

# Nutrition

Nutrients Intake → Nutrition  
 Need  $\xrightarrow{\text{Energy}}$   $\begin{cases} \text{growth} \\ \text{repair \& maintenance} \\ \text{Reproduction} \end{cases}$

## Autotrophs

→ Prepares food  
 All photosynthetic

## Heterotrophs

→ Prepared food Intake.  
 Fungi & animals.  
 Holozoic Nutrition  
 → Ingestion  
 → Digestion  
 → Absorption  
 → Assimilation  
 → Egestion

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## Digestion:

↳ Break down / simplify.

Starch → glucose →  $\begin{matrix} \text{K.C} \\ \downarrow \\ \text{ATP} \end{matrix}$   
 Proteins → A. Acids →  $\begin{matrix} \text{K.C} \\ \downarrow \\ \text{ATP} \end{matrix}$   
 Lipids → F.A →  $\begin{matrix} \text{K.C} \\ \downarrow \\ \text{ATP} \end{matrix}$

components of human food:

• Nutritional	• Non-Nutritious
→ Carbs	H <sub>2</sub> O
→ Proteins	Minerals
→ Lipids	Vitamins
	Fibers

## Digestive System

Sac

Tube

→ Single opening.  
 ↳ Ingestion  
 ↳ Egestion

→ Two separate openings  
 ↳ Ingestion  
 ↳ Egestion

→ Cnidarians  
 → Platyhelminths

→ Specialized compartments  
 → Advance.

Aschelminths → chordates.

## Human Digestive System:

→ Tube like ~ 9 meters.  
 → 4 layers

## Associated Structures:

Nonsecretory  
Tongue, Teeth  
Palate & cheeks

Secretory  
→ glands  
→ Salivary  
→ Liver  
→ Pancreatic

## Alimentary Canal

→ mouth → Anus

# Alimentary Canal:

**Mouth:** → Ingestion

→ Lips → Language

→ Cheeks → Lateral sides

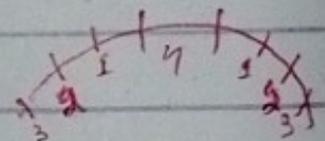
→ Teeth → Diphyodont

Heterodont

→ Incisor 4  
→ Canine 2  
→ Premolar 4  
→ Molars 6

→ dental formula

(2 1 2 3)



→ Palate → roof of oral cavity.

→ Tongue → muscular organ fill oral cavity

→ Papillae  
→ Taste  
→ Tactile  
→ Food collection

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→ Grinding & mastication:

→ Teeth → Chew

→ Saliva → Mixing.

## Saliva:

→ Secretion → 3 glands.

1. Parotid → In front of ear → Mucous + Amylase

2. Submaxillary → Behind jaws → Mucous + Amylase

3. Sublingual → Below tongue → Mucous only

## Mixture

→ H<sub>2</sub>O  
→ Mucous  
→ Glycoprotein  
→ Mucin  
→ NaHCO<sub>3</sub>  
→ Antigens  
→ Antibodies

salivary amylase → Titane

(Antiseptic)

(Softening)

→ bolus

↳ Swallowing / Deglutition: <sup>cranial</sup> <sup>Autonomic</sup> medulla oblongata

- ↳ Tongue tip touches  $\rightarrow$  palate.
- ↳ Backward  $\rightarrow$  food push  $\rightarrow$  oral cavity
- ↳ Soft palate move upward  $\rightarrow$  covers nasal cavity
- ↳ Larynx  $\rightarrow$  moves upward.
  - ↳ present on ventral side
- ↳ Epiglottis  $\rightarrow$  covers  $\rightarrow$  glottis
- ↳ Bolus  $\rightarrow$  pharynx.

uvula

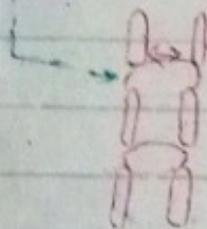
## Oesophagus:

