DIGESTIVE SYSTEM-

→ The breaking of complex food into simple substances with the help of enzymes.

Food → Macronutrient (Carbohydrates, protein, fat)
(ऊर्जा देते हैं)
↓
organic food
↓ breaks into
Glucose, Amino acid, Fatty acid.
↓
Inorganic food.

→ Micronutrients — Minerals, vitamins.

→ The breakdown of complex organic food into simple inorganic food is called digestion.

→ Digestion takes place in Alimentary Canal.

→ Alimentary Canal (आहार नाल) — From mouth to Anus.
— 30 feet | 9 m. in length. (Mouth to L.I)
(आंत्र नली) → 25 cm.

→ Mouth → Buccal Cavity (मौखिक गुहा) → Pharynx → Oesophagus (food pipe)
↓
Stomach → Small Intestine (6.25 m.) → Large Intestine (1.5 m.) → Rectum

Saliva (लार) – Breaks starch ⟶ Maltose (30% Starch break)
↓ enzyme
Salivary amylase

⊛ In enzyme's name → 'ase' comes in the last.

→ Lysozyme present (antibacterial – जीवाणु रोधी)

Stages of digestive system –

(i) Ingestion (अंतर्ग्रहण) – Intake of food.

(ii) Digestion (पाचन) –

(iii) Absorption (अवशोषण) – Takes place in small intestine.

(iv) Assimilation (स्वांगीकरण)

(v) Excretion (उत्सर्जन)

Digestive system

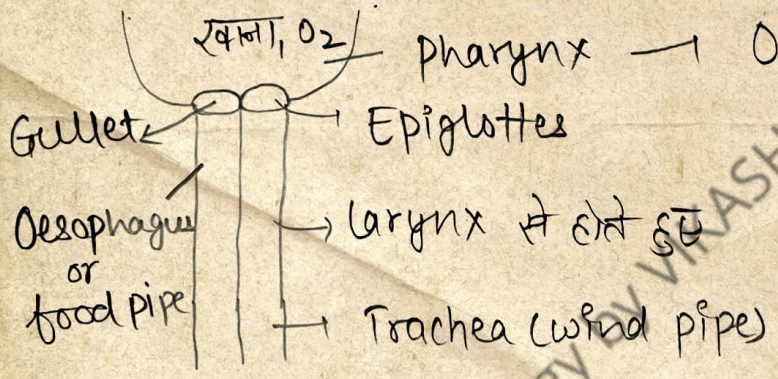
Alimentary Canal (आहार नाल)	Digestive glands / Exocrine glands
Mouth ← Teeth, Tongue	Salivary glands
Food pipe	—
Stomach	Gastric glands
Small Intestine ← Liver → Bile juice, Pancreas	
Large Intestine	—
Anus	—

① Mouth – After teeth & tongue → BOLUS food formed.

② Food pipe / Oesophagus – used to take food from mouth to stomach
– 25 cm. in length.

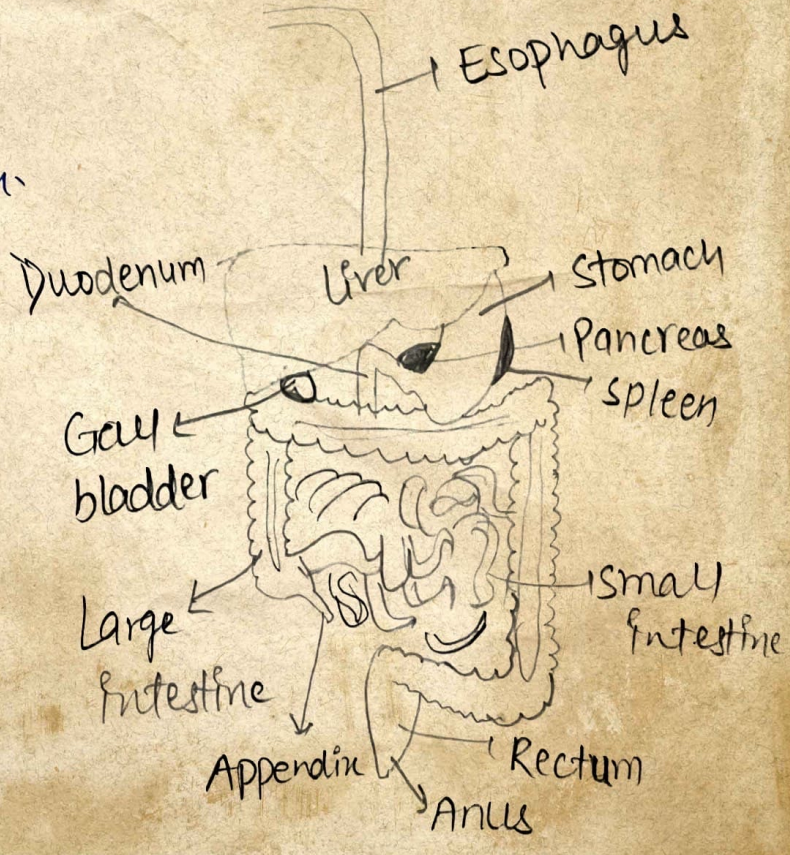
Peristalsis (क्रमाकुंचन) – The process in which the food of mouth goes to stomach.
– By contracting & relaxing of muscles.
– No digestive enzyme.

