EPITHELIA

Objective

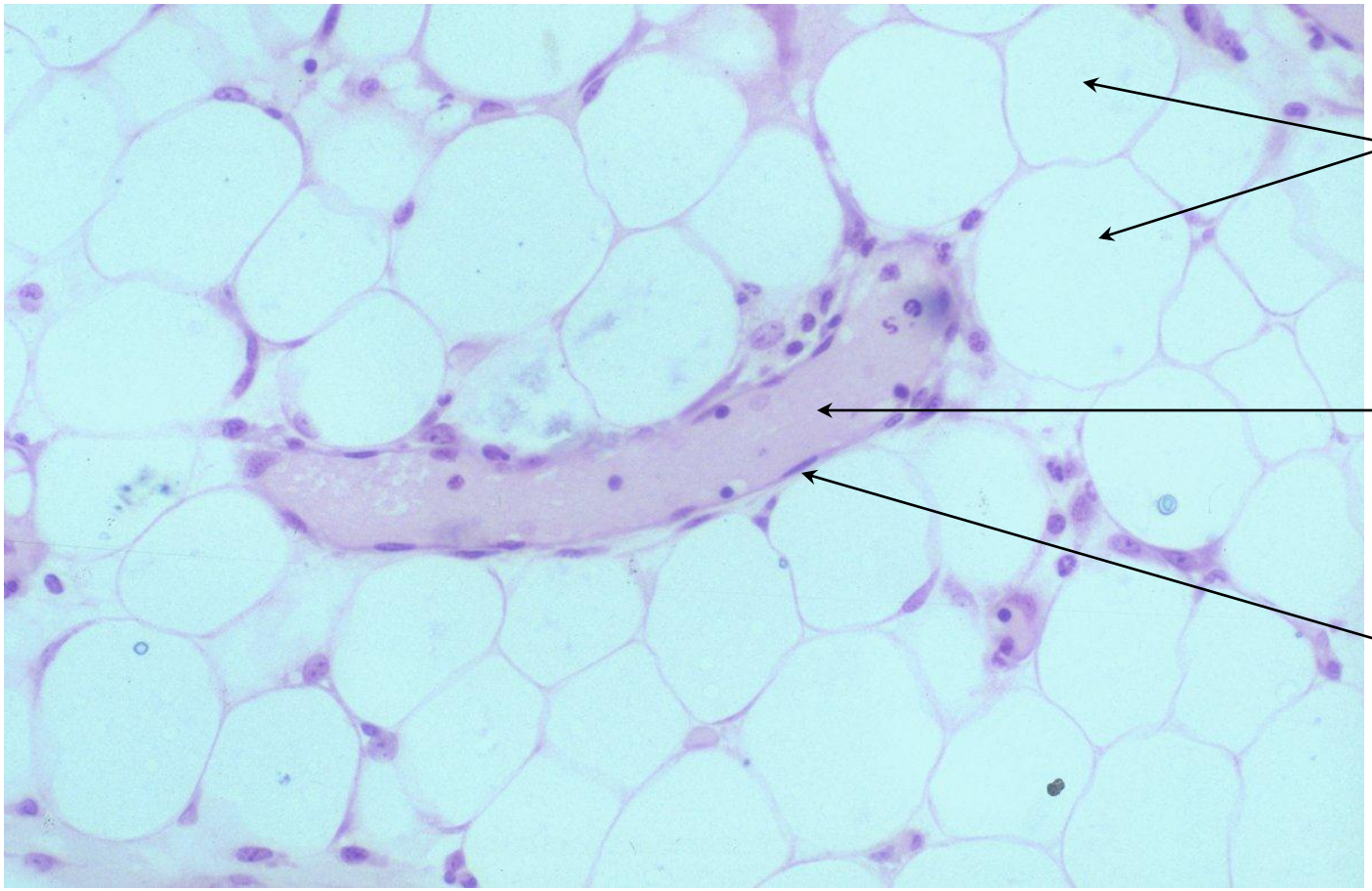
The objective of this class is to observe how different epithelia vary in terms of cell shape, size and number of cell layers enabling them to be well adapted for functions in different tissues.

Areolar connective tissue

Examine the epithelium lining the blood vessels or capillaries amongst the adipose tissue, fatty cells that have a bubbly appearance (large cells that look empty in this preparation).

What is this epithelium called and how would you describe it in terms of cell shape and number of cell layers?

Simple Squamous Epithelium … a single layer of flattened cells.

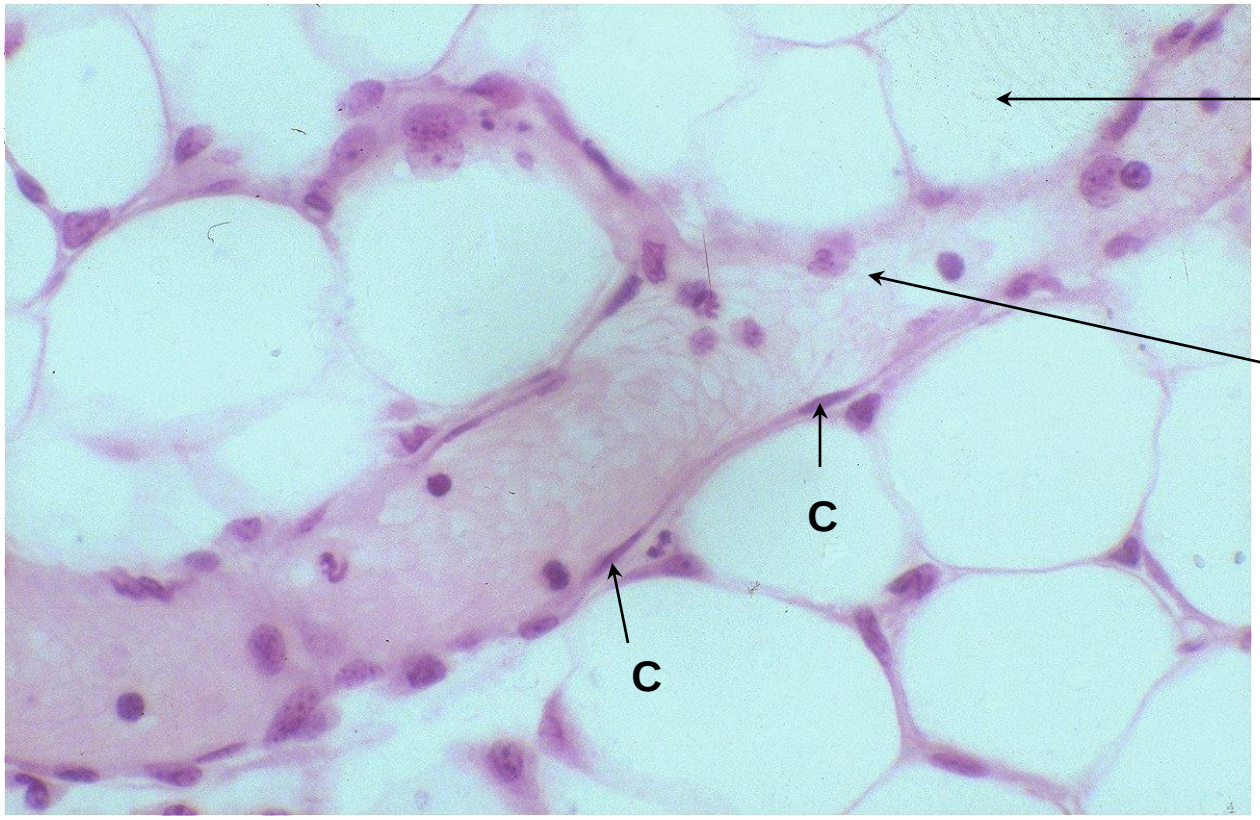


Areolar connective tissue

At a higher magnification examine the epithelium lining the blood vessels or capillaries amongst the adipose tissue.

What is this epithelium called and how would you describe it in terms of cell shape and number of cell layers?

Simple Squamous Epithelium… a single layer of thin and flattened cells well adapted for active transport and movement of gases and metabolites.



A adipose cell

B lumen of capillary with erythrocytes and nucleated white blood cells

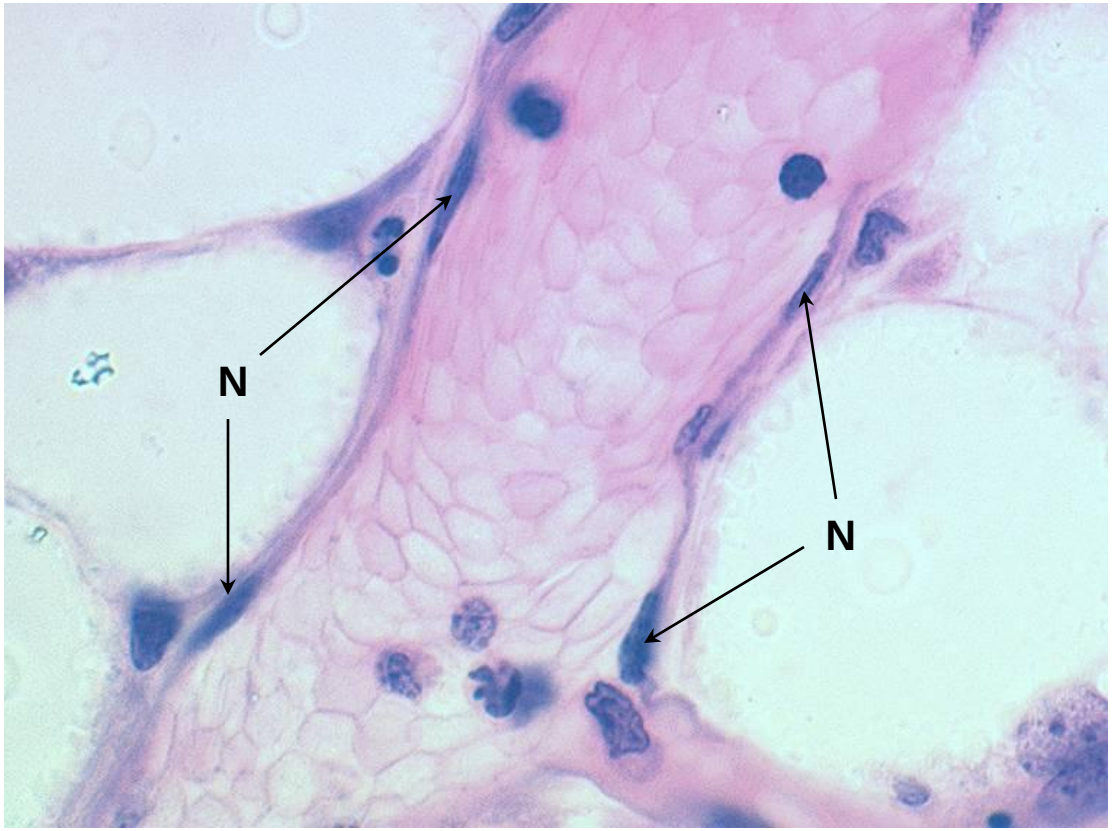
C epithelium of blood vessel

25 µm

Areolar connective tissue

Viewed under an oil immersion lens the flattened nature of the epithelium and single cell thickness becomes clearer.

Simple Squamous Epithelium… a single layer of thin and flattened cells well adapted for active transport and movement of gases and metabolites.

