

SCIENCE

STANDARD EIGHT TERM III

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Note to the teacher...

As we present this revised edition of the Science Textbook, we would like to express our deepest gratitude to the learners and the teaching community for their enthusiastic responses.

In science some concepts could be subject to change from time to time as new theories and principles are constantly being evolved.

We have tried to present facts and concepts of science (both concrete and abstract) in a visually appealing manner without detracting from the content.

Activity based learning is now accepted as the basis of science education. These activities should be regarded as a means for open-ended investigation rather than for verification of principles / content given in the textbook has been designed to facilitate low-cost activities and experiments using locally available materials. With a view to streamlining the activities, we have now segregated them into three groups:

B I Do - activities to be done by an individual learner.

D We Do - activities to be done by a group of learners. and

D We Observe - activities to be demonstrated by the teacher.

The third group of activities have a higher degree of difficulty or require careful handling as it may involve dealing with chemicals, electricity etc.,

The "More to know" snippets in the text represents some unusual and interesting facts or information in which the students need not be examined.

The evaluation section is nothing but another space for learning in a different manner. As the focus is on understanding, rote learning is to be discouraged thoroughly. Application of learnt ideas, problem solving skills and critical thinking is to be encouraged. There could be scope for more than one answer to a question, which should be acknowledged always.

To facilitate further reference, books and websites have been suggested at the end of each lesson. Suggestions and constructive criticism are most welcome. Valuable suggestions will be duly incorporated.

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Diversity in Living Organism

1. DIVERSITY I N L|V| NG ORGANISMS

LOOK at some Of the plants and ACTIVITY-L1 WE OBSERVE animals around you. Do they have

the same shape and size? No,
they differ in their size, shape and
structure.

Our world is filled with many varieties
of living organisms. Animals vary in
size from the tiny amoeba to the huge
blue whale. However, their bodies can
adapt to their living condition.

1.1. CELL AS A FUNDAMENTAL UNIT OF LIFE

Cell is the structural and functional
unit of all living organisms. Cell was

discovered by Robert Hooke in 1665. _ (I)
like the nerve cell or a neuron. The 9
following table shows the various I'I'I
types of cells and their shape. %

EXamp|e:- m

Cells Shape

Nerve cells Star

Flame cells Tubular

Gland cells Cuboidal

1.1.1. Types of Human Cells Squamous polygonal

Related to Function epithelium

Based on the function, the size S0i|tl:]r:|?UarL Cylindrical
and the shape of the cells differ. p

Generally, cells are round, spherical Egg cells Oval

or elongated. Some cells are long RBC Round

and ointed at both ends. The are .

spindle shaped. Cells, sometiines, II:/:br0l|1S H Elongated

are quite long. Some are branched Uscece S

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Diversity in Living Organism

Let us learn about the cells and
the functions of certain cells. A list is
provided below 2

Cells Function

Squamous Protective & give
epithelium shape

Contractile &

Muscle cells .

Retractlle

Fat Cells Storing more fat

droplets
Conduction of nerve
Nerve cells .
impulses
Bone cells Rigidity
Rods and Vision & colour
cone cells
Ear cochlear Conduction of sound
cells waves
Gland cells Secretory
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Fat cell

Sperm
Various cells of the human body

1.2. STRUCTURE AND FUNCTIONS OF CELL ORGANELLES

The cell organelles are present in the cell cytoplasm matrix, which are the living structures of the cytoplasm. They have the properties of growth and multiplication at the time of necessity within the cell.

1.2.1. Cell Organelles and their Functions

The Cell Organelles are

1. Endoplasmic Reticulum
 2. Ribosome
 3. Golgi apparatus
 4. Lysosomes
 5. Mitochondria
 6. Centrioles
1. Endoplasmic Reticulum

The electron microscopic study by Porter in 1945 revealed a network of membranous system with vacuoles in the endoplasm. This was named as endoplasmic reticulum by Porter in 1952. It is assumed that the endoplasmic reticulum originated by evagination of the nuclear membrane. Two types of endoplasmic reticulum have been observed. They are rough ER and smooth ER, based on the presence or absence of ribosome in the ER respectively.

