REVIEW OF HISTOLOGY

BY DR. BEDA OLABU

BSc Anat (Hons), MBChB

DEPARTMENT OF HUMAN ANATOMY

UNIVERSITY OF NAIROBI

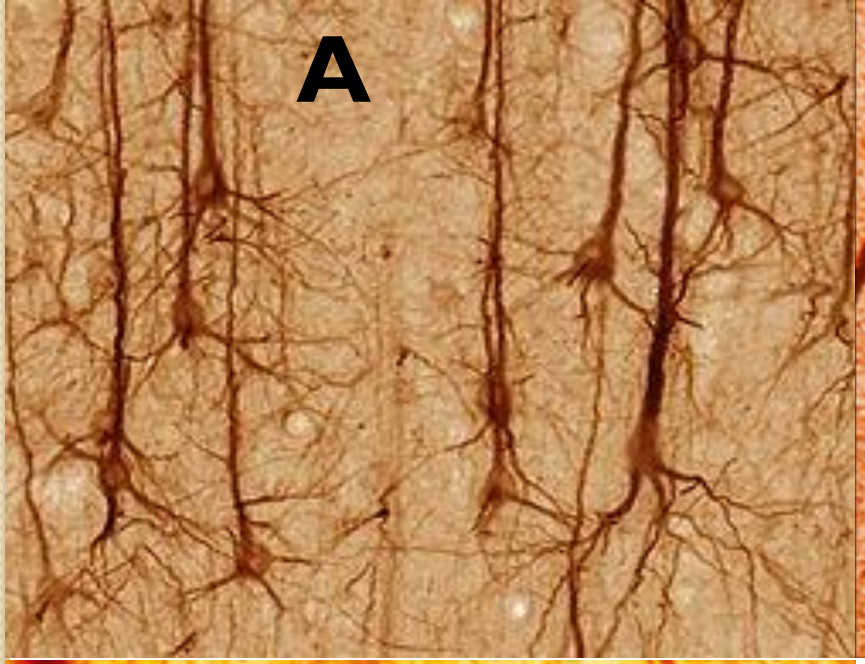
INSTRUCTIONS

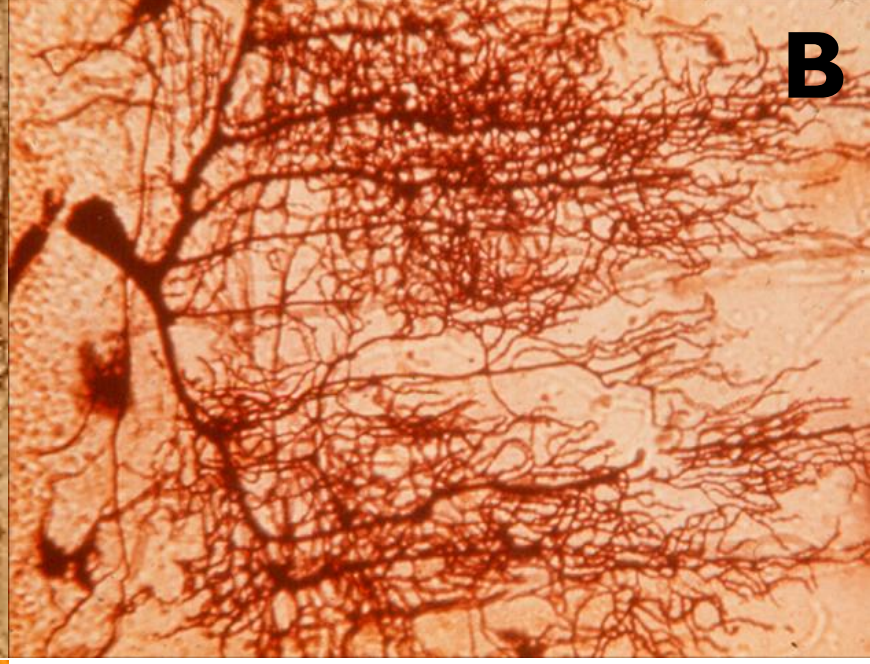
1. Section I contain the questions and Section II the Marking Scheme
2. Attempt ALL questions
3. Each question has about 8 marks
4. Each slide will show for 90 seconds
5. Part (a) is related to the slide projected
6. Part (b) and (c) are NOT NECESSARILY related to the slide

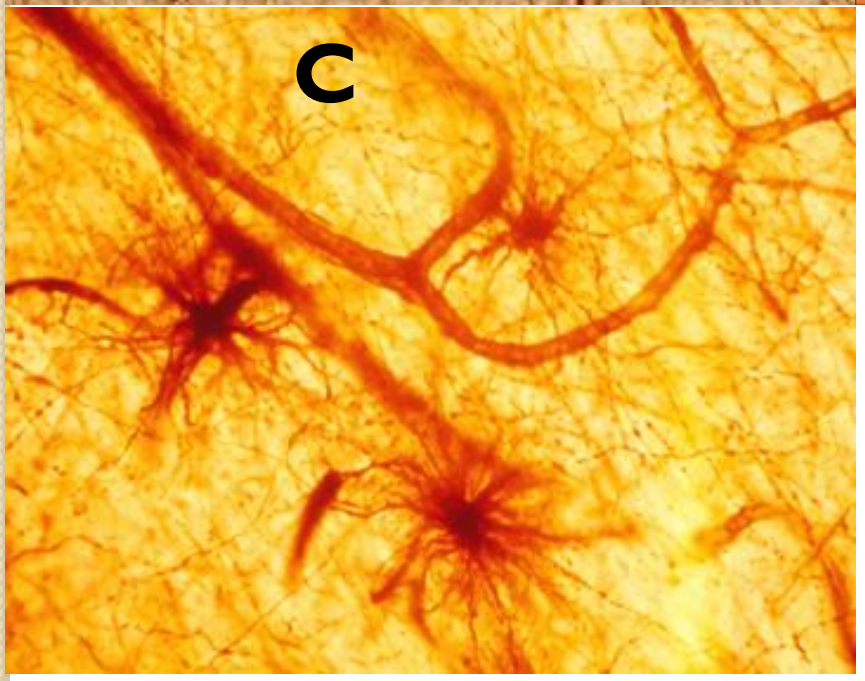
SECTION I

QUESTIONS

1



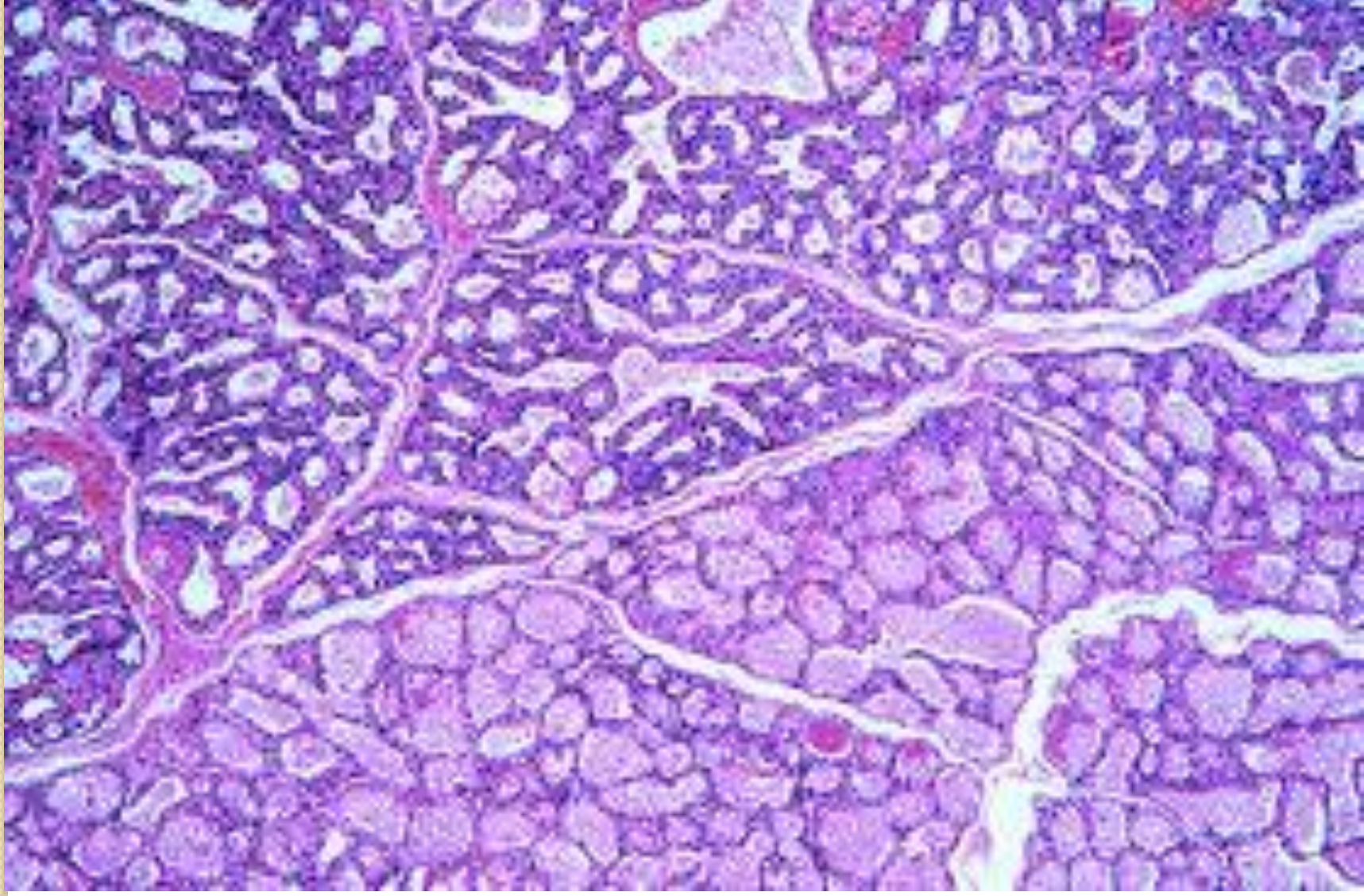




a) Identify the cell types shown and give two reasons each (8mks)

b) State where they are located (3mks)

2

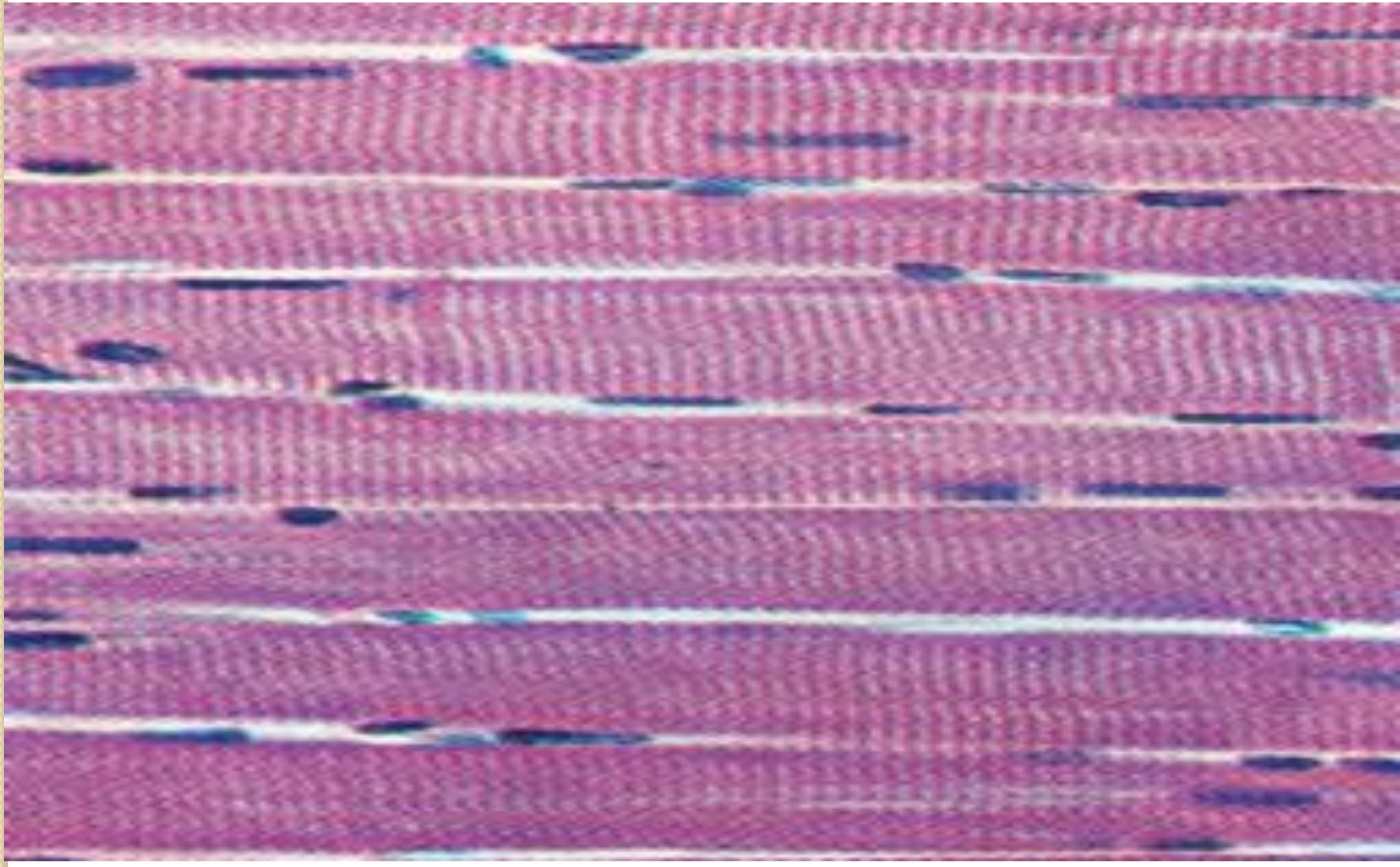


a) Identify the gland shown and give two reasons (3mks)

b) Name two main hormones which act on this gland (2mks)

c) State two cell types found in the secretory portion (2mks)

3

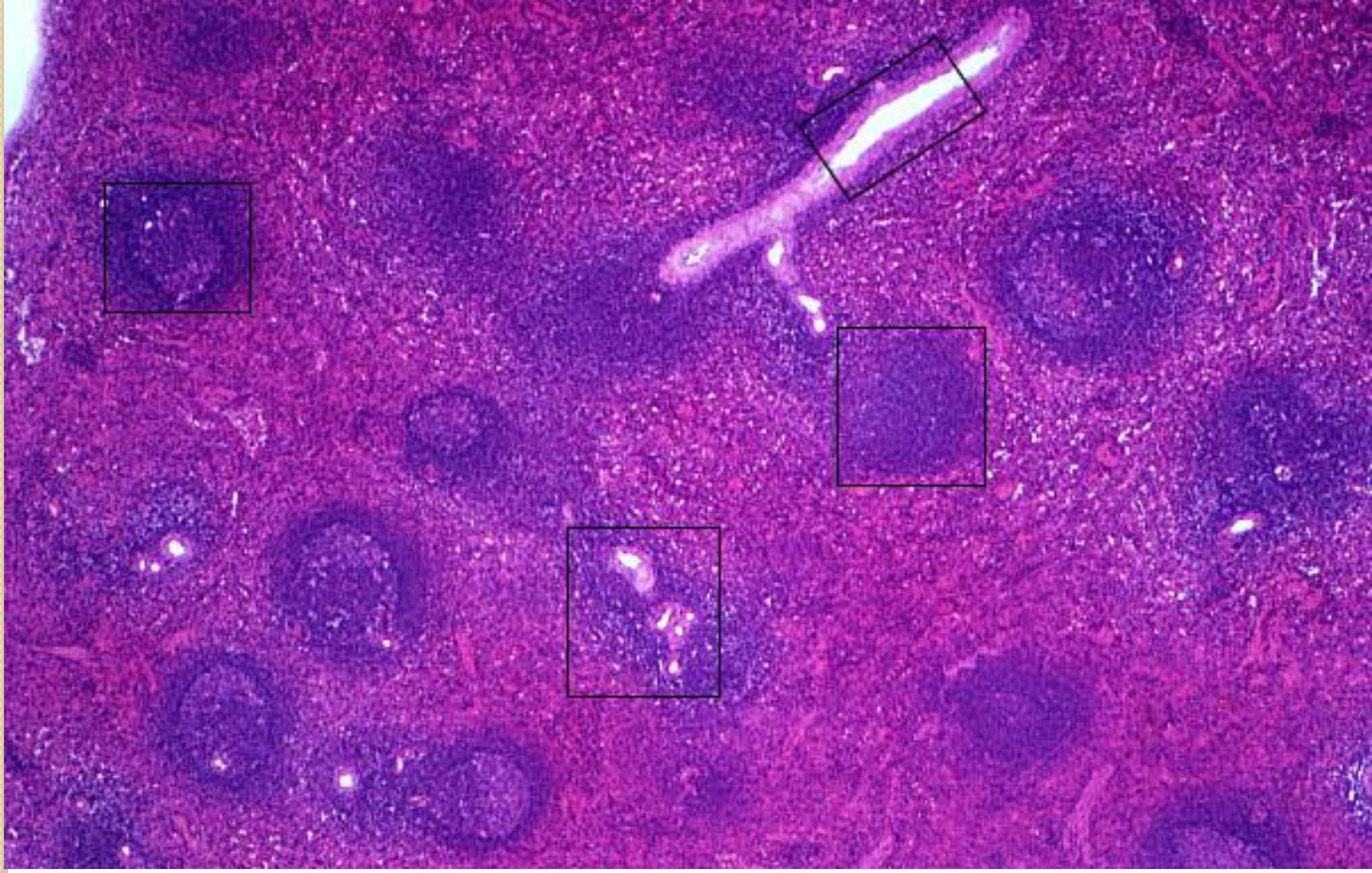


a) Identify the tissue shown and give three reasons (4mks)

b) List three ultrastructural features of this tissue (3mks)

c) State the functional unit of this tissue (1mk)

4

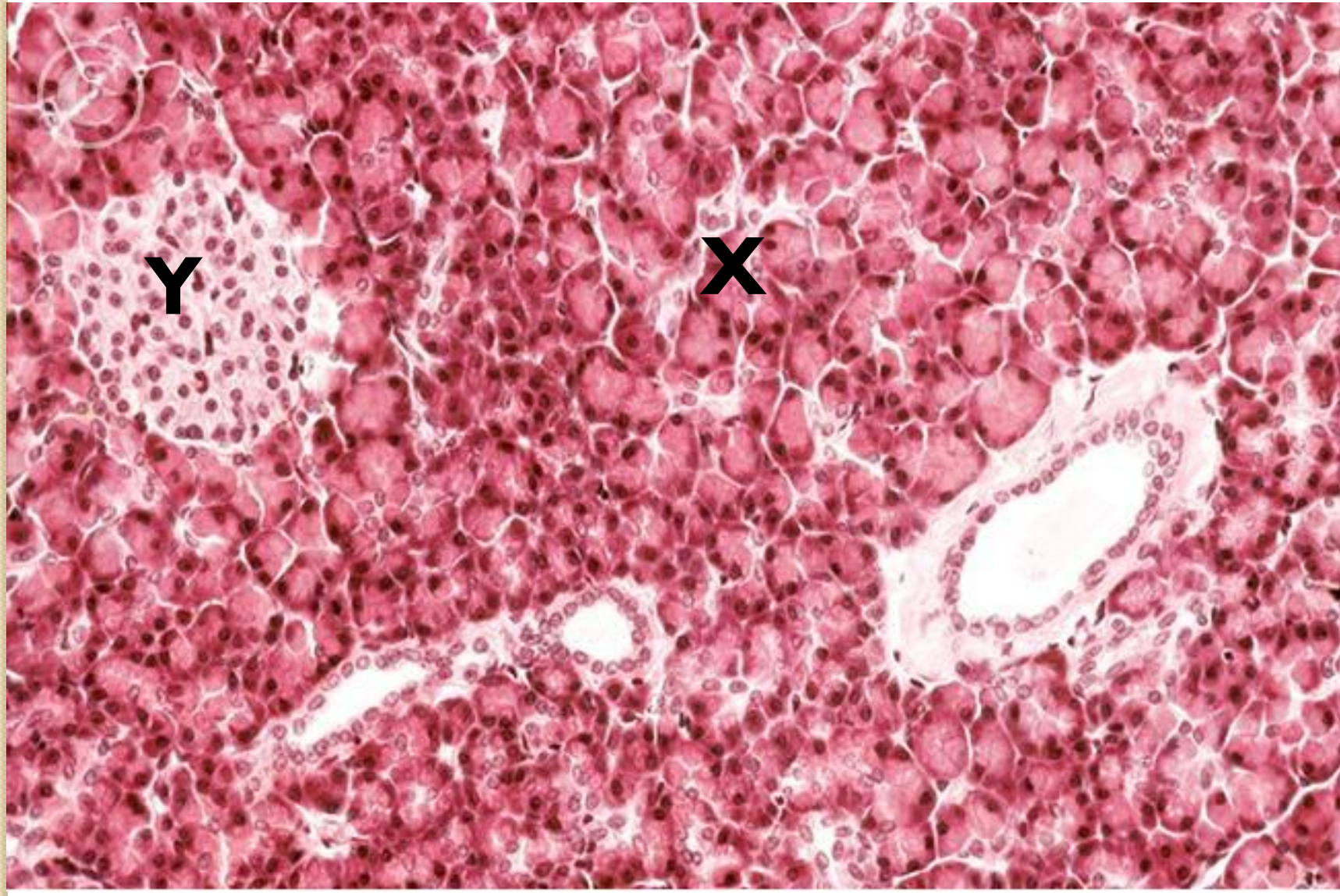


a) Identify the slide shown and give two reasons (3mks)

b) State two main functions of this organ (2mks)

c) Name the components of the blood air barrier (3mks)

