

# WJEC (Wales) Biology A-level

## Topic 2.4 - Adaptations for Nutrition

### Definitions and Concepts

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**Absorption** - The movement of useful substances into the bloodstream.

**Amylase** - An enzyme found in saliva and pancreatic juice that hydrolyses starch to maltose.

**Anus** - The opening at the far end of the gut that controls egestion.

**Assimilation** - The synthesis of biological compounds from absorbed simpler molecules.

**Autotrophic** - Describes an organism that produces its own food. Autotrophs manufacture complex organic compounds from simpler inorganic molecules such as water and carbon dioxide. There are two types of autotrophic organisms: photoautotrophic and chemoautotrophic.

**Bile** - A fluid produced by the liver that is stored in the gall bladder and secreted, via the bile duct, into the duodenum. It consists of bile salts and an alkaline fluid that neutralises stomach acid, providing an ideal pH for lipase.

**Bile salts** - A component of bile that emulsifies lipid globules, increasing the surface area for lipase action.

**Buccal cavity** - The oral cavity through which food enters the body. Mechanical digestion and chemical digestion of starch takes place here.

**Carnassials** - Modified pre-molars and molars, found in carnivores, with sharpened edges for shearing flesh.

**Carnivores** - Animals that prey on and eat other animals. They have many adaptations to a high protein diet including a short gut, powerful jaw muscles and specialised dentition.

**Chemical digestion** - A type of digestion that involves breaking down large, insoluble molecules into smaller, soluble molecules using enzymes.

**Chemoautotrophic** - Describes an organism which obtains its nutrition through inorganic molecules, such as sulfur, in the absence of light.

**Colon** - The long, coiled organ (known as the large intestine) that is the final section of the digestive system. It reabsorbs water and minerals from the waste material.

**Diastema** - A gap between the incisors and premolars in a herbivore that separates fresh grass from the cud and enables the manipulation of food by the tongue.

**Digestion** - The processes by which large, insoluble molecules are broken down into smaller, soluble molecules that can be absorbed across cell membranes.

**Duodenum** - The first section of the small intestine where proteins and lipids are hydrolysed.

**Ectoparasites** - Parasites that live on the host e.g. *Pediculus*.

**Egestion** - The removal of undigested waste material from the body.

**Endoparasites** - Parasites that live in the host e.g. *Taenia*.



**Endopeptidases** - Enzymes found in gastric and pancreatic juices that hydrolyse non-terminal peptide bonds within a protein to form smaller peptides e.g. pepsin, trypsin.

**Enterokinase** - An enzyme secreted by cells of the duodenum that converts inactive trypsinogen into active trypsin.

**Epithelium** - A single layer of cells that line the gut wall.

**Exopeptidases** - Enzymes produced in the pancreas and secreted into the duodenum that hydrolyse the terminal peptide bonds of a protein to form dipeptides and amino acids.

**Gastric glands** - Glands of the stomach that secrete endopeptidases, hydrochloric acid and an alkaline mucus.

**Gut** - A long, hollow, muscular tube where digestion and absorption takes place.

**Herbivores** - Animals that eat plants. They have many adaptations to a high protein diet including a long gut, loose articulation of the lower jaw and specialised dentition for grinding tough plant material.

**Heterotrophic** - Describes an organism that cannot produce its own food. It obtains energy by feeding on organic compounds produced by other organisms.

**Holozoic** - Describes a heterotrophic organism that internally digests food substances. Holozoic nutrition involves ingestion, digestion, absorption, assimilation and egestion.

**Ileum** - The second section of the small intestine that serves as the main site of absorption of the products of digestion.

**Ingestion** - The process by which organisms take food into their bodies.

**Intestinal glands** - Glands in the wall of the duodenum that secrete digestive enzymes and alkaline fluid.

**Intracellular digestion** - A type of digestion that takes place in the cytoplasm of unicellular organisms such as Amoeba.

**Lactase** - An enzyme located on the epithelial cell membranes of the small intestine that hydrolyses lactose to glucose and galactose.

