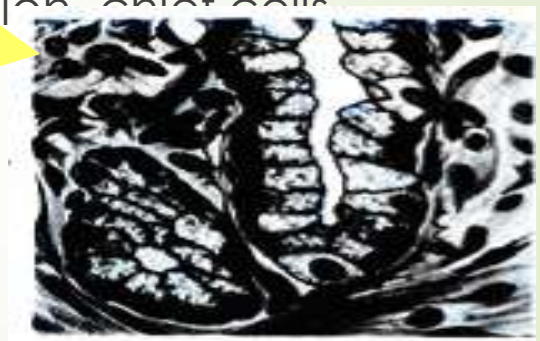
Lecture 28. Digestion and absorption in the stomach

Stomach functions

1. **IN DIGESTION:**
   - ✓ **Motor function;**
   - ✓ **Secretion function;**
   - ✓ **absorption**
2. **ENDOCRINE (gastrin secretion)**
3. **FOOD DEPOT (empty stomach volume – 50 ml, full stomach – 750 ml)**

Stomach glands

- **Fundic glands** – *fundus and body of stomach* –chief,parietal and accessory cells (not much)
- **Cardiac glands** – tubular glands – mucus secretion
- **Pyloric glands** – accessory cells –mucus secretion, chief cells



Secretory cells of stomach

- **Chief cells – produce pepsinogens in non-active form**
- **Parietal cells – secrete hydrochloric acid**
- **Accessory cells (mucocytes) – secrete mucus**

Gastric juice content

2,0 to 2.5 1 daily, a colourless clear fluid

- hydrochloric acid (0.3-0.5 per cent) , acid reaction (pH 1.5-1.8).
- Inorganic substances – water (995 gr/l), chlorides (5-7 gr/l), sulphates (10 mg/l), bicarbonates of sodium, potassium, calcium, and magnesium, and ammonia(20-80 mg/l).
- organic components - nitrogeh-containing substances: urea, uric and lactic acids, amino arids, polypeptides (200-500 mg/l). The protein content reaches 3 g/1, the mucoprotein content—up to 0.8 g/1, the content of mucoproteases—up to 7 g/1.

Main components of gastric juice

- **Enzymes - pepsinogens**
- **Hydrocloric acid**
- **Mucus**

Hydrochloric acid functions

1. **Pepsinogens activation**
2. **Creating acidic medium (***1,5-6,5)*;
3. **Proteins denaturation;**
4. **Curding milk;**
5. **Regulation of motor and secretory function of gastro-intestinal tract;**
6. **Antibacterial action.**