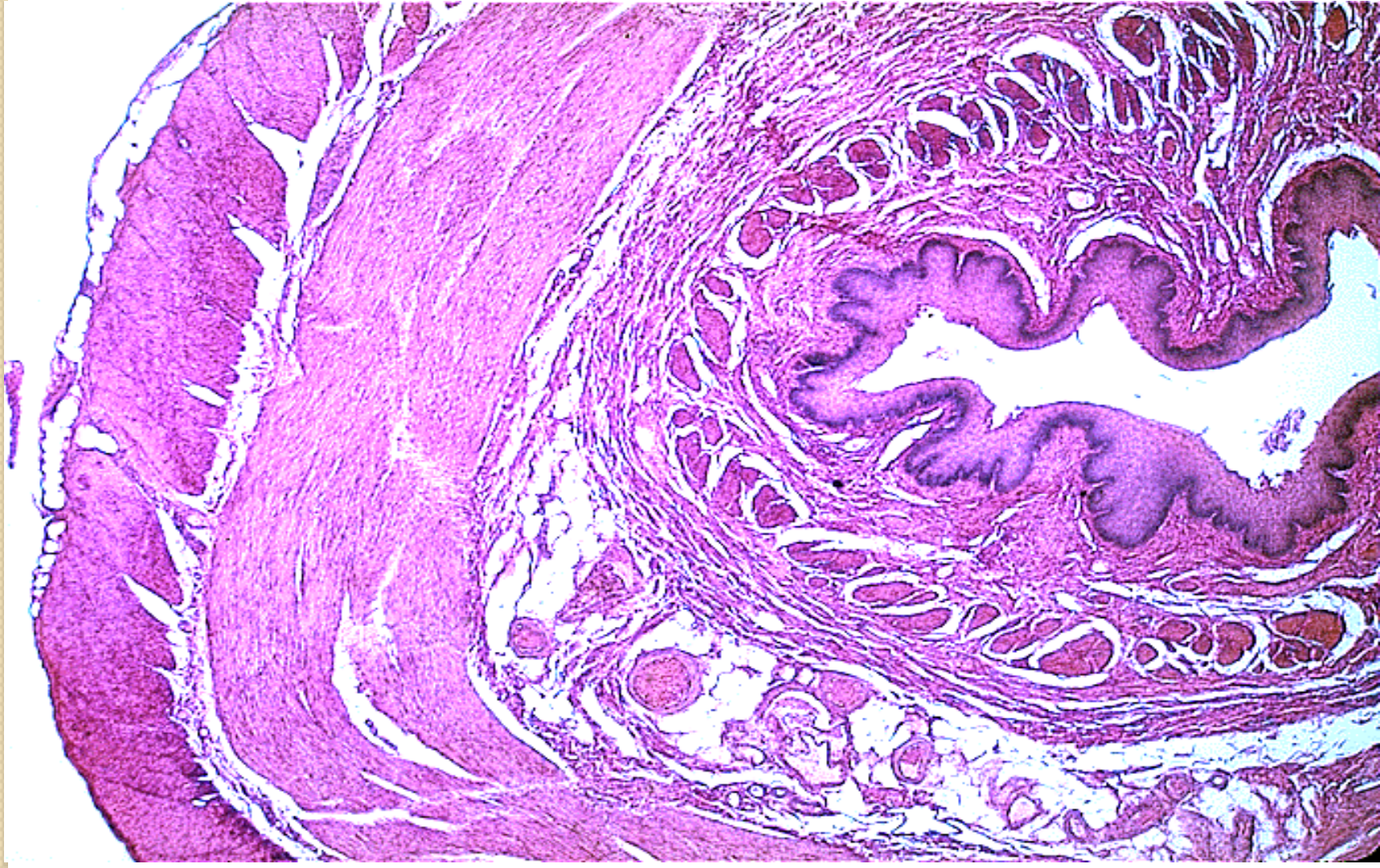
5



a) Identify the organ shown and give two reasons (3mks)

b) State two cell types found in X and three in Y and indicate their various functions (5mks)

6

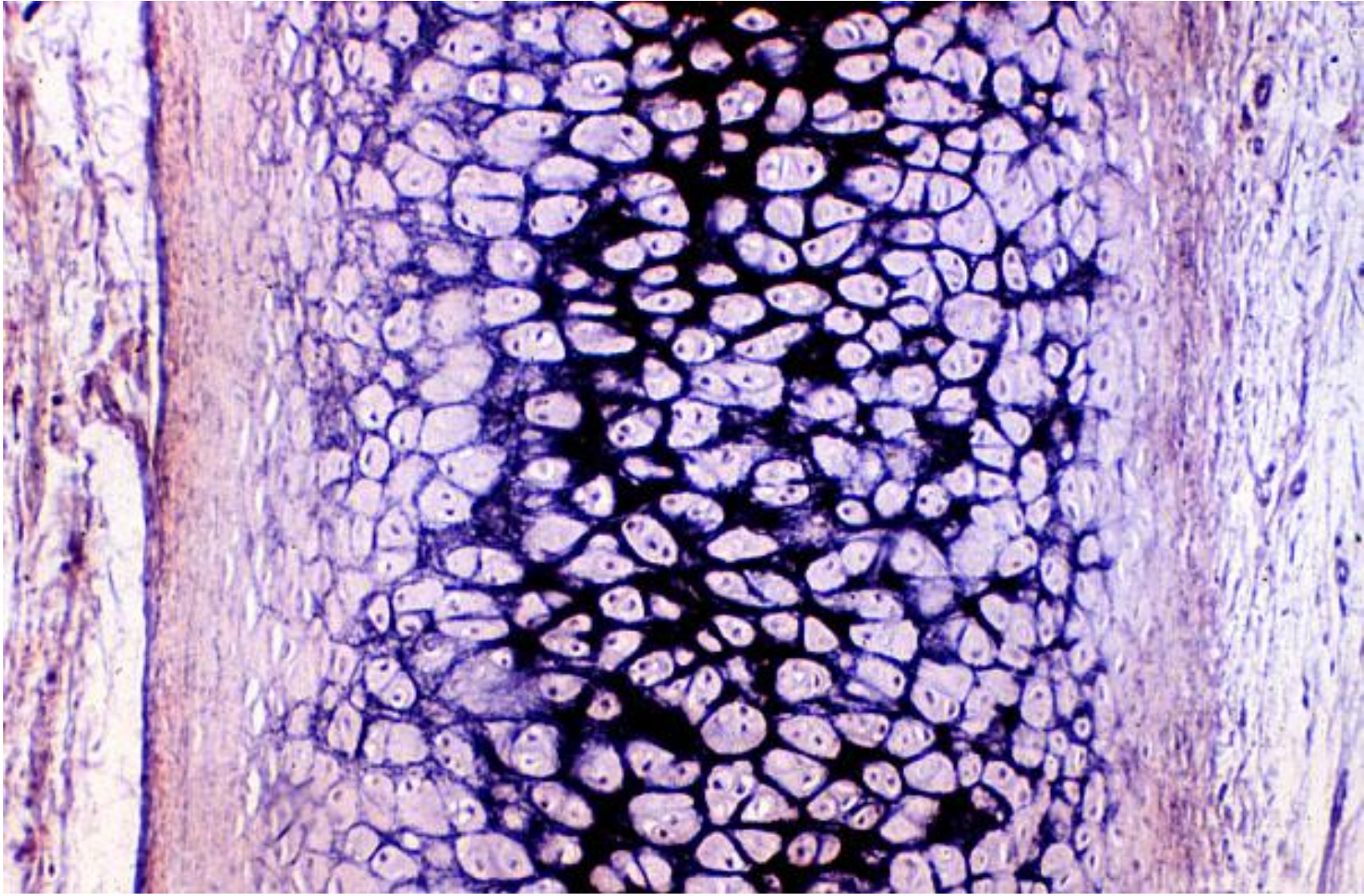


a) Identify the organ shown and give two reasons (3mks)

b) Define epithelial metaplasia and state it's significance in this organ (2mks)

c) Name three cell types found in gastric glands an indicate their role (3mks)

7

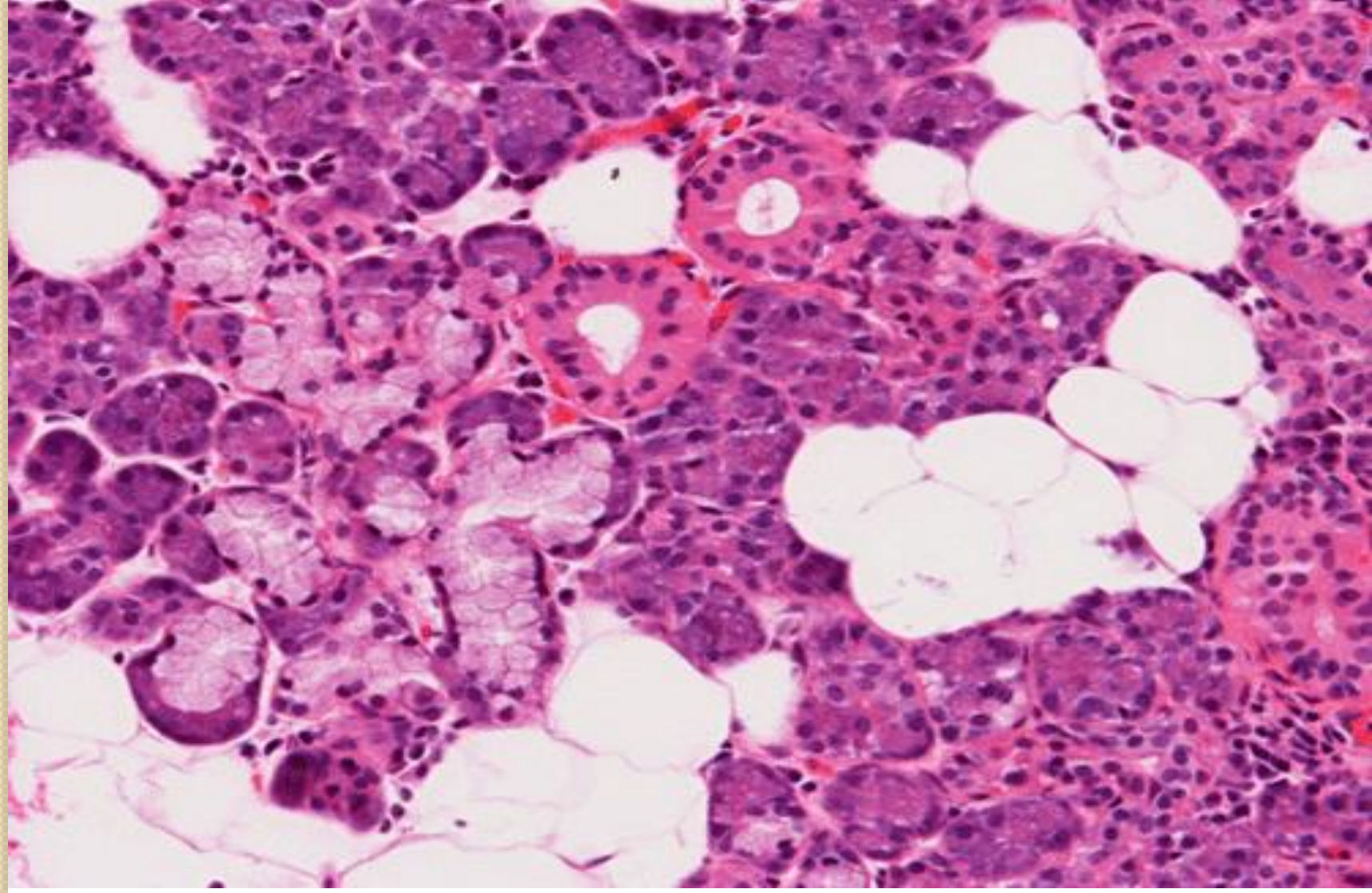


a) Identify the connective tissue shown and give two reasons (3mks)

b) State three distribution of this tissue (3mks)

c) Name the components of the outer layer of this tissue (2mks)

8

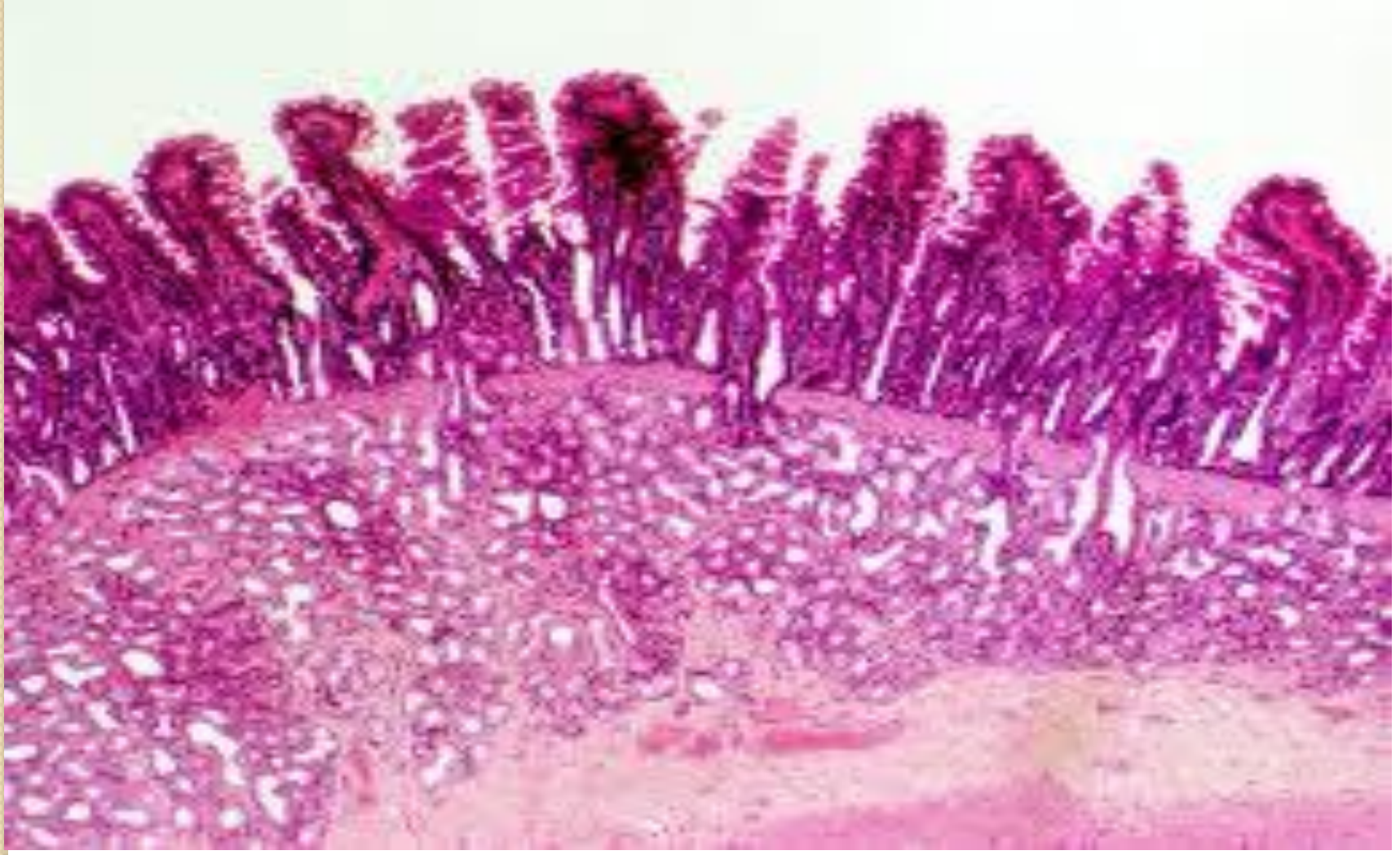


a) Identify the salivary gland shown and give two reasons (3mks)

b) Name the types of ducts in this gland (2marks)

c) State three components of the salivon (3marks)

9

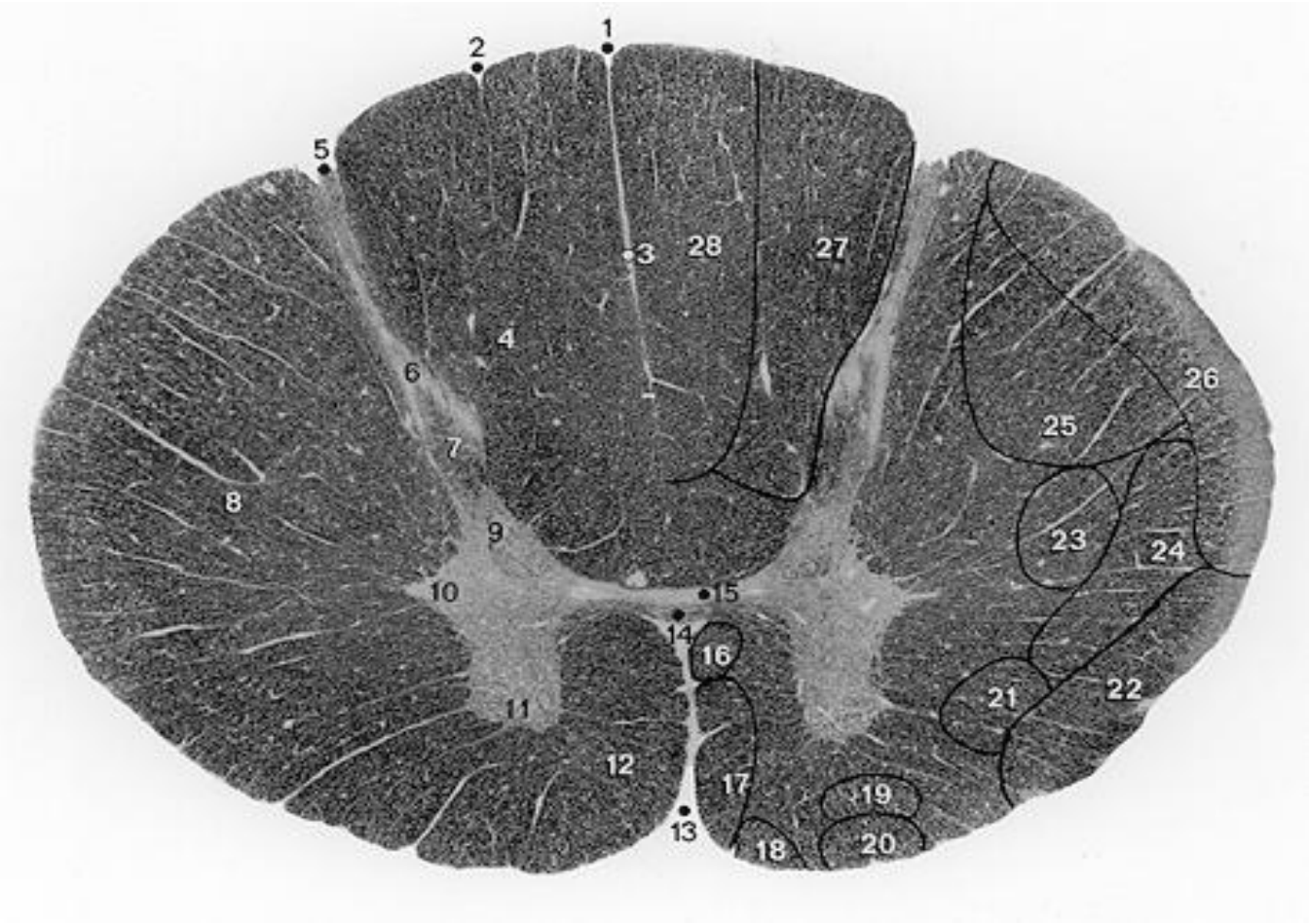


a) Identify the part of the alimentary canal shown and give two reasons (3mks)

b) Give three protective properties of this epithelium (3 marks)

c) Mention two structural adaptations of the alimentary canal to nutrient absorption (2mks)

