Excerpts from Upjohn's "Look-Alikes in Histology" To be used for review in Histology/MicroAnatomy by Medical students in the Duke University School of Medicine.

(GO TO PAGE 5 to see TOC for what's included)

(GO TO PAGE 8 to start review immediately)

This material is excerpted from a paperbound booklet, printed/published several times from 1972 to 1993, as one of Upjohn's SCOPE Manual series , offered at no charge to medical students and medical schools on request for many years. It was produced and offered by The Upjohn Company of Kalamazoo, MI (now a subsidiary/partner with Pharmacia). The booklet's author, Dr.Ira Telford, retired from the Chair of Anatomy at George Washington University School of Medicine in 1972, and died in 1998 at age 90. Because the booklet is no longer being publicized or offered to us, we decided to convert a large part of it to a computer-viewable file.

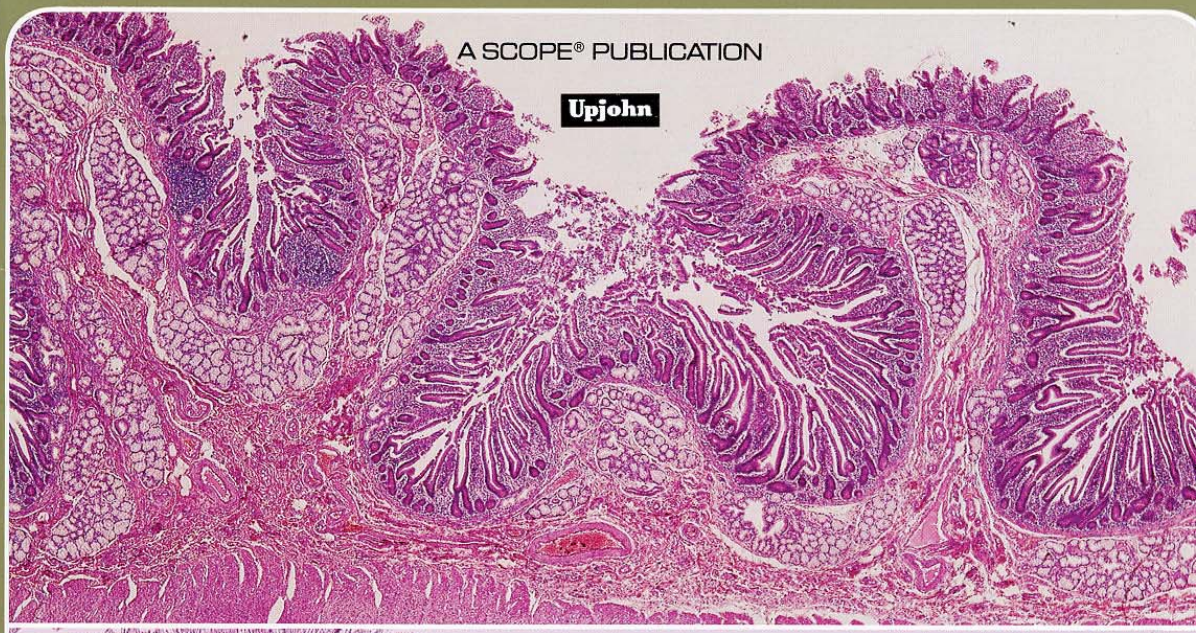
This computer-viewable file of a major part of "Look-Alikes in Histology" was prepared in November 2003 by Valerie Vaughn and Dr Michael Reedy in the Duke University School of Medicine. Our intention is to resurrect this material to usefulness in Histology and MicroAnatomy classes by preparing it in an easily shared form that all Duke Medical Students can use. Until we are clearer about the terms of its copyright status, we ask that you not circulate it outside of Duke, and do all you can to restrict access and use to known students in the Duke School of Medicine. (There is a visually inferior version already accessible on the Web, where Google lists 21 hits for an exact search on its title, "Look-Alikes in Histology".)

This file was created by scanning in the cover, introductory text-pages, and most of the light microscopy images (all H & E: that is, paraffin sections stained with hematoxylin and eosin) as 150 ppi JPEG files using an EPSON 2450 desktop scanner from within Photoshop 5.5. Using Microsoft Word's "Insert Picture from File" command, these images were then placed in order in an MS Word file. We have omitted about 32 of the booklet's images of material to restrict this file to what is presently included and emphasized in the Histology and MicroAnatomy course at Duke University School of Medicine (e.g., omitted images include lacrimal glands, tonsils, CNS silver-stained for glial cells, and some 22 electron micrographs. These items are grayed out but readable on the two TOC pages.)

NOTE THIS:
Several organs are not shown here. Liver, kidney, pituitary for example. You should pat yourself on the back if you can conjure up from memory the names of all the others you've studied in this course that are not listed here. By the end of this course, every student will probably find herself/himself able to do so!

Should they be listed here? Why or why not?

Look-alikes in histology



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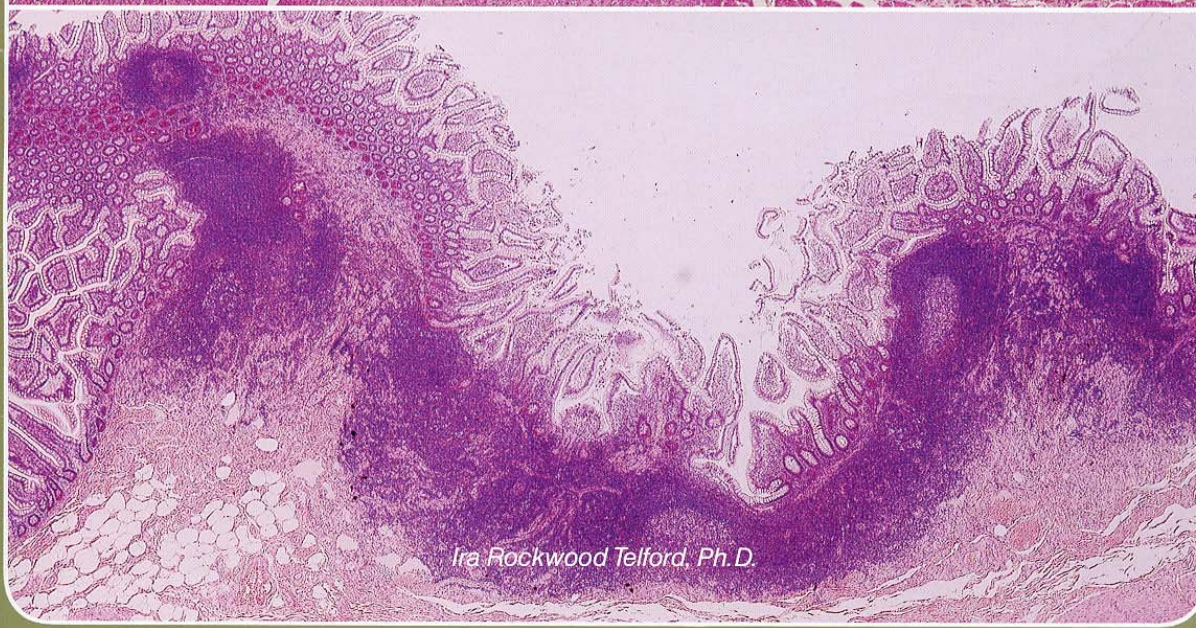

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Look-alikes in histology

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Published by The Upjohn Company Upjohn

Acknowledgments

Audiovisual Services, George Washington University Medical Center:
Plates 1-30
Thomas M. Crisp:
Plates 31, 32, 36A, 39, 40
Frank Denys:
Plates 37A, 37D
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Preface

"...but these structures look so much alike that I can't tell them apart" is a constant complaint of the beginning student in histology. Having heard this lament for years, we decided to do something about it. We began by summarizing in charts, diagrams, and tables the salient diagnostic similarities between various tissues and organs; but the usefulness of our material, we found, was limited. We therefore developed the idea of wall charts, each with enlarged color photomicrographs of two or three structures that look alike. Below the photographs, differentiating characteristics were tersely listed. Forthwith, students enthusiastically recognized the charts as exceptionally valuable teaching aids.

Encouraged by the immediate and whole-hearted acceptance of our charts, we decided to make them available to medical students throughout the country.

We firmly believe that careful study of these *Look-alikes* plates will greatly facilitate the student's ability to quickly and accurately distinguish between similar structures, and to do so with considerably less expenditure of time and effort. These 40 plates present comparisons of the organs, tissues, and cell organelles and inclusions that are most commonly confused in the study of histology. Because only the diagnostic differences, not similarities, are emphasized, differentiating features between structures are immediately apparent–even to the beginning student.

All color photomicrographs are from histological sections stained with hematoxylin and eosin, unless otherwise noted. The electron micrographs are from tissues prepared by conventional electron microscopic techniques.

If we have helped to make the study of histology a more meaningful, challenging, yet pleasant experience for the student, the purpose of this publication has been accomplished.

Ira R. Telford

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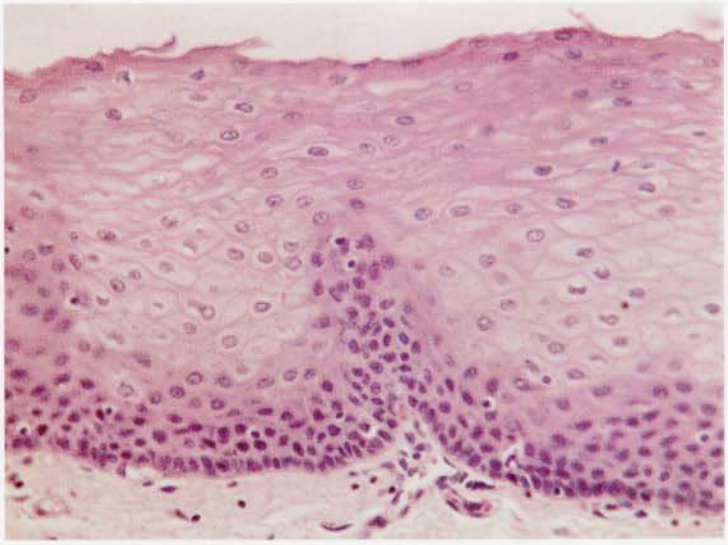
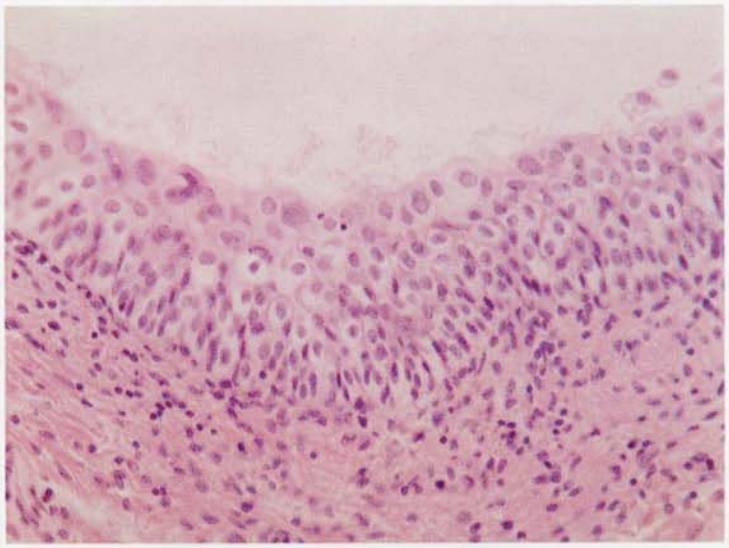
PLATE 1 **Epithelium**