Mucus function

Protective layer 1-1,5 mm

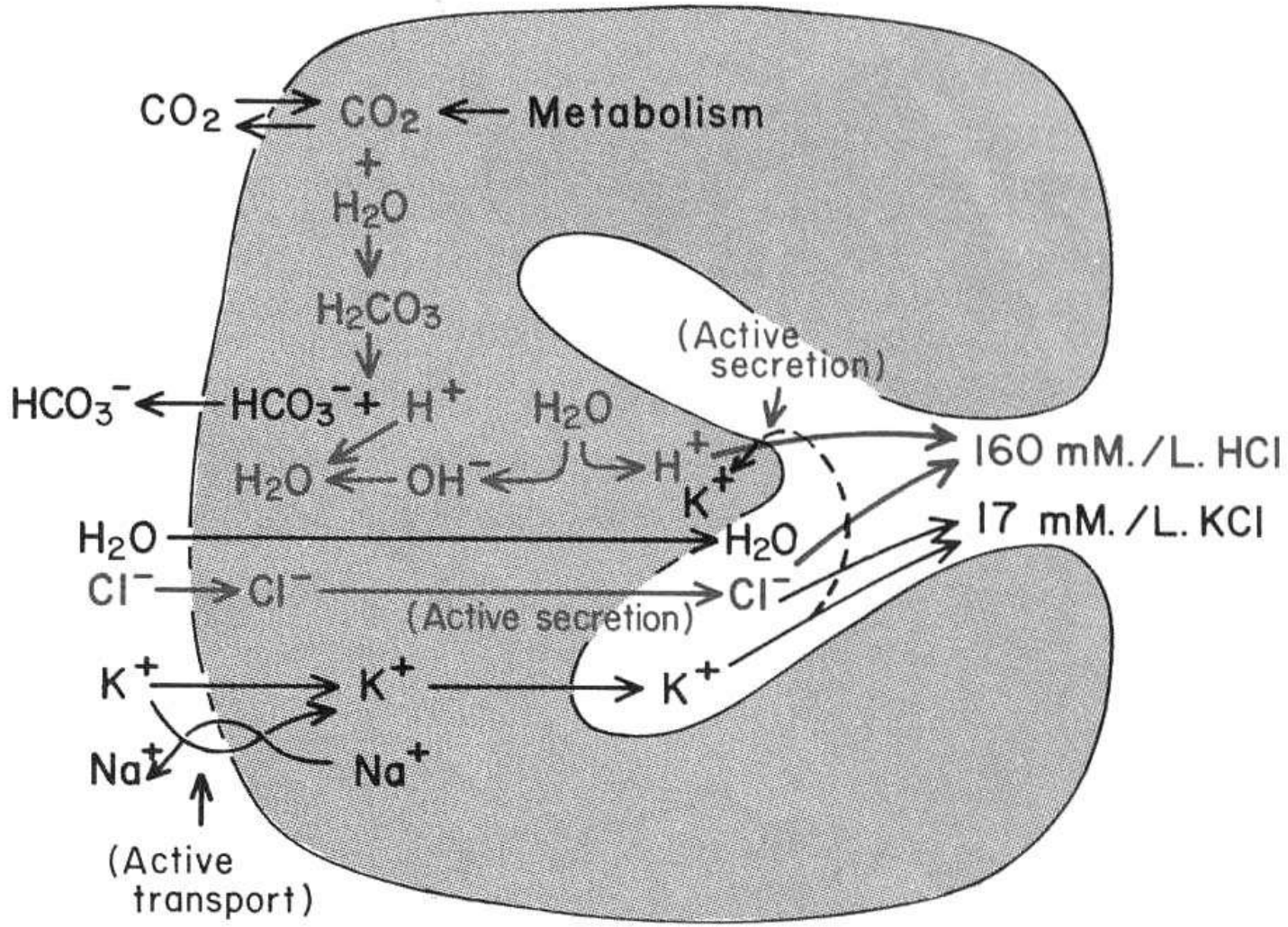
1. **Glucoproteins – 80%**
2. **Proteoglucanes - 20%**

Alcaline reaction (because of hydrocarbonates) neutrolise H^+

Viscosity depends on pH.