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Pharynx  $\xrightarrow{\text{tube}}$  Stomach  
20-25cm

circular muscles

longitudinal muscles

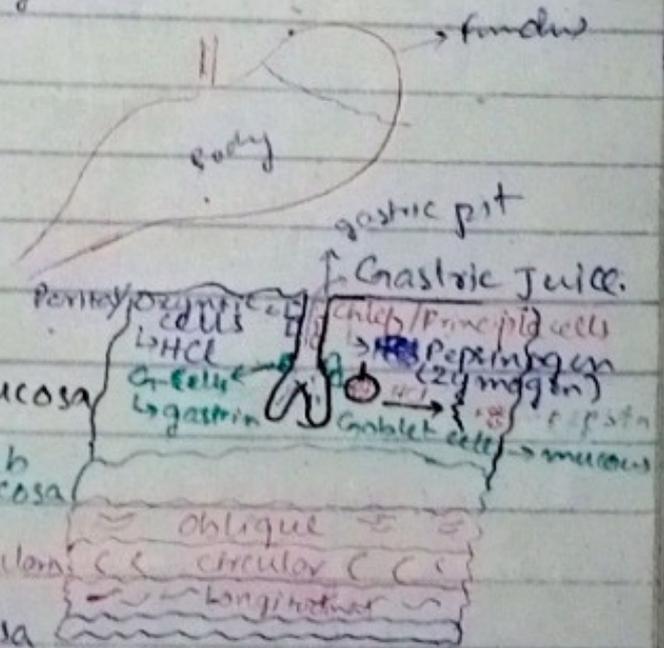


peristalsis  $\rightarrow$  oesophagus to anus  
 ↳ strong  $\rightarrow$  one way direction  
 ↳ Reverse  $\rightarrow$  vomiting

## Stomach: $\rightarrow$ (Metachrine gland)

↳ J-shaped, sac

- $\rightarrow$  left side of body
- $\rightarrow$  Below diaphragm
  - $\rightarrow$  separates chest cavity from abdominal cavity



- ↳ Chief cells / Principle:
  - $\rightarrow$  Pepsinogen (zymogen)
  - $\text{HCl} \rightarrow \{ + \rightarrow \text{pepsi}$

- ↳ Oxyntic cells / Parietal:
  - $\rightarrow$  HCl

- $\rightarrow$  G-cells

↳ gastrin (positive feedback to chief cells) it will cause more pepsinogen

gastric juice + bolus  $\rightarrow$  Churning Chyme  
Enzymatic

→ mucosa  
 → stomach act as heterocrine  
 Heterocrine gland

**Function:**

- Discontinuous feeding
- Protein digestion start
- Little absorption of  $H_2O$  & alcohol soluble.
- Heat production
  - ↳ lipids → liquify.

→ Oblique muscles are only specific to stomach.