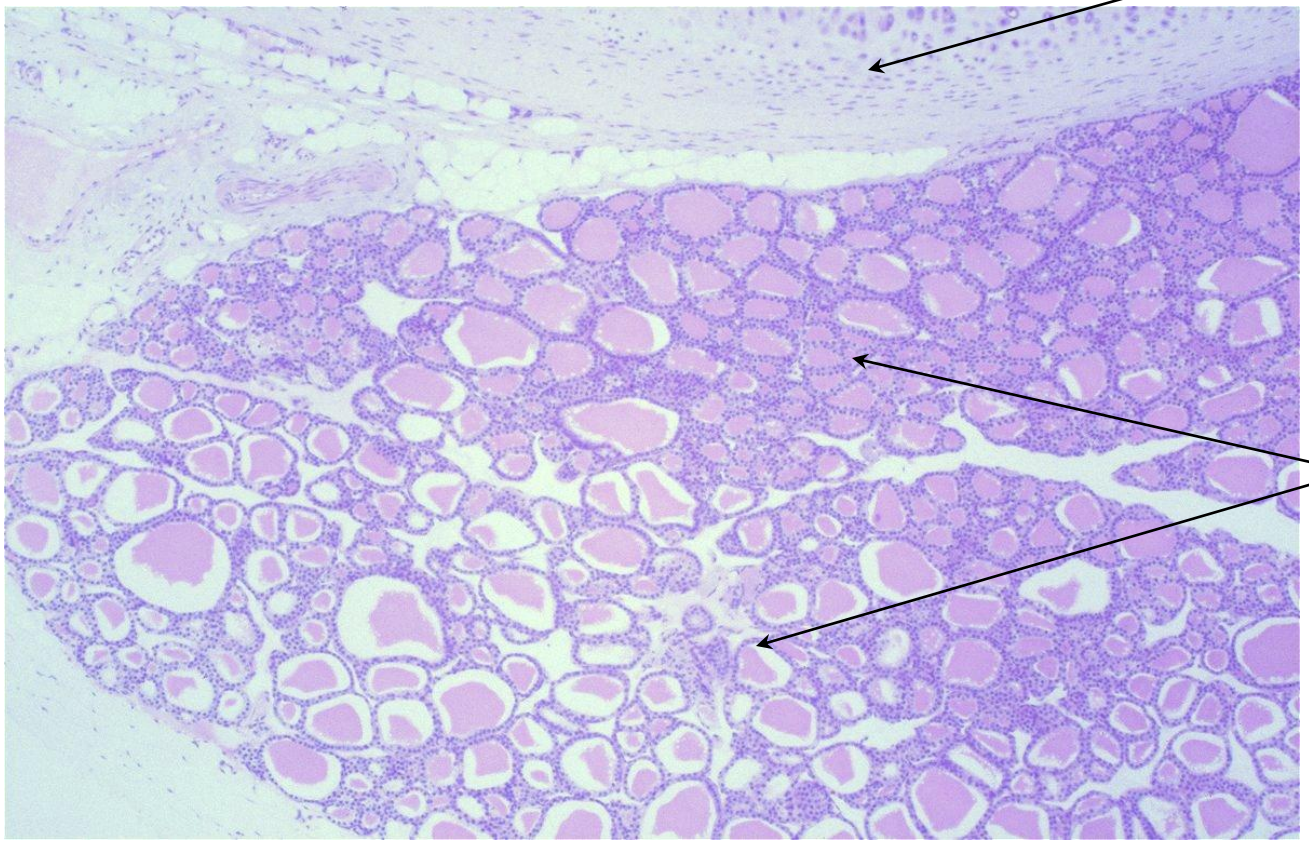


N : nuclei of epithelial cells

25 µm

Thyroid gland

In section 151 the gland is seen as as a deeply staining mass adjacent to the wall of the trachea.



Thyroid gland

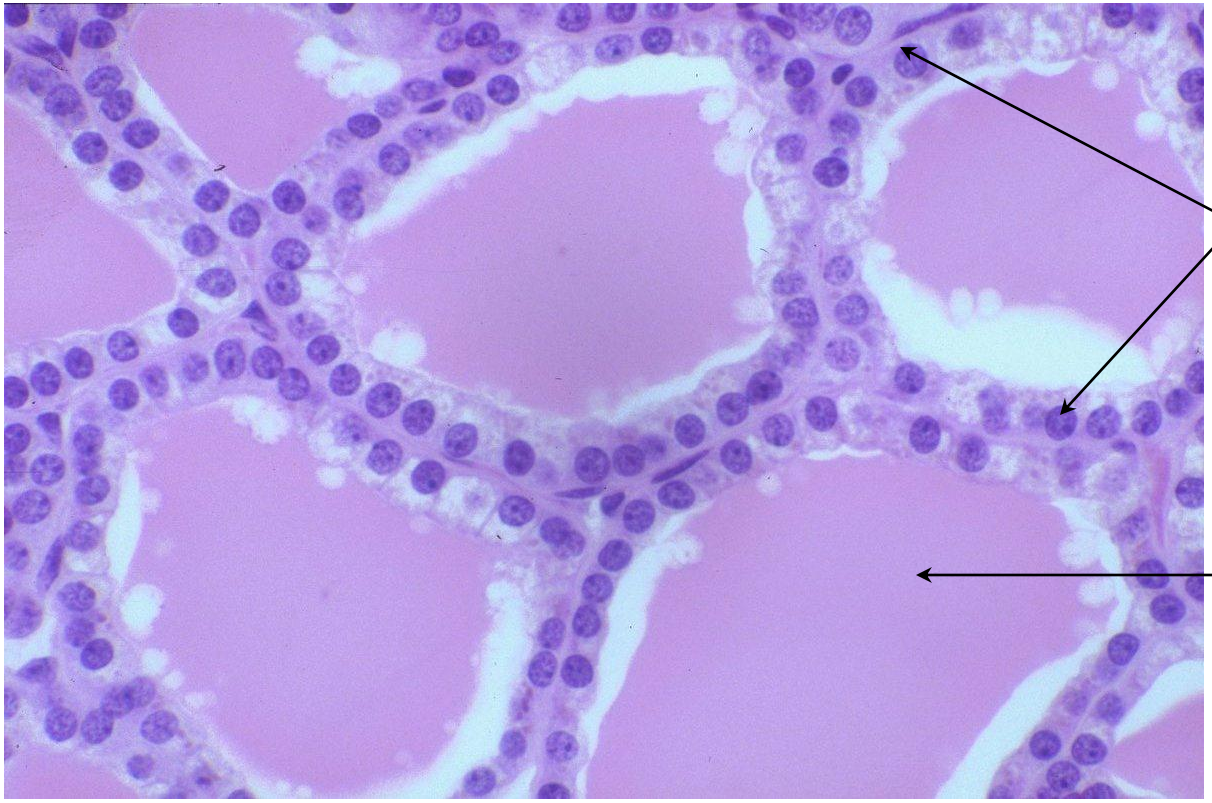
This section shows the presence of a simple epithelial layer.

What type of epithelium is it?

Simple cuboidal epithelium.

Why is it well suited in this tissue?

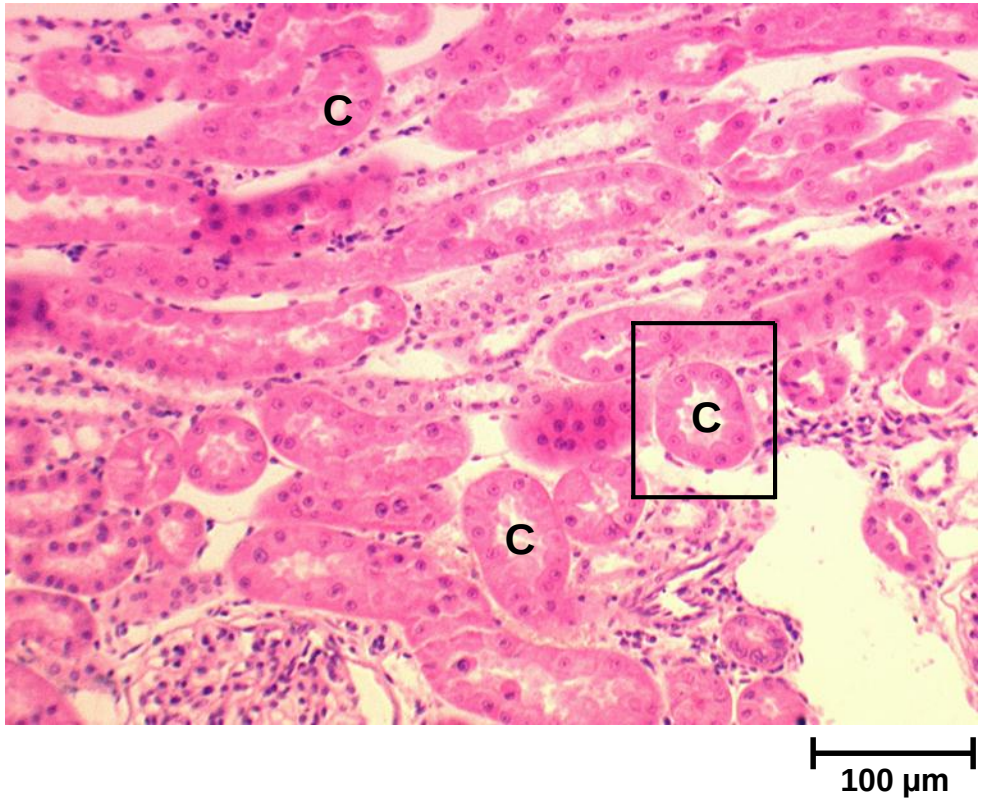
Thin single layer ideal for absorption or secretion. Cells may vary in height.



Kidney convoluted tubules

Identify the convoluted tubules in the cortex of the kidney.
These are also examples of a simple cuboidal epithelium.

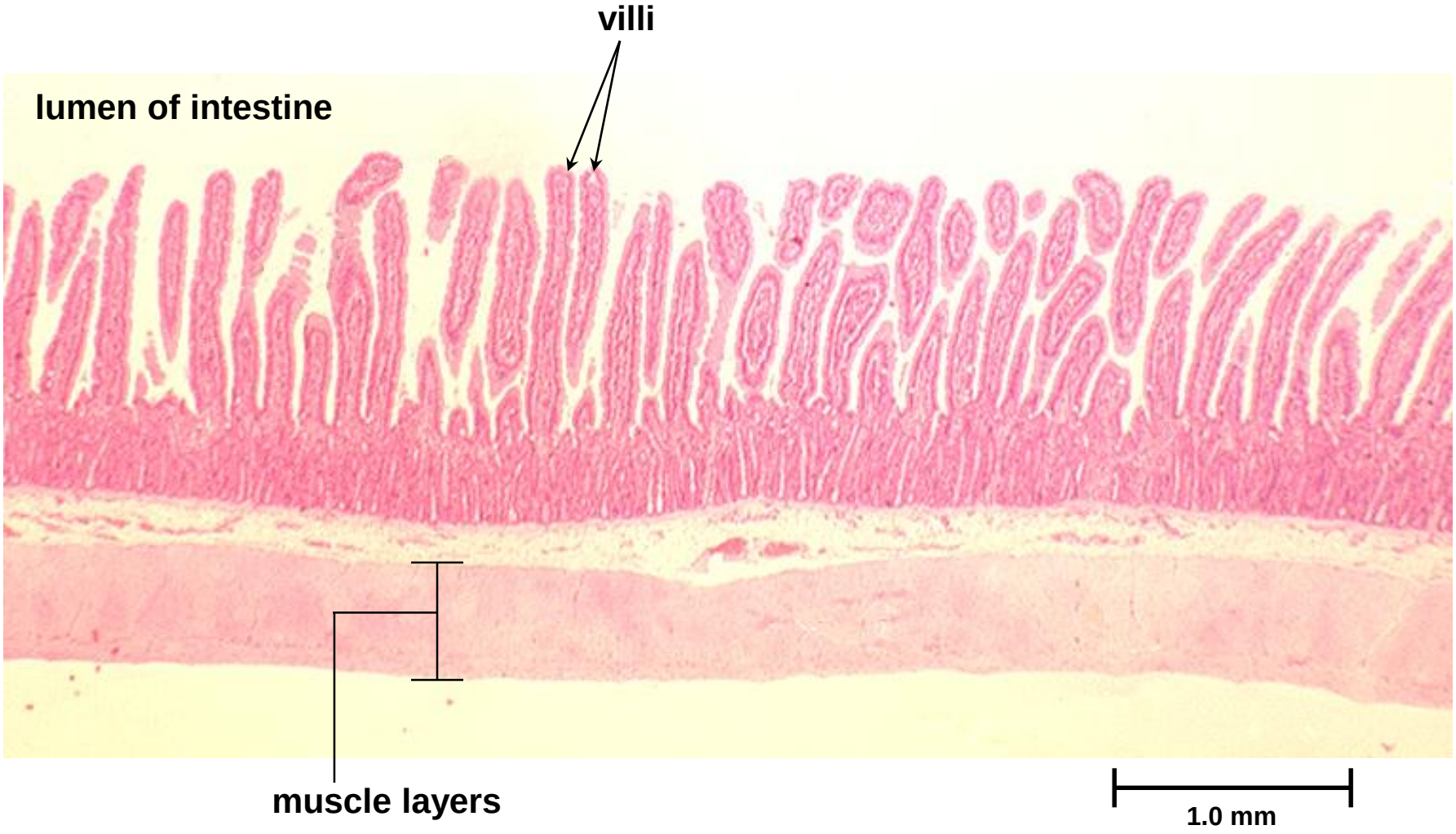
C convoluted tubules (three only labelled)



