

HOW CELLS ARE ARRANGED IN MULTICELLULAR ORGANISMS

Cells are arranged into tissues

A **tissue** is made of groups of the same kind of cells with a common structure and function.

Tissues are arranged into organs

An **organ** is a structure that contains at least two different types of tissue functioning together for a common purpose.

Organs are arranged into organ systems

Four Main Plant Tissues

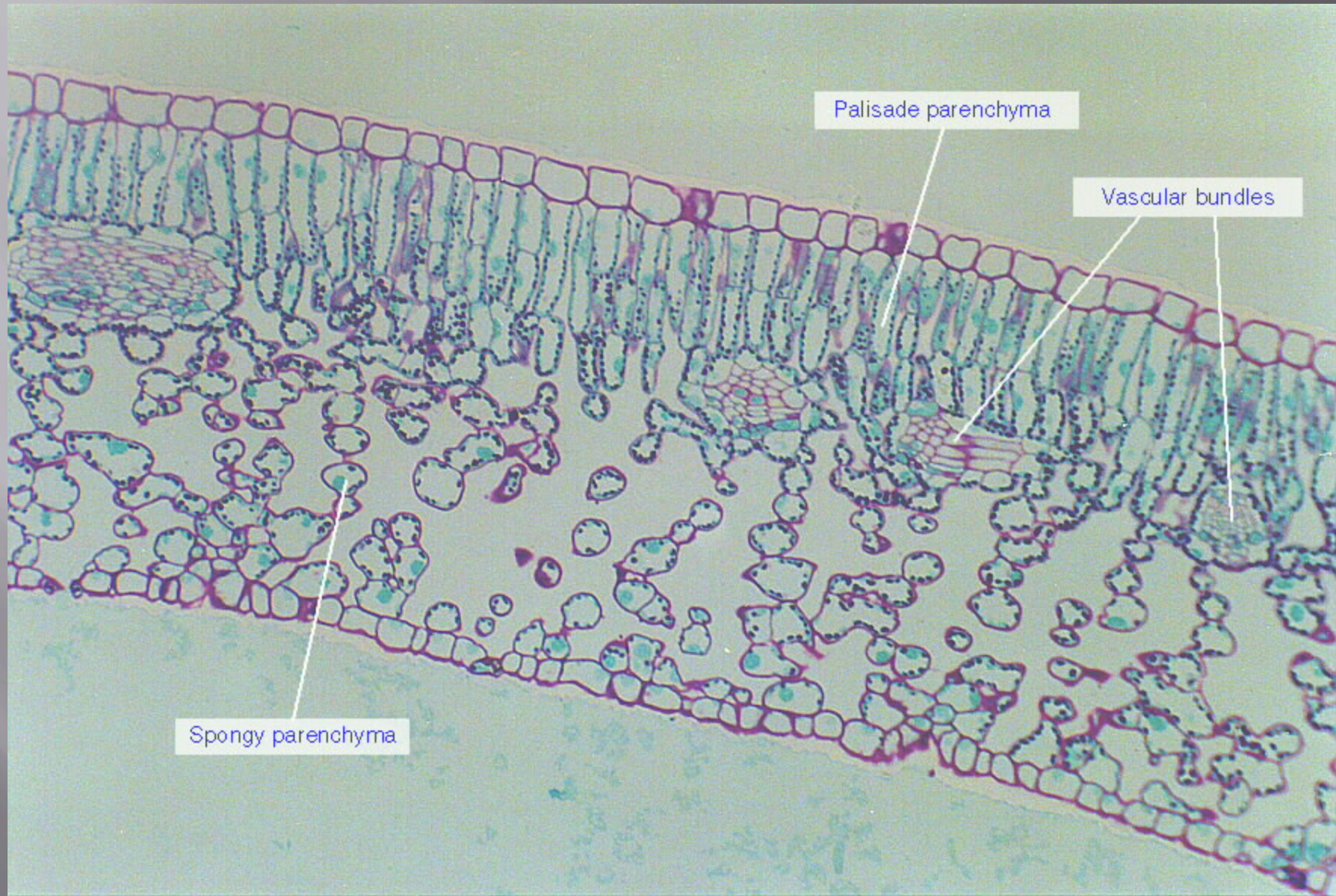
Dermal...forms a border around other cells
epidermis
endodermis