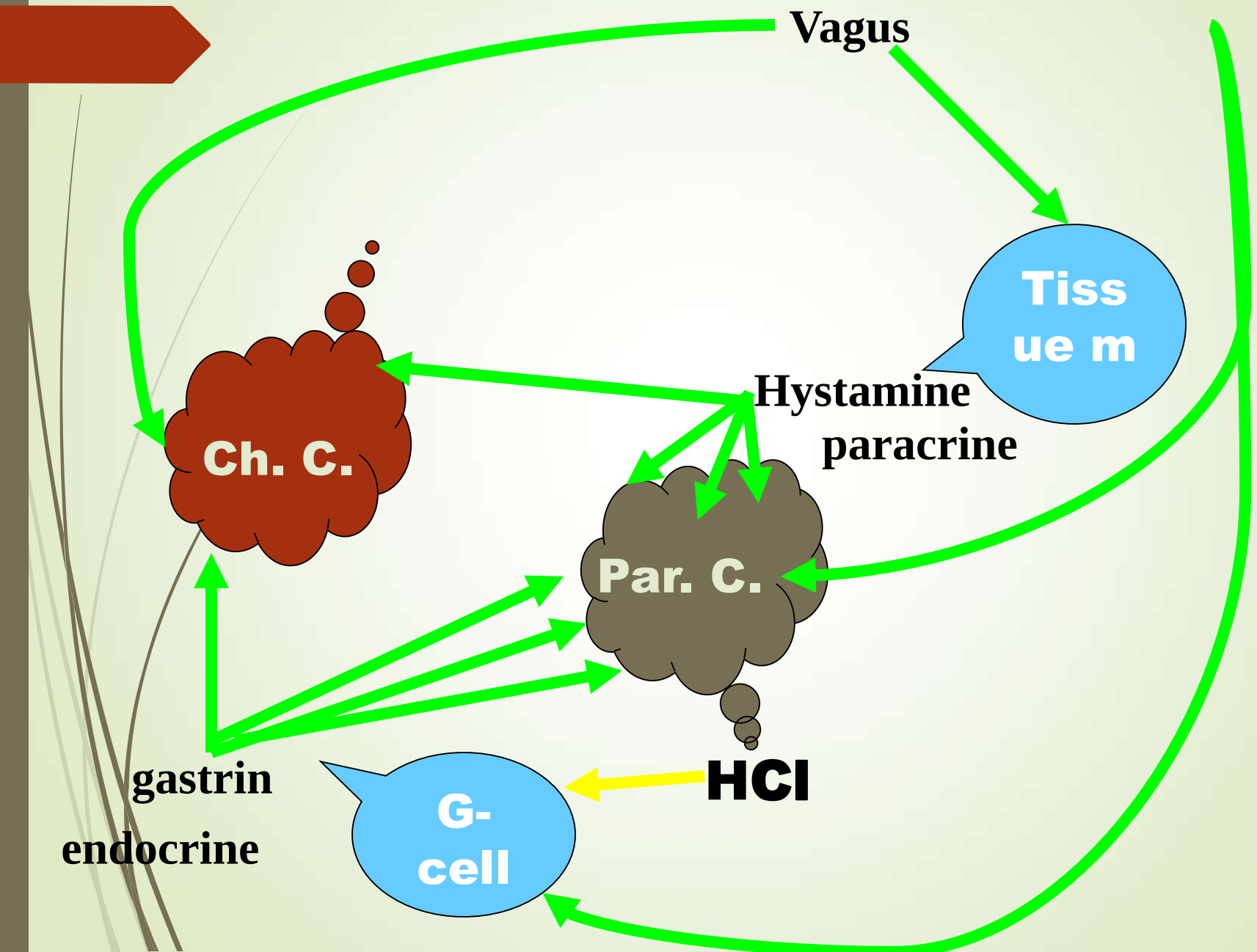
Maximum viscosity at pH=5.

Mechanism of HCl secretion



Postulated mechanism for the secretion of hydrochloric acid.

Regulation of secretion



hystamine

- **Endogenous – secreted by mast cells & not destroyed by hystaminase**
- **Endogenous – comes with food – meat, vegetables (cabbage, cucumbers)**