10



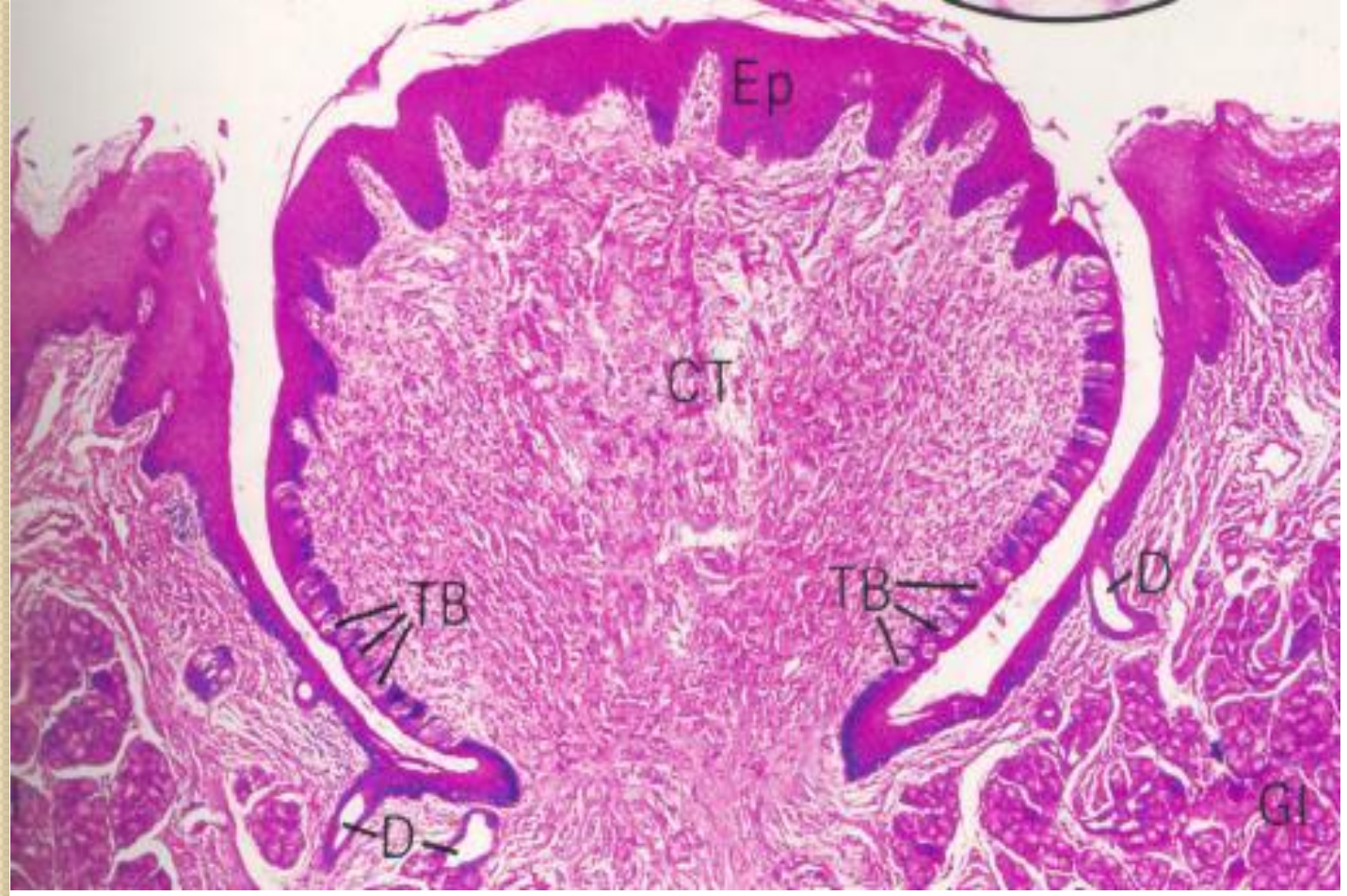
a) Identify the segment from which this spinal cord section comes from and give two reasons (3mks)

b) Identify the fibre tracts labeled **26** and **27** (2mks)

c) Name one structure that traverses region **13** (1mk)

d) Name the microorganisms that commonly infect regions **11** & **28** (2mks)

11



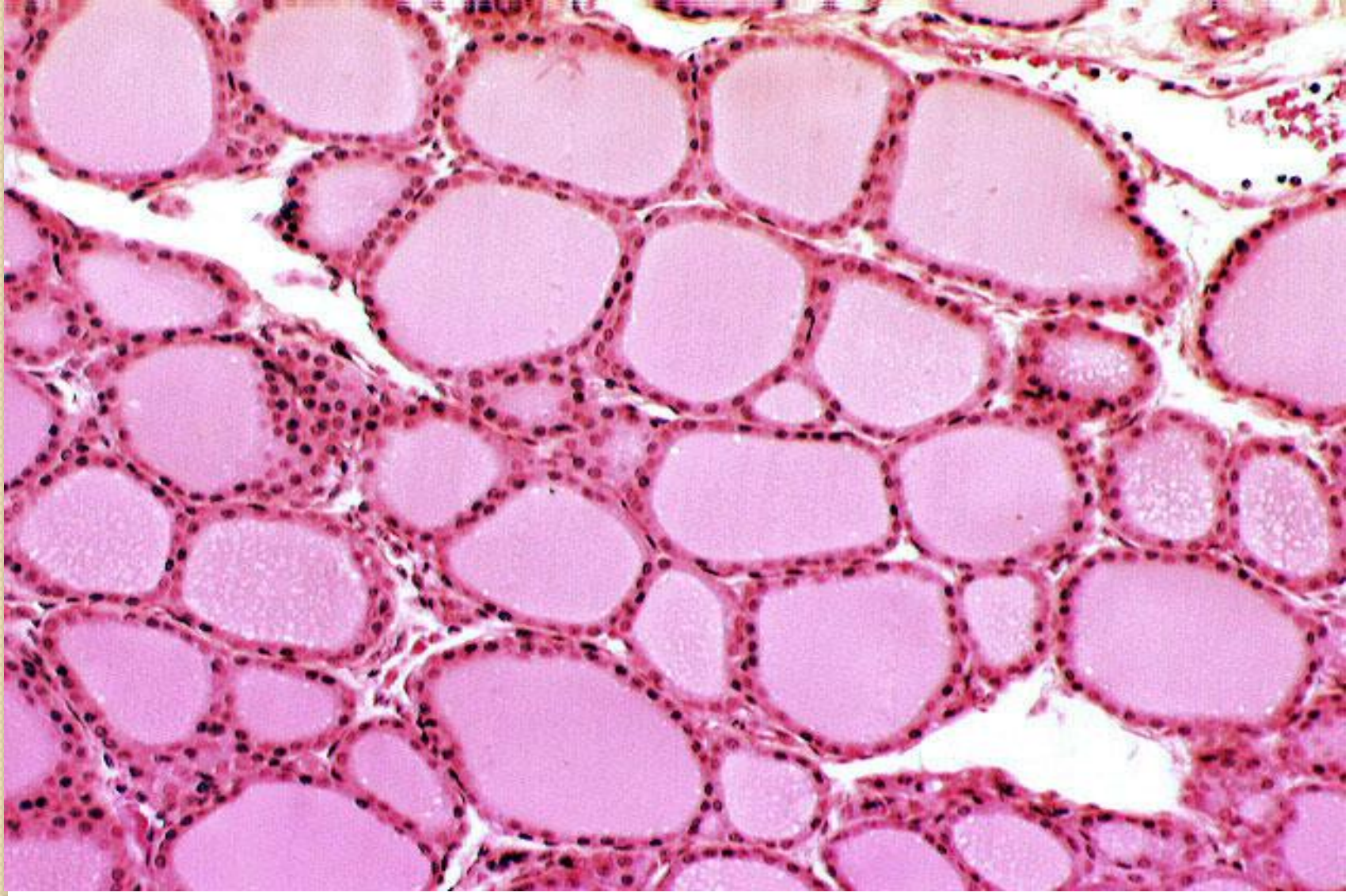
a) Identify the structure shown and give two reasons (3mks0

b) Name the cell types found on the receptors associated with this structure (3mks)

c) State the innervation of this structure (1mk)

d) Name the glands whose secretions are associated with this structure or its contents (1mk)

12

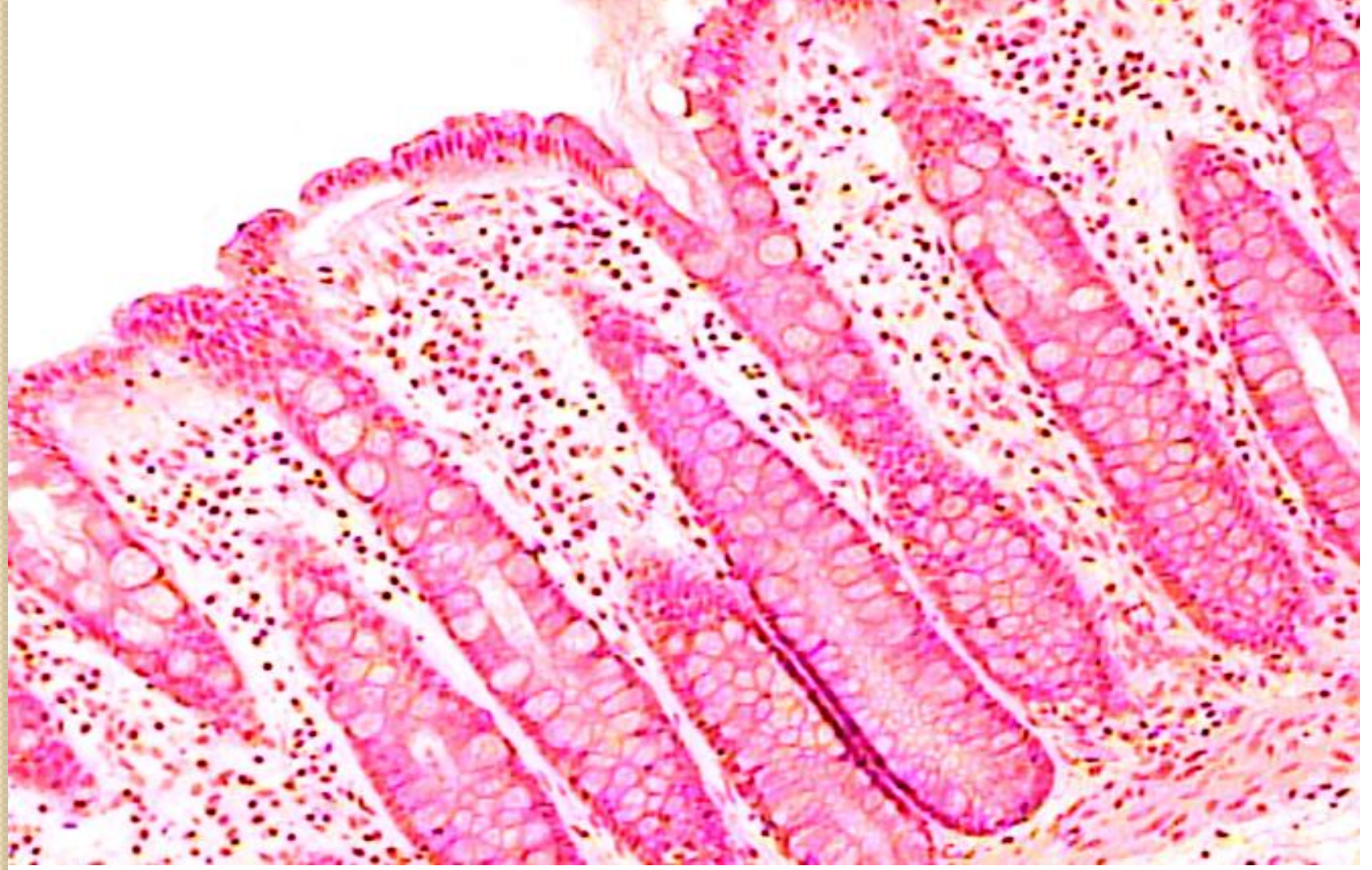


a) Identify the gland shown and give two reasons (3mks)

b) Name the cell types found in this gland and indicate their functions (4mks)

c) State one unique thing about this gland compared to others (1mk)

13

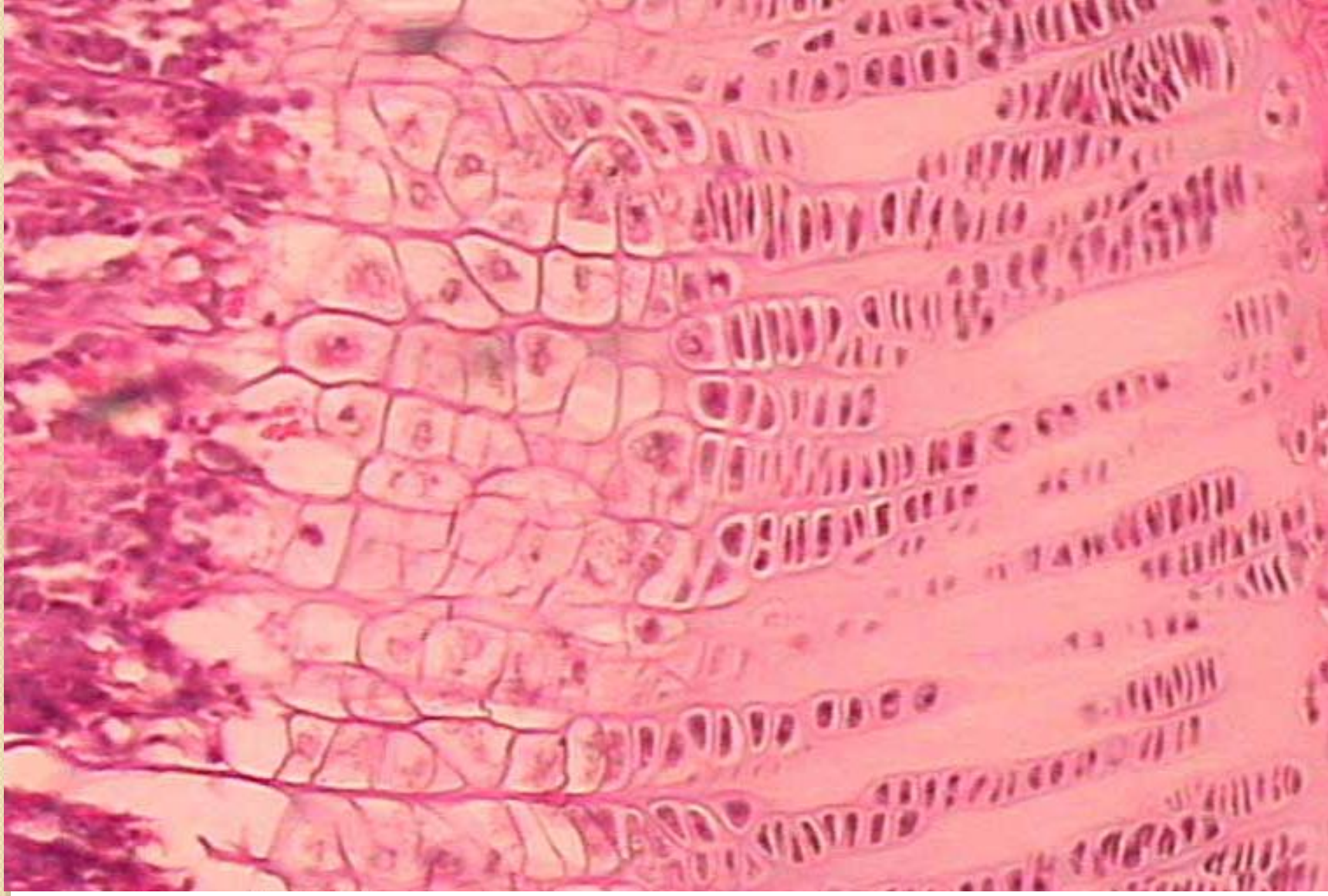


a) Identify the part of the alimentary canal shown and give two reasons (3mks)

b) Name the cell types found in this region (2mks)

c) Name three unique gross features of this region (3mks)

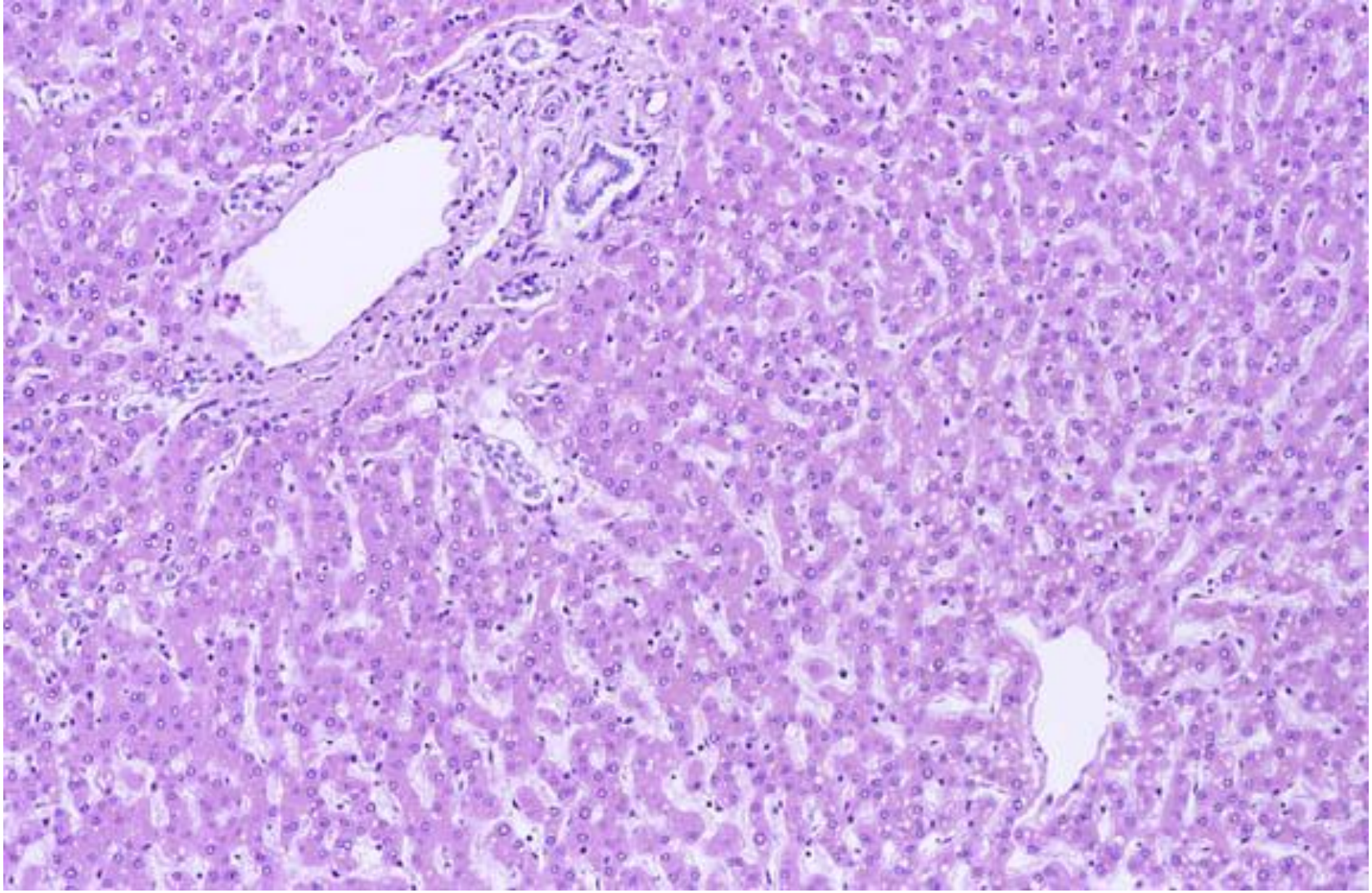
14



a) Identify the structure shown and give two reasons (3mks)

b) Name the different zones of this structure (5mks)