A / Stratified squamous (x 200)

1. Surface cells flattened and dehydrated
2. Basal cuboidal cells become squamous
3. Many cell layers





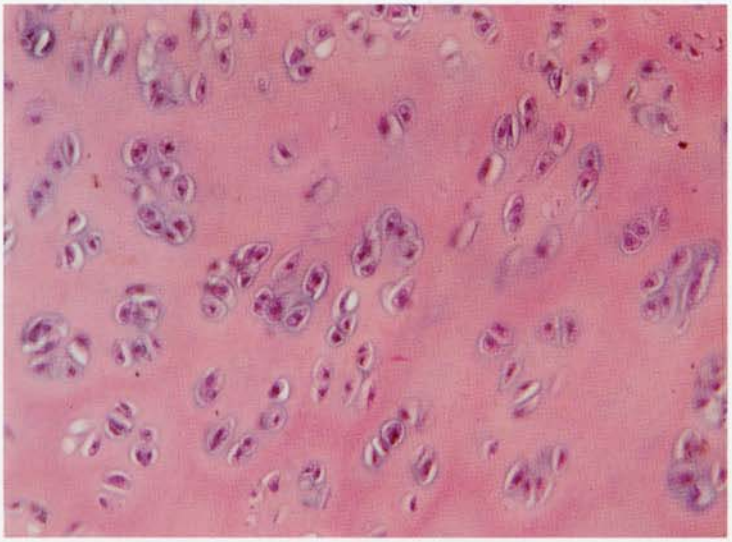
B / Transitional (contracted) (x 200)

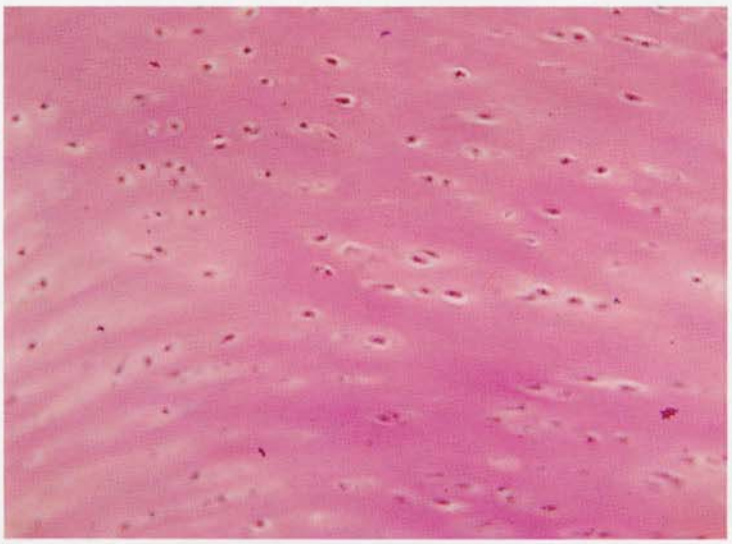
1. Large dome-shaped surface cells
2. Cells remain cuboidal or columnar
3. Fewer cell layers

PLATE 2 Cartilage

A / Hyaline (x162)

1. Homogeneous, slightly basophilic matrix
2. Lacunae often contain two or more cells (cell nests)
3. Lacunae rather evenly spaced and rimmed with basophilic matrix





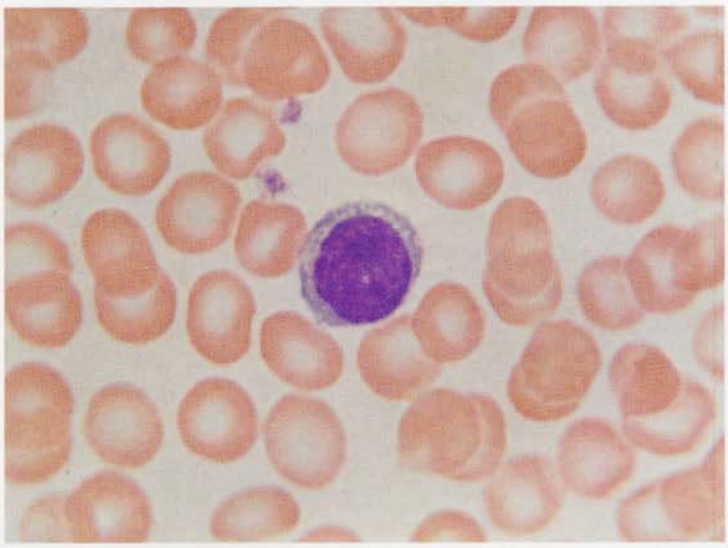
B / Fibrous (x162)

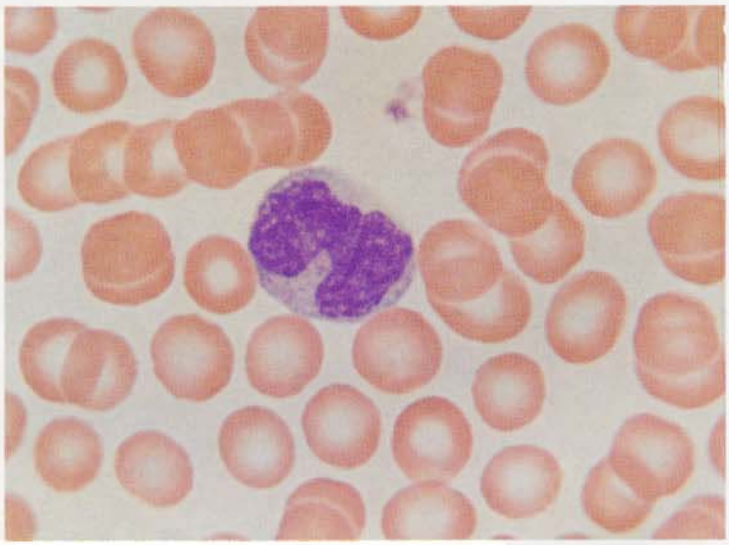
1. Collagenous fibers in eosinophilic matrix
2. Cells usually in individual lacunae
3. Lacunae more widely spaced and arranged in rows or clusters

PLATE 3 **Leukocytes** (Wright's stain)

A / Lymphocyte (large) (x1200)

1. Round, dark nucleus
2. Smaller cell (10-12μ)
3. Less cytoplasm





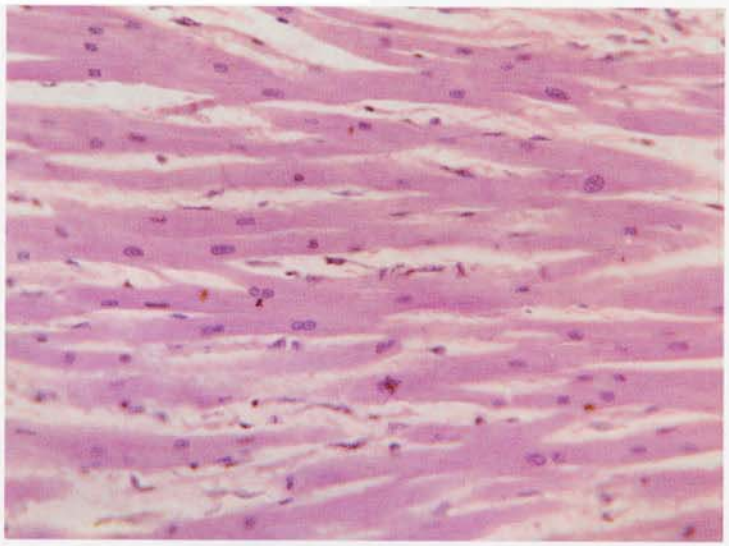
B / Monocyte (x1200)

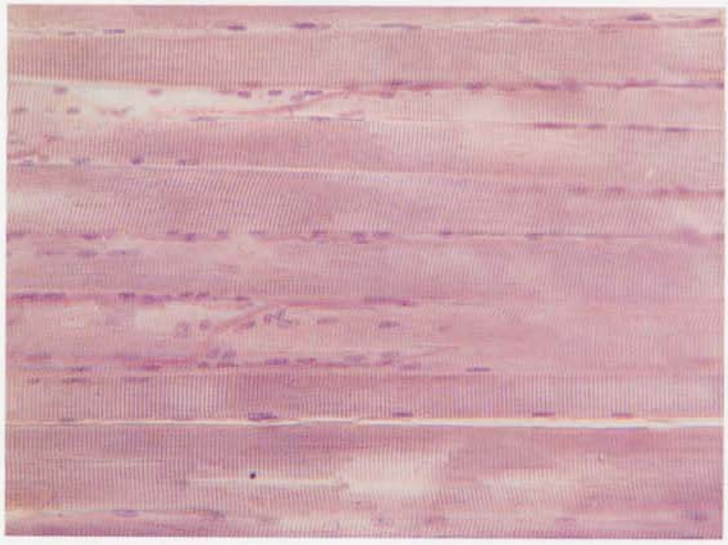
1. Indented, lighter-staining, flocculent nucleus
2. Larger cell (12-15μ)
3. More cytoplasm

PLATE 4 Muscle

A / Cardiac (x216)

