

**PENANG SANGAM HIGH SCHOOL**  
**P.O.BOX 44, RAKIRAKI**  
**LESSON NOTES**

**Year/Level:** 12C/D

**week** 16

**Subject:** Biology

<b>Strand</b>	1 structure & life processes
<b>Sub Strand</b>	1.4 comparative form and function in plants and animals
<b>Content Learning Outcome</b>	Discuss the process of digestion in selected organisms.( carnivores , omnivores)

***Comparison of Vertebrate Carnivores and Omnivores with the vertebrate herbivore nutrition***  
**Vertebrate Carnivores (eat other animals) E.g. Lions**

<b>Feature</b>	<b>Purpose</b>
Sharp teeth	For catching and tearing prey
Shorter intestine	Allows for faster digestion
Simple digestion	Since all the digestive juices for digestion of flesh is present.
<b>Vertebrate Omnivore (eat both plants and animals) E.g. Humans</b>	
<b>Feature</b>	<b>Purpose</b>
Sharp canine teeth	For tearing flesh
Flat molar teeth	For grinding food (plants)
Caecum	Hosts cellulose digesting bacteria

**Nutrition Methods of Heterotrophs**

<b>Nutrition Method</b>	<b>Adaptive Value</b>
<b>External digestion</b>	<ul style="list-style-type: none"> <li>- Food is digested outside the body so there is no need for digestive organs;</li> <li>- Appropriate only for small sessile organisms because the organisms must stay on the food until it is <u>completely digested</u> <i>e.g in saprophytic bacteria and fungi.</i></li> </ul>
<b>Internal Digestion</b>	<ul style="list-style-type: none"> <li>- Food is digested inside the body so that the organisms can move about while food is being digested and absorbed.</li> <li>- Appropriate for motile organism <i>e.g in animals and protists</i></li> </ul>
<b>Food vacuoles</b>	<ul style="list-style-type: none"> <li>- Food is enclosed and digested in a cell's food vacuoles;</li> <li>- Appropriate for motile unicellular organisms that have cell organelles <i>e.g in protists</i></li> </ul>
<b>Gut-sac-like</b>	<ul style="list-style-type: none"> <li>- Only one gut opening and one gut chamber so food is ingested and wastes egested through the same opening.</li> <li>- Food must be completely digested and absorbed and the wastes egested before the animal can eat again; sufficient to supply nutrients to cells of sessile animals <i>e.g in cnidarians</i></li> </ul>
<b>Gut –tube (with specialised gut chambers)</b>	<ul style="list-style-type: none"> <li>- Two gut openings so food moves one-way through the gut</li> <li>- This digestive system allows consumption of large amounts of food as it allows animals to eat continuously <i>e.g in most animal phyla, including annelids, arthropods and chordates.</i></li> <li>- Alimentary canals of animals with two gut opening have specialized sections along the gut.</li> <li>- Each section doing a different digestive task - this speeds digestion as it allows many different digestive functions to go on at the same time <i>e.g of some specialised chambers: crop for food storage, gizzard for grinding food, caecum and glands for enzyme secretion, hind gut for absorption of water.</i></li> </ul>

### Evolutionary Trends in Nutrition

- The more recently evolved organism groups have more complex nutrition methods.
- For example, a mongoose has two gut openings with many specialised chambers while a mushroom can survive by secreting enzymes and then absorbing the nutrients.
- The factor here is *speed*.
- Motile organisms need more energy and they need it more quickly than sessile organisms.
- ***The faster organisms move, the more efficiently its digestive system must process food.***
- As the ability for speed increases, the following trends in the nutrition methods of organisms can be observed:
  1. Increasing capacity for ingestion.
  2. Increasing specialisation of gut chambers.
  3. Increasing surface area for nutrient absorption.
  4. Specialisation of a transport system to carry nutrients from the digestive system to body cells.

### Nutrition and Other Body Systems

- ❖ The organ system of multicellular organisms cannot function on their own/ alone.
- ❖ Nutrition often depends upon other body systems for the following functions.
  1. The organisms must be able to find food (or in the case of autotrophs, inorganic materials for making food).
  2. The organism must distribute the nutrients to all body cells once it has digested food.
  3. The organisms must take in and distribute oxygen to decompose the nutrients in cells by respiration.
  4. The organisms must excrete the metabolic wastes created by breaking down the nutrients.
- ❖ Thus, the nutrition system of multicellular organisms usually works together with the nervous, transport, gas exchange and excretion systems.

### Exercise

1. Over time, nutrition methods have evolved to be more efficient and complex.
  - i. In what ways have nutrition methods become more efficient?

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- ii. What evolutionary trend has led to selection for efficient and complex method?

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