

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

Subject: Biology

Year/Level: 11

Week 23

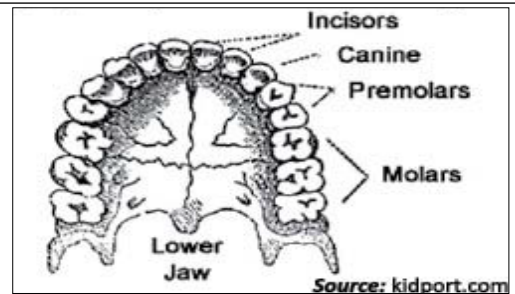
Strand	1 Structure and Life Processes
Sub Strand	1.6 Structure And Functions In Animals
Content Learning Outcome	Discuss the pathway through the gut and explain disorders related to digestive system

Food pathway through the Gut:

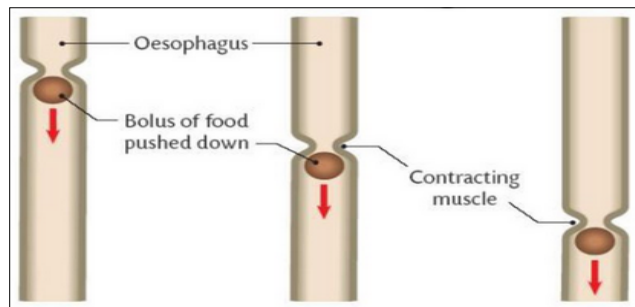
- Ingestion
- Mastication
- Saliva softens the food
- Salivary amylase converts starch → glucose

Types of Teeth and their Functions

Type	Location	Feature/ Function
Incisors	In front of the mouth	for biting and cutting food
Canines	At the side of the mouth	Sharp and pointed For tearing food
Premolars and molars	At the back of the mouth	Broad For crushing & grinding



- The bolus of food moves down the oesophagus into the stomach via peristaltic movement.
- Peristalsis a wave- like motion caused by alternative contraction of circular and longitudinal muscles.



- Sphincters present around the entrance and exit of stomach.
- Mixes and liquefies food into chyme
- Releases gastric juice which contains:
 - i. HCl- provides acidic medium for proper functioning of pepsin and kills bacteria in food.
 - ii. Pepsin- an enzymes that converts protein → peptides
 - iii. Rennin (in young children)- acts on milk protein → casein

Note: stomach adaptation to prevent itself from being digested- it produces thick mucus lining which prevent autolysis.

1. Duodenum (first part of small intestine)	<ul style="list-style-type: none"> - Bile from the bladder is added through bile duct. - Bile contains organic salts which reduce surface tension of salts and emulsifies them. - Pancreatic juice from the pancreas is added, it contains: <ol style="list-style-type: none"> Alkaline juice (sodium bicarbonate)- neutralize acidity of chyme Trypsin- convert protein → peptide and peptide → amino acids Lipase- digests lipids → fatty acid and glycerol Amylase- for further starch digestion
2. Ileum (second part of small intestine)	<ul style="list-style-type: none"> - Digestion continues and is completed here - Absorption of nutrients into bloodstream - Ileum is lined with finger- like projections called villi (increases surface area for absorption of nutrients). - Each villus is cell thick, has a network of blood capillaries and has a single lymph vessel (lacteal) <ol style="list-style-type: none"> Glucose and amino acid absorption pathway: Epithelium → blood capillaries → hepatic portal vein → liver Fatty acids and glycerol absorption pathway: Epithelium → lacteal → lymphatic system → bloodstream <div data-bbox="604 936 1101 1198" data-label="Image"> <p>The diagram illustrates a single villus, a finger-like projection of the intestinal lining. It shows a cross-section with an outer epithelial layer. Inside the villus, there is a central lacteal (labeled 'lacteal') and a network of blood capillaries (labeled 'blood capillary'). The villus is shown with a network of blood vessels and a central lymph vessel, illustrating the absorption pathway for nutrients.</p> </div>
3. Large intestine	<ul style="list-style-type: none"> - Reabsorbs water and some salt from faeces - Faeces: a semi solid waste which contains bacteria, water and undigested food
4. Rectum	<ul style="list-style-type: none"> - Stores faeces - Controls the elimination of faeces
5. Anus	<ul style="list-style-type: none"> - Eliminates faeces