cuboidal epithelium

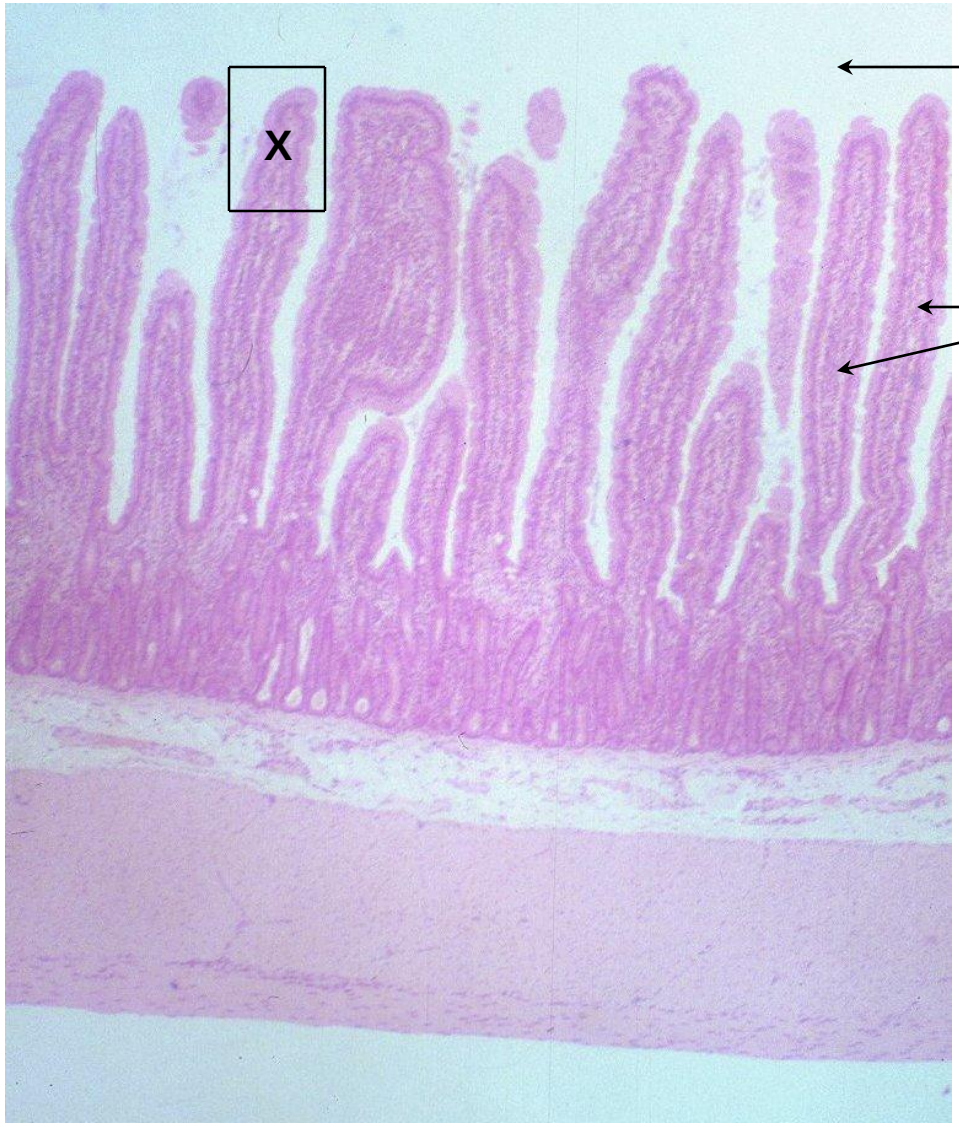
Duodenum

A longitudinal section through a portion of the duodenum.



Duodenum

Examine the epithelial layer lining the villi (the finger like structures).



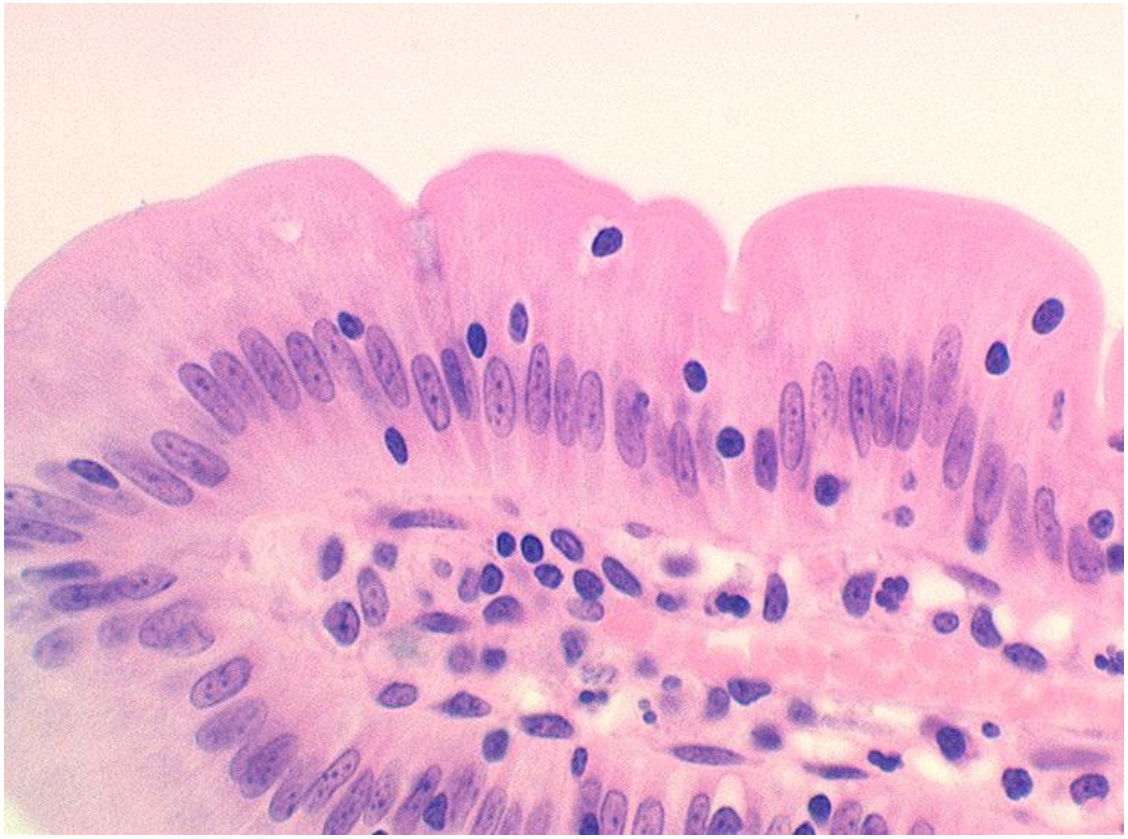
Duodenum (simple columnar)

How does this epithelium compare in its thickness to the previous two epithelia?

Cells are 5-10 times thicker than the previous two epithelia.

Is the increased thickness achieved by increasing the thickness of a single cell or by increasing the number of cell layers?

By increasing the thickness of single cells.



Duodenum (simple columnar)

Does the nuclear shape reflect the cell shape?

Yes, the nuclei are elongated.

Are all the nuclei present at the same or different levels?

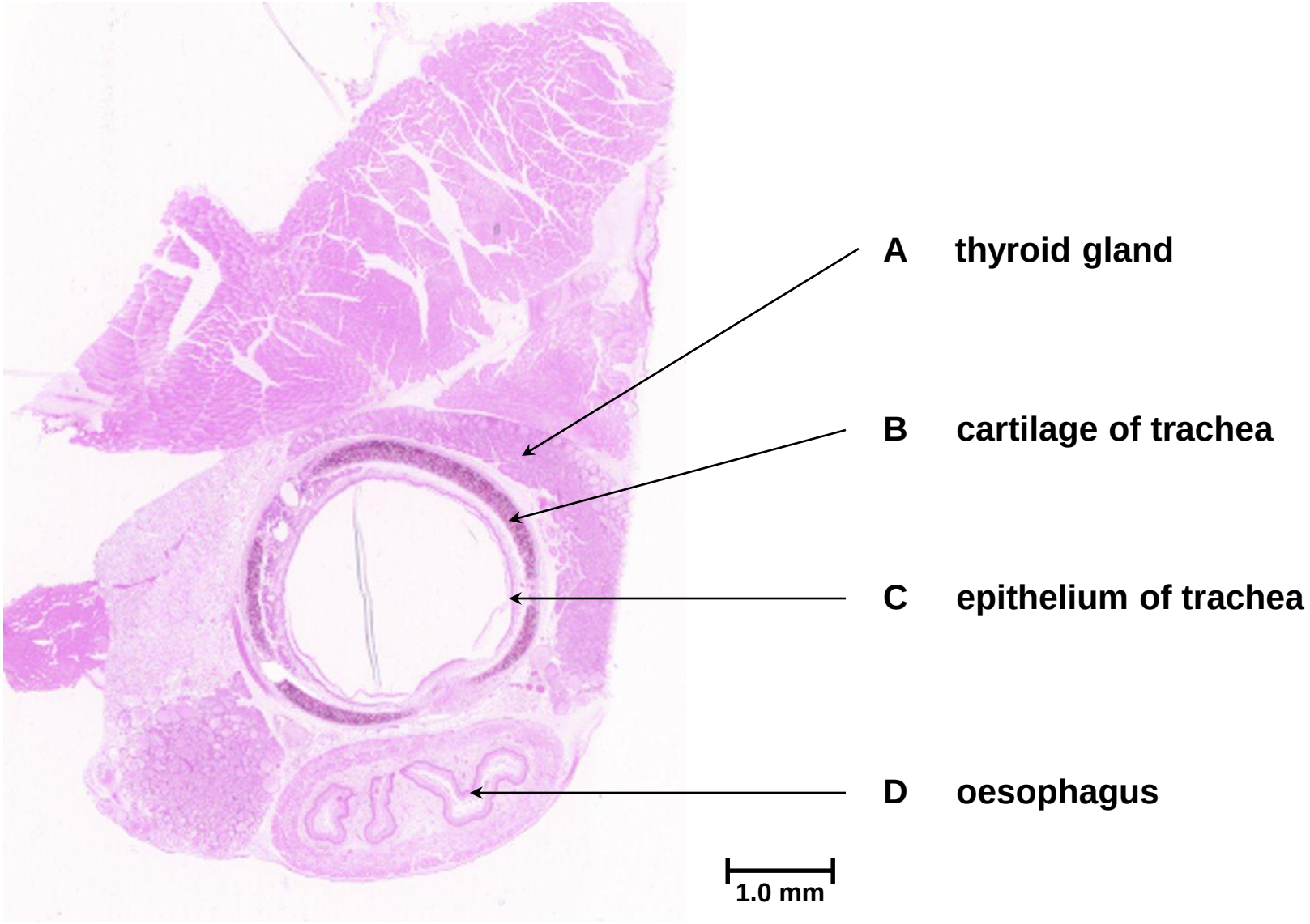
Nuclei mostly at the same level, may be slight variations.

