MADHESH AGRICULTURAL UNIVERSITY

RAJBIRAJ , SAPTARI

TOPIC :- DIGESTIVE SYSTEM OF INSECT

CO-ORDINATED BY:-

Mr. PREM CHAUDHARY

(ASSISTANT PROFESSOR OF MADHESH AGRICULTURAL UNIVERSITY)

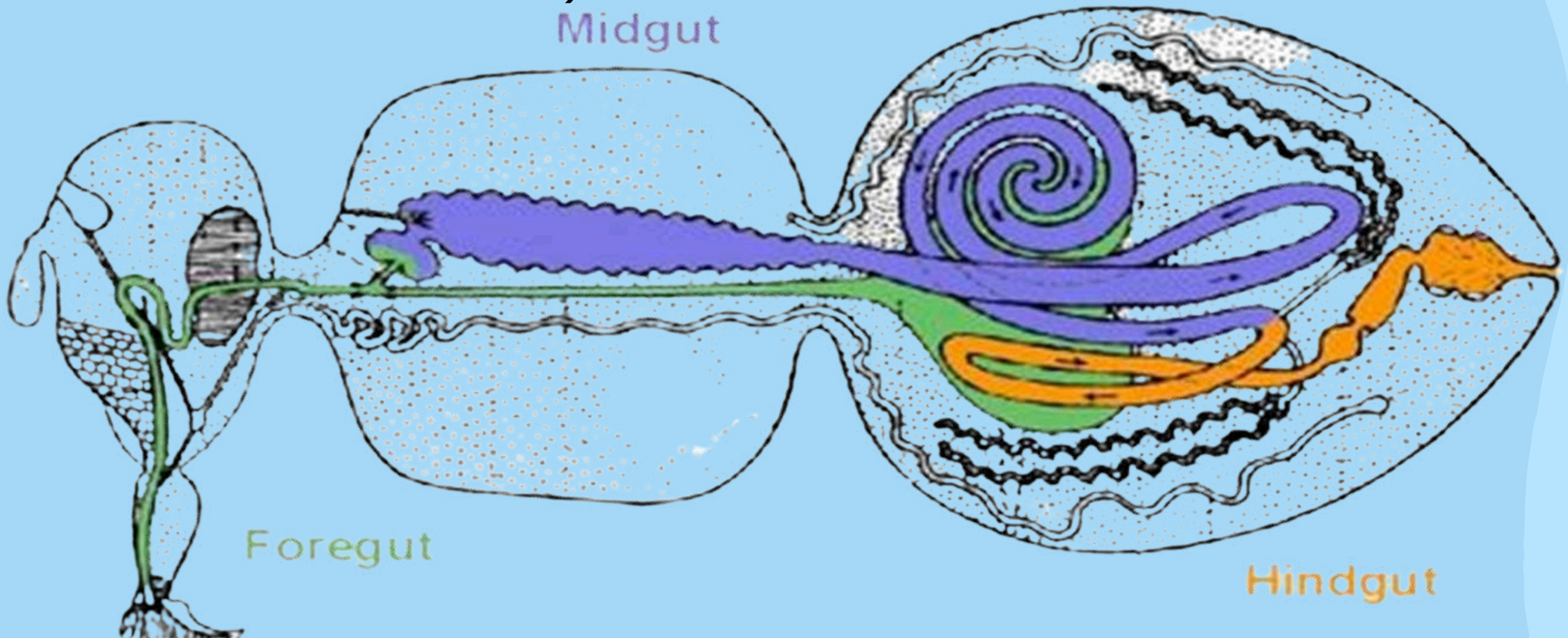
PREPARED BY:-

