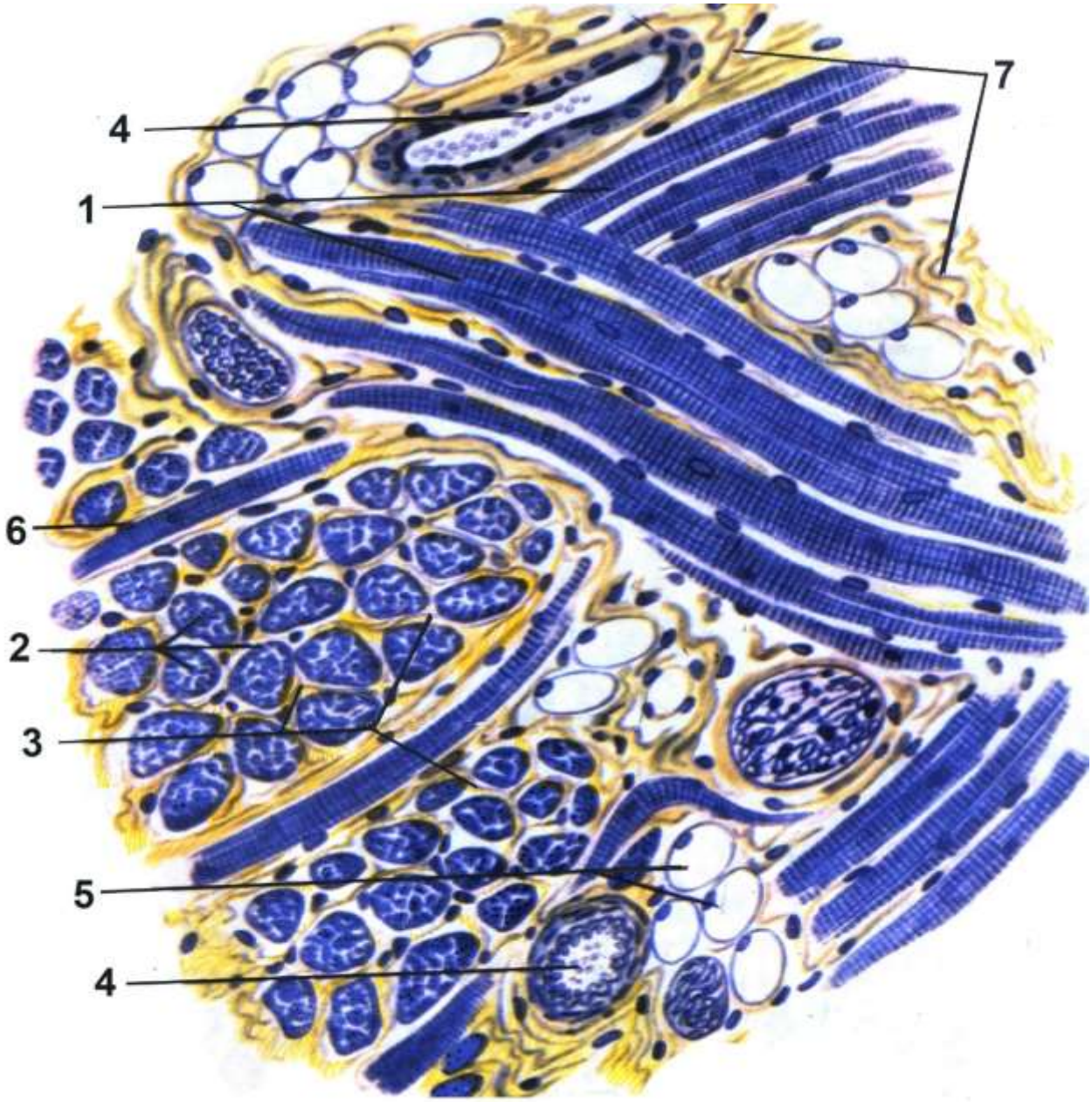
Figure № 1. Smooth muscle, urinary bladder. H&E. ×400.



Designations:

1. Smooth muscle cells (longitudinal section)
2. Smooth muscle cells (cross-section)
3. Loose connective tissue with blood vessels

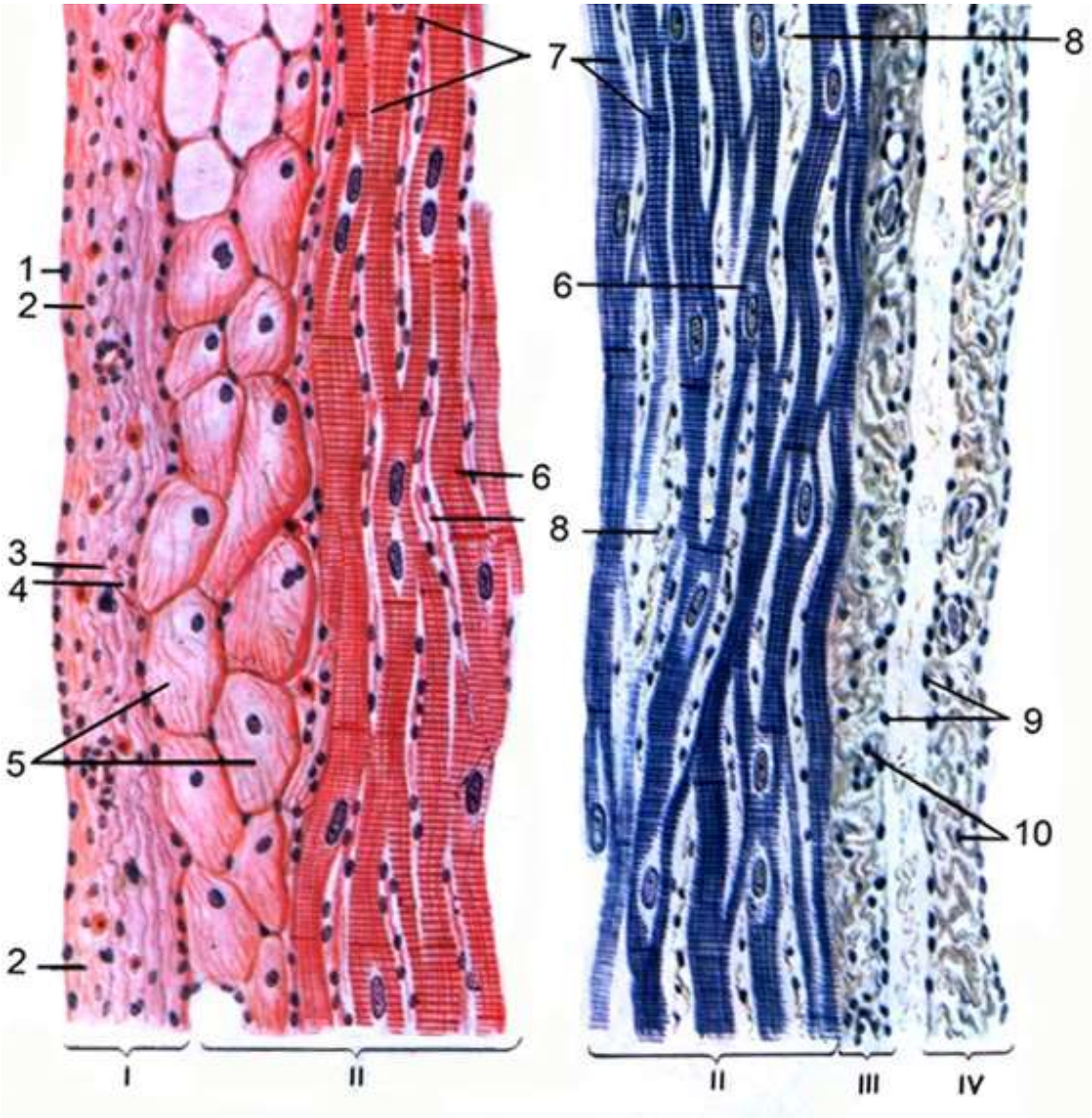
Figure № 2. Skeletal muscle (striated), tongue. Iron hematoxylin. ×400.



Designations:

1. Longitudinally sectioned muscle fibers
2. Cross-sectioned muscle fibers
3. Endomysium
4. Blood vessels
5. Adipose cells
6. Satellite cells
7. Perimysium

Figure № 3. Cardiac muscle (striated), heart. H&E, Iron hematoxylin. ×400.



Designations:

I. Endocardium
- 1. Endothelium
- 2. Subendothelial layer
- 3. Muscular-elastic layer
- 4. Connective tissue

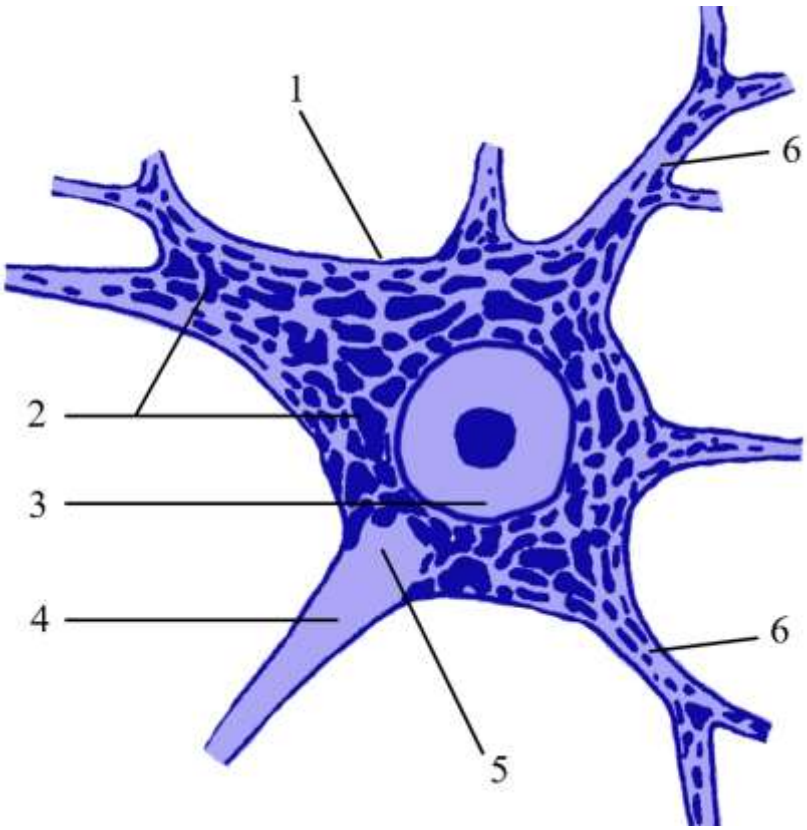
II. Myocardium
- 5. Conducting (Purkinje) fibers
- 6. Contractile cardiac muscle cells
- 7. Intercalated discs
- 8. Connective tissue with blood vessels and nerves

III. Epicardium

IV. Pericardium
- 9. Mesothelium
- 10. Lamina propria

2.7. SPECIALIZED TISSUE. NERVOUS TISSUE

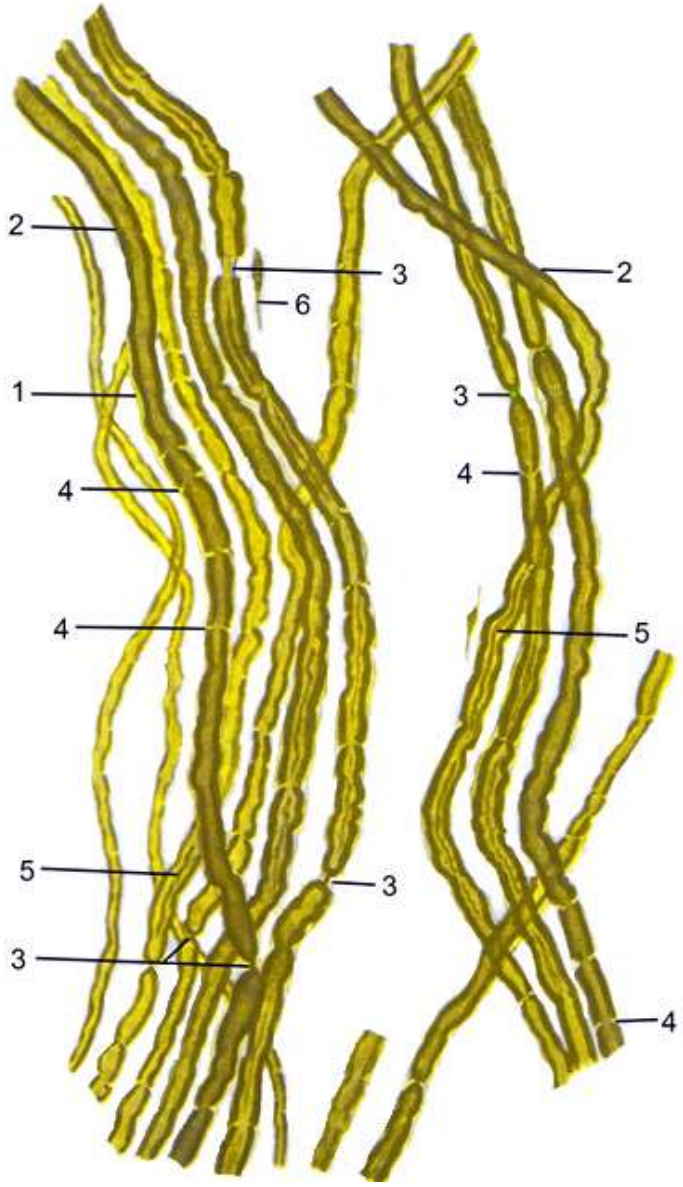
Figure № 1. Basophilic Nissl substance in multipolar neuron, spinal cord. Toluidine blue. ×1200.



Designations:

1. Neuron
2. Nissl bodies
3. Nucleus with nucleolus
4. Axon
5. Axon hillock
6. Dendrites

Figure № 2. Myelinated nerve fibers. Osmic acid. ×400.



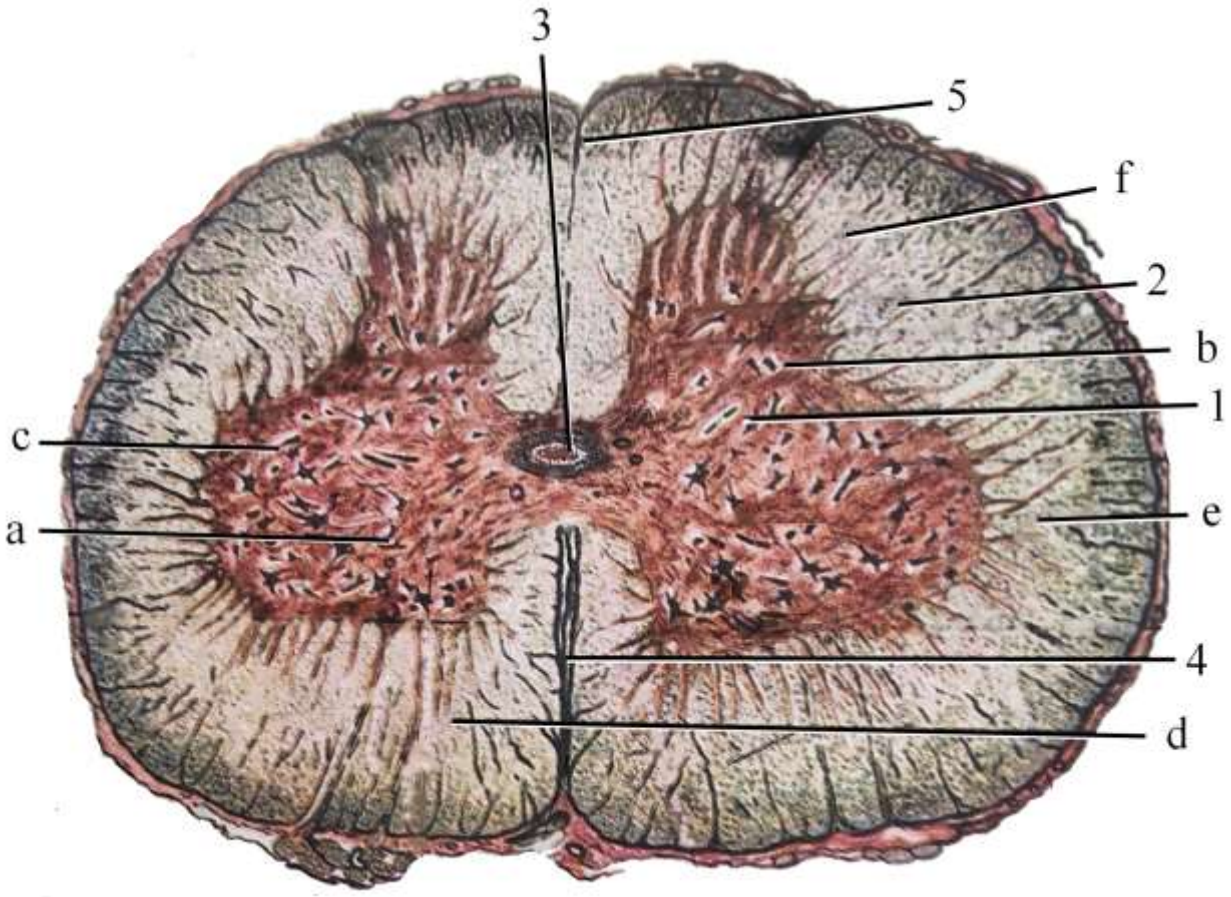
Designations:

1. Neurolemma
2. Myelin sheath
3. Nodes of Ranvier
4. Schmidt-Lanterman clefts
5. Axon
6. Connective tissue (endoneurium)

3. SPECIAL HISTOLOGY

3.1. CENTRAL NERVOUS SYSTEM

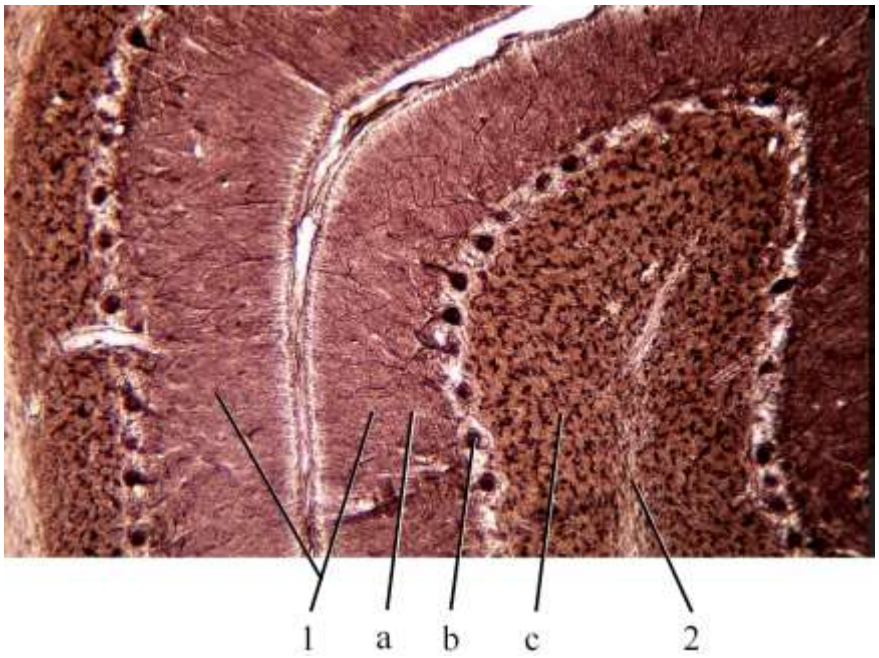
Figure № 1. Spinal cord, a cross-section. Silver impregnation. ×80.



Designations:

1. Gray matter
   a) anterior (ventral) horns
   b) posterior (dorsal) horns
   c) lateral horns
2. White matter
   d) anterior (ventral) column
   e) lateral column
   f) posterior (dorsal) column
3. Central canal
4. Anterior (ventral) median sulcus
5. Posterior (dorsal) median sulcus

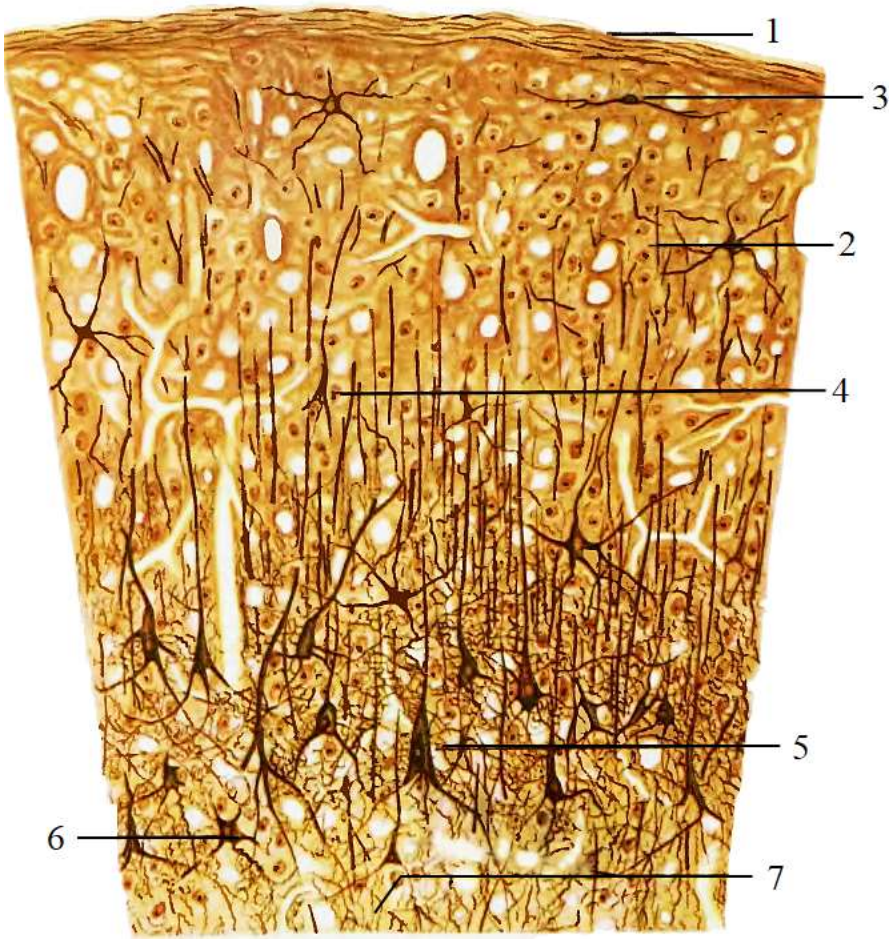
Figure № 2. Cerebellum, brain, human. Silver impregnation. ×100.



Designations:

1. Gray matter
   a) molecular layer
   b) ganglionic layer (Purkinje neurons)
   c) granular layer
2. White matter

Figure № 3. Cerebral cortex, brain, human. Silver impregnation. ×100.