Why is this epithelium best suited for the duodenum ?

A brush border of microvilli is present, increasing the surface area for absorption.

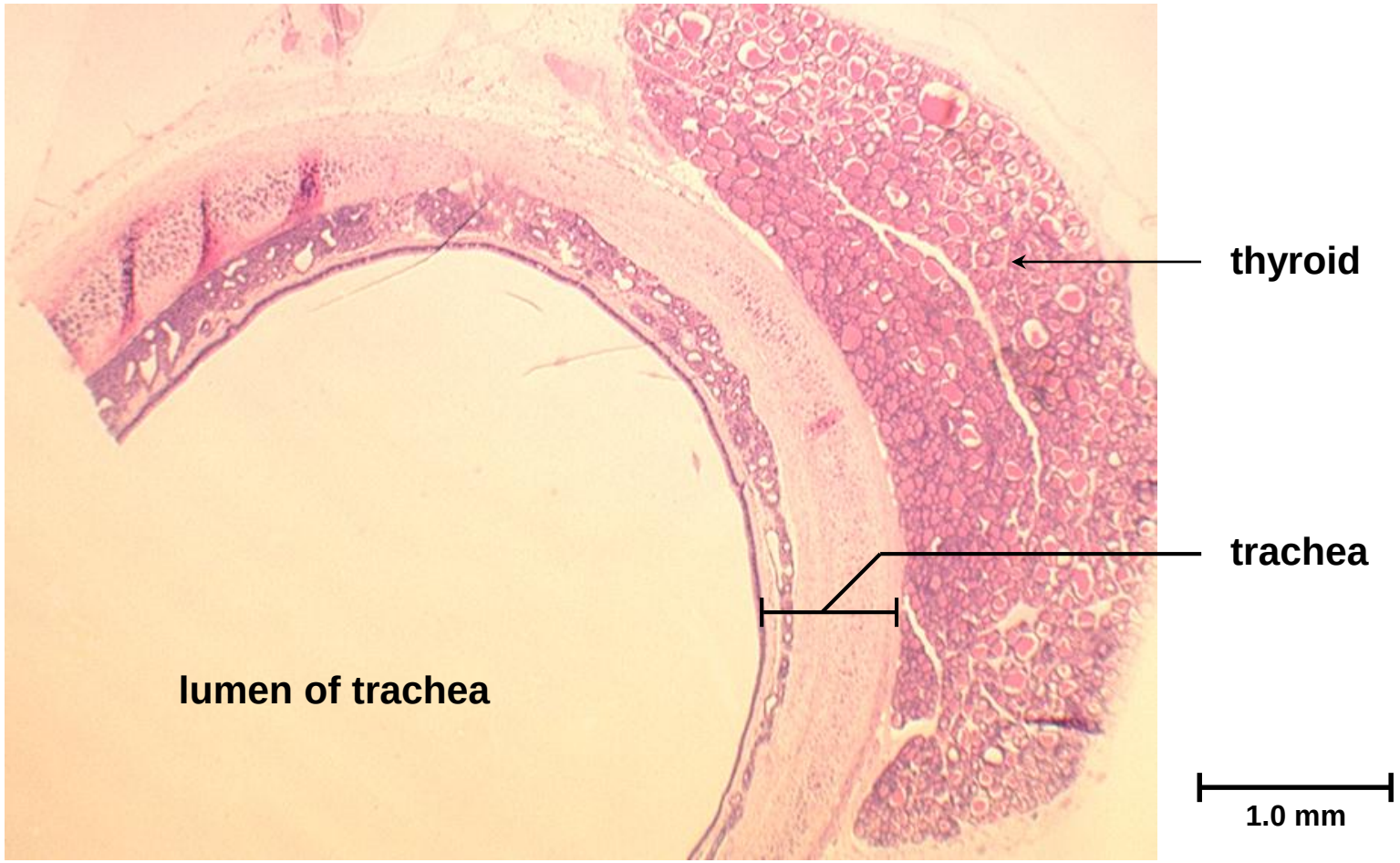
Trachea

Identify the tracheal epithelium. **Pseudostratified columnar epithelium.**



Trachea

This section shows just a portion of the trachea and thyroid only.
Intense pink areas on the trachea are caused by folds in the section.
Identify the trachea and the thyroid.



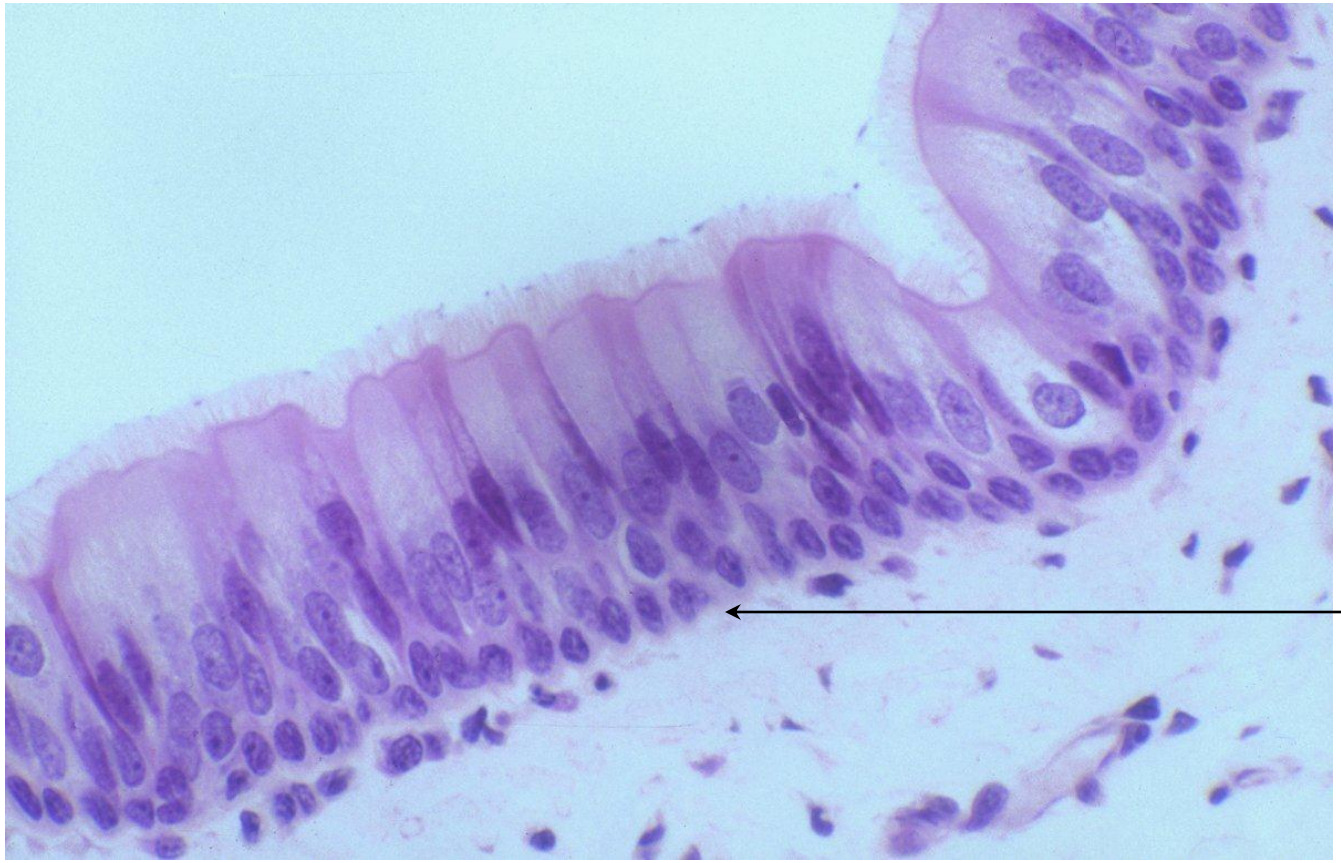
Trachea

How easy or difficult is it to distinguish cell layers in this epithelium?

Do the epithelial cells look similar in shape and size?

Only one cell layer, all cells attached to basement membrane, but some cells do not reach the free surface.

pseudostratified, ciliated columnar epithelium



Trachea

Does the shape or size of the nuclei reflect the shape of the cells?

Taller cells have elongated nuclei, shorter cells more rounded nuclei.

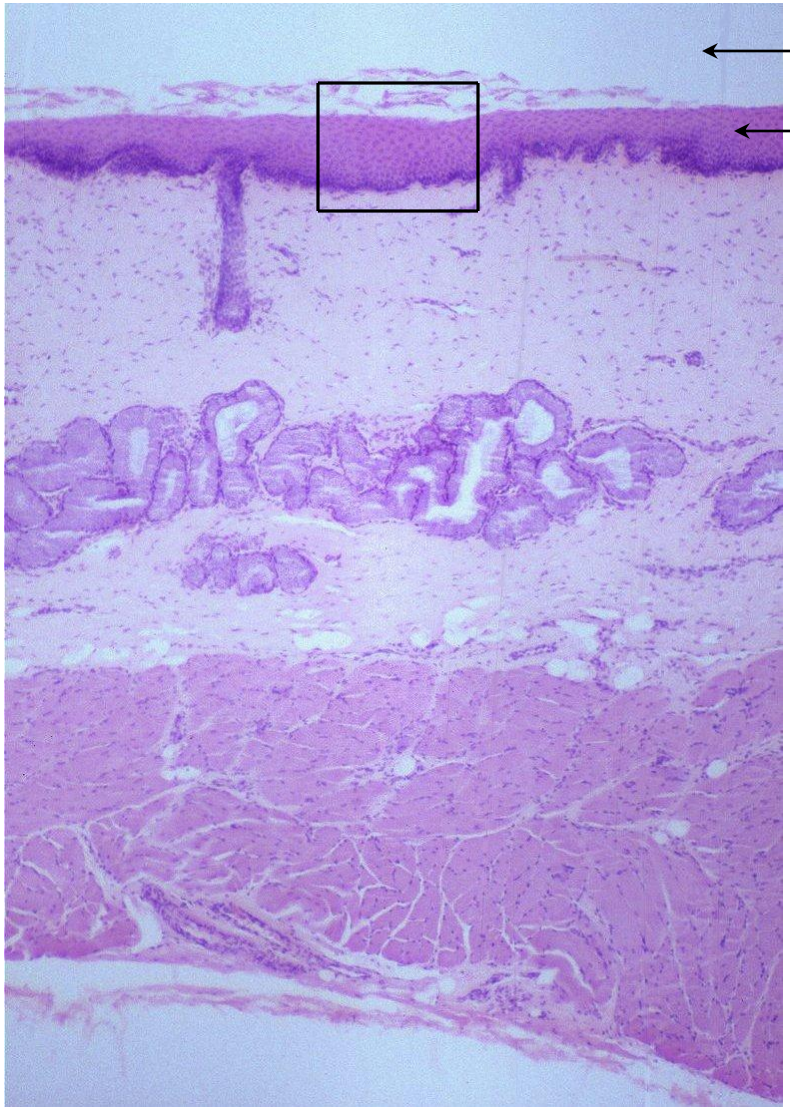
Look for the surface specialisation on these epithelia. What are these surface specialisations called and what purpose do they serve in the trachea?

