ZIAUDDIN UNIVERSITY
EXAMINATION BOARD

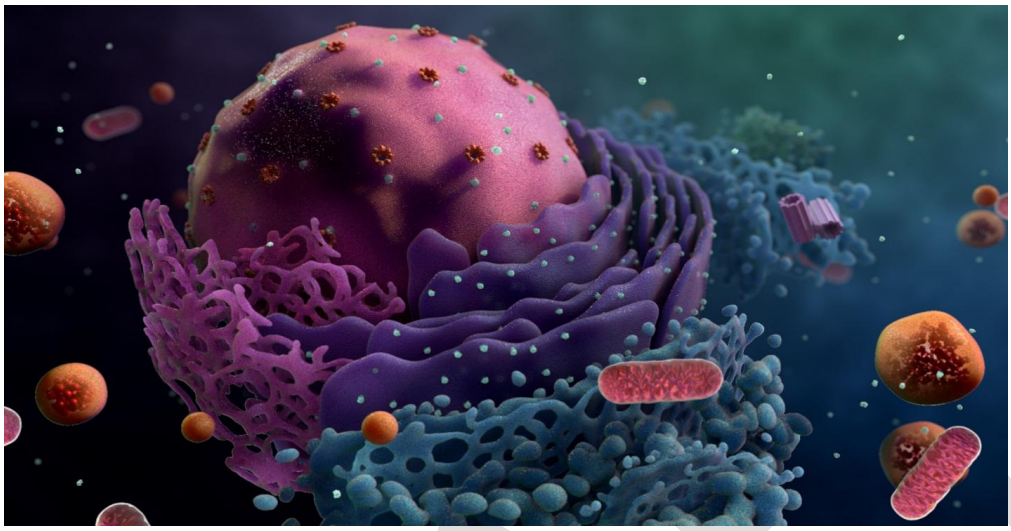
Biology
XI
Teacher Resource

BIOLOGY XI

EXAMINATION SYLLABUS

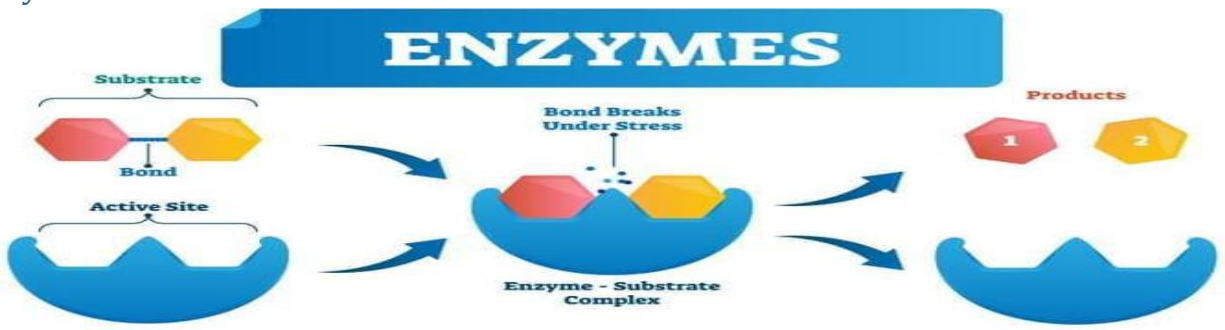
SECTIONS	CHAPTERS	WEIGHTAGE In EVALUATION
Section 1 : Cell Biology	1. Cell structure and function 2. Biological Molecules 3. Enzymes 4. Bioenergetics	15%
Section 2 : Biodiversity	5. A cellular life 6. Prokaryotes 7. Diversity among Animals	15%
Section 3 : Life Processes	8. Digestion 9. Circulation 10. Immunity	20%

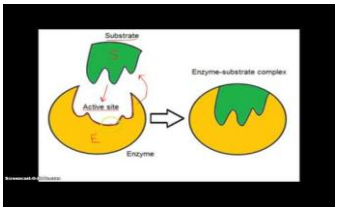
Cell Biology



It Includes

Enzymes



Chapter	Skills	Understanding	Reference web material
Enzymes	Student will Identify the competitive and noncompetitive inhibitors from the given list of chemicals. List the diagnostic uses of enzymes.	Describe the structure of enzyme Explain the role and component parts of the active site of enzyme Explain the mechanism of enzyme action through induced fit model, comparing with lock and key model. Classify enzymes on the basis of the reaction catalyzed.	 What are enzymes?  Structure of an enzyme..  Lock and key theory https://www.slideshare.net/fatimasaleh94214/enzymes-2-30256325 Enzymes terminologies Slide share.

Chapter Overview

Characteristics Of Enzymes

Protein in nature and are formed by living cells.

May be intracellular or extra cellular.

Remains unchanged during and after the reaction.

Speed up the rate of reaction by decreasing energy of action.

Action can be alter by activators and inhibitors.

Classification Of Enzyme (On The Basis Of Structure)

Pure or Simple Enzyme consist of only protein (e.g.Amylase and Pepsin)

Apoenzyme: it's a protein part of enzyme

Conjugated or Holoenzymes: May contain a non-protein part "Prosthetic group" as well (e.g. Phosphatase and Peptidase)
Holoenzyme = Apoenzyme + Prosthetic group

Mode Of Action Of Enzymes

1- The action of enzyme depends on its chemical structure. A typical enzyme molecule, has "3D" structure.
2- Has depression or pit for substrate (to fit in) known as "Active site".
3- Any other site other than active site is called "Allosteric site"
There are two theories in respect of enzyme action, which are as follows.

Lock And Key Model

Proposed by Fischer (1898) and modified by Paul Filder and D.D Woods according to this model,

The active site of enzyme has distinct shape.

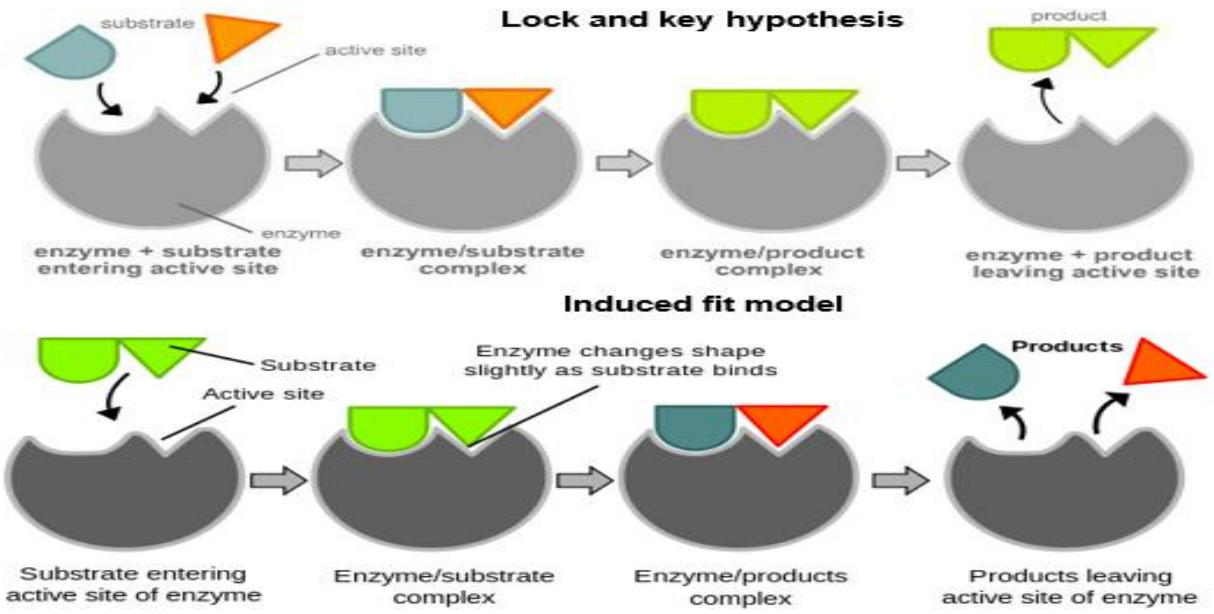
It allows few substrate to fit in (like a particular lock allows particular key to fit in)

Induce Fit Model

Proposed by koshland (1959), it states that

Enzyme binds with a substrate

This binding induce changes in enzyme structure



Factors Affecting Enzyme Activity

The activity of enzymes depend on following factors,

1. Substrate Concentration

Increases with increase in substrate concentration (up to a limit)

2. Temperature

Increases with in temperature(up to limits)

Highly active at 37˚C and destroyed at 100˚C

At 0˚C minimum activity.

3. PH

Enzymes are pH specific

4. Water

Enzyme activity is usually maximum (up to limits) but decrease after limits (dilution of enzyme)

5. Radiations

Enzymes become inactive due to radiations (including Alpha, Beta, Gamma rays).

6. Co-Enzyme And Activators

Induce the enzyme activity.

Things To Be Remember

Inhibitors : Substances which decreases the activity of enzymes.

Competitive Inhibitors

Inhibitor molecules which resemble the normal substrate molecule and compete for admission into the active site. They block the substrate from entering active site.

Non-Competitive Inhibitors

Inhibitors bind to a part of the enzymes away from the active site (Allosteric site). This binding cause change in the enzyme molecule shape and decrease in enzyme activity.

Feed Back Inhibition

Common biological control mechanism of brain in order to regulate enzyme activity.

Prosthetic Group

Non-protein part of enzyme (Co-enzyme or Co-factor)

Co-Enzyme

When prosthetic group consist of organic molecules (like FAD/NAD)

Co-Factors/Activators

When prosthetic group consist of inorganic molecules (like Ca++, Na+ etc).

Apoenzyme

Protein part of enzyme

Reference pages

https://www.britannica.com/science/enzyme/Factors-affecting-enzyme-activity

http://all-notes.blogspot.com/2012/06/class-xi-biology-enzymes.html

https://byjus.com/biology/enzymes/

https://en.wikibooks.org/wiki/Structural_Biochemistry/Enzyme/Apoenzyme_and_Holoenzyme

http://toppr.com/guides/biology/biomolecules/enzymes/

https://www.medicalnewstoday.com/articles/319704.php#how-enzymes-work

Student Assessment

1. A _____is a biocatalyst that increases the rate of the reaction without being changed.
a) Aluminum oxide
b) Silicon dioxide
c) Enzyme
d) Hydrogen peroxide

2. Enzyme increases the rate of reaction by lowering the activation energy.
a) True
b) False

3. What is the nature of an enzyme?
a) Vitamin
b) Lipid
c) Carbohydrate
d) Protein

4. What is an apoenzyme?
a) It is a protein portion of an enzyme
b) It is a non-protein group
c) It is a complete, biologically active conjugated enzyme
d) It is a prosthetic group

5. Name the coenzyme of riboflavin (B2)?
a) NAD or NADP
b) FAD and FMN
c) Coenzyme A
d) Thiamine pyrophosphate

6. Name the enzyme secreted by pancreas?
a) Pepsin
b) Chymotrypsin
c) Trypsin
d) Alcohol dehydrogenase

Lesson Plan

Lesson Plan Template:

General Lesson Plan

Learning Objectives: What should students know and be able to do as a result of this lesson

Students will be able to describe what an enzyme does in terms of a biological process.