STIMULATORS OF GASTRIN SECRETION

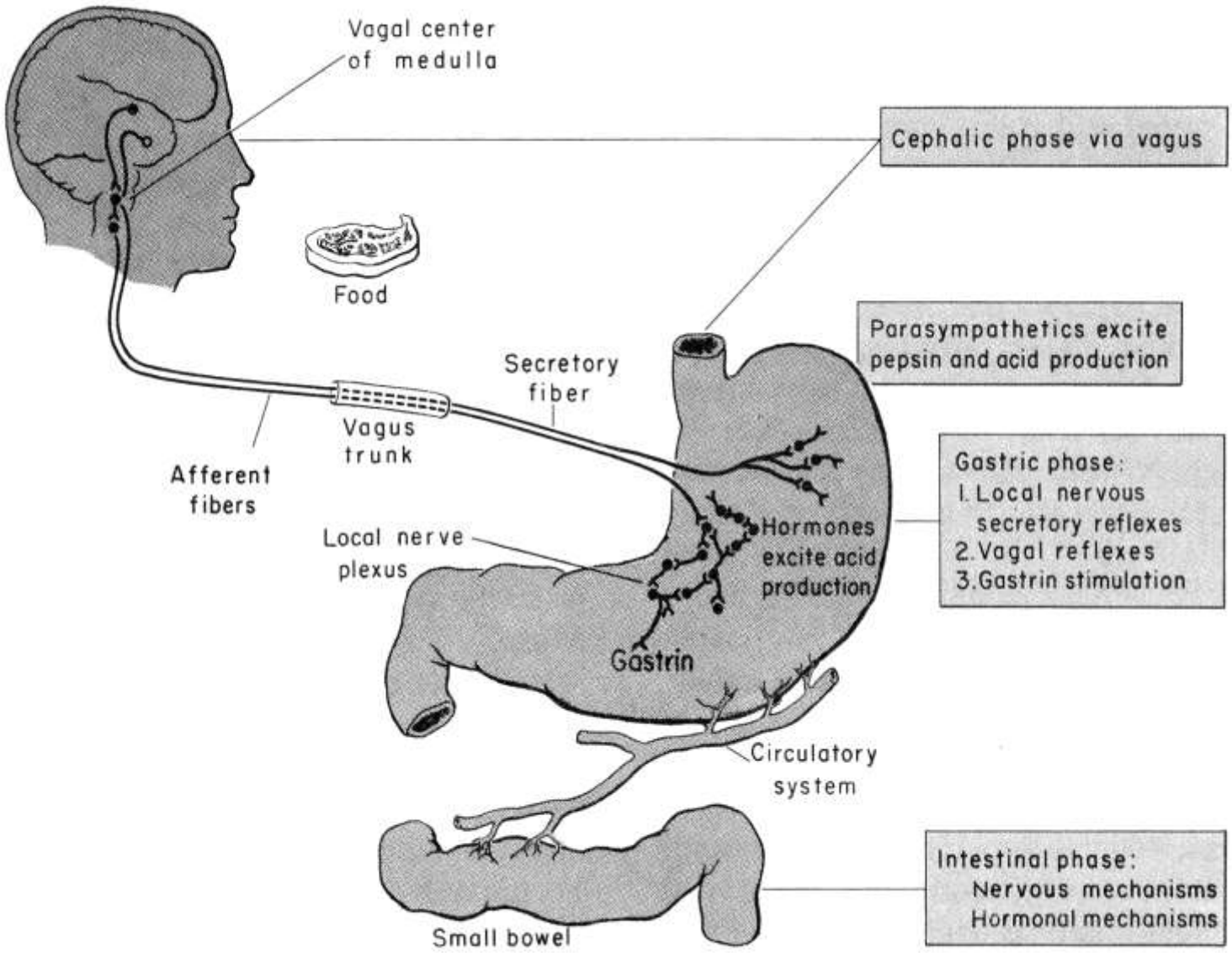
- **POLYPEPTIDES**
- **EXTRACTIVE SUBSTANCES (from meat & vegetable broth);**
- **SOAPED FATS;**
- **MECHANICAL STIMULI (reflex mechanism)**

The role of HCl in the regulation of secretion

- **HCL affects G-cells by feed-back mechanism.**
- **At pH<1,5 inhibits gastrin secretion**
- **At pH < 1,0 gastrin secretion stops**

Phases of gastric secretion

- **“CEPHALIC” (conditioned & unconditioned reflexes)**
- **GASTRIC (neuro-humoral)**
- **ENTERAL (humoral)**



The phases of gastric secretion and their regulation.