Surface specialisation presence of cilia.

They move mucous and facilitate the flow on the surface of the trachea.

Oesophagus

Lining epithelium of the oesophagus. **Stratified squamous epithelium.**



Oesophagus (stratified squamous)

How does this epithelium differ from those seen already?

A thicker epithelium. Only the basal layer of cells touches the basement membrane.

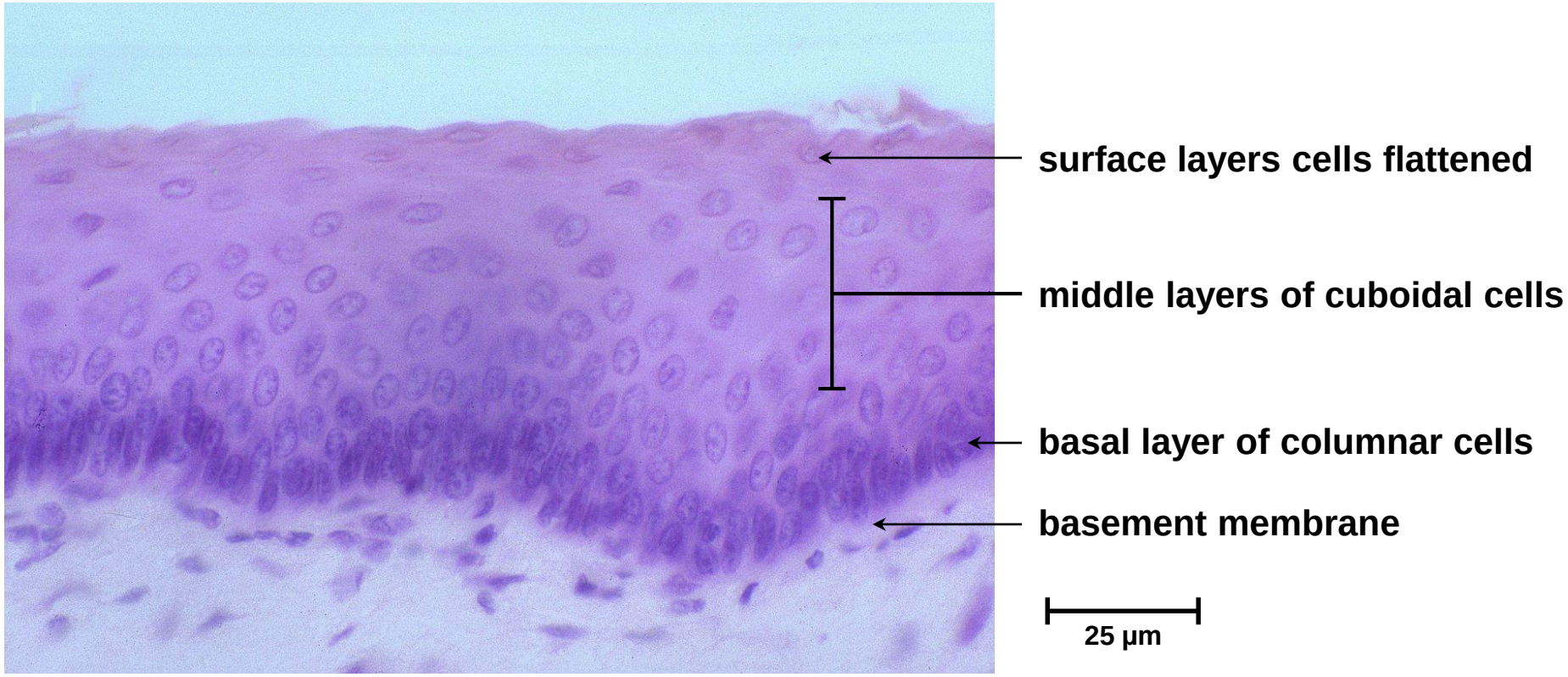
Different layers contain cells of different size and shape.

Can you discern the cell shape or size and how does that change at different levels?

Basal cells larger more columnar, middle cells cuboidal and superficial cells flattened.

Why is this epithelium best suited for these tissues?

Thick layer provides protection to underlying structures and helps prevent fluid loss.

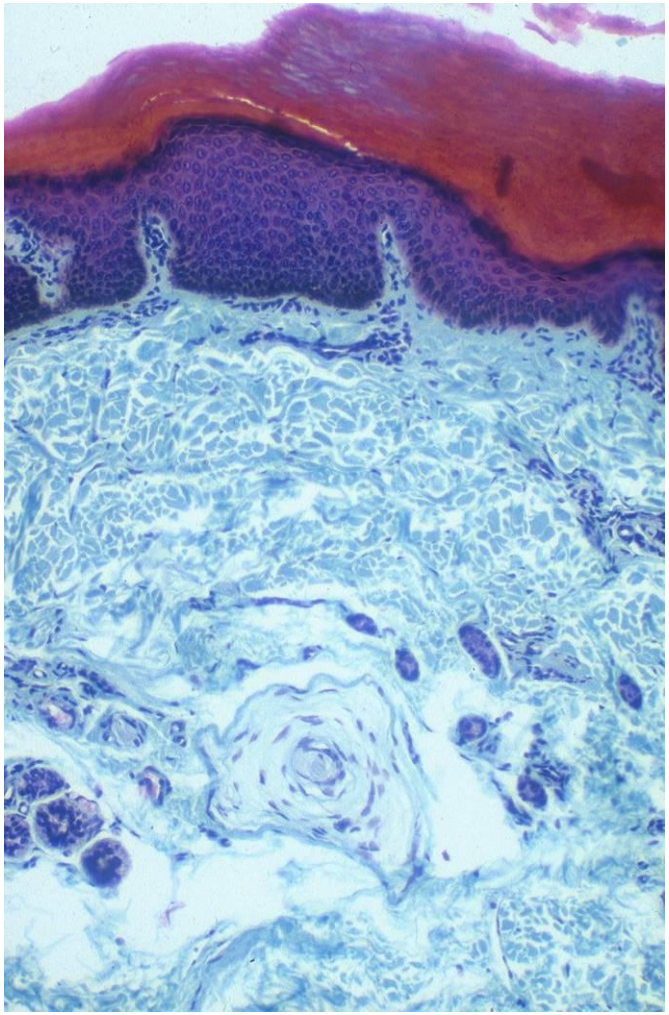


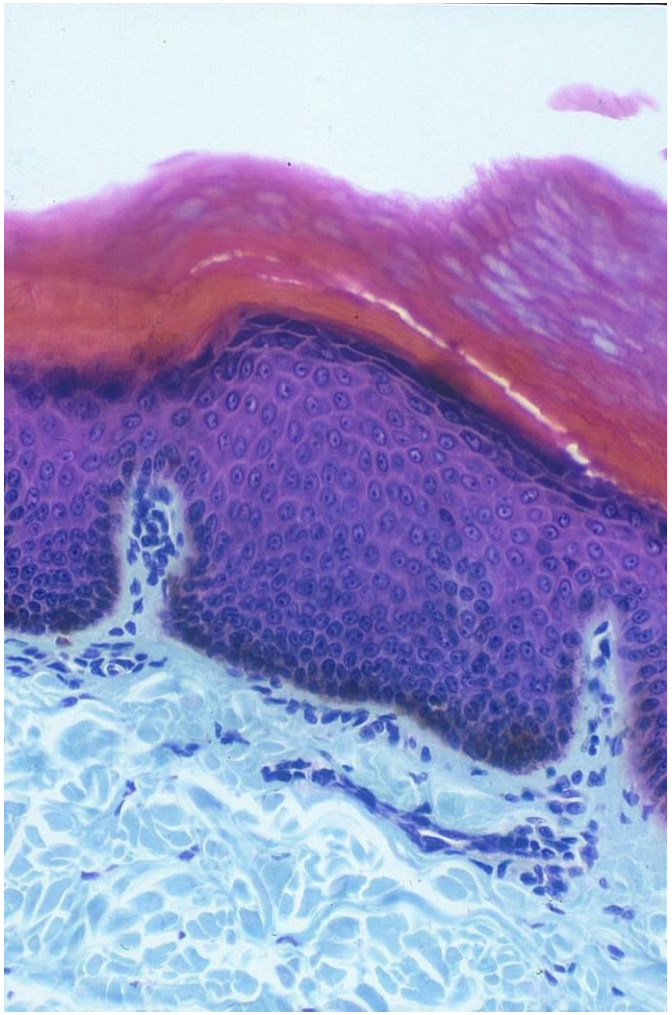
Digital skin

Keratinised,stratified squamous epithelium.

A thick keratinised layer is found covering the surface and providing protection.

Cells in the keratinised layer flattened and lacking cellular organelles.