1. Central nuclei
2. Branching fibers
3. Cross striations faint
4. Intercalated disks (not shown)





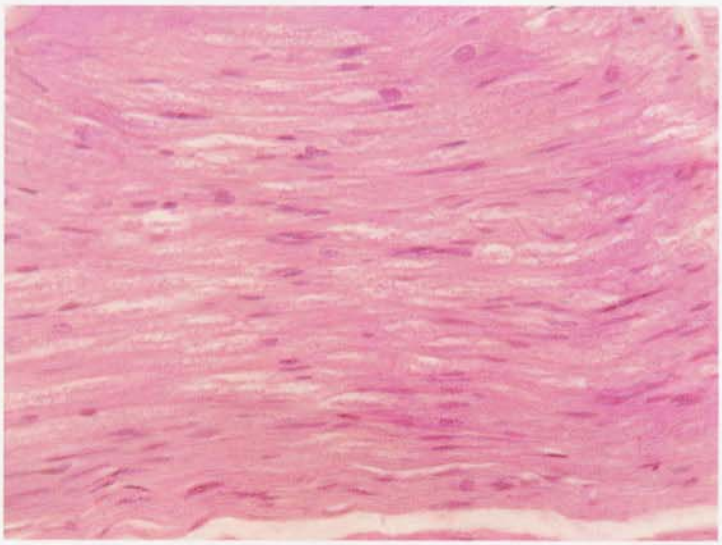
B / Skeletal (x216)

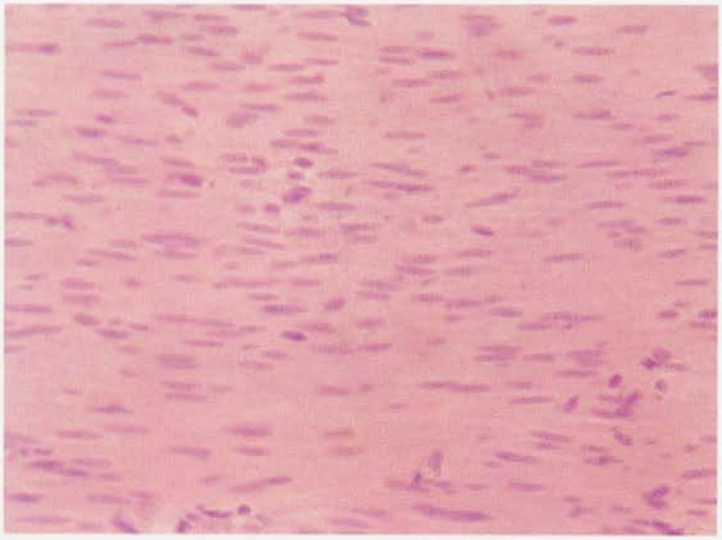
1. Peripheral nuclei
2. Nonbranching fibers
3. Cross striations prominent

PLATE 5

A / Peripheral nerve (myelinated) (x 248)

1. Uneven distribution of various types or shapes of nuclei
2. Spongy network of neurokeratin around central axons
3. Somewhat wavy appearance
4. Nodes of Ranvier





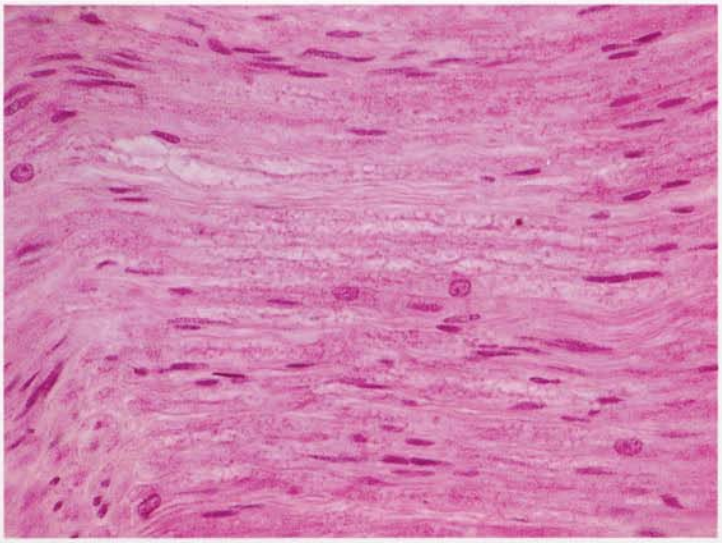
B / Smooth muscle (x 248)

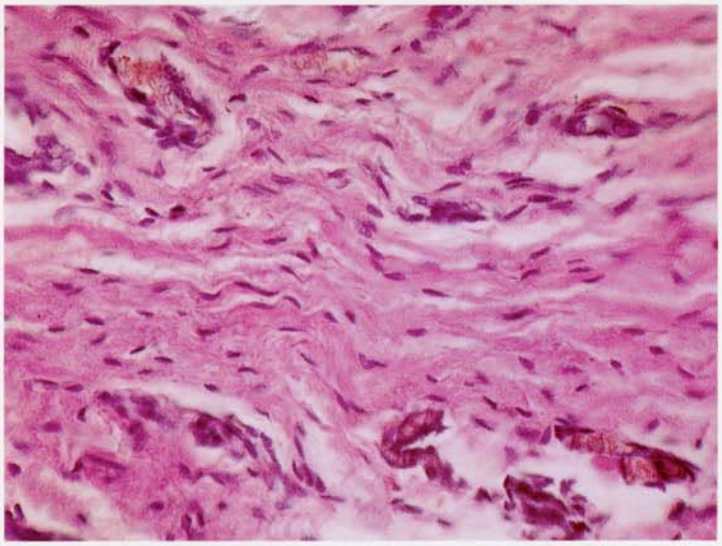
1. Fusiform nuclei quite uniform in size and distribution
2. Darker, homogeneous cytoplasm

PLATE 6

A / Peripheral nerve (myelinated) (x 320)

1. Several rounded, light-staining neurolemmal nuclei; many dark-staining fibroblast (endoneurial) nuclei
2. Parallel, light-staining fibers
3. "Washed-out," spongy neurokeratin around axis cylinders
4. Blood vessels absent except in larger nerves
5. Nodes of Ranvier





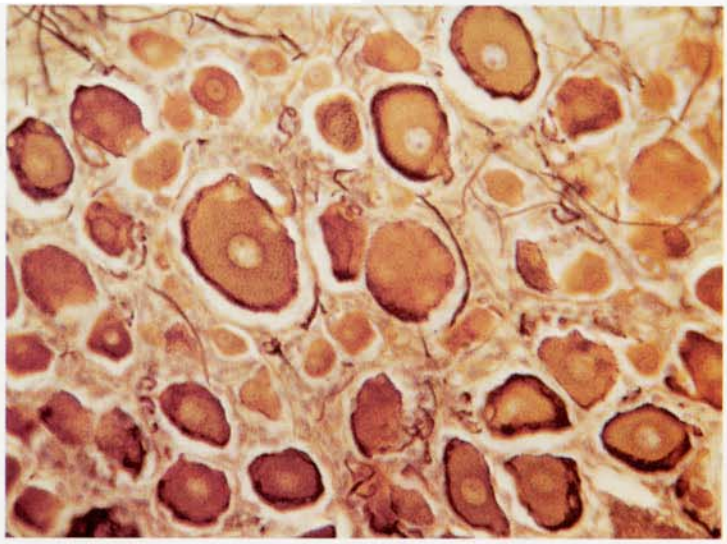
B / Collagenous fibers (x 320)

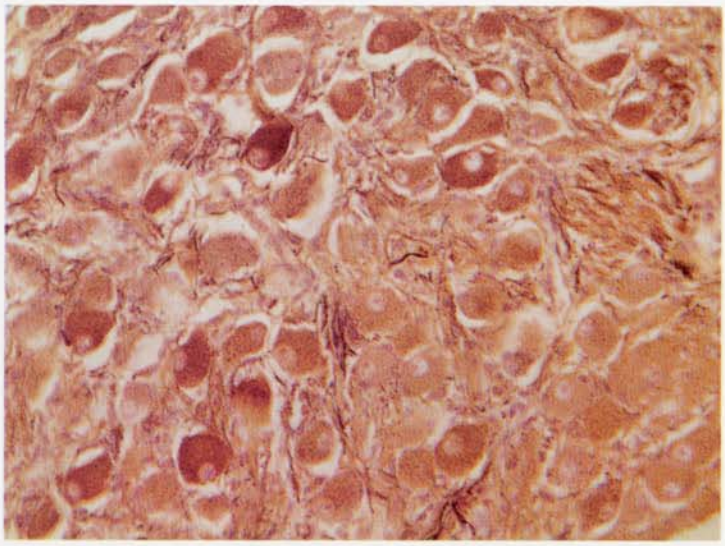
1. Many uniform, dark-staining fibroblast nuclei
2. Uneven, undulating, dark-staining fibers
3. Reduced cytoplasm in fibroblasts
4. Blood vessels usually present

PLATE 7 **Ganglia** (Cajal's silver stain)

A / Spinal (x 200)

1. Central nuclei
2. Both large and small cells
3. Cells unipolar





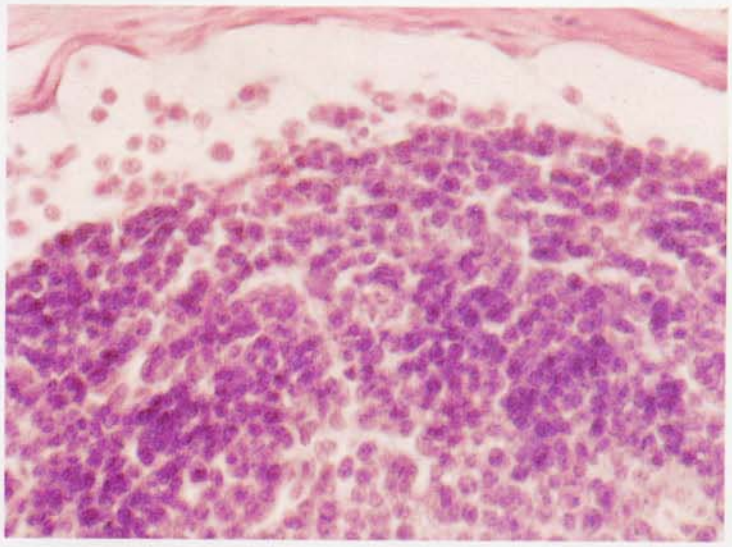
B / Sympathetic (x 200)