※ No digestion takes place in food pipe / oesophagus.

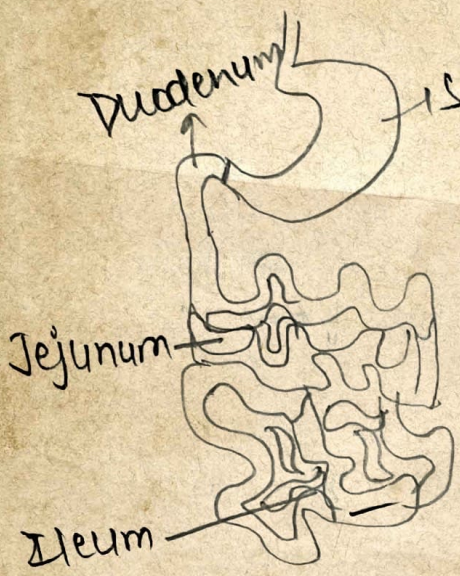


③ Digestion in stomach.

④ Small Intestine –
– 6 to 6.25 mtrs. in length.
– 1 inch diameter (approx)
– Coiled condition



Small Intestine is divided into three parts –

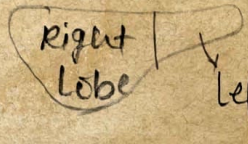


Duodenum (ग्रहणी)
- 10 inch length
- attached to
  - Liver (यकृत)
  - Pancreas (अग्नाशय)

Jejunum
- (2.5 mtrs.)

Ileum
- max. absor.
- Last part of S.I. connected with L.I.
- 3.5 mtrs.

Liver – Largest gland of the body.
- Largest / heaviest internal organ.
- Weight < 1.4 – 1.8 kg. (male)
  1.2 – 1.4 kg. (female)
- Second largest organ of body after skin.
- Study – Hipatology.
- It secretes Bile juice (पित्तरस) 24 hrs.
  - PH 7.6 (basic in nature)
  - 600 – 800 ml. / day.
- Excess bile juice stores in Gall Bladder (पित्त की थैली)
  - Also called Green gland
  - Green colour due to a pigment called Biliverdin.
- But the appropriate bile juice reaches in Duodenum (S.I.) & mixed with food & helps in digestion.
- It is divided into two Lobes.



(27)

Composition of bile juice – water + salt + cholestrol + phospho-lipids.

- salt
  - Sodium bicarbonate
  - sodium glycolate.

→ Bile pigment is attached to Rectum → chyle (yellow color)

- Bile pigment
  - Bilirubin
    - ↓ yellow colour
    - Stored in nails, eyes
    - Excess causes Jaundice.
  - Biliverdin
    - ↓ Green colour

- Haemoglobin
  - Haem (Iron)
    - Porphyrin
      - Bilirubin
        - Stercobilinogen → मलाशय को पीला रंग देता है
        - urobilinogen → Plasma को पीला रंग देता है
        - (Stercobilinogen + urobilinogen = Bile pigments)
      - Biliverdin
    - Iron
  - Globin (Protein)

Liver → Bile juice mixing with food (Duodenum) → में से → Lipids → Bile salts break into → fatty acids (Partial digest)

Lipids → Liquid form.

Emulsification – The breakdown of large molecules of lipids (पायसीकरण) into the smaller molecules of fatty acids with the help of bile juice/salt.

OR

The bile juice secreted by liver works on the process of emulsification.