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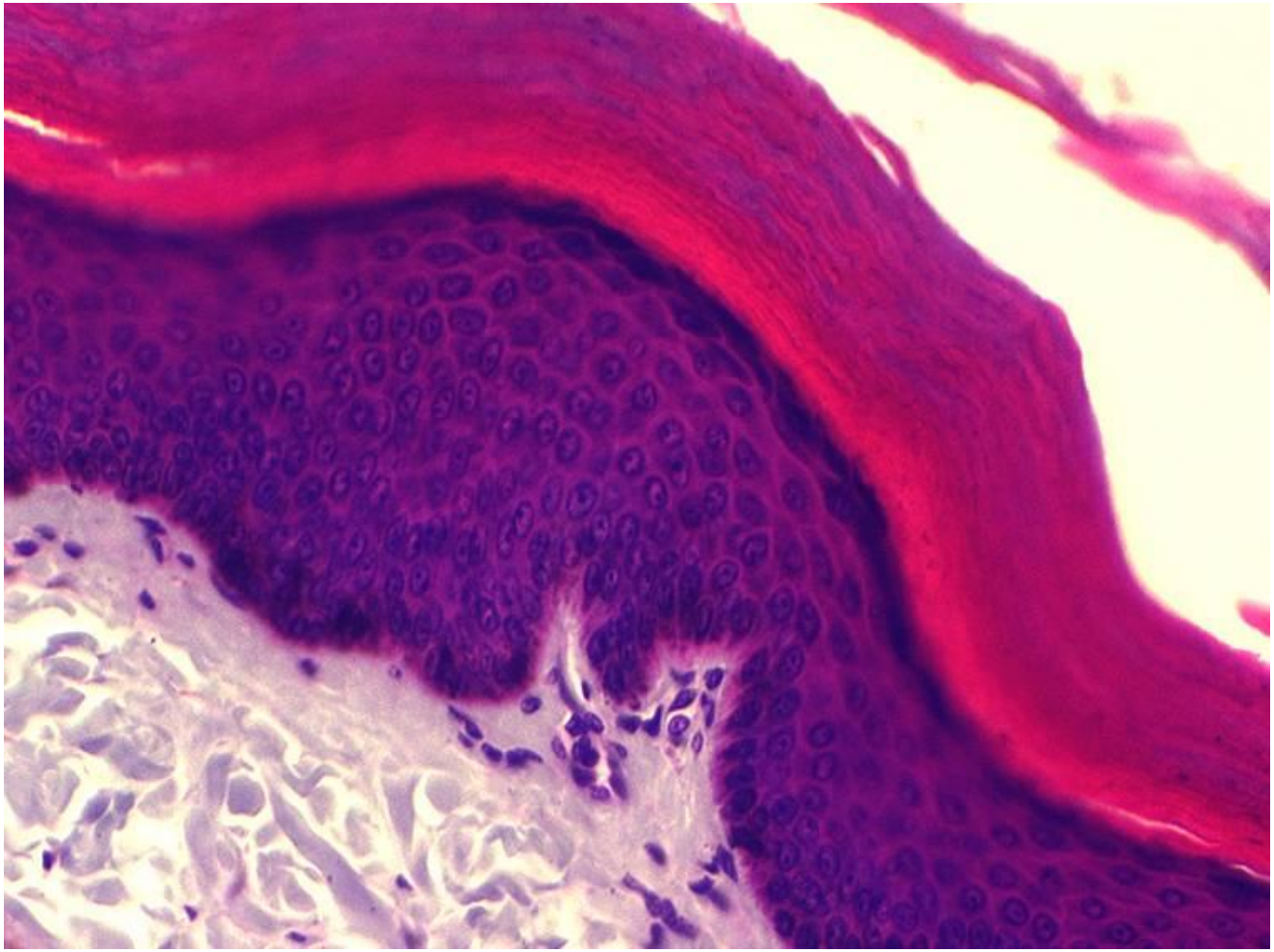
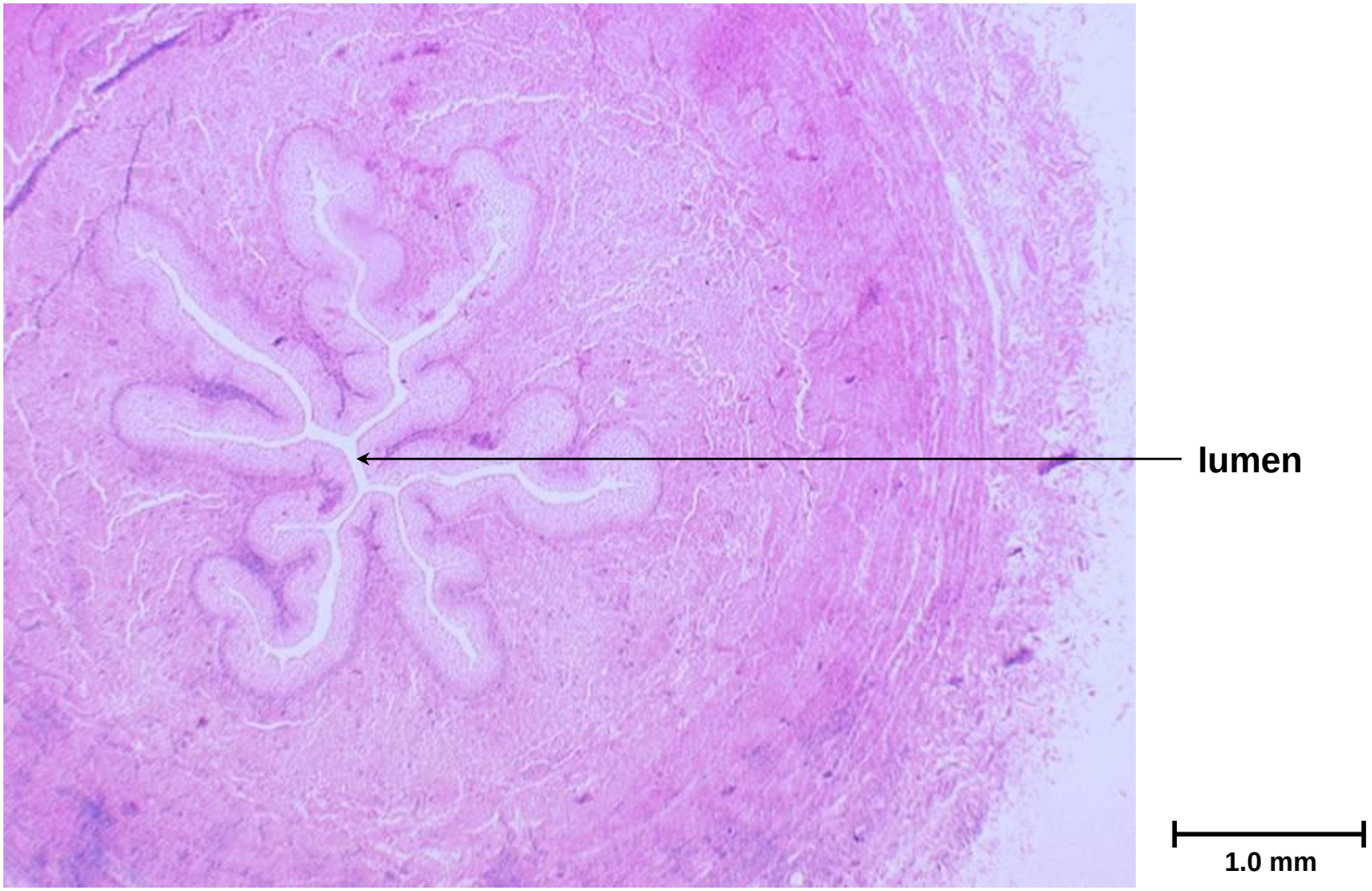


keratinised layer staining deep red

50 µm

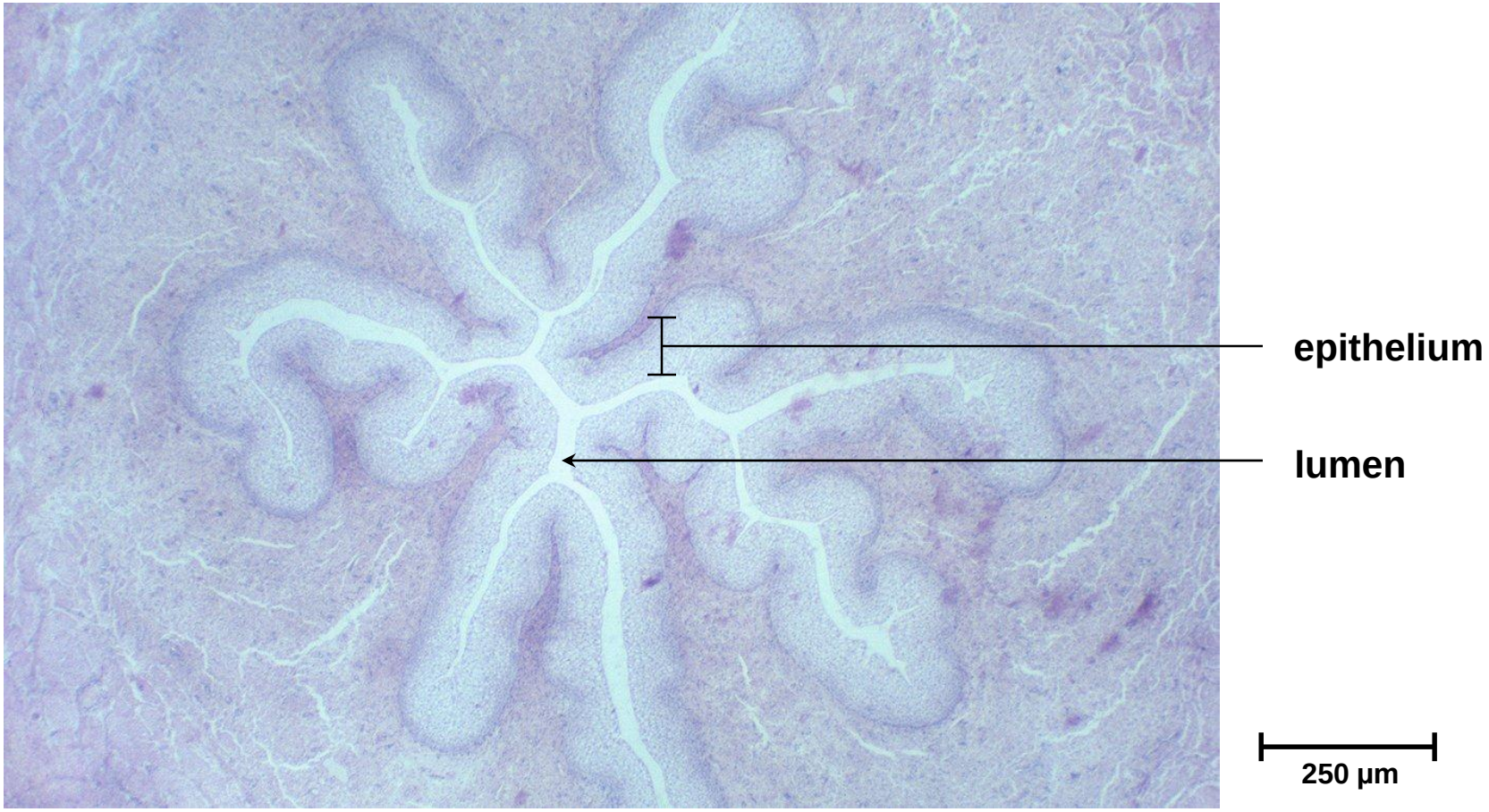
Ureter

Low magnification showing the lumen and the thick muscular wall.



Ureter

Locate the epithelium lining the lumen of the ureter.



Ureter

What sort of epithelial lining would you expect to see in this tissue and why?

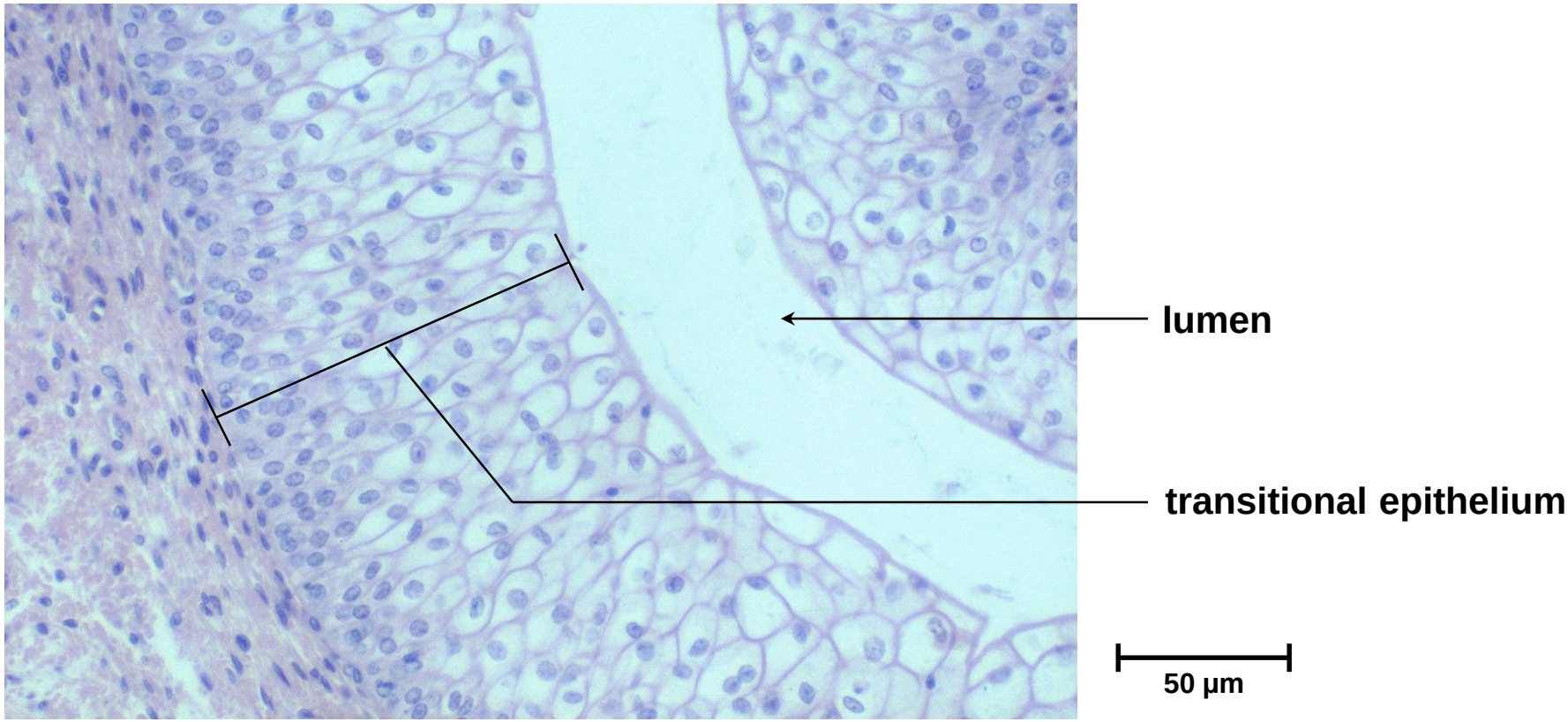
Transitional epithelium, it can stretch.