Students will be able to relate a catalyst to an enzyme.

Students will be able to explain how activation energy operates when it comes to analyzing the rate of a biochemical reaction.

Students will be able to identify the role of enzymes as it acts as a catalyst in lowering the activation energy of a biochemical reaction.

Students will be able to explain how factors such as pH and temperature affect enzyme activity.

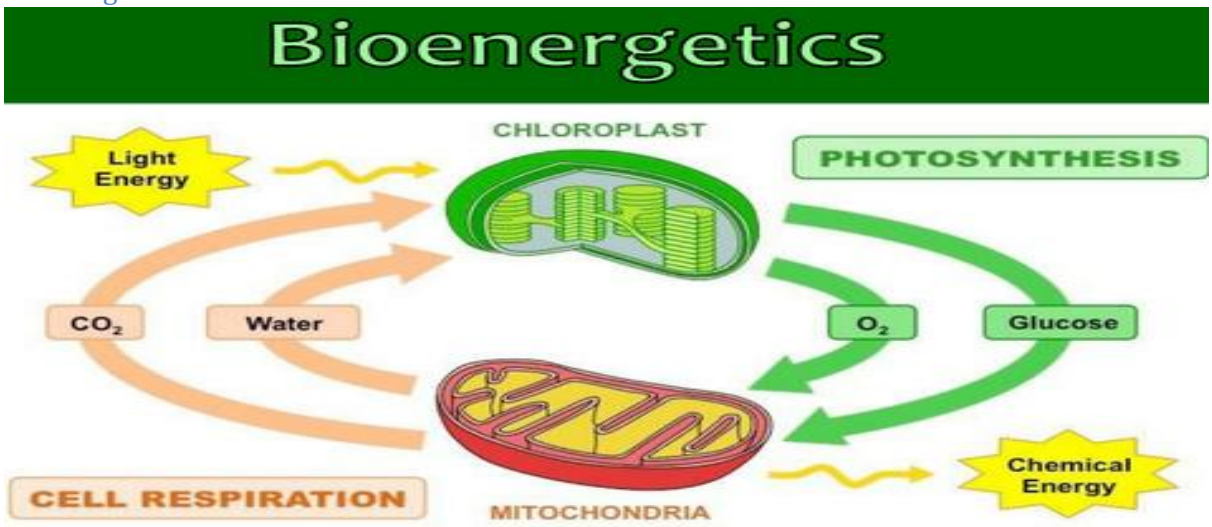
Prior Knowledge: What prior knowledge should students have for this lesson?

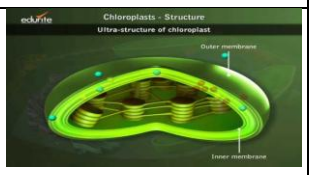
Students should be able to identify what an acid or a base is on a pH scale.

Students should be able to have knowledge about the structure and function of a protein so that they can relate this to how an enzyme operates.

Students should be familiar with factors such as temperature and pH that can affect biological systems, specifically, how they affect protein.

Bioenergetics



Chapter	Skills	Understanding	Reference web material
Bioenergetics	Student will Draw the molecular structure of chlorophyll Draw the Z-Scheme for explaining the events of light-dependent reaction Develop a flow chart of explaining the events of light-independent reaction. Draw the flow chart showing the events of glycolysis and Krebs cycle.	Student will Explain the role of light in photosynthesis Identify two general kinds of photosynthetic pigments. Describe the arrangement of photosynthetic pigments in the form of photosystem I and II. Explain the calvin cycle. Describe the events of non-cyclic and cyclic photophosphorylation	 Chloroplast  Photosynthesis with its cycles  Cellular Respiration 

			C3, C4 and CAM plants

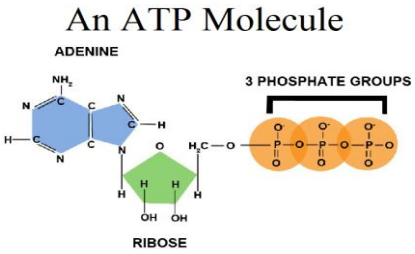
Photosynthesis

Photosynthesis is the process by which plants, some bacteria and some Protista's use the energy from sunlight to produce glucose and oxygen from carbon dioxide and water.

This glucose can be converted into pyruvate which releases adenosine triphosphate (ATP) by cellular respiration.

carbon dioxide + water $\xrightarrow[\text{chlorophyll}]{\text{sunlight}}$ glucose + oxygen

The conversion of usable sunlight energy into chemical energy is associated with the action of the green pigment chlorophyll.

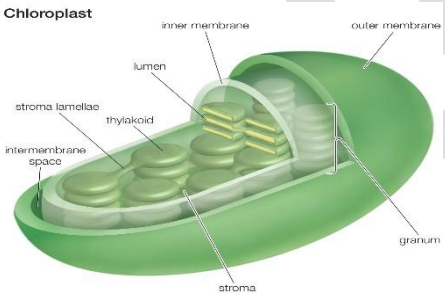


ATP (Adenosine tri phosphate)

Adenosine triphosphate, or ATP, is the principal molecule for storing and transferring energy in cells. It is often referred to as the energy currency of the cell and can be compared to storing money in a bank

Molecular Structure

Adenosine triphosphate (ATP) is comprised of the molecule adenosine bound to three phosphate groups. Adenosine is a nucleoside consisting of the nitrogenous base adenine and the five-carbon sugar ribose



What is Chlorophyll?

The role of chlorophyll in photosynthesis is vital.

Chlorophyll, which resides in the chloroplasts of plants, is the green pigment that is necessary in order for plants to convert carbon dioxide and water, using sunlight, into oxygen and glucose. During photosynthesis, chlorophyll captures the sun's rays and creates sugary carbohydrates or energy, which allows the plant to grow.

Role of light in Photosynthesis

During photosynthesis, plants trap light energy with their leaves. Plants use the energy of the sun to change water and carbon dioxide into a sugar called glucose.

Role of Water in Photosynthesis

At a fundamental level, water provides electrons to replace those removed from chlorophyll in photosystem II.

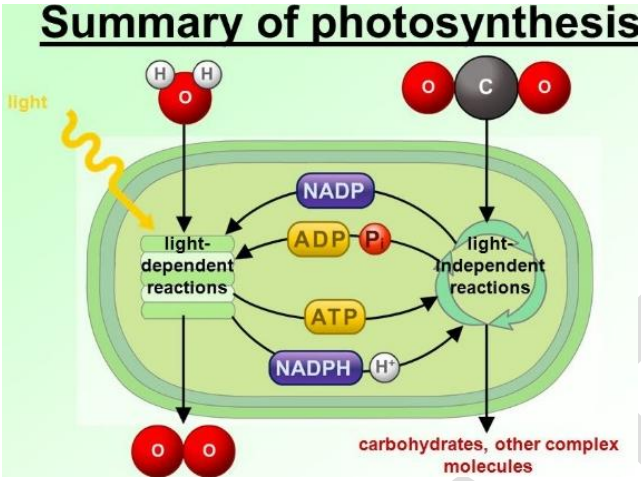
Also, water produces oxygen as well as reduces NADP to NADPH (required in the Calvin cycle) by liberating H+ ions.

Role of Carbon dioxidein Photosynthesis

Carbon dioxide, in its ionic form bicarbonate, has a regulating function in the splitting of water in photosynthesis.

The photosynthetic process

The reactions of plant photosynthesis are divided into those that require the presence of sunlight and those that do not.



Both types of reactions take place in chloroplasts:

light-dependent reactions in the thylakoid

Light-independent reactions in the stroma.

Light-dependent reactions (also called light reactions): When a photon of light hits the reaction center, a pigment molecule such as chlorophyll releases an electron.

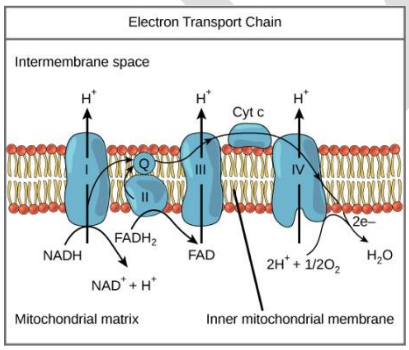
The released electron manages to escape by traveling through an electron transport chain, which generates the energy needed to produce ATP (adenosine triphosphate, a source of chemical energy for cells) and NADPH. The "electron hole" in the original chlorophyll pigment is filled by taking an electron from water. As a result, oxygen is released into the atmosphere.

Light-independent reactions (also called dark reactions and known as the Calvin cycle): Light reactions produce ATP and NADPH, which are the rich energy sources that drive dark reactions. Three chemical reaction steps make up the Calvin cycle:

Carbon fixation, reduction and regeneration.

These reactions use water and catalysts..

Electron Transport Chain



The electron transport chain is a series of electron transporters embedded in the inner mitochondrial membrane that shuttles electrons from NADH and $FADH_2$ to molecular oxygen. In the process, protons are pumped from the mitochondrial matrix to the inter

Membrane space, and oxygen is reduced to form water.

The common feature of all electron transport chains is the presence of a proton pump to create a proton gradient across a membrane.

Cellular Respiration

Cellular respiration is a metabolic pathway that breaks down glucose and produces ATP. The

stages of cellular respiration include glycolysis, pyruvate oxidation, the citric acid or Krebs cycle, and oxidative phosphorylation.

Aerobic respiration

Aerobic respiration requires oxygen (O_2) in order to create ATP, it is the preferred method of pyruvate breakdown in glycolysis and requires that pyruvate enter the mitochondria in order to be fully oxidized by the Krebs cycle. The products of this process are carbon dioxide and water.