ROHAN MANDAL

ROLL NO.:- 26

INTRODUCTION

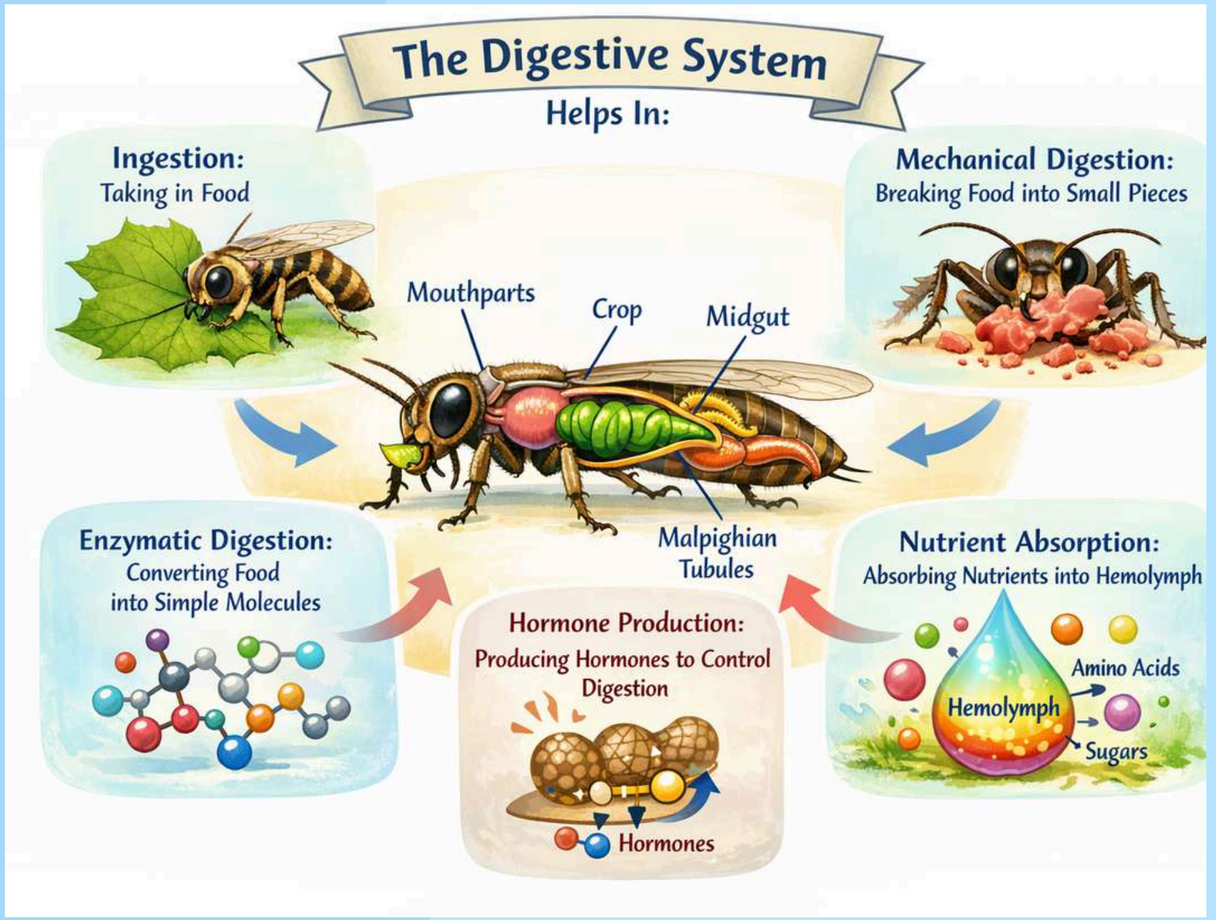
- The digestive system of insects is a tube-like structure.
- It starts from the mouth and ends at the anus.
- It is also called the alimentary canal.