Under what conditions could this epithelial lining appear different?

Fluid in the lumen will stretch the epithelium and the surface cells will become flattened.

What is the most characteristic feature of this epithelium that distinguishes it from other epithelia?

Cells on the surface are larger than those in the basal layers.



Urinary bladder

What sort of epithelial lining would you expect to see in this tissue and why?

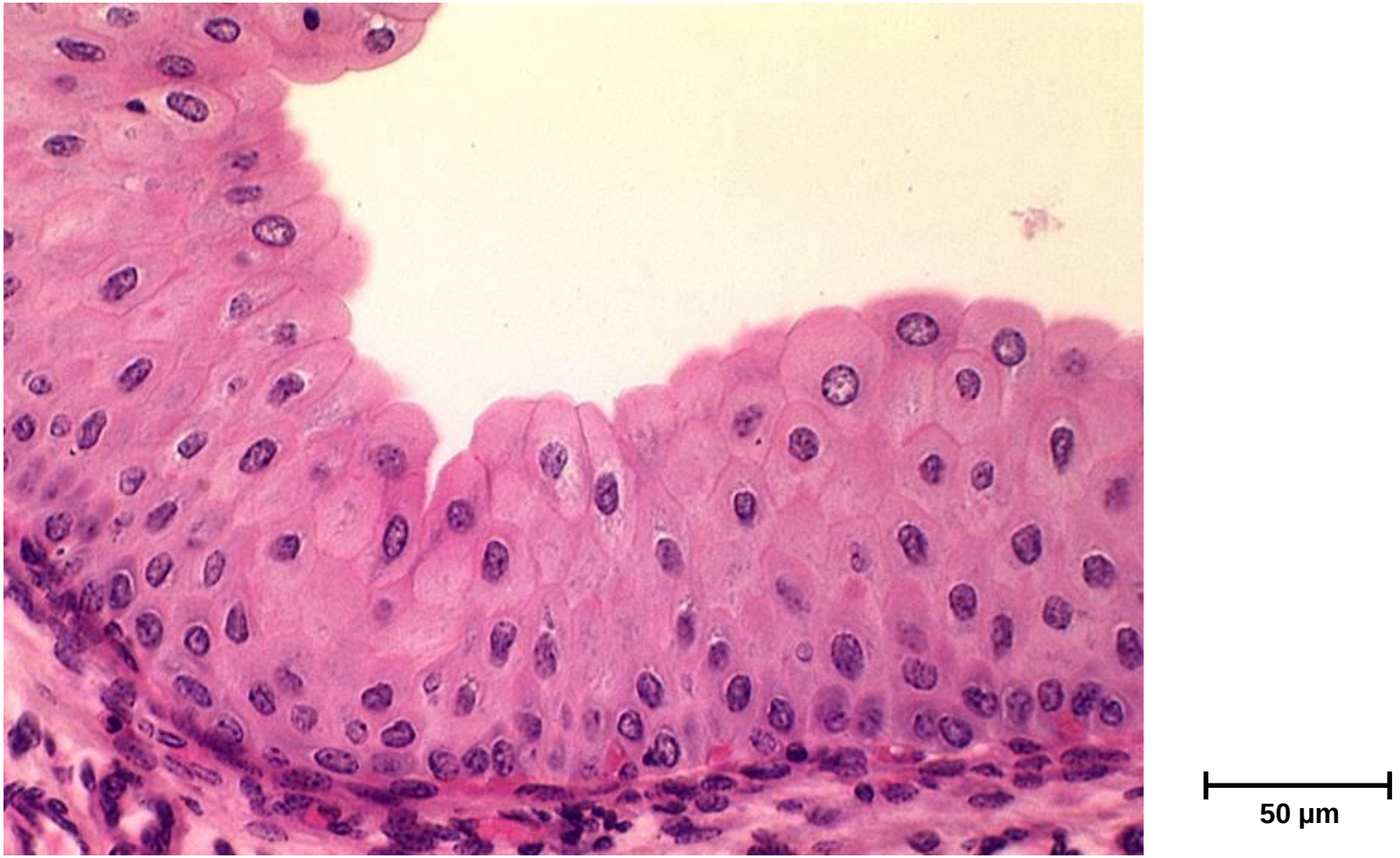
Transitional epithelium lines most of the urinary tract.

Distension will cause a change of shape of these epithelial cells.

Urinary bladder

Close up view of the transitional lining of the bladder (not stretched).

Cells towards the lumen are often larger and rounder than those in the deeper layers.



SECRETORY EPITHELIAL CELLS

Epithelial cells may be secretory i.e. glandular.

Identify these cells in the next few pictures

Note the presence or absence of ducts and the general arrangement of the secretory cells.

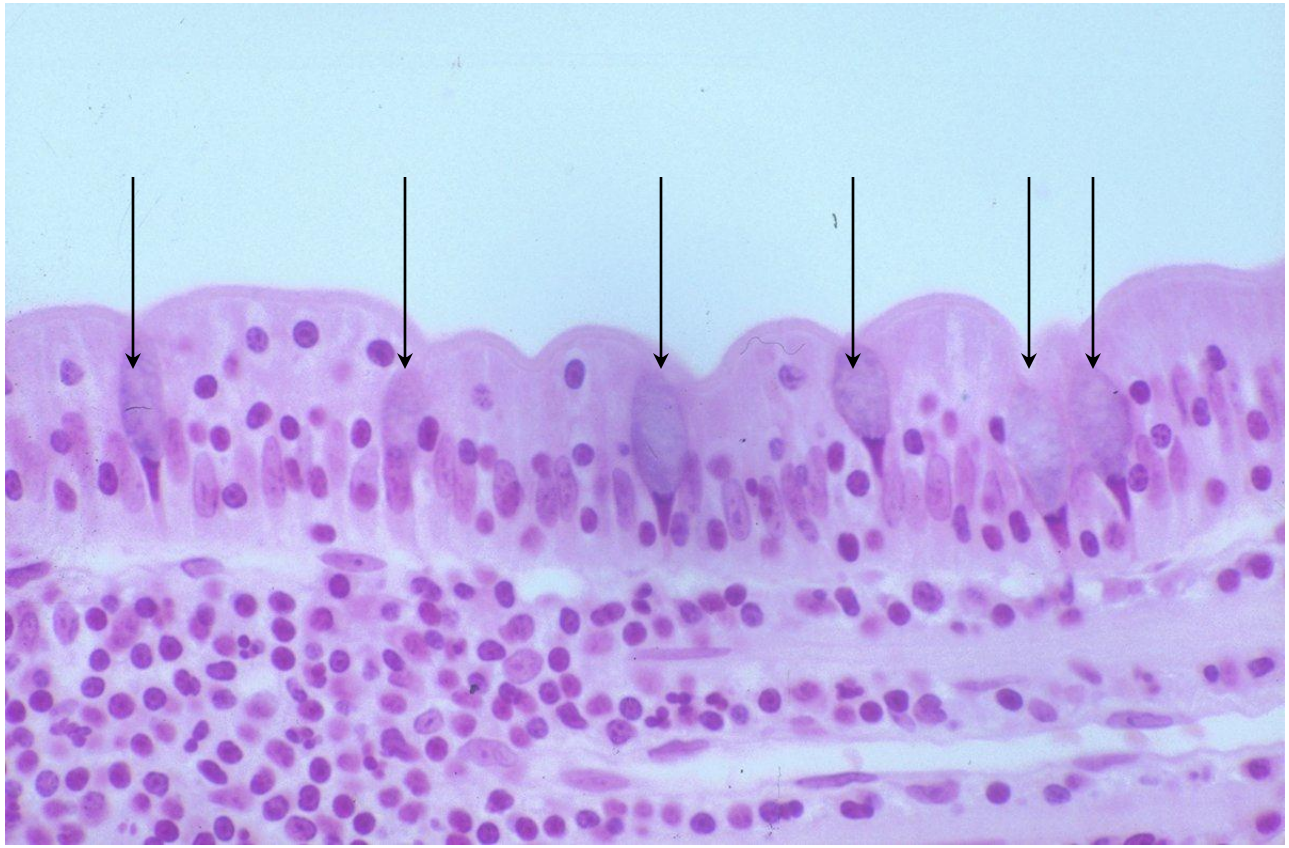
Classify the glands according to type.

Duodenum

Goblet cells (stained grey-blue) within the epithelial lining of the duodenum.

Classify these glands according to type.

Single cell gland.