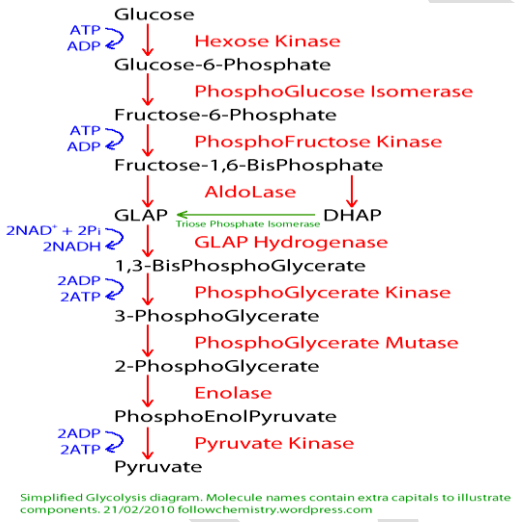
Anaerobic respiration

Its used by some microorganisms in which neither oxygen (aerobic respiration) nor pyruvate derivatives (fermentation) is the final electron acceptor.

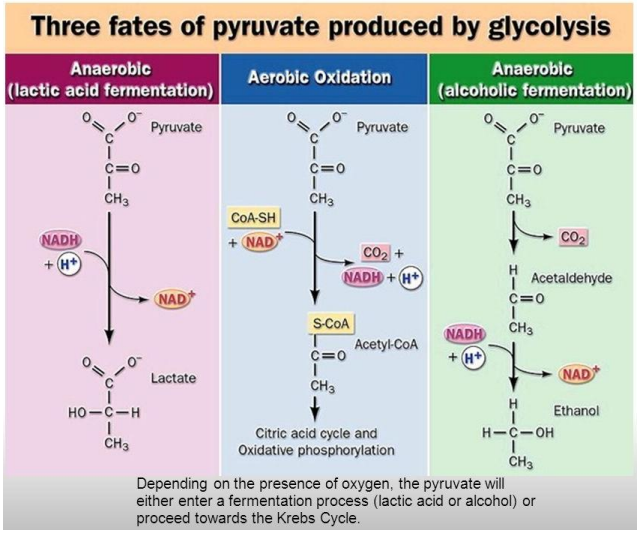
Steps of cellular respiration

To see how a glucose molecule is converted into carbon dioxide and how its energy is harvested as ATP and NADH /FADH2 in one of your body's cells, let's walk step by step through the four stages of cellular respiration.

Glycolysis. In glycolysis, glucose—a six-carbon sugar—undergoes a series of chemical transformations. In the end, it gets converted into two molecules of pyruvate, a three-carbon organic molecule. In these reactions, ATP is made, and NAD+ is converted to NADH.



Simplified Glycolysis diagram. Molecule names contain extra capitals to illustrate components. 21/02/2010 followchemistry.wordpress.com



Pyruvate oxidation. Each pyruvate from glycolysis goes into the mitochondrial matrix—the innermost compartment of mitochondria. There, it's converted into a two-carbon molecule bound to Coenzyme A, known as acetyl CoA.

Citric acid cycle.

The acetyl CoA made in the last step combines with a four-carbon molecule and goes through a cycle of reactions, ultimately regenerating the four-carbon starting molecule..

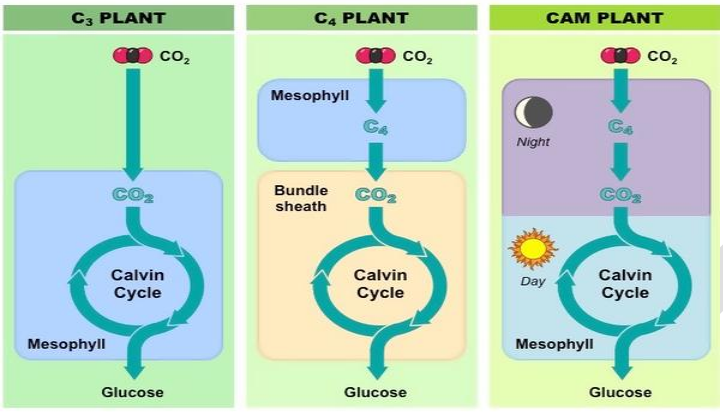
Oxidative phosphorylation. As electrons move down the chain, energy is released and used to pump protons out of the matrix, forming a gradient. Protons flow back into the matrix through an enzyme called ATP synthase, making ATP.

Glycolysis can take place without oxygen in a process called fermentation.

Photorespiration.

PhotorespirationRespiration refers to the metabolism of oxygen and the release of carbon dioxide.

Photorespiration is a wasteful pathway that occurs when the Calvin cycle enzyme rubisco acts on oxygen rather than carbon dioxide.



The majority of plants are C3 plants, which have no special features to combat photorespiration.

C4plants minimize photorespiration by separating initial CO2 fixation and the Calvin cycle in space, performing these steps in different cell types.

Crassulacean acid metabolism (CAM) plants minimize photorespiration and save water by separating these steps in time, between night and day.

Reference pages

https://www.khanacademy.org/science/biology/cellular-respiration-and-fermentation/overview-of-cellular-respiration-steps/a/steps-of-cellular-respiration

https://www.britannica.com/science/photosynthesis/Energy-efficiency-of-photosynthesis

https://www.nature.com/scitable/definition/atp-318/

https://courses.lumenlearning.com/boundless-biology/chapter/atp-adenosine-triphosphate/

https://www.rsc.org/Education/Teachers/Resources/cfb/Photosynthesis.htm

https://www.office.com.pk/ch11-bioenergetics-11th-class-premedical-notes-biology-new-course-fbise-2016-17/

https://www.sciencedirect.com/topics/earth-and-planetary-sciences/bioenergetics

https://www.khanacademy.org/science/biology/cellular-respiration-and-fermentation/overview-of-cellular-respiration-steps/a/steps-of-cellular-respiration

LESSON CONTENT

Lesson Plan Template:

General Lesson Plan

Learning Objectives: What should students know and be able to do as a result of this lesson?

Students will relate the role of ATP to energy transfer within the cell.

Students will explain the importance of ATP as an energy carrying molecule.

Prior Knowledge: What prior knowledge should students have for this lesson?

A basic understanding of a eukaryotic cell and its organelles is ideal but not required.

Students should have a basic understanding of energy.

Guiding Questions: What are the guiding questions for this lesson?

What is energy and what are the different types of energy?

How is energy transformed within a cell?

Teaching Phase: How will the teacher present the concept or skill to students?

The teacher will introduce the ATP/ADP cycle by using the Prezi "The Body's Energy Currency" by Tim Hartwich. Students should take notes during the presentation and will need to refer to them during the activities that follow.

Students will then be placed into groups of 2 or 3 using any technique that the teacher prefers.

In continuing with the theme that ATP is like currency, the students will make a paper wallet using directions from Instructables. The wallet will represent ADP. Each student will make their own Enhance your instruction on photosynthesis with a Study.com lesson. You will find directions for an experiment that will give your students hands-on experience observing, documenting and discussing the process of photosynthesis.

Lesson plan

Learning Objectives

After this lesson, students will be able to:

Explain the process of photosynthesis

List the three components necessary for photosynthesis to take place

List the products of photosynthesis

Compare the leaves of a plant that has all the components needed for photosynthesis to one that has a component missing

Length

The first part of this lesson will take 45 minutes to one hour.

The second part of this lesson will take 30-45 minutes after the 5-day experiment has concluded.

Curriculum Standards

Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.

Lesson Plan

https://study.com/academy/popular/photosynthesis-lesson-plan.html

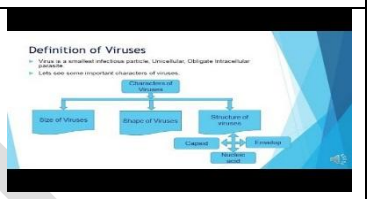
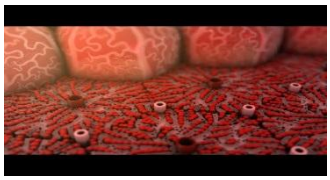
https://www.mcgill.ca/sciedchantier7/resources/sample-lesson-plans/photosynthesis

Section 2: BIODIVERSITY

It Includes

5. A cellular life
6. Prokaryotes
7. Diversity among Animals

Acellular Life

Chapter	Student learning outcomes	Understanding	Reference web material
The variety of life	Student will be able to differentiate between five kingdom of classification. Be able to describe lytic and lysogenic cycle of bacteriophage virus Know about cause and control of diseases caused by virus .	Describe taxonomy, homology, cytology and genetics. Explain the five kingdom classification of Whittaker & Margolis & Schwartz Describe characteristics, structure, classification and life cycle of virus. Explain cause, symptoms and control of diseases caused by viruses.	 Structure and classification of virus  The lytic and lysogenic cycle  Hepatitis

Chapter Review

Whittaker proposed that organisms should be broadly divided into kingdoms, based on certain characters like the structure of the cell, mode of nutrition and reproduction. According to this system, there are five main kingdoms. They are:

Kingdom MoneraKingdom ProtistaKingdom Fungi

Kingdom AnimaliaKingdom Plantae

Margulis and Schwartz modified the Whittaker classification. According to this system, there are five main kingdoms. They are:

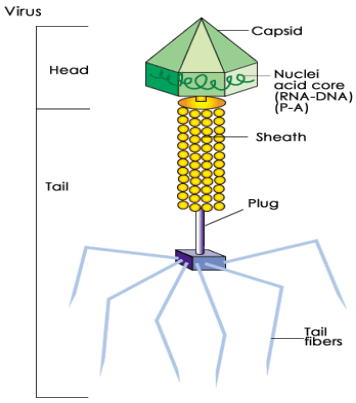
Kingdom Prokaryotae(Monera) Kingdom Protoctista (Protista)

Kingdom FungiKingdom AnimaliaKingdom Plantae

Kingdoms are divided into subgroups at various levels.

Kingdom → Phylum → Class → Order → Family → Genus → Species

Viruses



Viruses are infectious agents with both living and nonliving characteristics. They can infect animals, plants, and even other microorganisms. Viruses that infect only bacteria are called bacteriophages and those that infect only fungi are termed mycophages. There are even some viruses called virophagesthat infect other viruses.

Charecteristics of virus

1. Viruses are ultra-microscopic, non-cellular living particles,

2. They are ultra-microscopic and can only be visualized under electron microscope.

3. They do not increase in size.

4. They can pass through filters, through which bacteria cannot pass.

Bacteriophage virus

Bacteriophage viruses areany of a group of viruses that infect bacteria.