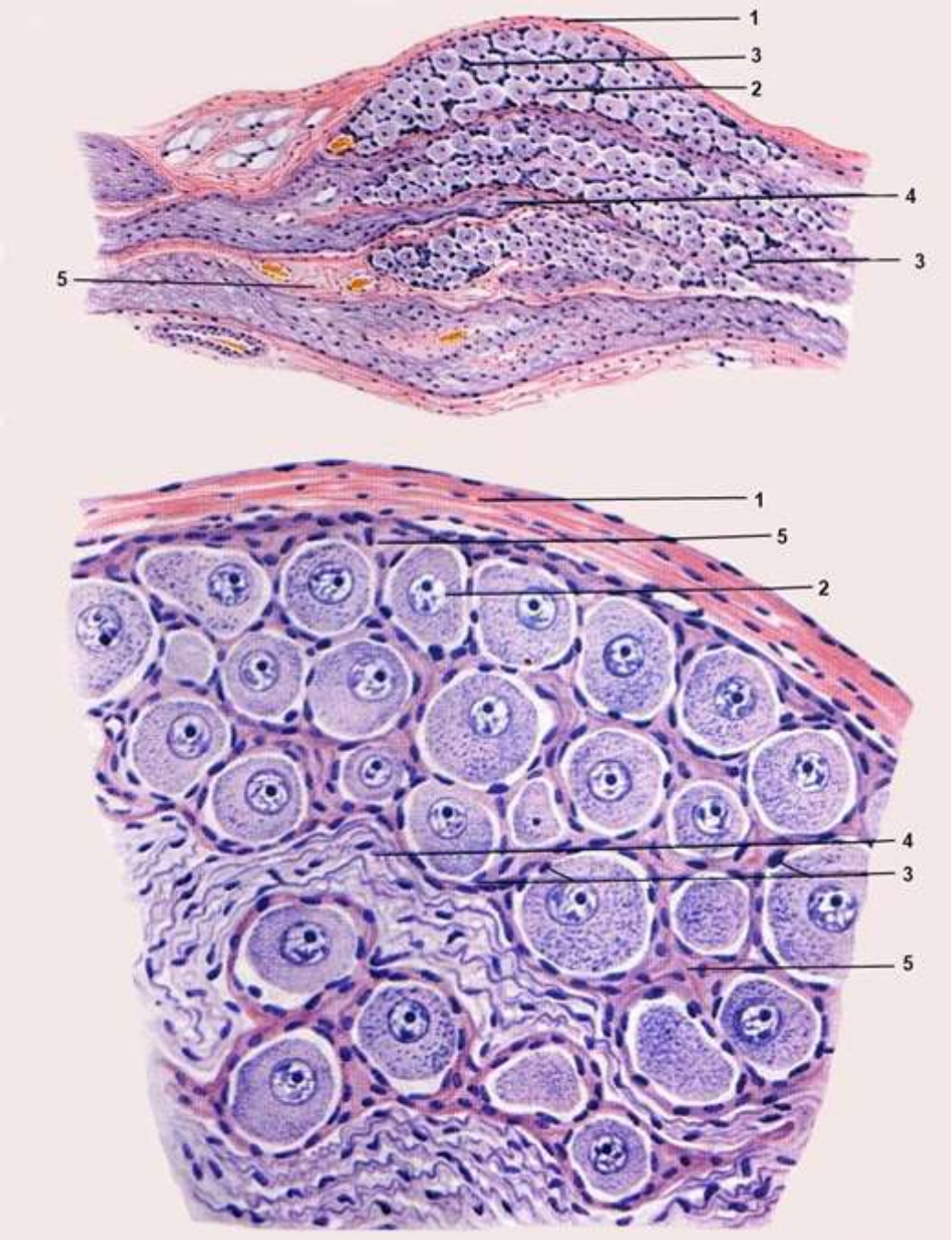


Designations:

1. Pia mater
2. Gray matter
3. Molecular layer
4. Pyramidal neurons
5. Large pyramidal neurons (Betz cells)
6. Polymorphic layer
7. White matter

3.2. PERIPHERAL NERVOUS SYSTEM. RECEPTORS

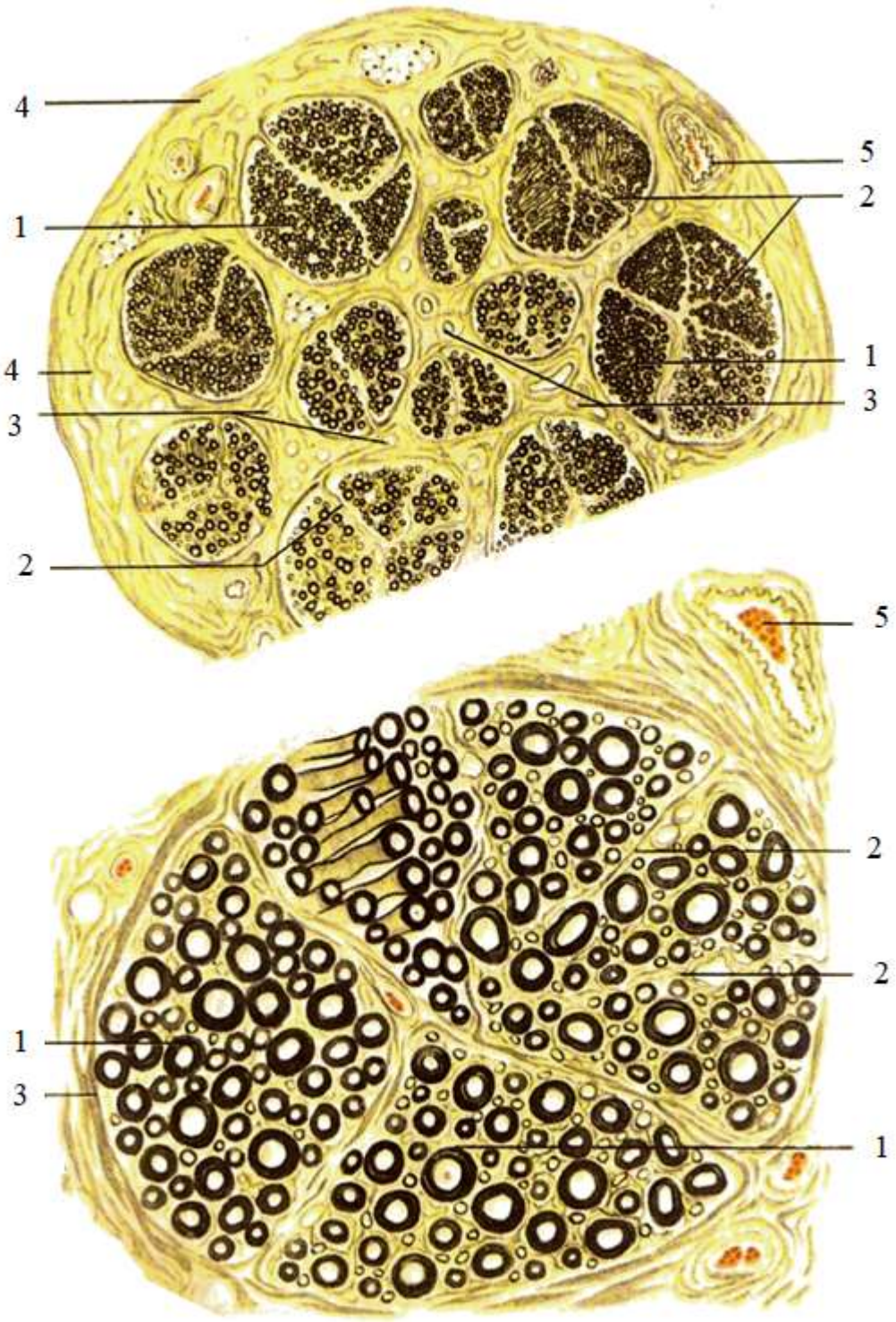
Figure № 1. Spinal ganglion. H&E. ×200 and ×400.



Designations:

1. Connective tissue capsule
2. Pseudounipolar neurons
3. Gliocytes (satellite cells)
4. Nerve fibers
5. Connective tissue

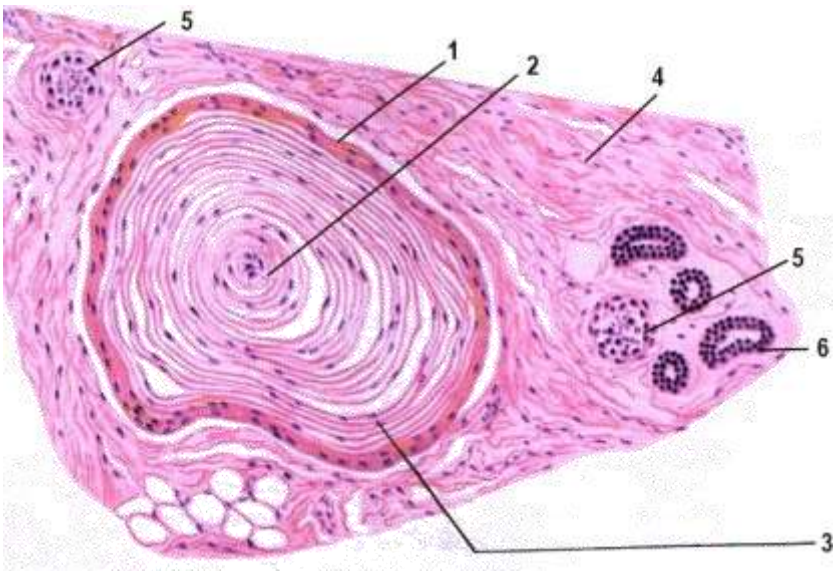
Figure № 2. Peripheral nerve, a cross-section. Osmic acid. ×140 and ×400.



Designations:

1. Myelinated nerve fibers
2. Endoneurium
3. Perineurium
4. Epineurium
5. Blood vessels

Figure № 3. Encapsulated nerve ending. Lamellar (Pacinian) corpuscle, fingertip. H&E. ×400.

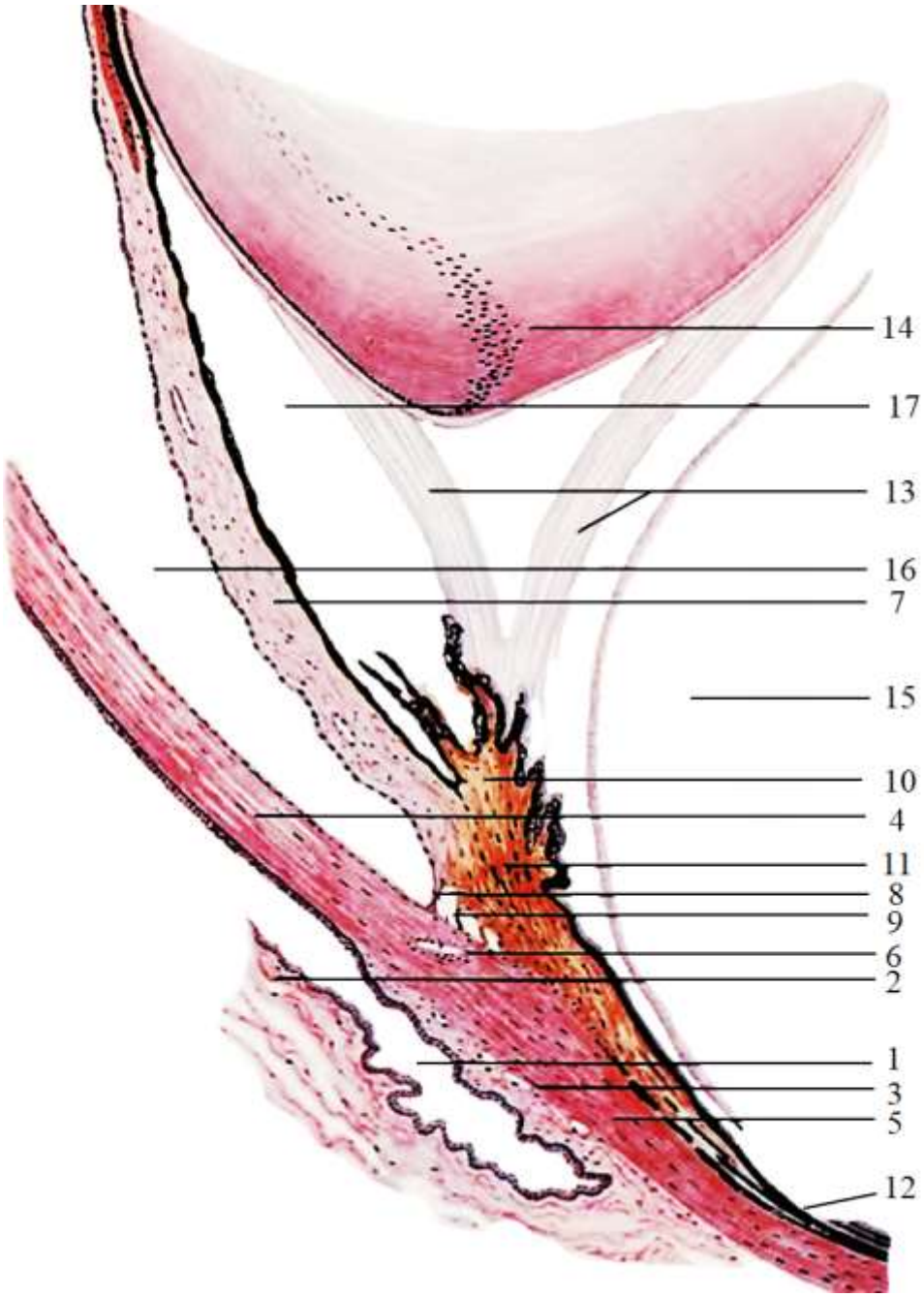


Designations:

1. Capsule
2. Neurone ending
3. Concentric cellular lamellae
4. Dermis of skin
5. Nerves
6. Sweat glands

3.3. THE EYE

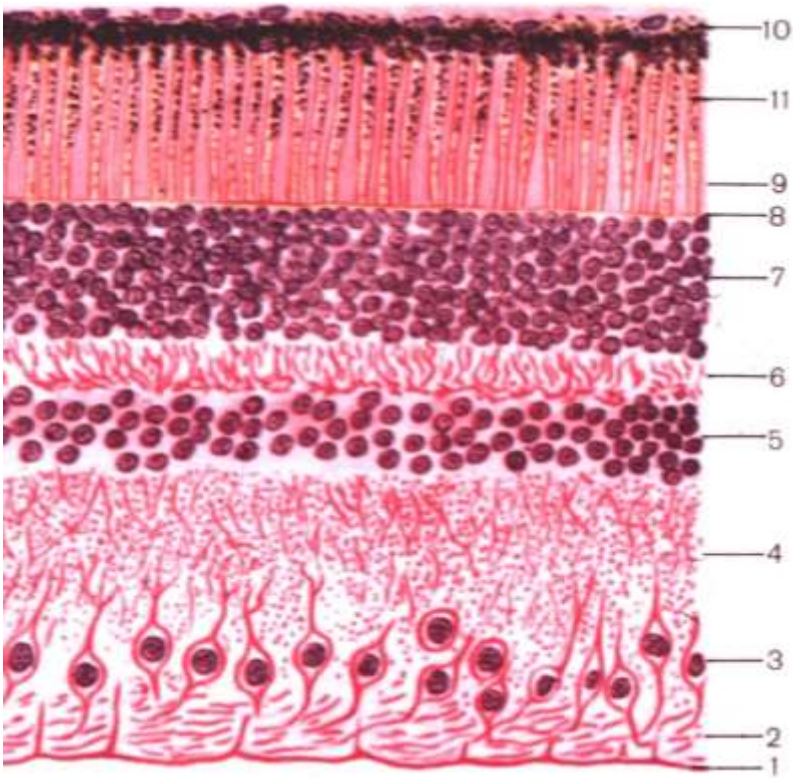
Figure № 1. The angle of the eye. H&E. ×56.



Designations:

1. Conjunctival sac
2. Conjunctiva
3. Episcleral vessels
4. Cornea
5. Sclera
6. Canal of Schlemm
7. Iris
8. Pectinate ligament
9. Spaces of Fontana
10. Ciliary body with process
11. Ciliary muscle
12. Ora serrata
13. Zonular fibers
14. Lens
15. Vitreous body
16. Anterior chamber
17. Posterior chambe

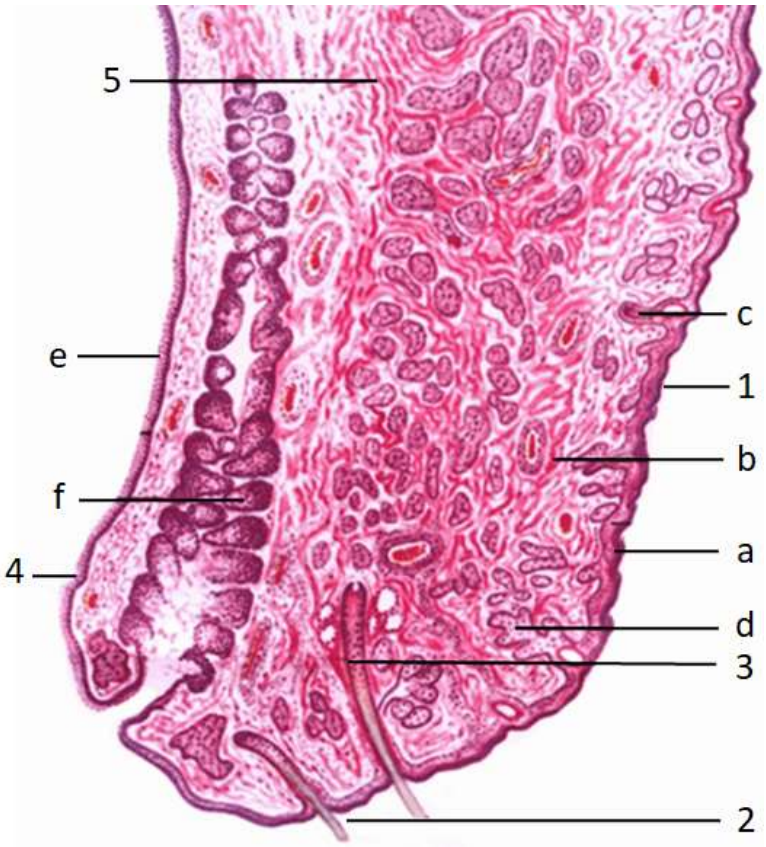
Figure № 2. Retina. H&E. ×400.



Designations:

1. Inner limiting membrane
2. Nerve fiber layer
3. Ganglionic layer
4. Inner plexiform layer
5. Inner nuclear layer
6. Outer plexiform layer
7. Outer nuclear layer
8. Outer limiting layer
9. Rod and cone layer
10. Pigment epithelium
11. Pigment cell processes

Figure № 3. Eyelid. H&E. ×56.

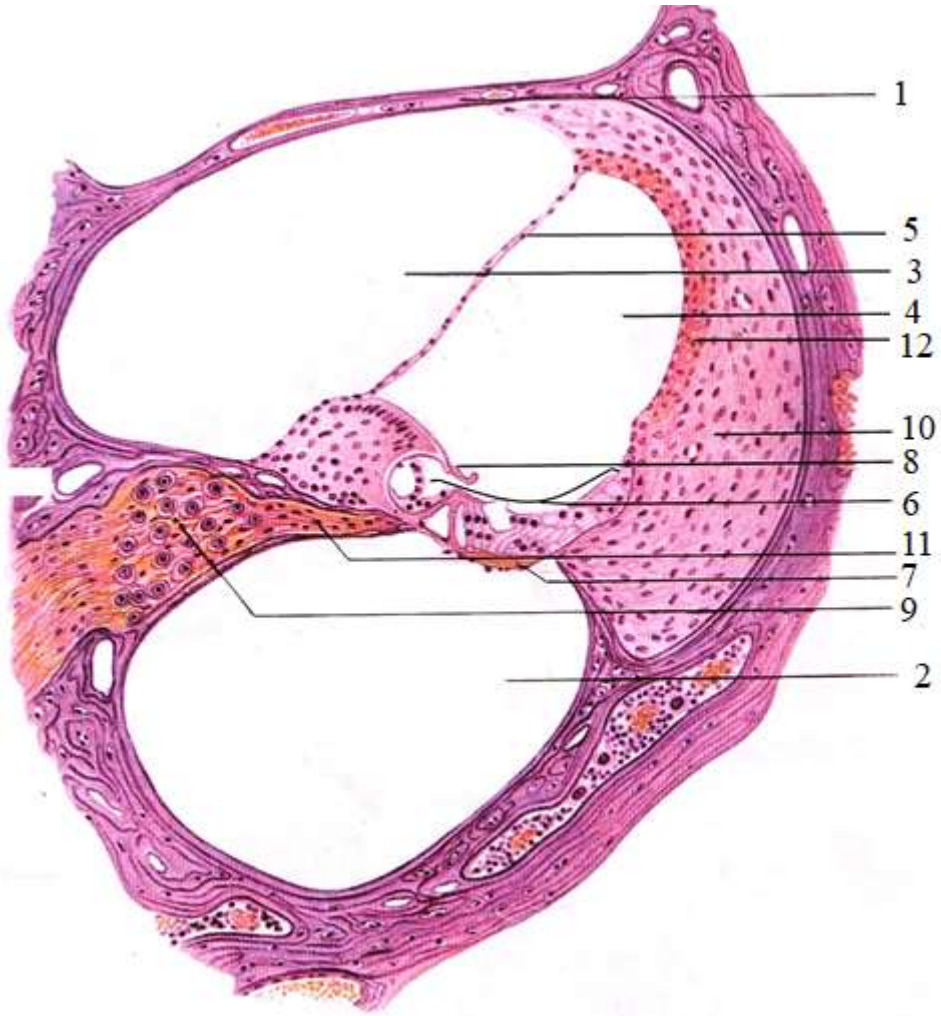


Designations:

1. Thin skin (external surface)
   a) epidermis
   b) dermis
   c) hair follicle
   d) sweat gland
2. Edge of the eyelid
3. Eyelash
4. Conjunctiva (inner surface)
   e) stratified squamous nonkeratinized epithelium
   f) tarsal glands (Meibomian glands)
5. Orbicularis oculi muscle

3.4. THE EAR

Figure № 1. Cochlear canal. H&E. ×140.

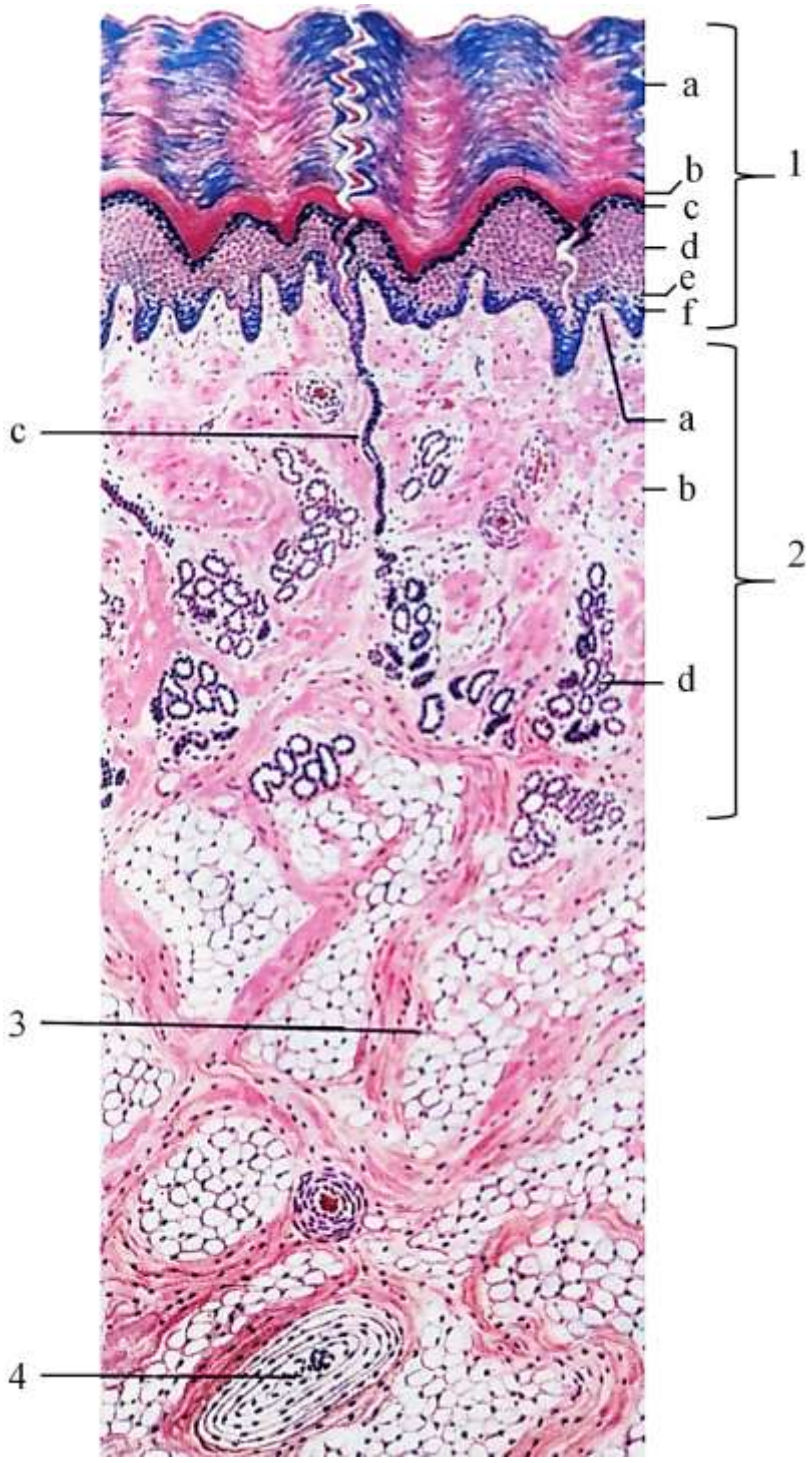


Designations:

1. Bony cochlear wall
2. Scala tympani
3. Scala vestibuli
4. Cochlear duct (Scala media)
5. Vestibular (Reissner's) membrane
6. Spiral organ of Corti
7. Basilar membrane
8. Tectorial membrane
9. Spiral ganglion
10. Spiral ligament
11. Spiral limbus
12. Stria vascularis

3.5. SKIN AND ITS DERIVATIVES. MORPHOLOGICAL BASES OF CUTANEOUS, DEEP AND VISCERAL SENSITIVITY

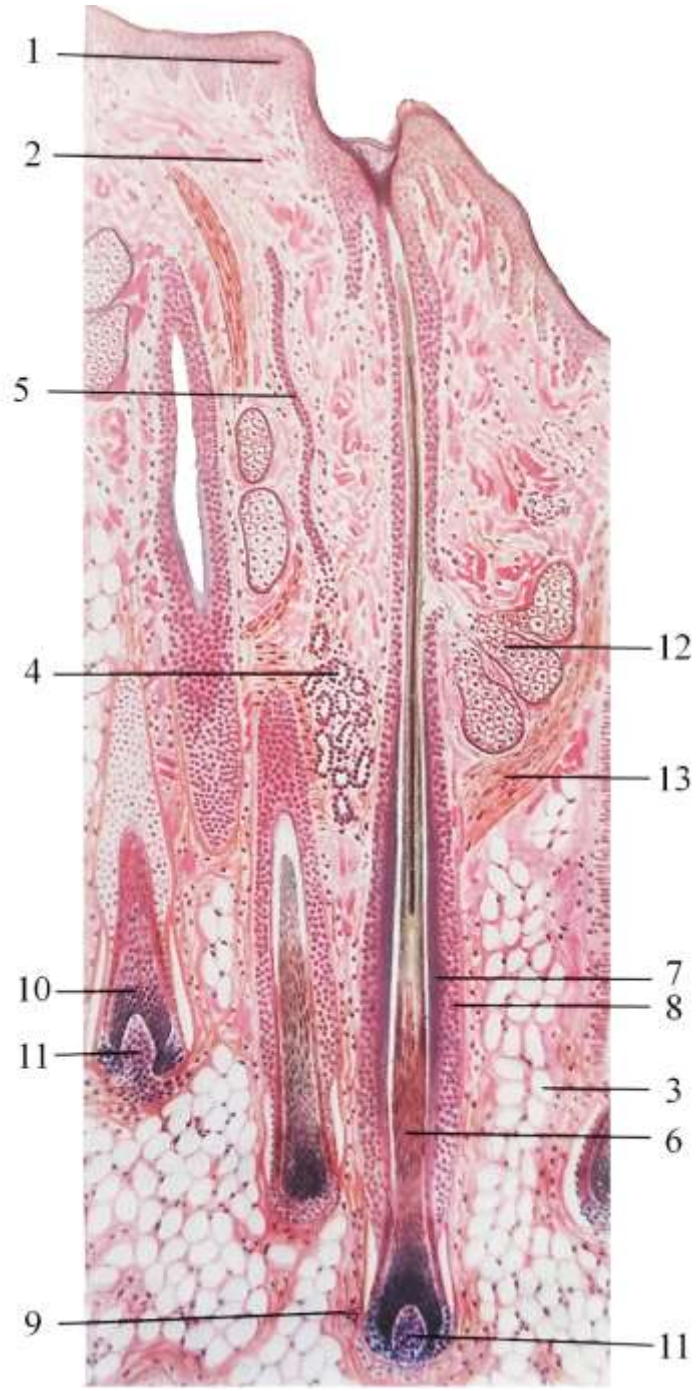
Figure № 1. Thick skin. H&E. ×58.



Designations:

1. Epidermis
   a) stratum corneum
   b) stratum lucidum
   c) stratum granulosum
   d) stratum spinosum
   e) stratum basale
   f) basement membrane
2. Dermis
   a) papillary layer
   b) reticular layer
   c) sweat gland duct
   d) sweat gland (secretory part)
3. Subcutaneous layer (hypodermis)
4. Lamellar corpuscle

Figure № 2. Thin skin with hair. H&E. ×100.

