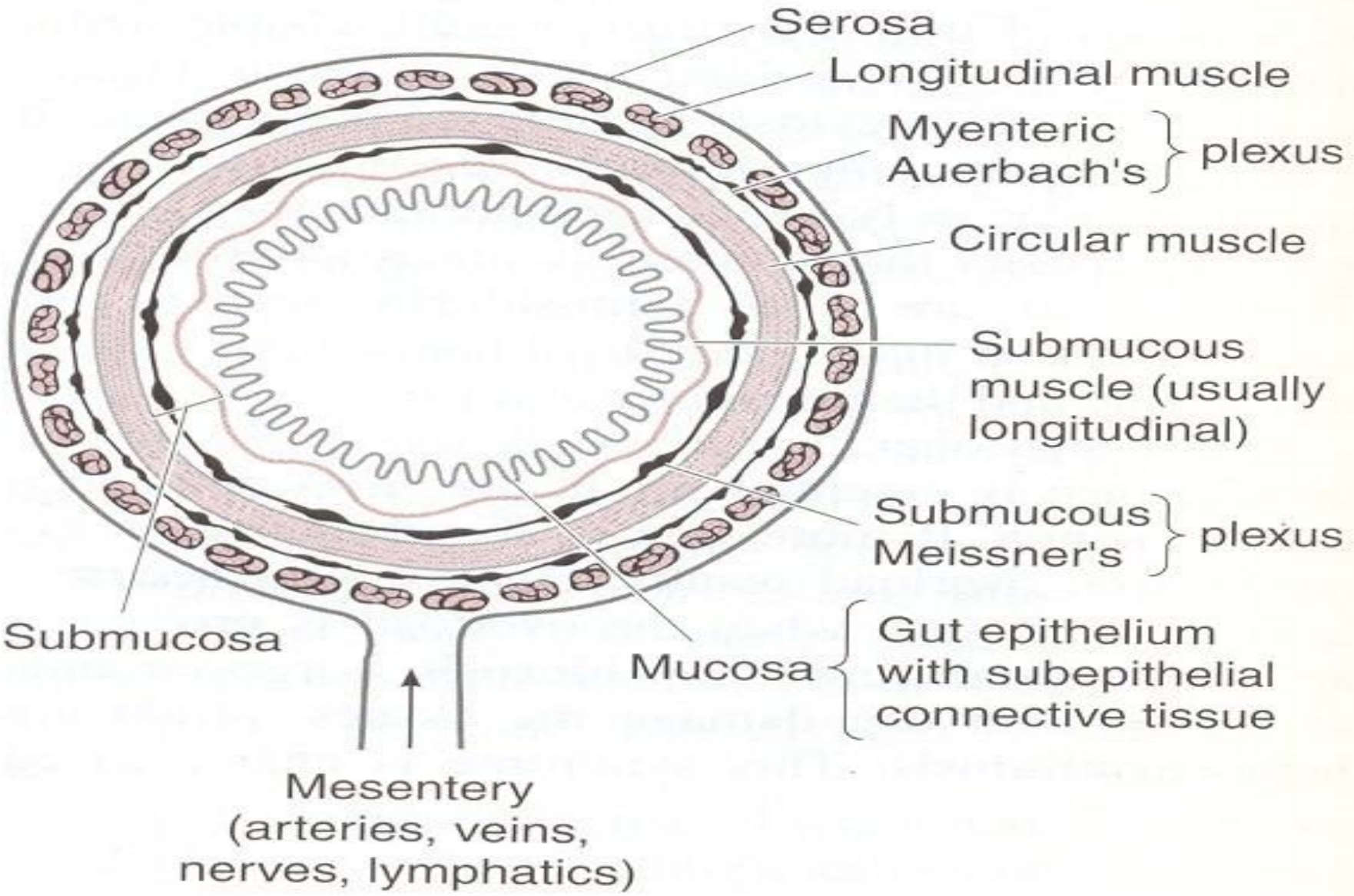
FACULTY OF ENGINEERING &TECHNOLOGY
DEPARTMENT OF BIOTECHNOLOGY

ORGANISATION OF GUT WALL



INTRODUCTION

- Duodenum – 25 cm
- Jejunum and Ileum – 260 cm
- Duodenum I Part IIPart III Part
- Second part of duodenum receives bile and pancreatic secretions

SMALL INTESTINE

- It is the major part of digestion and absorption of carbohydrates, proteins and fats.