Life Cycles Of Bacteriophages

During infection a phage attaches to a bacterium and inserts its genetic material into the cell. After that a phage usually follows one of two life cycles, lytic (virulent) or lysogenic (temperate).

Transmission of virus

A virus exists only to reproduce. They can spread through:

touch

exchanges of saliva, coughing, or sneezing

sexual contact

contaminated food or water

insects that carry them from one person to another

Viral diseases

Viruses cause many human diseases.

These include:

Smallpox

The common cold and different types of flu

Measles, mumps, rubella, chicken pox.

Hepatitis

Polio

Rabies

HIV, the virus that causes AIDS

Dengue fever

The immune system produces special antibodies that can bind to viruses, making them non-infectious. The body sends T cells to destroy the virus.

Most viral infections trigger a protective response from the immune system, but viruses such as HIV and neurotropic viruses have ways of evading the immune system's defenses.

Treatment and drugs

Bacterial infections can be treated with antibiotics, but viral infections require either vaccinations to prevent them in the first place or antiviral drugs to treat them.

Sometimes, the only possible treatment is to provide symptom relief.

Antiviral drugs have been developed largely in response to the AIDS pandemic.

These drugs do not destroy the pathogen, but they inhibit their development and slow down the progress of the disease.

Reference Pages

https://alevelbiology.co.uk/notes/the-five-kingdoms-classification-system/

https://www.livescience.com/53272-what-is-a-virus.html

https://www.britannica.com/science/virus

https://www.sparknotes.com/biology/microorganisms/viruses/section1/

http://www.yourarticlelibrary.com/micro-biology/viruses-definition-characteristics-and-other-details-with-figure-micro-biology/26672

Lesson plan

Objectives

Students will be able to:

- Describe the structure and shape of viruses.
- Distinguish the differences between lytic and lysogenic cycles.
- Explain the mechanism of transduction.
- Identify and describe several viral diseases and ways to defend against them.

2. Performance standard

The students are expected to follow attentively to the lecture and video presentation and take down informative notes throughout the lesson. They should be able to fulfill all of the objectives at the end of the lesson and answer at least 70% of the questions correctly on the virus quiz.

Resources, materials and supplies needed for video presentation

Supplementary materials,

handouts

Virus notes (will turn in later)

Virus quiz

Teacher Does	Probing Questions	Student Does
3. Anticipatory Set Learning Experience(s) Begin by asking how many of the students have gotten sick this pass year and what kind of diseases they had. Then ask how many were prescribed medication to treat their illnesses. After asking the last question, introduce today's topic as "Intro to Viruses".	How many of you have gotten sick this past year? And how many have taken medicine/antibiotics to get better/treat your illnesses? Can you think of reasons how you got sick and what caused your illnesses?	Most everyone will raise their hands. Most everyone will raise their hands. Various responses: (I got sick from others; it was really cold outside; from viruses; from bacteria; etc.)

Virus Quiz

1. Viruses reproduce by

A. Attacking a host cell and then waiting for the cell to die.

B. Splitting in half once they enter a host cell and later growing.

C. Using the process of meiosis. D. Using the host cell's DNA to create new viruses.

2. A virus is unique in that it

A. Contains DNA. B. Contains RNA.

C. Reproduces in a short time.D. Cannot reproduce outside a living cell.

3. The protein coat that envelopes the viral genetic material is known as a:

A. VironB. HeadC. CapsidD. Case

4. A virus that attacks a bacterial cell is called a:

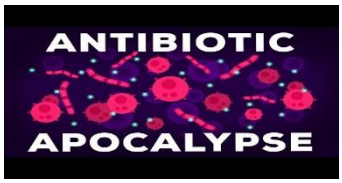
A. Provirus. B. Bacteriophage.C. Bacillus.D. Spirillum.

5. Which type of viral infection literally takes over and quickly destroys the host cell?

A. Lytic cycle. B. Lysogenic cycle.

C. Antibiotic cycle.D. Conjugation cycle.

Chapter:06

Chapter	Student learning outcomes	Understanding	Reference web material
Kingdom Prokaryotae (Monera)	Student will be able to Describe structure and shape of bacteria Draw diagram of bacteria. Define cyanobacteria Summarize nutrition in bacteria Learn about immunization and vaccination.	Describe characteristics of kingdom prokaryotae Explain structure , types and reproduction in bacteria Define conjugation, transduction and transformation in bacteria Describe cyanobacteria and Nostoc.	 Bacteria  Growth and reproduction in bacteria  What are antibiotics?

Chapter Review

Characteristics Of Kingdom Prokaryotae

Prokaryotes lack an organized nucleus and other membrane-bound organelles.

Prokaryotic DNA is found in a central part of the cell called the nucleoid.

The cell wall of a prokaryote acts as an extra layer of protection, helps maintain cell shape, and prevents dehydration.

Examples are bacteria and cyanobacteria

Bacteria

Bacteria vary from species to species, thus assigning many common traits to bacteria is difficult.

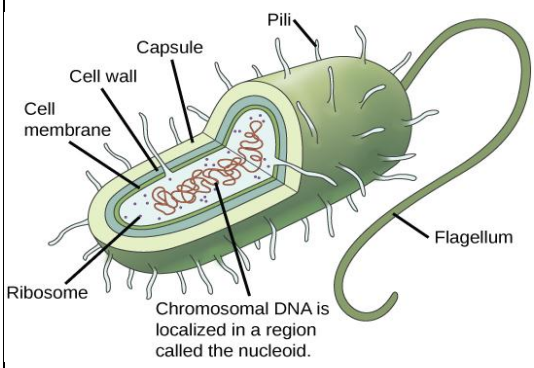
Bacterial species are typified by their diversity.

1) lack of membrane-bound organelles

2) unicellular

3) small (usually microscopic) size.

Not all prokaryotes are bacteria, some are archaea, which although they share common physicals features to bacteria, are ancestrally different from bacteria.



Structure of Bacteria

Capsule: A layer found on the outside of the cell .

Cell wall: The cell wall gives the bacteria its shape.

Plasma membrane: Found within the cell wall.

Cytoplasm: A gelatinous substance inside the plasma membrane

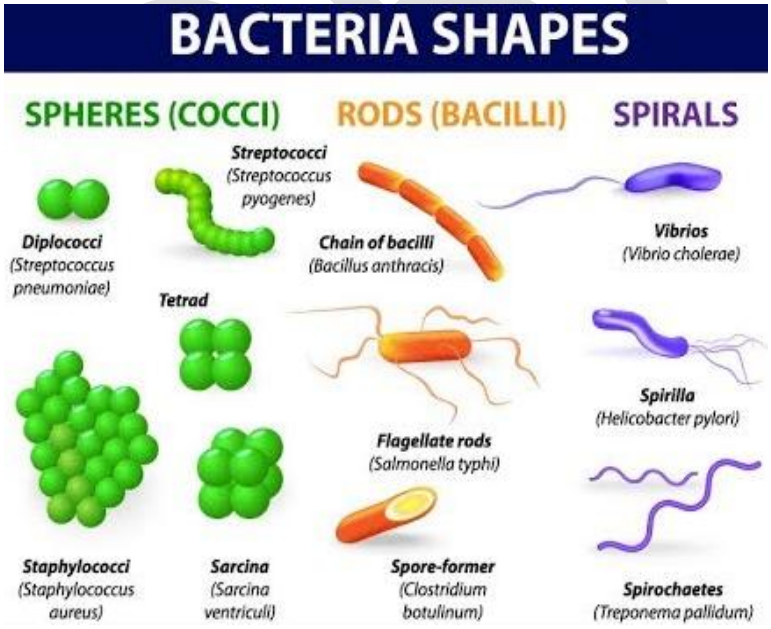
DNA: This contains all the genetic instructions used in the development and function of the bacterium

Ribosomes: This is where proteins are made, or synthesized. Ribosomes are complex particles made up of RNA-rich granules.

Flagellum: This is used for movement, to propel some types of bacteria.

Pili: These hair-like appendages on the outside of the cell allow it to stick to surfaces and transfer genetic material to other cells.

Shape of Bacterial Cell



Bacterial Recombination

Recombination involves the transfer of genes between cells. Bacterial recombination is accomplished through conjugation, transformation, or transduction.

Growth in Bacteria

There are four distinct phases of the growth curve:

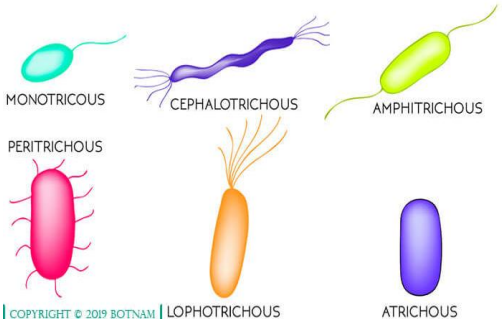
The initial phase is the lag phase where bacteria are metabolically active but not dividing.

The exponential or log phase is a time of exponential growth.

In the stationary phase, growth reaches a plateau as the number of dying cells equals the number of dividing cells.

The death phase is characterized by an exponential decrease in the number of living cells.

Types Of Bacteria According to Flagella



Monotrichous. – Single polar flagellum.

Amphitrichous. – Single flagellum on both sides.

Lophotrichous. – Tufts of flagella at one or both sides.

Peritrichous. – Numerous falgella all over the bacterial body.

Reproduction in Bacteria

Bactria lacks traditional sexual reproduction and mitosis.

However it undergo genetic recombination by bacterial recombination.

Generally bacteria reproduced by binary fission and endospore formation.

Antibiotics, also known as antibacterial, are medications that destroy or slow down the growth of bacteria. They include a range of powerful drugs and are used to treat diseases caused by bacteria.

Cyanobacteria: Nostoc

Nostoc is a genus of cyanobacteria found in various environments that forms colonies composed of filaments of moniliform cells in a gelatinous sheath

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Lesson Plan 1

Lesson Objective

SWBAT identify 3 traits that are unique about Kingdom Protista (and Monera. SWBAT identify living organisms in Kingdom Protista (and Monera) and rationalize their classification.

Lesson Plan

1. DN - Classification Hierarchy

2. Kingdoms Protista/Monera Notes

What are the 3 characteristics of Protista?

Examples of Protista

Diversity within Protista (all the way down to species level)

What are the 3 characteristics of Monera?