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Ribosome

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Smooth endoplasmic reticulum

Structure of Endoplasmic reticulum

Functions of the Endoplasmic Reticulum

a. The endoplasmic reticulum provides an ultra structural and skeletal framework to the cell.

b. The smooth endoplasmic reticulum helps in the synthesis of lipids and in the breaking down of glycogen.

c. During cell division, the endoplasmic reticulum membranes disappear and form a new nuclear envelope after each nuclear division.

2. Ribosome

Many minute spherical structures known as ribosomes remain attached with the membrane of endoplasmic reticulum and form the (granular) rough endoplasmic reticulum. The ribosomes are produced in the nucleolus. Each ribosome is composed of two structural units, one smaller

and the other a larger unit. The small sub-units occur on the larger unit and form a cap-like structure. The ribosome also may occur freely in the cytoplasm.

MORE TO KNOW

Three researchers, who made the crystal structure of the ribosomes received the Nobel Prize for Chemistry in the year 2009 – Venkatraman Ramakrishnan, an Indian born U.S.A scientist, Thomas Steitz of U.S.A and Ada Yoath of Israel.

They are the sites of protein synthesis.

3. Golgi Apparatus

The electron microscopic observation of Golgi bodies reveals the presence of three membranous components, namely,

i. Disc shaped group of flattened sacs or cisternae

ii. Small vesicles

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iii. Large vacuoles.

Functions

a. It produces secretory vesicles like zymogen granules that may have enzymes inside.

b. It forms certain yolk substances in the developing oocytes.

c. It helps in retinal pigment formation in the retinal cells.

d. It helps in the formation of acrosome in sperm cells.

4. Lysosomes

Lysosomes are a kind of waste disposal system of the cell. Lysosomes originate either from the Golgi apparatus or directly from the endoplasmic reticulum. Each lysosome is of a rounded structure. It is filled with dense material.

Functions

a. Lysosomes help to keep the cell clean by digesting any foreign material as well as worn-out cell organelles.

b. When the cell gets damaged lysosomes may burst and the enzymes digest their own cell. Therefore lysosomes are also known as suicidal bags of a cell.

5. Mitochondria

In the cytoplasm of most cells, large size filamentous, rounded or rod-like structure known as mitochondria

may be seen. The mitochondria are bounded by two membranes made of proteins. The outer membrane forms a bag like structure around the inner membrane, which gives out many finger like folds on the lumen of the mitochondria. The folds of inner mitochondrial membrane are known as cristae.

Cristae
In er Membrane

Outer Membrane

Internal structure of Mitochondria
Functions

Mitochondria are considered to be the power houses of the cell because they are the seat of cellular respiration. They also synthesize the energy rich compound ATP– Adenosine Tri Phosphate.

6. Centrioles

Centrioles were first described by Henneguy and Leuhossek in 1897. The centrioles are micro tubular structures, found in two shapes—rods and granules located near the nucleus of the animal cell.

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At the time of cell division, the centrioles produce spindle fibres and astral bodies. They also decide the plan of cell division.

1.2.2. Nucleus

The nucleus is a highly specialised cell organelle which controls all the activities in a cell. It is the brain of a cell. It is round or oval in outline and possesses four parts.

They are :

1. Nuclear Membrane
2. Nucleoplasm
3. Chromatin Reticulum
4. Nucleolus

The nuclear membrane is the outer delicate covering of the nucleus. It contains pores of different dimensions.

The nucleoplasm is the protoplasmic substance of the nucleus. It is also known as

nuclear sap. Chromatin Reticulum is composed of a network with highly elongated chromatin threads

Chromatin '
Reticulum '

Nucleolus

Structure of Nucleus

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which overlap one another and are embedded in the nucleoplasm. At the time of cell division, the chromosomes become clearly visible.