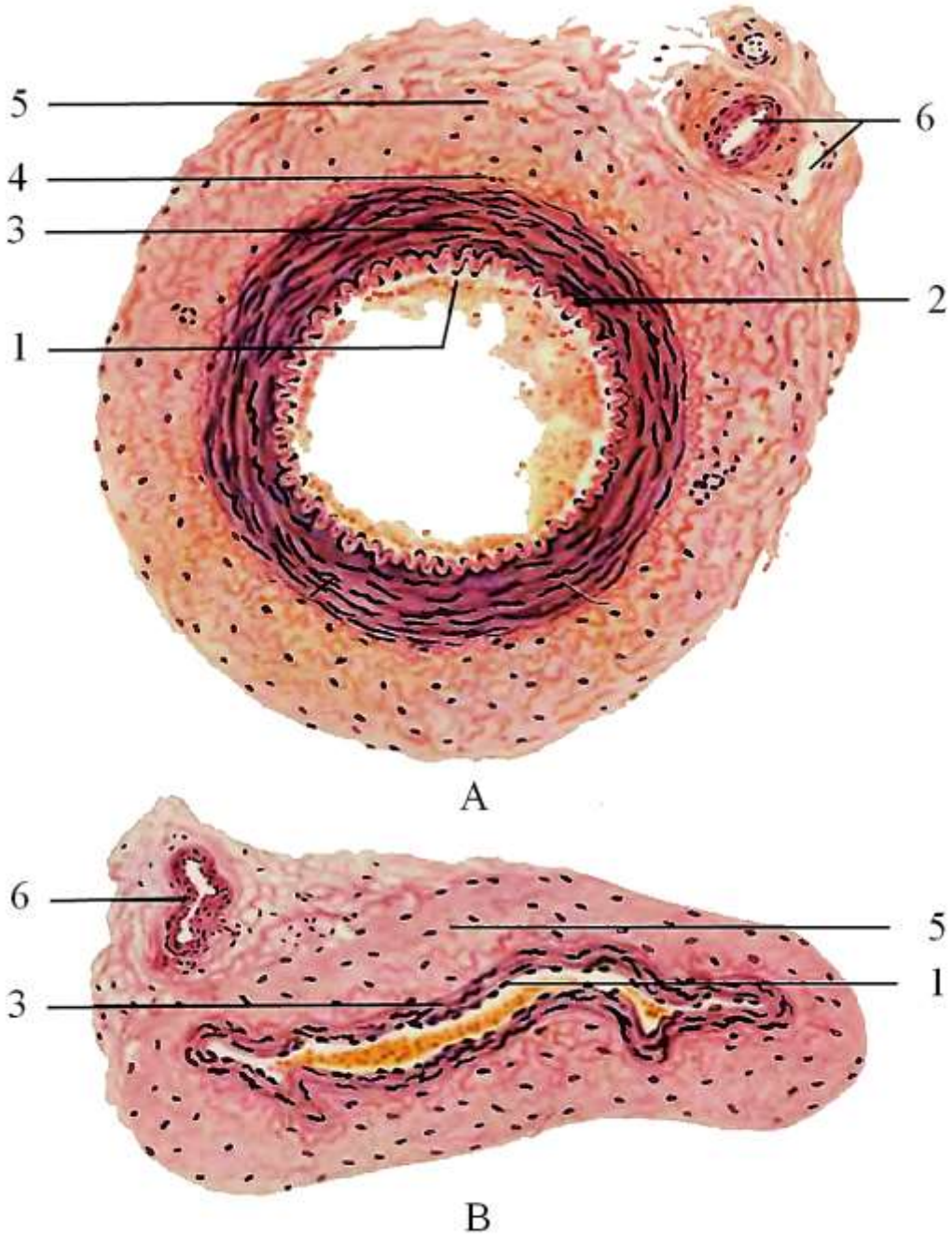


Designations:

1. Epidermis
2. Dermis
3. Subcutaneous layer (hypodermis)
4. Sweat gland (secretory part)
5. Sweat gland duct
6. Hair root
7. Internal root sheath
8. External root sheath
9. Connective tissue root sheath
10. Hair follicle
11. Hair papilla
12. Sebaceous gland
13. Arrector pili muscle

3.6. CARDIOVASCULAR SYSTEM

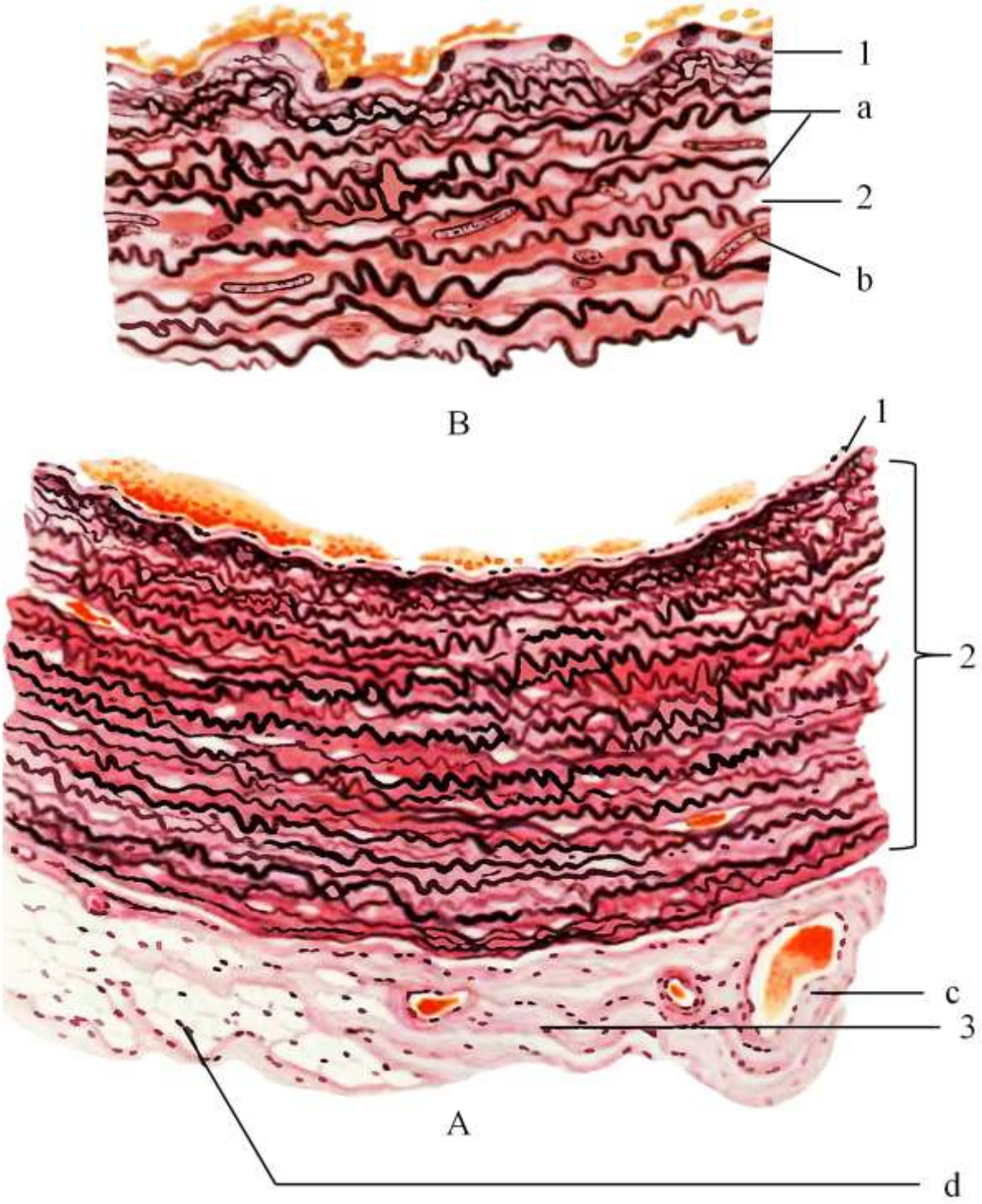
Figure № 1. Muscular artery (A) and vein (B). H&E. ×400.



Designations:

1. Tunica intima (inner layer)
2. Internal elastic lamina
3. Tunica media (middle layer)
4. External elastic lamina
5. Tunica adventitia (externa)
6. Vasa vasorum (“vessels of the vessel”)

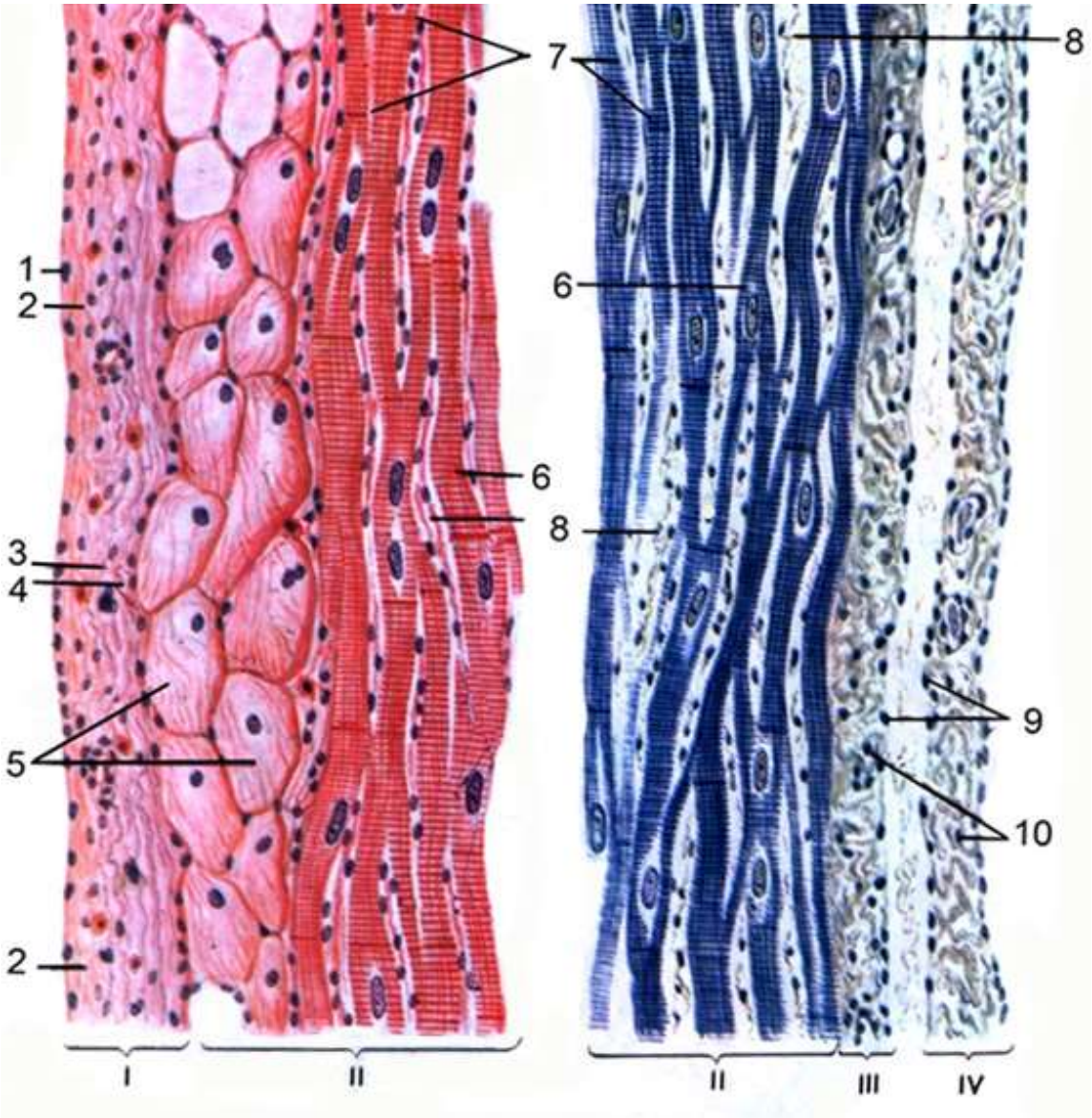
Figure № 2. Elastic artery, aorta. Resorcin-fucin. ×120 (A) and ×400 (B).



Designations:

1. Tunica intima (inner layer)
2. Tunica media (middle layer)
   a) elastic laminae
   b) smooth muscle cells
3. Tunica adventitia (externa)
   c) vasa vasorum (“vessels of the vessel”)
   d) adipose cells

Figure № 3. Cardiac muscle (striated), heart. H&E, Iron hematoxylin. ×400.



Designations:

I. Endocardium
   1. Endothelium
   2. Subendothelial layer
   3. Muscular-elastic layer
   4. Connective tissue

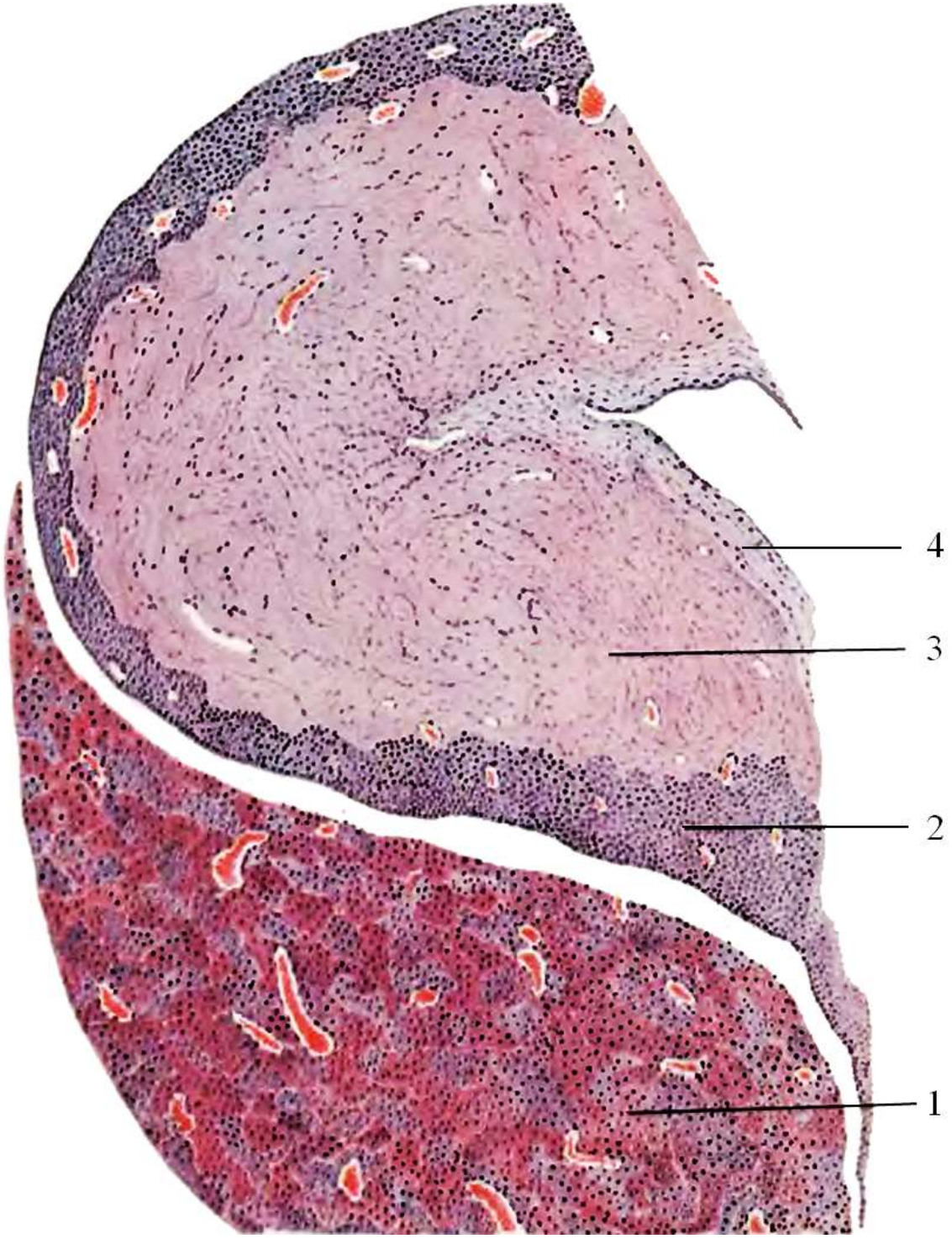
II. Myocardium
   5. Conducting (Purkinje) fibers
   6. Contractile cardiac muscle cells
   7. Intercalated discs
   8. Connective tissue with blood vessels and nerves

III. Epicardium

IV. Pericardium
   9. Mesothelium
   10. Lamina propria

3.7. ENDOCRINE SYSTEM

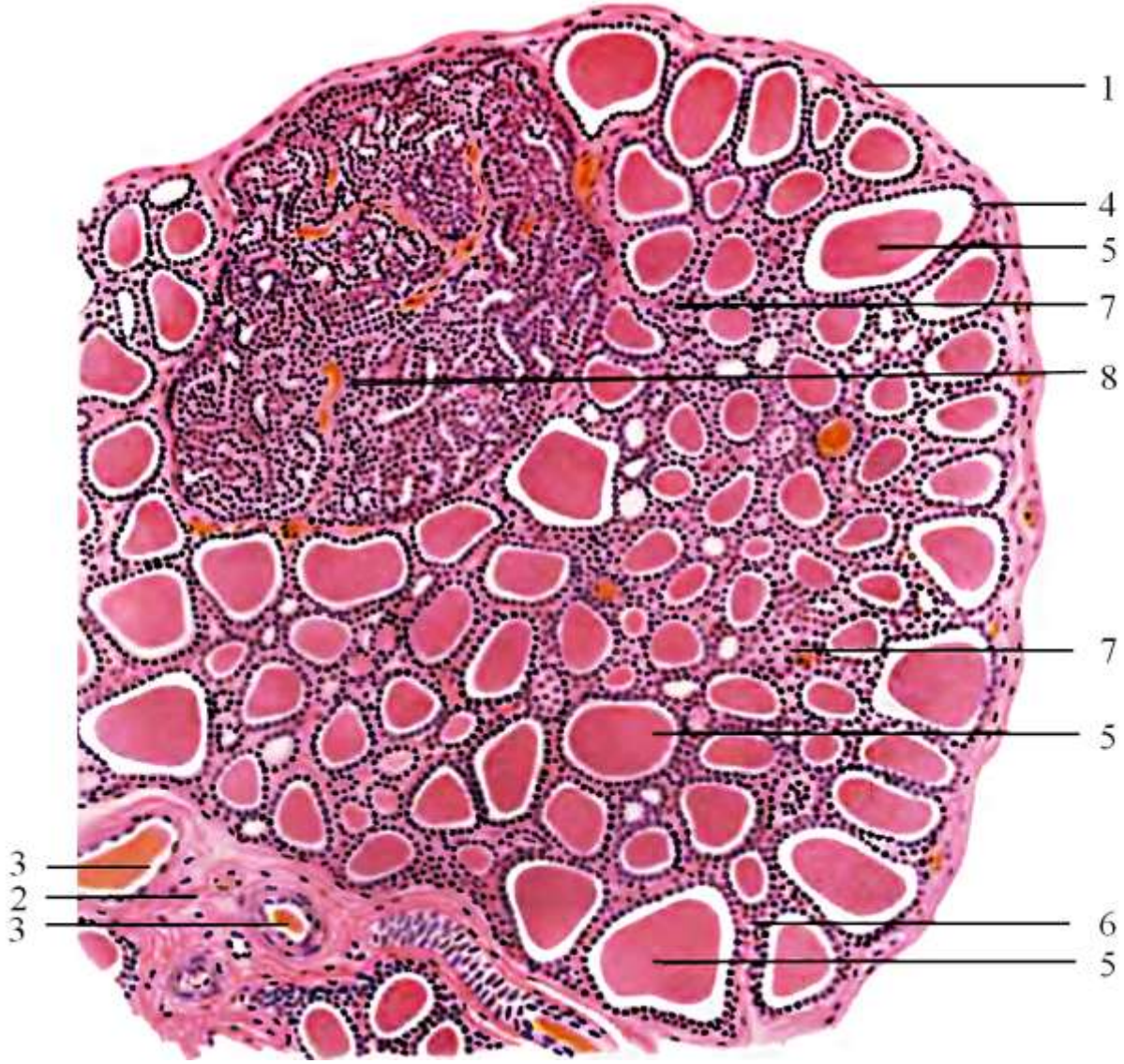
Figure № 1. Pituitary gland. H&E. ×56.



Designations:

1. Adenohypophysis (anterior lobe)
2. Pars intermedia
3. Neurohypophysis (posterior lobe)
4. Ependyma

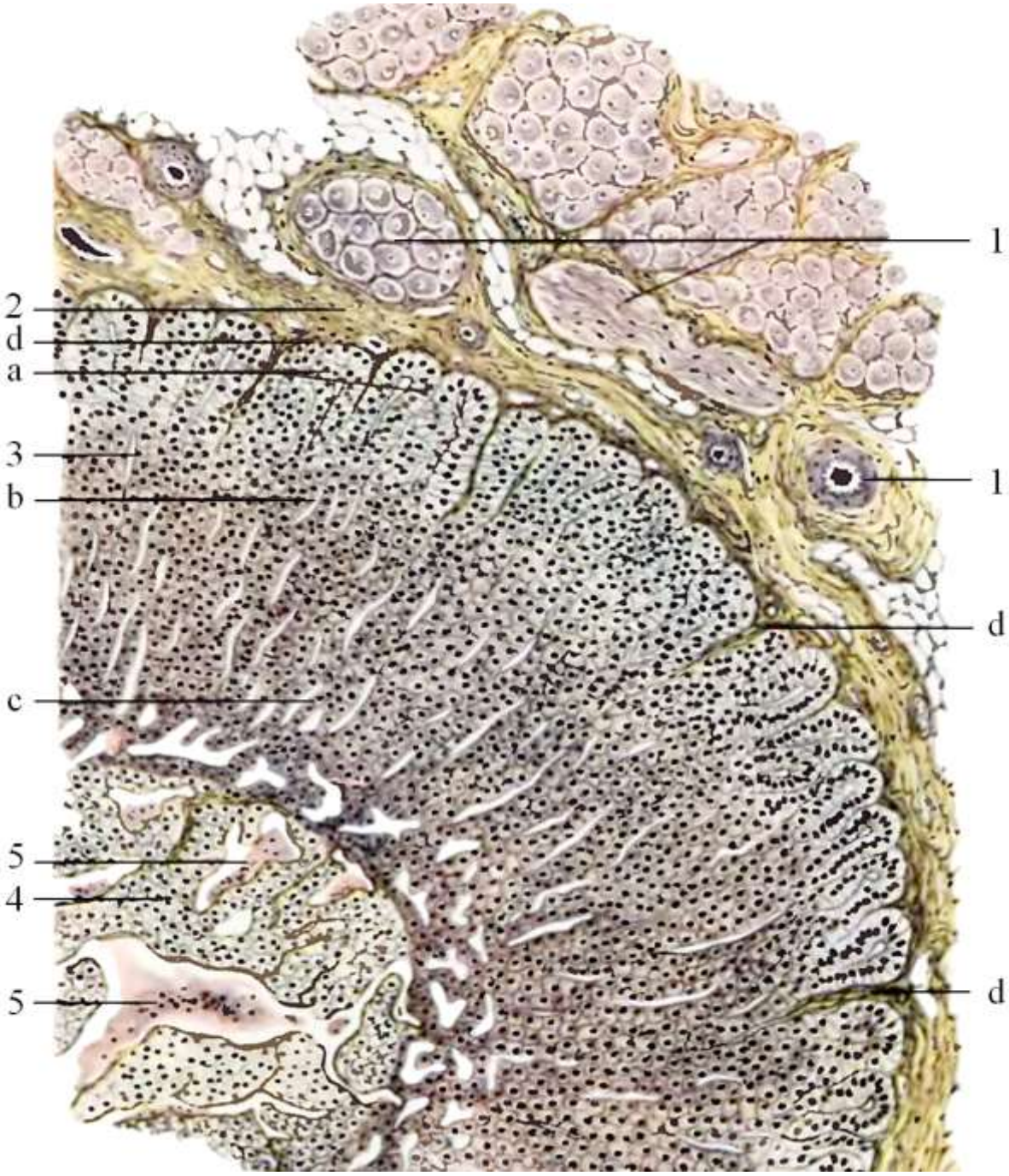
Figure № 2. Thyroid and parathyroid glands. H&E. ×56.



Designations:

1. Capsule
2. Septa
3. Blood vessels
4. Thyroid follicles
5. Colloid
6. Follicular cells (thyrocytes)
7. Parafollicular cells (C cells)
8. Parathyroid gland

Figure № 3. Adrenal gland. Hematoxylin. ×280.