15

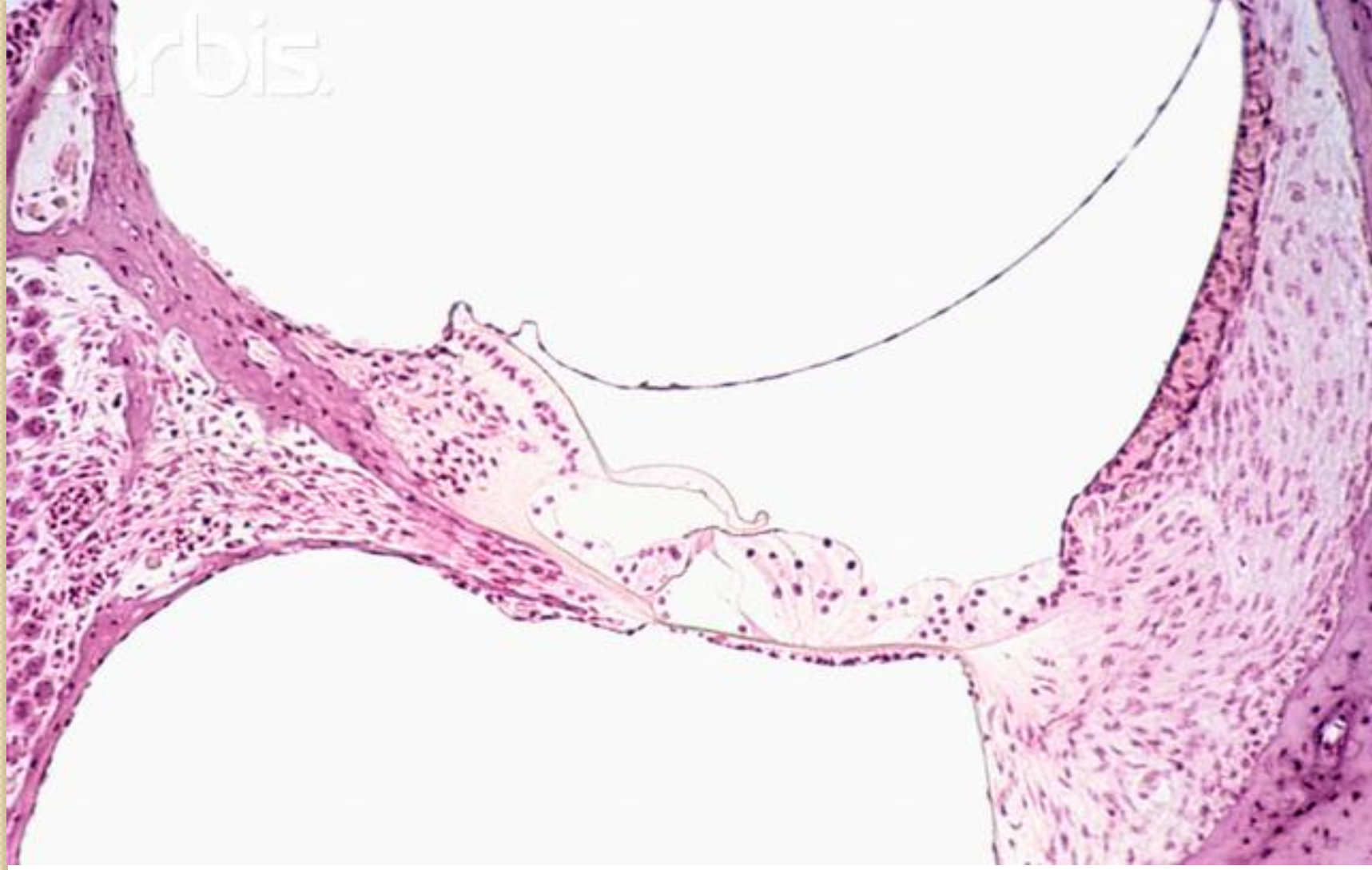


a) Identify the organ shown and give three reasons (4mks)

b) Name the cell types found in this organ and indicate their functions (3mks)

c) State the functional lobule of this structure (1mk)

16

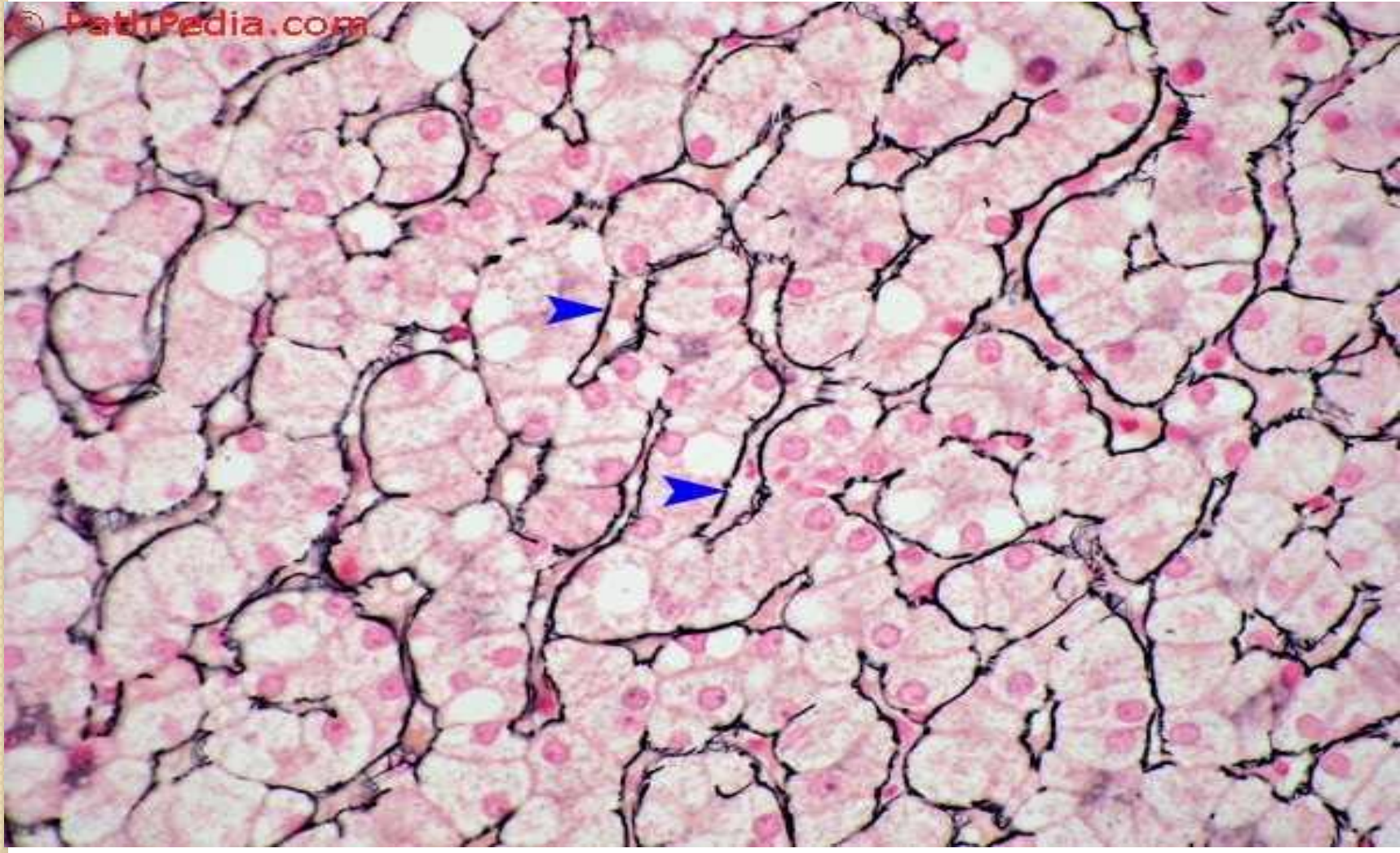


a) Identify the structure shown and give two reasons (3mks)

b) Name three cell types found in this structure (3mks)

c) Name two components of the membranous labyrinth (2mks)

17

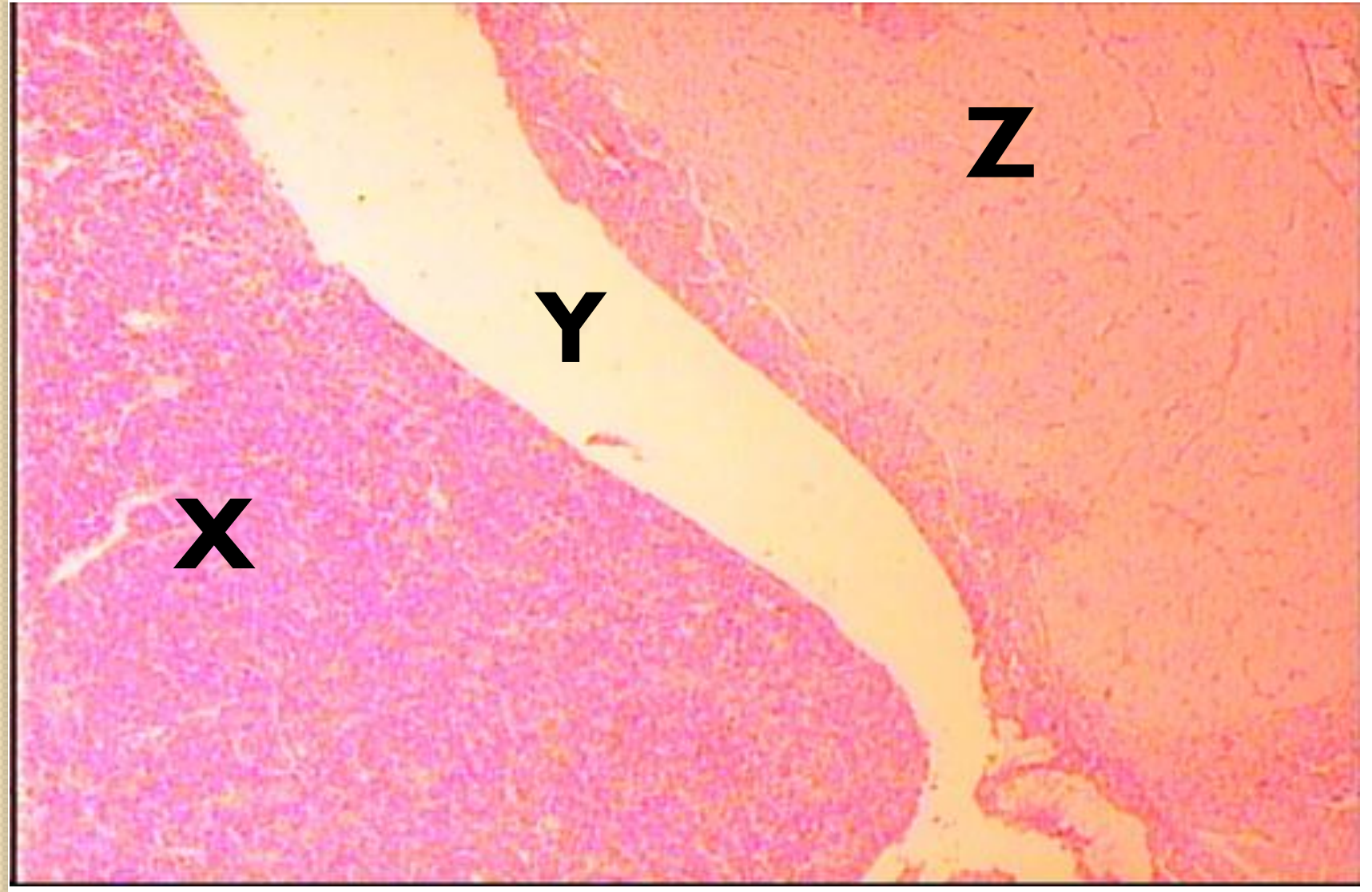


a) Identify the connective tissue fibre shown and give two reasons (3mks)

b) Name four regions where this connective tissue fibre is predominantly located (4mks)

c) State the main function of this fibre (1mk)

18



a) Identify the gland shown and give two reasons (3mks)

b) Name two cell types found in region Z (2mks)

c) State the categories of secretory cells in region X in humans (3mks)

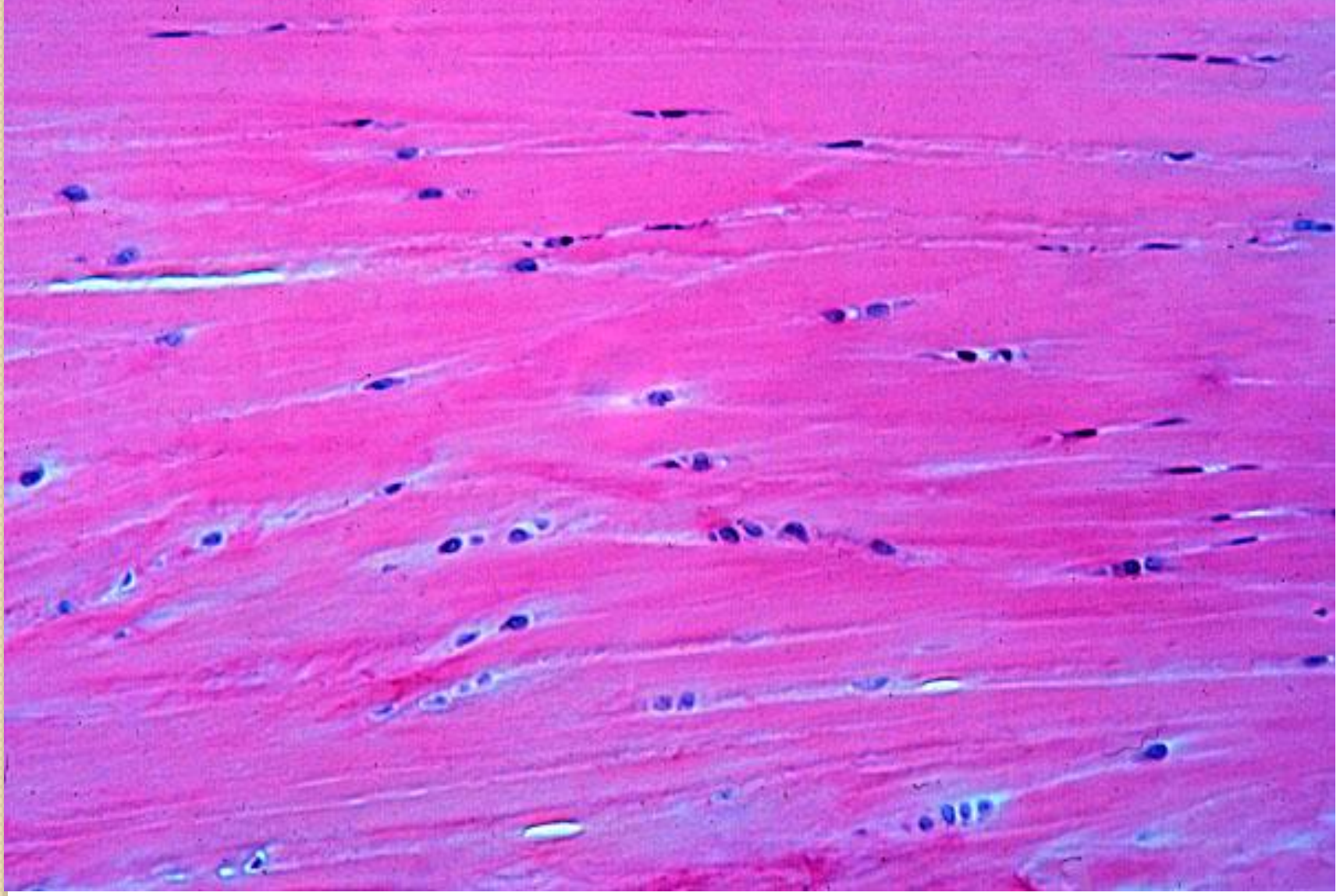
19

a) Identify the tissue shown and give two reasons (3mks)

b) State the ultrastructural features unique to this particular tissue (2mks)

c) Apart from muscle, name three other cells with propulsive property (3mks)

20

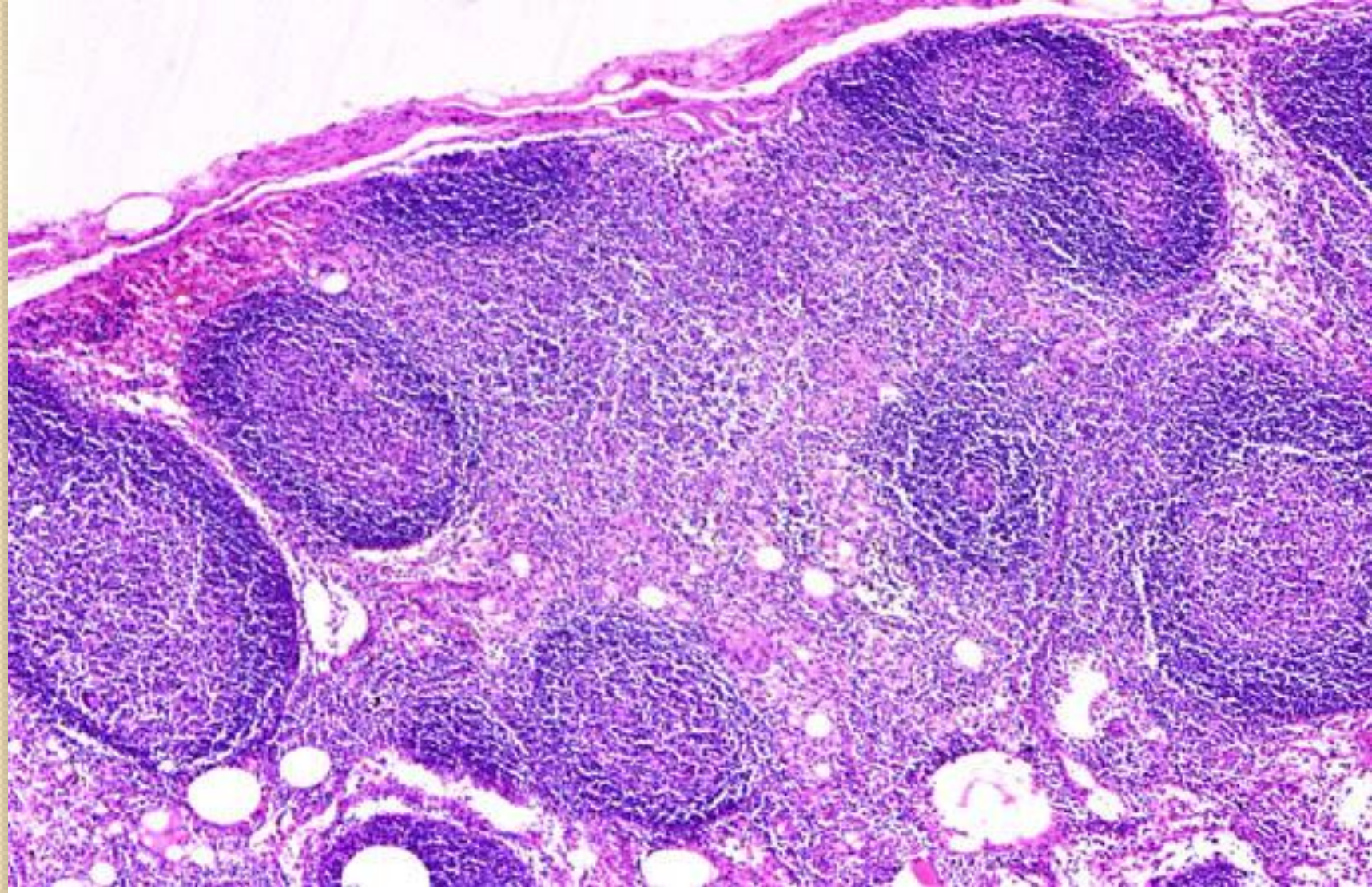


a) Identify the tissue shown and give two reasons (3mks)

b) State the connective tissue fibre type abundant in this tissue throughout life (1mk)

c) State the distribution and function of this tissue (4mks)

