Chapter – 2: Nutrition in Animals

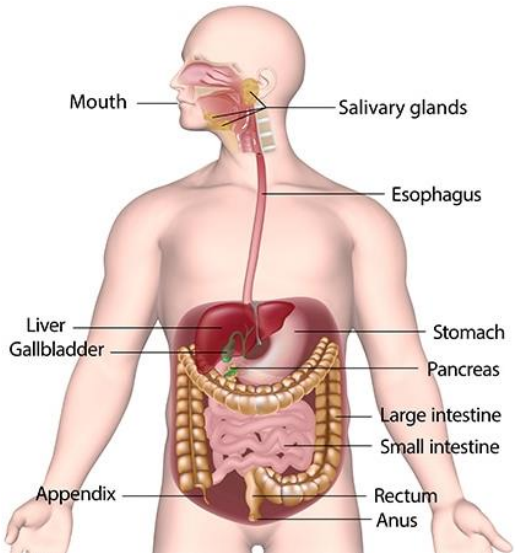
- Plants – produce own food
- Animals – eat plants or other animals for food
- All organism – require food – growth, repair, functioning of body
- Nutritional requirement, mode of intake and use of food – **animal nutrition**
- Some components – carbohydrates – complex structure
- Complex structure – broken down to simpler substance – **digestion**

Different Ways of Taking Food

- Mode of nutrition – varies – different organisms
  - Bees, humming-birds – suck nectar
  - Infants (babies) – feed on mother's milk
  - Snakes – swallow whole
  - Aquatic animals – filter tiny food and feed on them
- Starfish – feed on hard shell (calcium carbonate) animals – after opening shell – stomach comes out – engulfs the soft animal – goes back inside and digest it

Digestion in humans

- Take food through mouth – digest it – use it – remove the unused part
- What happens inside the body?
- Food passes through long canal – begins at buccal cavity – ends at anus
- Canal – divided into many parts –
  - Buccal cavity
  - Food pipe or oesophagus
  - Stomach
  - Small intestine
  - Large intestine
  - Rectum
  - Anus



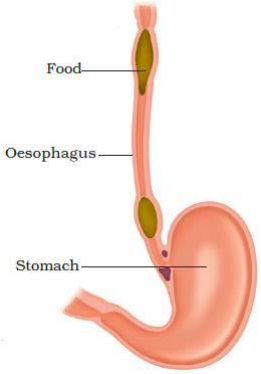
- All these parts – **alimentary canal (digestive tract)**
- Food – gets digested gradually – various components
- Walls – stomach, small intestine and glands – **salivary glands**, **liver**, **pancreas** – produce digestive juices
- Digestive juices – convert complex structure to simple one
- Digestive tract along with all the glands – **digestive system**

The mouth and buccal cavity

- Food – taken through mouth - **ingestion**
- Chew with teeth – breakdown into small pieces
- Each tooth – separate roots – in the gums
- Teeth – vary in appearance, functions
- 32 teeth – 2 sets – 16 upper and 16 lower
    - Incisor – 4 per set – cutting and biting
    - Canine – 2 per set – tearing
    - Premolar – 4 per set – chewing
    - Molar – 6 per set – grinding (breaking into small pieces)
- Mouth – salivary glands – produce saliva
- 2 test tube – 1st – boiled rice – 2nd – chewed rice – add water to both – add iodine solution to both – boiled rice (1st test tube) converts to blue-black colour – chewed rice (2nd test tube) does not change colour
- Saliva – breaks down starch into sugar
- Tongue – fleshy muscular organ – attached – end of buccal cavity
- Free at front – move in all directions
- Use tongue for talking – mix saliva with food – help in swallowing
- Taste food with tongue – taste buds – detect different food
- Make different solutions – sugar solution, salt solution, lemon juice, neem or bitter guard juice – take a toothpick for each solution – taste them

The foodpipe / oesophagus

- Swallowed food – passed down foodpipe
- Runs along neck and chest
- Food – pushed down – movement of walls of alimentary canal (food pipe in this case)
- Sometimes – food not accepted – stomach vomits it out



The stomach

- Thick-walled bag
- Shape like J – widest part

- Receive food from food pipe – release it to intestine
- Inner lining – release – mucous, hydrochloric acid, digestive juices
- Acid – kills bacteria – helps in digestion
- Digestive juices – break down **protein**
- 1822 – a man was shot – taken to army doctor William Beaumont – saved the man, left the hole bandaged – made observations inside stomach – also observed – opening to intestine – closed until food is digested