MAIN FUNCTION

The digestive system helps in:-

- Taking in food (ingestion)
- Breaking food into small pieces (mechanical digestion)
- Converting food into simple molecules (enzymatic digestion)
- Absorbing nutrients into hemolymph.
- Producing hormones to control digestion



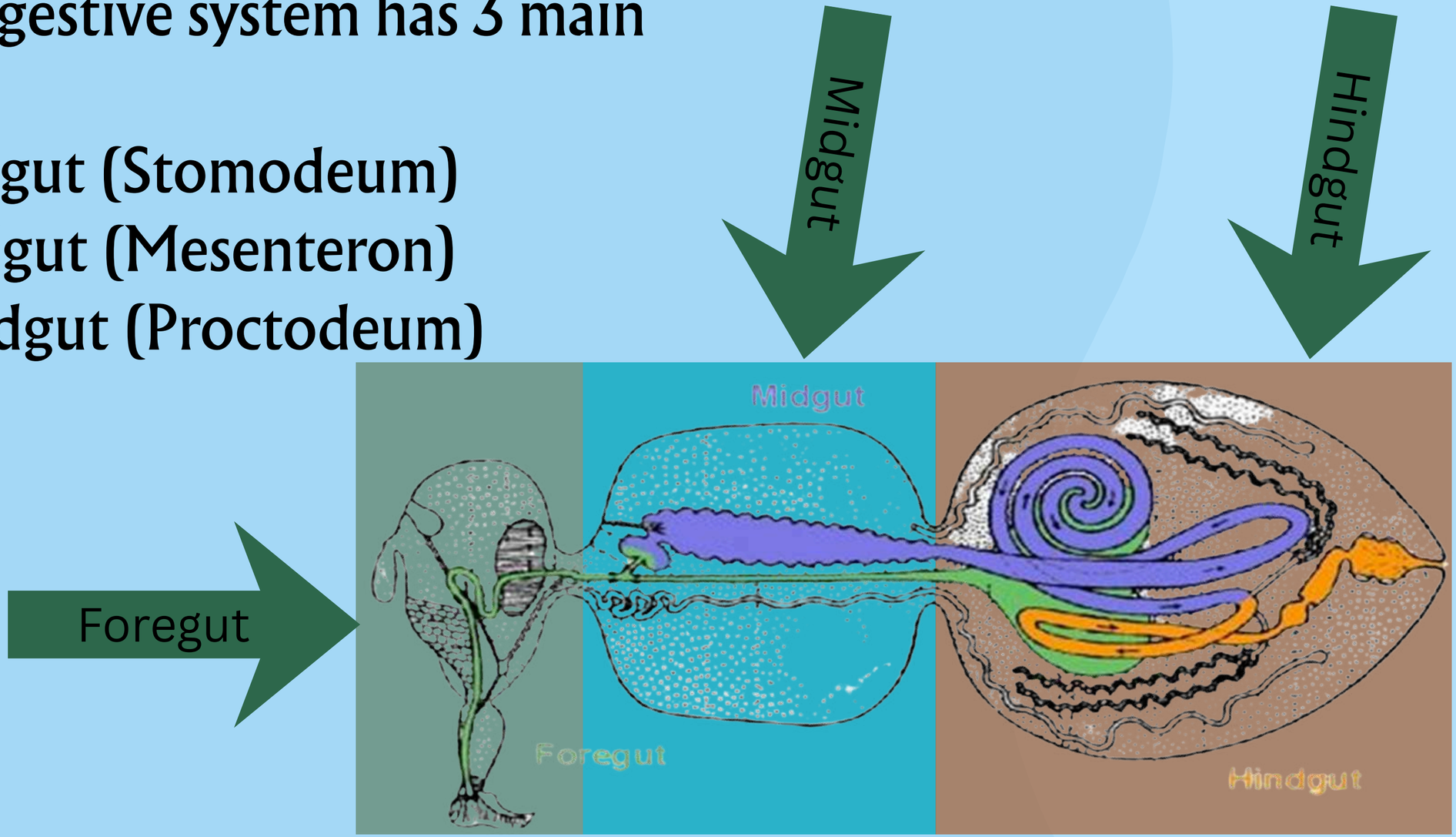
ORIGIN OF DIGESTIVE TRACT

Foregut & Hindgut → Ectodermal origin
Midgut (Mesenteron) → Endodermal origin

General Structure

The digestive system has 3 main parts:-

1. Foregut (Stomodeum)