→ There is no enzyme in bile juice. It helps in digestion.

Functions of Liver-

- Emulsification of fat (वसा के पाचन में सहायक)
- Formation of bile juice.
- Stores Albumin protein.
- Helps in fat store.
- Formation of cholestrol.
- Formation of glycogen.
- Stores iron, vitamin & glycerol (reversed food)

'B_{12}' & 'E' also

→ A → 1 to 2 months.
→ D → 1 to 4 months
→ K → 3 to 5

- Helps in detoxification. (जहरीले पदार्थों का प्रभाव कम करना)
- Formation of Urea. (मल kidney बनाती है but urea liver बनाता है)
- Liver has the maximum regeneration power.

By:-
Chaudhary
V.K. PHOGAT

⊛ Nerve cells have the minimum regeneration power.

⊛ Glycogenolysis- टूटना
↳ Breakdown of molecules Glycogen into Glucose.

Glycogenesis- बनना
↳ Formation of Glycogen from Glucose.

Glyconeogenesis-
↳ Formation of glucose from fat, amino acid etc.

Pancreas (अग्नाशय) – Leaf like organ ie attached to Duodenum part of small intestine.

– Discovered by – Langerhens.

– It is the second largest gland in human body after Liver.

In Pancreas, 4-types of cells are present–

Acts as Endo-crine glands that forms hormones.

(i) α-cells – Hormone formation.

(ii) β-cells – Hormones (Insulin) formed (maximum

(iii) δ-cells – Hormones formed.

Acts as Exo-crine gland that forms Pancreatic juice.

(iv) F-cells – Pancreatic juice formed.

→ 1 ltr./day.

→ PH – 8 to 8.5

→ Enzymes present.

Here F-cells are the part of digestive system because in digestion juice/enzyme helps. So we will discuss about F-cells here.

→ Pancreas are also called mixed gland. (Exocrine + Endocrine)

– Langerhens gave these 4-cells the name→

Islets of Langerhens. (लैंगरहैंस की द्वीपिकाएँ)

→ F-cells – Enzymes present.

→ 3 enzymes

- Amylase digestion, Carbohydrates.
- Lipase digestion, Lipids
- Trypsin digestion Protein

→ Starch $\xrightarrow[\text{break (100\%)}]{\text{Amylase}}$ Maltose (digestion)

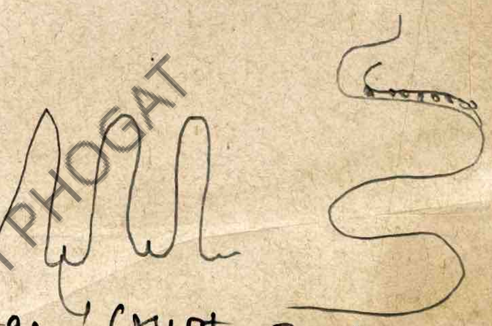
→ Lipids/fat $\xrightarrow[(100\%)]{\text{Lipase}}$ Fatty acid + glycerol

→ protein $\xrightarrow{\text{Trypsin}}$ Peptones/peptides → Amino Acid.

→ Here liver & pancreas done their work & now the food is in small intestine.

→ Now in small intestine, 2 crypt is formed-

* Maltose – Carbohydrate
* maltase – Enzyme



Maltase, ~~Lactase enzymes~~ Lactase, sucrase → intestinal juice. ← creates juice — Crypt of Lieberkuhn

लिबरकुहन की ग्रंथियाँ

Maltose $\xrightarrow[\text{breaks}]{\text{maltase}}$ Glucose + ~~Fructose~~ Glucose.
(1 molecule) (1 molecule)

Sucrose $\xrightarrow[\text{breaks}]{\text{sucrease}}$ Glucose + Fructose
(1) (1)

Also called milk sugar ← Lactose $\xrightarrow[\text{breaks}]{\text{Lactase}}$ Glucose + Galactose
(1) (1)

Now the complete digestion of carbohydrate takes place.

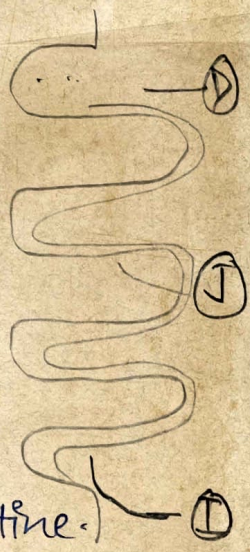
⊛ We eat Carbohydrates the most that's why our body has glucose in maximum quantity. So we called glucose a energy molecule.