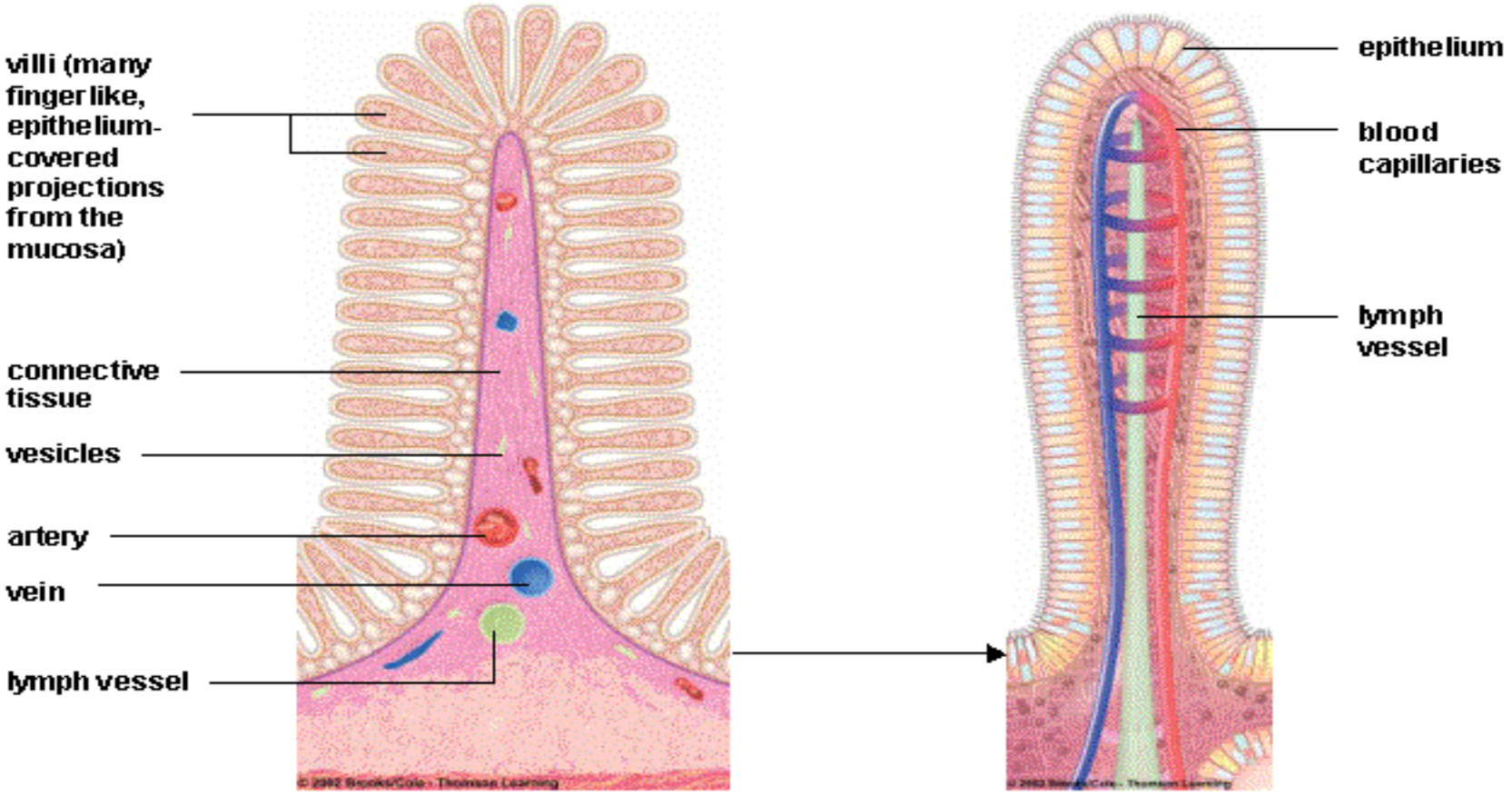
- It is presented with 9 litres of fluid/day (- dietary sources and - GI secretions).