Goblet cells arrowed

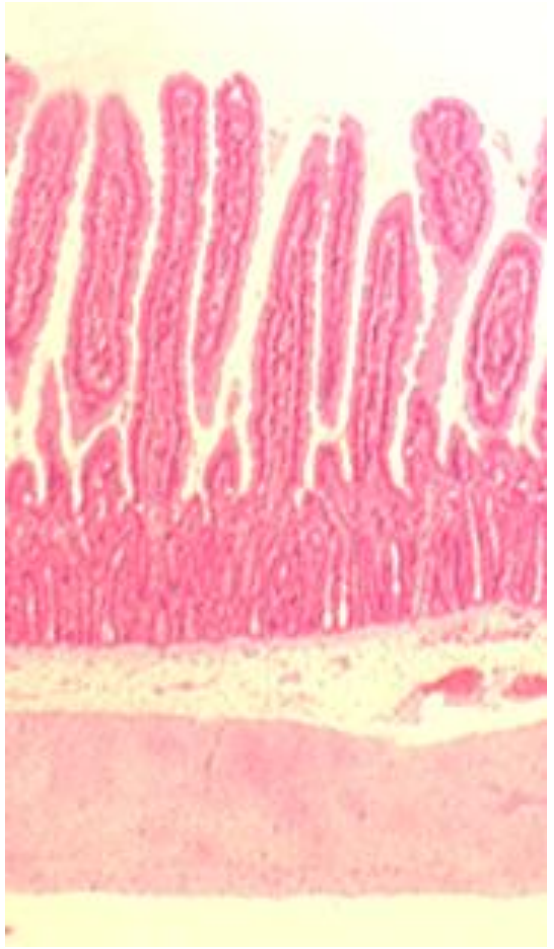
25 µm

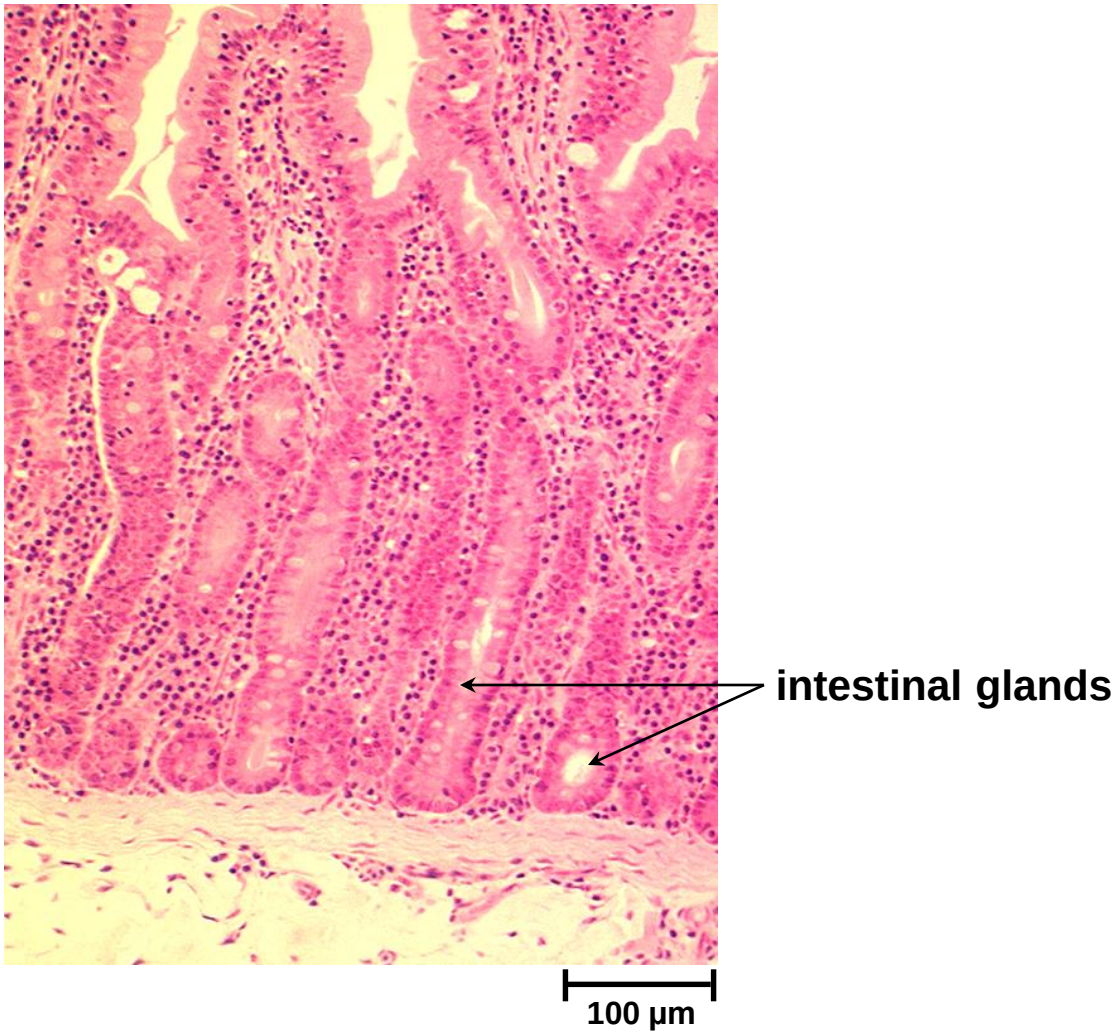
Duodenum

Intestinal glands in duodenum.

Classify these glands according to type.

Simple tubular multicellular gland.



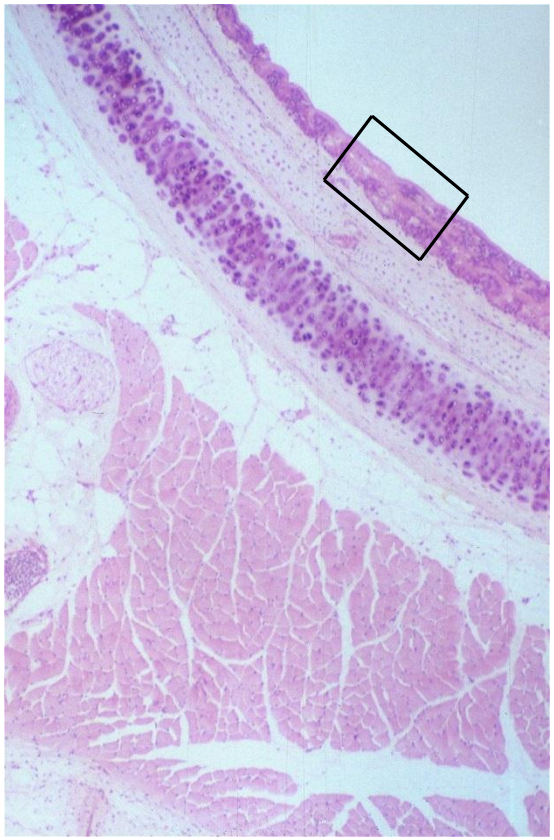


Trachea

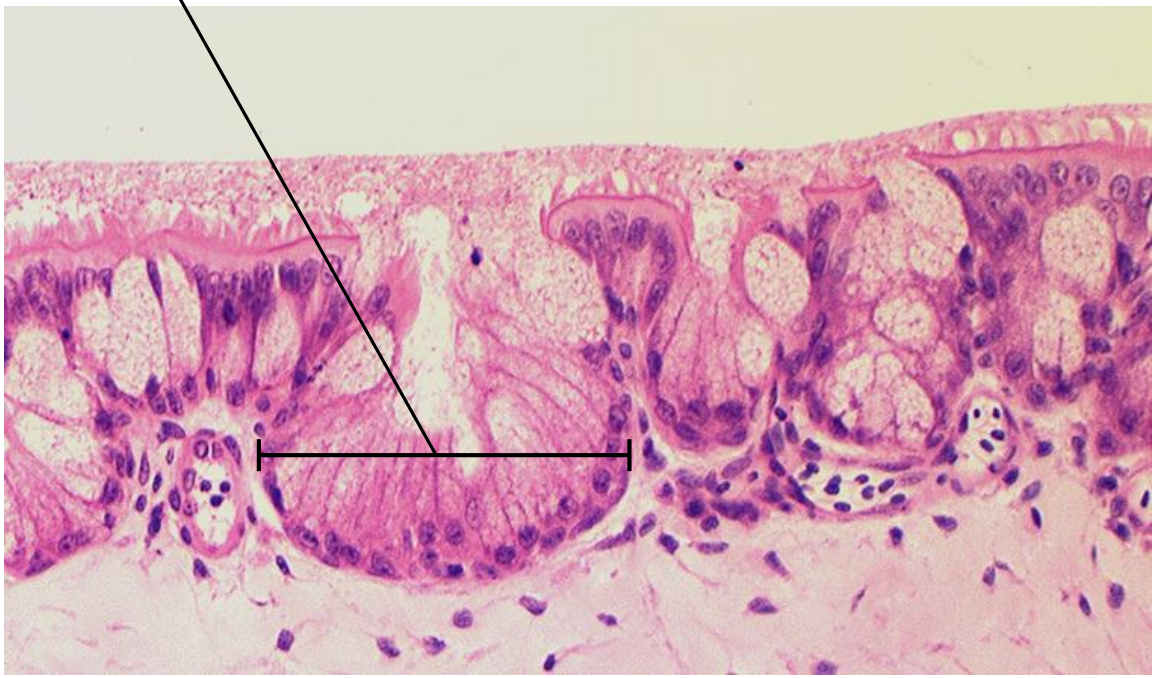
Mucous glands within the trachea.

Classify these glands according to type.

Simple acinar multicellular gland.



250 µm



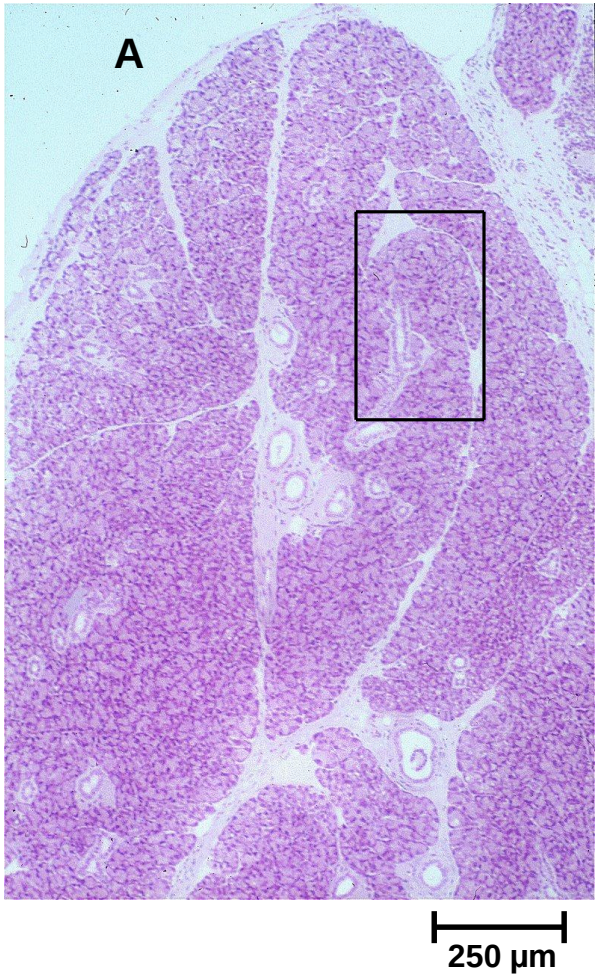
50 µm

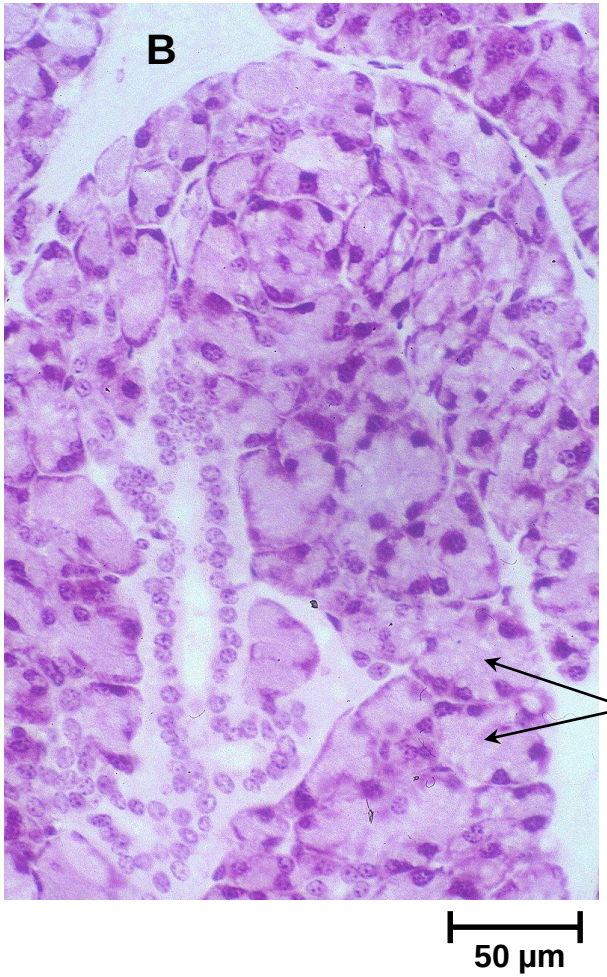
Salivary gland

Locate and identify salivary gland tissue.

Classify these glands according to type.

Compound acinar multicellular gland.





A Salivary gland lobules

B Enlarged area

acini of gland