



NEET - UG

NATIONAL TESTING AGENCY

Zoology - 3

Volume - 1



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Digestive System

Physiology Study of normal functioning of tissue, organ and organ system.

Pathology Study of defect and abnormal functioning of tissue, organ and organ system.

"Digestion and Absorption"

Nutrition:- Sum total of all the process by which organism obtained the substance required for energy, growth & development is called nutrition.

Nutrient:- chemical present in food. Nutrient are of two types.

Macro Nutrients	Micro Nutrient
<p>Proximate principle of food.</p> <p>Nutrient utilized in energy production, growth & devolvement.</p> <p>Example:-</p> <p>Carbohydrate</p> <p>Protein</p> <p>Lipids</p>	<p>Protective principle of food.</p> <p>Not involves in Energy production, Growth & Development.</p> <p>These nutrients are essential for health.</p> <p>Example:-</p> <p>Vitamins</p> <p>Minerals</p> <p>Water</p> <p>(Their deficiency lead specific diseases or abnormalities.)</p>

Minerals (Two Types)

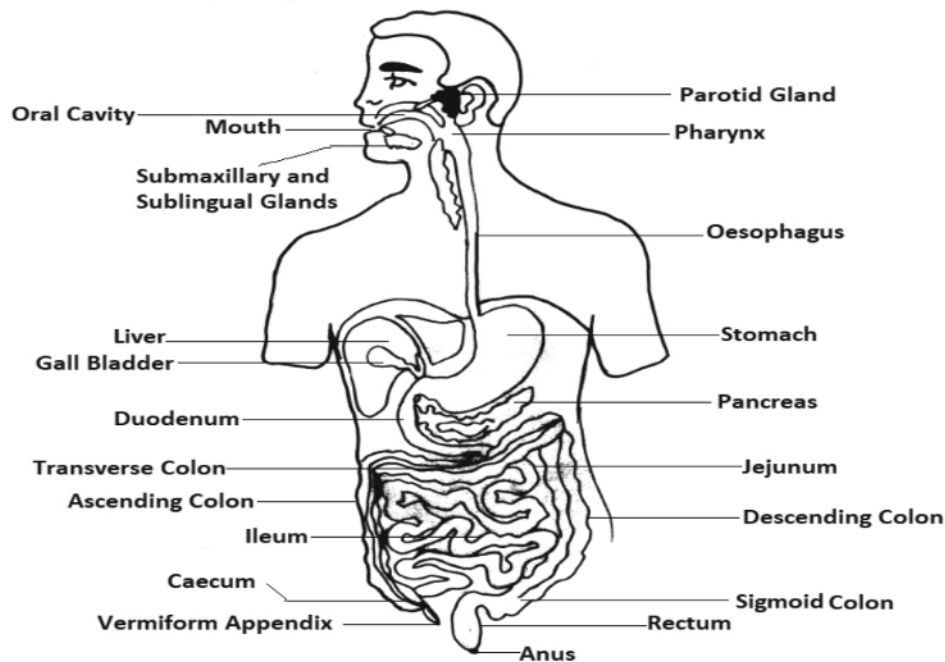
Macro elements = All (around 21 minerals.)	Micro elements
<ul style="list-style-type: none"> * Required in more amount more than 100 mg/day. * Example:- <ul style="list-style-type: none"> o Na (Sodium) o K (Potassium) o Ca (Calcium) o Cl (Chloride) o P (Phosphorus) o S (Sulphur) o Mg (Magnesium) 	<p>Required in small amount less than 100 mg/day.</p> <ul style="list-style-type: none"> * Example: <ul style="list-style-type: none"> o Fe (Iron) o Zinc o I (Iodine) o Mn (Manganese) o Co (Cobalt) o Cu (Copper) o Mo (Molybdenum)

Stages of Nutrition

- * **1. Ingestion** - Food Intake.
- * **2. Digestion** - Breakdown of complex food into simpler for absorption.
- * **3. Absorption** - Transfer of end product of digestion into blood and lymph through intestinal mucosa.
- * **4. Assimilation** - Utilization of nutrient by cells.
- * **5. Egestion** - Removal of undigested food.