→ $C_6H_{12}O_6 + O_2 \longrightarrow CO_2 + H_2O + \underline{Energy}$.
(Glucose)

↳ This energy is what our body needed.

⊛ Now, the digestion is completed in small intestine so now the absorption of food takes place and now the energy that the small intestine has, given to the different body parts.

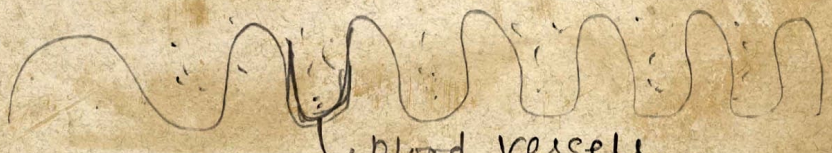
SI. $\xrightarrow{in}$ Duodenum → Digestion is completed.



Jejunum just helps to transfer the food from Duodenum to Ileum.

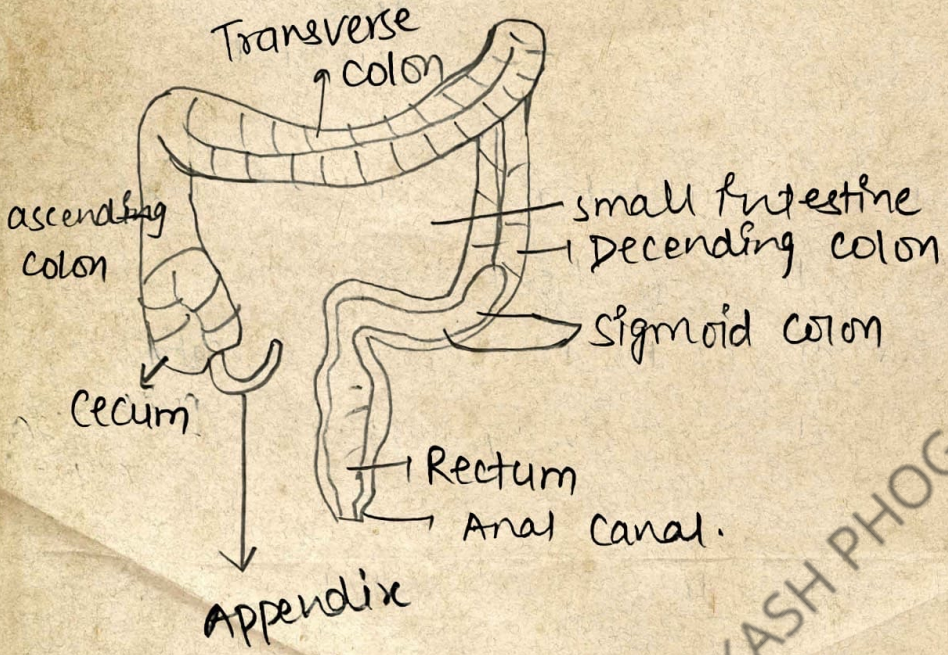
→ Ileum– Absorption of nutrients before emptying into the large intestine.

→ Villis– (दीर्घरोम) Villis are tiny, finger-like projections from the wall of small intestine. Their role is to increase the surface area within the small intestine. This will lead to the increase of surface area of the absorption of nutrients.



→ Now the blood vessel that are present in inner side of villis absorbs the nutrients and mixes it into the blood.

Large Intestine– 1 to 1.25/1.5 mtrs & 3 inch in diameter.



Large intestine has divided into three parts :–

Cecum Colon Rectum

Appendix/vermiform Appendix– It is a 8cm. long (अपेन्डिक्स)
vestigial organ present in Cecum in large intestine.
– In herbivorous, it helps in digestion of cellulose

Function of large intestine–

– Also called house of bacteria (Good bacteria)

↙
Escheria Coli / E-Coli

Undigested food (from S.I) —E. Coli (turns it into)→ Faeces / wastes food (मल)

E-coli gives two vitamins to our large intestine
- Vitamin B_{12}
- Vitamin K.

- Absorption of water.

Rectum- 5 to 6 cm. in length.

Now the food stores in rectum for some time. After that the solid waste material / faeces excrete through Anus.