Examples of Monera

Diversity within Monera (all the way down to species level)

3. Activity - Reading on Protista and Monera
4. HW- QA

Lesson Plan 2

CURRICULAR STATEMENT

To develop different dimensions of knowledge of5 kingdom classification through practical, group discussion, lecturing, etc and evaluate by questioning observation of practical work, participation in group discussion, reporting, presentation, etc

LEARNING OUTCOMES

To enable the pupil to

recall the term unicellular and multicelluar organism for developing the factual knowledge

classify the living world in to 5 kingdom for developing the conceptual knowledge

demonstrate the organisms which have the power of locomotion and which do not have the power of locomotion for developing the procedural knowledge

prepare a model based on 5 kingdom classification

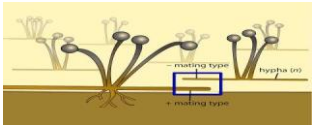
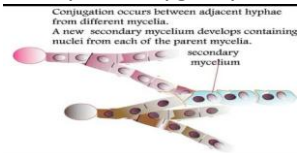
write a note on various aspects of importance and classification of organism

Process skills:1) Observing the chart showing 5 kingdom classification

2)Classify the organism based on their characteristics

3)Communicating about Robert Whittaker and his classification

Chapter:07

Chapter	Student learning outcomes	Understanding	Reference web material
The kingdom Protista And Kingdom Fungi	Student will be able to Define characteristics of fungi Know about classification of Protista Student will be able to define general characteristics of kingdom fungi Know about importance of fungi	Describe general characteristics of kingdom Protista and its classification Define fungi with its characteristic and classification Explain life cycles of zygomycota, Deutromycota, Basidiomycota , Ascomycota. Explain importance of fungi.	 Protista and Fungi  Kingdom fungi  Life cycle of slime mouls  Life cycle of zygomycota  life cycle of Basidiomycota

Chapter Review

Characteristics of Kingdom Protista

The primary feature of all kingdoms Protista (Protoctista) is that they are eukaryotic organisms. This

means that they have a membrane-enclosed nucleus.

These are usually aquatic, present in the soil or in areas with moisture.

Most kingdom Protista (Protoctista) species are unicellular organisms, however, there are a few multicellular

They may be autotrophic or heterotrophic in nature.

Symbiosis and Parasitism is observed in the members of this class.

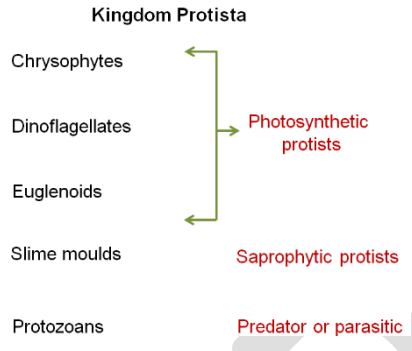
How are Protista classified?

Protista are broadly classified into 3 subdivisions based on their general characteristic features. They are classified as:

Plant like Protista : Algae

Fungi like Protista : Moulds (Primitive Fungi)

Animal like Protista : Protozoa



Algae

These are generally single-celled or multicellular organisms.

These are photosynthetic, found mostly in freshwater sources or marine lakes.

The algae are divided into six types, namely, green algae, brown algae, red algae, diatoms, pyrrophytes, and euglenoids.

Primitive fungi (Mould)

Moulds are saprophytic organisms (they feed on the dead and decaying matter).

Water Molds

Belong to the group known as oomycetes. The water molds resemble other fungi because they have branched filaments and form spores.

Slime Molds

Phenotypically similar to both fungi and protozoa, slime molds produce spores but move with amoeba-like gliding motility.

Protozoa

Protozoans are unicellular organisms.

These are also called animal protists.

Amoeboid protozoans – Theyhave pseudopodia which help to change their shape and in capturing and engulfing food. E.g., Amoeba

Flagellated protozoans – As the name suggests, the members of this group have flagella. E.g., Euglena

Ciliated protozoans – They have cilia all over their body which help in locomotion as well as nutrition. They are always aquatic. Wg., Paramecium

Sporozoans – These organisms are so-called because their life cycle has a spore-like stage. For example, the malarial parasite, Plasmodium.

Kingdom Fungi

Fungi are a eukaryotic organism that includes microorganisms such as yeasts, moulds, and mushrooms.

Characteristics of Fungi

Fungi are eukaryotic, non-vascular, non-motile and heterotrophic organisms.

They may be unicellular or filamentous.

They reproduce by means of spores.

Fungi exhibit the phenomenon of alternation of generation.

Fungi lack chlorophyll and hence cannot perform photosynthesis.

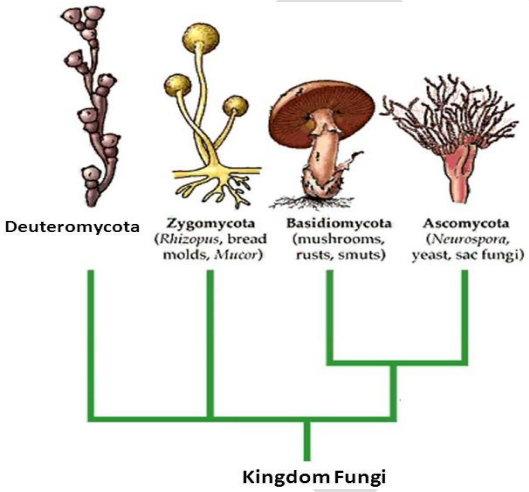
Some fungi are parasitic and can infect the host.

Fungi produce a chemical called pheromone which leads to sexual reproduction in fungi.

For eg., mushrooms, moulds, yeast

Classification of Fungi

The different classification of fungi are as follows:



Zygomycetes – These are formed by the fusion of two different cells. The sexual spores are known as zygospores

Ascomycetes – They are also called as sac fungi. They can be coprophilous, decomposers, parasitic or saprophytic. The sexual spores are called ascospores.

Basidiomycetes – Mushrooms are the most commonly found basidiomycetes and mostly live as parasites. Sexual reproduction occurs by basidiospores.

Deuteromycetes – They are otherwise called imperfect fungi as they do not follow the regular reproduction cycle as the other fungi. They do not reproduce sexually. Asexual reproduction occurs by conidia

Reproduction in Fungi

Reproduction in fungi is both by sexual and asexual means. The sexual mode of reproduction is referred to as teleomorph and the asexual mode of reproduction is referred to as anamorph.

Vegetative reproduction – By budding, fission, and fragmentation

Asexual reproduction – This takes place with the help of spores called conidia or zoospores .

Sexual reproduction – ascospores, basidiospores, and oospores

Importance of Fungi

Fungi are one of the most important groups of organisms on the planet as it plays a vital role in the biosphere and has great economic importance on account of their both benefits and harmful effects.

Following are some of the important uses of fungi:

Recycling – They play a major role in recycling the dead and decayed matter.

Food – Mushrooms species are edible which are cultured and are used as food by humans.

Medicines – There are many fungi which are used to produce antibiotics, which are used to control diseases in humans and animals. Penicillin antibiotic is derived from a common fungi Penicillium.

Bio control Agents – Fungi are involved in exploiting insects, other small worms and help in controlling pests. Spores of fungi are used as spray-on crops.

Food spoilage – Fungi play a major role in recycling organic material and are also responsible for major spoilage and economic losses of stored food.

Reference pages

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https://study.com/academy/lesson/kingdom-protista-definition-characteristics-examples.html

Lesson plan

Introduce your students to fungi with this lesson plan. Students will watch an informative video lesson, participate in discussions and play a fun game testing their understanding of the concepts.

Learning Objectives

After this lesson students will be able to:

Define fungi and discuss its reproductive nature

Identify various types of fungus

Explain the many benefits and disadvantages of fungus

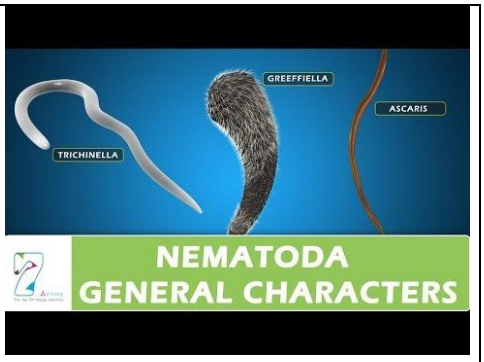
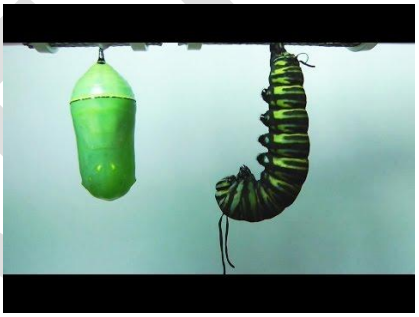
Materials

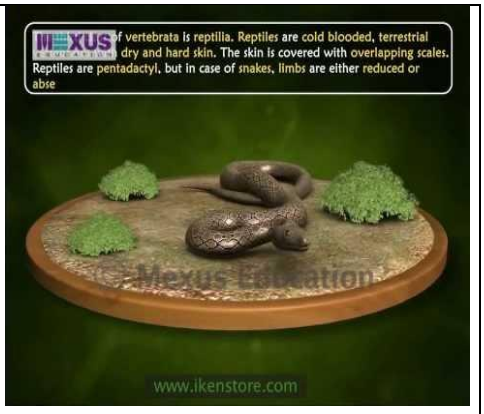
Hard copies of the What are Fungi? - Types and Characteristics lesson and lesson quiz, one for each student