21

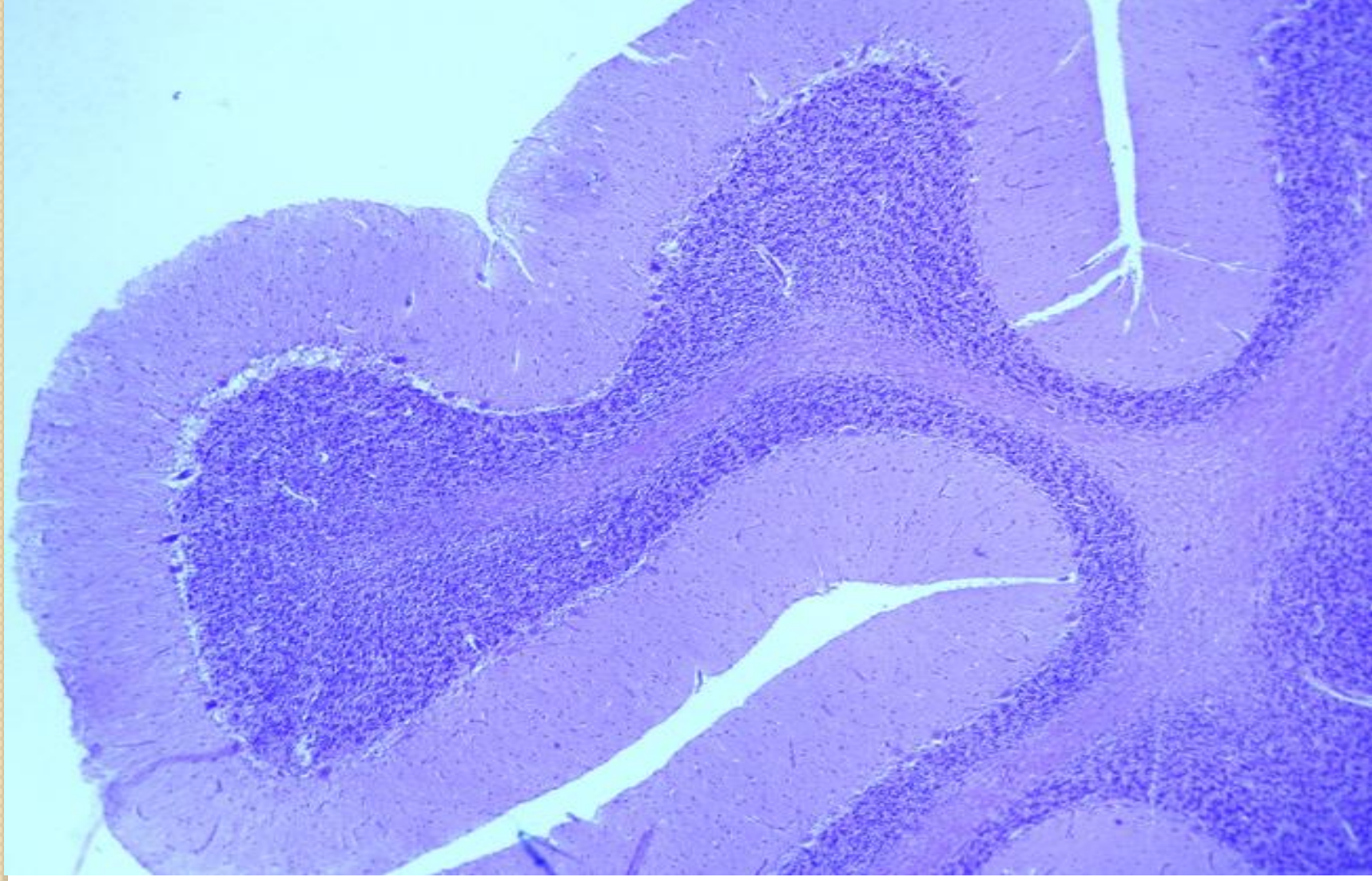


a) Identify the structure shown and give three reasons (4mks)

b) Name two components of the medulla of this structure (2mks)

c) Name two classes of adaptive immune response (2mks)

22

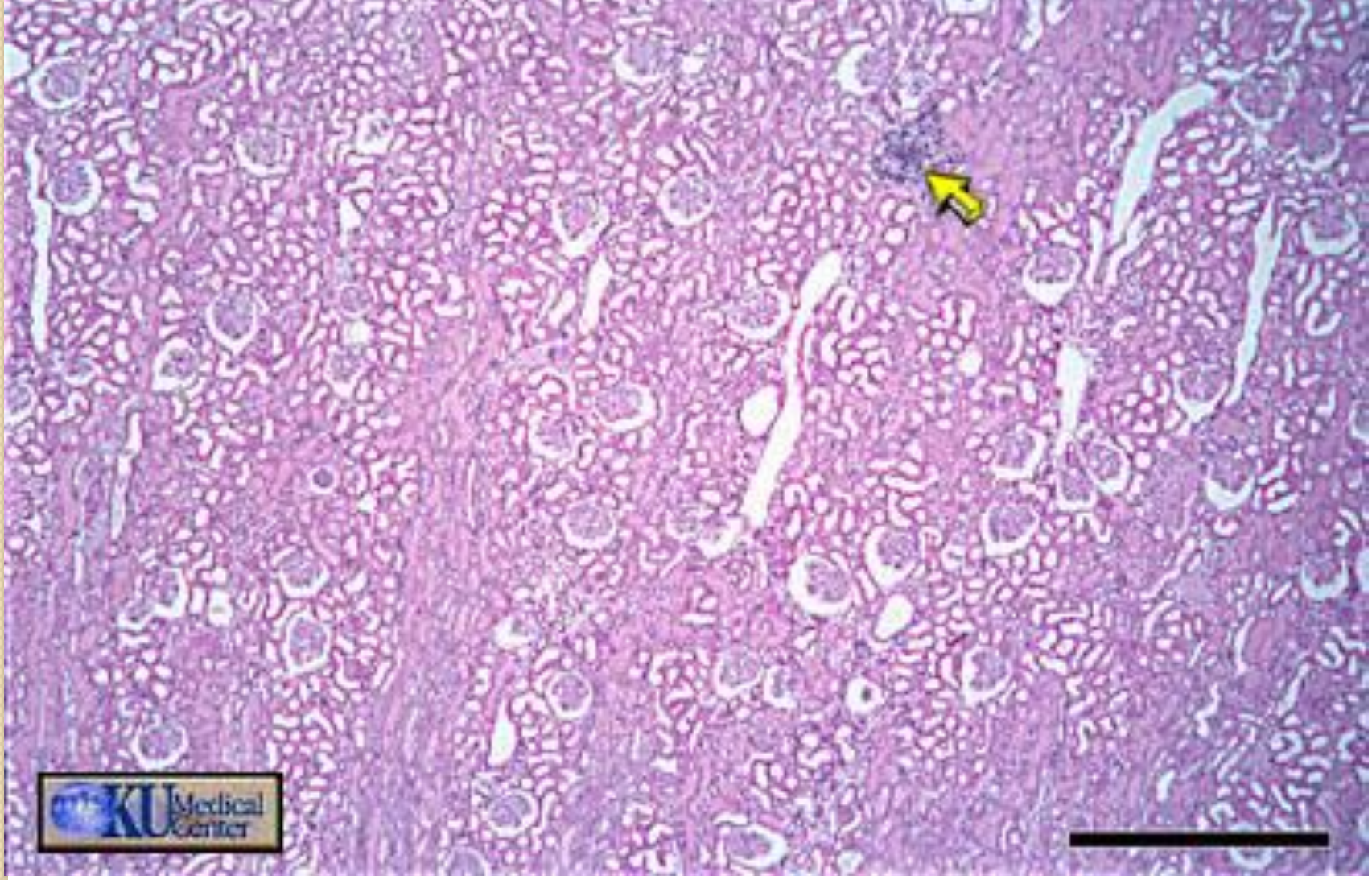


a) Identify the structure shown and give two reasons (3mks)

b) Name the layers of the outer zone of this organ (3mks)

c) Name two classes of fibres which terminate in this organ (2mks)

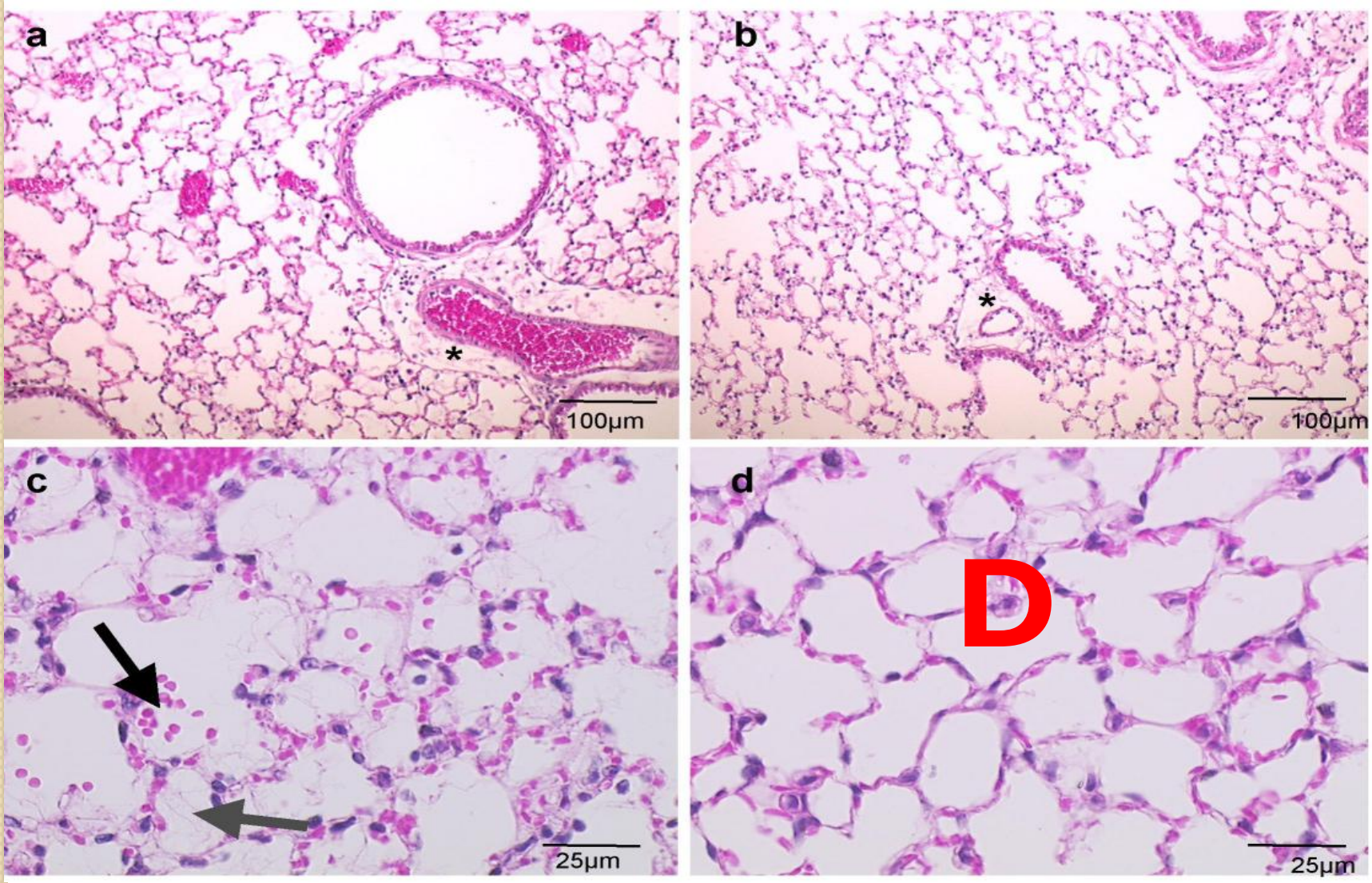
23



a) Identify the organ shown and give three reasons (4mks)

b) State the ultrastructural features of most lining epithelial cells in this organ (4mks)

24

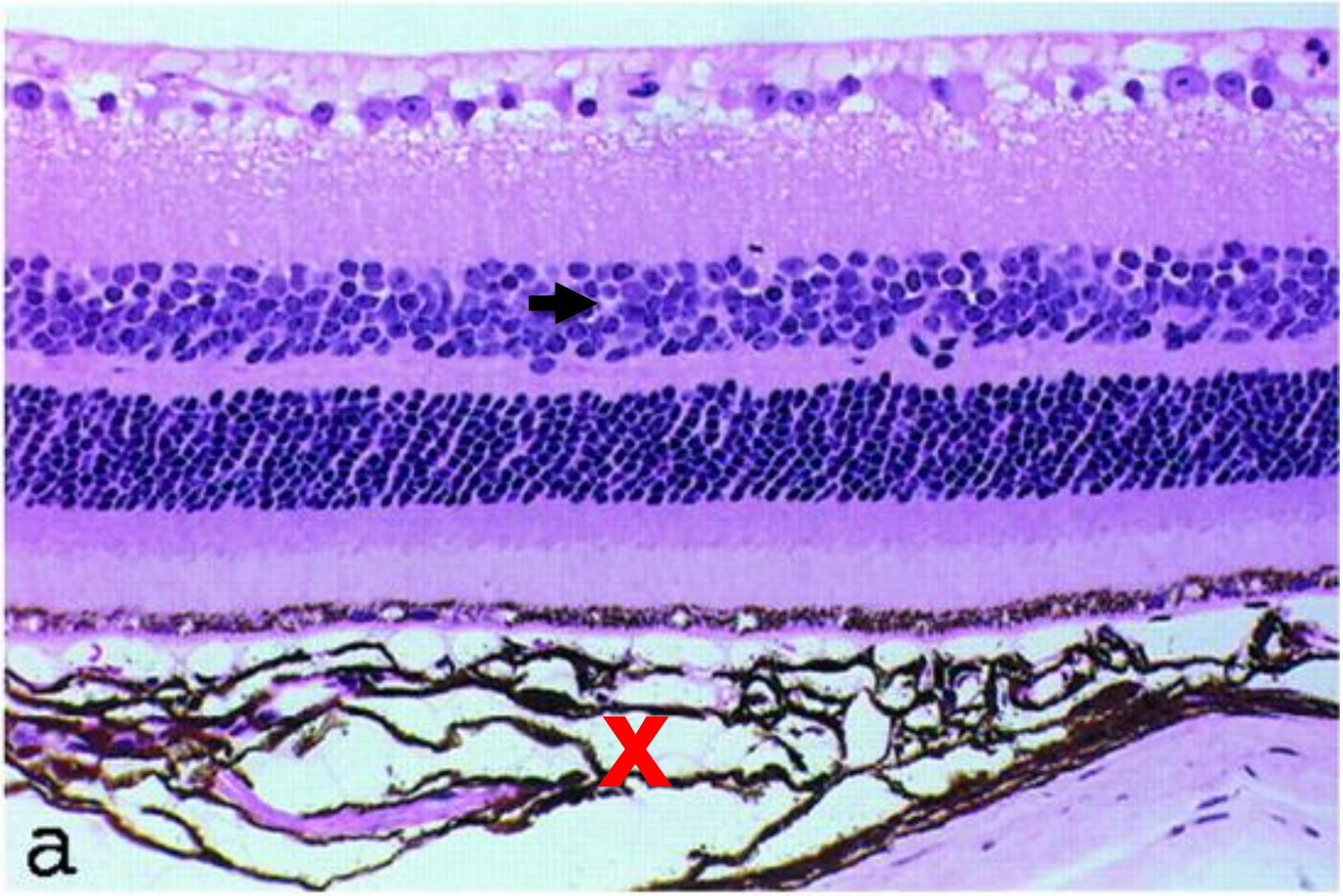


a) Identify the organ shown and give two reasons (3mks)

b) List two resident cell types in zone D and indicate their functions (2mks)

c) State the components of the functional unit of this organ (3mks)

25

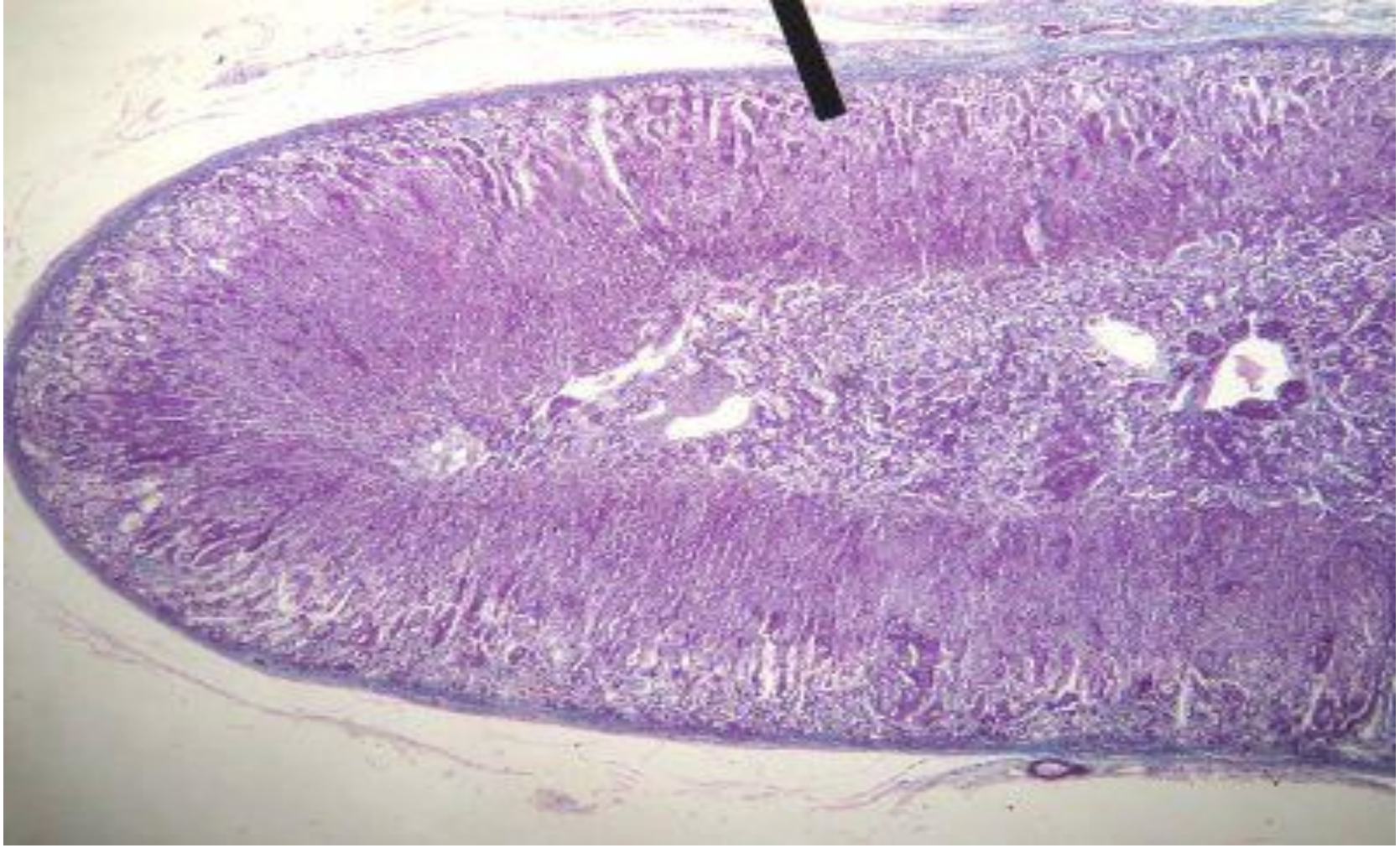


a) Identify the structure shown and give two reasons (3mks)

b) State the categories of the cells found in the layer pointed (3mks)

c) Apart from X, name two other components of this layer (2mks)