"Human digestive system"

- * Human is heterotrophic, holozoic & omnivores organism.
- * Digestive system include → Alimentary canal.
→ Digestive Gland.



Alimentary canal:-

- * Tube of varying diameter starting from mouth and ends at anus.
- * Produce by "Archenteron" in embryo.
- * Part of alimentary canal:- It consist of

1. Buccopharyngeal chamber

- * Oral vestibule
- * B Cavity
 - o Tongue.
 - o Teeth
 - o Palate
 - o Hard
 - o Soft
- * Pharynx

- Nasopharynx
- Oropharynx

2. Oesophagus

3. Stomach

- * Cardiac
- * Fundus
- * Body
- * Pyloric

4. Intestine

- * Small
 - Duodenum
 - Jejunum
 - Ileum
- * Large
 - Caecum
 - Colon
 - Rectum
 - Anal canal

5. Anus

1. Mouth

- * Opening at face
- * Having **orbicularis Oris** in both lips & Philtrum (Depression present in upper lip).
- * Mouth open into buccal cavity.

* Buccal cavity having following parts.

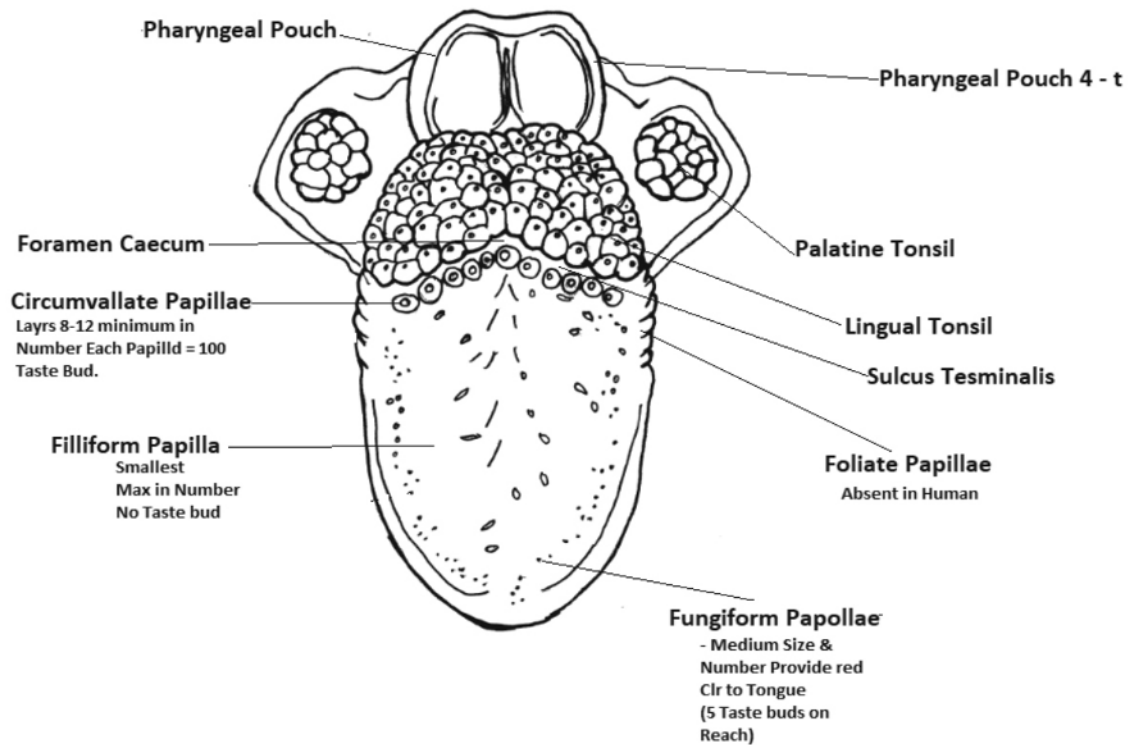
- o Palate
- o Tongue
- o Teeth

A. Palate:- Root of oral cavity

Hard Palate (Anterior)	Soft Palate (Posterior)
<ul style="list-style-type: none"> * Consist of maxillar & Palatine bone. * Palatine Rugae - Transverse ridge on ant. hard palate. 	<ul style="list-style-type: none"> * Consist C.T & Muscle. * UVULA (Velum palati) * Posterior median hanging part of soft palate * Which prevent entry food into nasopharynx.