Summary of Digestive Enzymes

Organ/ gland	Enzyme produced	Where the enzyme acts?	What it digests?	Products
Salivary gland	Salivary amylase	Mouth	Starch	Glucose
Stomach (gastric glands)	1. Pepsin	Stomach	Proteins	Peptide
Pancreas	2. Rennin (in young children)	Stomach	Milk protein	
	Trypsin	Duodenum	Peptides	Amino acids
Pancreas	Lipase	Duodenum	Fat/ lipids	

				Fatty acids and glycerol
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Disorders Related to Digestive System

Disease	Description/ Signs & symptoms	Causes	Prevention/ cure/ treatment
1. Constipation	A condition in which bowel movement is not frequent or is difficult to pass	Insufficient water or dietary fibre, ignoring the urge to visit the toilet	Taking regular exercise, having 8 or more glasses of water / day, eating more fibre, prescribed laxatives
2. Vomiting	The stomach contents are forcefully ejected through the mouth	Several reasons- gastritis or poisoning	Eat foods that can be tolerated- avoid oily food.
3. Heartburn	A burning sensation in the chest, just behind the breast bone after a heavy meal	Stomach acids come in contact with the oesophagus walls, eating certain foods, eating too much quickly, smoking	Allow ample time for digestion before bedtime, eating less and eating slowly, reduce smoking
4. Mumps	The salivary glands become swollen and tender	A viral infection. More common in children	Drink a lot of fluid, eat soft food, gargle with warm water
5. Cirrhosis	Chronic liver damage, leading to scarring and liver failure. Symptoms: <ul style="list-style-type: none"> - Pain in the abdomen, bloating - Dark stool/ urine - Vomiting blood, shortness of breath - Weight gain/ loss, muscle weakness - Reduced hormone production - Loss of appetite, nausea or fatigue 	Hepatitis and chronic alcohol abuse Symptoms often do not show up until damage is extensive	<ul style="list-style-type: none"> - Cirrhosis is irreversible - Medications can prevent progression and complications - In advanced stages of cirrhosis, the only option is liver transplant
6. Alcoholic hepatitis	Liver inflammation Symptoms: yellow skin and eyes along with increasing belly size due to fluid accumulation	Drinking too much alcohol	Treatment involves hydration, nutritional care and stopping alcohol use, steroid drugs

7. Hepatitis A	A highly contagious liver infection Symptoms: fatigue, nausea, abdominal pain, loss of appetite and low-grade fever	It is caused by the Hepatitis A virus It spreads from contaminated food or water or contact with someone who is infected	<ul style="list-style-type: none"> - The condition clears up on its own - Rest and adequate hydration can help - Preventable by vaccine
8. Hepatitis B	A serious liver infection Symptoms: yellowing of the eyes, abdominal pain and dark urine	It is caused by the Hepatitis B virus Mainly spread by sexual intercourse	<ul style="list-style-type: none"> - In chronic cases, liver failure and cancer or scarring can occur - Chronic cases need medication and possibly a liver transplant - The condition clears up on its own - Preventable by vaccine
9. Hepatitis C	Liver infection, leading to inflammation Most people do not show any symptoms and learn the disease when liver damage is discovered	Spread by infected blood (poorly sterilized medical equipment's, transfusions, drug use)	<ul style="list-style-type: none"> - Treated with antiviral medications - In some people, newer medicines can eradicate the virus
10. Peptic ulcer disease (PUD)	Open sores develop on the lining of the stomach or first part of the small intestine (gastric ulcers, duodenal ulcers) Symptoms: burning stomach pain, bloating or belching, fatty food intolerance, heartburn, nausea	Bacterial infection and long-term use of pain killers (aspirin, ibuprofen)	<ul style="list-style-type: none"> - Prevention: protect yourself from infections and use pain relievers cautiously - Treatment: prescribed antacid/ medicines
11. Diabetes	A group of metabolic diseases characterized by high blood sugar (glucose) levels that result from defects in insulin secretion, or its action, or both Symptoms: frequent infections, nausea & vomiting, blurred vision, dehydration, weight loss or gain, fatigue, dry mouth, slow-healing cuts/ sores	Causes: insulin resistance, family history & obesity/ physical inactivity Type 1- pancreas is incapable of making insulin due to autoimmune attack by the body itself Type 2 – inadequate insulin production, lack of sensitivity to insulin by body cells, defective insulin	<ul style="list-style-type: none"> - Reduce sugar consumption - Exercise regularly - Prescribed medications

Activity:

1. Why don't people's cells starve from lack of glucose while they are fasting?

2. What organ produces bile? How does bile aid in digestion and absorption of fats?

3. What do sphincters do? What is the importance of the sphincter in the stomach?