26

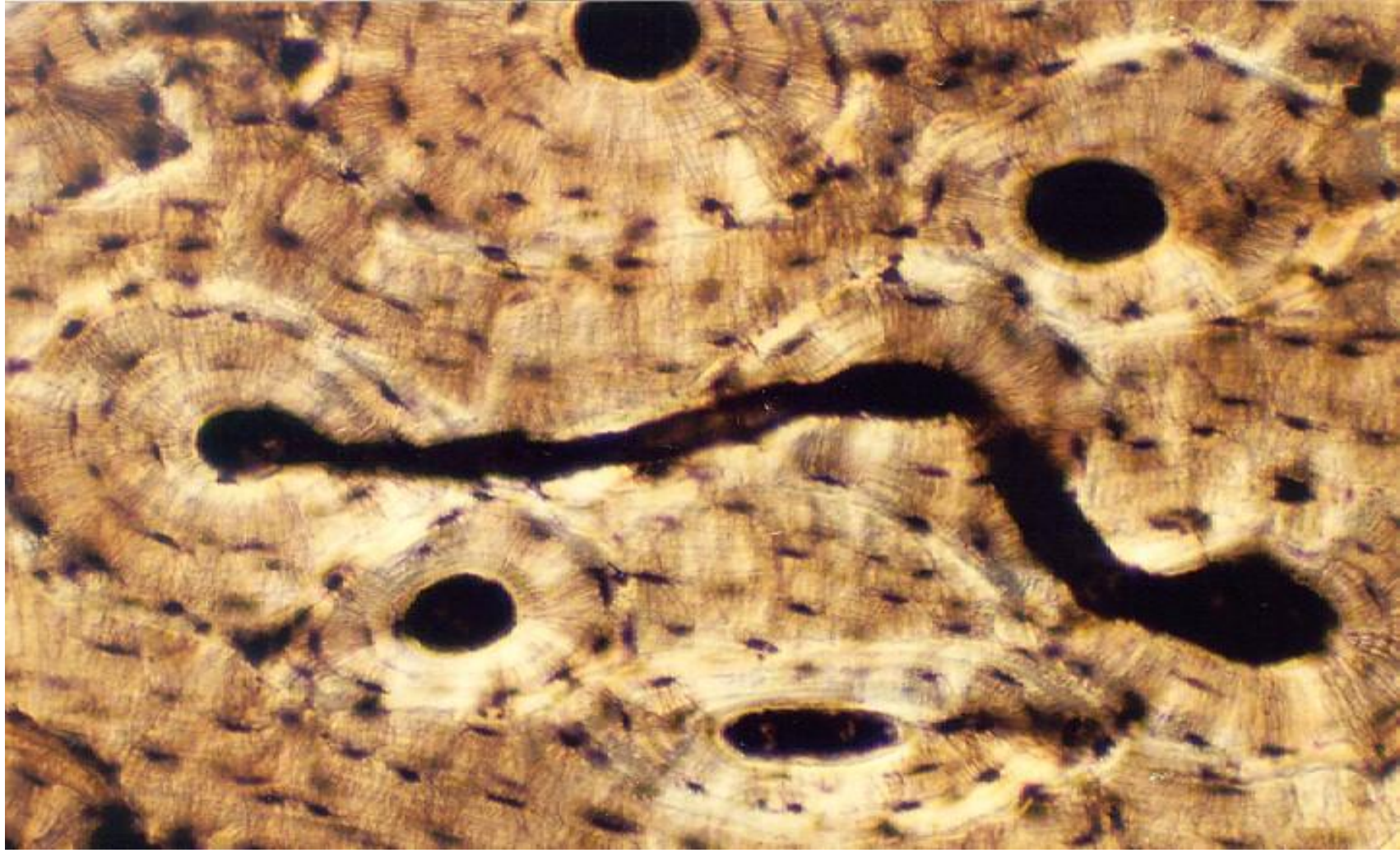


a) Identify the slide shown and give three reasons (4mks)

b) Outline the various factors influence the secretions of this gland (3ms)

c) State one metabolic disease associated with abnormality of the outer layer of this gland (1mk)

27



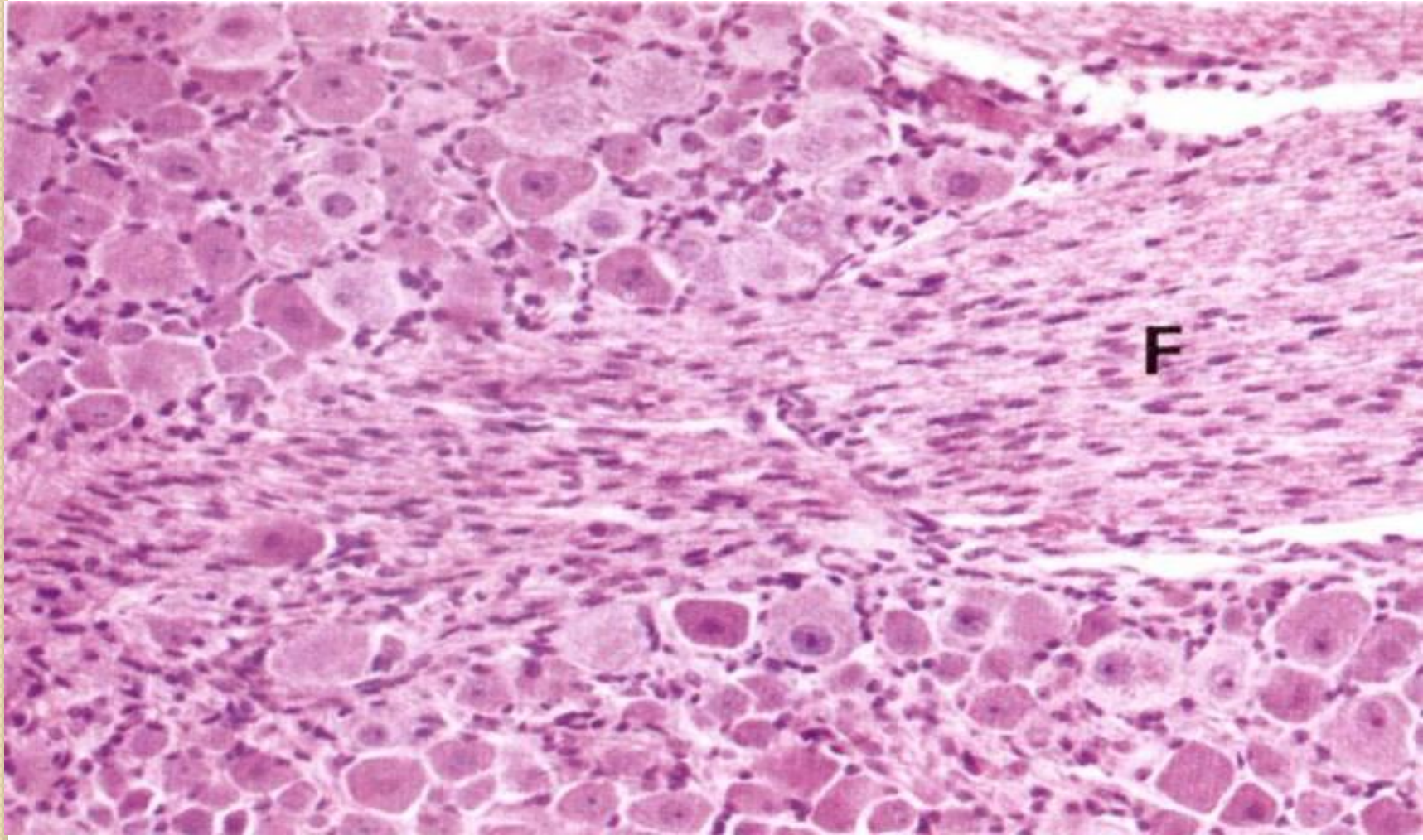
a) Identify the tissue shown and give three reasons (4mks)

b) Name the cell types of this tissue and indicate their functions (4mks)

c) Name and state the components of the outer layer of this tissue (3mks)

d) State the function of this outer layer (1mk)

28



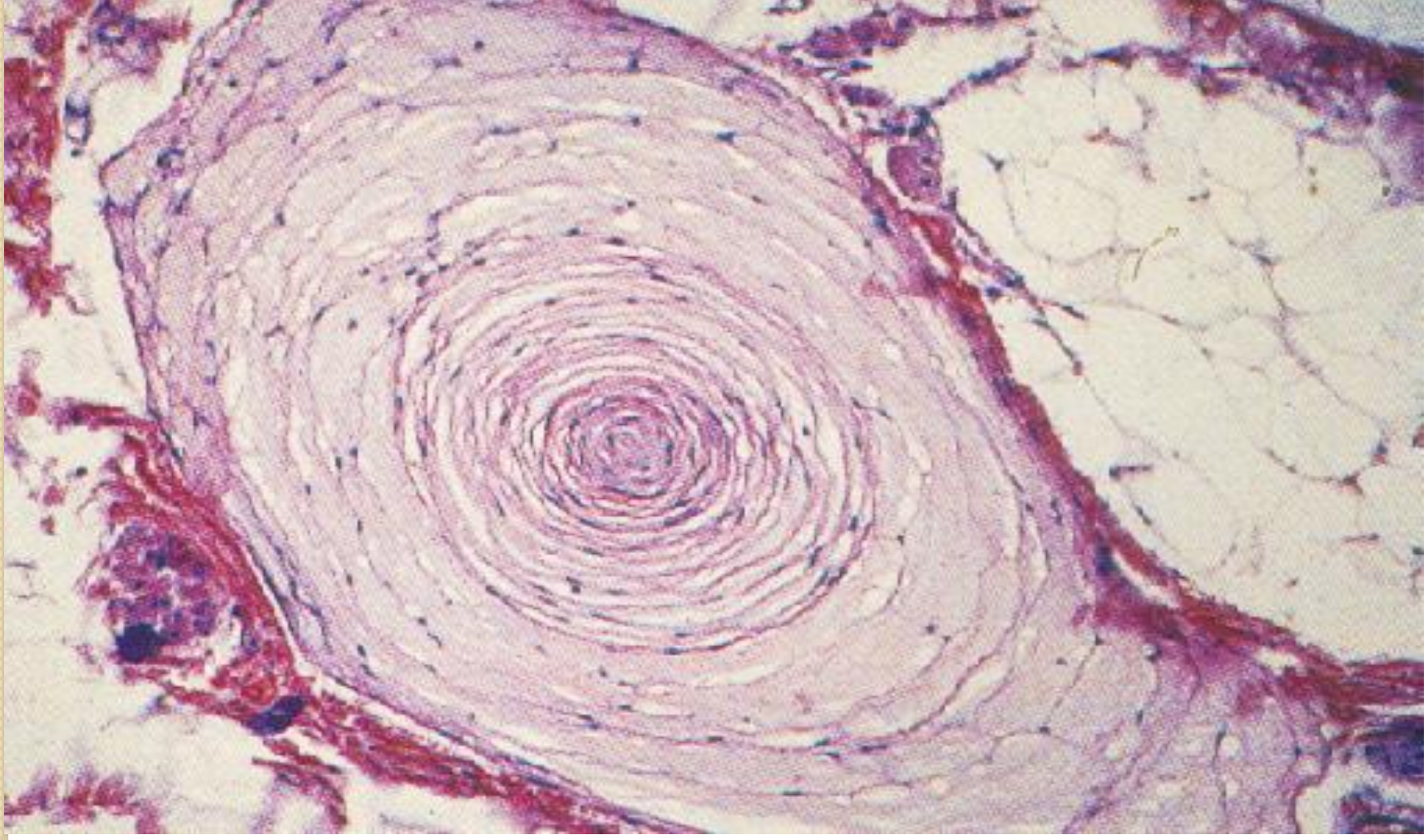
a) Identify the slide shown and give three reasons (4mks)

b) Name two main cell types found in this structure (2mks)

c) Name one microorganism that commonly infect this structure (1mk)

d) State the embryonic origin of this structure (1mk)

29

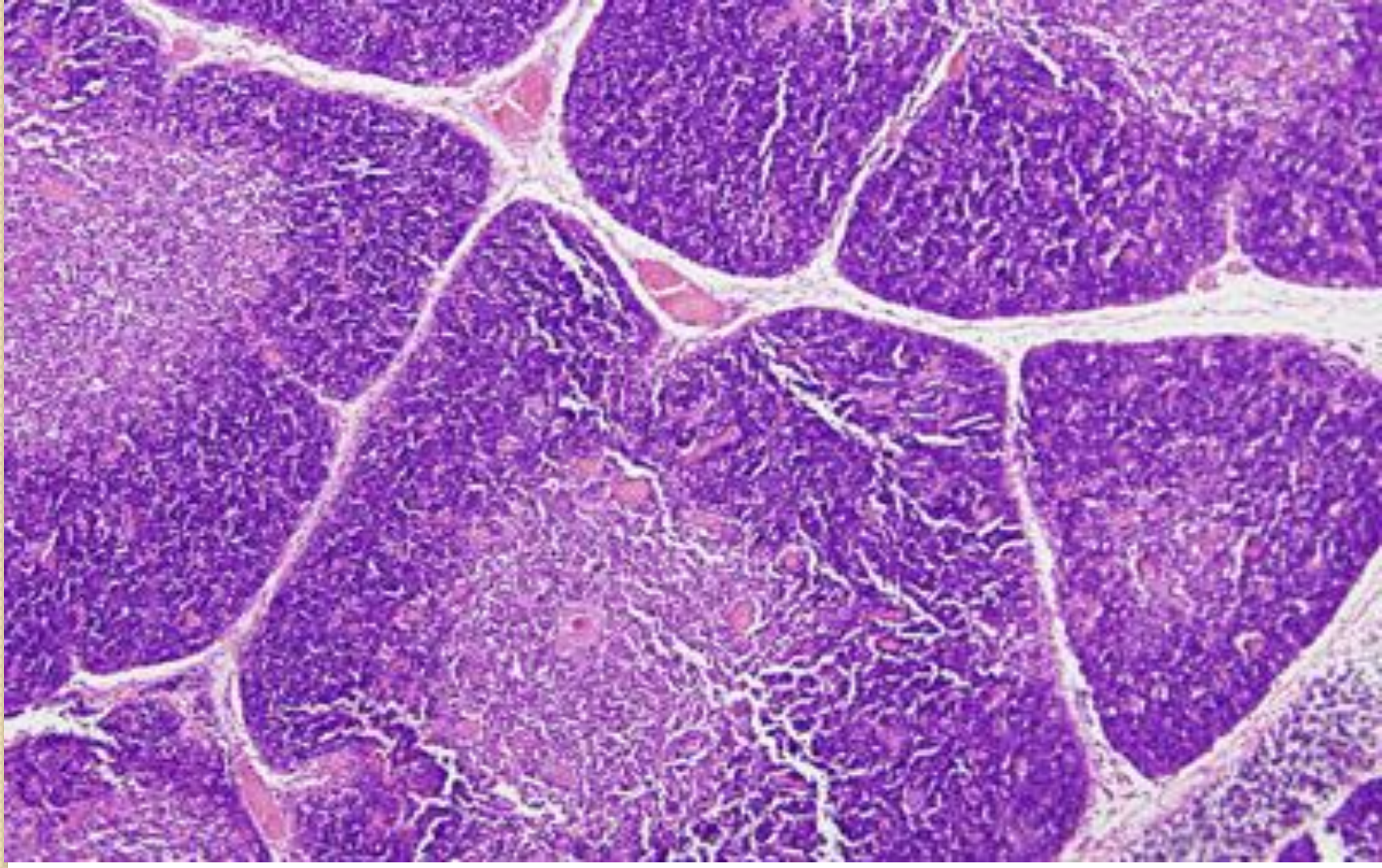


a) Identify the structure shown and give three reasons (4mks)

b) Name two sensory modalities perceived by this structure (2mks)

c) Name two parts of the dermis (2mks)

30

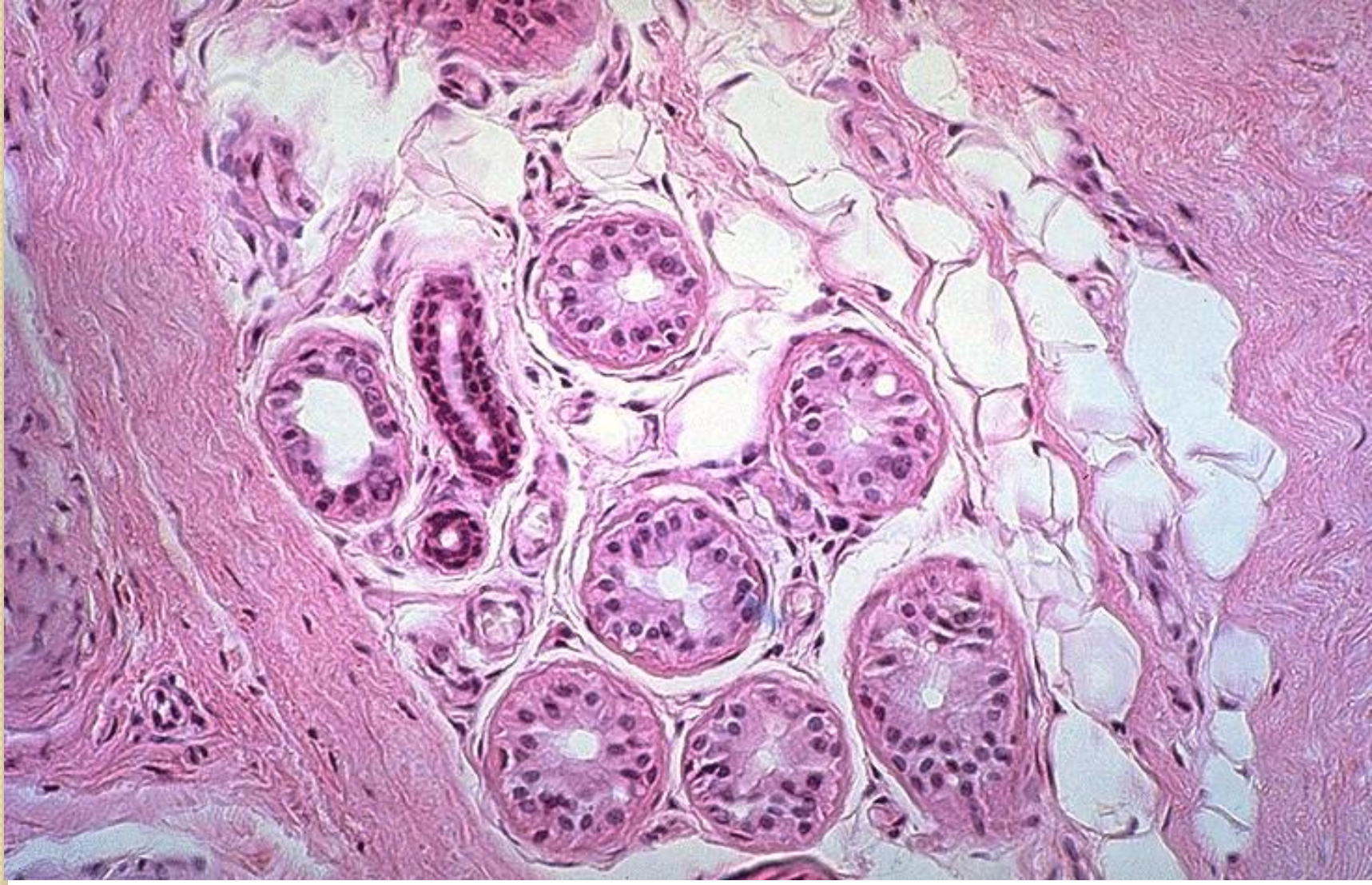


a) Identify the slide shown and give three reasons (4mks)

b) Name the cell four main cell types found in this organ (4mks)

c) Name four hormones produced by this organ (4mks)