The nucleolus is generally present in the nucleus of most of the cells. The nucleolus become enlarged during active period of cell division and are less developed in quiescent stage. It is often called as cell organizer.

Functions

a. It controls all metabolic processes and hereditary activities of the cell.

b. The nuclear membrane allows exchange of ions between the nucleoplasm and the cytoplasm.

ORGANIZATION – CELLS
– TISSUES – ORGANS –
ORGAN SYSTEM

In multicellular animals, cells multiply by the process of cell division and specialise themselves in performing a particular function. For example, the muscle cells perform contraction and relaxation of organs that help in locomotion and conduction.

1.3.

1.3.1. Tissues

A group of cells having common origin, structure and function is referred to as tissue. The bodies of animals are composed of several distinct tissues. On the basis of the function, we can

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Animal Tissues

Vascular
1'issue

Epithelial
1'issues

classify animal tissues into five broad categories.

Epithelial Tissues

Epithelial tissues cover most organs and cavities within the body. Since the cells are closely packed, there is very little space between them. The absence of intercellular space is the characteristic of epithelial tissues. The cells in this tissue remain attached to the basement membrane that separates it from the other tissues.

Based on the shape, arrangement of cells and the functions, Epithelia are classified into seven types.

A. Squamous Epithelium

Squamous epithelium consists of a single layer of flattened cells with a central disc like nucleus. The inner lining of the cheek and the membranes within the body are examples of this epithelium.

Connective
Tissues Newe

'l'issues
Muscular
Tissues

Central Disc
Shaped Nucleus

Squamous epithelium

Functions

Protection is their function. In the alveoli they help in exchange of gases.

B. Columnar Epithelium

The cells are cylindrical and tall , the height of each cell being greater than its width. The oval nuclei are usually found at the base of these cells. Example – the inner lining of the intestine.

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Nucleus

Columnar Epithelium

Function

Secretion of enzymes in the stomach

and absorption of digested food in the intestine.

C. Cuboidal Epithelium

The cells of this epithelium are cube shaped. The walls of the ducts and the glands are examples of this type of epithelium.

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Cuboidal Epithelium

Function

This tissue helps in secretion and re-absorption of water in kidney tubules.

D. Ciliated Epithelium

Its structure is like the columnar epithelium. In addition it contains a number of fine protoplasmic projections called cilia. The wind pipe on the trachea is internally lined by ciliated epithelium.

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Ciliated Epithelium Function

They remove the dust particles by the vibration of the cilia.

E. Sensory Epithelium

Some of the epithelial cells are modified to respond to stimuli and they form the sense organs.

Vascular Tissues

This is a liquid tissue adapted for the transportation of the nutritive materials, respiratory gases, excretory materials and others. It consists of 55% plasma and 45% blood cells. There are three kinds of blood cells.

They are,

i) Red Blood Cells
(Erythrocytes)

ii) White Blood Cells
(Leucocytes)

iii) Blood Platelets
(Thrombocytes)

i) Erythrocytes: The Red Blood Cells are present in vast majority. Each red cell is a circular or biconcave disc without a nucleus. These are formed in the bone marrow. Their life span

RBC

WBC

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is between 100 and 120 days. They contain haemoglobin, a respiratory pigment that chiefly carries oxygen

from the lungs to the other parts of the body.

ii) Leucocytes: The nucleated white blood cells are irregular and contain no pigment. They are produced in the bone marrow and in the lymph glands. The life span of WBC is two to three weeks.

They are the police force of the body and protect it from disease producing organisms.

iii) Thrombocytes: The blood platelets are the smallest of the blood cells. They are responsible for the clotting of the blood when blood vessels are damaged.

Connective tissues

The cells of connective tissues are loosely spaced and embedded in an inter cellular matrix. The matrix may be a jelly like fluid, dense or rigid. They are of two types. They are

- A) Adipose tissue
- B) Supportive tissue

A) Adipose Tissue:- This is modified for storing fat. The inter cellular material is more or less absent. It is found chiefly below the skin and in between the internal organs.