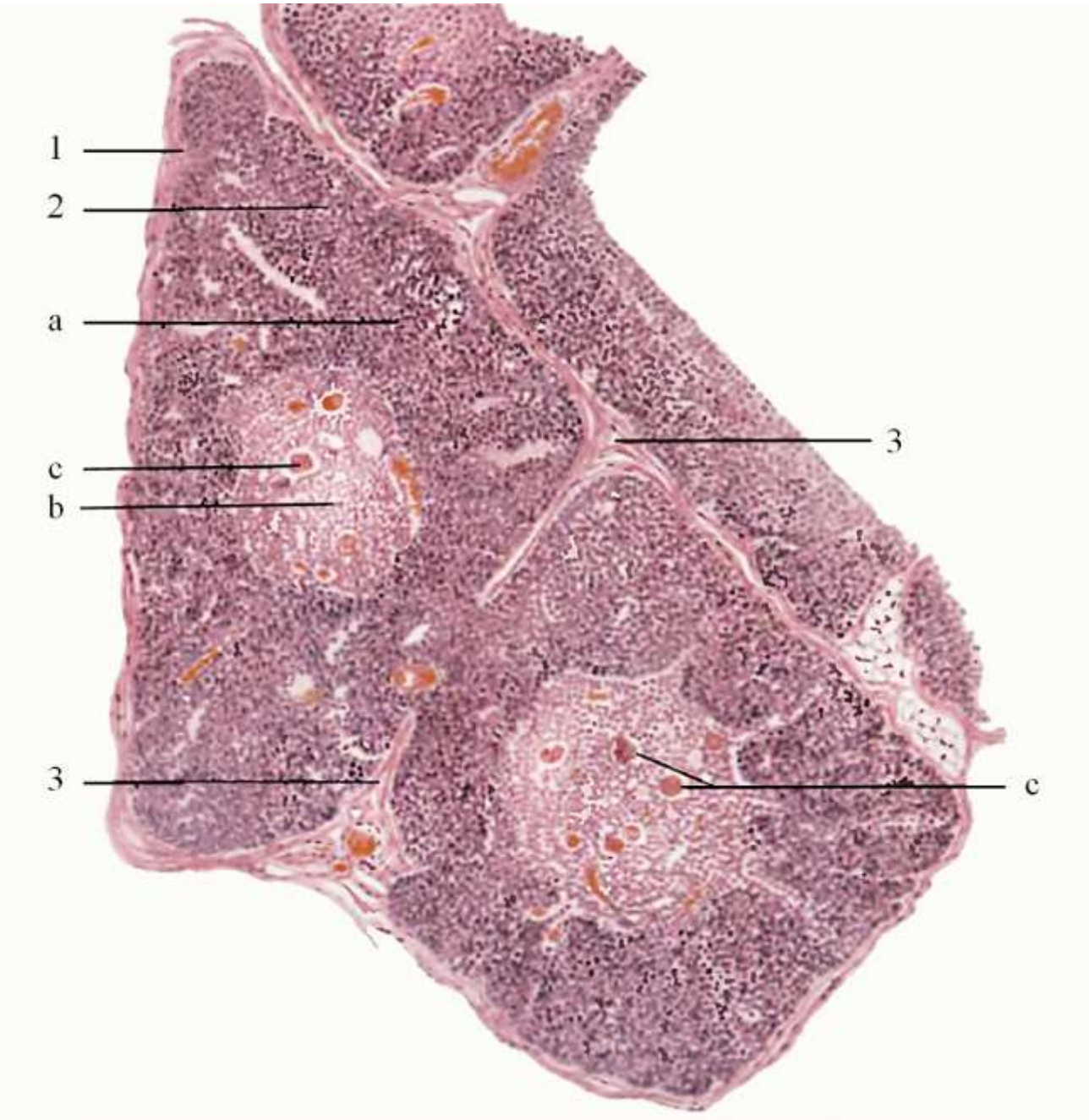


Designations:

1. Paraganglion, bundles of nerve fibers and blood vessels
2. Capsule
3. Adrenal cortex
   a) zona glomerulosa
   b) zona fasciculata
   c) zona reticularis
   d) connective tissue trabeculae
4. Adrenal medulla
5. Sinusoidal capillaries

3.8. IMMUNE ORGANS

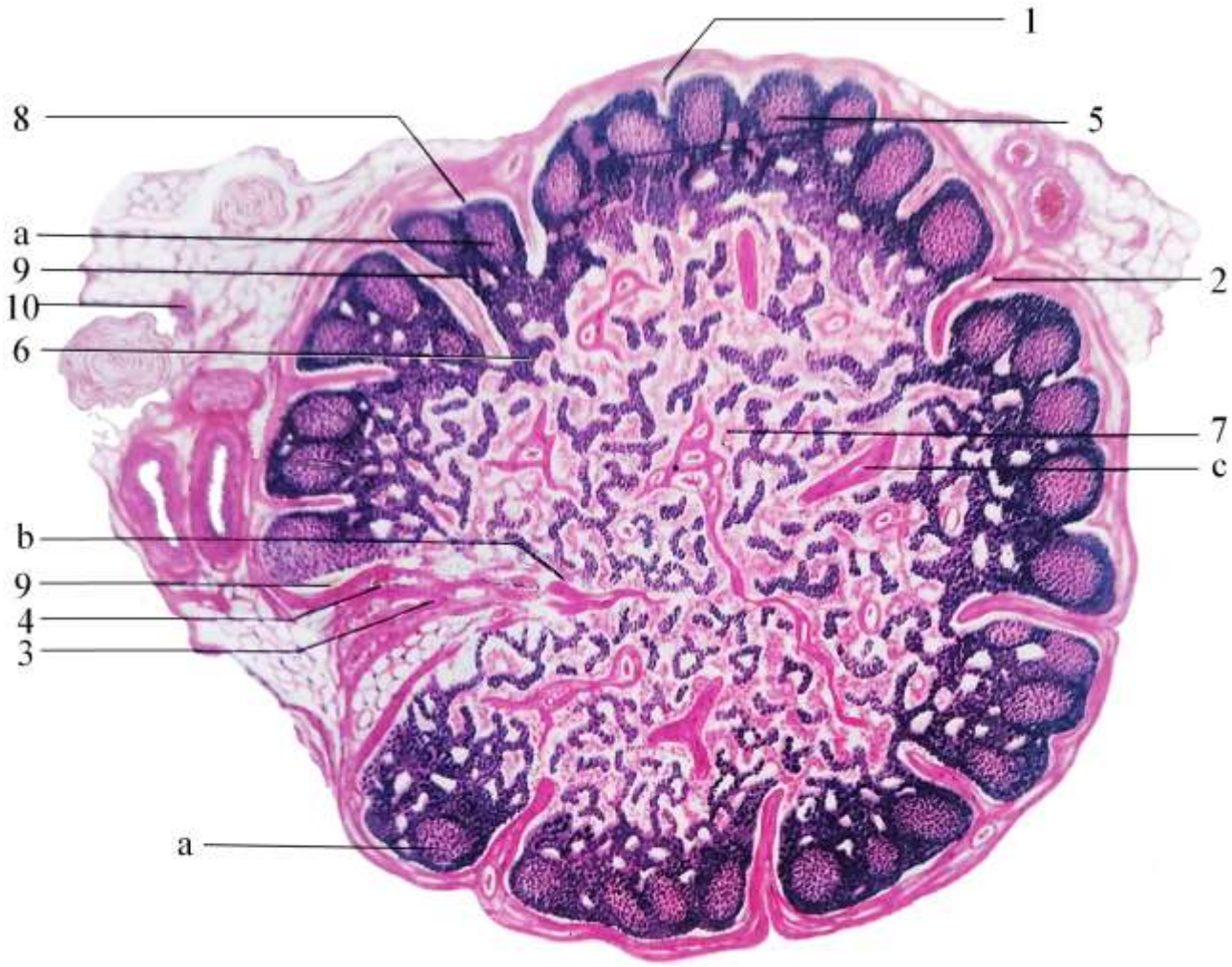
Figure № 1. Thymus. H&E. ×70.



Designations:

1. Capsule
2. Thymic lobule
   a) cortex
   b) medulla
   c) thymic (Hassall) corpuscles
3. Septa

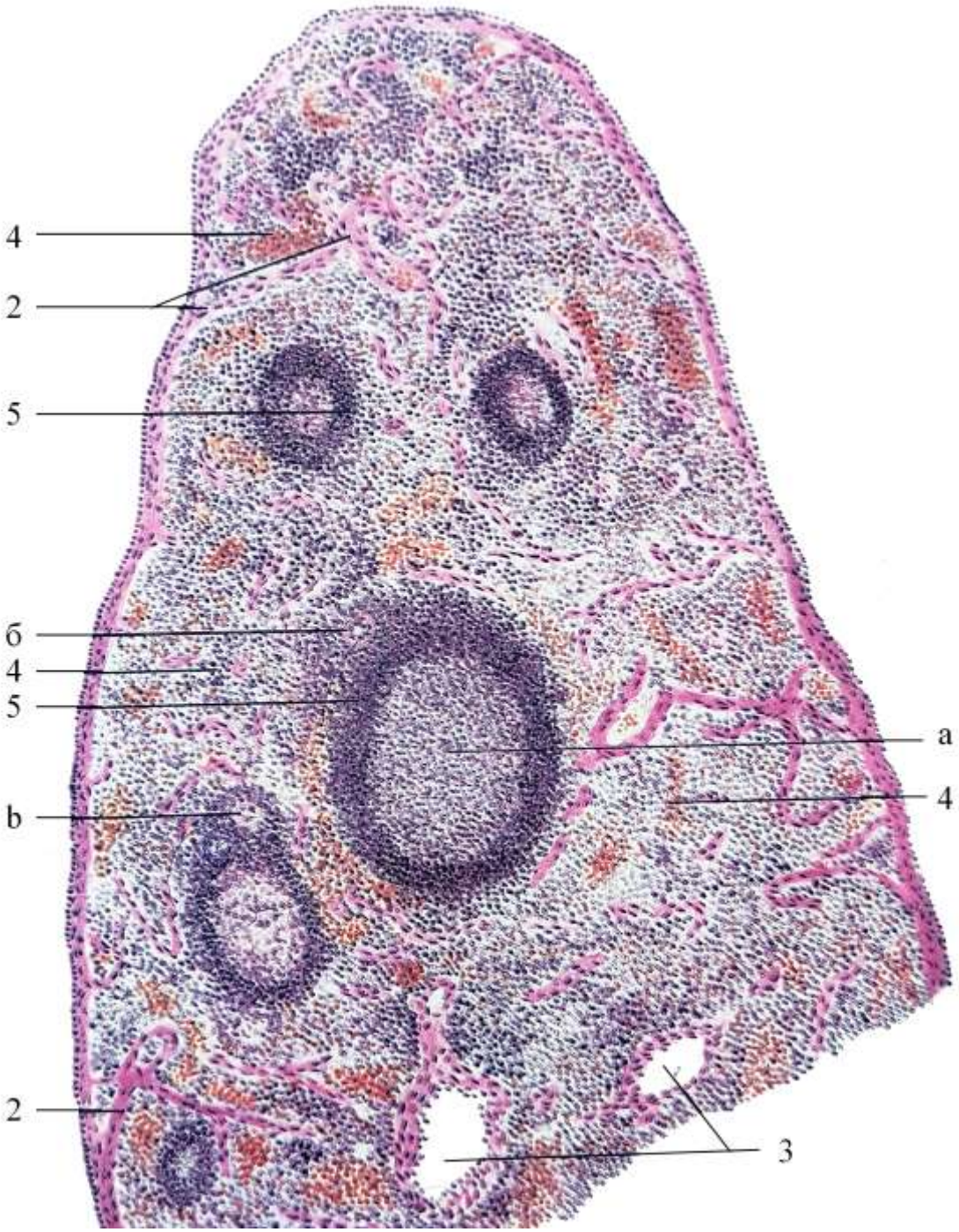
Figure № 2. Lymph node. H&E. ×100.



Designations:

1. Capsule
2. Trabeculae
3. Hilum
4. Blood vessels
5. Cortex
   a) lymphoid nodules (or follicles)
6. Paracortex
7. Medulla
   b) medullary cords
   c) trabeculae
8. Subcapsular sinus
9. Cortical (or trabecular) sinuses
10. Lamellar corpuscle, a bundle of nerve fibers and blood vessels

Figure № 3. Spleen. H&E. ×200.



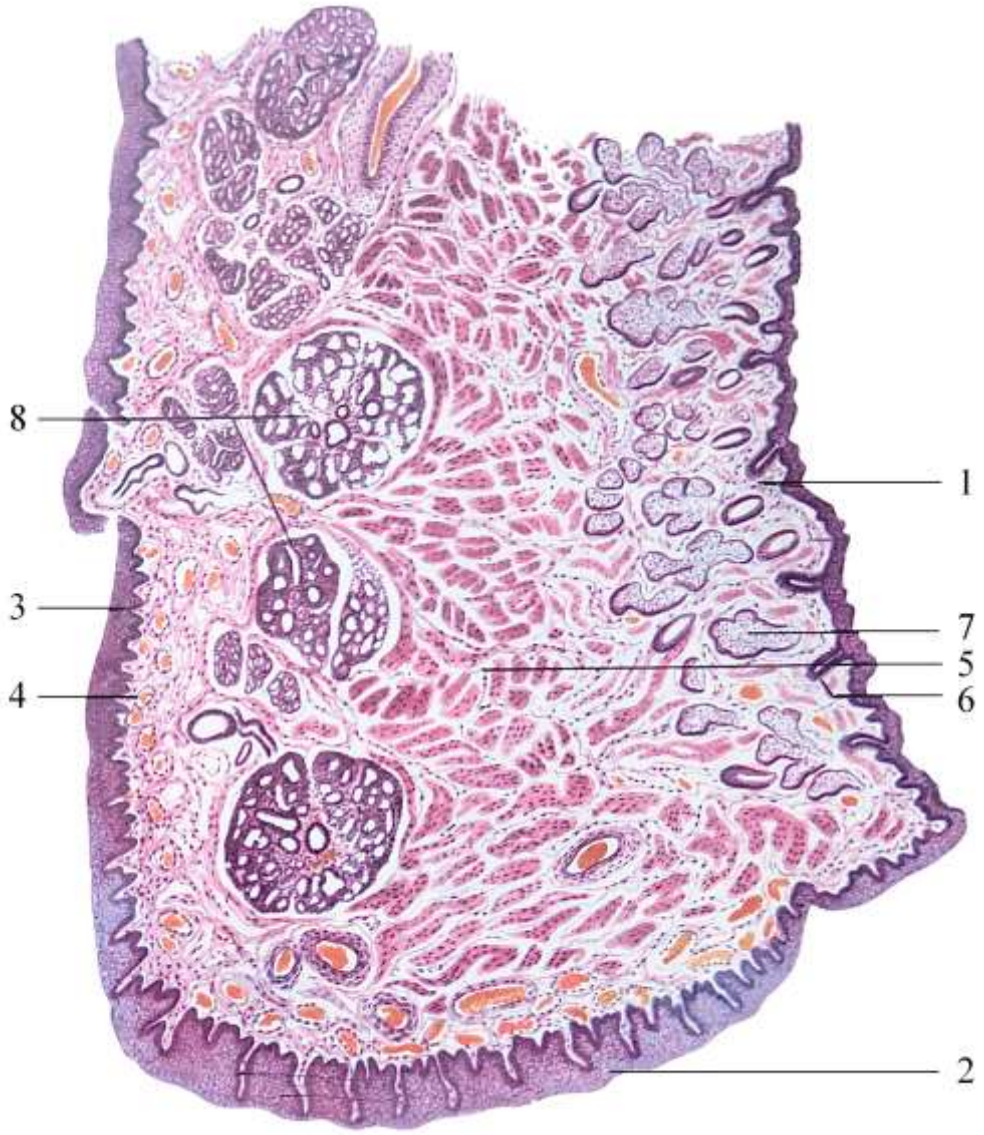
Designations:

1. Capsule
2. Trabeculae
3. Trabecular artery and vein
4. Red pulp
5. Lymphoid nodules (white pulp)
   a) germinal center
   b) central arteriole

3.9. DIGESTIVE SYSTEM

3.9.1. GENERAL STRUCTURE OF DIGESTIVE TUBE. ORGANS OF ORAL CAVITY. STRUCTURE OF THE LIP. TONGUE. TONSILS

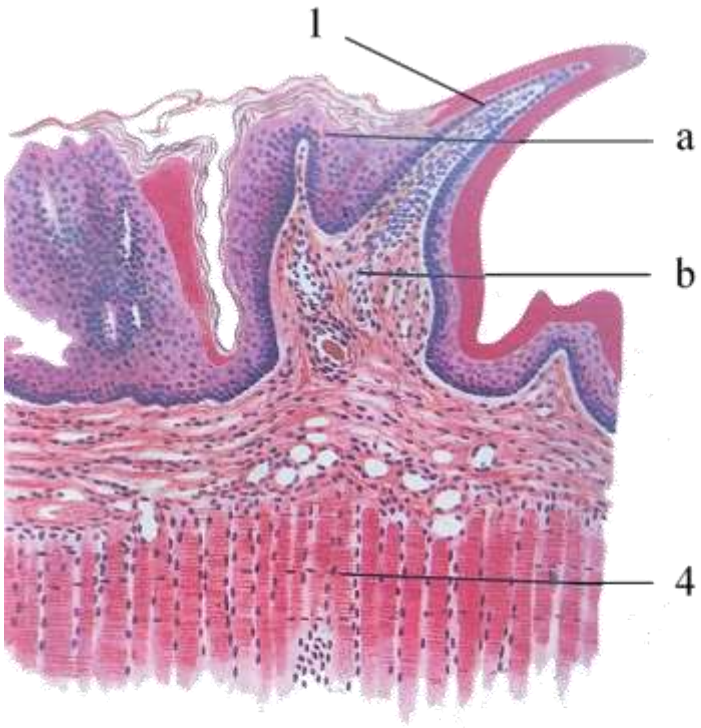
Figure № 1. Lip, sagittal section. H&E. ×56.



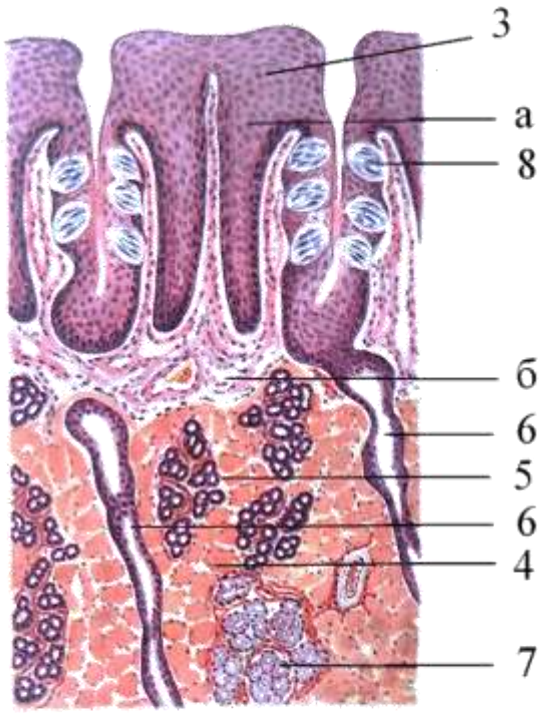
Designations:

1. External part (skin)
2. Vermilion border
3. Internal part (mucosa)
4. Lamina propria
5. Orbicularis oris muscle
6. Hair follicle
7. Sebaceous gland
8. Labial salivary glands

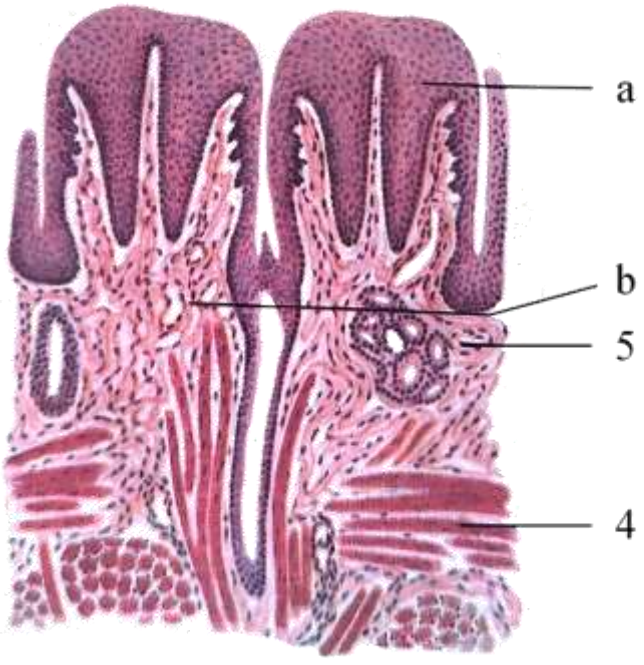
Figure № 2. Lingual papillae (filiform, fungiform and foliate). H&E. ×100.



1



3

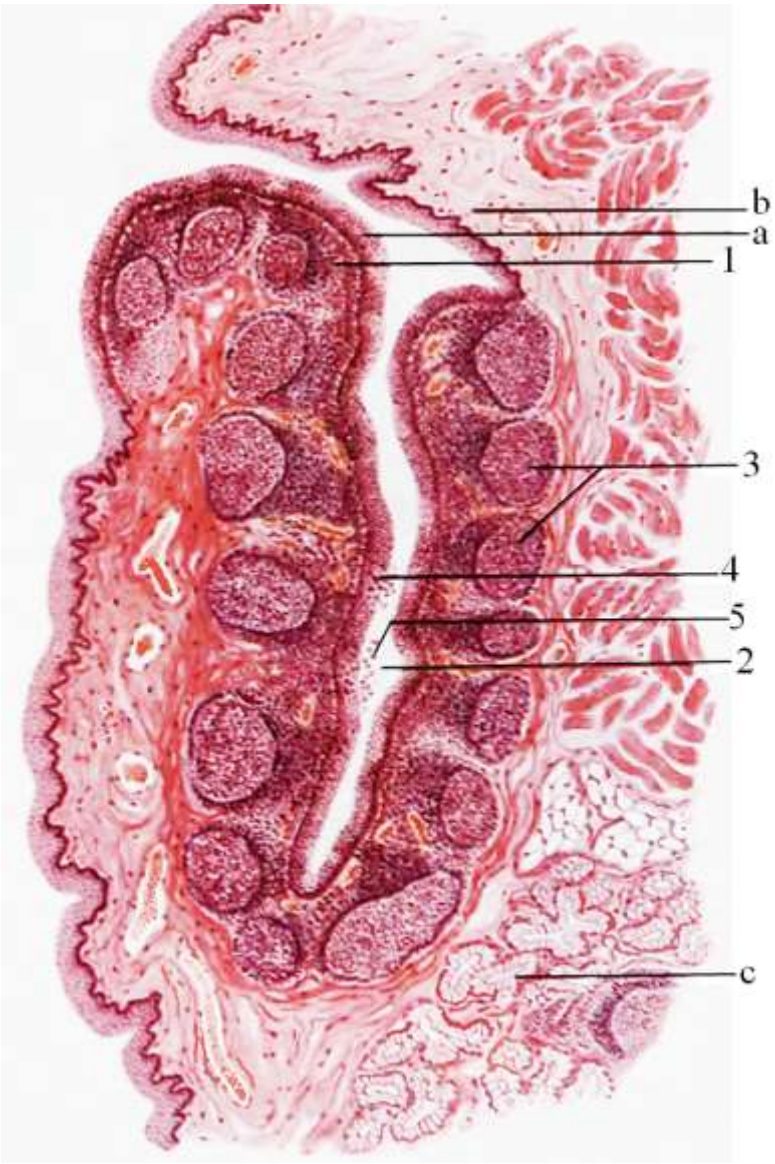


2

Designations:

1. Filiform papilla
2. Fungiform papilla
3. Foliate papilla
   a) stratified squamous epithelium
   b) lamina propria
4. Skeletal muscle fibers
5. Serous (von Ebner's) glands
6. Gland ducts
7. Mucous glands
8. Taste buds

Figure № 3. Palatine tonsil. H&E. ×56.

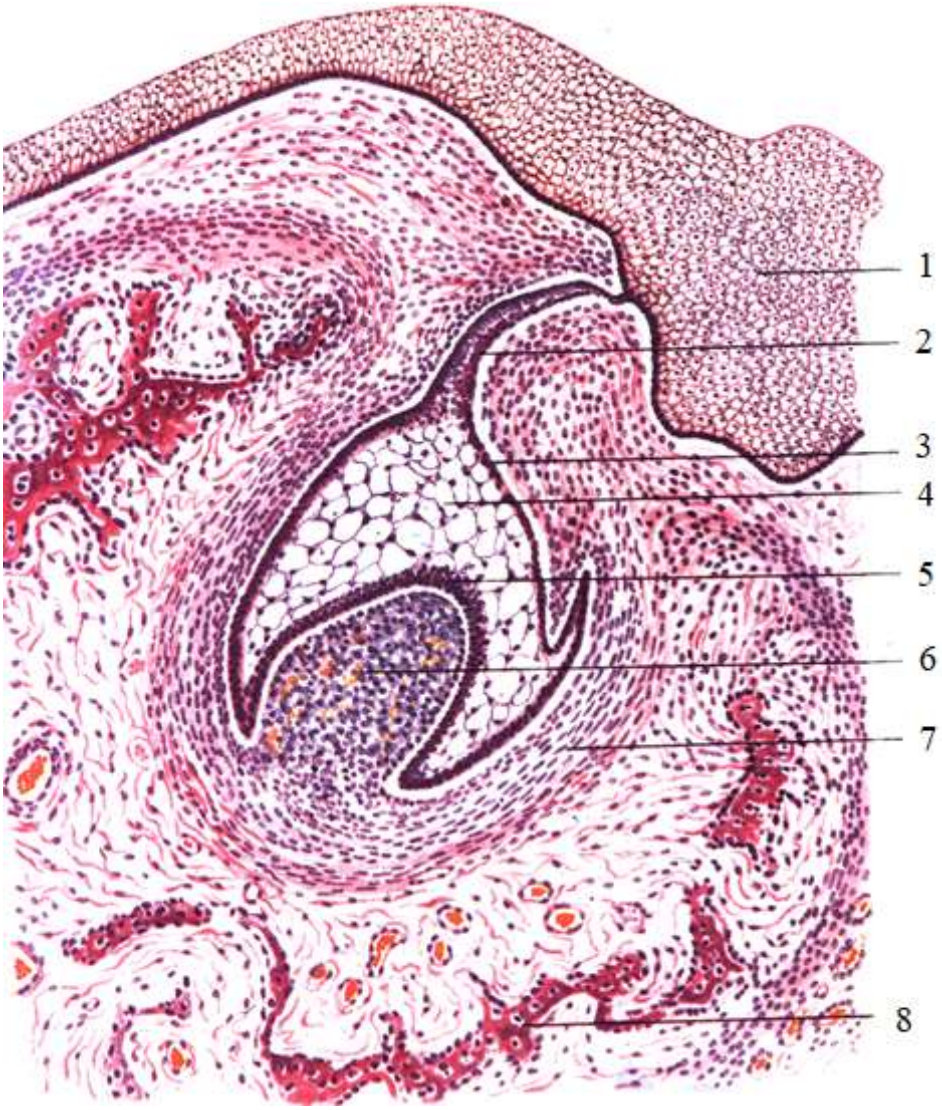


Designations:

1. Mucosa
   a) stratified squamous epithelium
   b) lamina propria
   c) mucous glands
2. Crypt
3. Lymphoid follicles
4. Diffuse lymphoid infiltration
5. Leukocytes on the surface of the epithelium

3.9.2. TEETH. STRUCTURE AND DEVELOPMENT OF TEETH. LARGE SALIVARY GLANDS

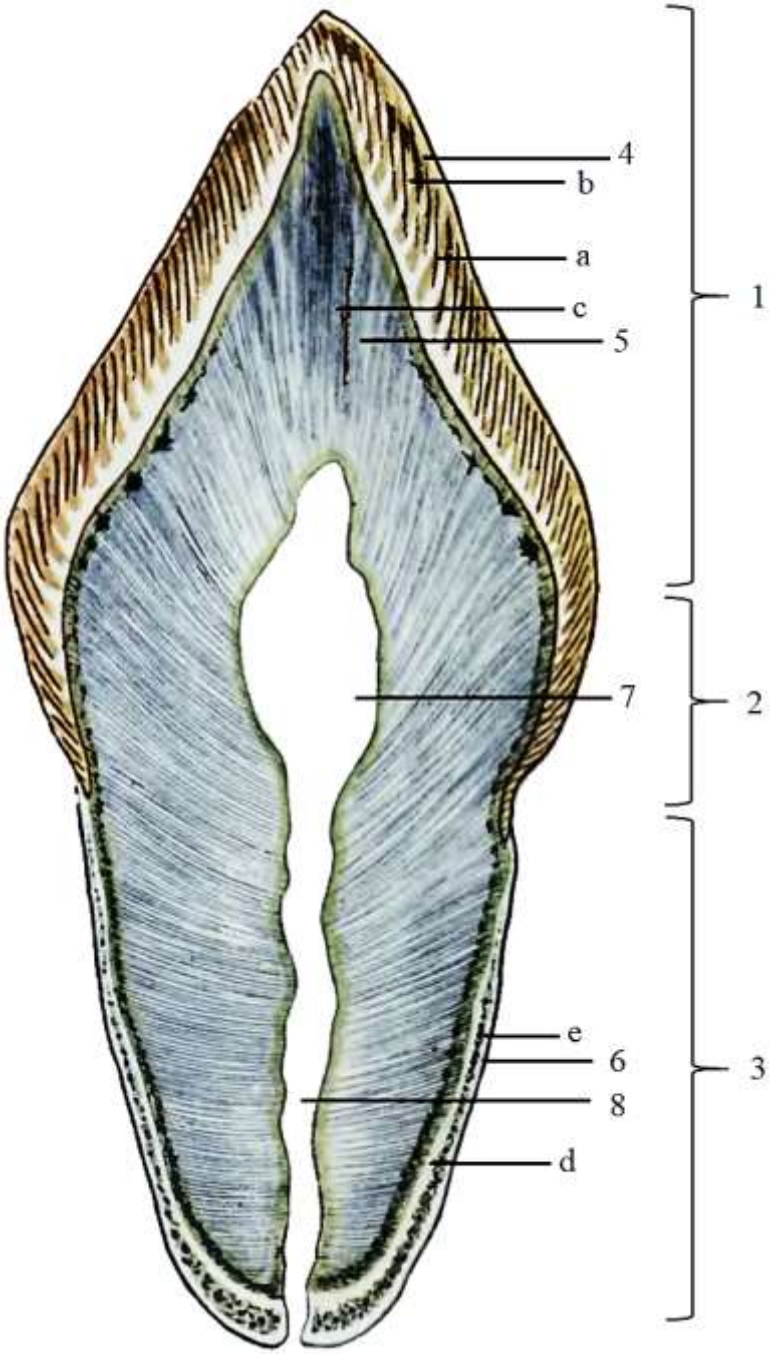
Figure № 1. Tooth development, enamel organ. H&E. ×200.