https://www.elementaryschoolscience.com/animal-lesson-five-kingdoms-of-life

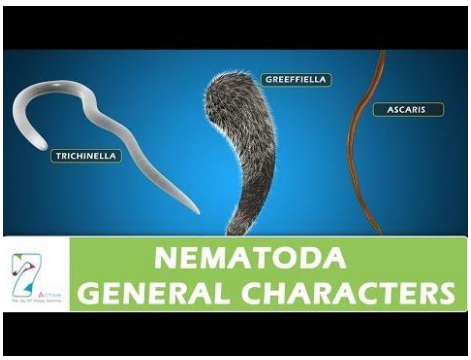
Diversity Among Animals

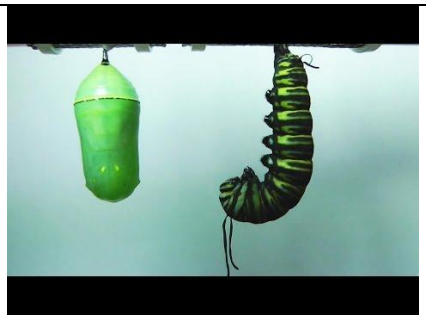
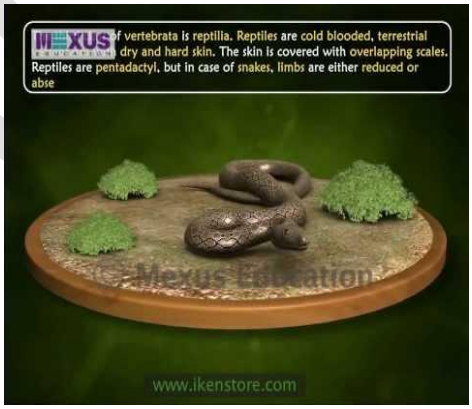
Chapter	Student learning outcomes	Understanding	Reference web material
Digestion	After studying this course, ONE should be able to: list the general characteristics of animals. Classify animals on the basis of presence or absence of tissue Explain criteria for animal classification Identify diversity among animals; invertebrates and vertebrates	Describe the general characteristics of animals Classify animals on the basis of presence or absence of tissue Differentiate diploblastic and triploblastic level of organization Describe different types of symmetry found in animals Differentiate pseudocoelomates and coelomates Classify coelomates into protostomes and deuterostomes. EXPLAIN : Phylum Porifera; main characteristics, habit and habitat, microscopic structure (pinacocyte, sporocytes, choanocytes), digestion, process of feeding, reproduction, larva. Phylum Cnidaria (Coelentrata); main characteristics,habit and habitat, structure, structural types(polyp and medusa),Reproduction(Regeneration, Asexual and sexual reproduction), classification of Cnidaria (Hydrozoa, Scyphozoa, Anthozoa)	 KINGDOM ANIMALIA AND PHYLUM PORIFERA  PHYLUM CNIDARIA  PHYLUM PLAYHELMINTHES

		Phylum Platyhelminthes(Flatworms); main characteristics, habit and habitat, structure, parasitic adaptations, precautions against diseases.	
		Phylum As helminthes (Nematode/ Roundworms); main characteristics, habit and habitat, structure, internal features, reproduction.	PHYLUM NEMATODA 
		Phylum Annelida (Segmented worms); main characteristics , habit and habitat, structure, external features, internal features, systems of body. Classification of phylum Annelid(Polychaeta, Oligochaeta, Hirudina, Archisnnelida).	PROCESS OF MOULTING 
		Phylum Arthropoda (Jointed appendages animals); main characteristics, habit and habitat, nature, external features, internal features.	PROCESS OF MOULTING 
		Phylum Echinodermata; main characteristics , habit and habitat, structure, external features, internal features, regeneration, Water Canal System, importance of Water Canal System, Larva.	PHYLUM CHORDATA

		Phylum Chordata; General characters (notochord, dorsal hollow nervous system, gill clefts, pharyngeal pouches), Classification of Phylum Chordata Class Pisces(Chondrichthes, Osteiochtyes, lung fishes) Class Amphibians: main characteristics, habit and habitat, nature, structural features, reproduction. Class Reptilia; main characteristics, habit and habitat, nature, structural features, reproduction. Class Aves; habit and habitat, flight and adaptation, adaptation for communication, structural features, Migration in birds, Sub-classes of birds Class Mammalia; main characteristics , habit and habitat, nature, temperature regulation, apparent features, skeletal systems, internal features, reproduction, classification of Class Mammalia.	 PHYLUL CHORDATA-VERTEBRATA

Diversity Among Animals

Chapter	Student learning outcomes	Understanding	Reference web material
<u>Digestion</u>	After studying this course, ONE should be able to: list the general characteristics of animals. Classify animals on the basis of presence or absence of tissue Explain criteria for animal classification Identify diversity among animals; invertebrates and vertebrates	Describe the general characteristics of animals Classify animals on the basis of presence or absence of tissue Differentiate diploblastic and triploblastic level of organization Describe different types of symmetry found in animals Differentiate pseudocoelomates and coelomates Classify coelomates into protostomes and deuterostomes. EXPLAIN : Phylum Porifera; main characteristics, habit and habitat, microscopic structure (pinacocyte, sporocytes, choanocytes), digestion, process of feeding, reproduction, larva. Phylum Cnidaria (Coelentrata); main characteristics,habit and habitat, structure, structural types(polyp and medusa),Reproduction(Regeneration, Asexual and sexual reproduction), classification of Cnidaria (Hydrozoa, Scyphozoa, Anthozoa) Phylum Platyhelminthes(Flatworms); main characteristics, habit and habitat, structure, parasitic adaptations, precautions against diseases. Phylum Aschelminthes (Nematoda/ Roundworms); main characteristics, habit and habitat, structure, internal features, reproduction.	 KINGDOM ANIMALIA AND PHYLUM PORIFERA  PHYLUM CNIDARIA  PHYLUM PLAYHELMINTHES  PHYLUM NEMATODA  PROCESS OF MOULTING

		Phylum Annelida (Segmented worms); main characteristics , habit and habitat, structure, external features, internal features, systems of body. Classification of phylum Annelida(Polychaeta, Oligochaeta, Hirudina, Archisnnelida).	 PROCESS OF MOULTING
		Phylum Arthropoda (Jointed appendages animals); main characteristics, habit and habitat, nature, external features, internal features.	 PHYLUM CHORDATA
		Phylum Echinodermata; main characteristics , habit and habitat, structure, external features, internal features, regeneration, Water Canal System, importance of Water Canal System, Larva.	
		Phylum Chordata; General characters (notochord, dorsal hollow nervous system, gill clefts, pharyngeal pouches), Classification of Phylum Chordata	PHYLUL CHORDATA-VERTEBRATA
		Class Pisces(Chondrichthes, Osteiochtyes, lung fishes)	
		Class Amphibians: main characteristics, habit and habitat, nature, structural features, reproduction.	
		Class Reptilia; main characteristics, habit and habitat, nature, structural features, reproduction.	

		Class Aves; habit and habitat, flight and adaptation, adaptation for communication, structural features, Migration in birds, Sub-classes of birds Class Mammalia; main characteristics , habit and habitat, nature, temperature regulation, apparent features, skeletal systems, internal features, reproduction, classification of Class Mammalia.	

Example of subphylum Porifera includes- Spongilla, Sycon, etc.

Phylum Coelenterata (Cnidaria)

The term Coelenteratais derived from the Greek word “kilos” which means hollow-bellied. Their features are:

Have a hollow body cavity.

The body is differentiated into two ends.

Includes all aquatic animals.

The body is made of two layers of cells: inner and outer linings.

Live in colonies (corals) as well as solitary (Sea anemone).

Example of subphylum Coelenterata includes – Hydra, Jellyfish, etc.

Phylum Platyhelminthes

Platyhelminthes are commonly known as flatworms. Their features are:

Dorsoventrally flattened body.

Complex and have differentiated body structure.

Tissues are differentiated from three layers of cells and are triploblastic.

Don't have true internal cavity or coelom.

Have bilateral symmetry.

Either free-living (Planaria) or parasitic (Liver flukes).

Example of subphylum Platyhelminthes includes -Tapeworm, Planaria, etc.

Phylum Nematoda

Phylum Nematoda consists of nematodes or roundworms. Their features are:

Nematodes have a cylindrical body.

Bilaterally symmetrical and triploblastic.

Have pseudocoelom, a false body cavity.

Parasitic and causes diseases such as elephantiasis, ascariasis, etc.

Example of subphylum Nematoda includes – Ascaris, Wuchereria, etc.

Phylum Annelida

Annelids are commonly known as segmented or ringed worms. They have the following features:

Have a segmented cylindrical body.

The body is differentiated into head and tail.

Bilaterally symmetrical and triploblastic.

Have a true body cavity.

Habitat: marine, freshwater, and land.

Example of subphylum Annelida includes – Earthworm, Leech, etc.

Phylum Arthropoda

Arthropod means jointed legs. Animals which have jointed appendages belong to this phylum. This is the largest phylum in the animal kingdom. Other features are:

They are bilaterally symmetrical.

Have jointed appendages, exoskeleton, and a segmented body.

Have well-differentiated organ and organ system.

Have an open circulatory system, but don't have differentiated blood vessels.

Phylum Mollusca

Phylum Mollusca consists of a large group of animals. Features are:

Bilaterally symmetrical and triploblastic.

Less segmented body.

Well-developed organ and organ system.

Open circulatory system.

Limbs are present.

Example of subphylum Mollusca includes- Snails and octopus.

Phylum Echinodermata

The term Echinodermata is derived from the Greek words, *echinos* meaning hedgehog and *derma* meaning skin. Thus, echinoderms are spiny-skinned animals.

Radial symmetry and triploblastic.

Have true coelom.

Have hard calcium carbonate skeleton structure.

Free-living marine animals.

Example of subphylumEchinodermata includes- Sea urchins, starfish, etc.

Phylum Protochordate

Protochordates have the following features:

Bilaterally symmetrical and triploblastic.

Have true coelom.

Habitat: marine.

The notochord is present at some stages of lives.

Example of subphylum Protochordates includes- Balanoglossus, etc.

The notochord is a long supporting structure tha n t separates the nervous tissues from the gut. It runs along the back of an animal and is a place for muscle attachment that helps in movement.

Subphylum Vertebrata

Phylum Vertebrata consists of animals with a true vertebral column. They have an internal skeleton where muscles are attached and help in movement. Other features are:

Bilaterally symmetrical, triploblastic, coelomates and the segmented body.

The body design is complex and well-differentiated.

The body has an organ and organ system level of organization.

Possess notochord.

Reference Pages

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https://www.toppr.com/guides/biology/biological-classification/kingdom-animalia/

https://www.pmfias.com/classification-animalia-animal-kingdom/

https://www.mcqbiology.com/2012/10/mcq-on-kingdom-animalia.html#.XgtE9kczbDc (MCQs)

https://www.mcqslearn.com/biology/mcq/kingdom-animalia-multiple-choice-questions-answers.php (MCQs)

Vertebrates are further grouped into five classes. They are-Pisces, Amphibia, Reptilia, Aves, Mammalia.