B) Supportive Tissue:- This tissue gives support to the entire body.

ACTIVITY 1.2 WE OBSERVE

0 We observe the different types of epithelial tissues under a compound microscope.

9 We identify their important features.

The supportive tissues are of three types. They are :

- i) Cartilage tissue
- ii) Bone tissue
- iii) Areolar tissue

i) Cartilage Tissue:- It has widely spaced cells. The solid matrix is composed of proteins and sugars. The cartilage smoothens the bone surface at the joints and is also present in the nose, ear, trachea and larynx.

ii) Bone Tissue:- It forms the framework that supports the body. Bone cells are composed of calcium and phosphorous compounds. Two bones can be connected to each other by the ligament. This tissue is very elastic and the ligaments contain very little matrix.

iii) Areolar Tissue:- It is found between the skin and the muscles around the blood vessels, nerves and in the bone marrow. It fills the space inside the organs. It supports the internal organs and helps in repairing the tissues.

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Nervous Tissue

The nervous tissue is formed of nerve cells called neurons and nerve fibres. It has highly developed powers of irritability and conductivity. The brain, spinal cord and nerves are all composed of nervous tissues.

Neurons: It is a structural unit of the nervous system. It has a cell body

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Nucleus
Dendrites

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Neuron '

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Axon -4

called cyton which assumes different shapes in the different regions of the nervous system, and a long tail called axon. Neurons may be either rounded or oval shaped. The protoplasm of the cyton has a number of small dark granules referred to as Nissl's bodies. The cyton gives out numerous branches called dendrons. These in turn, divide into finer branches called

dendrites.

Diversity in Living Organism

Muscular Tissue

It consists of elongated cells, also called muscle fibres. This tissue is responsible for movement in our body. Muscular tissue contains proteins called Contractile Proteins. There are three types of muscular tissues:

Striated Muscle

a) Striated Muscle: Since these muscles are attached to the skeleton, they are also called Skeletal Muscles. Each muscle fibre in this muscle is a long parallel sided cylindrical structure with cross striations and are hence named striped muscles. There are a number of nuclei placed near the periphery. They are covered by a membrane called Sarcolemma. Since their contraction is under conscious control they are also called voluntary muscles.

b) Non-striated muscles

The cells are arranged to form a sheet of muscular tissue commonly found in the wall of the digestive tract,

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Diagram :Non-striated Muscles

urinary bladder and other internal organs. They are not under the control of our willpower. So, they are called involuntary muscles.

c) Cardiac muscle: In structure it is

between the striped and unstriped muscles fibres. These are found only in the heart.

They are multi nucleated but the nuclei are centrally located. Dark and Light bands are present. The muscle of the heart show rhythmic contraction and relaxation throughout life. These involuntary muscles are called cardiac muscles.

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Cardiac Muscle

1.3.2. ORGANS

Two or more kinds of tissues associate together to form an organ. An organ is a specialized part of the body performing some specific

functions. For example, the eye, has epithelial tissue, connective tissue, nervous tissue and muscular tissue. We have many such organs in our body like eyes, ears, lungs, etc.

Now let us study in detail the

structure of the eyes.
The eyes (Photoreceptor)

The sense organ eye is concerned with vision. The eye which is spherical in shape is kept in the orbit of the skull.

The eye is made up of three coats.

1. the outer-sclerotic coat
2. the middle choroid coat

3. the inner coat (Retina)

1. Sclerotic coat

The outer sclerotic coat is white in colour except in the front where it forms the transparent cornea.

2. The Middle Choroid coat

It is highly vascularised and deeply pigmented. In front of the eye the choroid coat forms the iris and lens. An opening called the pupil is present in the centre of the Iris.