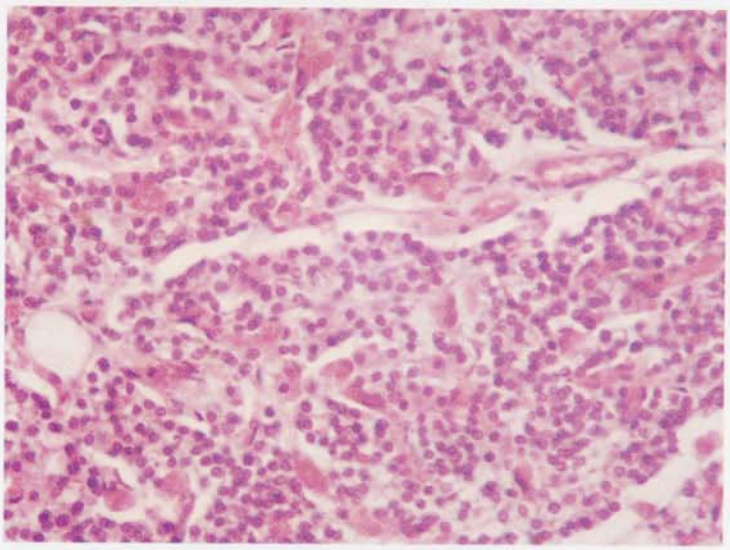
1. Many eccentric nuclei
2. Only small cells
3. Cells multipolar
4. Cells often have pigment

PLATE 8

A / Lymph node (x 336)

1. Medullary cords prominent (not shown)
2. Lymph sinuses prominent
3. Large subcapsular sinus
4. Many lymphoid follicles





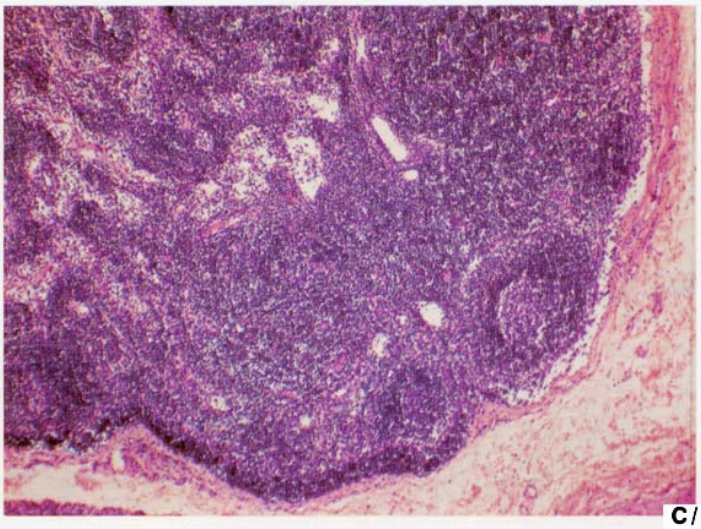
B / Parathyroid (x 336)

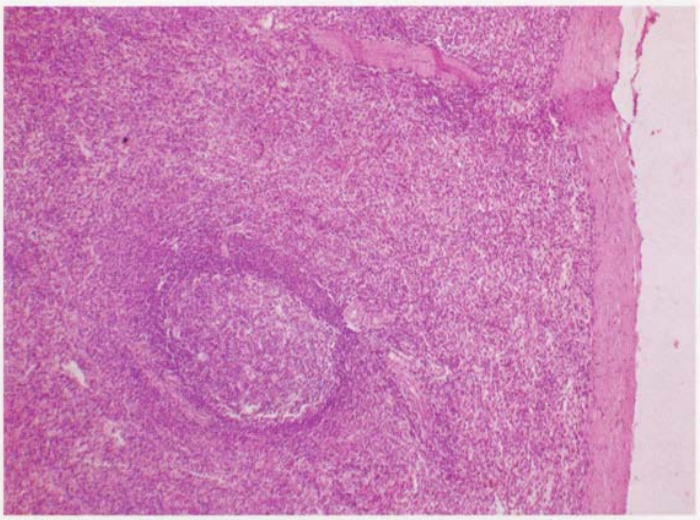
1. Chief cells in cords resemble lymphocytes
2. Prominent capillary bed, no lymph sinuses
3. Some oxyphil cells
4. No lymphoid tissue

PLATE 10 Lymphoid organs

A / Lymph node (x 44)

1. Thin connective-tissue capsule
2. Cortical sinus
3. Cortex and medulla
4. Medullary cords





B / Spleen (x 44)

1. Heavy fibromuscular capsule with trabeculae
2. Eccentric central arteries in white pulp
3. No cortex or medulla
4. Red and white pulp

C / Thymus (x 44)

1. Thin connective-tissue capsule
2. Hassall's bodies
3. Medulla and cortex in each lobule
4. Lobules are "blocks" of tissue

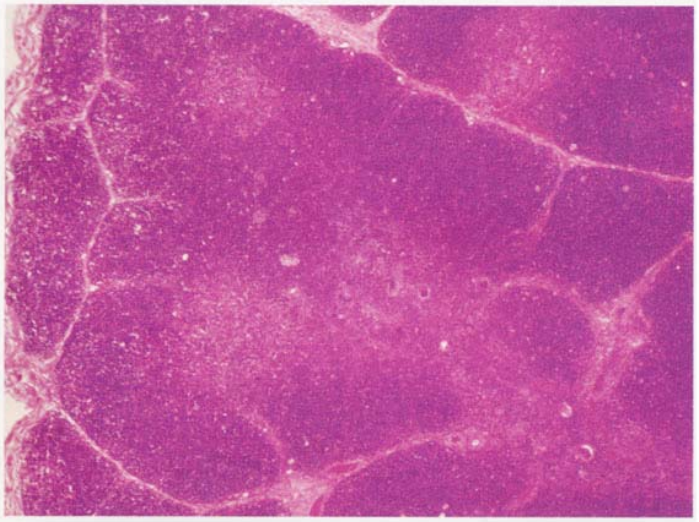
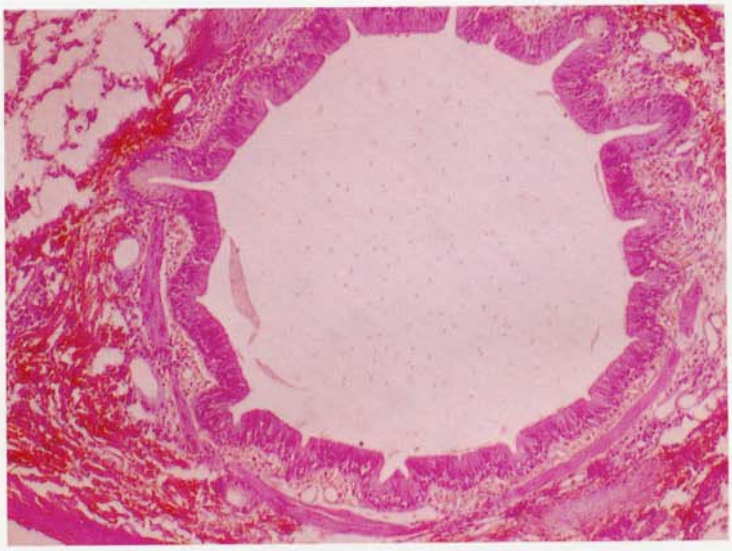
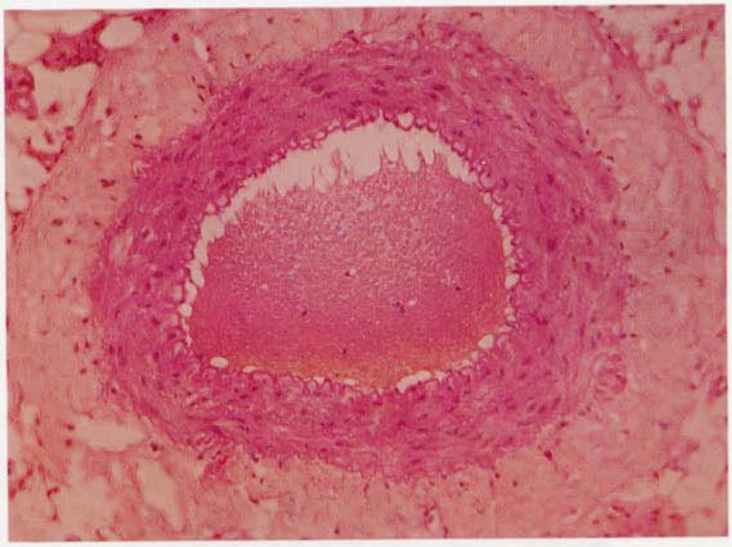


PLATE 11

A / Bronchiole (x100)

1. Ciliated columnar epithelium
2. Prominent longitudinal epithelial folds
3. Empty lumen
4. Thin circular smooth-muscle layer





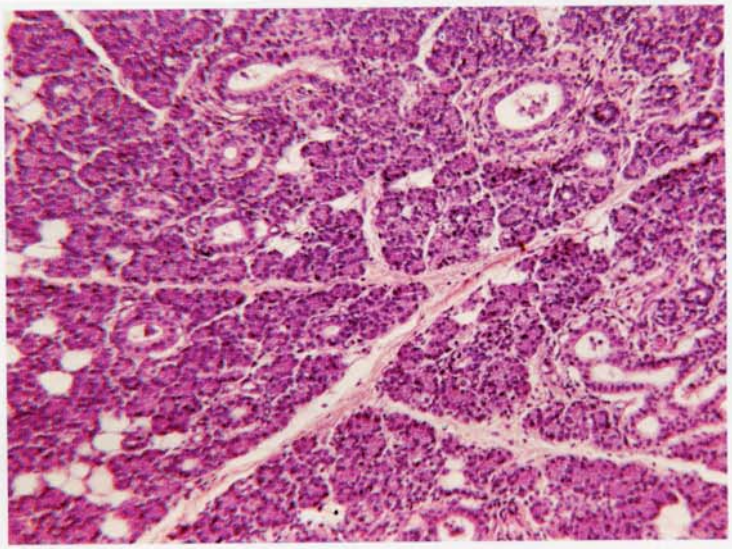
B / Small artery (x100)

