

Lecture 27. General characteristics and functions of the digestive system.
Digestion in the oral cavity. The role of taste and olfactory sensory systems

ORGANISM IS AN OPENED SYSTEM

Types of exchange with external environment:

- **Energy exchange**
- **Substance exchange**
- **Information exchange**

SUBSTANCES from the external environment

HIGH MOLECULAR SUBSTANCES, which have species specificity :

- proteins,
- fats,
- carbohydrates,

Microelements, vitamins, water, cellulose

DIGESTION is

**physical and chemical food processing
in the result of which its components preserve
their energy and plasticity,
but lose species specificity and
are converted to absorbable particles which
are included in normal metabolism.**

DIGESTIVE TRACT FUNCTIONS

- **Secretory**– secretion of digestive juices by the digestive glands
- **Motor** – is performed by the muscle layer of the GIT, results in the changes of food from solid to liquid
- **Absorbtive** – transport of end products of digestion, salts, water and vitamins from the cavity to blood and lymph

Basic types of digestion

INTRACELLULAR

- CAVITY

- MEMBRANE

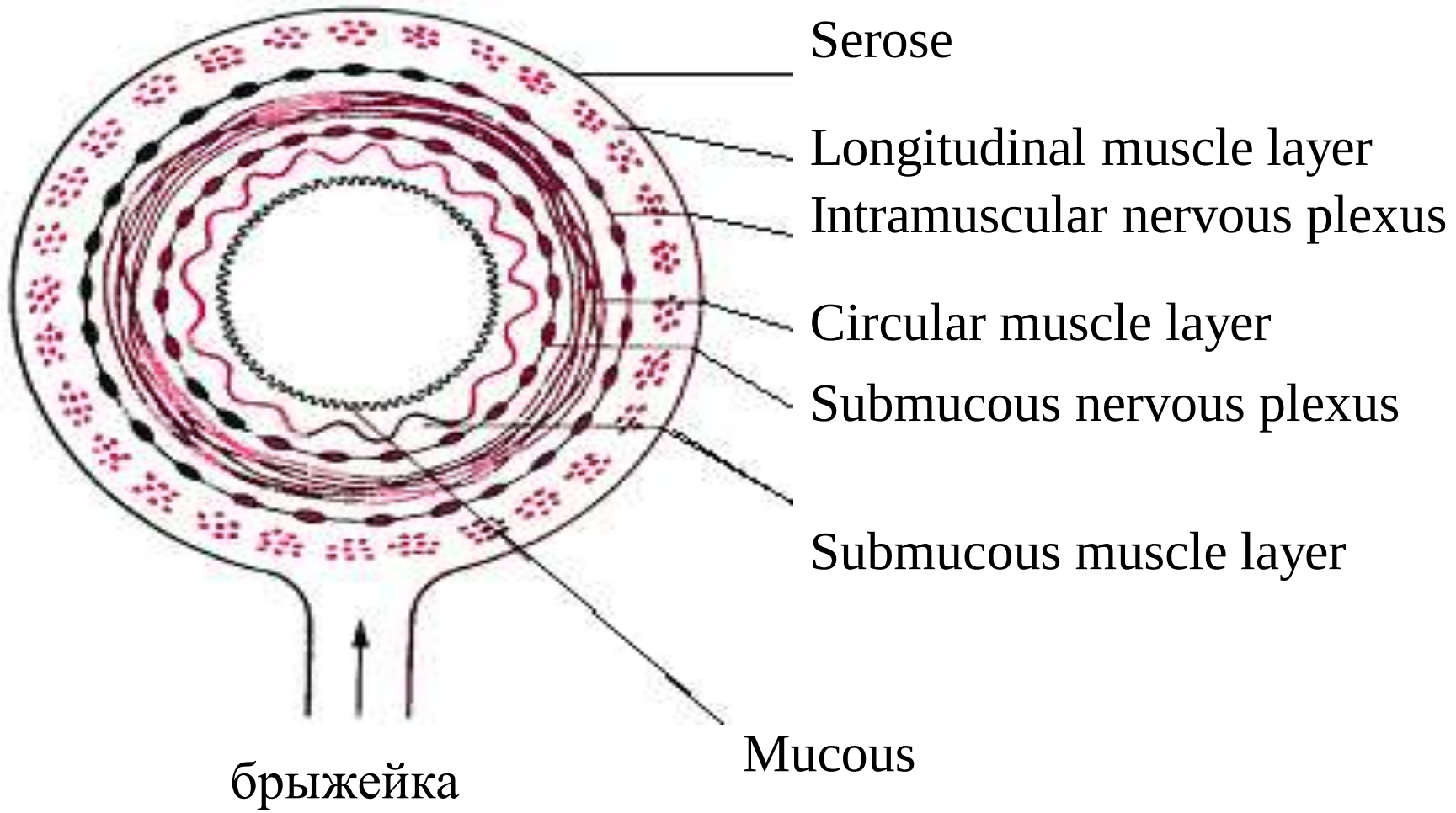
MOTOR FUNCTION OF DIGESTIVE TRACT

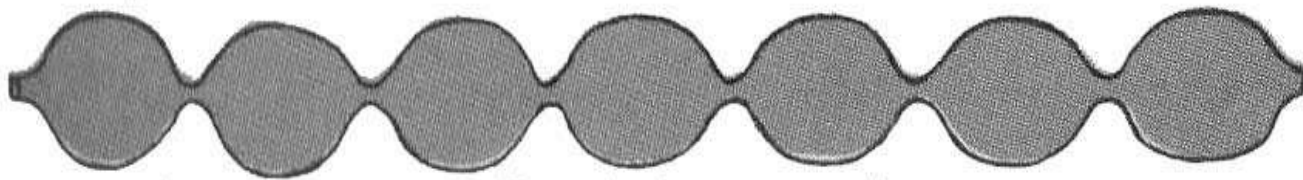
1. STRIATED MUSCLES:

- **mouth cavity, larynx and upper part of oesophagus (mastication and swallowing);**
- **External anus sphincter (tonic contractions).**