2. Midgut (Mesenteron)
3. Hindgut (Proctodeum)



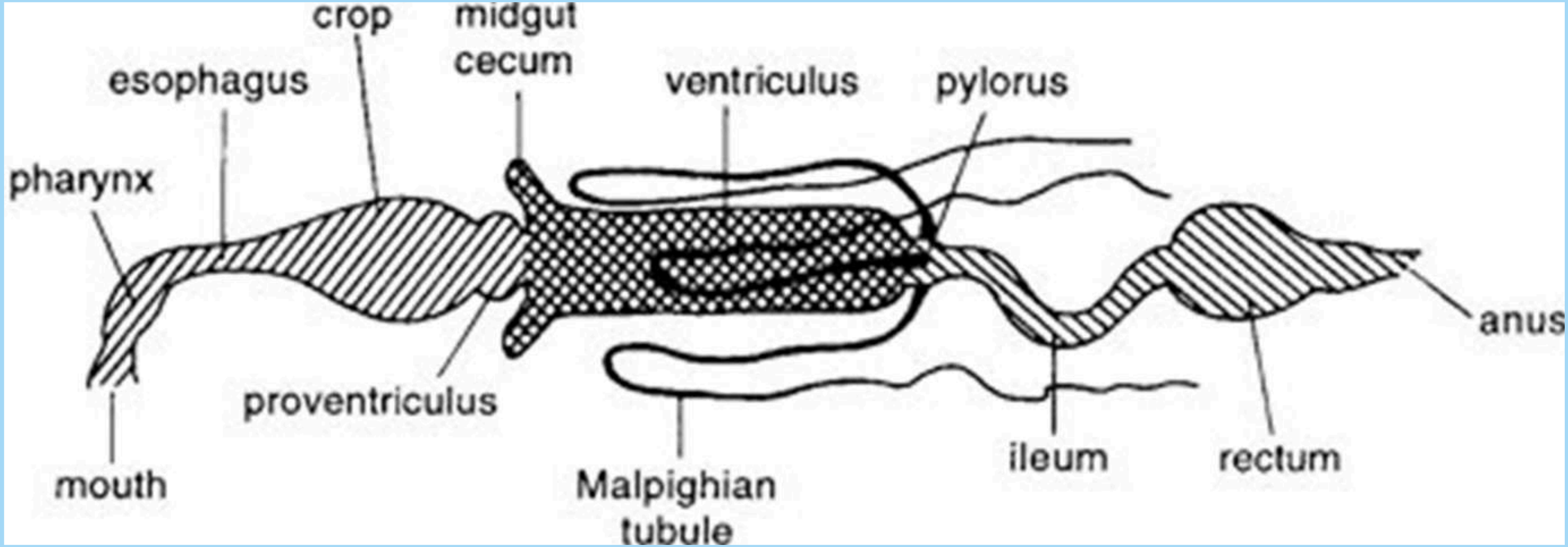


Fig.:- Digestive tract of insect

FOREGUT

Structure

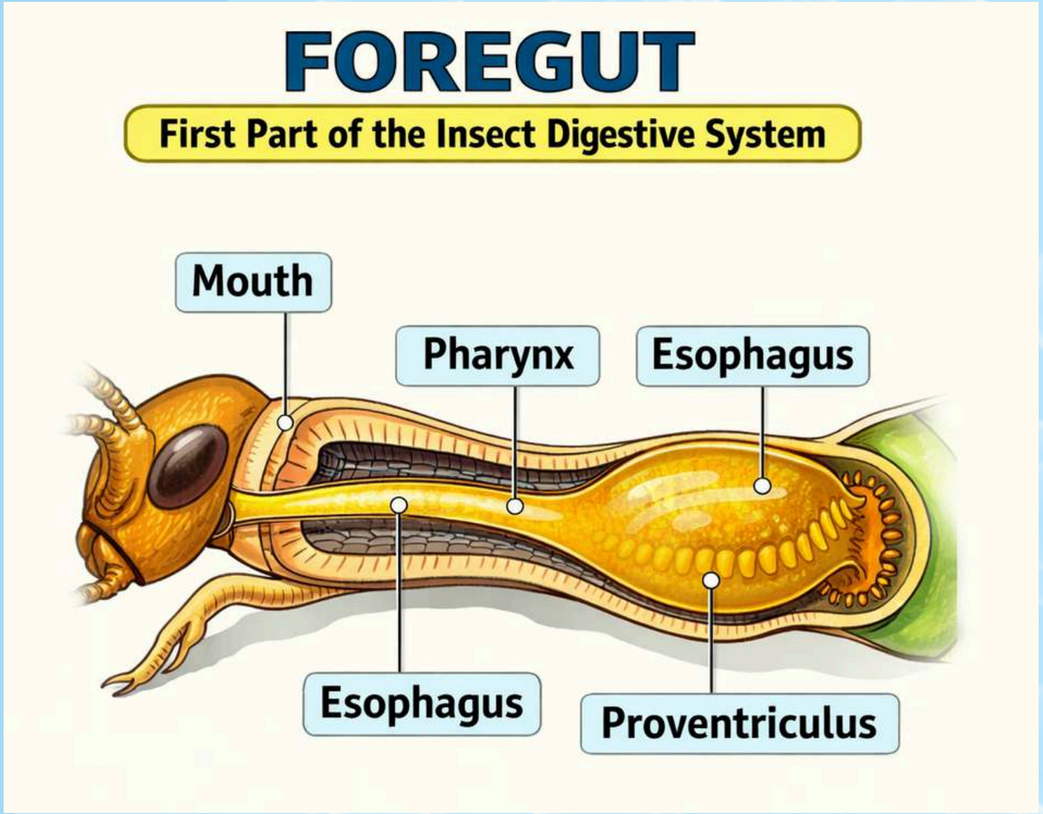
- Mouth → pharynx → esophagus → crop → proventriculus

Functions

- Help in ingestion of food.
- Helps in temporary storage
- Mechanical breakdown of food
- Mixing food with saliva

Important Points

- Little or no digestion occurs here
- Proventriculus acts like grinding organ.



Important Functions of These Organs:-

1. Mouth

- Takes in food (ingestion).
- Different insects have different mouthparts for chewing, sucking, or piercing.

2. Pharynx

- Acts like a muscular pump.
- Helps to move food from the mouth to the esophagus.

3. Esophagus

- A narrow tube that transports food from the pharynx to the crop.

4. Crop

- A temporary food storage organ.
- Allows insects to store food before digestion.

5. Proventriculus (Gizzard)

- Grinds food into smaller particles (mechanical digestion).
- Helps regulate the passage of food into the midgut.