Designations:

1. Oral epithelium
2. Dental lamina
3. External enamel epithelium
4. Stellate reticulum
5. Internal enamel epithelium
6. Dental papilla
7. Dental sac
8. Bone trabecules

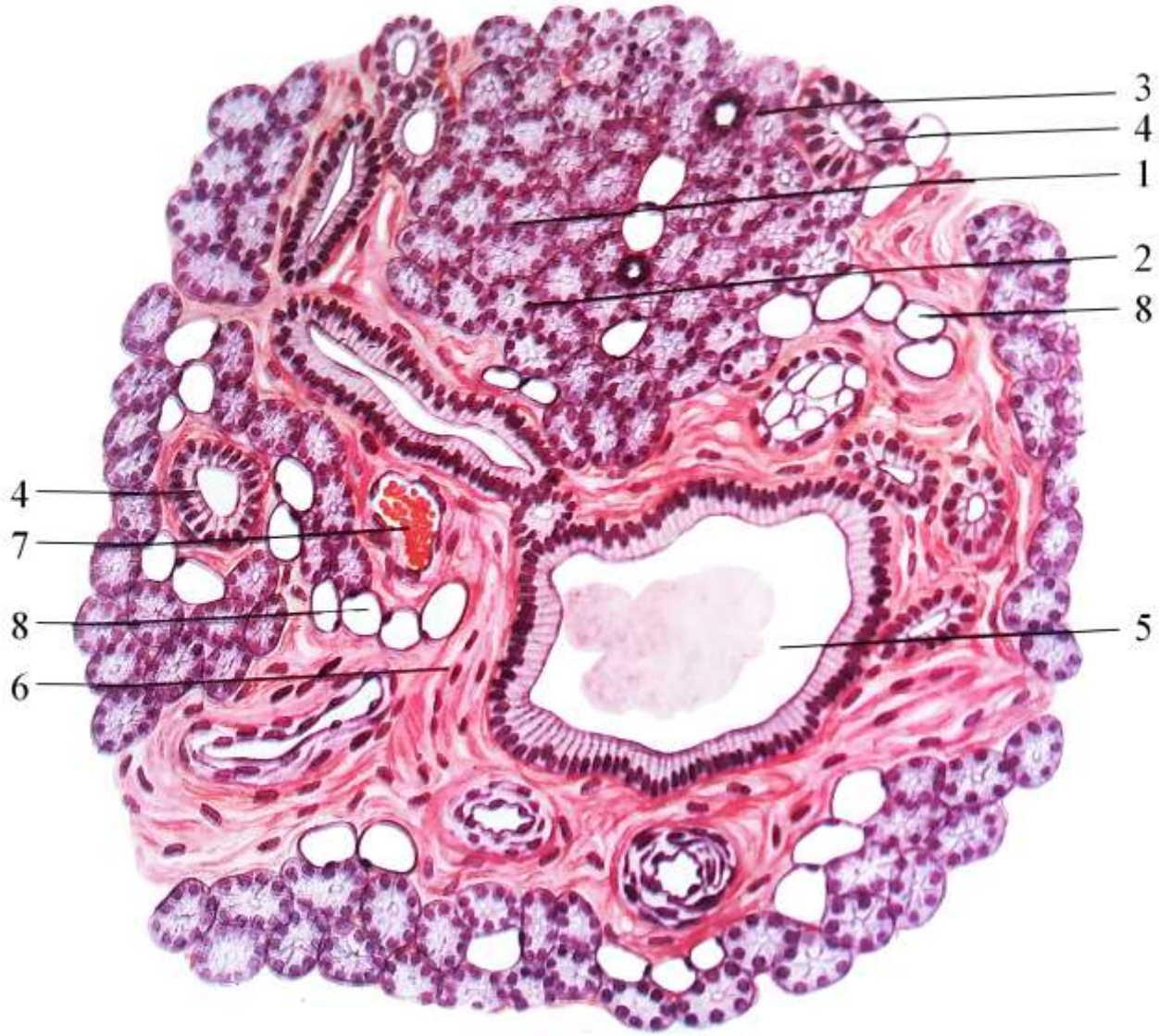
Figure № 2. Permanent tooth, incisor. Thin tooth preparation by grinding. ×5.



Designations:

1. Crown
2. Neck
3. Root
4. Enamel
   a) lines of Retzius
   b) lines of Schreger
5. Dentin
   c) dentine tubules
6. Cementum
   d) cellular
   e) noncellular
7. Pulp cavity
8. Root canal

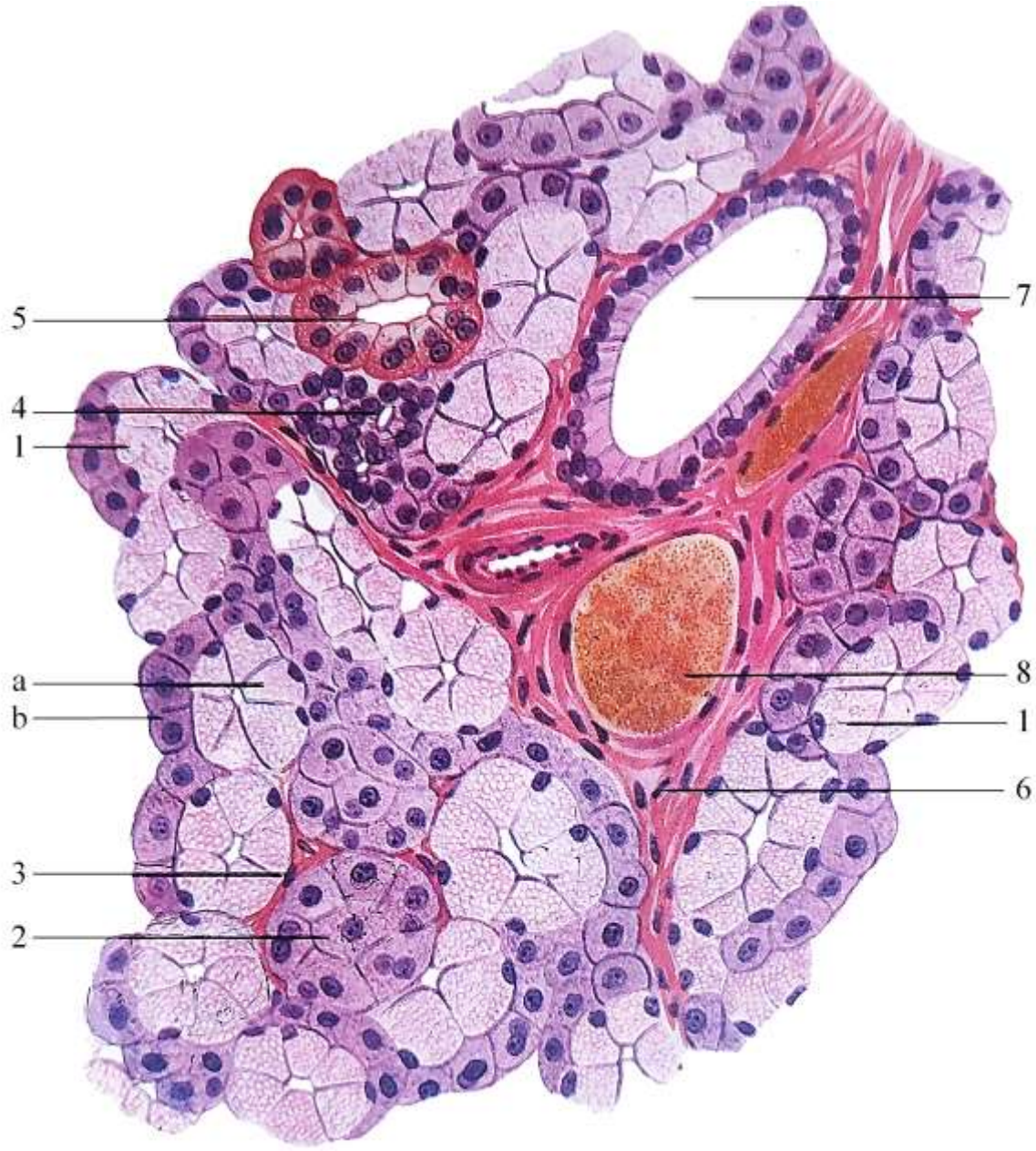
Figure № 3. Parotid gland. H&E. ×200.



Designations:

1. Gland lobule
2. Serous acinus
3. Intercalated duct
4. Striated duct
5. Interlobular duct
6. Connective tissue septa
7. Blood vessel
8. Adipose cells

Figure № 4. Submandibular gland. H&E. ×600.

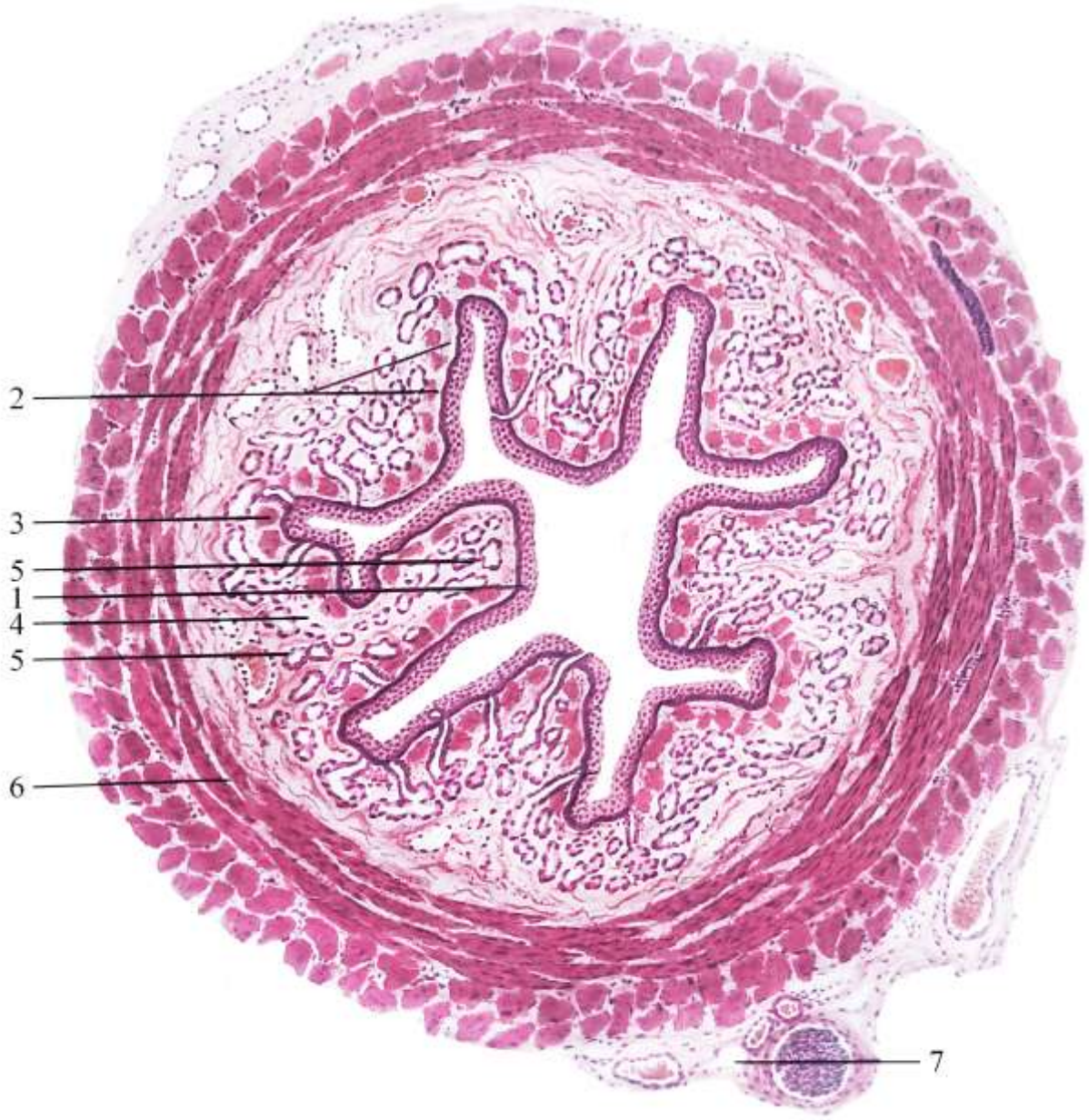


Designations:

1. Mixed acinus
   a) mucous tubule
   b) serous demilune of Gianuzzi
2. Serous acinus
3. Myoepithelial cell
4. Intercalated duct
5. Striated duct
6. Connective tissue septa
7. Interlobular duct
8. Blood vessel

3.9.3. PHARYNX, ESOPHAGUS, STOMACH. GASTRIC GLANDS. HISTOPHYSIOLOGY OF DIGESTION

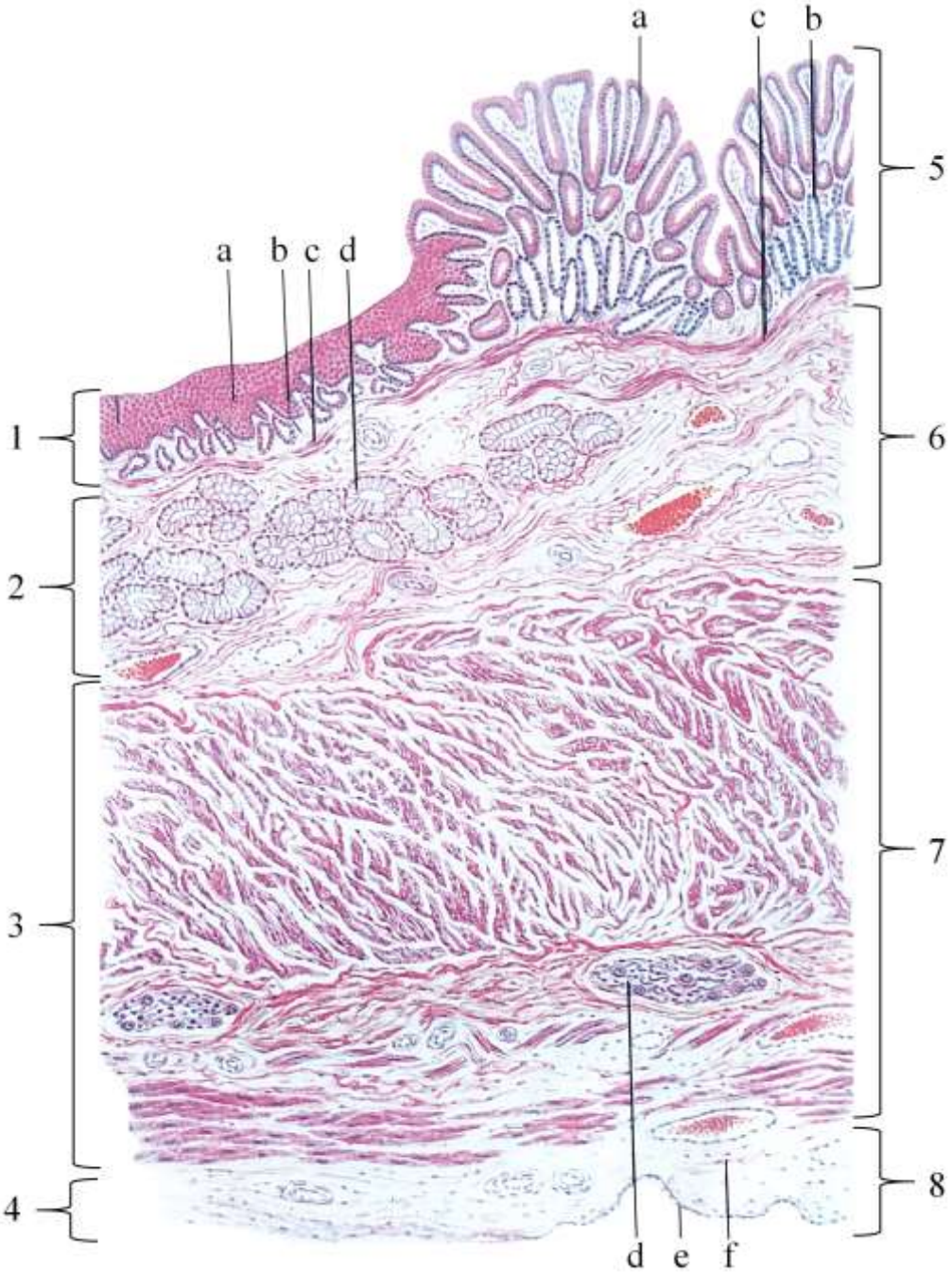
Figure № 1. Esophagus. H&E. ×56.



Designations:

1. Stratified squamous nonkeratinized epithelium
2. Lamina propria mucosae
3. Muscularis mucosae
4. Submucosa
5. Esophageal glands proper
6. Tunica muscularis
7. Tunica adventitia

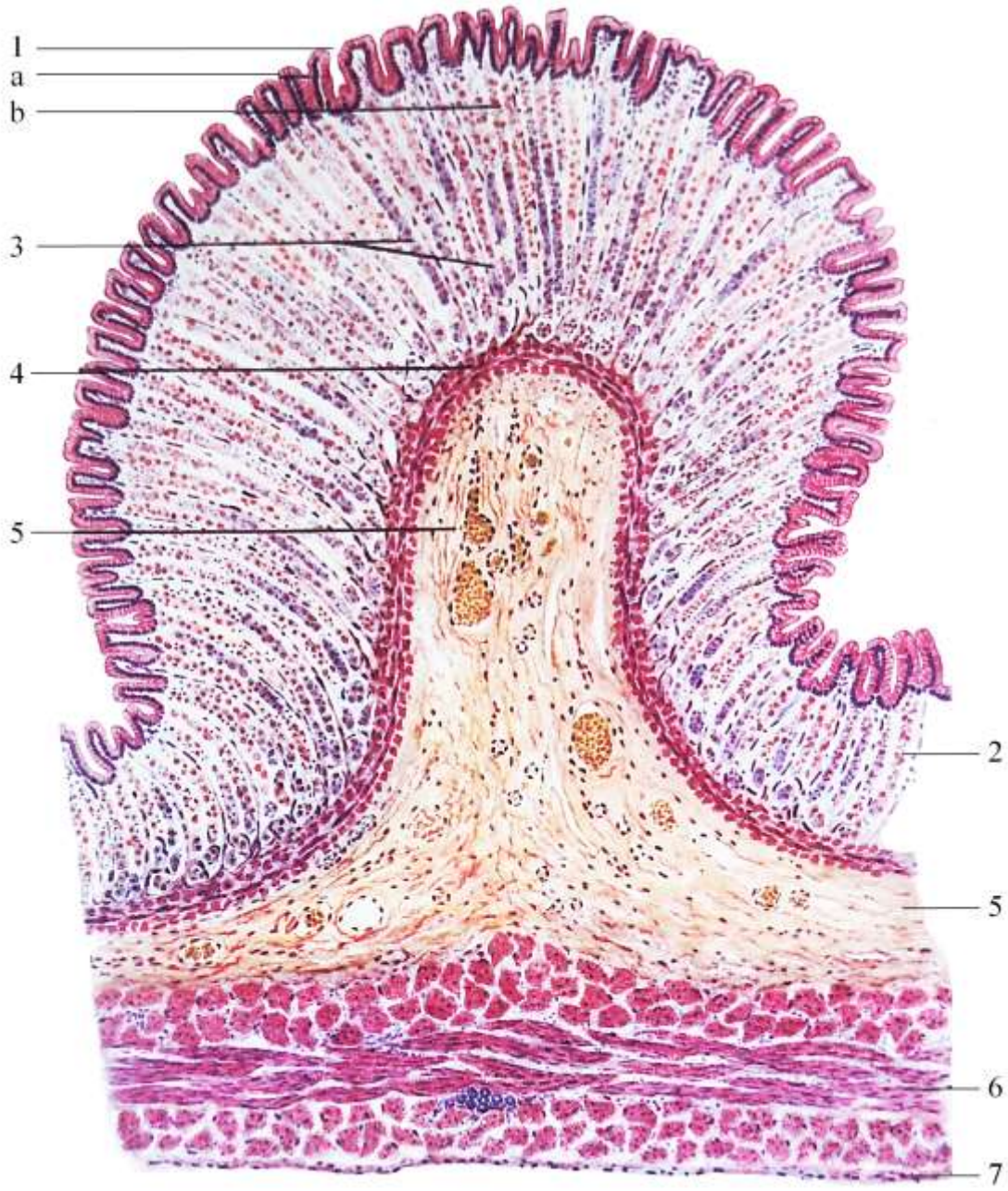
Figure № 2. Gastroesophageal junction. H&E. ×56.



Designations:

1. Tunica mucosa
   a) stratified squamous nonkeratinized epithelium
   b) lamina propria mucosae
   c) muscularis mucosae
2. Submucosa
   d) esophageal glands
3. Tunica muscularis
4. Serosa
5. Cardiac part of stomach mucosa
   a) simple columnar epithelium
   b) cardiac glands
   c) muscularis mucosae
6. Submucosa
7. Tunica muscularis of stomach
   d) myenteric (Auerbach) nerve plexus
8. Serosa
   e) mesothelium
   f) connective tissue

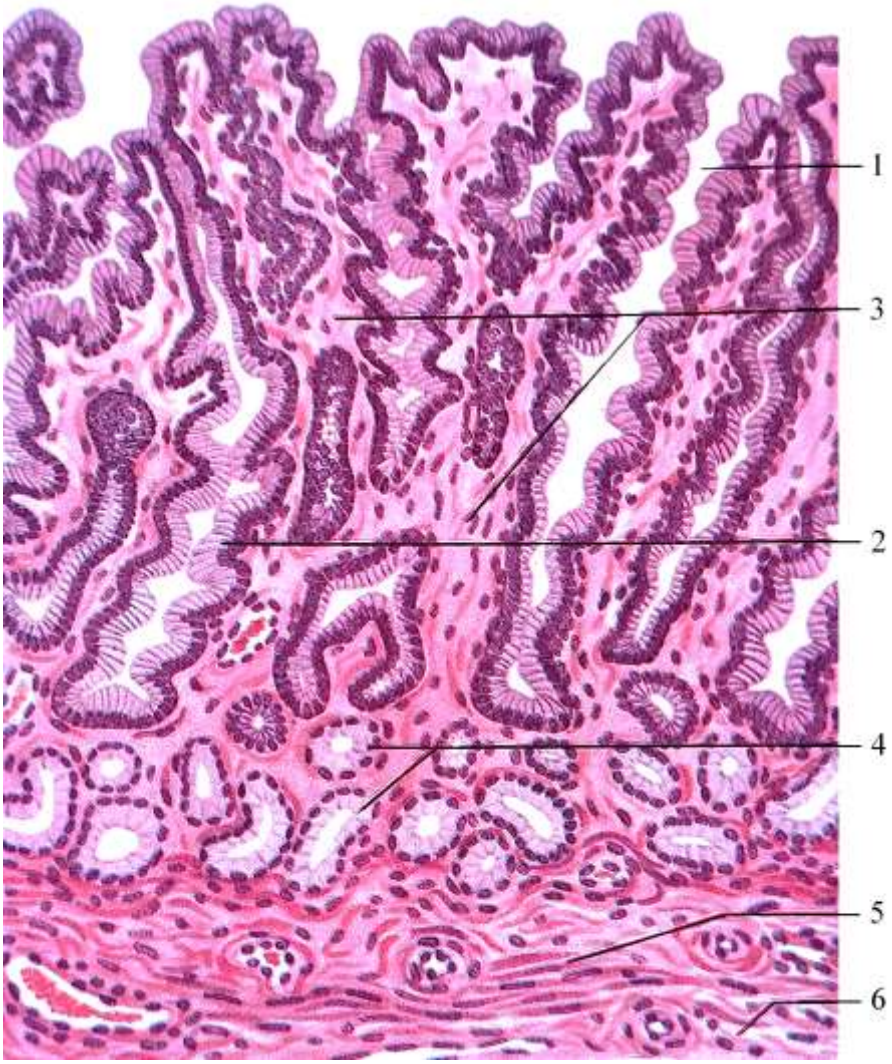
Figure № 3. Stomach, fundic part. H&E. ×56.