2. Smooth muscles (mixing and moving).

LAYERS OF THE DIGESTIVE TRACT WALL

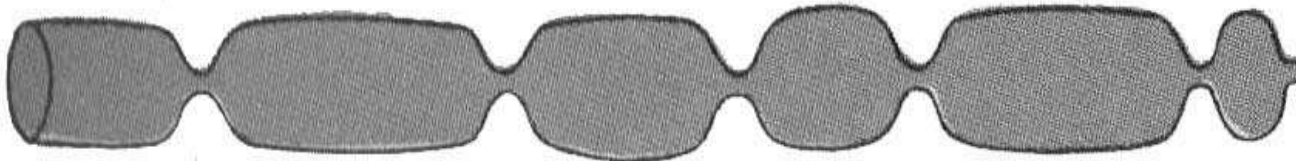




Regularly spaced



Isolated



Irregularly spaced



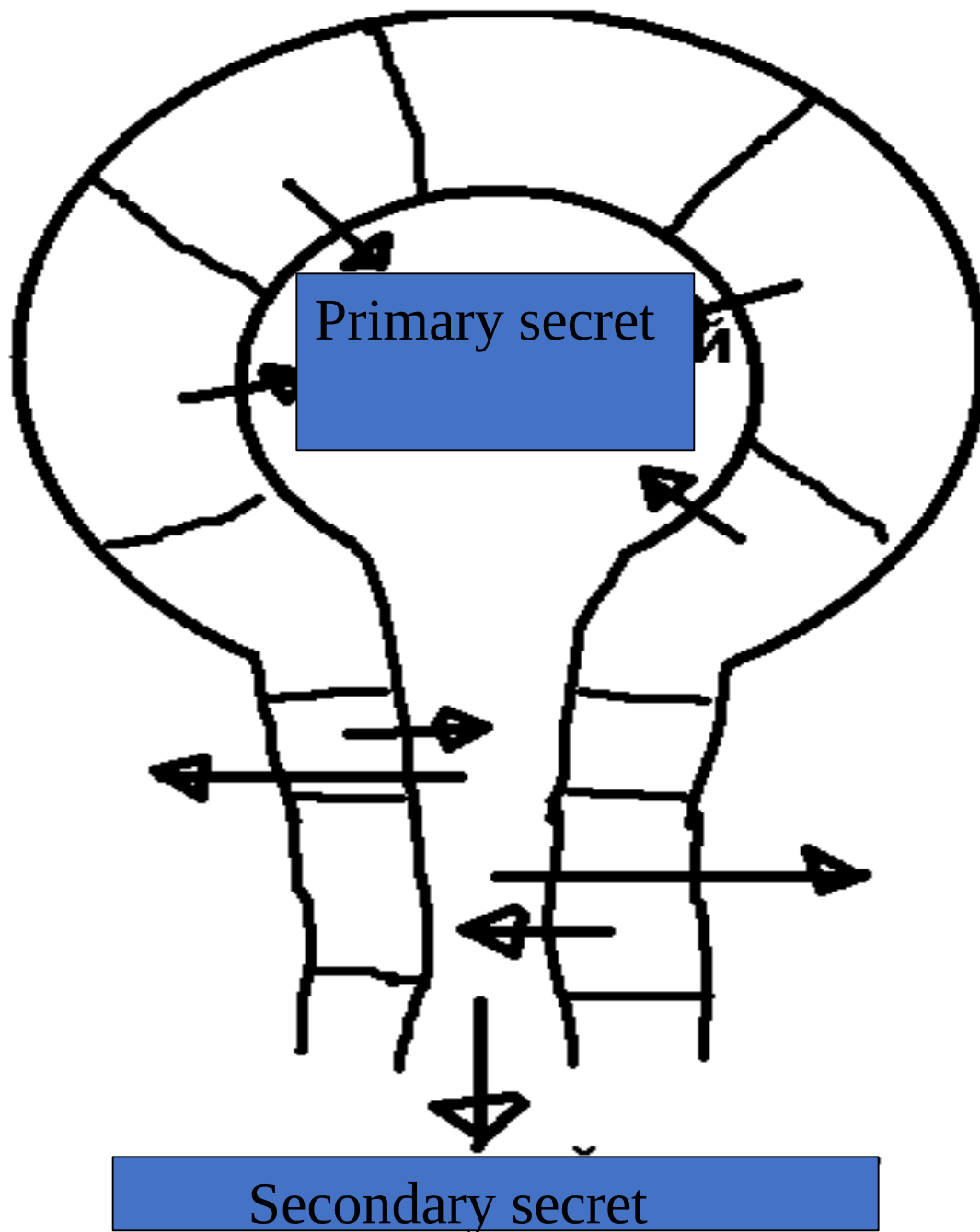
Weak, regularly spaced

Segmentation movements of the small intestine.

SECRETION is

Intracellular process during which the cell:

- ***Gets necessary substances from blood plasma***
- ***Synthesises the secret***
- ***Excretes the secreted substances along with water and electrolites***



Primary saliva

- **Solution rich in electrolytes & enzymes.**
- **Types of enzymes:**
 - **Amylazes**
 - **Lipazes**
 - **Proteazes**
 - **nucleazes**