SALIVARY GLANDS

Functions:-

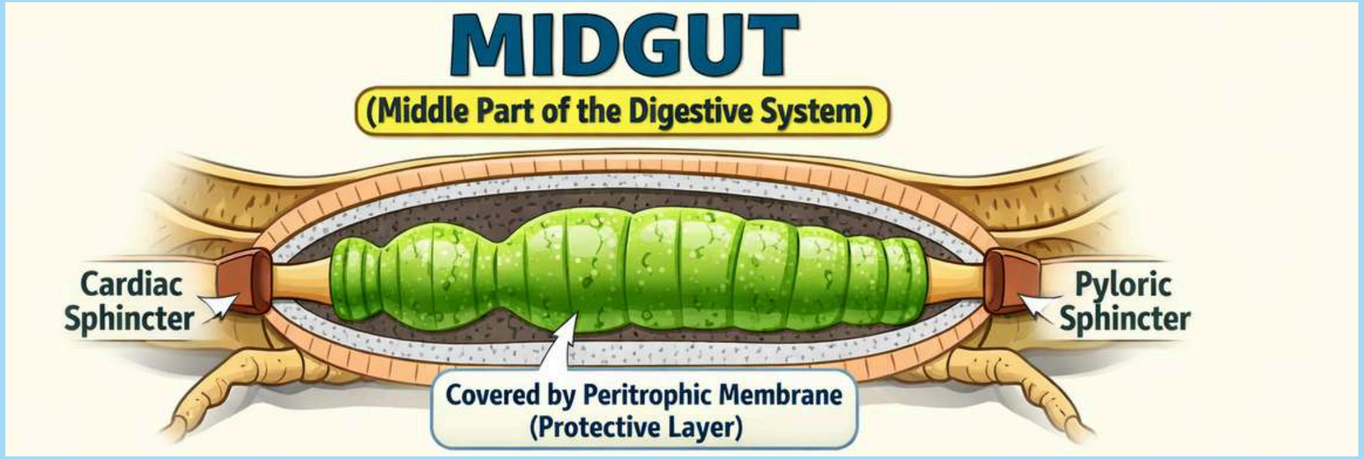
- Moistens and softens food
- Lubricates mouthparts
- Produces digestive enzymes (e.g., amylase)
- Helps in pre-digestion

Types of Salivary Glands

1. Acinous glands → directly controlled by nerves
2. Tubular glands → controlled by hormones (serotonin)

MIDGUT

- The midgut is the middle part of the digestive system.
- It is located between the cardiac sphincter and the pyloric sphincter.
- The midgut is covered by a peritrophic membrane, which is a thin protective layer.
- This membrane protects the gut wall from damage and harmful particles in food.



Main Functions:-

Its important functions are:-

- Digestion of food using enzymes
- Breaking complex food into simple molecules
- Absorbing nutrients into the hemolymph (insect blood)

Types of Cells in the Midgut

1. Digestive Cells

- It produce and release digestive enzymes that break food into small molecules

Examples :-

- Proteins → Amino acids
- Carbohydrates → Glucose
- Fats → Fatty acids

These nutrients are then absorbed into the insect body for energy and growth.

2. Regenerative Cells

- It produce new cells to replace old or damaged digestive cells and maintain the health of the midgut lining.

These cells ensure the midgut can keep functioning properly.

3. Endocrine Cells

- It produce and release hormone that control digestive activities

Example:-

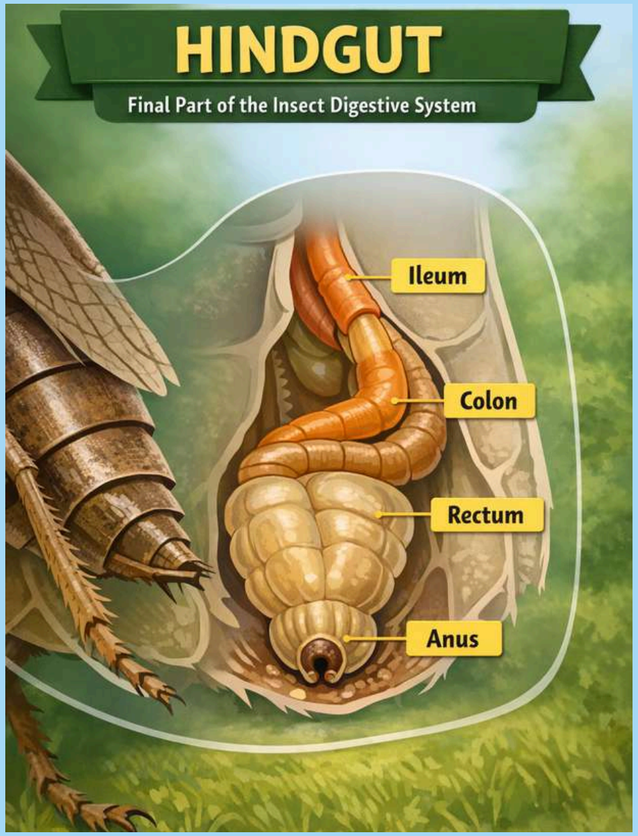
- Enzyme secretion
- Movement of food in the gut
- Digestive processes

4. Goblet Cells

- It help in ion transport (i.e. movement of salts and minerals)
- Control water balance in the gut.
- Maintain the proper environment for digestion.