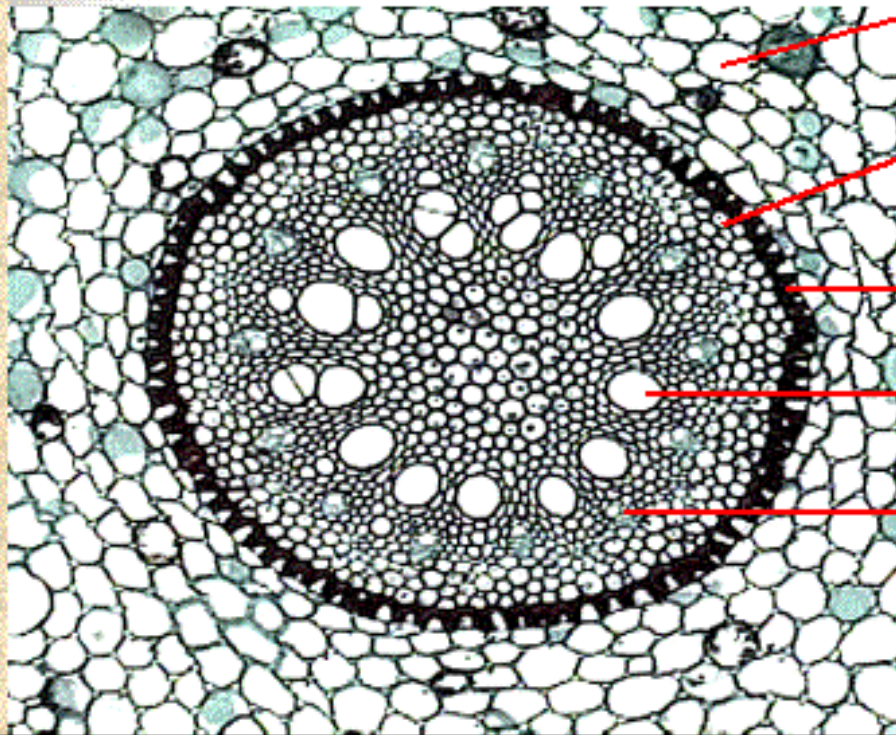
Vascular...transports fluids

Ground ...cells in between the epidermis and vascular tissue

Meristem...divide and differentiates into the above tissues

LEAF CROSS SECTION





cortex

pericycle

Endodermis

xylem

phloem

Four Main Animal Tissues

Epithelial...coverings and linings e.g. skin and intestinal lining

Connective...most abundant: cartilage, bone, adipose, blood

Nervous...nerve cells

Muscle...skeletal, cardiac and smooth

Plants seem neat and orderly partly because plant cells have cell walls.

Animal cells have no cell walls and in multicellular animals the cells are often bathed in fluids...squishy