Secondary saliva

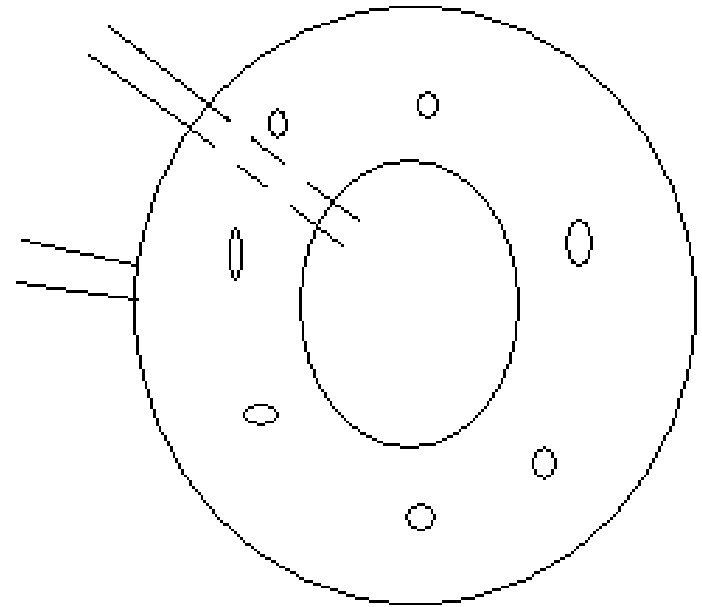
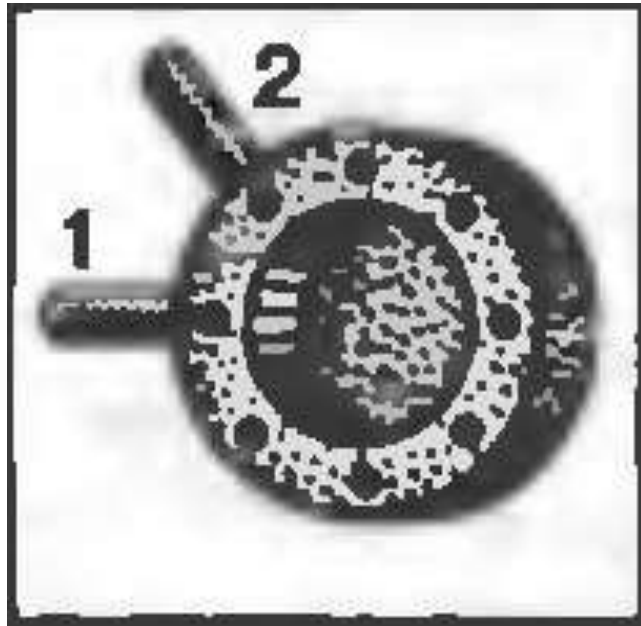
Is formed in the ducts due to ionic exchange, as the result **Ph is changed & can be regulated.**

Fistula - a hollow organ connection with the external environment

Fistula of a salivatory gland is a salivatory gland duct on the external buccal surface