The small intestine

- Highly coiled – 7.5 metres
- Receives juices from liver, pancreas and its wall too
- Liver – reddish brown – upper part of abdomen
- Largest gland in the body – produce **bile juice** – stored in bags – **gall bladder**
- Bile – helps in digestion of **fats**
- Pancreas – cream coloured – just below the stomach
- Produce **pancreatic juices** – acts on carbohydrates, fats, proteins
- Partly digested food – reaches lower part – intestinal juices – completes the digestion
- Carbohydrates break down to sugars, fats to fatty acid and glycerol, proteins into amino acid

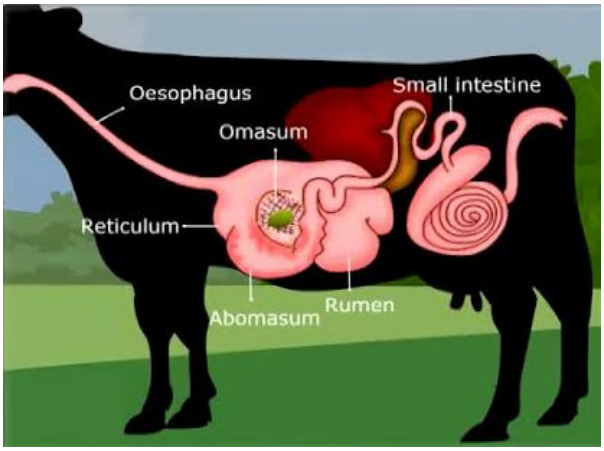
Absorption in the small intestine

- Digested food – pass into blood vessels – walls of intestine - **absorption**
- Inner walls – small intestine – 1000s of finger-like structures – **villi** (villus)
- Villi – increase absorption area
- Each villus – network of blood vessels
- Absorbed substance – transported to different organs – used to build proteins – **assimilation**
- Inside cells – glucose break down with the help of oxygen – produce carbon dioxide and water – release energy
- Food – undigested, unabsorbed – enter large intestine

Large intestine

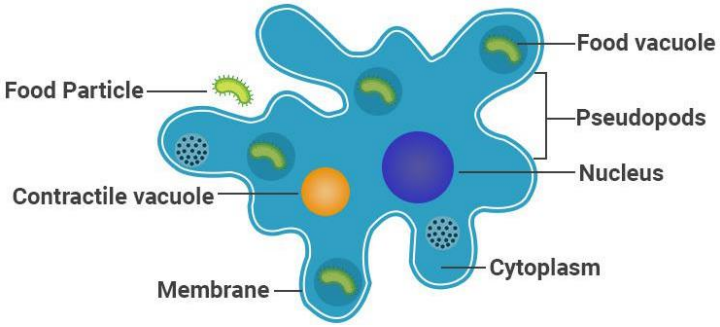
- Wider and shorter – 1.5 metres
- Function – absorb water and salts from undigested food
- Remaining waste – passes into rectum – semi-solid faeces
- Faecal matter – removed through anus – **egestion**

Digestion in Grass-Eating Animals



- Cows, buffaloes, other grass-eating animals – chew food continuously
- Quickly swallow – store in part of stomach – **rumen**
- Food – partially digested – **cud**
- Later – cud returns to mouth – animal chews it – **rumination**
- Animals – **ruminants**
- Grass – rich in **cellulose** – carbohydrate
- Ruminants – bacteria – rumen – digest cellulose
- Many animals – including humans – cannot digest cellulose
- Animals – horses, rabbit – large sac-like (bag) structure – Caecum – between oesophagus and small intestine
- Cellulose – digested by bacteria – not present in humans
- Many small organisms – do not have mouth and digestive system

Feeding and Digestion in Amoeba



- Microscopic, single-celled organism
- It has cell membrane (boundary), rounded and dense nucleus (brain), many vacuoles (empty spaces)
- Constantly change shape and position
- One or more finger-like projections – **pseudopodia** – false feet – movement and capture food
- Amoeba – feeds on small microscopic organisms
- Sense food – push out pseudopodia – engulf it
- Food trapped inside vacuoles
- Digestive juices – produced inside vacuoles
- Juices – act on food – digest it, absorb it – undigested food – removed by vacuole
- Basic process of digestion – same in all animals