- 1-2 litres passes onto the colon.

MUCOSA OF SMALL INTESTINE

Walls of Small Intestine

Projections into the intestinal lumen increase the surface area available for absorption



Villi on one of the folds, longitudinal section

One villus

STRUCTURE OF SMALL INTESTINE

- Finger like projections of 1mm height – Villi (20- 40 villi/$mm^{2)}$
- Covered by columnar epithelium which has microvilli (1 μM in length and 0.1 μM in width).
- Each villus has a central lymphatic vessels – lacteal.
- Villus also has nerve net & capillaries.

INTESTINAL GLANDS

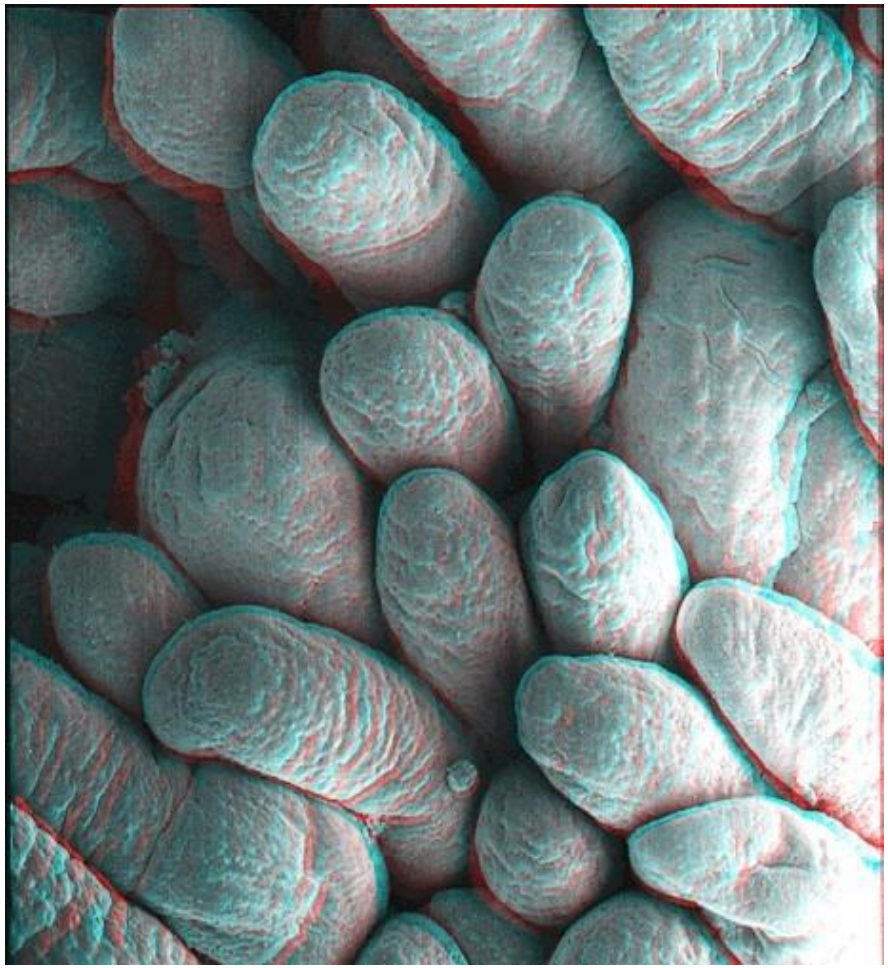
- Between villi are tubular glands - Crypts of Lieberkuhn.

- Duodenum in addition has coiled tubuloacinar glands- Brunner's gland.

- Epithelium of crypts are mitotic, move upwards, and shed off.