Designations:

1. Gastric pit
2. Tunica mucosa
   a) simple columnar epithelium
   b) lamina propria mucosae
3. Gastric glands
4. Muscularis mucosae
5. Submucosa
6. Tunica muscularis
7. Serosa

Figure № 4. Stomach, mucosa of pyloric part. H&E. ×400.

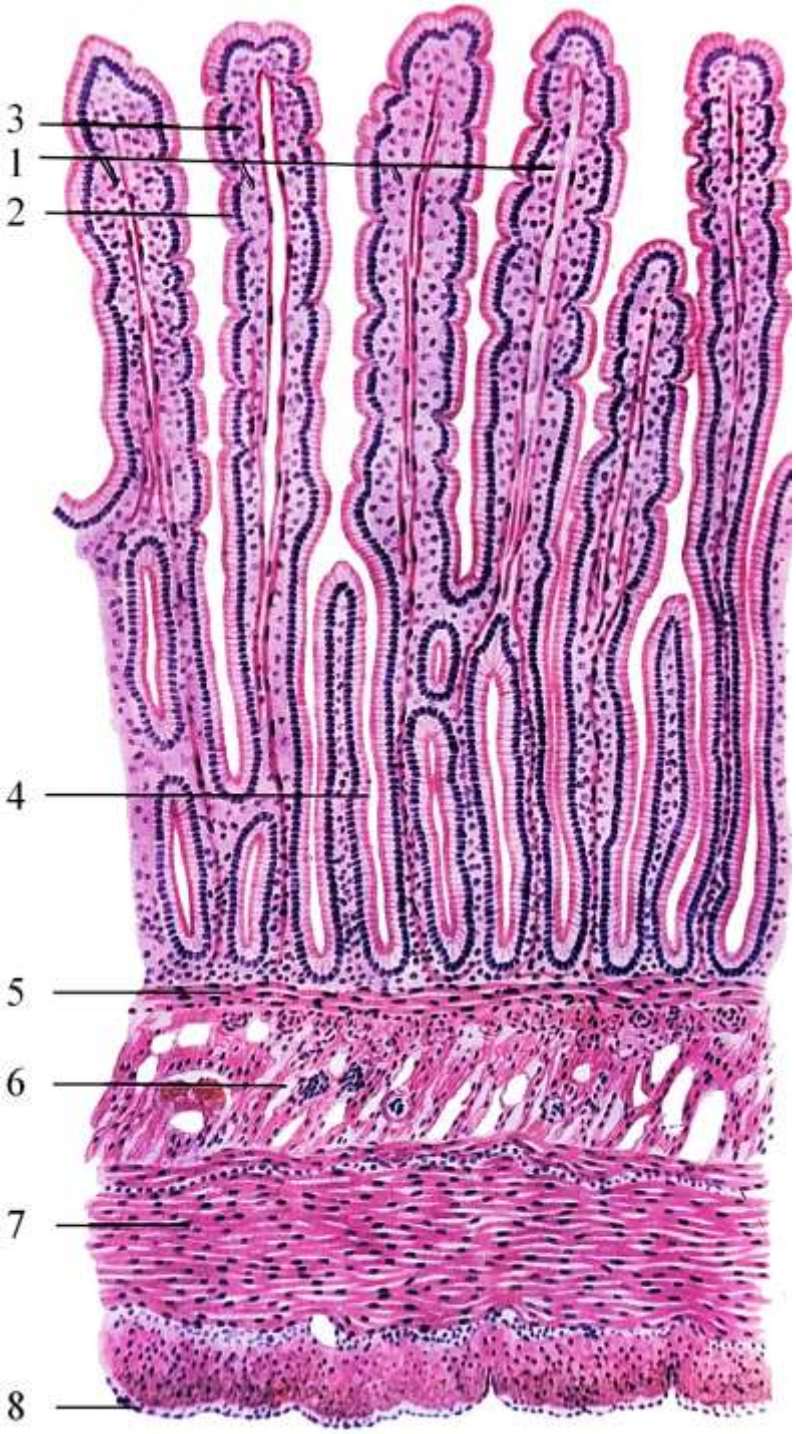


Designations:

1. Gastric pit
2. Simple columnar epithelium
3. Lamina propria mucosae
4. Pyloric glands
5. Muscularis mucosae
6. Submucosa

3.9.4. GENERAL STRUCTURE OF INTESTINE. MORPHOLOGICAL DIFFERENCES OF THE WALL' STRUCTURE OF SMALL AND LARGE INTESTINE

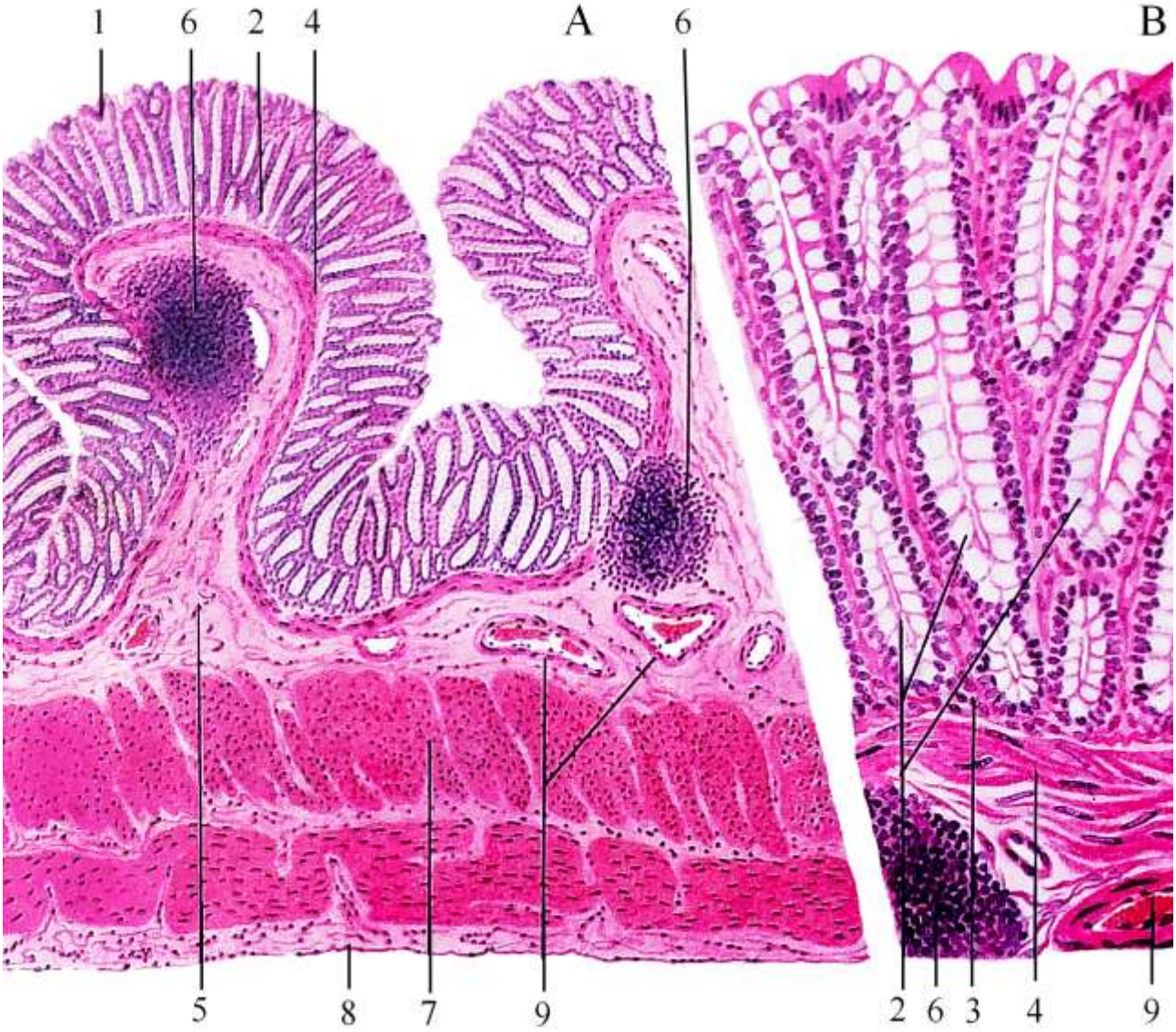
Figure № 1. Small intestine. H&E. ×56.



Designations:

1. Intestinal villus
2. Simple columnar epithelium
3. Lamina propria mucosae
4. Intestinal gland (crypt of Lieberkühn)
5. Muscularis mucosae
6. Submucosa
7. Tunica muscularis (inner circular and outer longitudinal layers)
8. Serosa

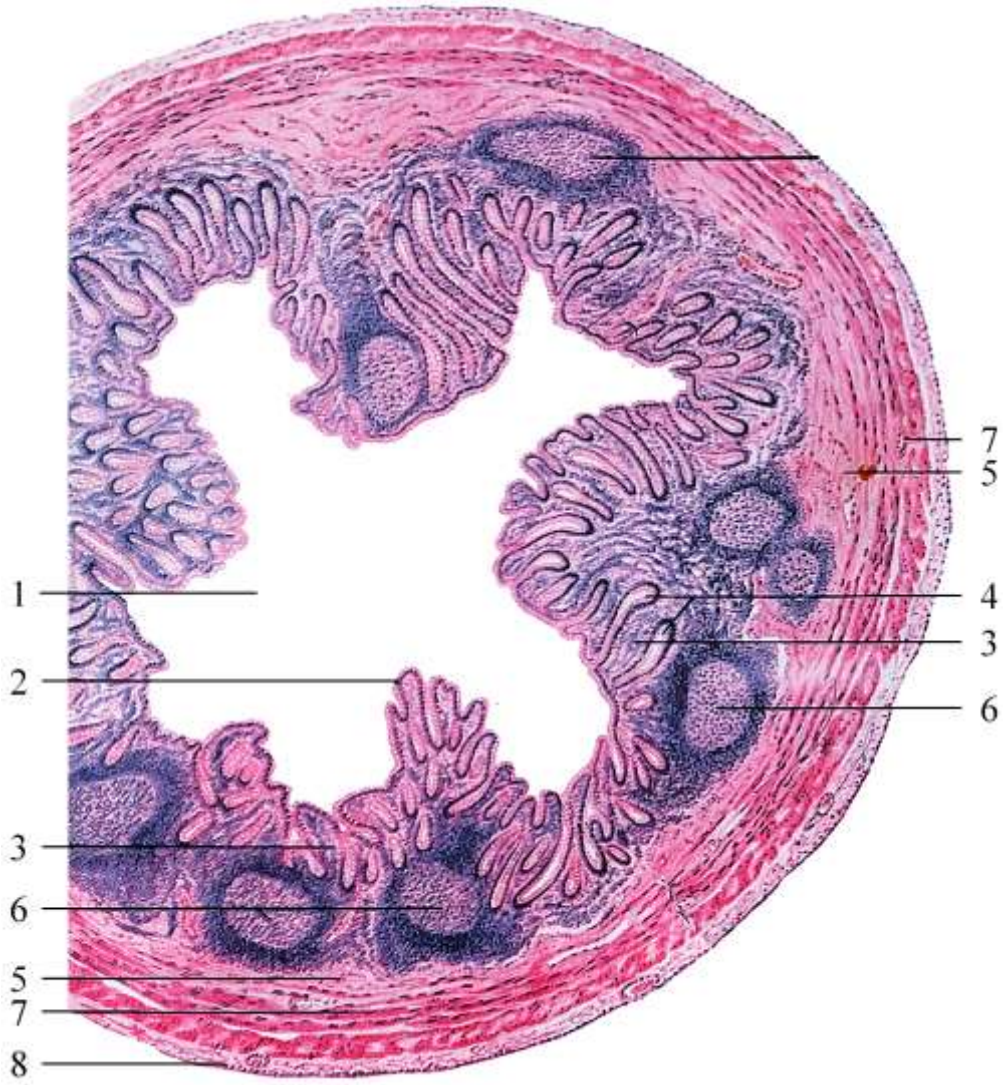
Figure №2. Large intestine. H&E. A ×56; B × 400.



Designations:

1. Simple columnar epithelium
2. Intestinal glands
3. Lamina propria mucosae
4. Muscularis mucosae
5. Submucosa
6. Lymphatic nodules
7. Tunica muscularis
8. Serosa
9. Blood vessels

Figure № 3. Vermiform appendix. H&E. × 56.

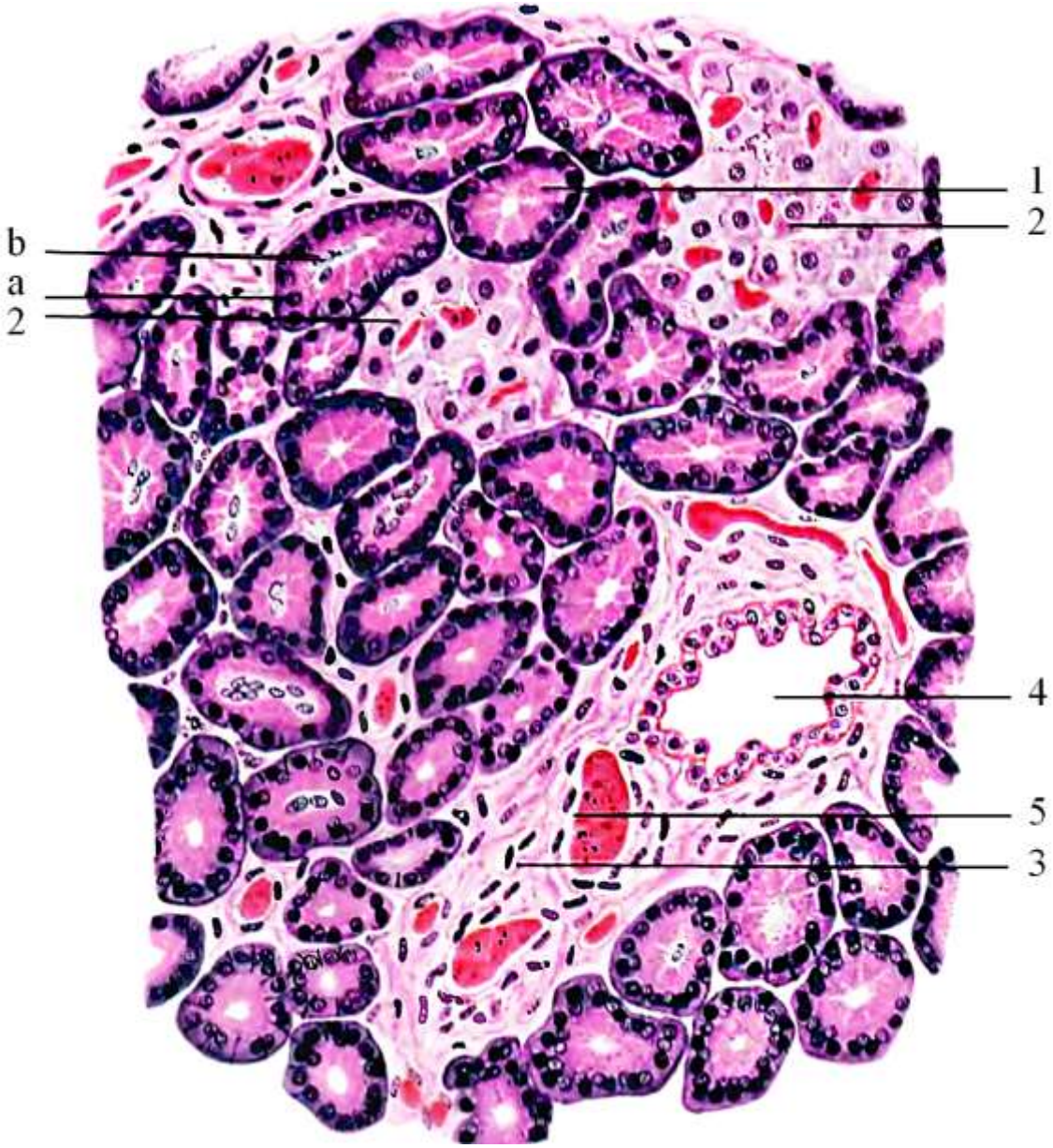


Designations:

1. Lumen
2. Simple columnar epithelium
3. Lamina propria mucosae
4. Intestinal glands
5. Submucosa
6. Lymphatic nodules
7. Tunica muscularis
8. Serosa

3.9.5. LIVER AND PANCREAS

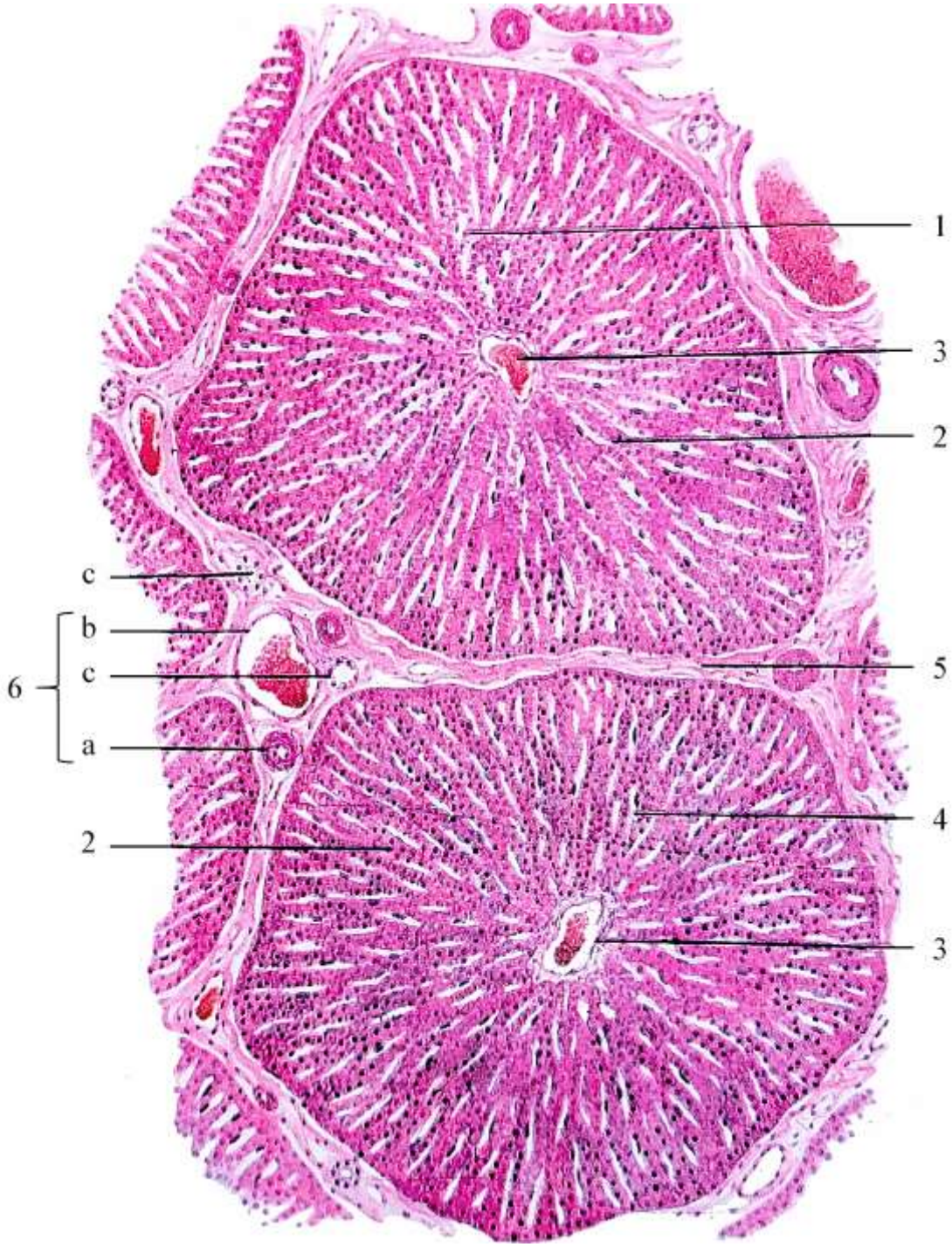
Figure № 1. Pancreas. H&E. ×400.



Designations:

1. Pancreatic acinus (exocrine pancreas)
   a) nuclei of acinar cells
   b) nuclei of centroacinar cells
2. Pancreatic islet (islet of Langerhans)
3. Connective tissue septa
4. Interlobular duct
5. Blood vessels

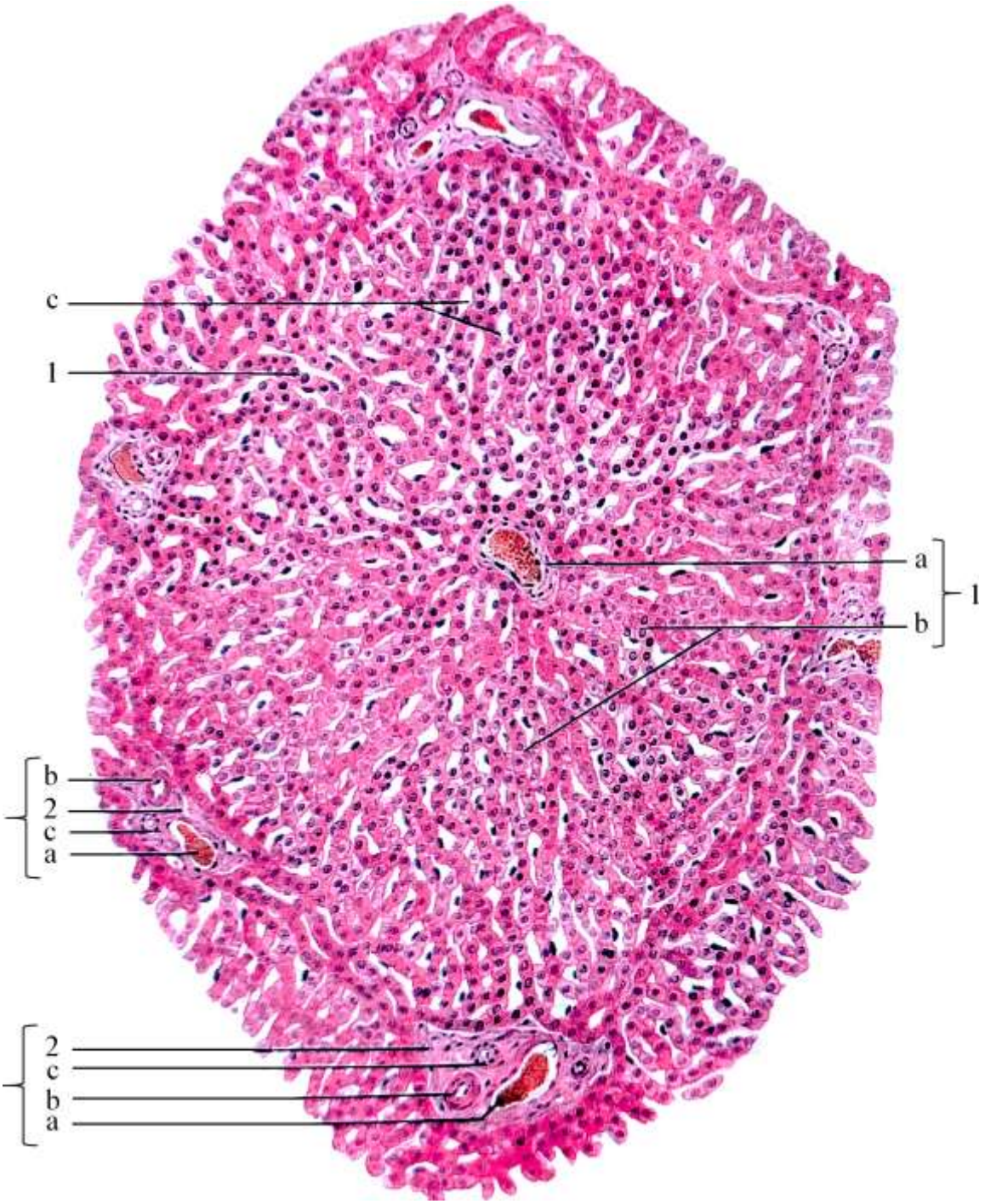
Figure № 2. Pig liver. H&E. ×56.



Designations:

1. Hepatic lobule
2. Plates of hepatocytes
3. Central vein
4. Hepatic sinusoids
5. Connective tissue septa
6. Portal triad
   a) branch of hepatic artery
   b) branch of hepatic portal vein
   c) branch of bile duct

Figure № 3. Human liver. H&E. ×140.