**Small Intestine:**

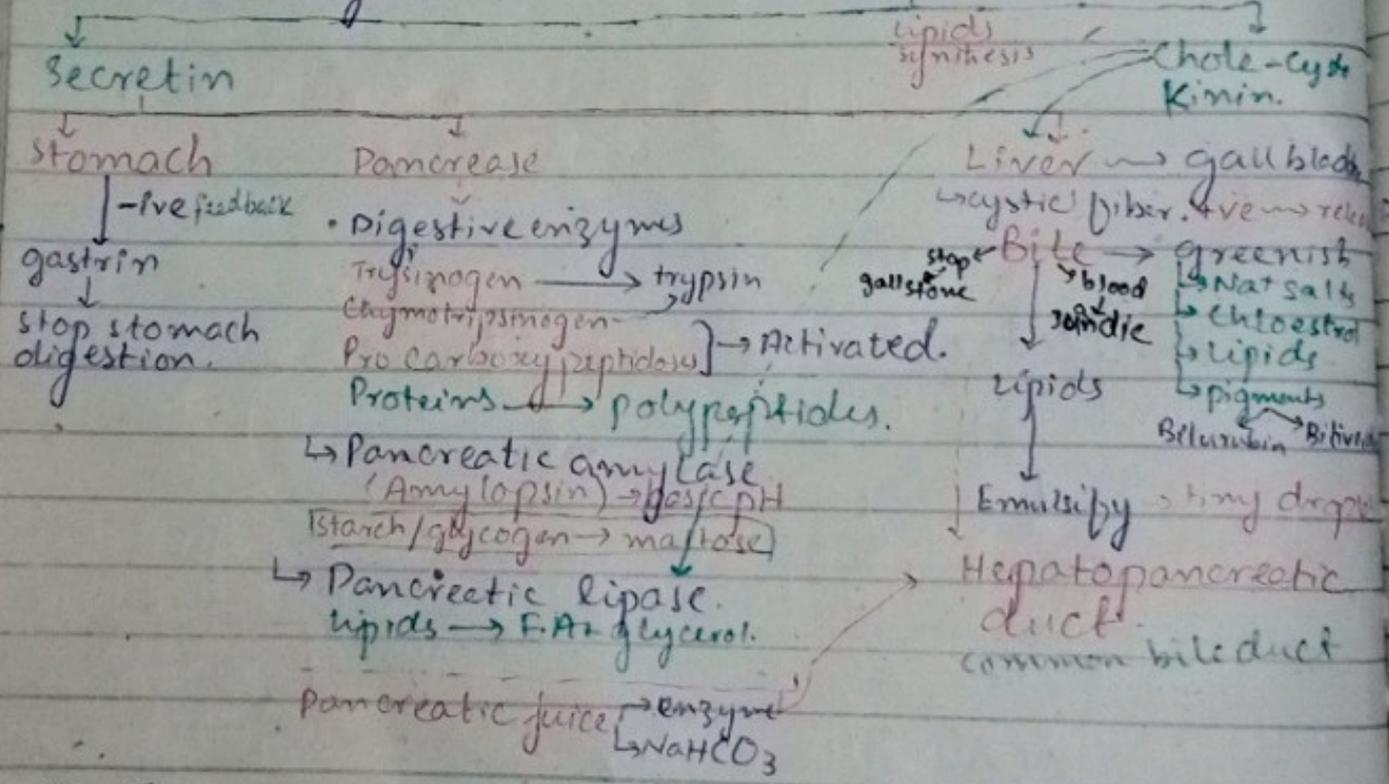
- ↳ longest ~ 6m
- ↳ Diameter ~ Narrow

**1: Duodenum: (Proteins lipids)**

Heterocrine gland → hormones

stomach  $\xrightarrow{\text{pyloric sphincter}}$  S-intestine

Acidic chyme → stimulates Duodenal Walls



**2: Jejunum (Proteins) (2.5m)**

major function → Finalise digestion

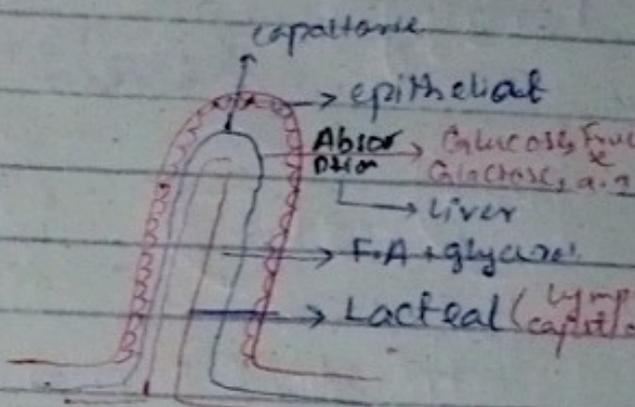
**Intestinal Juice:**

- Amino peptidase → Polypeptides → Dipeptides
- Trypsin → Dipeptides → a.a
- Maltase → Maltose → glucose

sucrase → Sucrose → glucose + fructose  
 lactase → Lactose → glucose + galactose

3: Ileum: 3.5m

- ↳ Absorption
- ↳ Villi (velvety appearance)



After Crossing:

F.A + glycerol + cholesterol + proteins } chylomicron

99% lipids + 1% proteins → absorb into lacteal

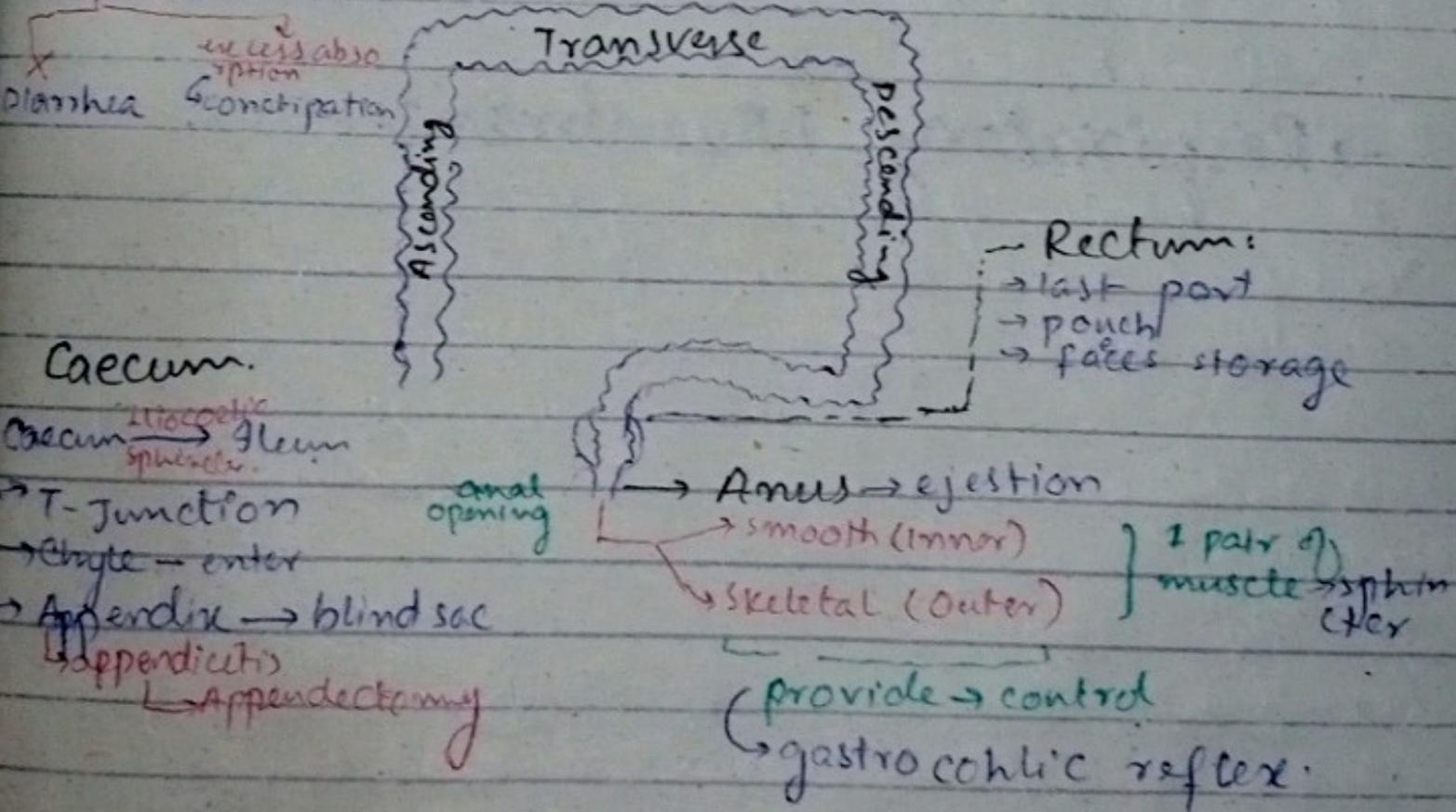
→ Finally all components of food absorb.

(Chyle) → watery fluid.

## Large Intestine:

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colon: → absorption  
water + salts + vitamin K



Caecum.

Caecum  $\xrightarrow{\text{Ileocecal sphincter}}$  Ileum

- T-Junction
- Chyle → enter
- Appendix → blind sac
- ↳ appendicitis
- ↳ Appendectomy

Rectum:  
 → last part  
 → pouch  
 → faeces storage

Anus → ejection  
 ↳ smooth (inner)  
 ↳ skeletal (outer) } 1 pair of muscles sphincter  
 ↳ provide → control  
 ↳ gastrocolic reflex.