3. The inner coat (Retina)

Retina is the sensitive part of an eye. It contains two types of receptor

cells – the rods and cones. Rods are sensitive to different shades of light but not to colour. Cones are sensitive to colour. The fovea or yellow spots of the retina are densely packed with

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Vitreous hum
Lens 1'-

Cross-Section of the eye
cones. It is the part, that is used when one concentrates on something.
e.g. when reading, sewing etc. The lens is transparent, elastic and biconvex in shape. It is attached by ligaments to the ring shaped ciliary muscles. The aqueous humor is a clear, watery liquid between the cornea and the lens. The vitreous humor is a viscous liquid which fill the space between the lens and the retina. Vitreous humor helps in image formation and in maintaining the spherical shape of the eye.

1.3.3. Organ System

Several organs of the body together perform a common function. They constitute an organ system. Now let us discuss the excretory system and their functions.

Excretory system

Excretion is the elimination of metabolic waste products from the body. The major function of the excretory system is the elimination of nitrogenous waste products from the body. The mammalian urinary

Diversity in Living Organism

system consists of two kidneys, an ureter and an urinary bladder.

Sclera

Choroid

Retlna

There is a pair of kidneys

located inside the abdomen
_ on either side of the vertebral

column in the lumbar region
and against the posterior
abdominal wall. The right kidney is slightly
on the lower side due to the presence of
the liver. The outer surface is convex
and the inner surface is concave. The
concave side is called hilus.

A vertical section of the kidney shows
an outer dark portion called the cortex
and an inner pale region called medulla.
The medulla has a number of cone like

Vertical section of the kidney

structures called pyramids. The pelvis
projects in between the pyramids as
cup like spaces called calyces.

Nephrons

The kidney contains many minute
tubular nephrons. These are the
structural and functional units of the
kidney.

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Bowman's cap
Glomerulus

Proximal convoluted

*\'~--xv

tubule \
Distal convoluted tubule\

Loop of Henle

Collecting duct 4?

Diagram : Structure of nephron U
Functions of the Kidney

- o The kidney not only removes the waste product from the blood but also maintains a constant composition of blood.

- 0 It maintains the p"

- o The kidney regulates the loss of excess water from the body

ACTIVITY 1.3 WE OBSERVE

9 We observe the preserved organs like, the human eye, the kidney and models of some organs with the help of the teacher.

1.4. HOMEOSTASIS

Homeostasis is the maintenance of a constant internal environment of the body. It was first pointed out by the French physiologist Claude Bernard in 1857. All mammals are capable of maintaining a constant body temperature despite changes in the external temperature. Behavioural and physiological responses are two important regulating mechanisms that maintain the stability of Homeostasis.

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For example

The control of blood glucose level is a good example of homeostasis and it involves the secretion of atleast six hormones. A rise in the blood glucose level stimulates insulin secretion whereas a fall in the blood glucose level inhibits insulin secretion and stimulates the secretion of glucagon and other hormones which raise blood glucose levels.

1.5. CELLULAR RESPIRATION

Respiration is the process by which chemical energy in organic molecules is released by oxidation. This energy is then made available to living cells in the form of ATP.

The biochemical process which occurs within cells is called cell respiration. If it uses oxygen, it is called

as aerobic respiration. If the process takes place in the absence of oxygen, it is termed as anaerobic respiration.

Aerobic respiration

It involves the utilisation of free oxygen and results in complete oxidation of glucose into carbon-di-oxide and water.

Anaerobic Respiration or Fermentation

Here oxygen is not utilized for respiration. So, it is called anaerobic respiration. It is often referred to as fermentation.

A variety of micro organisms use anaerobic respiration as their major source of ATP – E.g. bacteria, yeast.

1.6. METABOLISM

The word metabolism has its root from the Greek word Metabole which means change. The sum total of the biochemical reactions involved in the release and utilization of energy or energy exchange within the organism is termed as metabolism.

Such a chemical reaction in the metabolic process can be divided into two categories.

1. Anabolism

The simple substances obtained from the food are converted into cellular substance. This process is called Anabolism. During this process energy is not involved or utilized.