**Lacteals** - Lymphatic vessels that absorb fatty acids and glycerol from the small intestine.

**Lipase** - An enzyme found in pancreatic juice that hydrolyses triglycerides to fatty acids and glycerol.

**Liver** - An organ that secretes bile into the small intestine via the gall bladder and bile duct.

**Maltase** - An enzyme located on the epithelial cell membranes of the small intestine that hydrolyses maltose to  $\alpha$ -glucose.



**Mechanical digestion** - A type of digestion that involves physically breaking down food material into smaller pieces. This increases the total surface area for chemical digestion.

**Microvilli** - Protrusions of the epithelial cell membrane that provide a large surface area for absorption in the ileum.

**Mucosa** - The mucous membrane lining the gut wall. It contains glands that secrete digestive enzymes, mucus, and an acid or alkaline liquid that provides an optimum pH.

**Muscle layer (human gut)** - A layer of circular and longitudinal muscles beneath the submucosa. Contraction of the circular muscle is responsible for peristalsis.

**Oesophagus** - A muscular tube that carries food from the buccal cavity to the stomach by peristalsis.

**Pancreas** - A gland situated behind the stomach that, via the pancreatic duct, secretes enzymes and alkaline fluid into the duodenum.

**Parasite** - An organism that lives on or in a host and takes nourishment at the expense of the other organism e.g. *Taenia* and *Pediculus*.

**Pediculus** - An ectoparasite, commonly known as the head louse, that feeds by sucking blood from the host's scalp. It can transfer from host to host by direct contact.

**Pepsin** - An endopeptidase secreted by gastric glands into the stomach as pepsinogen. Hydrochloric acid converts inactive pepsinogen into active pepsin.

**Peristalsis** - The contraction of the circular muscle behind the bolus of food and the relaxation of the longitudinal muscle in front, forcing food down the gut.

**Photoautotrophic** - Describes an organism which obtains its nutrition through photosynthesis.

**Rectum** - The segment of the large intestine that stores faeces prior to egestion.

**Rumen** - The first stomach of a ruminant. It contains mutualistic bacteria that are able to hydrolyse cellulose into glucose.

**Ruminants** - Mammals that digest plant material slowly in a specialised four-chambered stomach and regurgitate it to chew it again, enabling the efficient breakdown of fibre.

**Sac-like gut** - A simple, undifferentiated gut found in Hydra. It has a single opening.

**Salivary glands** - Glands in the buccal cavity that secrete amylase, mineral ions and mucus.

**Saprotrophic** - Describes an organism that feeds by extracellular digestion, e.g. fungi. Saprotrophs release enzymes which catalyse the breakdown of dead plant and animal material into simpler organic matter.

**Serosa** - The tough, protective layer that surrounds the gut.



**Stomach** - A muscular organ that receives food from the oesophagus. Mechanical digestion (mixing and grinding) and chemical digestion of protein occur here.

**Submucosa** - The layer of connective tissue below the mucous membrane that contains blood vessels and lymph for the transport of digestion products. It also contains glands that secrete an alkaline fluid.

**Sucrase** - An enzyme located on the epithelial cell membranes of the small intestine that hydrolyses sucrose to glucose and fructose.

**Taenia** - An endoparasite, commonly known as the pork tapeworm, that is adapted to live in the human gut, absorbing pre-digested nutrients through its cuticle. Pigs may become infected by ingesting contaminated faeces.

**Teeth** - Structures located in the buccal cavity that crush and grind food into smaller pieces, increasing its surface area (mechanical digestion).

**Tongue** - A muscular organ in the buccal cavity that is vital in the chewing and swallowing of food.

**Trypsin** - An endopeptidase secreted by the pancreas as trypsinogen. Enterokinase converts inactive trypsinogen into active trypsin in the duodenum.

**Tube-like gut** - A gut with two openings, a mouth for ingestion and anus for egestion. It is found in more advanced organisms and is divided into different specialised regions.