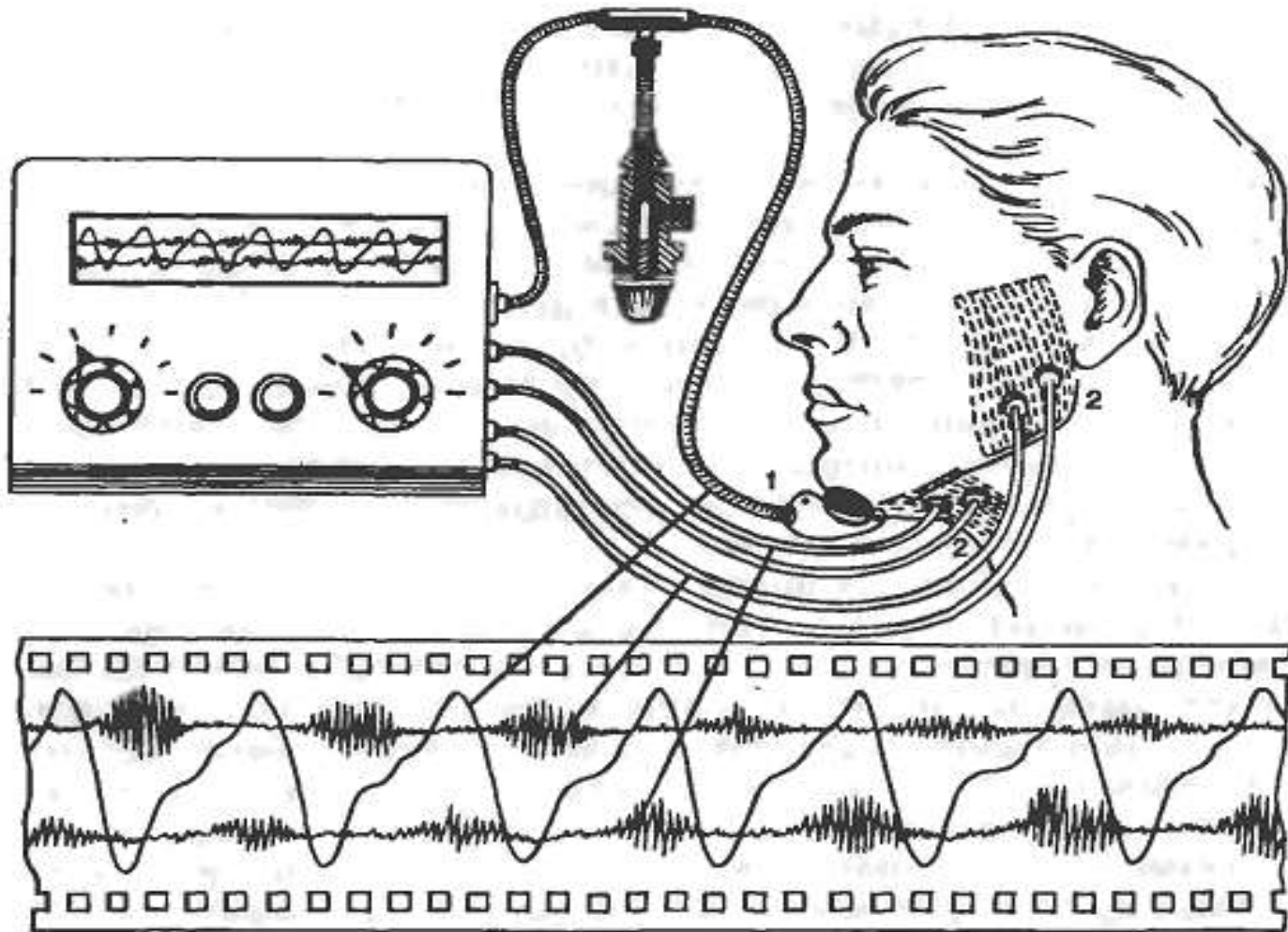
First operation was performed by Basov in 1942

Leshli-Krasnogorskiy capsule





myoelectromasticatziography



DIGESTION IN THE MOUTH
CAVITY. GUSTATORY
SENSORY SYSTEM.

MOUTH CAVITY

Peripheral PART OF GUSTATORY SENSORY SYSTEM:

- 1. Defines eatable & non-eatable substances;**
- 2. Is a receptory field for the non-conditioned reflexes in all the gastrointestinal tract.**

Mouth cavity functions:

- 1. Mastication & formation of food bolus;**
- 2. Primary hydrolysis of some substances – carbohydrates (α -amylase, maximum activity at pH 6,9)**