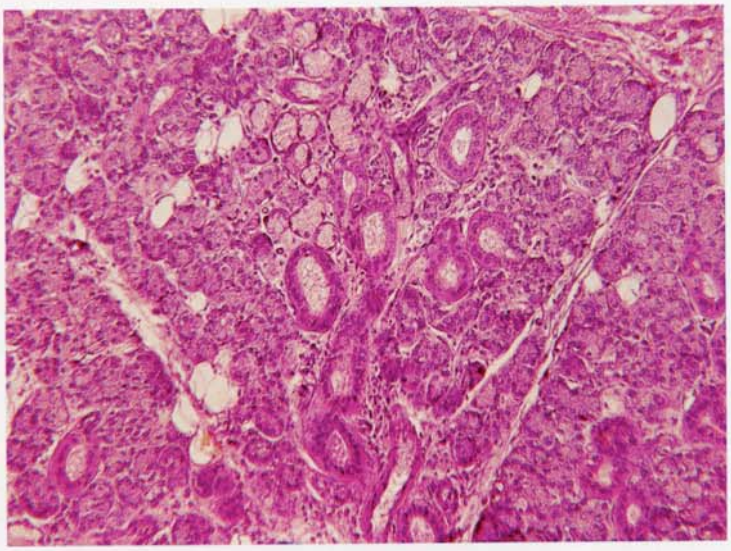
1. Simple squamous epithelium (endothelium)
2. Delicate wavy folds in endothelium due to undulations of underlying internal elastic membrane
3. Lumen may contain blood
4. Prominent circular smooth-muscle layer

PLATE 13 Salivary glands

A / Parotid (x 96)

1. All alveoli are serous
2. No demilunes
3. Numerous fat cells





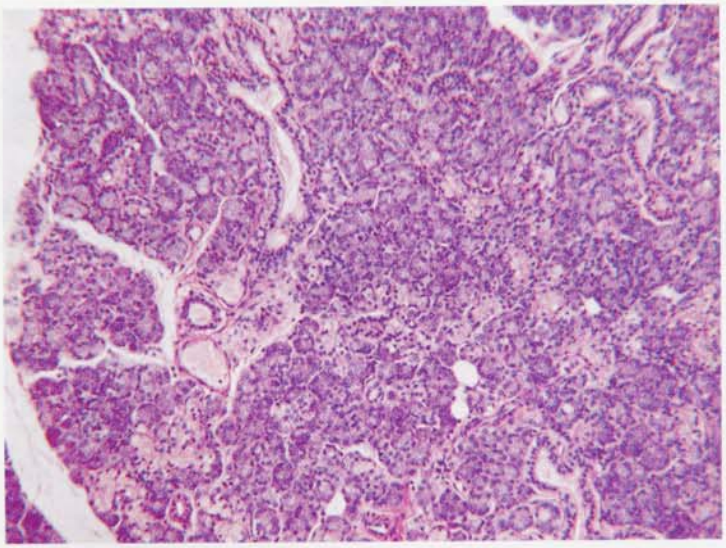
B / Submandibular (x 96)

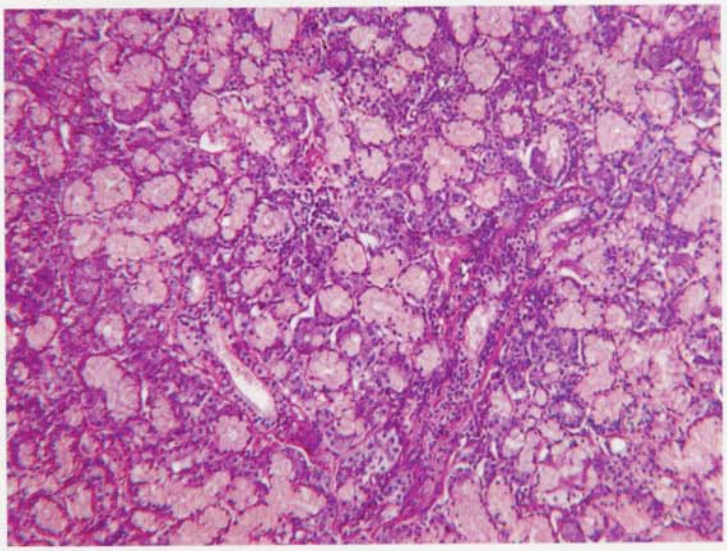
1. Most alveoli are serous
2. Some mucous alveoli with serous demilunes
3. Some fat cells

PLATE 14 Salivary glands

A / Submandibular (x 96)

1. Alveoli mostly serous, some mucous
2. Serous demilunes on some mucous alveoli
3. Few fat cells





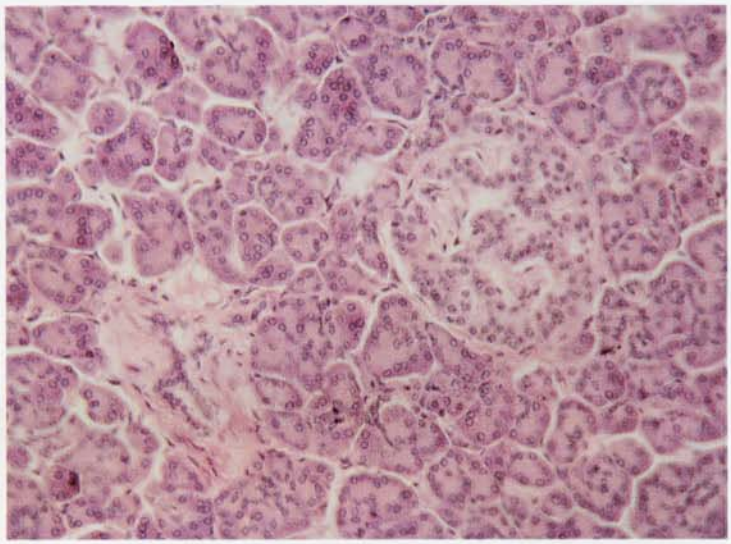
B / Sublingual (x 96)

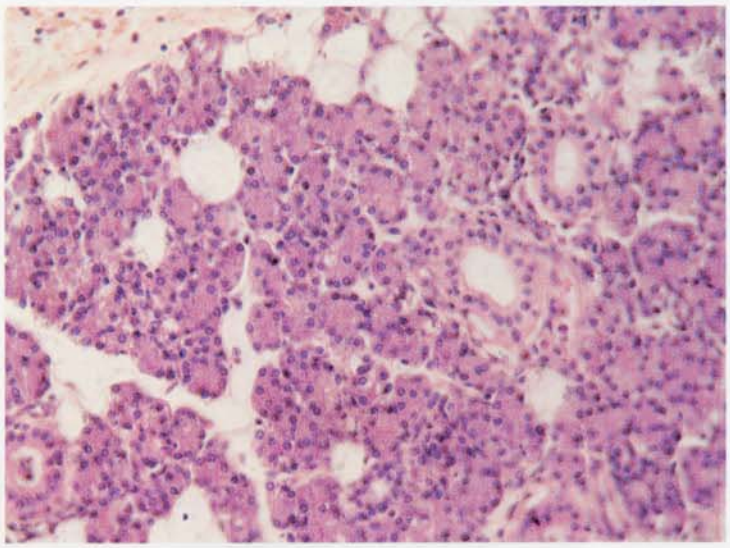
1. Mucous alveoli equal or exceed serous alveoli in number
2. Many mucous alveoli with serous demilunes
3. Occasional fat cell

PLATE 15 Serous glands

A / Pancreas (x148)

1. All serous acini with pyramidal cells
2. Minute acinar lumina associated with centroacinar cells
3. Few fat cells
4. Islet tissue prominent





B / Parotid (x148)

1. All serous acini with pyramidal cells
2. Small acinar lumina–no centroacinar cells
3. Many fat cells

PLATE 16

A / Oropharynx–longitudinal section (x 34)

1. Interlacing bundles of skeletal muscle
2. No muscularis mucosae (Replaced by layer of elastic fibers)

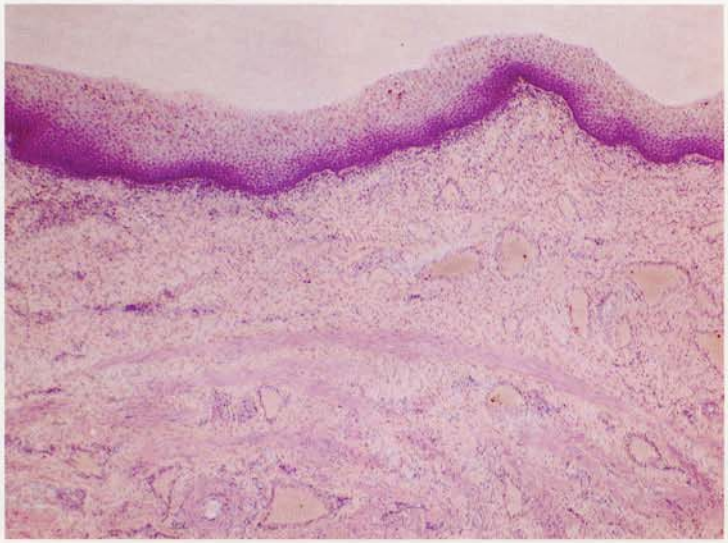
B / Esophagus–longitudinal section (x 34)

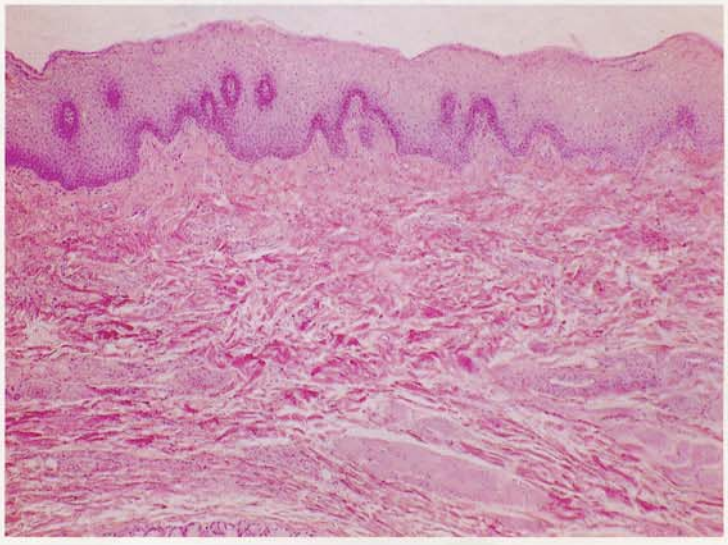
1. Outer longitudinal (not shown), inner circular layers of either smooth muscle or skeletal muscle, or both (as shown here)
2. Prominent muscularis mucosae
3. Esophageal glands may be present (not shown)

PLATE 17

A / Vagina (x 46)

1. Venous plexuses prominent
2. Many leukocytes, occasional lymph nodule
3. No glands
4. Smooth-muscle fibers
5. Collagenous fibers indistinct