31

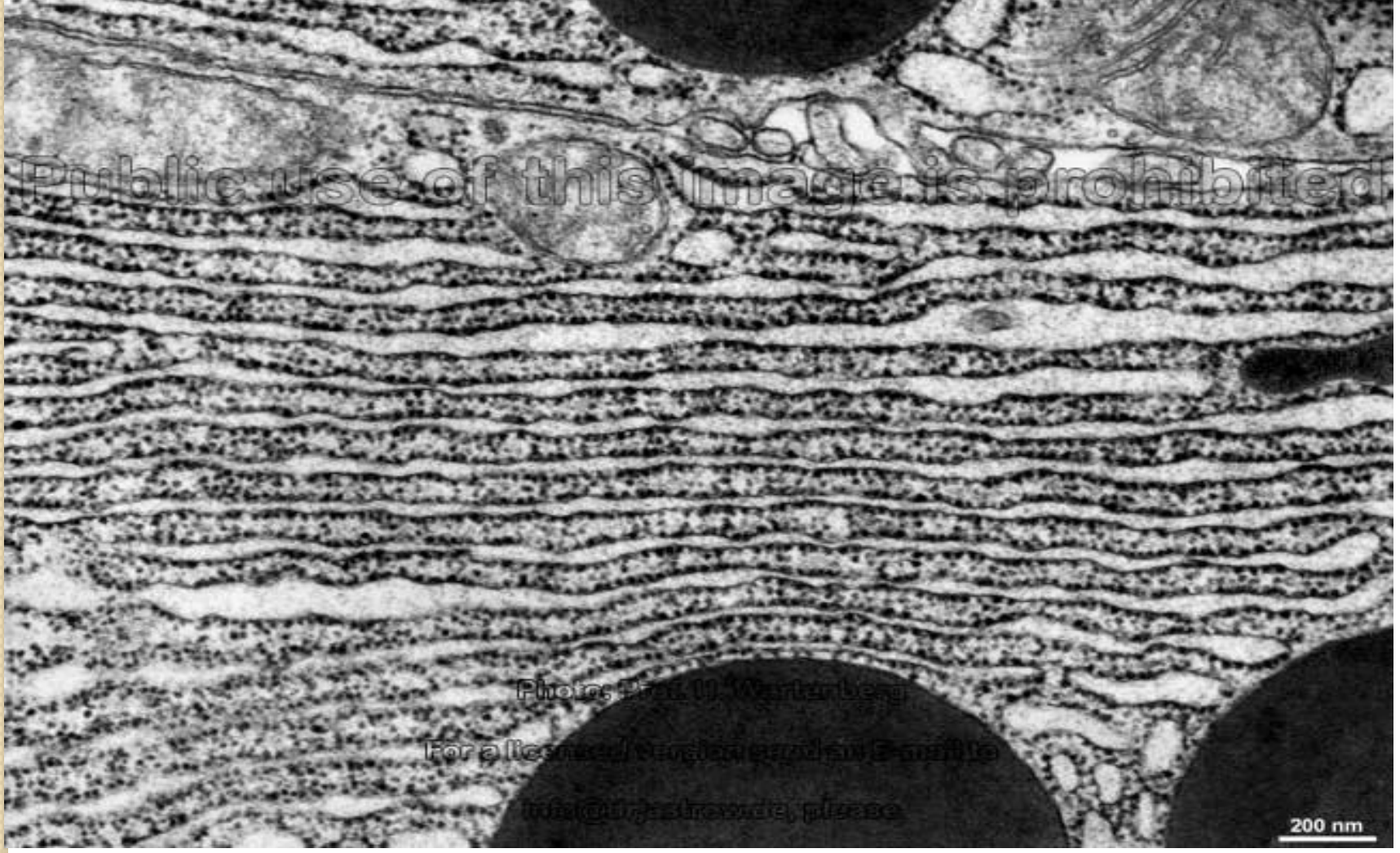


a) Identify the structures shown and give two reasons (3mks)

b) Name the components of the blood thymus barrier (3mks)

c) Name two cells of neural crest origin found in the skin (2mks)

32

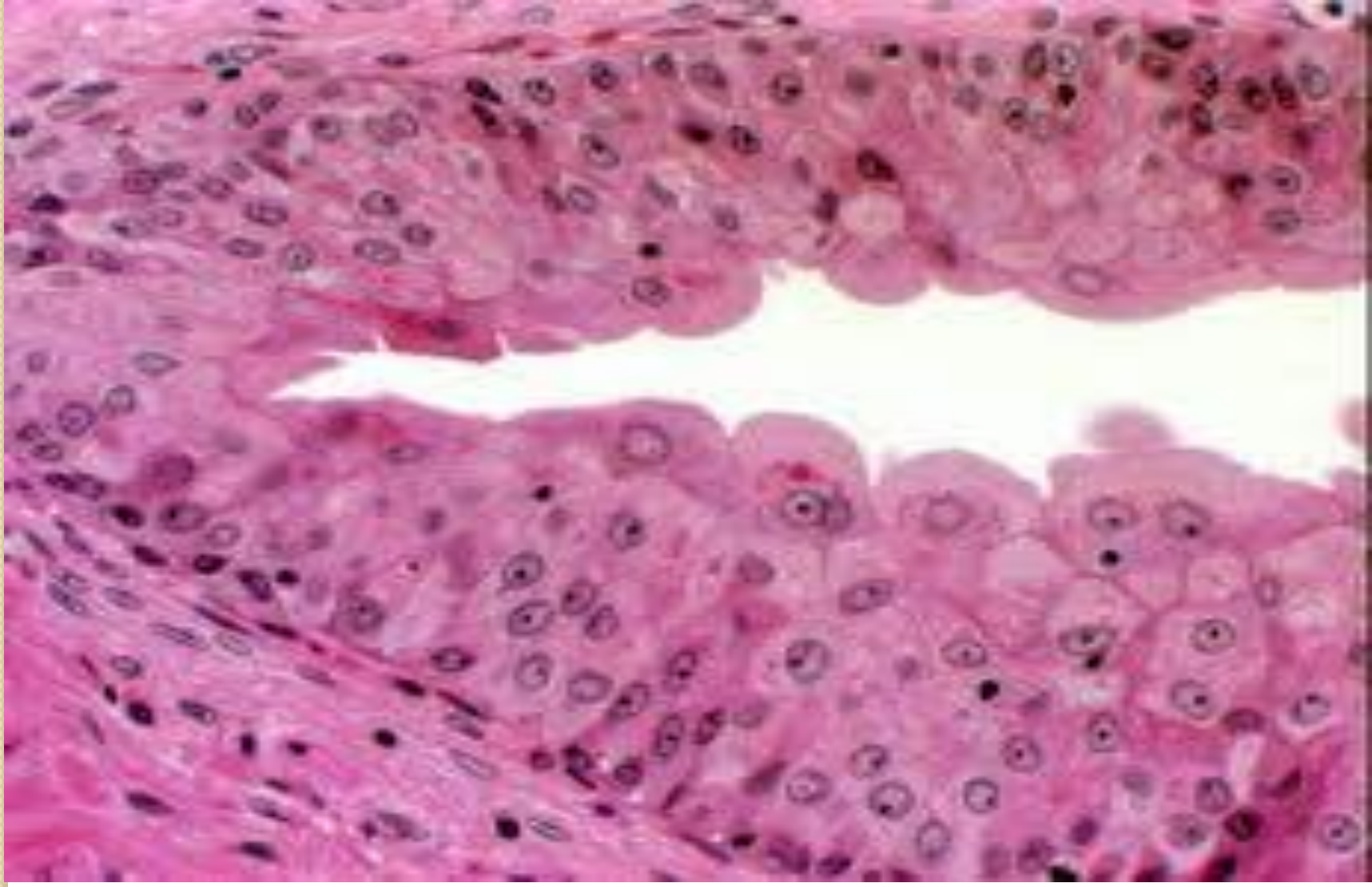


(a) Identify the cell organelles shown and indicate their main function (2mks)

(b) Name the components of the cytoskeleton (3mks)

(c) State three ultrastructural features of hepatocytes (3mks)

33

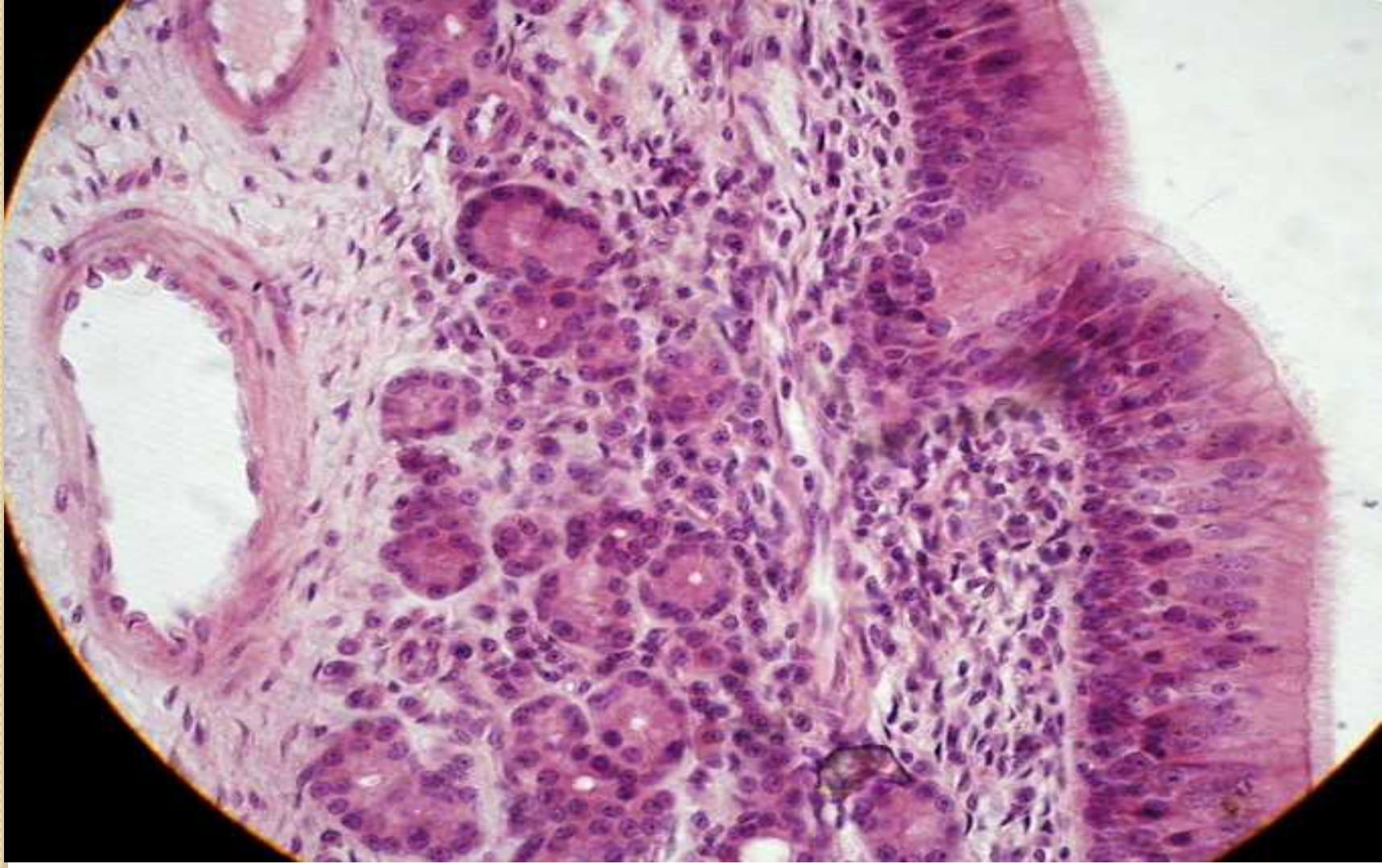


(a) Identify the type of epithelium shown and give 2 reasons (3mks)

(b) State the distribution of this type of epithelium (3mks)

(c) Name two cell types of the parathyroid gland (2mks)

34

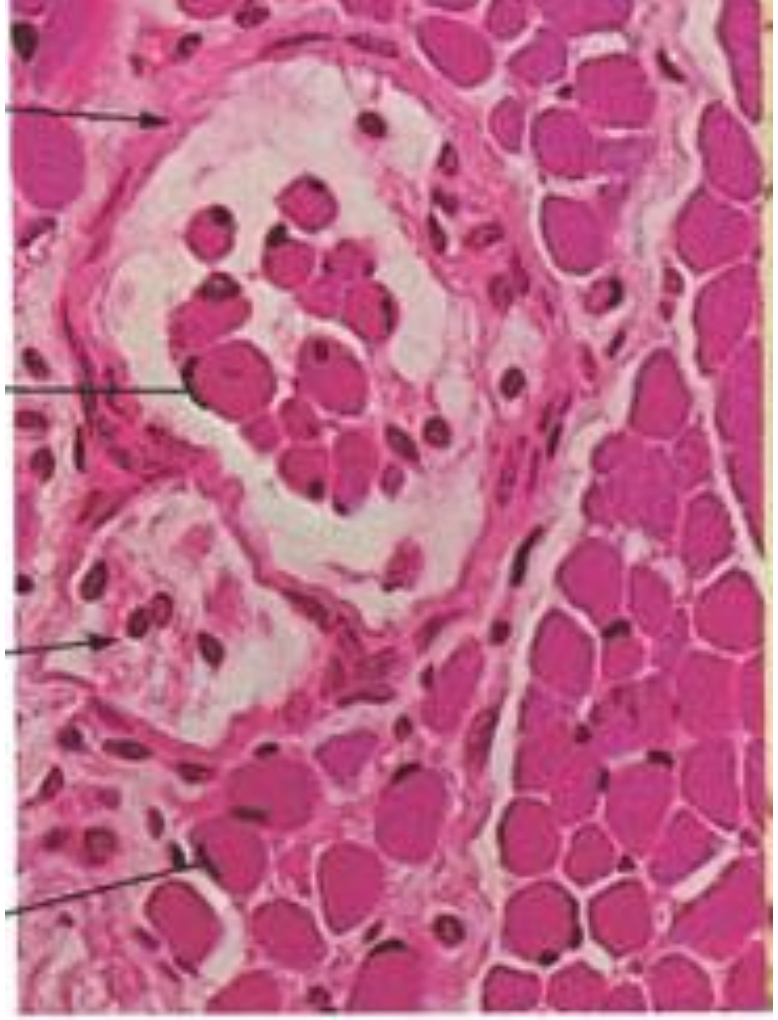


(a) Identify the type of epithelium shown and give two reasons (3mks)

(b) State the specific location of this epithelium (2mks)

(c) Name three cell types found in this epithelium (3mks)

35

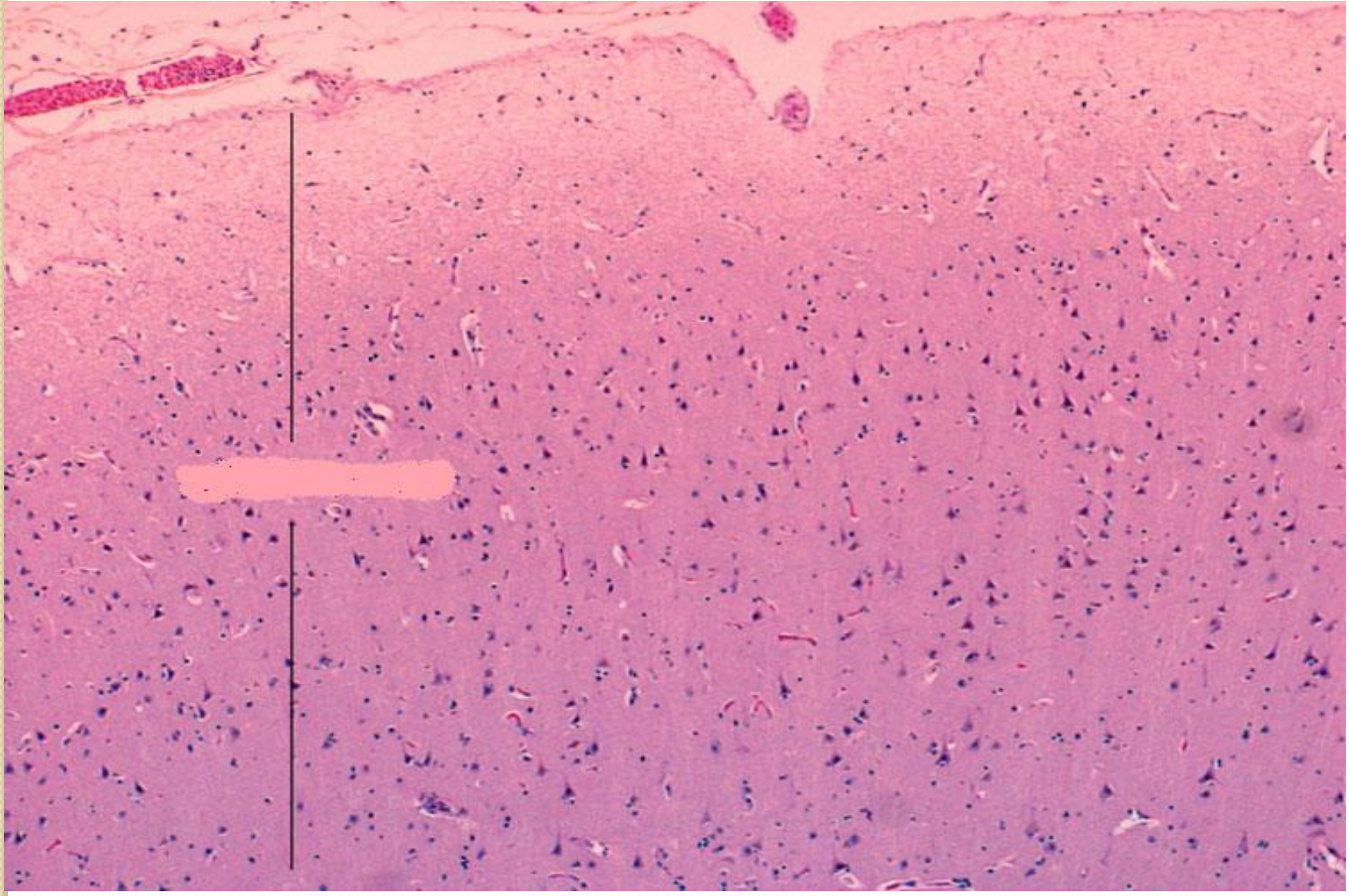


(a) Identify the structure shown and give two reasons (3mks)

(b) Name the components of this structure (2mks)

(c) State the sensory modalities transmitted by neurons from this structure (2mks)

36



(a) Identify the slide shown and give two reasons (3mks)

(b) State the functional unit of this region and list its characteristics (3mks)

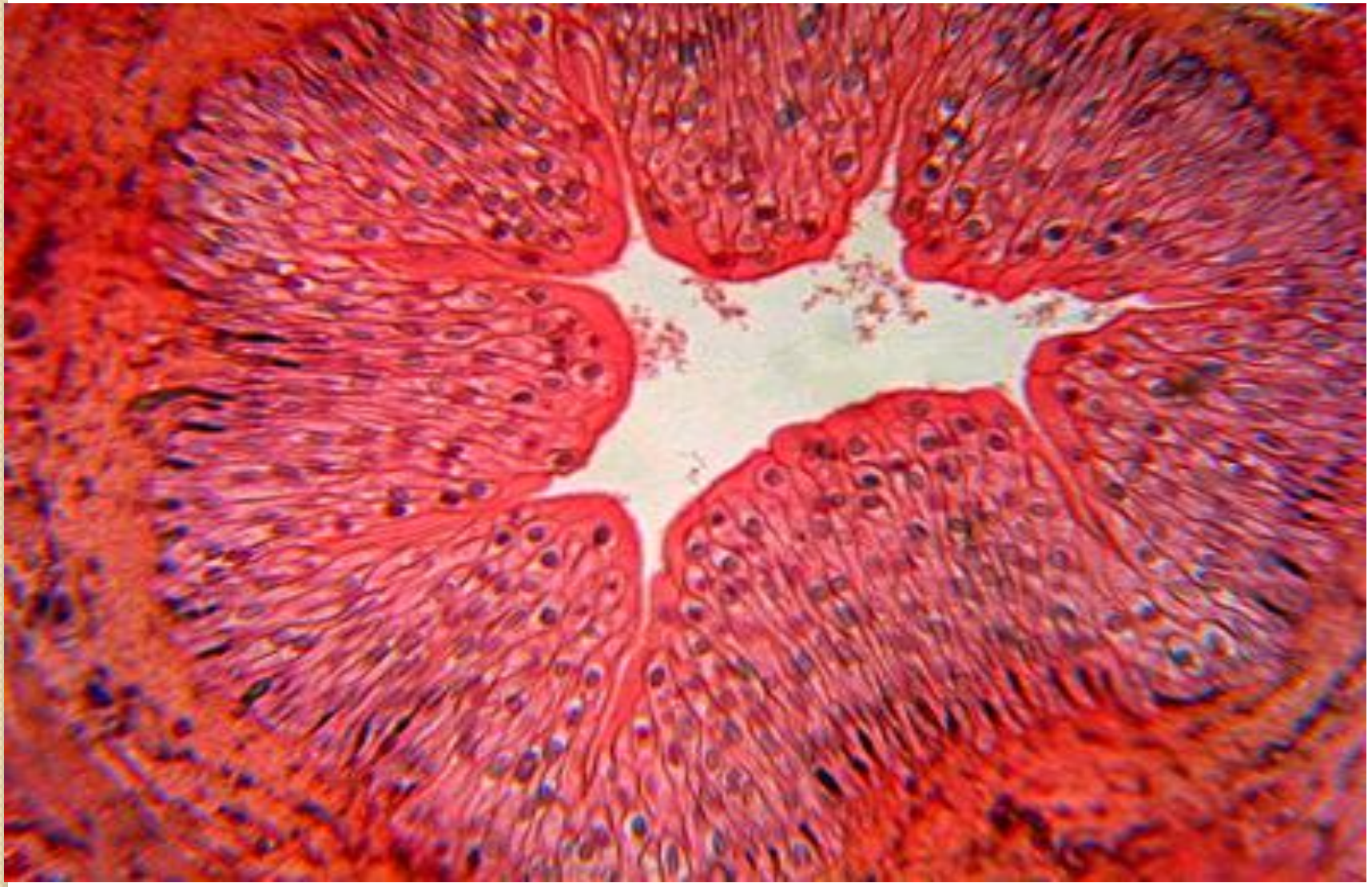
(c) Name two types of astrocytes (2mks)