Digestion

Chapter	Student learning outcomes	Understanding	Reference web material
Digestion	After studying this course, you should be able to: list the main organs for digestion and their function. summaries the structure and function of the different digestive organ understand the process of digestion in man	Describe gastrointestinal tract (dentitions, salivary glands, function of tongue, swallowing, peristalsis, antiperistalsis, non-directional peristalsis, bile production) Describe the process of digestion in man	 digestive system organs

	Dental diseases, their causes, prevention and control disorders of GIT	different types of dental diseases, their causes, prevention and control. The disorders of GIT (diarrhoea, dysentery, constipation, piles, dyspepsia, peptic ulcer, food poisoning, malnutrition, overnutrition, under-nutrition, anorexia and bulimia nervosa)	 dental formula

Chapter overview

"**Digestion**, sequence by which food is broken down and chemically converted so that it can be absorbed by the cells of an organism and used to maintain vital bodily functions."

Role of digestion

When we eat, our food is broken down into small molecules that can be used by the cells in our organs and any waste that is indigestible or has not been absorbed is eliminated in the process known as digestion. This process consists of mechanical actions (fragmentation, mixing) and chemical ones (thanks to gastric juices) that take place along the gastrointestinal tract with the aid of the organs connected to it. Digestion also plays a role in the body's defences, thanks in particular to the hostile environment of the stomach and the intestinal wall, which protects the body against microorganisms such as bacteria and viruses. In fact, the gastrointestinal tract can be thought of as a reservoir that enables the body's cells to be continuously nourished even while we are not actually eating.

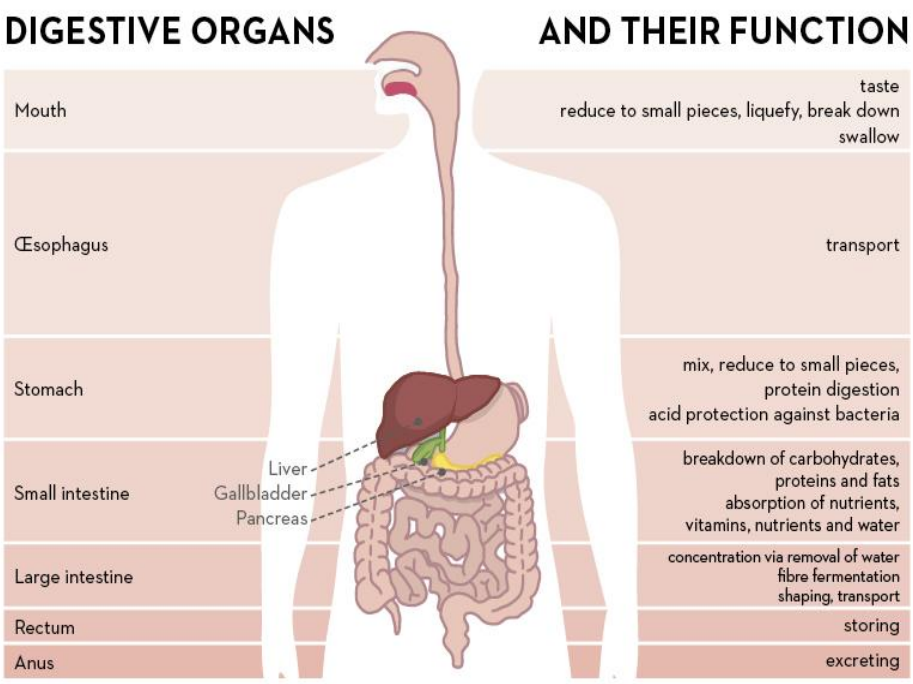
What is digestion in Human?

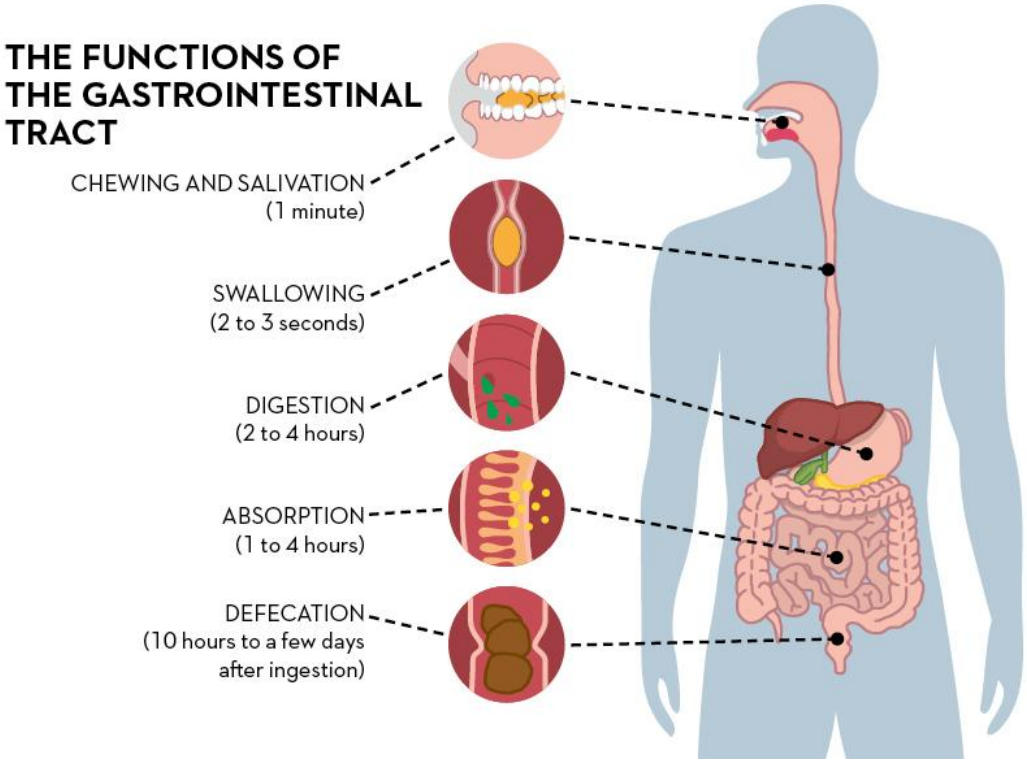
In humans, digestion is about more than just breaking down food and providing the nutrients essential for metabolism; it also involves the organs of the five senses to create a wide range of sensations. Moreover, the food we eat is often modified by industrial preparation methods or simply by cooking, which may make it easier to digest. Cooking pasta, for example, makes starch more accessible to the digestive enzymes, thereby facilitating its digestion.

Swallow, digest, assimilate and eliminate: these terms can be applied both to food and to emotions. Expressions and sayings use the terminology of digestion to express how we cope with life.

Digestive system

The digestive system is made up of the gastrointestinal (GI) tract—also called the digestive tract—and the liver, pancreas, and gallbladder. The GI tract is a series of hollow organs joined in a long, twisting tube from the mouth to the anus. The hollow organs that make up the GI tract are the mouth, esophagus, stomach, small intestine, large intestine—which includes the rectum—and anus. Food enters the mouth and passes to the anus through the hollow organs of the GI tract. The liver, pancreas, and gallbladder are the solid organs of the digestive system. The digestive system helps the body digest food.





Why is digestion important?Digestion is important for breaking down food into nutrients, which the body uses for energy, growth, and cell repair. Food and drink must be changed into smaller molecules of nutrients before the blood absorbs them and carries them to cells throughout the body. The body breaks down nutrients from food and drink into carbohydrates, protein, fats, and vitamins

How is the digestive process controlled?

Hormone and nerve regulators control the digestive process.

HORMONE REGULATORS The cells in the lining of the stomach and small intestine produce and release hormones that control the functions of the digestive system. These hormones stimulate production of

digestive juices and regulate appetite.

NERVE REGULATORSTwo types of nerves help control the action of the digestive system: extrinsic and intrinsic nerves.

Extrinsic, or outside, nerves connect the digestive organs to the brain and spinal cord. These nerves release chemicals that cause the muscle layer of the GI tract to either contract or relax, depending on whether food needs digesting. The intrinsic, or inside, nerves within the GI tract are triggered when food stretches the walls of the hollow organs. The nerves release many different substances that speed up or delay the movement of food and the production of digestive juices.

Gastrointestinal Disorders

Gastrointestinal disorders include such conditions as constipation, irritable bowel syndrome, hemorrhoids, anal fissures, perianal abscesses, anal fistulas, perianal infections, diverticular diseases, colitis, colon polyps and cancer. Many of these can be prevented or minimized by maintaining a healthy lifestyle, practicing good bowel habits, and submitting to cancer screening.

Important points about digestion

Digestion is important for breaking down food into nutrients, which the body uses for energy, growth, and cell repair

Digestion works by moving food through the gastrointestinal (GI) tract

Digestion begins in the mouth with chewing and ends in the small intestine

As food passes through the GI tract, it mixes with digestive juices, causing large molecules of food to break down into smaller molecules. The body then absorbs these smaller molecules through the walls of the small intestine into the bloodstream, which delivers them to the rest of the body

Waste products of digestion pass through the large intestine and out of the body as a solid matter called stool

Digestive juices contain enzymes that break food down into different nutrients

The small intestine absorbs most digested food molecules, as well as water and minerals, and passes them on to other parts of the body for storage or further chemical change. Hormone and nerve regulators control the digestive process

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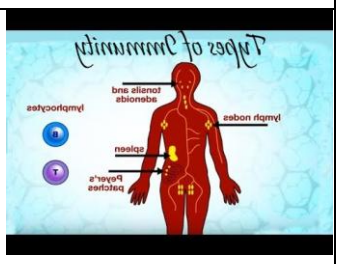
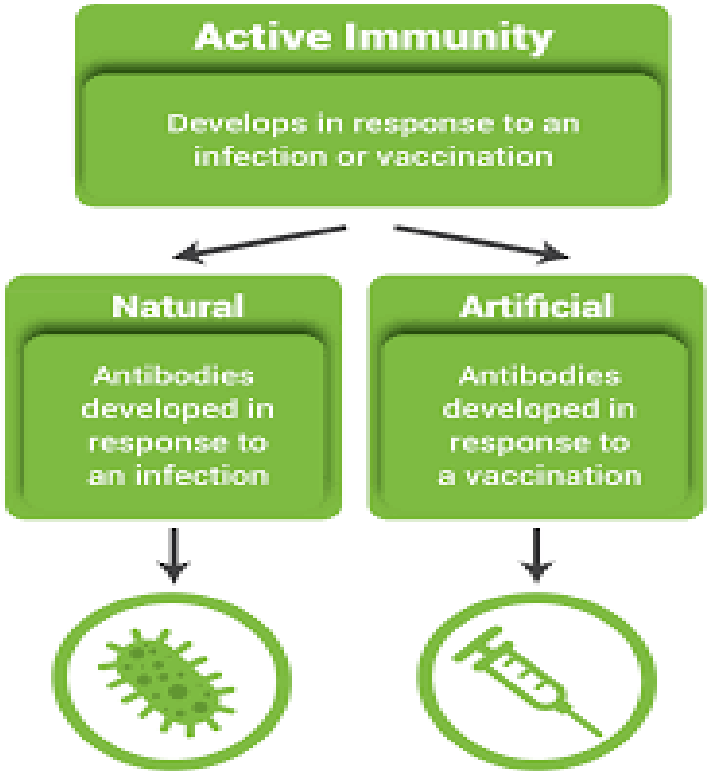
Immunity