B. Tongue

- * Flat muscular structure (Voluntary muscle).
- * **Ant part** - free, post part = attach to hyoid apparatus.
- * **Lower/** Ventral surface attached to floor of mouth with help of frenulum lingui /Lingual frenulum.
- * Dorsal surface of divided into two parts by V-shaped sulcus (Furrow) called **Sulcus terminal** is having central depression called **foramen caecum**.



Type of taste buds -In mammal -4

* In human 3 (Foliate absent.)

(a) **Circumvallate Papillae** (8-12)

-100 taste bud on papillae.

(b) **Fungiform Papillae**

- o Rounded red dots on tongue.
- o Max number.
- o Each Papillae has 5 taste buds

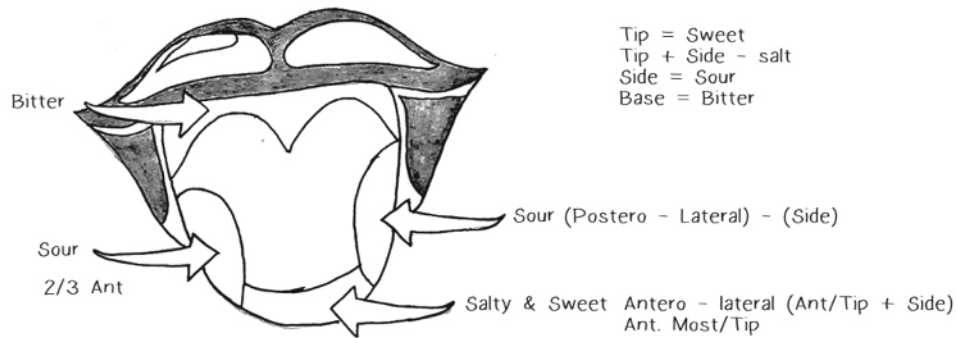
(c) **Filiform/smallest - Max in number.**

- No taste buds.

(d) **Foliate Papillae - absent in human**

Taste area of tongue.

Taste Area of Tongue



Note

- No taste bud for chillies only pain sensation.
- Dog tongue has sweat gland that help in thermoregulation in summer.

Teeth:-

* **Ecto-Mesodermal**

* **Enamel** - Ectodermal, **rest whole** = mesodermal.

* **Human (Mammalian) teeth** are.

- **Diphyodont** - Erupt two times / 2 set of teeth.

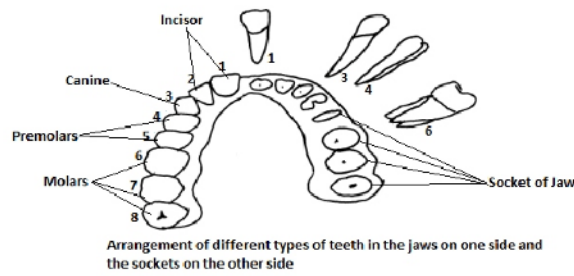
* **Milk (Deciduous)**

* **Permanent**

- **Thecodont** - Embedded in socket/alveolus.

- **Heterodont** -More than one type.

- Incisor (I)
- Canine (C)
- Pre Molar (Pm)
- Molar (M)



Diphyodont - 2 set of teeth.

Diphyodont - 2 Set of Teeth

(A) Milk Teeth Total 20, or Tempary Erupt at 6 Month.