For example,
Glucose → Glycogen and other sugars

Amino acids → Enzymes, hormones, proteins

Fatty acids → Cholesterol and other steroids.

2. Catabolism

Organic substances which are obtained from the food are broken down to produce energy for the purpose of physiological functions of the cells. This process is called as catabolism.

The following are examples for

catabolism.

Diversity in Living Organism

Glucose → CO₂, Water and heat

Protein → amino acid

Fats → Glycerol, fatty acid, etc.

The repeated anabolism and catabolism reactions in the metabolic process maintain the homeostatic condition of the body.

Because of the metabolic process, the ionic balance is being maintained in the body.

The metabolic process is responsible for movement, growth, development, maintenance and repair of the cells, tissues and the human body.

This metabolic process occurs in different organs of living species.

1.7. DESIGN OF THE BODY-
ITS BEAUTY – STRUCTURE
AND FUNCTION – SOME
EXAMPLES.

Our body structure suits its function. The human foot, which was originally a climbing structure, has been readapted for bipedal walking and running.

Likewise, there are various animals that range from unicellular to multicellular organisms whose body structures suit their function and the movements they make.

Some animal movements are very beautiful. For example, an insect walking on the reverse of a leaf, the soaring of eagles and the running of Jaguar and other animals.

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Soaring of eagle
Body Contour

Contour is nothing but the shape of the body. Observe a race horse. Its body has been beautifully designed by nature. The body is spindle-shaped, its streamlined contour offering minimum resistance in air.

Racehorse

The body of fish is also streamlined so that it can freely swim in the water.

Fish - Rohu (Belongs to Kendal)

How do animals fly?

The nature of the flight of an aeroplane differs from that of birds, animals and insects. Planes have fixed wings that create lift when air flows past. They move forward by pushing air through a jet engine or around a propeller very swiftly.

The wings of animals do both these jobs at once. When the wings flap downwards, the body of a bird or a bat or an insect is pushed forward and it is kept aloft and stable in its flight.

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Bat

Bats are the only mammals that truly fly, by flapping their wings. The wing of bat is a fold of skin called patagium supported by all digits of the hand except the first.

Now let us learn about the various shapes of beaks.

They have been beautifully

designed by nature to suit their feeding habits.

A sparrow eats seeds it finds on the ground. Its bill helps it to pick up things easily.

A heron gets its food found in water. It lifts fish out of water, and swallows them.

Pelicans

When a bird eats insects, worms or berries, its bill or beak helps it to get the food it wants. For most birds, bill is a special tool that has the right shape. In fact, the bills of many birds work just like the tools you may have at home.

ACTIVITY 1.4

Sparrow

EVALUATION

1. Match the following.

- a) Endoplasmic Reticulum sweat gland
- b) Glandular Epithelium _ streamlined body
- c) Retina _ porter
- d) Kidney _ cone cells
- e) Fish _ nephron.

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2. Choose the correct answer :

- 1. Muscle fibres are branched in m (cardiac skeletal) muscle.
- 2. Bone and cartilage are types of m (nerves/connective) tissues.
- 3. Ciliated epithelium is found in m (trachea / oesophagus)

3. Choose the correct answer :

- i) Assertion : The image falls on Fovea
- ii) Reasoning : Because of refraction of light by vitreous humors

- a. A is correct B is wrong
- b B is correct A is wrong
- c. B explains A
- d A explains B.

4. Complete the table by filling the functions.

Tissues Functions

- 1) Columnar epithelium
- 2) Glandular epithelium
- 3) Ciliated epithelium

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5. i) Identify part A and part B.
ii) How does part A differ from part B ?

6. Our kidneys help our body to lead a healthy life – How?

7. Can you name and describe the muscle which is present only in our heart and works throughout our life?

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8. Identify the odd item from column A and write it under column B. Write the common features of the other two items in column.

In Column A, 3 terms are given of which 2 belong to one group and 1 remains odd. Identify the odd item and write it under Column B. Write the common features of the other two under Column C.