STRUCTURE OF VILLI

VILLI



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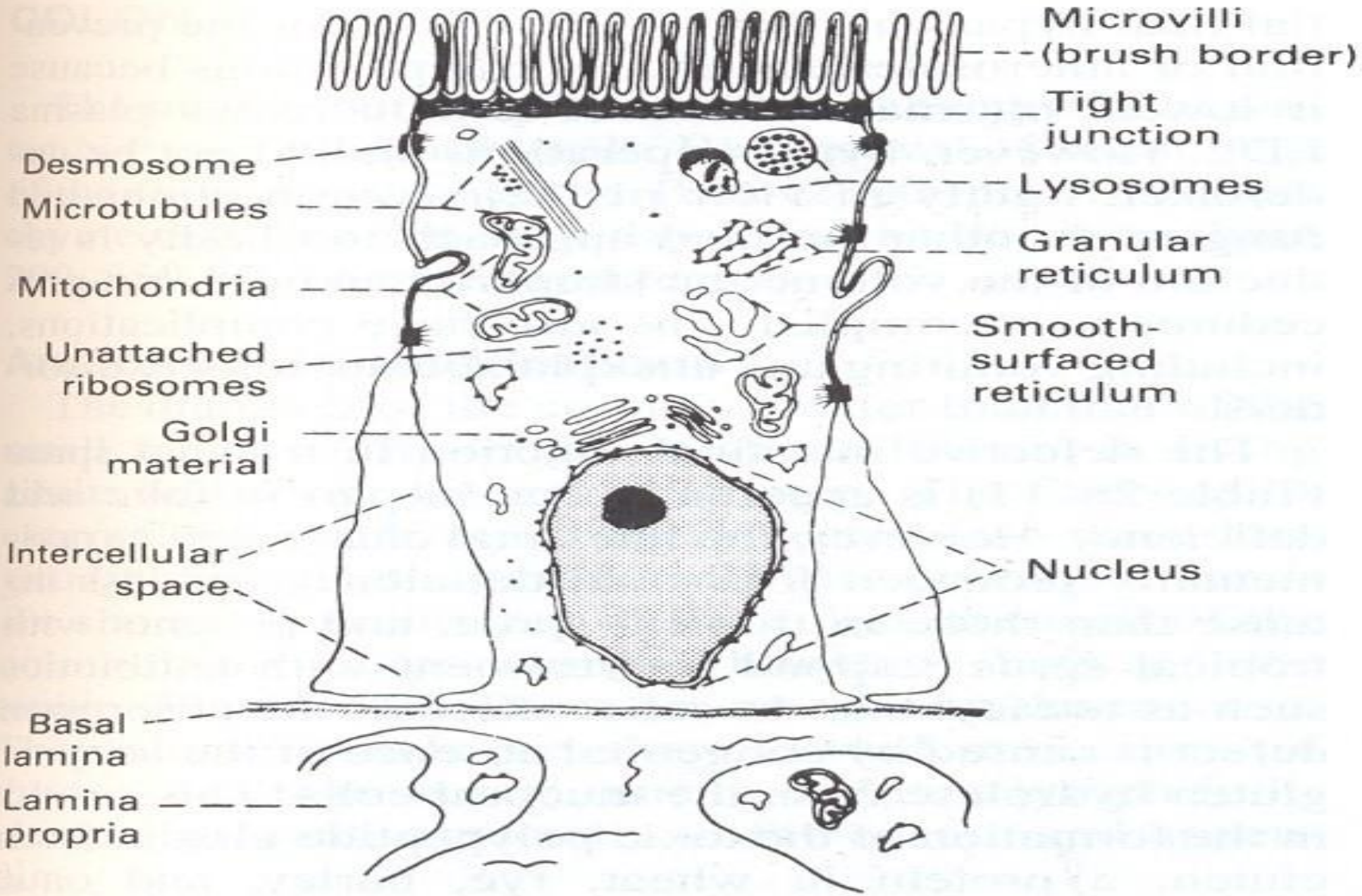