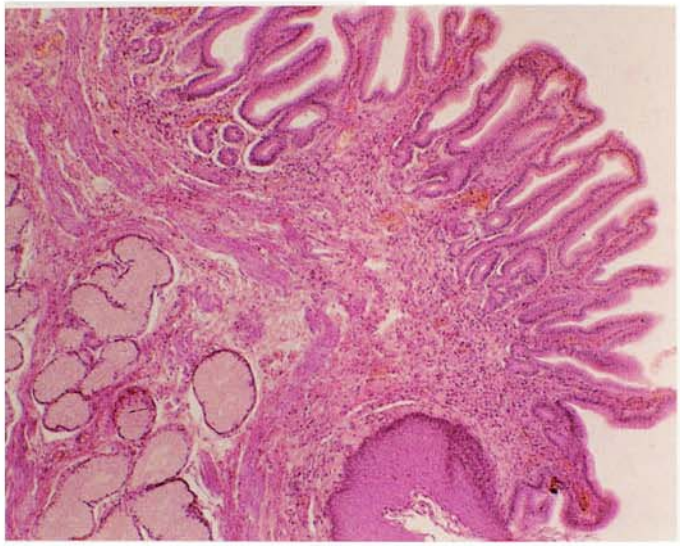




B / Lip (x 46)

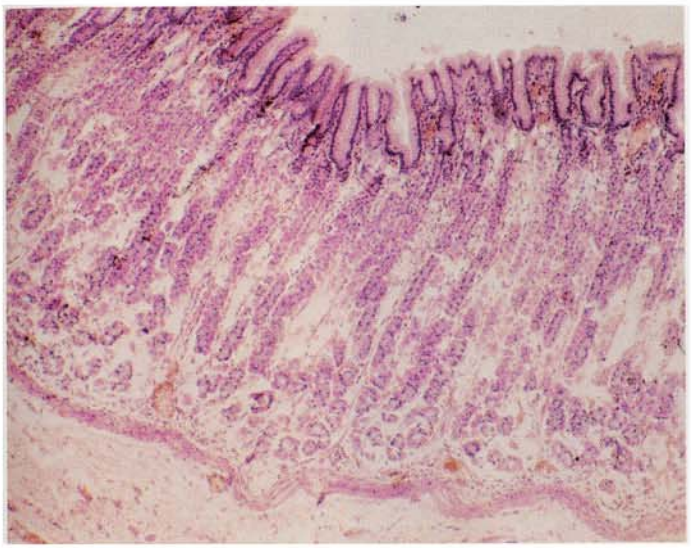
1. Arteries prominent
2. Few leukocytes
3. Mucous and serous (labial) glands (not shown)
4. Skeletal muscle fibers
5. Collagenous fibers conspicuous

PLATE 18 Stomach glands



A / Cardiac (x 64)

1. Open gastric pits
2. Slightly coiled, shallow glands
3. Only mucous-type cells
4. Often associated with esophagus (Note esophageal mucus glands in submucosa)



B / Fundic (x 64)

1. Pits narrow and shallow
2. Straight, long, tubular glands
3. Many parietal and chief cells
4. Found in body and fundic regions

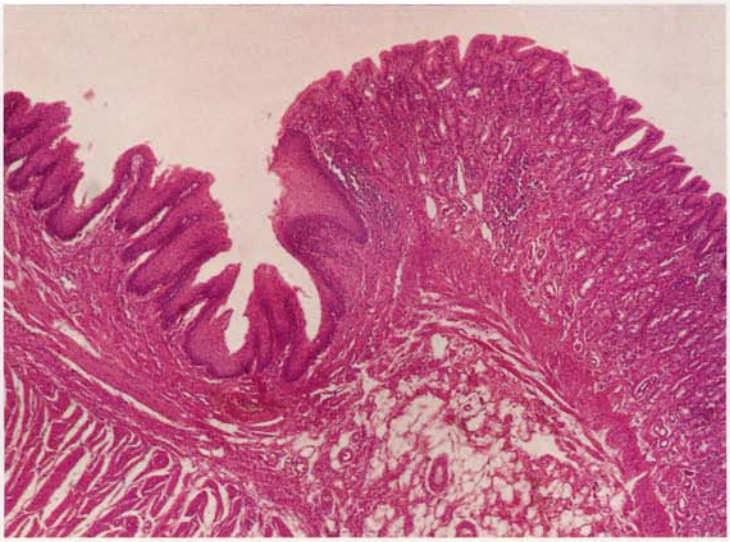
C / Pyloric (x 64)

1. Pits open and deep
2. Quite short, coiled glands
3. Mucous-type cells, few parietal cells
4. May be associated with duodenum

PLATE 19

A / Stomach–esophageal junction (x52)

1. Simple columnar epithelium lining stomach–no goblet cells
2. Cardiac glands empty into wide gastric pits
3. Muscularis mucosae persists across junction
4. Mucous glands in submucosa (not shown)



B / Rectoanal junction (x52)

1. Simple columnar epithelium with many goblet cells lining rectum
2. Deep intestinal glands lined mostly with goblet cells
3. Muscularis mucosae broken up and lost at junction
4. No submucosal glands

PLATE 20

A / Gallbladder (x 34)

1. No true villi; mucosal folds resemble villi
2. No goblet cells (except in neck region)
3. Diverticula (sinuses) present
4. No muscularis mucosae
5. Smooth-muscle layers thin and interlacing

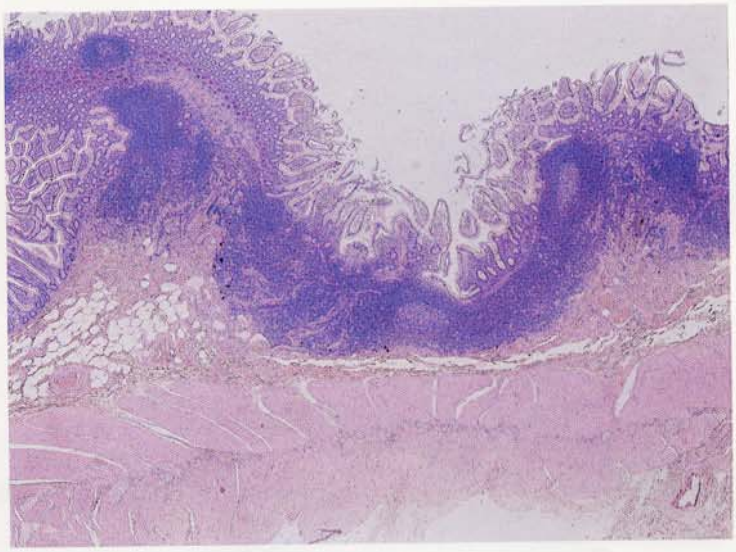
B / Small intestine (x 34)

1. Many villi
2. Abundant goblet cells
3. No diverticula
4. Muscularis mucosae present
5. Two distinct smooth-muscle layers

PLATE 21

A / Duodenum (x16)

1. Brunner's glands in submucosa
2. No Peyer's patches, only solitary lymph nodules in tunica propria



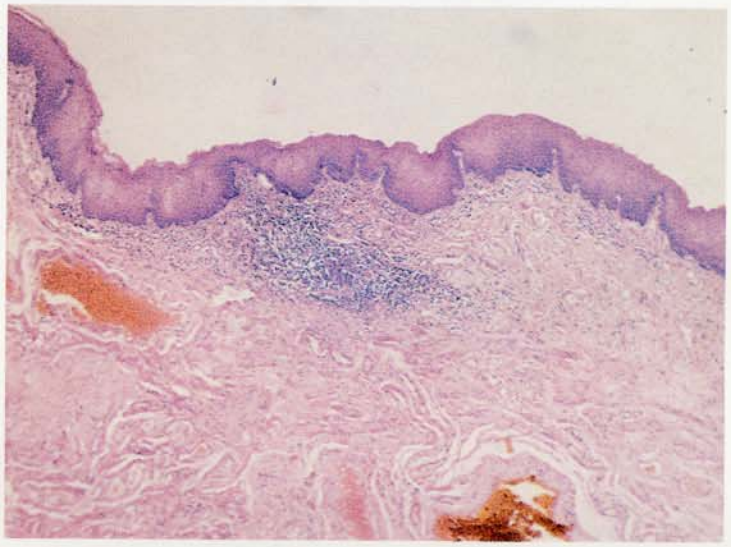
B / Ileum (x16)

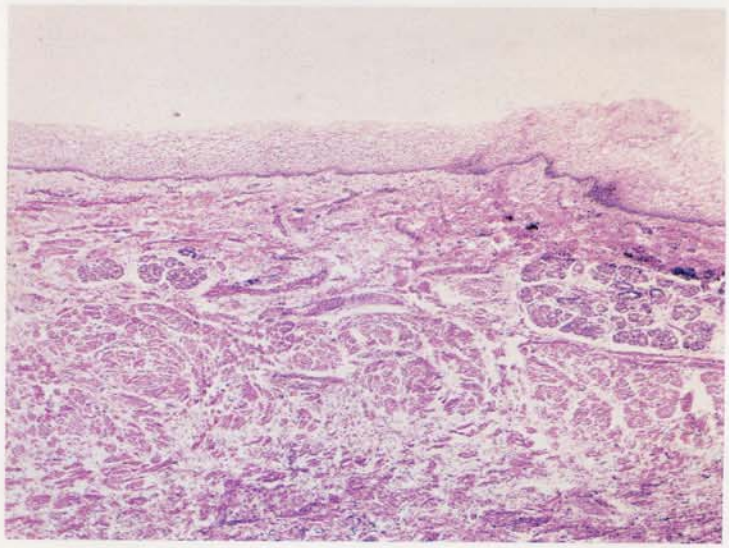
1. No glands in submucosa
2. Peyer's patches in tunica propria

PLATE 22

A / Anal canal (x 42)

1. Nonkeratinized stratified squamous epithelium–becomes keratinized at anus
2. No glands except circumanal (sweat) glands near anus
3. Diffuse lymphoid tissue
4. Prominent venous plexuses–when widely dilated called internal hemorrhoids
5. Smooth-muscle layer thickens as internal sphincter