Let's look at an example of an organ of an animal
and
the tissues of that organ

Intestine and stomach...part of the digestive organ system



Intestine is an Organ

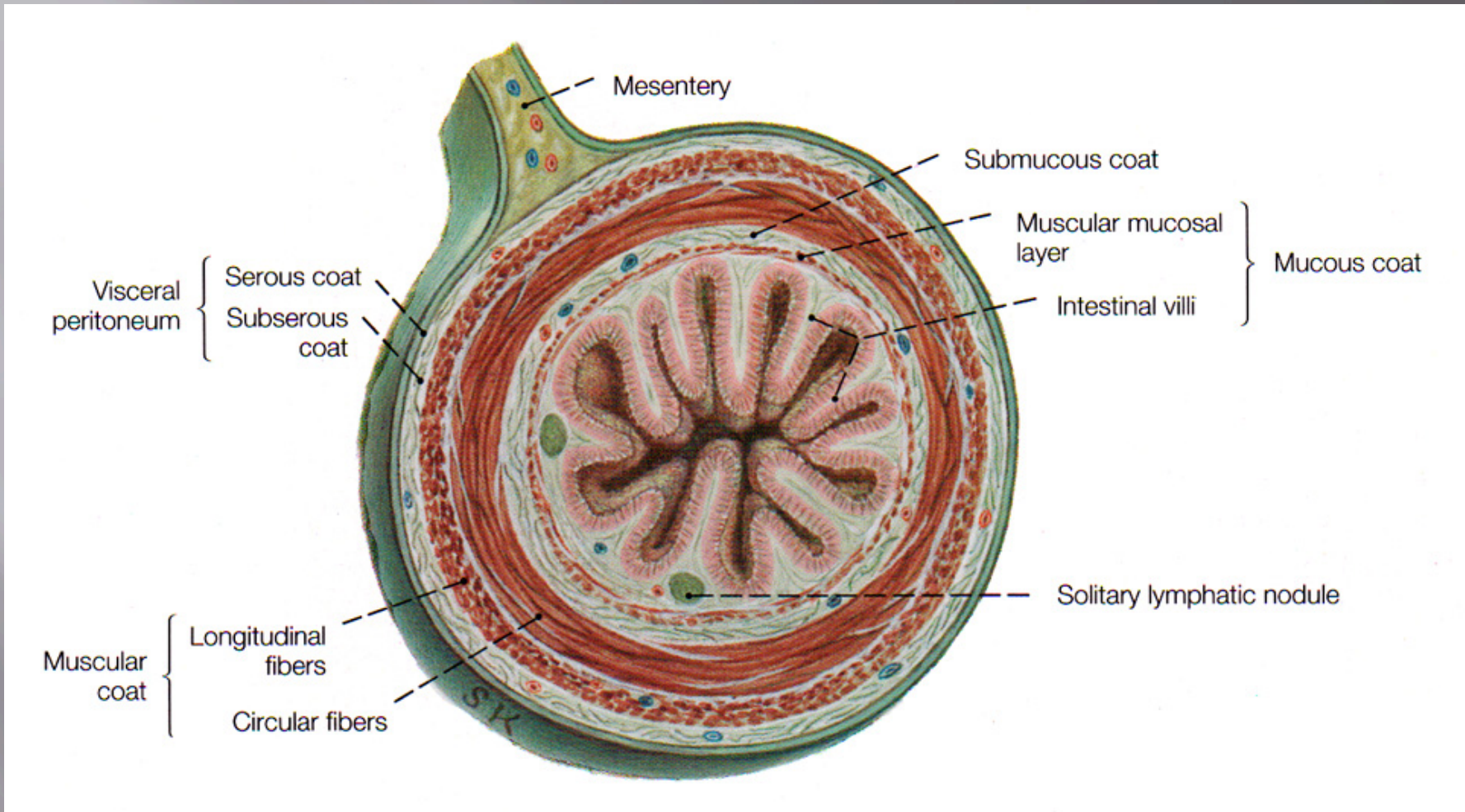
Millions of smooth muscle cells (muscle tissue) arranged into two layers