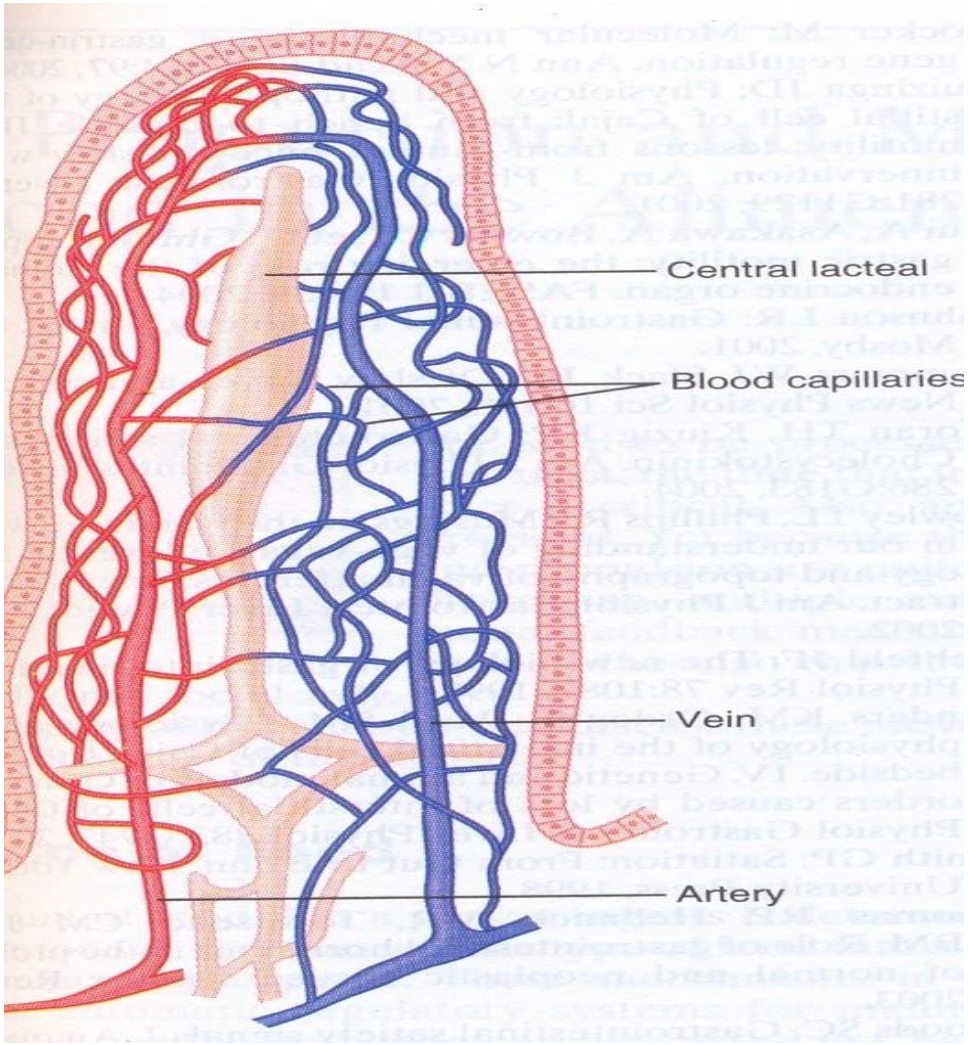
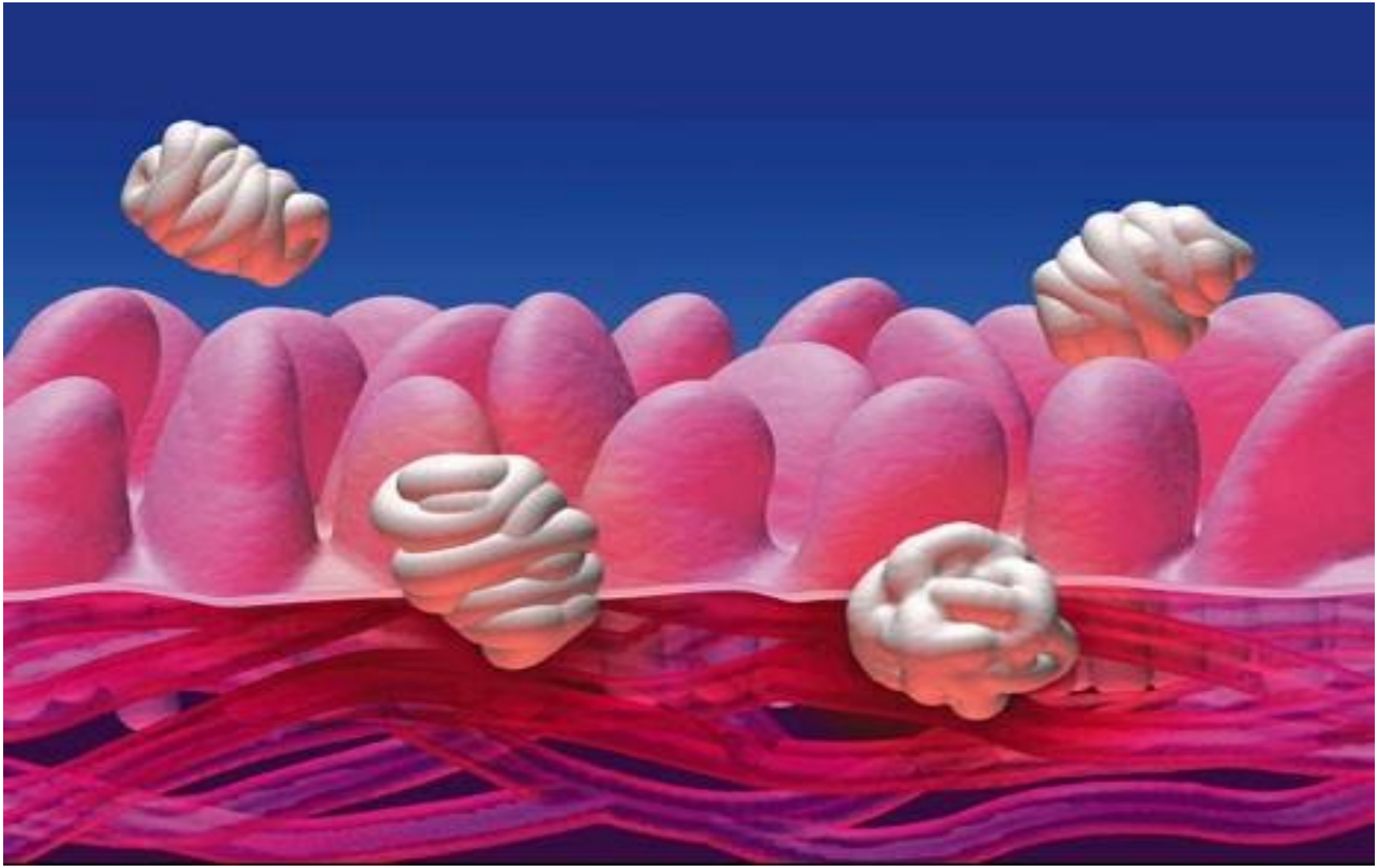