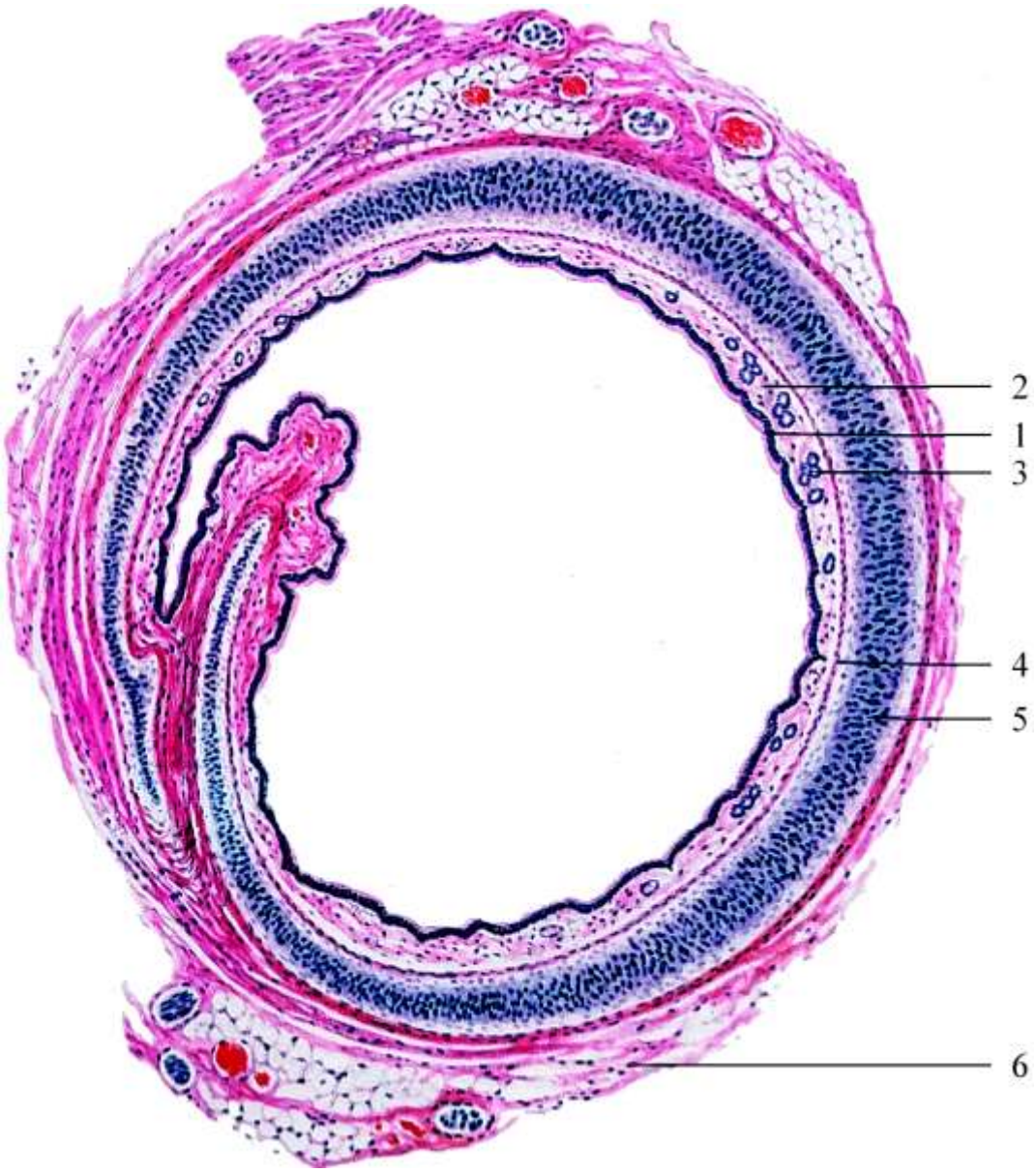


Designations:

1. Hepatic lobule
   a) central vein
   b) plates of hepatocytes
   c) hepatic sinusoids
2. Portal triad
   a) branch of hepatic portal vein
   b) branch of hepatic artery
   c) branch of bile duct

3.10. GENERAL MORPHOFUNCTIONAL CHARACTERISTICS OF RESPIRATORY ORGANS. CONDUCTING PORTION AND RESPIRATORY PORTION

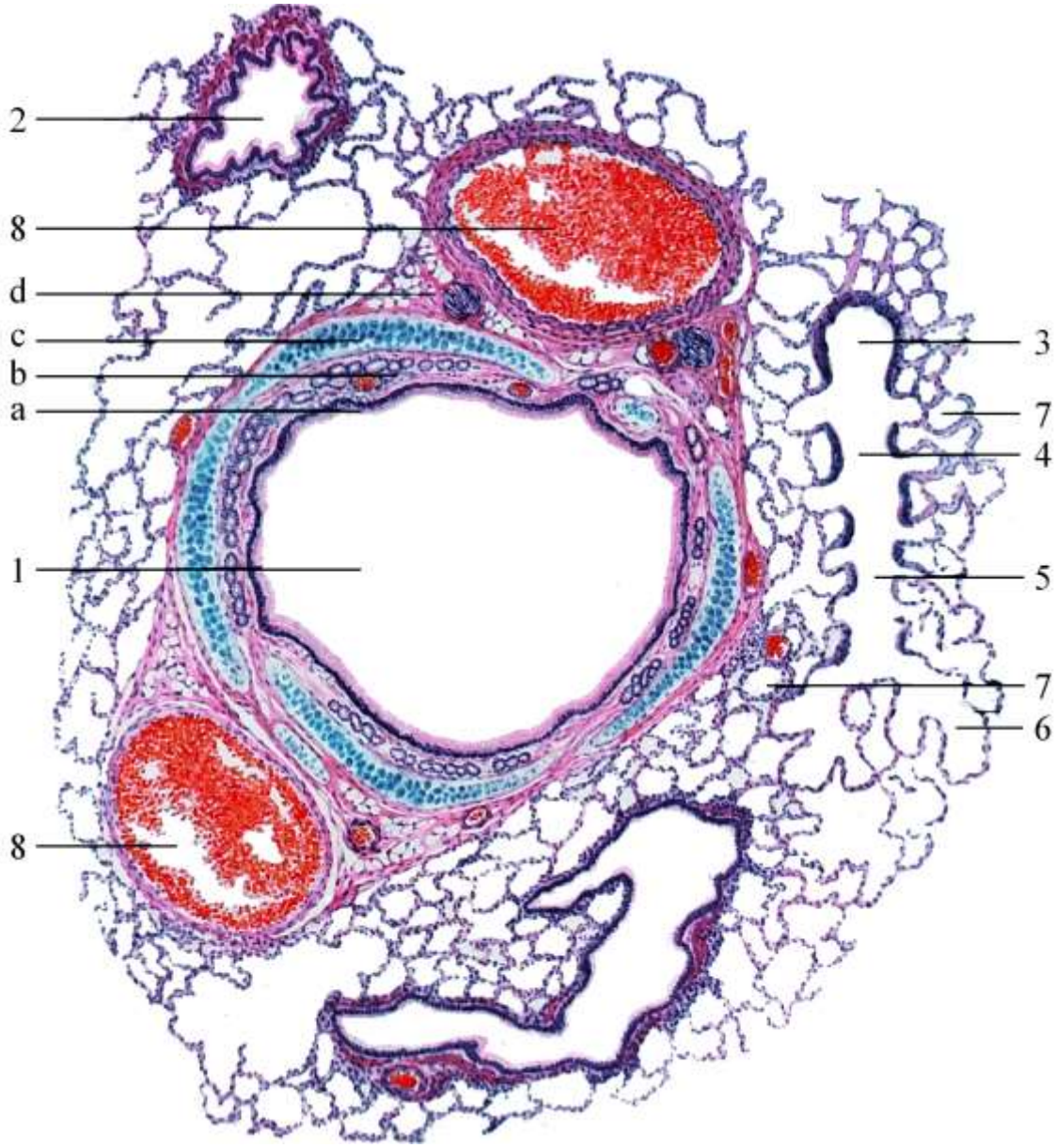
Figure № 1. Trachea. H&E. ×56.



Designations:

1. Respiratory epithelium (pseudostratified ciliated columnar epithelium)
2. Lamina propria mucosae
3. Seromucous glands
4. Perichondrium
5. Cartilage layer (hyaline cartilages)
6. Adventitia

Figure № 2. Lung. H&E. ×56.

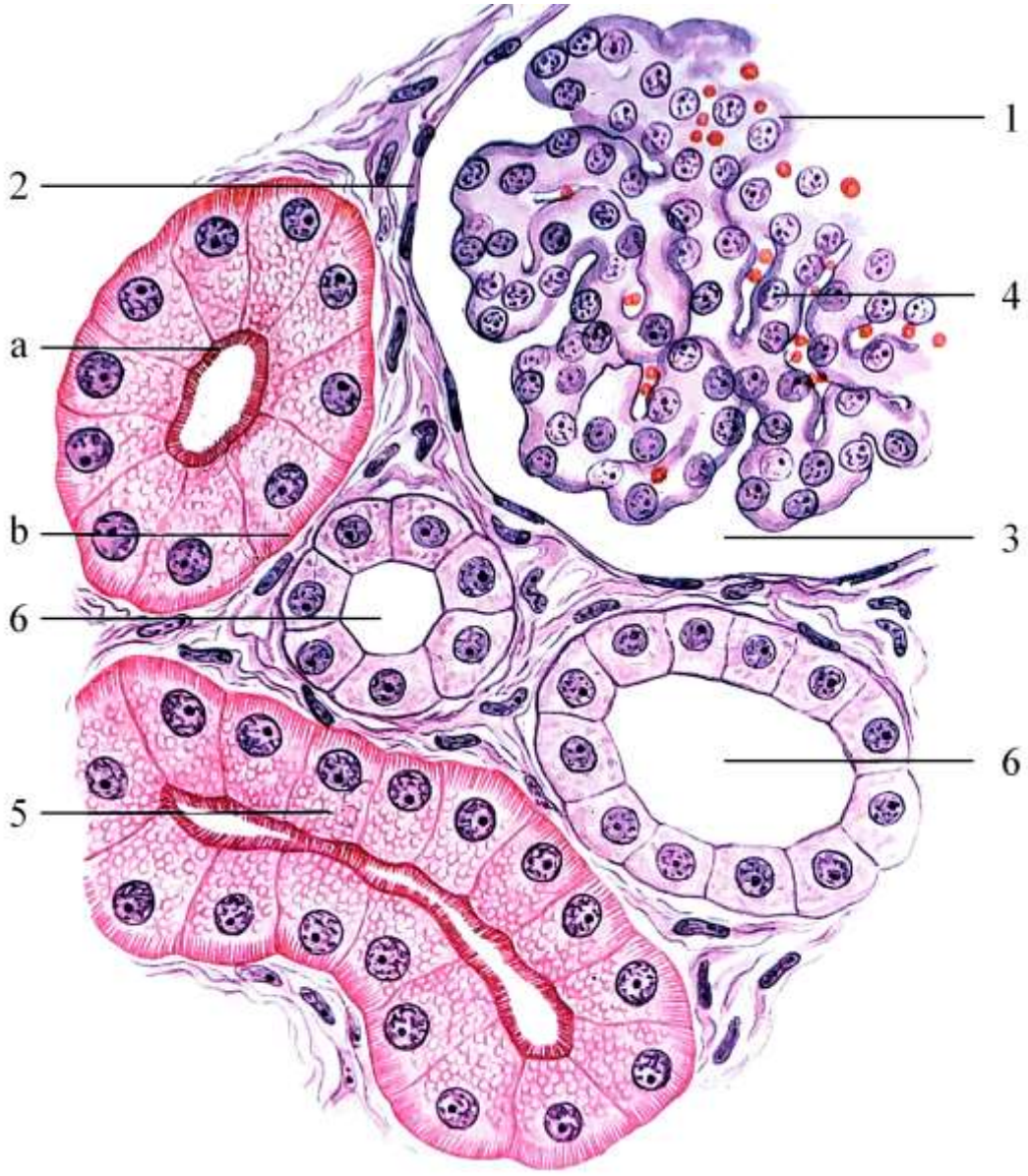


Designations:

1. Segmental bronchus (tertiary bronchus)
   a) mucosa
   b) lamina propria with glands and blood vessels
   c) hyaline cartilages
   d) adventitia
2. Smaller bronchus
3. Terminal bronchiole
4. Respiratory bronchiole
5. Alveolar duct
6. Alveolar sac
7. Alveolus
8. Blood vessels

3.11. KIDNEYS AND URINARY TRACT. HISTOPHYSIOLOGY OF URINE FORMATION

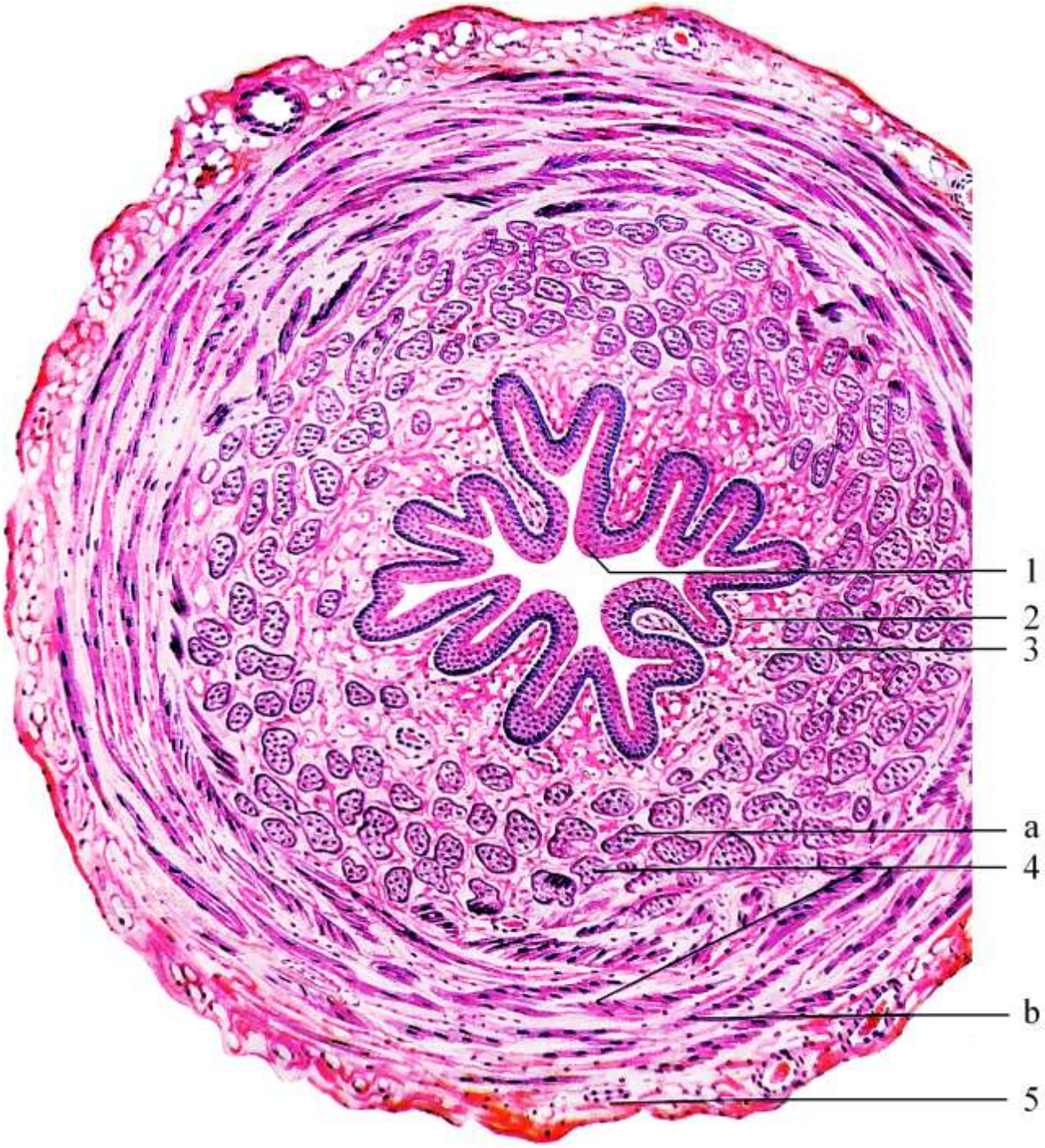
Figure № 1. Renal corpuscle, proximal and distal tubules. H&E. ×600.



Designations:

1. Renal corpuscle
2. Parietal layer of Bowman’s capsule
3. Urinary space (Bowman’s space)
4. Glomerulus
5. Proximal tubule
   a) brush border
   b) basal striations
6. Distal tubule

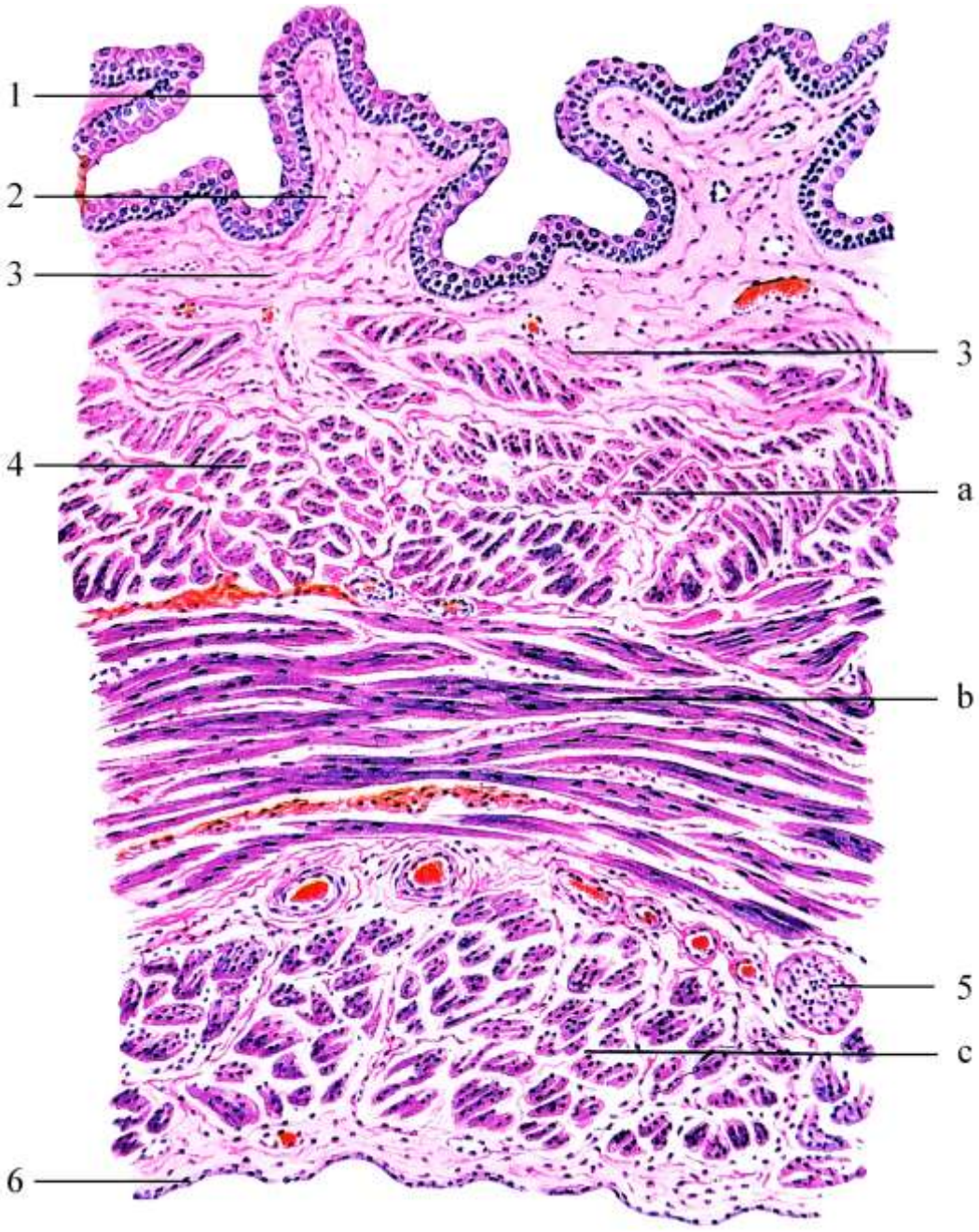
Figure №2. Ureter. H&E. ×56.



Designations:

1. Transitional epithelium (urothelium)
2. Lamina propria mucosae
3. Submucosa
4. Muscularis
   a) inner longitudinal layer
   b) outer circular layer
5. Adventitia

Figure №3. Urinary bladder. H&E. ×80.

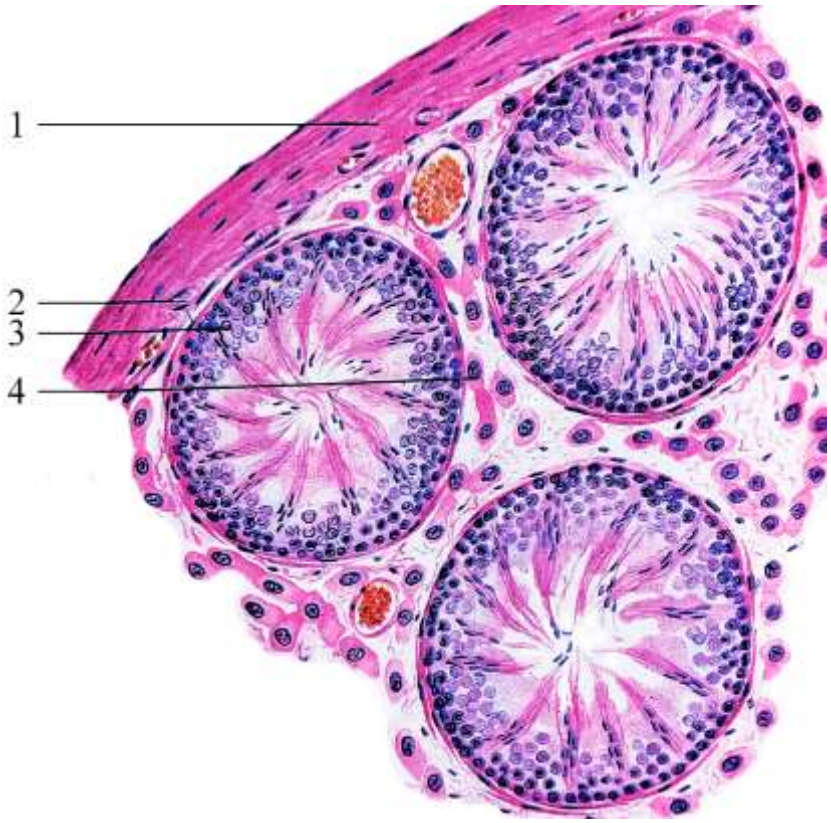


Designations:

1. Transitional epithelium (urothelium)
2. Lamina propria mucosae
3. Submucosa
4. Muscularis
   a) inner longitudinal layer
   b) middle circular layer
   c) outer longitudinal layer
5. Ganglion
6. Adventitia

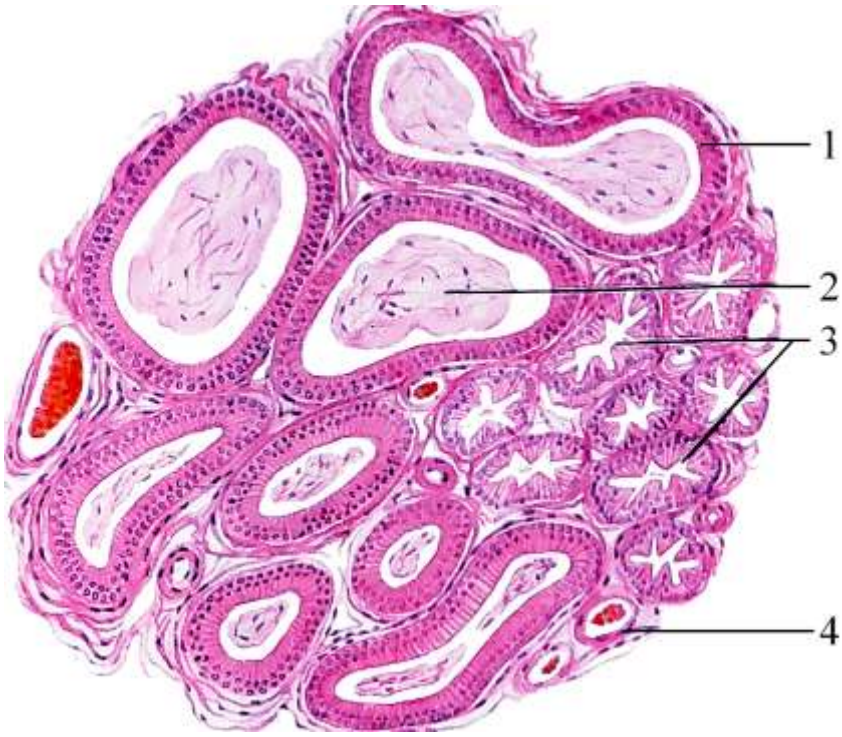
3.12. MALE REPRODUCTIVE SYSTEM. GENERAL CHARACTERISTICS. SOURCES AND COURSE OF DEVELOPMENT. FUNCTIONS. PRINCIPLES OF REGULATION

Figure № 1. Testis. H&E. ×400.



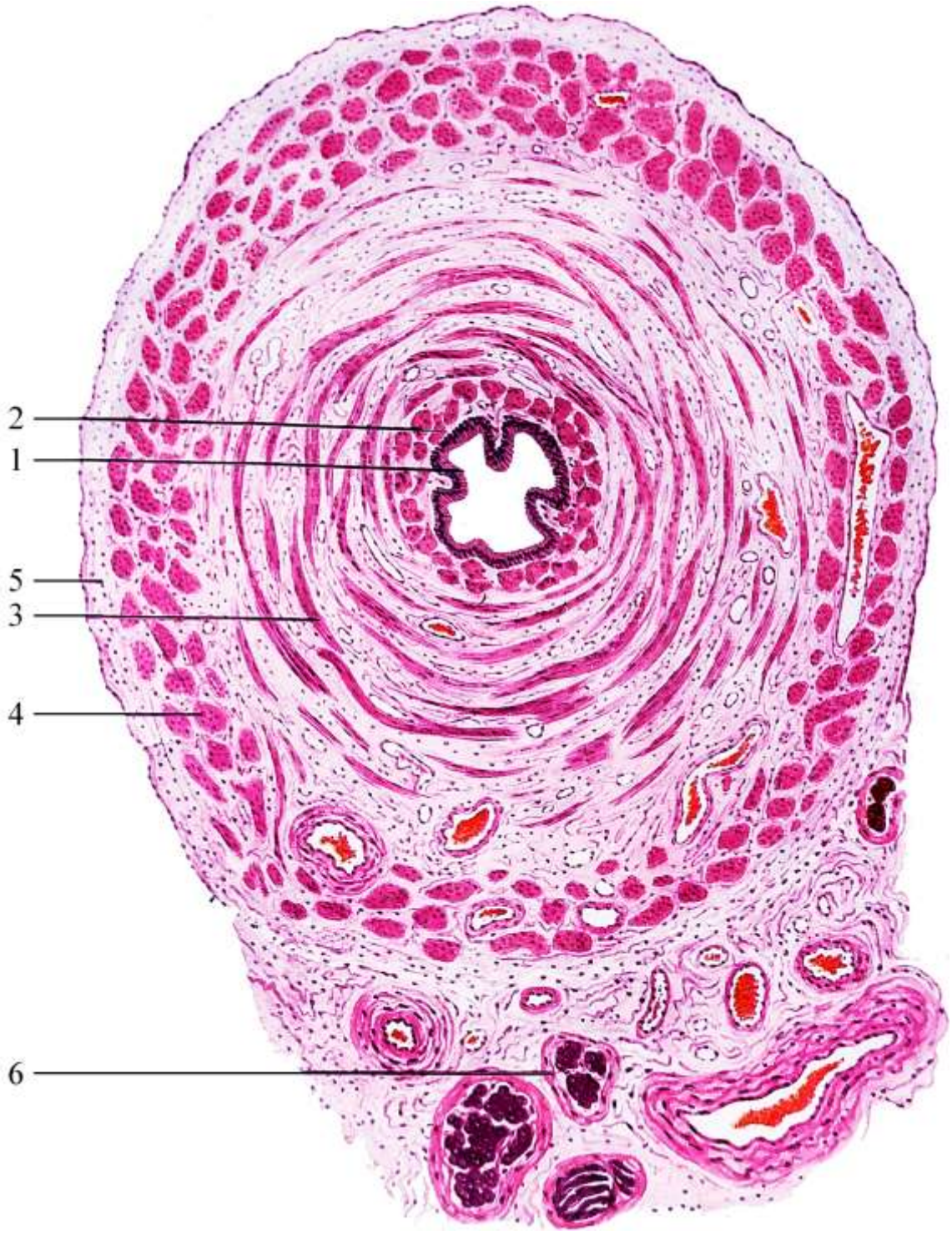
Designations:
1. Tunica albuginea
2. Tunica vasculosa
3. Seminiferous tubules
4. Interstitial cells (Leydig cells)

Figure № 2. Ductus epididymidis. H&E. ×140.