Connective tissue between muscle and inner mucosal lining

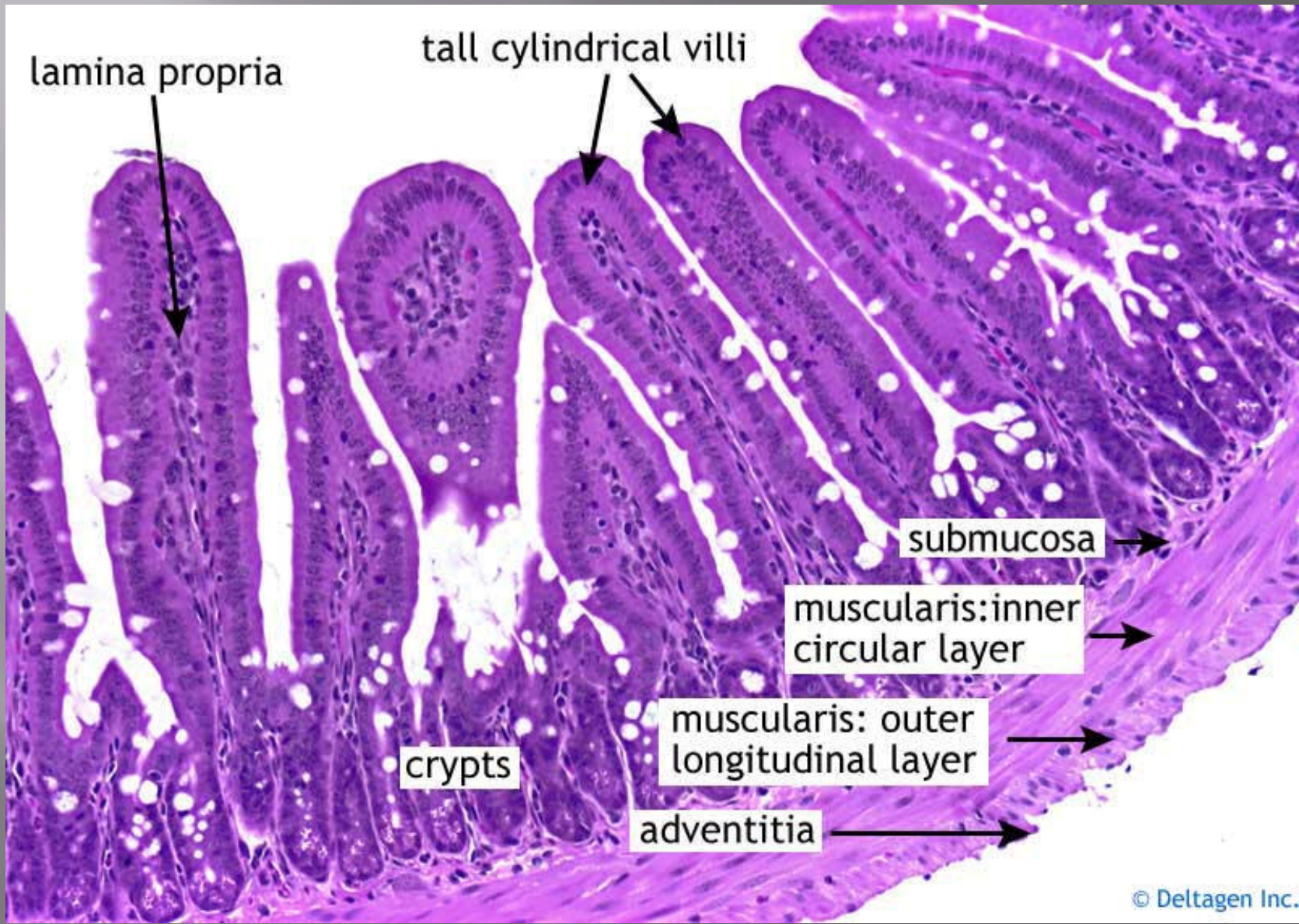
Nervous tissue that runs through the muscle and inner wall

Epithelial tissue that covers the outside of the intestine and lines
The inner mucosal tissue.