Microvilli
(brush border)
Tight
junction
Desmosome
Microtubules
Lysosomes
Granular
reticulum
Mitochondria
Smooth-
surfaced
reticulum
Unattached
ribosomes
Golgi
material
Intercellular
space
Nucleus
Basal
lamina
Lamina
propria

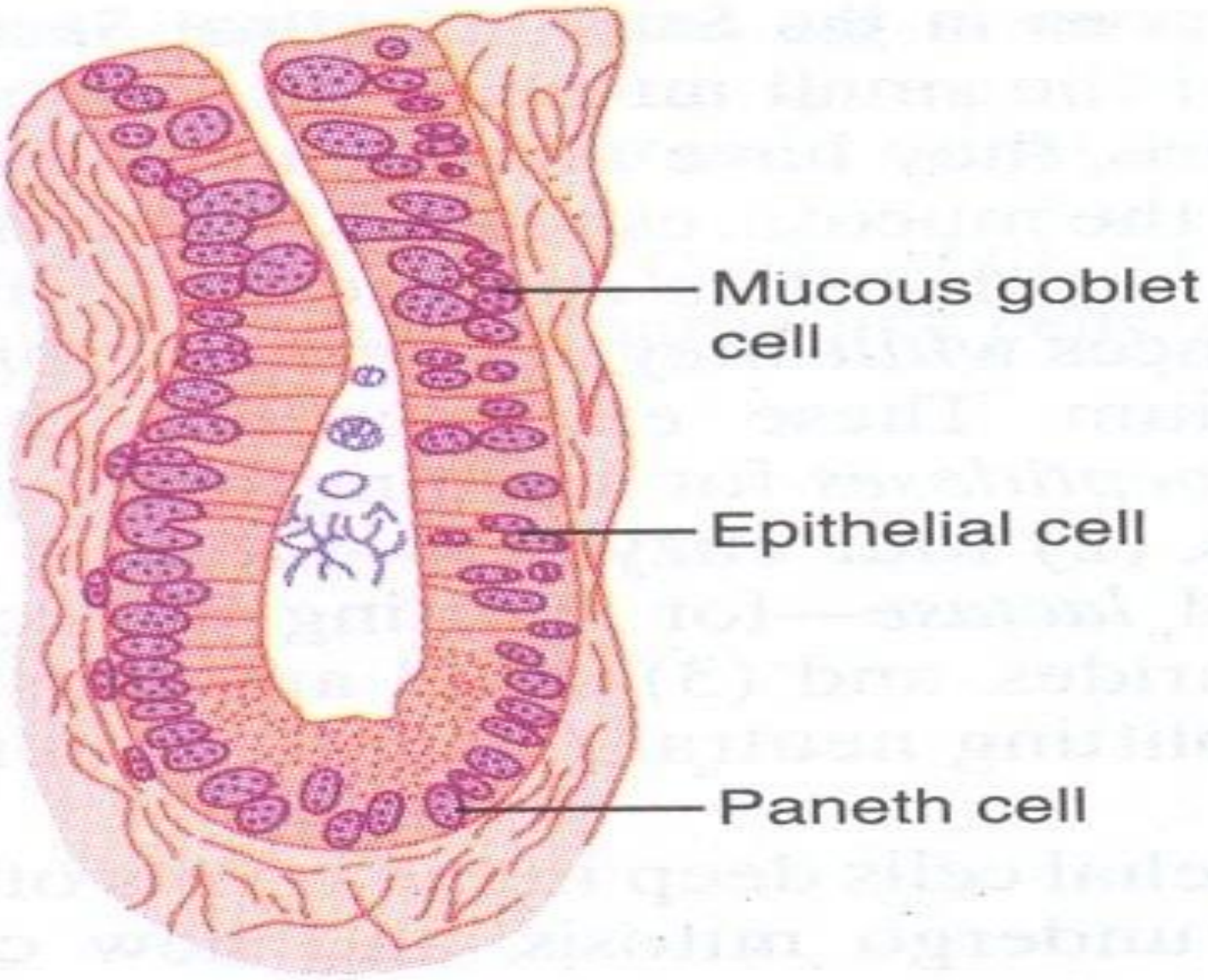
STRUCTURE OF VILLI



STRUCTURE OF VILLI

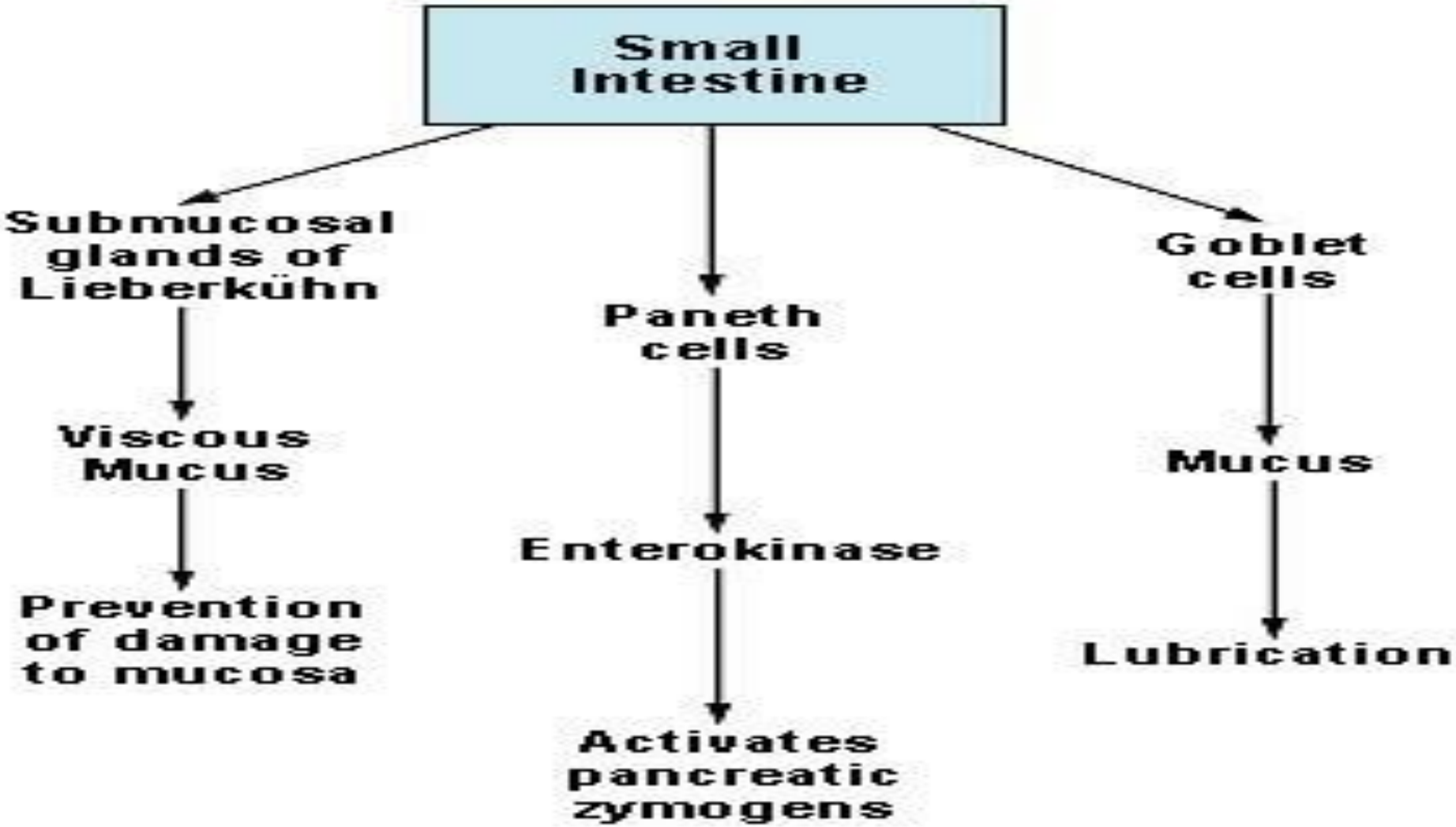


CRYPTS OF LIEBERKUHN



CRYPTS OF LIEBERKUHN

- Epithelium – enterocyte.
- Outer border of microvilli of enterocyte has digestive enzymes.
- Paneth cells in the crypts secrete defensins.
- Ileum has aggregate of lymphatic nodules Peyer's patches.


Small Intestine
Submucosal glands of Lieberkühn
Viscous Mucus
Prevention of damage to mucosa
Paneth cells
Enterokinase
Activates pancreatic zymogens
Goblet cells
Mucus
Lubrication

INTESTINAL JUICE- SUCCUS ENTERICUS

COMPOSITION

Daily secretion – 3 litres pH - 7.6

Water - 98.5%

Solids - 1.5%

i) Inorganic - 0.7%

Cations - Na^+, K^+, Ca^{2+}, Mg^{2+}
Anions - Cl^-, HCO_3^-, PO_4^{3-}

INTESTINAL ENZYMES

- Enterokinase
- Proteolytic enzymes

1)Erepsin

2)Nucleases

- Sucrase, Maltase, Lactase, α- dextrinase
- Intestinal Lipase
- Cholesterol esterase
- Lecithinase
- Alkaline Phosphatase

CONTROL OF SECRETION

- Presence of food, chemical, mechanical stimuli - ↑ secretion
- Local irritation - ↑ mucus secretion.
- Vagal stimulation - ↑ secretion of Brunner's gland.