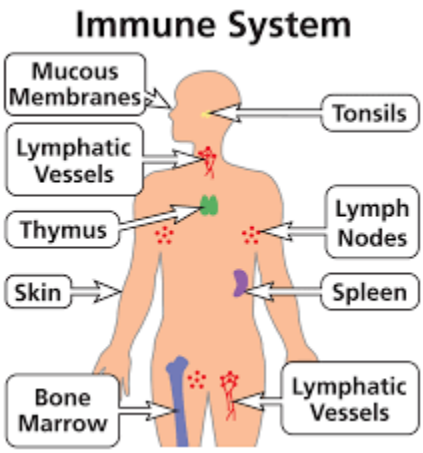
Chapter	Student learning outcomes	Understanding	Reference web material
Immunity	Students must Be able to: Define Immune system Differentiate innate and adaptive immune system Explain primary and secondary immune responses	Describe immune system Define immunity Explain innate and adaptive immune system Differentiate between primary and secondary immune responses, Active and passive immunity.	 Types of immunity  The immune system  What is good for immune system

Chapter Overview



IMMUNE SYSTEM AND IMMUNITY

Immune system, the complex group of defense responses found in humans and other advanced vertebrates that helps repel disease-causing organisms (pathogens). Immunity from disease is actually conferred by two cooperative defense systems, called nonspecific, innate immunity and specific, acquired immunity. Nonspecific protective mechanisms repel all microorganisms equally, while the specific immune responses are tailored to particular types of invaders. Both systems work together to thwart organisms from entering and proliferating within the body. These immune mechanisms also help eliminate abnormal cells of the body that can develop into cancer.



How the immune system works

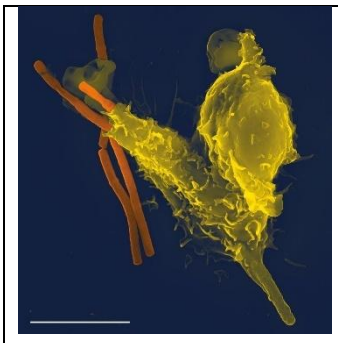
Our immune system is essential for our survival. Without an immune system, our bodies would be open to attack from bacteria, viruses, parasites, and more. It is our immune system that keeps us healthy as we drift through a sea of pathogens.

This vast network of cells and tissues is constantly on the lookout for invaders, and once an enemy is spotted, a complex attack is mounted.

The immune system is spread throughout the body and involves many types of cells, organs, proteins, and tissues. Crucially, it can distinguish our tissue from foreign tissue — self from non-self. Dead and faulty cells are also recognized and cleared away by the immune system.

If the immune system encounters a pathogen, for instance, a bacterium, virus, or parasite, it mounts a so-called immune response. Later, we will explain how this works, but first, we will introduce some of the main characters in the immune system.

White blood cells



white blood cell (yellow), attacking anthrax bacteria (orange). The white line at the bottom is 5 micrometers long.
White blood cells are also called leukocytes. They circulate in the body in blood vessels and the lymphatic vessels that parallel the veins and arteries.White blood cells are on constant patrol and looking for pathogens. When they find a target, they begin to multiply and send signals out to other cell types to do the same.

Our white blood cells are stored in different places in the body, which are referred to as lymphoid organs. These include the following:

Thymus — a gland between the lungs and just below the neck.

Spleen — an organ that filters the blood. It sits in the upper left of the abdomen.

Bone marrow — found in the center of the bones, it also produces red blood cells.

Lymph nodes —small glands positioned throughout the body, linked by lymphatic vessels.

There are two main types of leukocyte:

1. Phagocytes

These cells surround and absorb pathogens and break them down, effectively eating them. There are several types, including:

Neutrophils — these are the most common type of phagocyte and tend to attack bacteria.

Monocytes — these are the largest type and have several roles.

Macrophages — these patrol for pathogens and also remove dead and dying cells.

Mast cells — they have many jobs, including helping to heal wounds and defend against pathogens.

2. Lymphocytes

Lymphocytes help the body to remember previous invaders and recognize them if they come back to attack again.

Lymphocytes begin their life in bone marrow. Some stay in the marrow and develop into B lymphocytes (B cells), others head to the thymus and become T lymphocytes (T cells). These two cell types have different roles:

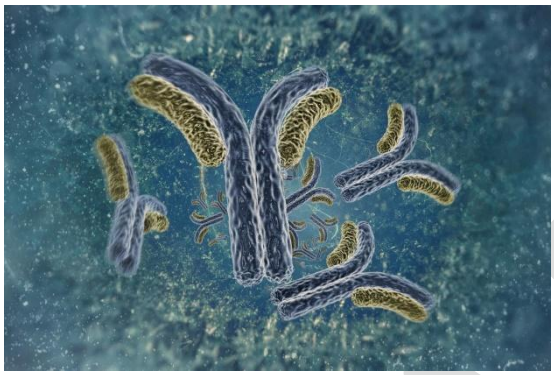
B lymphocytes — they produce antibodies and help alert the T lymphocytes.

T lymphocytes — they destroy compromised cells in the body and help alert other leukocytes.

Top of Form

Bottom of Form

How an immune response works



The immune system needs to be able to tell self from non-self. It does this by detecting proteins that are found on the surface of all cells. It learns to ignore its own or self proteins at an early stage.

An antigen is any substance that can spark an immune response.

In many cases, an antigen is a bacterium, fungus, virus, toxin, or foreign body. But it can also be one of our own cells that is faulty or dead. Initially, a range of cell types works together to recognize the antigen as an invader.

The role of B lymphocytes

Once B lymphocytes spot the antigen, they begin to secrete antibodies (antigen is short for "antibody generators"). Antibodies are special proteins that lock on to specific antigens.

Each B cell makes one specific antibody. For instance, one might make an antibody against the bacteria that cause pneumonia, and another might recognize the common cold virus.

Antibodies are part of a large family of chemicals called immunoglobulins, which play many roles in the immune response:

Immunoglobulin G (IgG) — marks microbes so other cells can recognize and deal with them.

IgM — is expert at killing bacteria.

IgA — congregates in fluids, such as tears and saliva, where it protects gateways into the body.

IgE — protects against parasites and is also to blame for allergies.

IgD — stays bound to B lymphocytes, helping them to start the immune response.

Antibodies lock onto the antigen, but they do not kill it, only mark it for death. The killing is the job of other cells, such as phagocytes.

The role of T lymphocytes

There are distinct types of T lymphocytes:

Helper T cells (Th cells) — they coordinate the immune response. Some communicate with other cells, and some stimulate B cells to produce more antibodies. Others attract more T cells or cell-eating phagocytes.

Killer T cells (cytotoxic T lymphocytes) — as the name suggests, these T cells attack other cells. They are particularly useful for fighting viruses. They work by recognizing small parts of the virus on the outside of infected cells and destroy the infected cells.

skin is the first layer of defense against external pathogens.

Everyone's immune system is different but, as a general rule, it becomes stronger during adulthood as, by this time, we have been exposed to more pathogens and developed more immunity.

That is why teens and adults tend to get sick less often than children.

Once an antibody has been produced, a copy remains in the body so that if the same antigen appears again, it can be dealt with more quickly.

That is why with some diseases, such as chickenpox, you only get it once as the body has a chickenpox antibody stored, ready and waiting to destroy it next time it arrives. This is called immunity.

There are three types of immunity in humans called innate, adaptive, and passive:

Innate immunity

We are all born with some level of immunity to invaders. Human immune systems, similarly to those of many animals, will attack foreign invaders from day one. This innate immunity includes the external barriers of our body — the first line of defense against pathogens — such as the

skin and mucous membranes of the throat and gut.

This response is more general and non-specific. If the pathogen manages to dodge the innate immune system, adaptive or acquired immunity kicks in.

Adaptive (acquired) immunity

This protect from pathogens develops as we go through life. As we are exposed to diseases or get vaccinated, we build up a library of antibodies to different pathogens. This is sometimes referred to as immunological memory because our immune system remembers previous enemies.

Passive immunity

This type of immunity is "borrowed" from another source, but it does not last indefinitely. For instance, a baby receives antibodies from the mother through the placenta before birth and in breast milk following birth. This passive immunity protects the baby from some infections during the early years of their life.

Immunizations

Immunization introduces antigens or weakened pathogens to a person in such a way that the individual does not become sick but still produces antibodies. Because the body saves copies of the antibodies, it is protected if the threat should reappear later in life.

Immune system disorders

Because the immune system is so complex, there are many potential ways in which it can go wrong. Types of immune disorder fall into three categories:

Immunodeficiencies

These arise when one or more parts of the immune system do not function. Immunodeficiencies can be caused in a number of ways, including age, obesity, and alcoholism. In developing countries, malnutrition is a common cause. AIDS is an example of an acquired immunodeficiency.

In some cases, immunodeficiencies can be inherited, for instance, in chronic granulomatous disease where phagocytes do not function properly.

Autoimmunity

In autoimmune conditions, the immune system mistakenly targets healthy cells, rather than foreign pathogens or faulty cells. In this scenario, they cannot distinguish self from non-self.

Autoimmune diseases include celiac disease, type 1 diabetes, rheumatoid arthritis, and Graves' disease.

Hypersensitivity

With hypersensitivity, the immune system overreacts in a way that damages healthy tissue. An

example is anaphylactic shock where the body responds to an allergen so strongly that it can be life-threatening

In a nutshell: The immune system is incredibly complicated and utterly vital for our survival. Several different systems and cell types work in perfect synchrony (most of the time) throughout the body to fight off pathogens and clear up dead cells.

STUDENT ASSESSMENT

Fill in the blanks

The most common type of immediate hypersensitivity is _____.(allergy)

First line of defense in human body is_____

Lymphocytes begin their life in _____

https://www.britannica.com/science/immune-system