P - 8
C - 4
PM - 0
M - 8/20

(B) Permanent Teeth All Persent at End of 24 Month

Total 32 $\left\{ \begin{array}{l} \text{P - 8, PM - 8} \\ \text{C - 4, M - 12} \end{array} \right.$

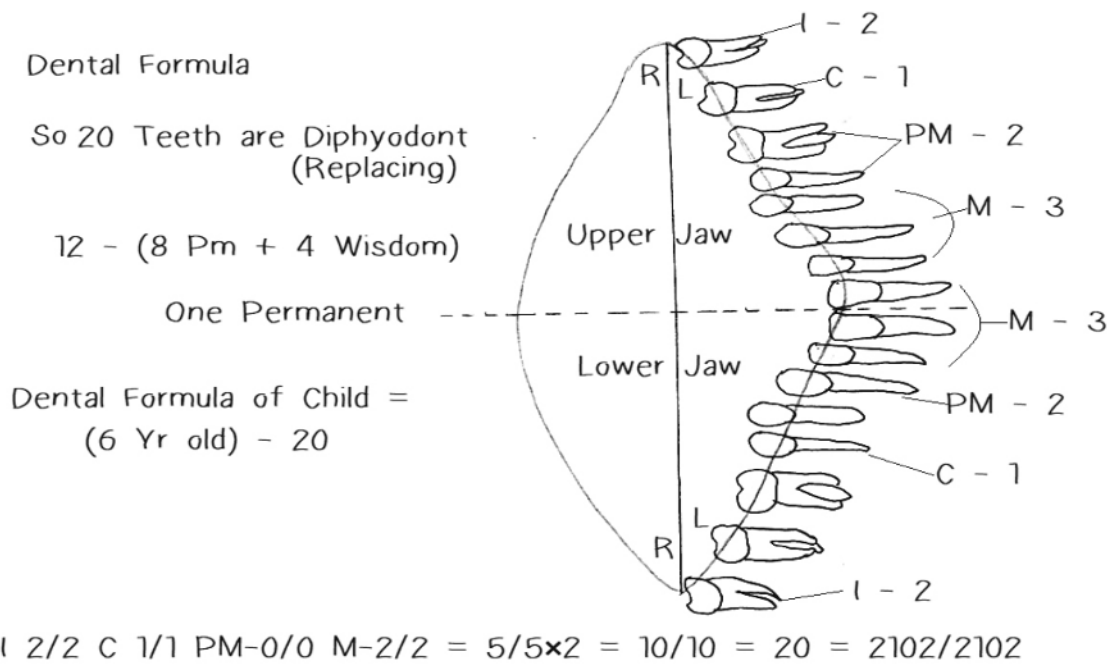
Dental Formula

17 Year old: (28 Teeth)

$$I \frac{2}{2}, C \frac{1}{1}, PM \frac{2}{2}, M \frac{2}{2} = \frac{7}{7} \times 2 = \frac{14}{14} = 28 = \frac{2122}{2122}$$

(iii) Adult : (32 Teeth)

$$I \frac{2}{2}, C \frac{1}{1}, PM \frac{2}{2}, M \frac{3}{3} = \frac{8}{8} \times 2 = \frac{16}{16} = 32 = \frac{2123}{2123}$$