HINDGUT

The hindgut is the last part of the insect digestive system.
It is located after the midgut and begins at the pyloric sphincter.
The hindgut is lined with cuticle, which protects the inner wall.
It is mainly involved in water and salt regulation.



The hindgut is divided into four main parts:-

- Ileum
- Colon
- Rectum
- Anus

Structure

1. Ileum

- Connects the midgut to the hindgut.
- Receives waste material from the midgut.
- Helps in the movement of food and waste toward the colon.
- Also participates slightly in water and salt absorption.

2. Colon

- Transports waste material from the ileum to the rectum.
- Helps in further absorption of water and salts.
- Assists in compacting waste material.

3. Rectum

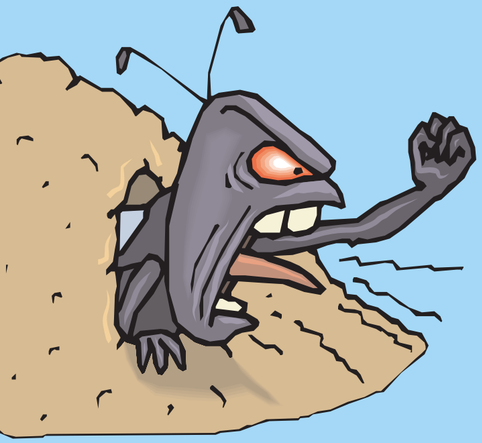
- Main site of water and ion reabsorption.
- Contains rectal pads that absorb water and salts back into the body.
- Helps insects conserve water, especially in dry environments.

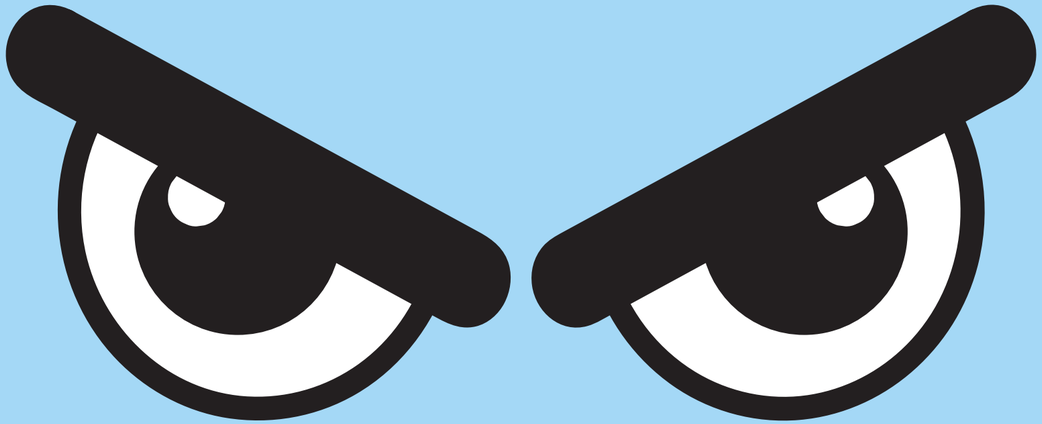
4. Anus

The final opening of the digestive system.
Responsible for expelling feces (waste) from the body.