Cross section of small intestine



The villi or fingers increase the area of the intestine that will absorb nutrients. The mesentery is made of nerves and blood vessels that carry nutrients from the intestine to the liver.



lamina propria

tall cylindrical villi

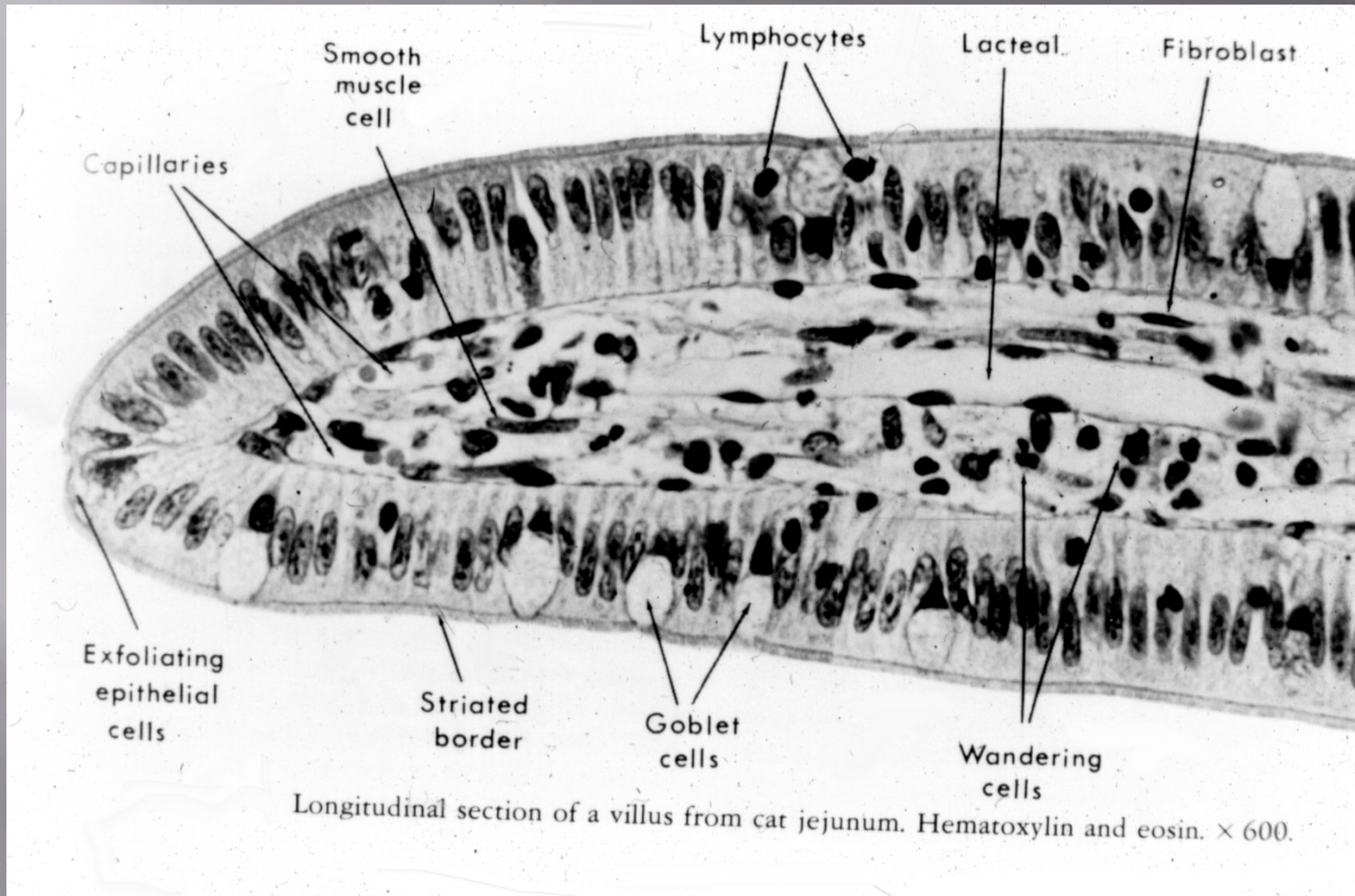
submucosa

muscularis: inner circular layer

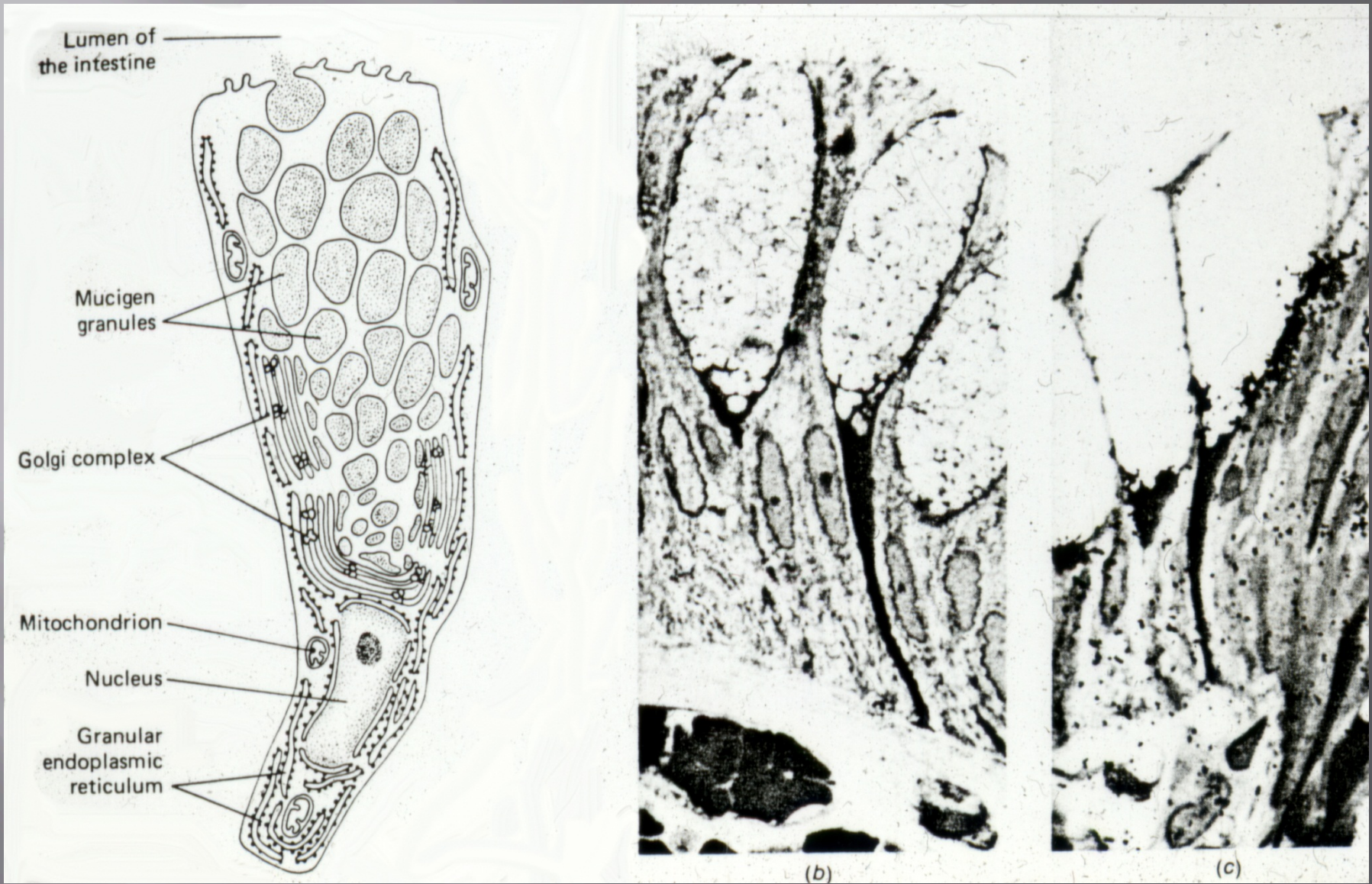
muscularis: outer longitudinal layer

crypts