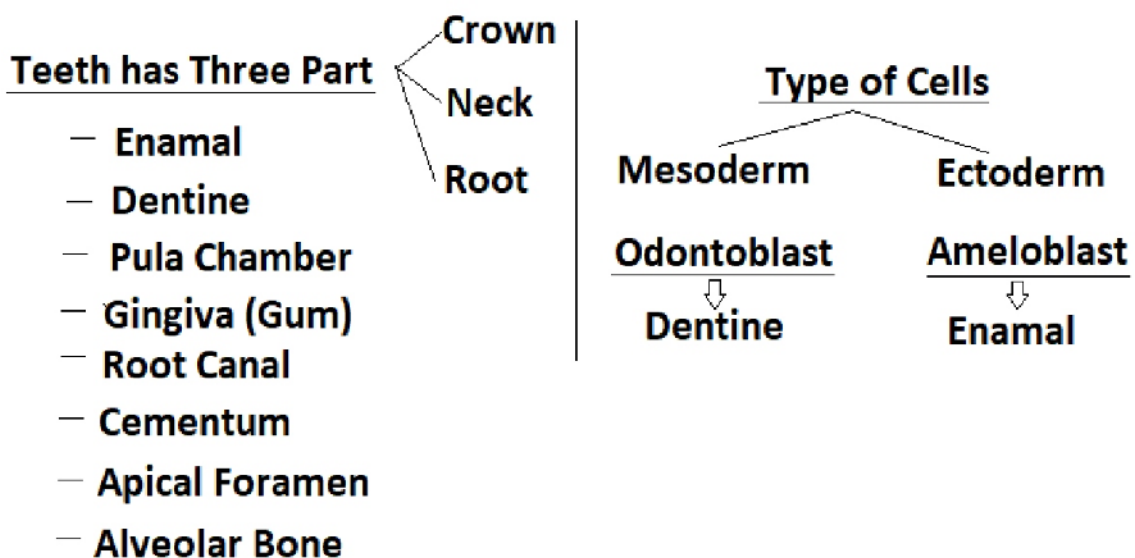


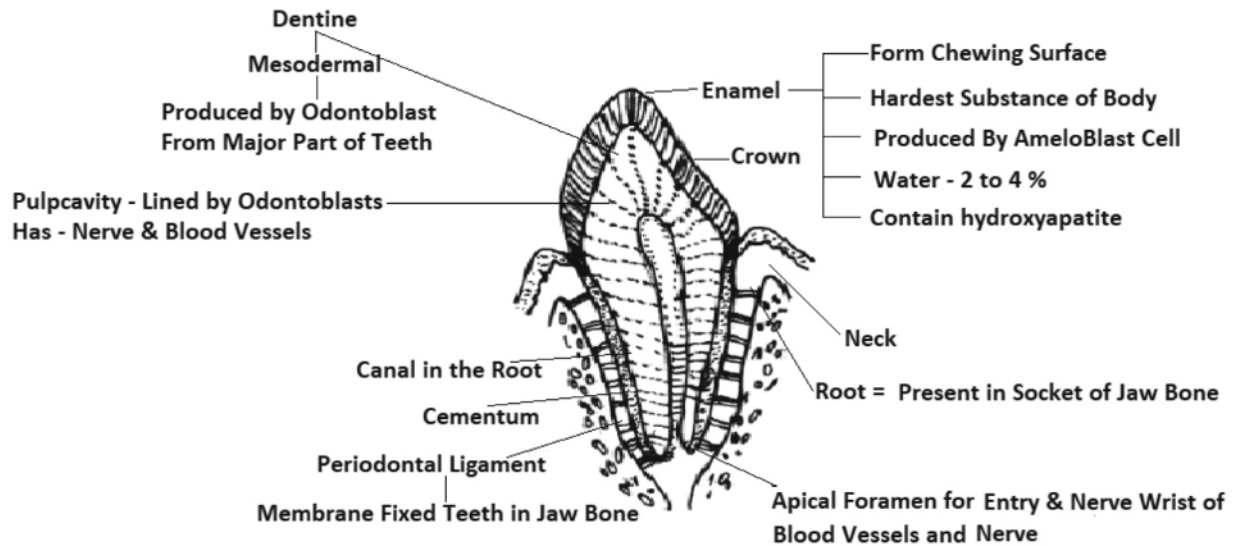
Last permanent tooth to be erupted is 3rd molar (Wisdom tooth) at age of 18-25 years

Monophyodont - $M = \frac{1}{1} = \frac{3}{3} \times 2 = \frac{6}{6} = 12$

Diphyodont - $I \frac{2}{2}, C \frac{1}{1}$ first 2M, $\frac{2}{2} = \frac{5}{5} \times 2 = \frac{10}{10} = 20$

Structure of teeth.





* **Types** of joints of tooth with jaw bone = **Gomphosis**

* Number of root in jaw bone.

- **In lower jaw -1 Root** → I, C, PM,
- 2 Root → M
- **In Upper Jaw. -1 Root** → I and C, and 1st PM
- 2 Root → 2nd PM
- 3 Root → Upper Molar.

Types of tooth on basis of cusp.

* **Bunodont**

- Brachydont (Rounded cusp)
- PM & M of human also called check teeth.

* **Lophodont** - Elephant.

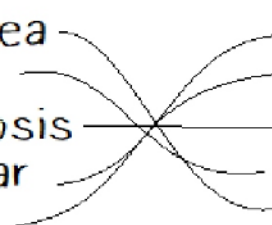
* **Selenodont** - Cow, Sheep.