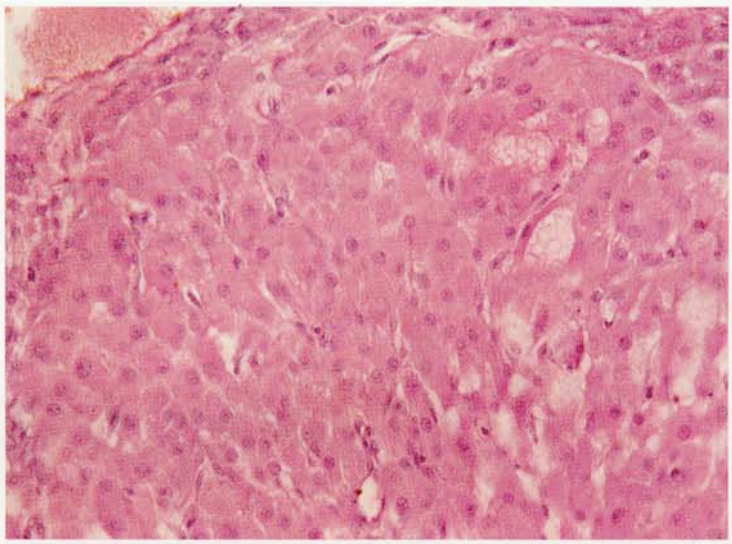
B / Inner lip (x 42)

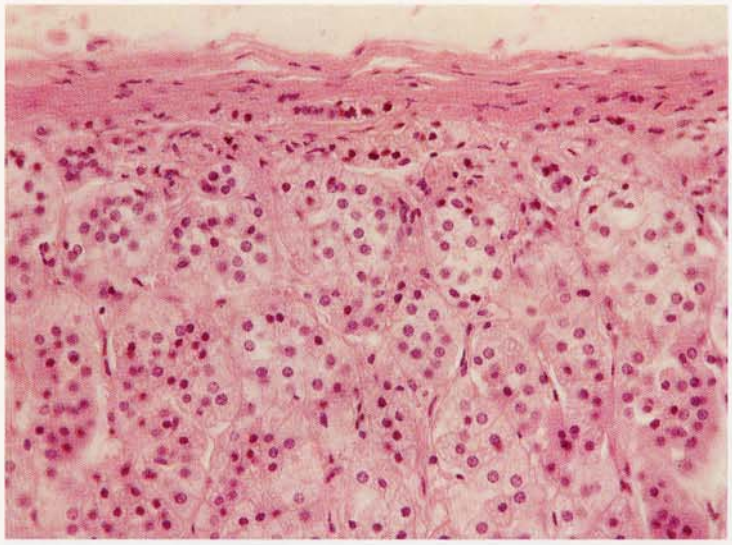
1. Nonkeratinized stratified squamous epithelium
2. Labial glands–mostly mucous, some serous
3. No lymphoid tissue
4. No obvious venous patterns
5. Skeletal muscle fibers prominent as orbicularis oris muscle

PLATE 23

A / Corpus luteum (x148)

1. No definite capsule
2. Cells arranged in cords
3. Remnant of corpus hemorrhagicum may be present (not shown)





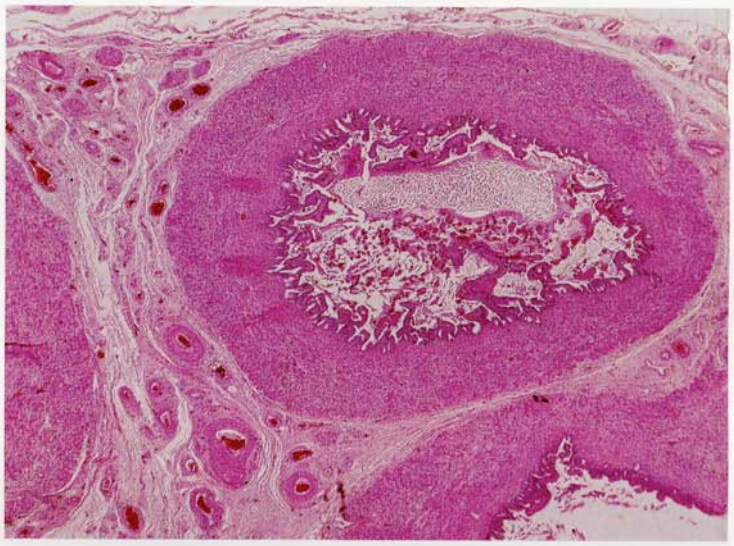
B / Adrenal cortex (x148)

1. Capsule present
2. Cords of cells in ovoid clusters (zona glomerulosa), in parallel columns (zona fasciculata), or in network (zona reticularis–not shown)

PLATE 24

A / Seminal vesicle (x 34)

1. Lumen filled with cellular debris and secretions
2. Pseudostratified columnar epithelium covers branching mucosal folds
3. Interlacing smooth-muscle layers



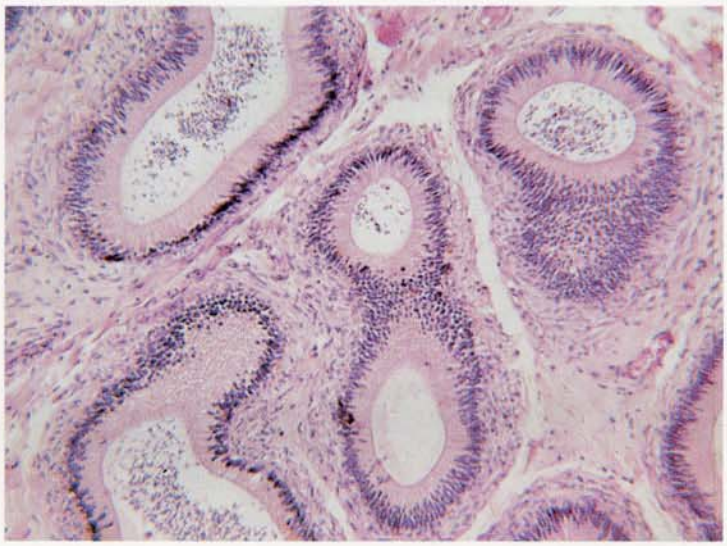
B / Oviduct (ampulla) (x 34)

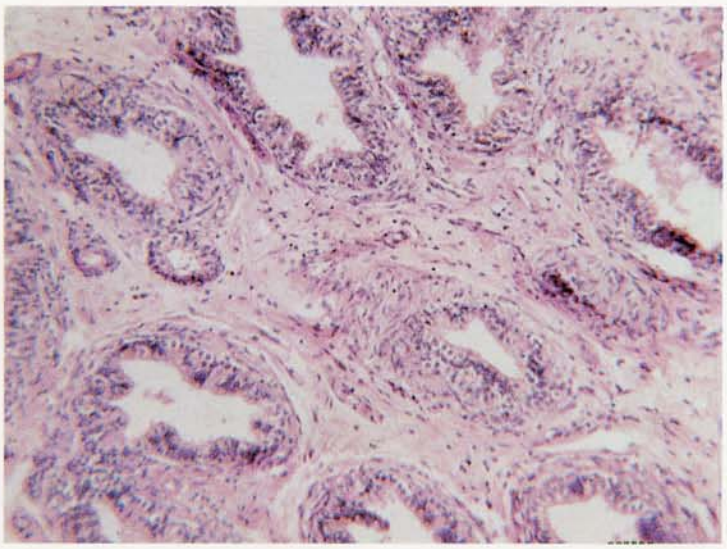
1. Lumen free from debris
2. Simple columnar epithelium, some cells with cilia
3. Greatly folded mucous membrane
4. Inner circular, outer longitudinal smooth-muscle layers

PLATE 25

A / Epididymis (x 96)

1. Large circular lumina with clusters of spermatozoa
2. Tall columnar epithelium with tufted stereocilia





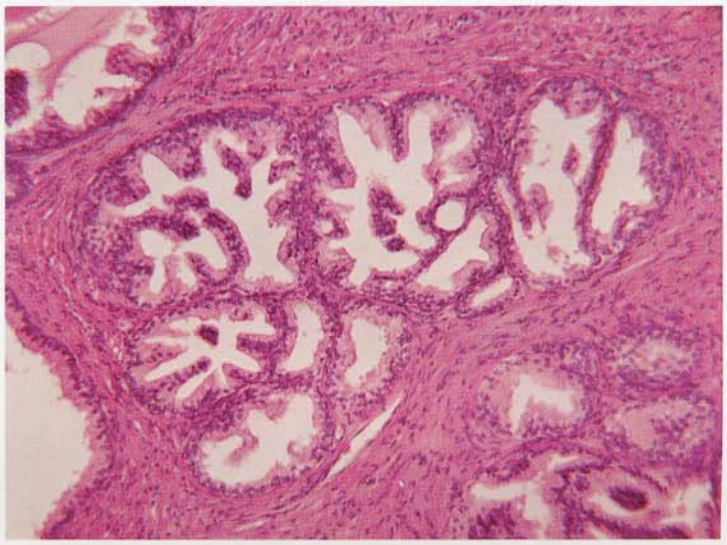
B / Ductuli efferentes testis (x 96)

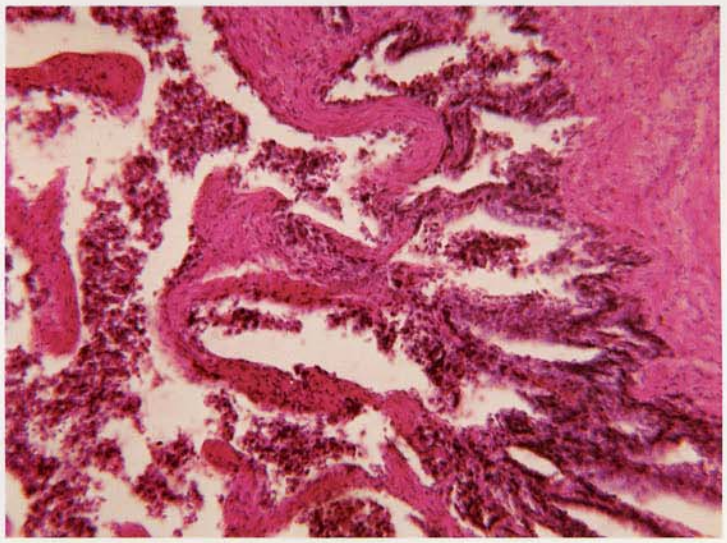
1. Irregular lumina free from spermatozoa
2. Simple columnar epithelium with patches of cilia

PLATE 26

A / Prostate (x 64)

1. Clusters of alveolar-type glands
2. Abundance of smooth muscle
3. Limited secretions and cellular debris in lumen
4. Concretions may be present (not shown)