Types of motor activity

- Periodic activity at fasting –20-50 min lasting contractions after 45-90min of resting period.
- Receptive relaxation – relaxation of the muscles of the stomach fundus during food intake.
- Peristaltic waves – start from small curvature, spread at a speed 1cm/sec, in the pyloric part at a speed 3-4 cm/sec

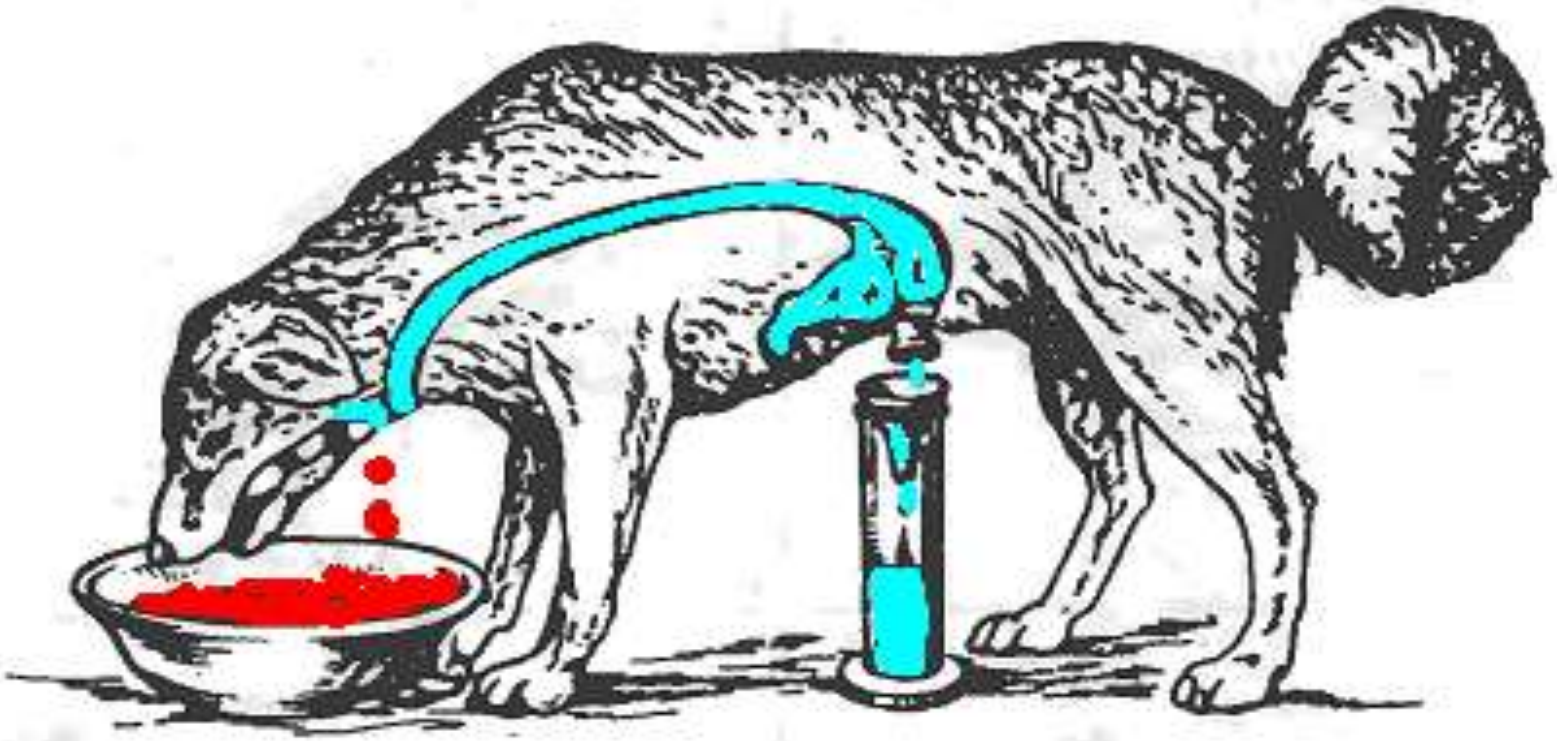
Gastric digestion in newborns

Autolytic colostrum and mother's milk (the first weeks after childbirth) contain enzymes secreted by the mammary glands:

Lipases

Amylase

he pH is created by lactic acid because the parietal cells are not working yet



Thank you for attention!