* **Secodont** - Carnivorous (Pointed cusp)

* **Aerodont** - Root less teeth (Fish and Amphibian)

* **Walrus tusk** - Modified canine.

Q. Match the column.

- | | | |
|--|---|---|
| 1. Pyorrhoea
2. Enamel
3. Gomphosis
4. Premolar
5. Incisor |  | a. Monophyodont
b. Diphyodont
c. Teeth Joint
d. Hardest Substance
e. Gum/Gingival Infection |
|--|---|---|

1. (e), 2. (d), 3. (c), 4. (a), 5. (b)

Q. Major Part of teeth formed by dentine. T/F.

Q. Dental carries /tooth decay is caused by acid producing bacteria. T/F.

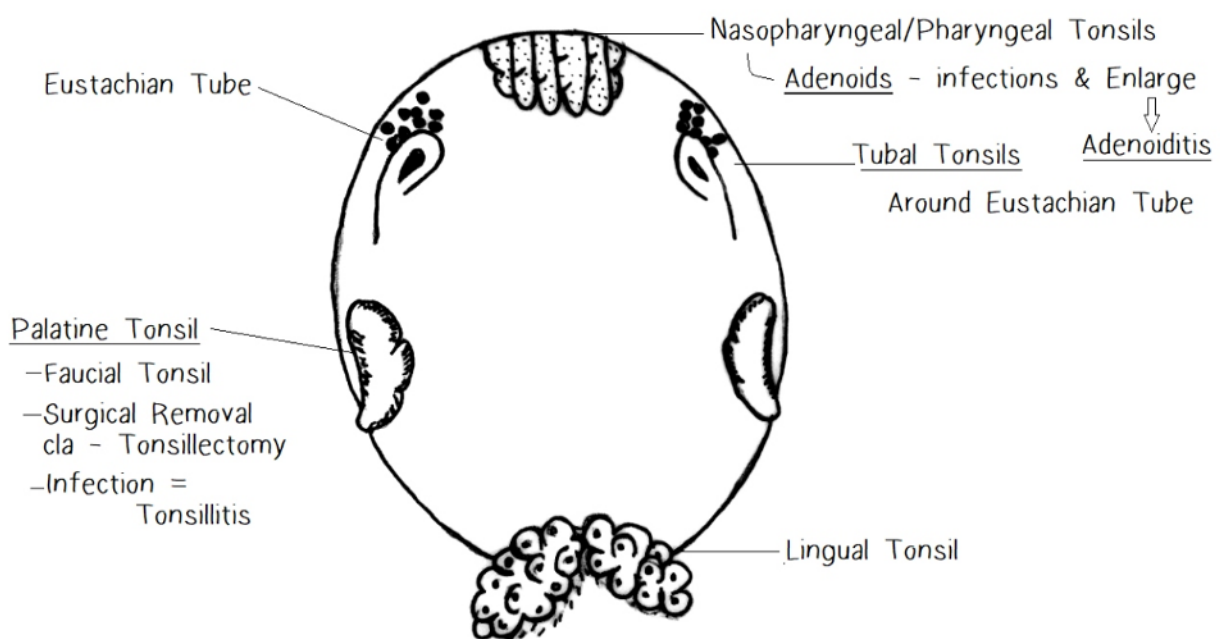
Q. Wisdom tooth is vestigial structure T/F.

Note - Diastema -space between teeth.

Ankyloglossia - **Tongue tie.**

Waldayer's lymphatic ring of tonsils.

(Ring like arrangement of lymphatic tissue of - Pharynx and Oral cavity.