Salivatory glands are paired structures

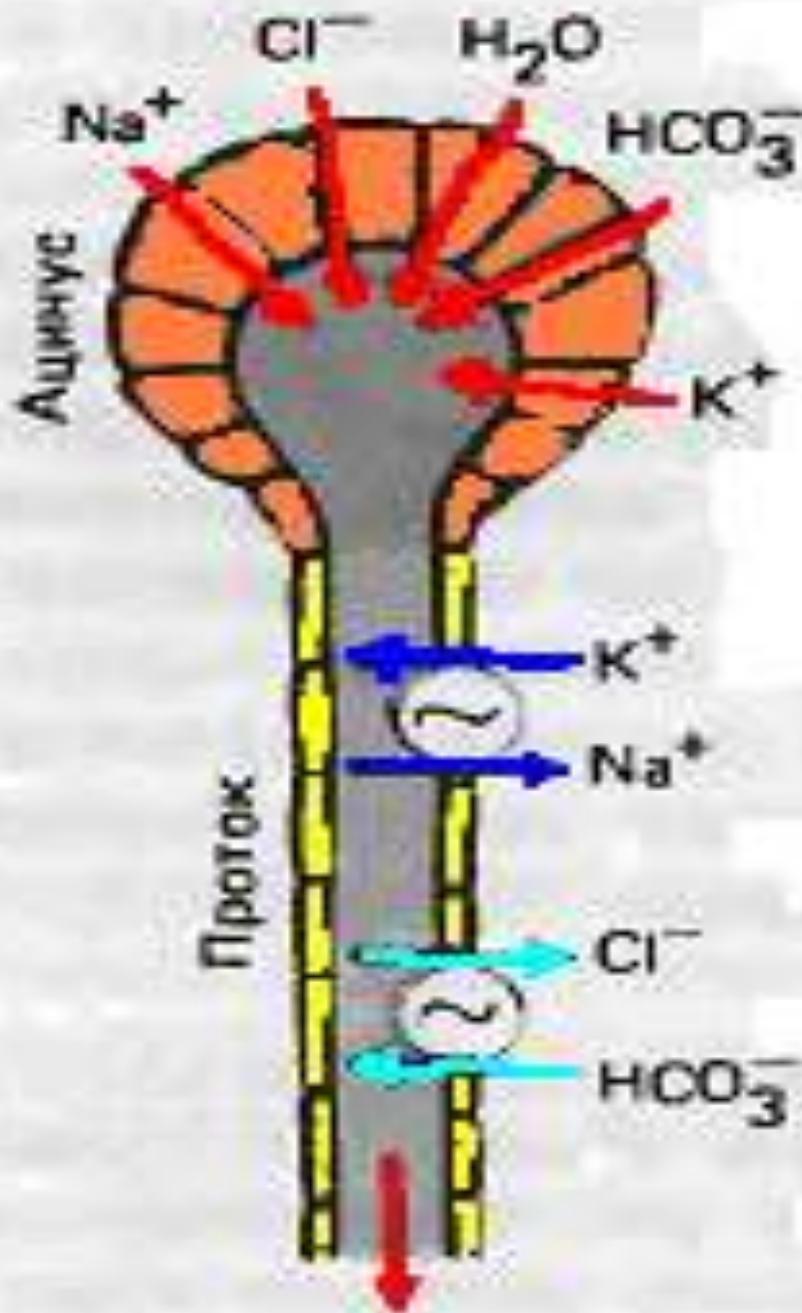
1. **Parotid– serous – 25% of saliva**
2. **Submandibular – mixed – 70% of saliva**
3. **Sublingual – mixed – 5% of saliva**
4. **Other glands in the mouth cavity - mucous**

Saliva composition

- **99% of water**
- **Main mineral components:**
 - ✓ **sodium, potassium, chlorine, hydrocarbonates.**
- **Macromolecules:**
 - ✓ **Enzymes – α -amylase, Lizotzim, proteinases, callicrein.**
 - ✓ **Glicoproteins, mucopolisaccarides (mucin)**
 - ✓ **Immunoglobulines**

Phases of secretory cycle.

- Entering of initial substances (water, ions, aminoacids, monosaccarides) by the way of diffusion and pinocytosis.
- Synthesis of enzymes on rybosomes and mucous (mucopolysaccarides and mucoproteins) in Golgi – complex.
- Maturation – formation and storage of secretory granules.
- Extrusion – merocrine, apocrine and holocrine mechanism.