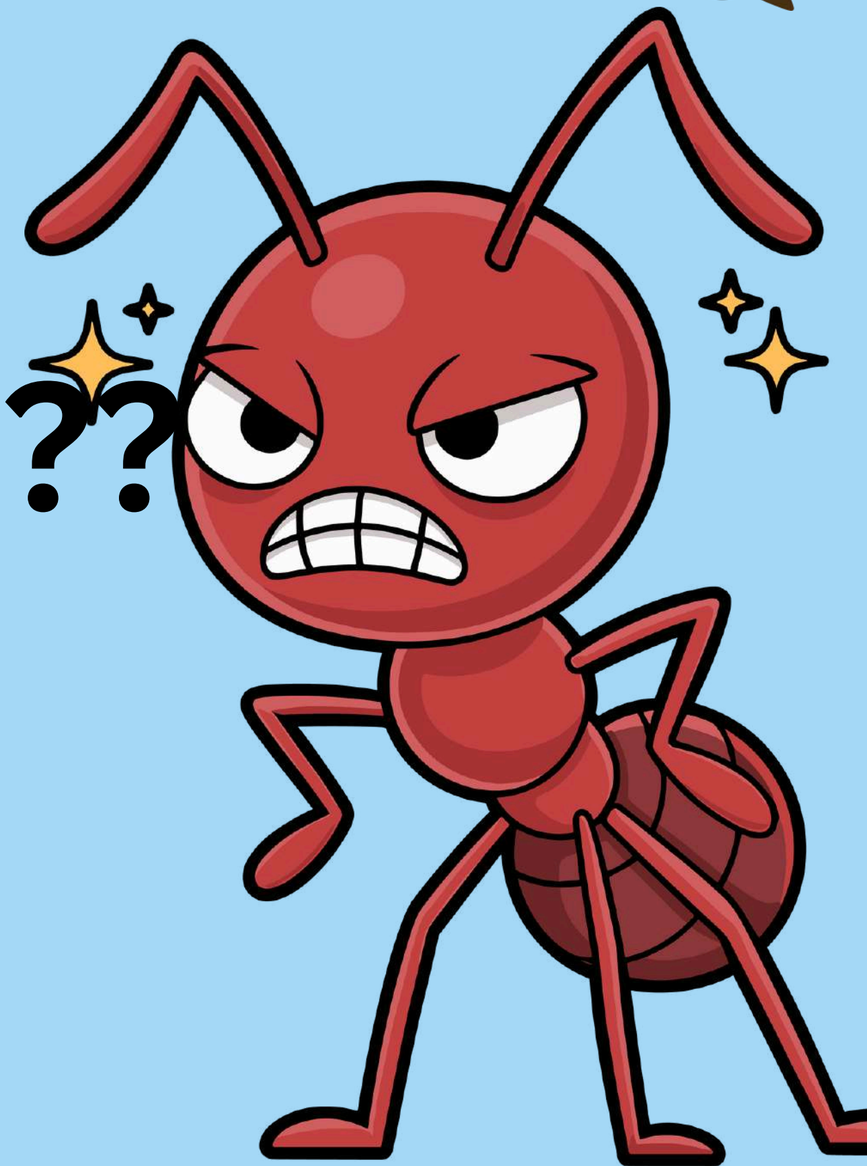
Function:-

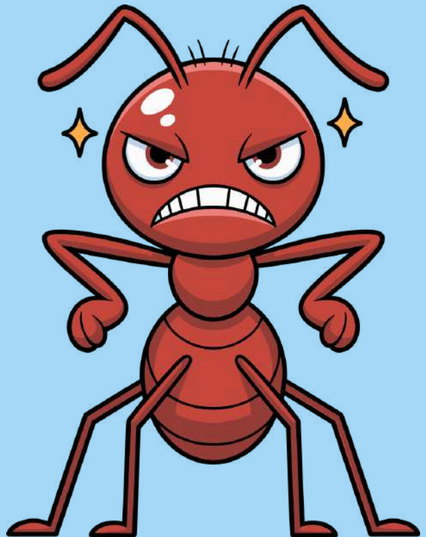
- The hindgut collects undigested food and removes it from the body through the anus.
- The hindgut absorbs water from waste to prevent water loss
- It maintains the balance of salts and minerals in the insect body.





ANY QUESTIONS ???






THANK YOU