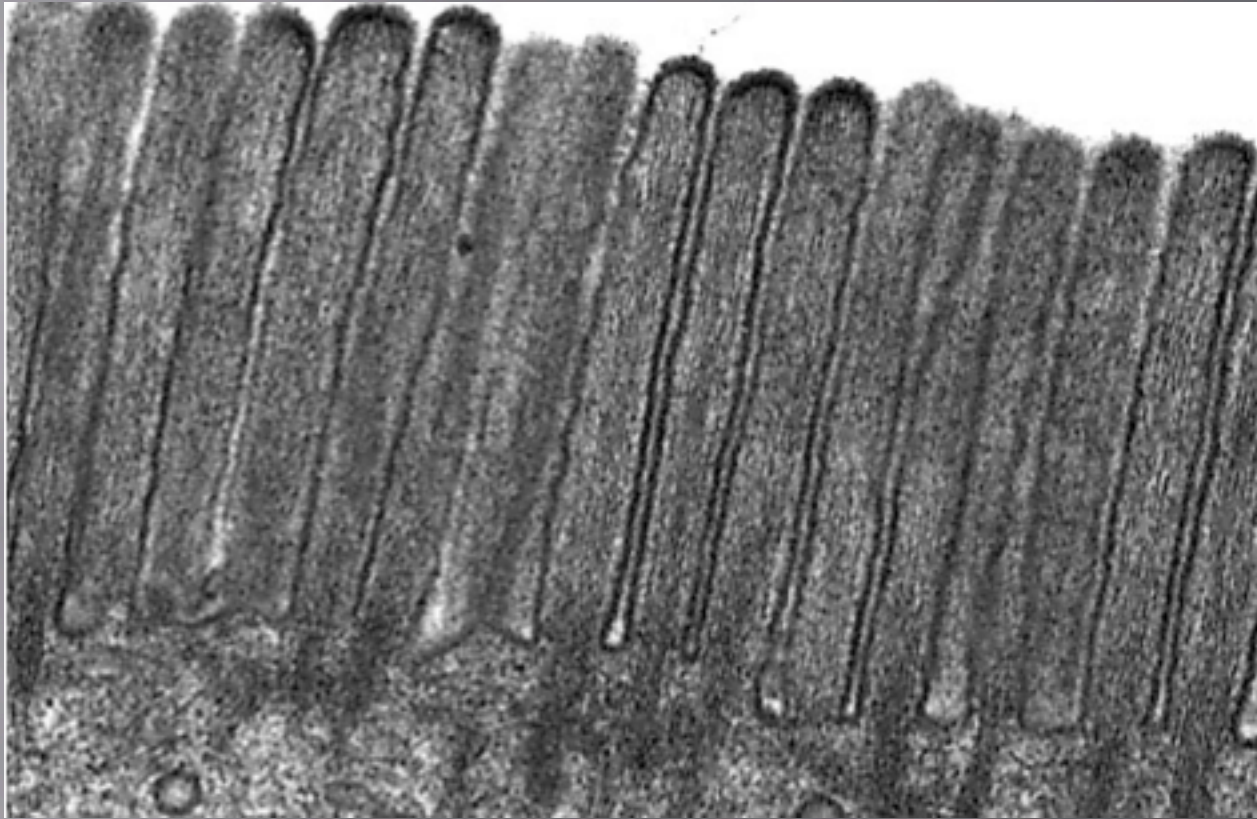
adventitia



A closer look at a villus (singular for villi). Goblet cells produce mucous, capillaries carry oxygen and carbon dioxide to and from the cells. Lacteals are “lymphatic” thin walled vessels that carry lipids absorbed from food and eventually deliver the lipids to the blood stream where they will be metabolized by the liver



A goblet cell showing mucigen granules that store and release mucous.



Looking at the edge of a single cell from a villus at very high magnification. Transmission electron microscope image of a thin section cut through a human jejunum (segment of small intestine) epithelial cell. This high magnification image shows some of the densely packed microvilli that cover a single mucosal cell. Each microvillus is approximately 1 μm long by 0.1 μm in diameter and contains a core of actin microfilaments. (source Wiki)