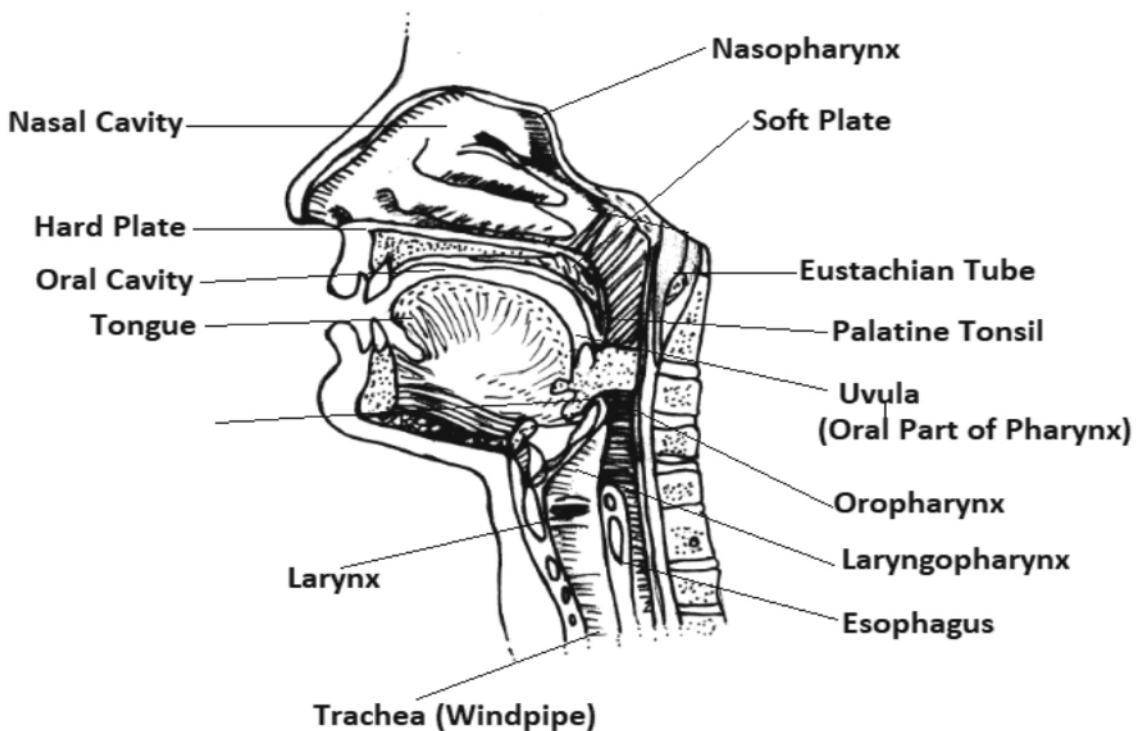


2. Pharynx

* Common passage for food and air (NCERT)

* 3 parts -

- nasopharynx → Upper only air.
- Oropharynx → Food + air
- Laryngopharynx → Food + air



Laryngopharynx (Laryngeal part of pharynx)

- * Most inferior part of pharynx.
- * Lead to open into **two** openings.

Anterior = Glottis	Posterior = Gullet
<ul style="list-style-type: none"> * Open into trachea. * Guarded by epiglottis (elastic cartilage that prevent entry of food into trachea). 	<ul style="list-style-type: none"> * Open into oesophagus.

Note:- Swallowing or deglutition = movement of food from mouth into oesophagus (both voluntary & involuntary.)