Designations:
1. Pseudostratified columnar epithelium with stereocilia
2. Lumen contains sperm
3. Efferent ductules (ductuli efferentes)
4. Connective tissue with blood vessels

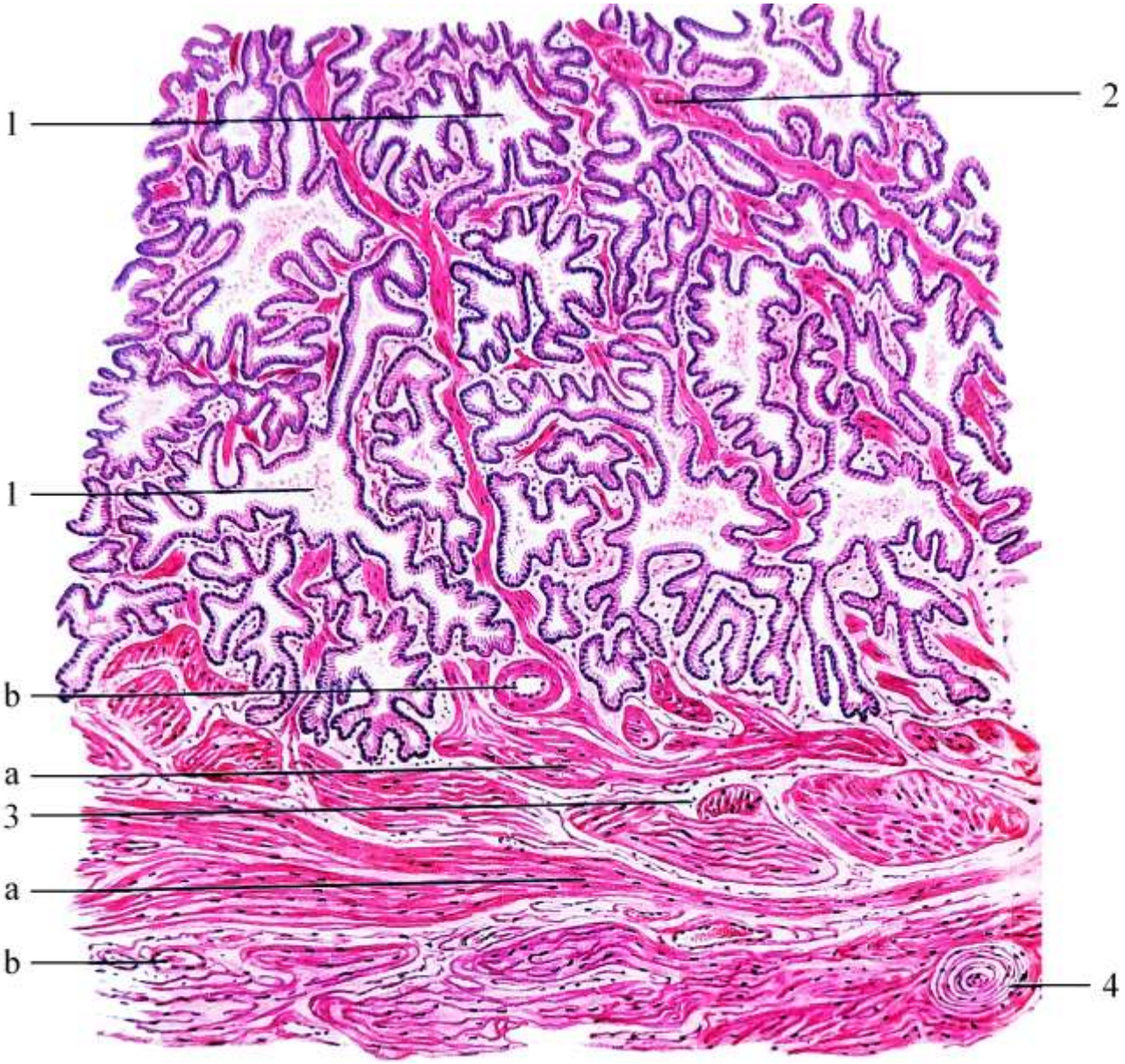
Figure № 3. Ductus (or vas) deferens. H&E. ×56.



Designations:

1. Mucosa (pseudostratified columnar epithelium with some stereocilia and lamina propria mucosae)
2. Inner longitudinal layer of smooth muscle
3. Middle circular layer of smooth muscle
4. Outer longitudinal layer of smooth muscle
5. Adventitia
6. Nerves and blood vessels

Figure № 4. Prostate gland. H&E. ×100.

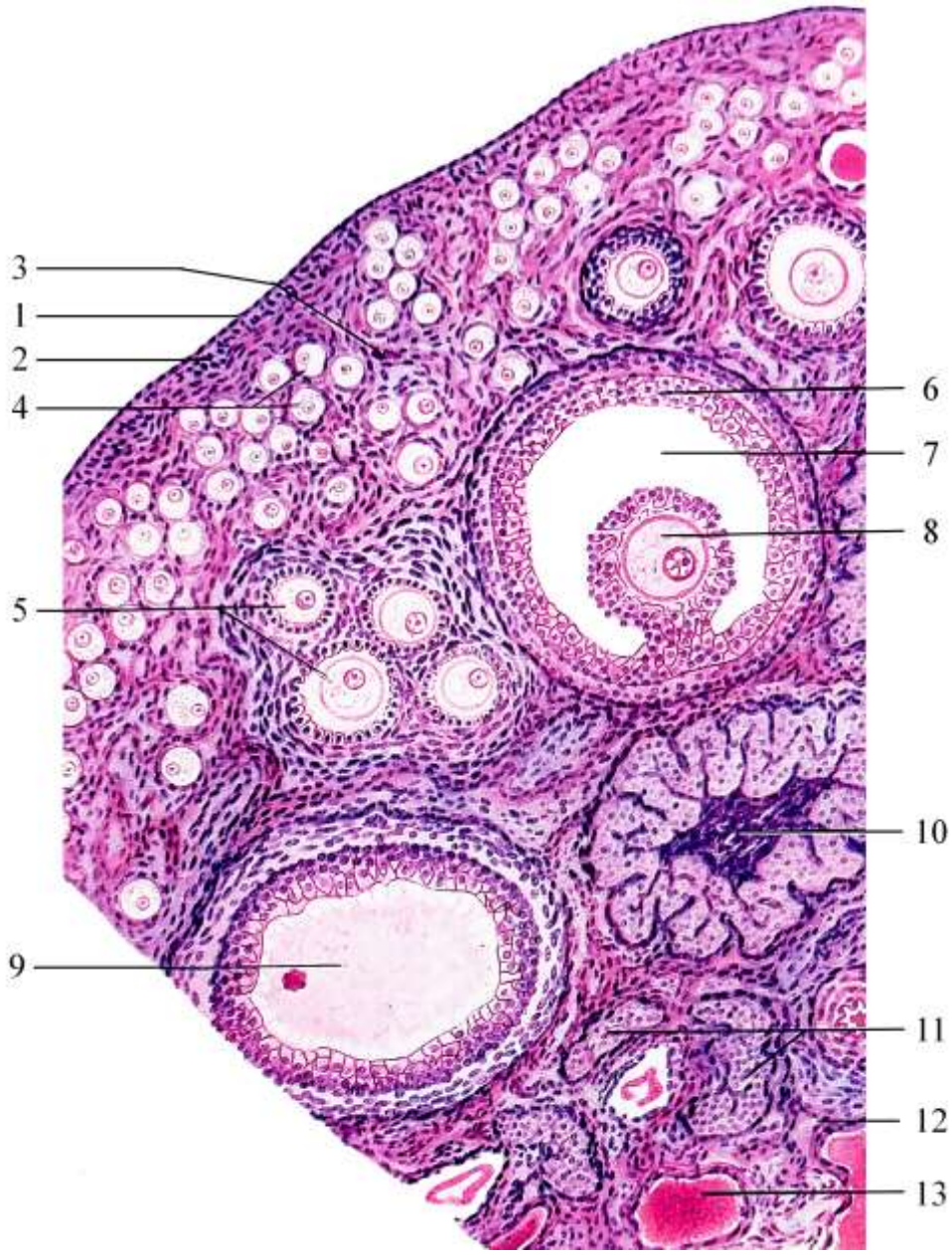


Designations:

1. Prostatic glands (acini)
2. Smooth muscle
3. Fibromuscular stroma
   a) smooth muscle
   b) blood vessels
4. Lamellar corpuscle

3.13. FEMALE REPRODUCTIVE SYSTEM. GENERAL CHARACTERISTICS. SOURCES OF DEVELOPMENT. FUNCTIONS. PRINCIPLES OF REGULATION. OVARIAN-MENSTRUAL CYCLE: PHASES, REGULATION. CYCLIC CHANGES IN FEMALE ORGANISM

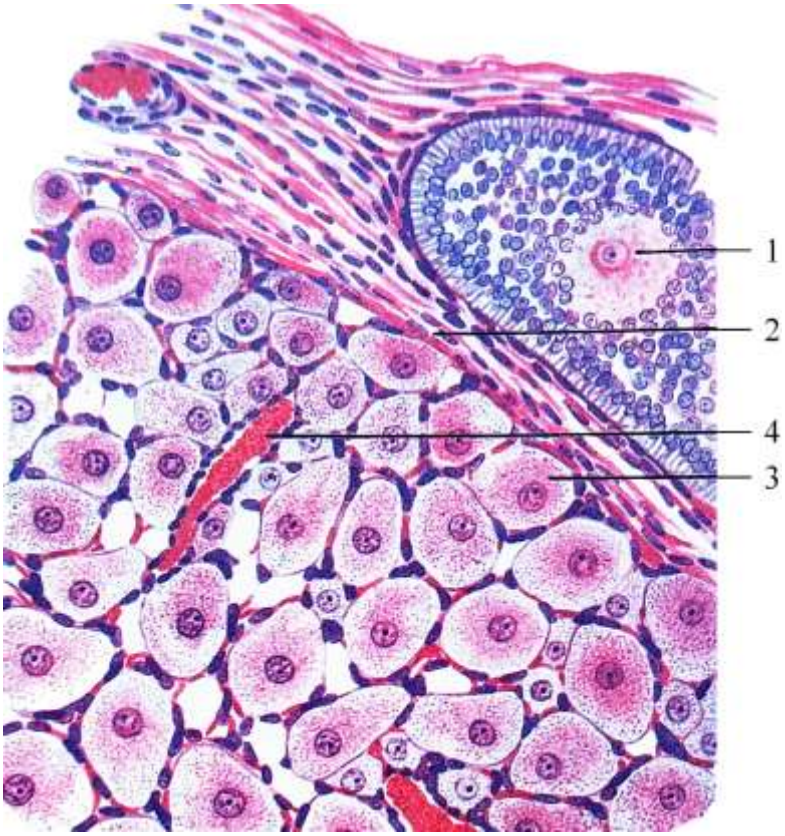
Figure № 1. Ovary. H&E. ×200.



Designations:

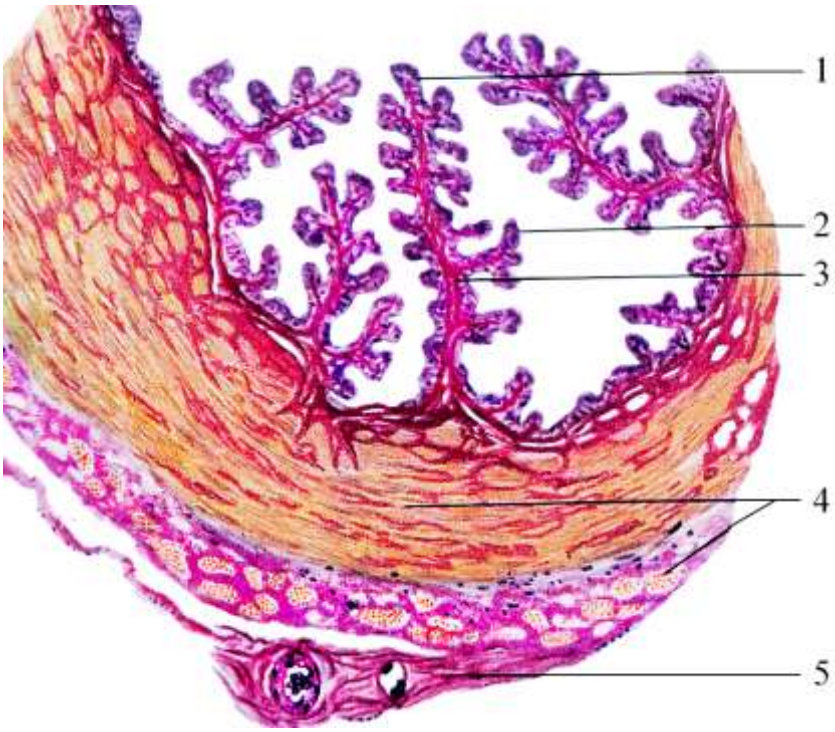
1. Germinal epithelium
2. Tunica albuginea
3. Cortex
4. Primordial follicles
5. Growing follicles
6. Graafian follicle
7. Antrum
8. Primary oocyte
9. Graafian follicle without oocyte
10. Corpus luteum
11. Atretic follicle
12. Medulla
13. Blood vessels

Figure № 2. Corpus luteum. H&E. ×400.



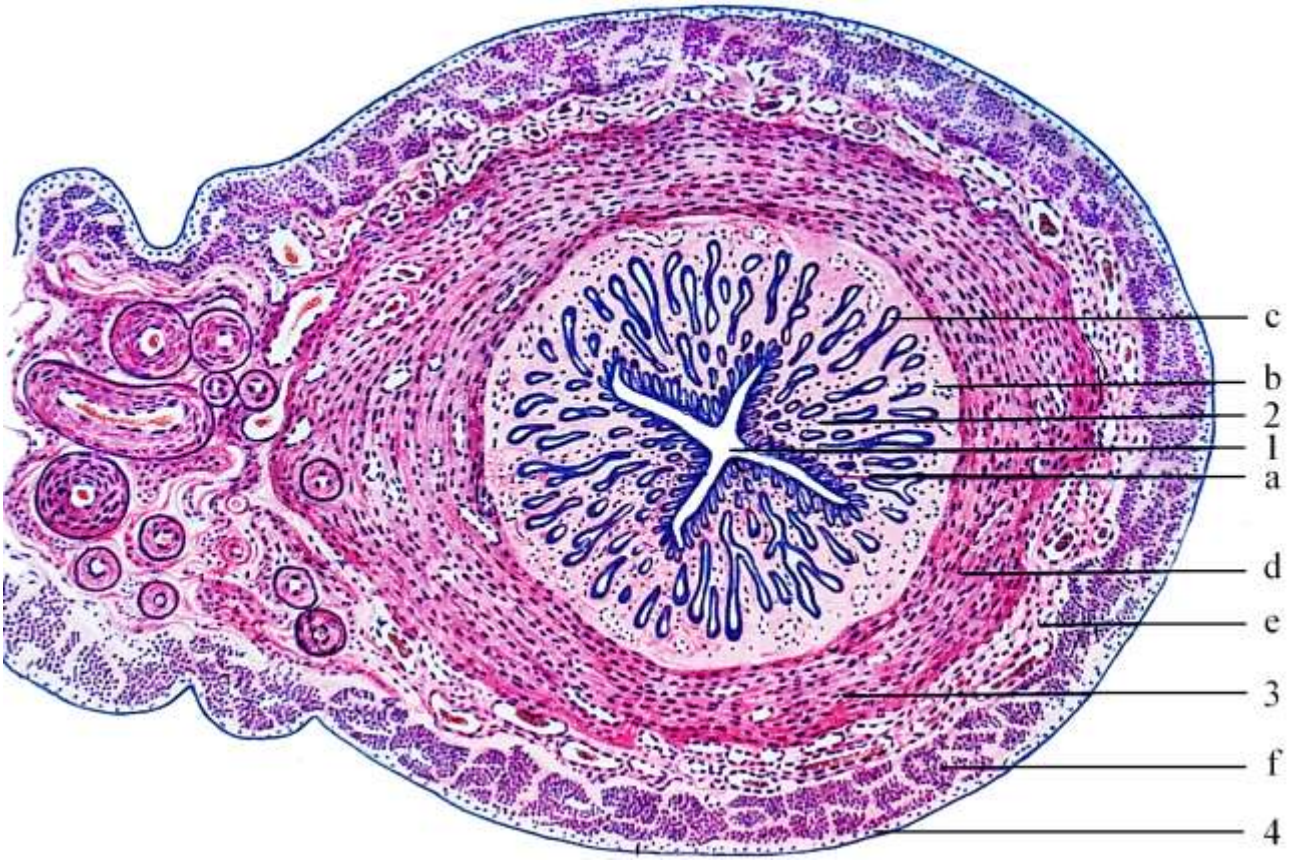
Designations:
1. Graafian follicle at the stage of reverse development
2. Connective tissue capsule
3. Lutein cells
4. Capillary

Figure № 3. Uterine (Fallopian) tube. H&E. × 56.



Designations:
1. Folds of the mucosa
2. Simple columnar epithelium
3. Lamina propria mucosae
4. Muscularis (inner circular layer and outer longitudinal layer)
5. Serosa

Figure №4. Uterus. H&E. × 20.

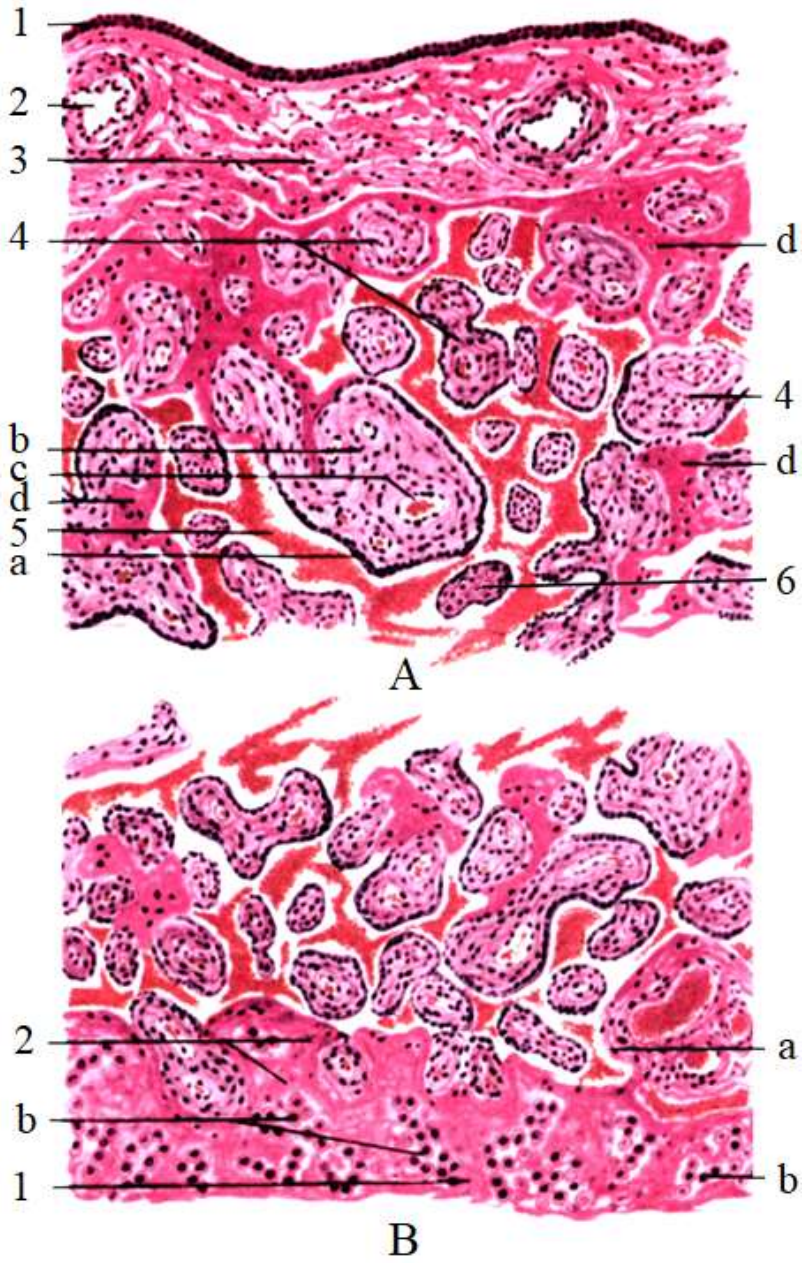


Designations:

1. Lumen
2. Mucosa (endometrium)
   a) simple columnar epithelium
   b) lamina propria mucosae
   c) uterine glands
3. Muscularis (myometrium)
   d) stratum submucosum
   e) stratum vasculare
   f) stratum supravasculare
4. Serosa (perimetrium)

3.14. MEDIAL EMBRYOLOGY. NUTRITION OF THE EMBRYO. PLACENTA: PARTS, STRUCTURE, FUNCTIONAL MEANING. STRUCTURE AND FUNCTION OF UMBILICAL CORD.

Figure № 1. Human placenta. H&E. ×80.



Designations:

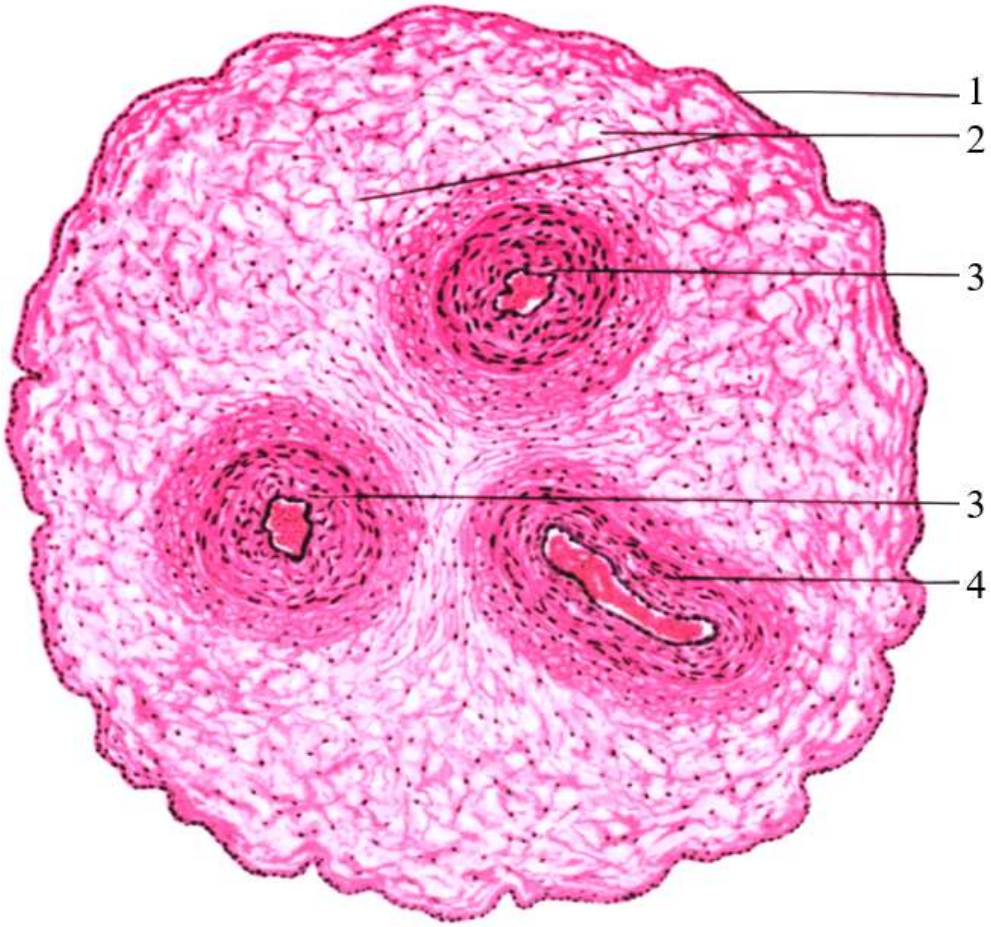
A – Fetal portion:

1. Amniotic epithelium
2. Blood vessels
3. Chorionic plate
4. Tertiary chorionic villi
   a) trophoblast
   b) connective tissue
   c) blood vessels
   d) perivillous fibrin
5. Lacunes with maternal blood
6. Secondary chorionic villi

B – Maternal portion:

1. Basal plate
   a) connective tissue
   b) decidual cells
2. Decidua basalis

Figure №2. Umbilical cord. H&E. ×56.



Designations:

1. Amniotic epithelium
2. Mucous connective tissue (Wharton’s jelly)
3. Umbilical arteries
4. Umbilical vein