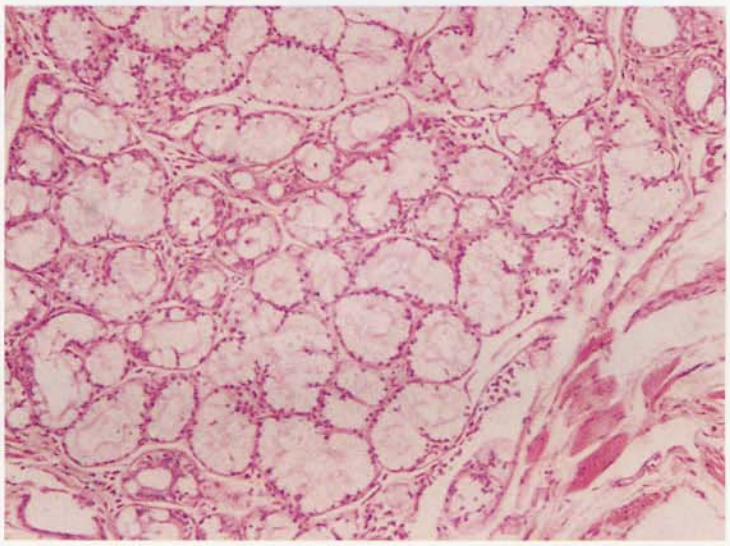
B / Seminal vesicle (x 64)

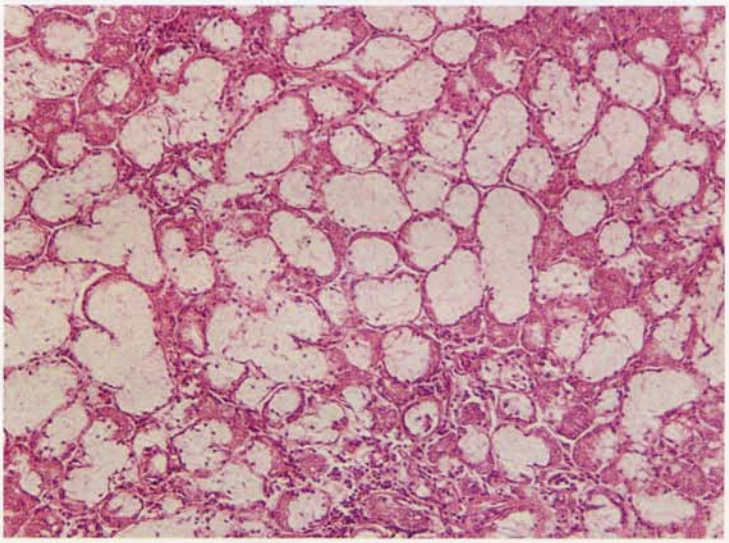
1. Large ductile organ, no alveoli
2. Less smooth muscle
3. Lumen partially filled with secretions and debris
4. No concretions
5. Extensive mucosal folds extend into lumen

PLATE 27

A / Bulbourethral gland (x130)

1. Only mucous acini, some of which form cyst-like dilatations
2. Acinar lumina often large and dilated
3. Skeletal muscle fibers in capsule





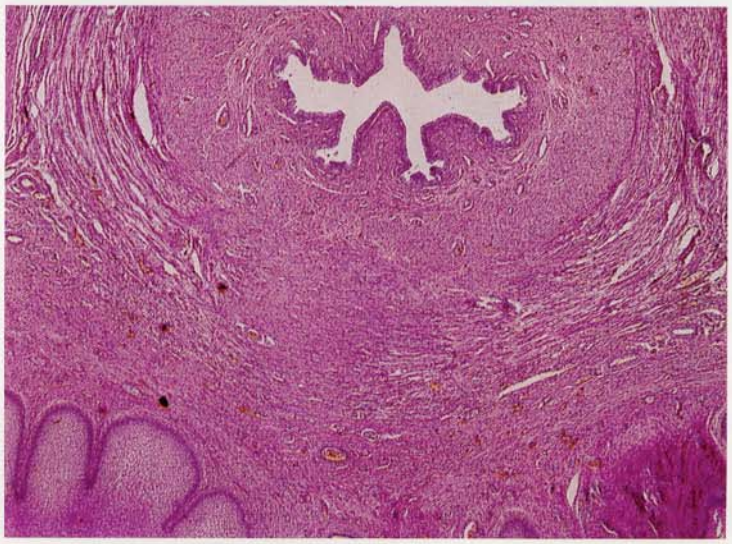
B / Sublingual gland (x130)

1. Some serous acini and demilunes among abundant mucous acini
2. Acinar lumina small and inconspicuous
3. No muscle in capsule

PLATE 28 Urethra

A / Male (penile portion of urethra) (x16)

1. Erectile tissue prominent
2. Muscle absent
3. Urethral glands (of Littré) prominent



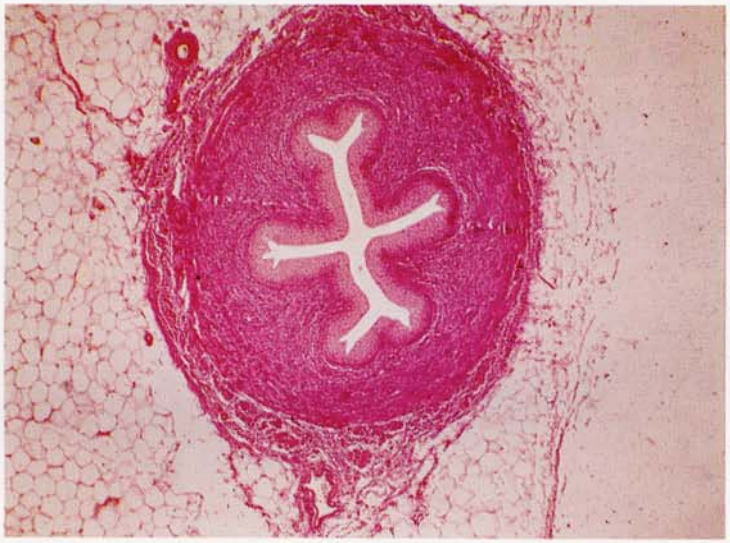
B / Female (x16)

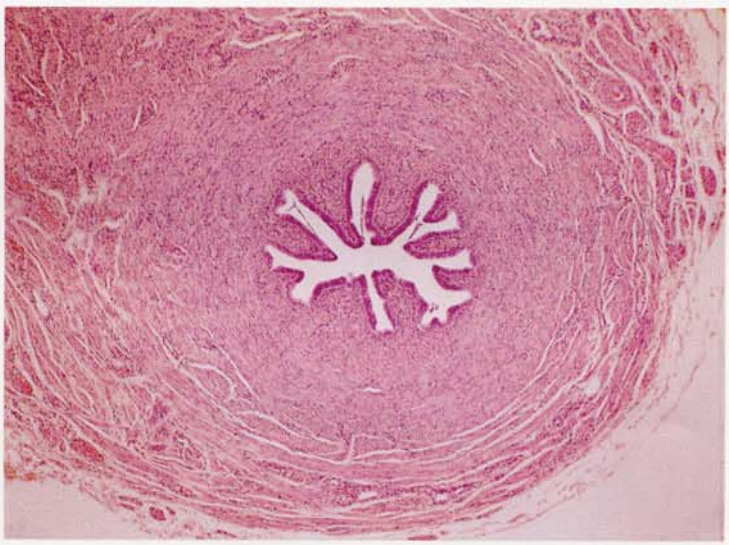
1. No erectile tissue
2. Sphincter muscle usually present
3. Urethral glands scarce

PLATE 29

A / Ureter (x 34)

1. Transitional epithelium
2. Outer circular, inner longitudinal smooth-muscle layers





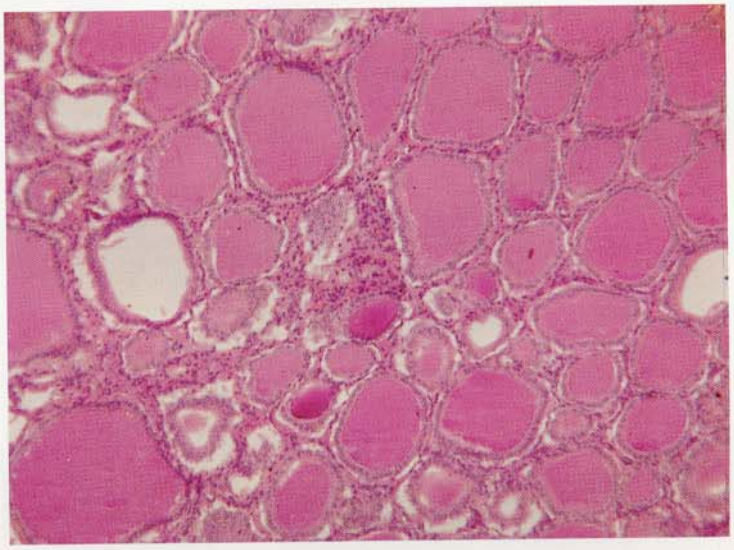
B / Oviduct (isthmus) (x 34)

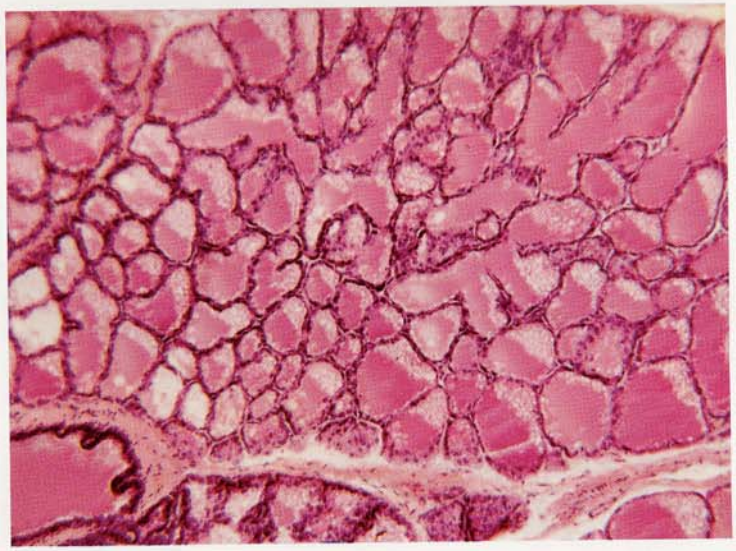
1. Simple columnar epithelium, some cilia
2. Outer longitudinal, inner circular smooth-muscle layers

PLATE 30

A / Thyroid (x 90)

1. Clear hyaline colloid in follicles
2. Vacuoles may be present in colloid
3. No ducts
4. No lobules
5. Islets of parafollicular cells





B / Active mammary gland (x 90)

1. Granular or hyaline secretion in expanded alveoli
2. Fat droplets (vacuoles) in alveoli and ducts
3. Excretory ducts present
4. Lobulated

THAT'S ALL!