37

(a) Identify the slide shown and give two reasons (3mks)

(b) Name the cell types found in this organ and indicate their functions (5mks)

38

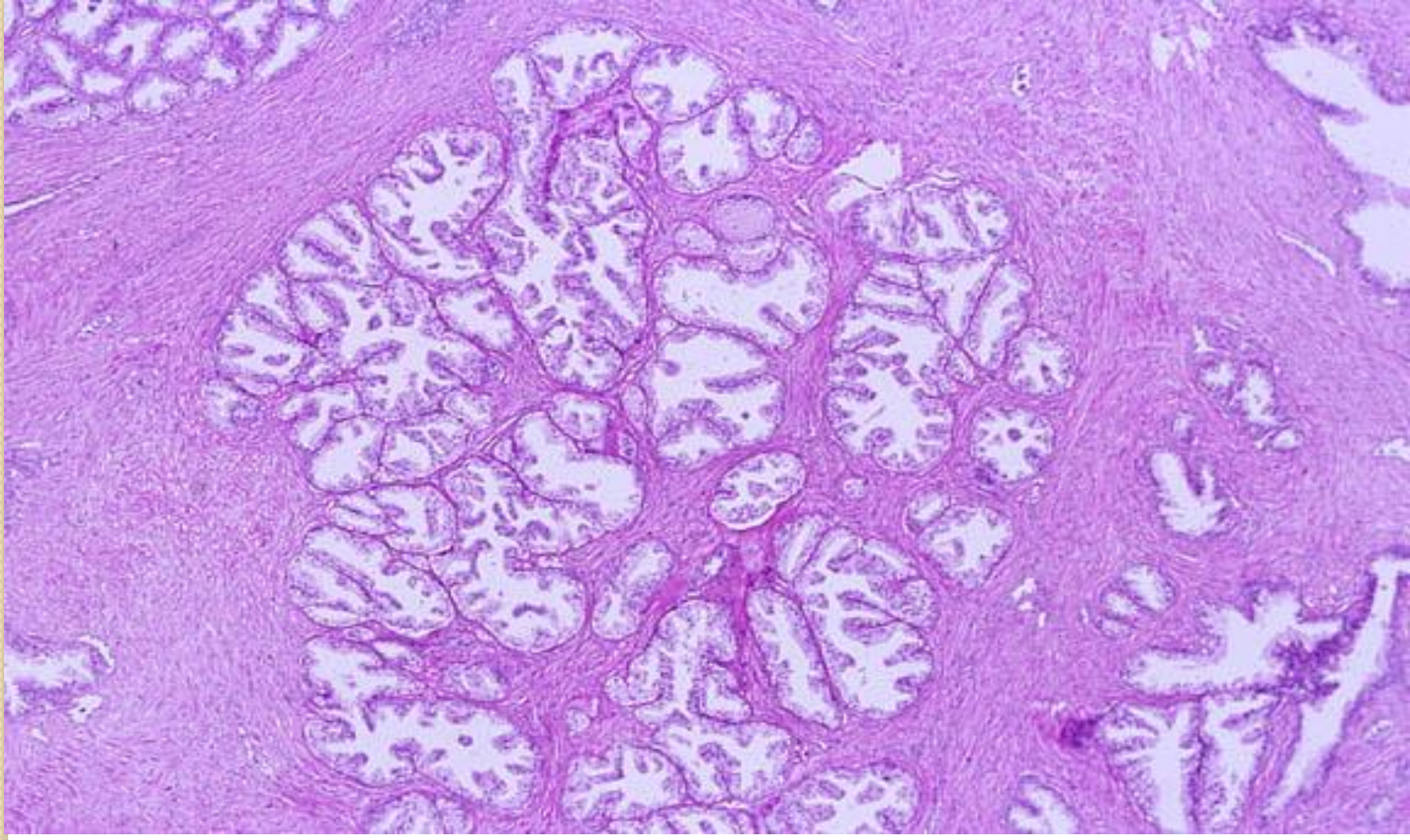


(a) Identify the slide shown and give two reasons (3mks)

(b) Name two cells responsible for myelination (2mks)

(c) Name the parts of the neurohypophysis (3mks)

39



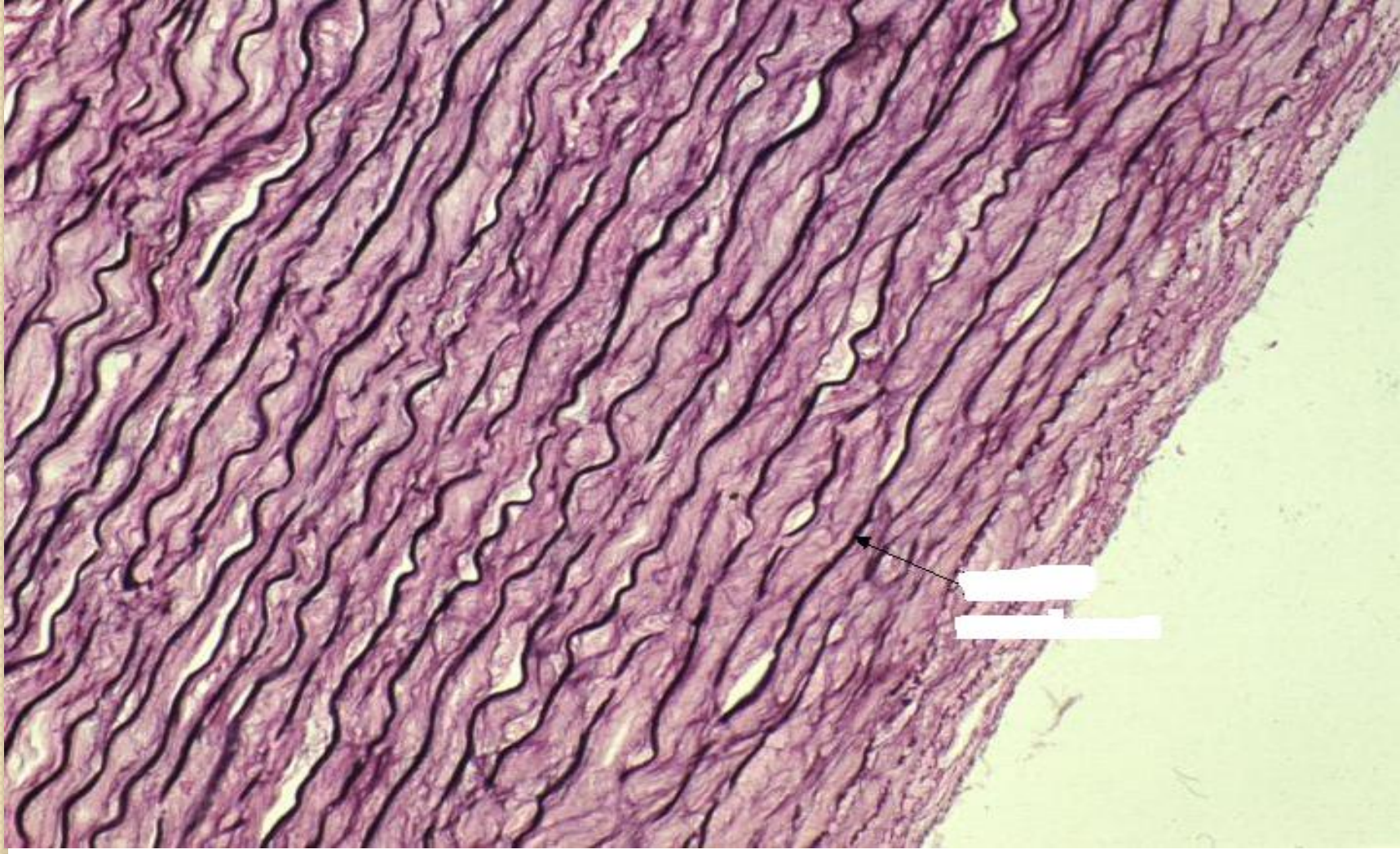
(a) Identify the gland shown and give two reasons (3mks)

(b) Name one factor used as a tumor marker for this gland (1mk)

(c) List the components of the endocrine ovary (2mks)

(d) Name the layers of the endometrium (2mks)

40



(a) Identify the type of artery shown and give one reason (2mks)

(b) Name two components of the tunica intima of a blood vessel (2mks)

(c) List two capillary types apart from continuous and indicate where they are located (4mks)

SECTION II

MARKING SCHEME

QUESTION 1 (8mks)

- A – Pyramidal
  - Pyramid shaped cell body
  - Apical dendrite
- B – Purkinje
  - Flask shaped cell body
  - Dendritic aborization
- C– Astrocytes
  - Bushy

- A – Cerebral Cortex
- B – Cerebellar Cortex
- C – Nervous System

QUESTION 2 (7mks)

a) Lactating mammary gland
   - Lobulated
   - Well developed duct system
   - Well developed alveolar
   - ?Nipple, Lactiferous ducts, skin appendage

b) Prolactin, Oxytocin, Estrogen

c) Acinar/alveolar cell, Myoepithelial cell

QUESTION 3 (8mks)

a) Skeletal muscle

- Striated, Multinucleated, Peripheral nuclei, Elongated

b) Myofilaments; Z, M, H, I; T-tubules, Sarcoplasmic reticulum, abundant mitochondria

c) Sarcomere

QUESTION 4 (8mks)

a) Spleen
   - Parenchyma has Red and White Pulp
   - Capsulated, with incomplete trabeculae
   - Central artery

b) Immunity, RBC sequestration

c) Alveolar epithelium, Capillary endothelium, Fused basal lamina

QUESTION 5 (8mks)

a) Pancreas
   - Two portions, acinar and islets
   - Lobulated
   - Ducts

b) X
   - Acinar – exocrine secretion
   - Centroacinar – duct
   - Pancreatic stellate cells – myofibroblast like

c) Y
   - Alpha – Glucagon
   - Beta – Insulin
   - Delta – Somatostatin, Gastrin
   - PP – Pancreatic polypeptide

QUESTION 6 (8mks)

a) Esophagus
   - Stratified squamous non-keratinizing epithelium
   - Esophageal glands in submucosa
   - Longitudinal folds
   - ?Adjacent to trachea

b) Epithelial change from one type to another
   - Risk of developing adenocacinomar

c) Gastric gland cell types
   - Parietal – HCl, Intrinsic factor
   - Chief – Pepsin(ogen), Gastric lipase
   - Mucous Neck - Mucous, Bicarbonate
   - ?Others - EC, D, G

QUESTION 7 (8mks)

a) Elastic Cartilage
   - Cells in Lacunae, Elastic fibres in matrix, perichondrium

b) Pinna of ear, Epiglottis, Small Laryngeal cartilages

c) Perichondrium – Inner cellular, Outer fibrous

QUESTION 8 (8mks)

a) Submandibular gland
   - Mixed serous and mucoid portions
   - Serous demilunes

b) Striated, Intercalated

c) Salivon - terminal acini, intercalated duct, striated duct, and excretory duct

QUESTION 9 (8mks)

a) Duodenum
   - Villi
   - Submucosal glands
   - Crypts of Lieberkuhn

b) Protective properties
   - Bicarbonate,
   - MALT,
   - Highly regenerative

c) Adaptations
   - Long,
   - Villi,
   - Microvilli,
   - Muscularis mucosa

QUESTION 10 (8mks)

a) Thoracic
   - Lateral Horn;
   - Small ventral horn;
   - Gracile and Cuniete fasiculi

b) Tracts
   - 26 – Dorsal Spinocerebellar
   - 27 – fasciculus Cunietus

c) Anterior spinal artery

d) Microorganisms
   - 11 – Poliomyelitis Virus
   - 28 – Treponema pallidum (Spirochetes)

QUESTION 11 (8mks)

a) Circumvallate papilla
   - Shape
   - Groove
   - Stratified squamous para-keratinizing epithelium

b) Cell types in taste buds
   - Taste (Gustatory, receptor cell)
   - Sustentacular
   - Basal

c) Glossopharyngeal nerve

d) Glands of Von Ebner

QUESTION 12 (8mks)

a) Thyroid
   - Follicles – follicular cells, colloid
   - Parafollicular cells
   - Lobes

b) Cell types
   - Follicular - T3; T4
   - Parafollicular (C-Cells) – Calcitonin

c) Stores secretion extracellularly

QUESTION 13 (8mks)

a) Colon
   - Long intestinal glands
   - Abundance of goblet cells
   - Absence of villi
   - Lymphoid aggregations

b) Columnar cells, goblet cells, enteroendocrine cells

c) Appendices epiploicae; Teniae coli; Haustrations

QUESTION 14

a) Epiphyseal growth plate
   - Stacked cells parallel to the long axis of the bone

b) Zones
   - Resting
   - Proliferative
   - Maturation and Hypertrophy
   - Calcified cartilage
   - Ossification

QUESTION 15

a) Liver
   - Hepatocytes in cords
   - Central vein
   - Portal triad
   - Liver sinusoids

b) Cell types
   - Hepatocytes – "main functional cells"
   - Ito/stellate – fat storing – Vit A
   - Kuppfer cell – phagocytic

c) Hepatic Acinus

QUESTION 16

a) Organ of Corti
   - Bony labyrinth, scalae, membranes, hair cells, spiral ganglion, stria vascularis

b) Cell types
   - Outer & Inner Hair cells
   - Outer & Inner Pillar cells
   - Outer & Inner Phalangeal cells (of Deiters)
   - Cells of Hensen
   - Cells of Claudius

c) Membranous labyrinth
   - Utricle – semicircular ducts
   - Saccule – cochlear duct

QUESTION 17 (8mks)

a) Reticular fibres (Collagen type III)
   - Highly branched
   - Net-like framework
   - Between each cell

b) Liver, spleen, bone marrow, adipose, lungs, basal lamina, lymphoid tissue

c) Support of delicate tissue/structure

QUESTION 18 (8mks)

a) Pituitary gland
   - Two lobes; fibrous and glandular
   - Inter-glandular cleft
   - Pars intermedia

b) Cells of neurohypophysis
   - Pituicytes; Axonal fibres

c) Categories of cells od adenohypophysis
   - Chromophobes
   - Acidophils – somatotrophs; mammotrophs
   - Basophils – thyrotrophs; corticotrophs; gonadotrophs

QUESTION 19 (8mks)

a) Cardiac Muscle
   - Cross striations
   - 1-2 nuclei
   - Branched
   - Intercalated discs

b) Diads, intercalated discs

c) Myofibroblast, myoepithelial, myoid

QUESTION 20 (8mks)

a) Fibrocartilage
   - Chondroblasts in lacunae
   - Fibrous matrix

b) Collagen type I

c) Articular discs, symphyseal joints, IVDs, tendon to bone attachment

QUESTION 21 (8mks)

a) Lymph node
   - Lymphoid follicles
   - Germinal centers
   - Capsulated

b) Medullary cords, medullary sinus

c) Humoral; Cellular

QUESTION 22 (8mks)

a) Cerebellum
   - Foliation
   - Cortex and medulla
   - Molecular and granular layers of the cortex

b) Molecular; Granular; Purkinje cell layer

c) Mossy; Climbing

QUESTION 23 (8mks)

a) Kidney
- Renal corpuscles
- Medullary rays
- Highly tubular structure
- ?Capsule

b) Features of active ion transport
- Basal invagination
- Microvilli
- Tight junctions
- Abundant basal mitochondria

QUESTION 24 (8mks)

a) Lungs
   - Alveoli; Airways with cartilage

b) Alveolar
   - Pneumocyte type I – lining
   - Pneumocyte type II – surfactant; regenerative

c) Respiratory bronchiole; alveolar duct; alveoli

QUESTION 25 (8mks)

a) Retina
   - Many layers
   - Choroid

b) Association; supporting; 1st order neuron

c) Iris; Cilliary body

QUESTION 26 (8mks)

a) Adrenal gland
   - Cortex and medulla
   - Ill defined cortical zones
   - Central vein in the medulla

b) Control
   - Angiotensin II – Gromerulosa
   - ACTH – Fasciculata
   - Sympathetic System – Medulla

c) Cushing's syndrome; 2° diabetes

QUESTION 27 (12mks)

a) Bone
   - Harvasian canals; lamellae systems; osteocytes in lacunae

b) Cells
   - Osteoblasts – synthetic
   - Osteoblasts – mature (maintain matrix)
   - Osteocytes – resorption

c) Periosteum
   - Outer fibrous and inner cellular

d) Interstitial growth

QUESTION 28 (8mks)

a) Sensory ganglion
   - Cell body of 1st order neuron
   - Neurosatelite cells
   - Open faced (euchromatic) nuceli
   - Axinal bundles
   -

b) Neurosatelite cell; Cell body of 1st order neuron

c) Varicella Zoster Virus

d) Neural Crest

QUESTION 29 (8mks)

a) Paccinian corpuscle
   - Onion-like lamellae
   - Capsulated
   - In hypodermis
   - ?nerve

b) Vibration; Pressure

c) Reticular; Papillary

QUESTION 30 (12mks)

a) Thymus
- Trabeculae
- Parenchyma has cortex and medulla
- Hassal corpuscles

b) Cells
- Thymocytes - T cell precursors
- Epithelial reticular cells
- Macrophages
- Thymic nurse cells

c) Hormones
- Thymosin; Thymopoietin; Thymulin; Thymus humoral factor

QUESTION 31 (8mks)

a) Sweat glands
   - Tubular structure cut in cross section
   - Dermo-hypodermal junction

b) Continuous blood capillaries; epithelial reticular cells; thick basal lamina

c) Merkel; Melanocytes

QUESTION 32 (8mks)

a) RER – secretory protein synthesis

b) Microtubules, microfilaments, intermediate filaments

c) Features of protein synthesizing cell
   - RER
   - Golgi
   - Mitochondria

QUESTION 33 (8mks)

a) Transition/Urothelium
   - Umbrella shaped surface cells
   - Varying cell layers

b) Ureter, Urinary bladder, Proximal urethra, male genital ducts

c) Oxyphil; Principal

QUESTION 34 (8mks)

a) Olfactory epithelium

b) Nasal Cavity
   - Roof;
   - Superior turbinate;
   - Upper part of nasal septum

c) Basal; Supporting; Olfactory cell

QUESTION 35 (8mks)

a) Neuromuscular spindle
   - Capsulated;
   - Intrafusal and extrafusal fibres

b) Annulospiral; Flower spray

c) Proprioception; vibration

QUESTION 36 (8mks)

a) Cerebral cortex
   - Highly cellular
   - Ill defined zones

b) Module
   - Columnar/vertical arrangement
   - Lateral inhibition

c) Fibrous; Protoplasmic

QUESTION 37 (8mks)

a) Testes

- Seminiferous tubules
- Interstitial cells of Leydig
- Spermatozoa

b) Cells

- Sertoli – supporting
- Leydig – Endocrine
- Myoid – Propulsive
- Cells of spermatogenic series – germ cells

QUESTION 38 (8mks)

a) Ureter
   - Urothilium
   - Star shaped lumen
   - Muscular wall

b) Schwann; Oligodendrocytes

c) Neuronypophysis
   - Pars nervosa,
   - Infundibular stalk,
   - Median Eminence

QUESTION 39 (8mks)

a) Prostate
   - Compound tubuloalveolar glands
   - Fibromuscular stroma/trabeculae
   - ?Prostatic urethra

b) Prostate Specific Antigen (PSA)

c) Follicular cells; Theca Interna cells; Corpus Luteum

d) Stratum functionalis; Stratum basalis

QUESTION 40 (8mks)

a) Elastic/conducting artery

b) Internal elastic lamina; Subendothelial zone; Vascular endothelium

c) Capillaries
   - Sinusoidal – liver; hematopoietic tissues
   - Fenestrated – kidneys

THE END