Nutrition in Animals

- Animals and humans have heterotrophic mode of nutrition because they obtain their food directly or indirectly from plants.
- Some complex food components of animal and human nutrition are carbohydrates, proteins, fats, vitamins and minerals.
- The process of breaking down of complex food components into simpler molecules is known as digestion.

Heterotrophic Nutrition

- The heterotrophs that derive their energy directly from plants are called herbivores and those who derive their energy indirectly i.e. by eating herbivores are called carnivores.
- Omnivores- feed on both plants and animals e.g. bear, rat, man etc.
- Decomposers- obtain nutrients by breaking down remains of dead plants and animals, includes some bacteria and fungi.
- Mainly of three types—holozoic, parasitic, and saprophytic.
- Digestion- mechanical and chemical reduction of ingested nutrients.
- Consumers can be further classified as-
  Sanguivores, Frugivores, Granivores, Insectivores and Carrion eaters or Scavengers.

- Nutrition is a complex process and involves five important steps − ingestion, digestion, absorption, assimilation, and egestion.

1. **Ingestion** is the process of taking food. It takes place through mouth.
2. **Digestion** is the process of breaking down of complex food components into simpler molecules.
3. **Absorption** is the process in which all the digested food is absorbed by the walls of intestine.
4. **Assimilation** is the process in which the absorbed food is delivered to each and every cell of the body where they are used to produce energy and complex substances such as proteins, etc.
5. **Egestion** is the process in which the undigested, stored waste is excreted out from the body as faeces via anus.

Nutrition in humans

- Mouth includes teeth, salivary glands, and tongue. Teeth break down the food. They are of four types – molars (6), premolars (4), canines (2), and incisors (4) in each jaw.
  - Molars and premolars are for chewing and grinding food.
  - Canines are for piercing and tearing food.

- Incisors are for cutting and biting food.
- In total life span of humans, two sets of teeth grow – milk teeth and permanent teeth.
- Saliva is secreted by salivary glands located under the tongue. It contains a digestive enzyme salivary amylase, which breaks down starch into sugar.
- Tongue helps in chewing and swallowing of food.
- The food from mouth passes down the oesophagus to the stomach, through the movement of walls of oesophagus (peristalsis)
- **Stomach** mixes the food received from oesophagus with digestive juices.
- Inner lining of stomach secretes:
- Mucus – protects the lining of stomach against the action of the acid.
- Hydrochloric acid – creates an acidic medium and helps in digestion of proteins.
- Digestive juices – break down protein into simple substance.
- Pepsin breaks proteins into polypeptides
- Rennin changes soluble milk proteins into curd which is insoluble.
- The food from stomach moves into the small intestine.
- **Digestion in small intestine**
- It is the longest part (about 7.5 m long) of the alimentary canal.
- It is the site where complete digestion of carbohydrates, proteins, and fats takes place.
- All the digested food is absorbed by the walls of intestine. This process is known as **absorption**.
- Inner lining of small intestine has tiny finger-like projections called **villi.**
- **Villi** increase the surface area for more efficient food absorption.
- The absorbed food is delivered to each and every cell of the body where they are used to produce complex substances such as proteins, etc. This process is known as **assimilation**.
- It receives intestinal juice from two glands – liver and pancreas that help in further digestion of food.
- **Liver** - It is the largest gland of the body and secretes bile juice. Bile juice is stored in gall bladder and plays an important role in the digestion of fats.
- **Pancreas** - Pancreas contains enzymes that help in complete digestion of all food components.
- Amylase breaks starch into maltose
- Lipase breaks complex fats into simple fats.
- The functions of enzymes secreted in small intestine are :
- Maltase changes maltose to glucose
- Sucrase changes sucrose to glucose
- Lactase changes lactose to glucose
- Peptidase changes polypeptides to amino acids
- **Digestion in large intestine**
- The digested food from small intestine goes into blood stream and the undigested and unabsorbed material and water enters the large intestine.
- The function of large intestine is absorption of water and some salts from undigested food.
- From large intestine, the waste material is stored in rectum in the form of semi-solid faeces.

- The undigested, stored waste is excreted out from the body as faeces via anus. This process is known as egestion.

- *Amoeba* is a single-celled organism which feeds on algae, rotifers, protozoans, and even other small *Amoeba*.
- *Amoeba* can constantly change its shape with the help of pseudopodia.
- Pseudopodia (also called false feet) are the finger-like projections that help *Amoeba* in moving and capturing food.
- When an *Amoeba* senses its prey, it pushes out its pseudopodia around it and engulfs it. The food thus eaten gets trapped in the food vacuole.
- Digestive juices such as amylase and protease are secreted inside the food vacuole in an *Amoeba.* These juices act on the food and break it down into smaller components.
- Amylase breaks down complex carbohydrates into simple sugars while protease breaks down proteins into simpler substances.
- The digested food is later absorbed by *Amoeba* for growth, maintenance, and multiplication.
- Undigested food is egested using pseudopodia.