Mechanism of secondary saliva secretion

0,5 to 2,0 l per day

pH of saliva at rest – 5,45-6,06

At stimulation – 7,8

Parasympathetic influence on saliva secretion

Efferent fibres:

- ***Chorda tympani*** – sublingual & submandibular glands
- ***N. glossopharyngeus*** – parotid gland

Ach



m-cholinoreceptors



Increased calcium permeability



Calmodulin activation



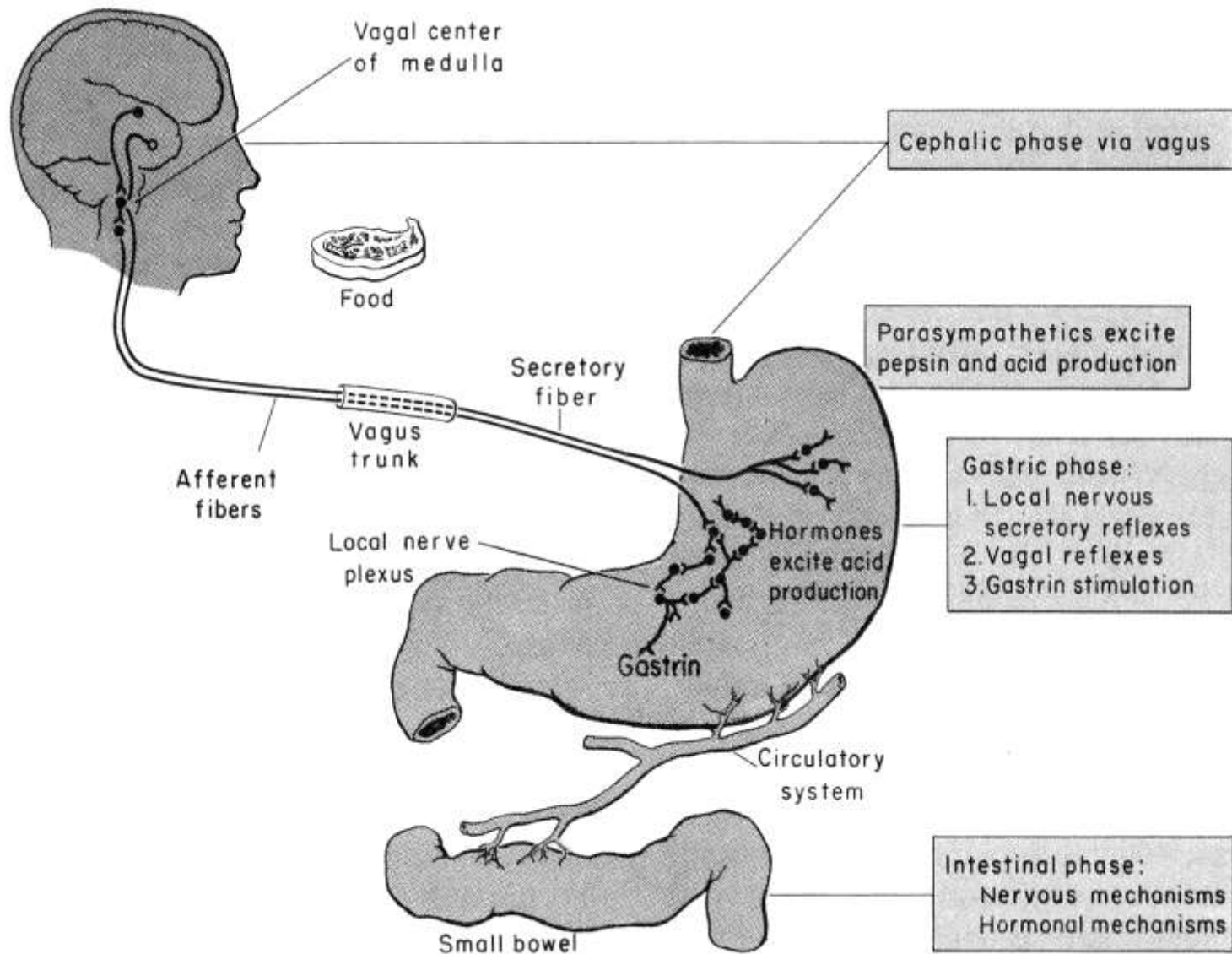
Stimulation of saliva extrusion



A lot of watery saliva is secreted

**Vessels
dilation**





The phases of gastric secretion and their regulation.

The end