3. Oesophagus:-

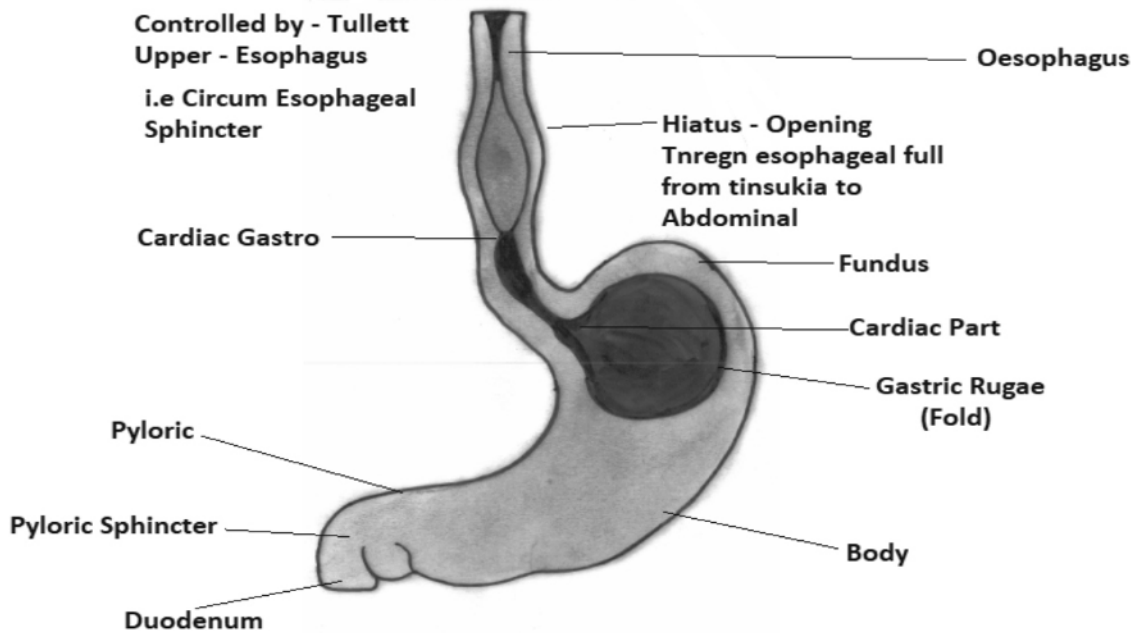
- * Food Pipe - 25cm long.
- * **No** digestive gland.
- * Only mucous gland for lubrication.
- * **Has following muscles.**
 - o **Upper** 1/3rd = only striated.
 - o Middle 1/3rd = Striated + Smooth.
 - o **Lower** 1/3rd = Smooth.

Note:- Aurbachs & meissener plexus absent in upper 1/3 part of oesophagus.

Function:-

- o Transfer food from pharynx to stomach.
- o food move to downward due regular contraction & relaxation called Peristalsis.

Note:- Open into stomach is regulated by M. Sphincter called gastro oesophaycal sphincter.



Q. Upper oesophageal /circumphonyngcal sphincter is skeletal and voluntary T/F.

Q. Cardiac sphincter is situated in cardiac (Heart) . T/F

Note:- Situated between oesophagus and stomach.

Fact:- If cardiac sphincter fails to relaxed fully then achalasia cardia = leading to dilation of lower oesophagus.

Fact:- If cardiac sphincter fails to closed = heart burn or Pyrosis due to entry of acidic chyme in oesophagus.

- * **Gastro oesophageal reflex** = which leads to vomiting.
- * **Emesis** i.e rejection of stomach content through mouth.
- * **Hiatus hernia:-** Part of stomach pushed above diaphragm through hiatus.

4. Stomach

- * Widest part of A. canal.
- * J-shaped.
- * Situated below diaphragm in abdominal cavity.

- * Max. Musculature and max peristalsis.
- * **Gastrostomy**- surgical removal of part of stomach or whole stomach.
- * Indication - Bariatric surgery (Surgery for weight loss).
- * **Gastrectomy may lead to**
 - o **Achlorhydria** - Low or absence of HCl.
 - o **Pernicious anaemia** - Due to the absence or low castle intrinsic factor.
 - o **Iron deficiency anaemia** - Due to non-conversion of Fe^{+3} into Fe^{+2} due to the absence of HCl.
 - o Effect protein digestion.

Stomach

Human (Simple stomach)	Compound (In Ruminant)
<ul style="list-style-type: none"> * 4 parts <ul style="list-style-type: none"> o Cardiac - Oesophagus open o Fundus - Above to cardiac. o Filled with gas (PMT) o Body - Main central region. o Pylorus - Open in duodenum. * 2 - Sphincter <ul style="list-style-type: none"> o Cardiac. o Pyloric. 	<ul style="list-style-type: none"> * 4 parts <ul style="list-style-type: none"> o Rumen - Largest. o Reticulum. o Omanum o Abomasum (True stomach and contain gastric gland). * Rumen and Reticulum has ruminococcus * Bacteria cellulose digestive.

5. Small intestine:- 6.25 meter long.

Note:- Herbivorous has **long intestine to digest cellular** completely.

- * Small intestine receive bile, pancreatic juice and intestinal juice.
- * Main site of digestion and absorption (max. absorption).
- * Diameter small, but length more than large intestine.