9. Copy the diagram of the human eye. Label the following parts:
 - a. the transparent part of the sclera.
 - b. the spot on the retina where cones are most abundant.

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Conservation of Plants and Animals

2. Conservation of Plants and Animals

2.1. CONSERVATION OF FOREST AND WILD LIFE

Forest Ranger: Hello Sheelan, Good Morning. Welcome to Topslip. This is one of the forest areas in the state, which is rich in bio-diversity. This is the Annamalai Tiger Reserve.

Sheelan : Thank you sir. I was told
to meet you and get all information
regarding forest and wildlife.

Forest Ranger: Fine! I would be glad
to share interesting facts about forests
and wildlife with you. Trees, what do
they mean to you?

Sheelan: Well, trees provide a
number of economically valuable
commodities, the most important being

A forest

timber, fuel wood, bamboo, resins,
gums and leaves.

Forest Ranger: You know that they
also support living organisms like
animals, birds, insects and also many
micro organisms.

Sheelan: Sir, it is said that forests
are signs of prosperity.

Forest Ranger: You know that they
have the capacity to support many
lives like animals, birds, insects and
fungi.

Sheelan: Sir, it is said that forests
are signs of prosperity.

Forest Ranger: Yes, Forests are
of immense economic importance as
they are a source of livelihood for many
different human settlements as well
as governments. They also provide
timber and timber products which are
a source of income for many people.
They are habitats to diverse animal
and plant species, they prevent soil
erosion and help in maintaining the
water cycle.

Hence it is important that we
should conserve the existing forests
covering the Himalayas, the Western

Conservation can be defined in simple terms, as the management of
resources in such a manner that largest number of people benefit for the
longest possible time without harming the natural or ecological balance.

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Conservation of Plants and Animals

All non-domesticated and non cultivated biota found in the natural habitat are termed wildlife.

and Eastern Ghats, and start establishing more National Parks and sanctuaries and maintaining properly the existing ones. Let us wander into the forest and explore its wonders.

Need for Conservation

0 Wildlife is an asset to be protected and preserved because of its aesthetic, ecological, educational, historical and scientific values.

0 Wildlife is essential for ecological balance.

0 Wildlife is a big boost to tourism.

0 The innumerable plants could yield products of immense medicinal value.

0 Wildlife is an important source of genetic material used in genetic engineering

India being a sub-tropical country, the temperature in most parts of the country is conducive to plant growth. Based on this, the forests can be divided into five major types.

1. Desert (Dry forests) – Rajasthan, Southern parts of Punjab & Haryana

2. Deciduous forests – Peninsular

region

3. Tropical Evergreen forests – Western Ghats, hilly areas in

North Eastern
Himalayan belt

India, The Sub

4. Hilly (mountainous) forests – The Himalayas, Southern India

5. Tidal forest – Estuaries of Ganges

& Mahanadi.

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2.2. DEFORESTATION AND AFFORESTATION

Selfish and anti-social elements have been destroying our natural wealth. Deforestation is one such dangerous act harming the ecological balance in the hilly areas.

The ill-effects of deforestation are reduced rainfall, change in climatic conditions, soil erosion and (global warming). The process of planting new trees is called afforestation. This is generally done in deserts and open grounds to check the velocity of wind. How can people involve themselves in planting new trees?

Afforestation is aimed at two kinds of forestry programmes such as social forestry and agro forestry. In a locality, 'Tree lovers Club' can be started, and more people can be invited to join these clubs'. Tree saplings can be planted on the road side. Sapling can be gifted to friends on special occasions and celebrations.

Social Forestry

In India, the Social Forestry Project was started in 1976. Its aim is to promote natural forests and create forests on unused lands. Social forestry

AFFORESTATION

Conservation of Plants and Animals

also aims at raising plantations by the common man so as to meet the growing demand for timber, fuel wood, fodder etc. thereby reducing the pressure on the traditional forest area.

Agro Forestry

Planting of trees in and around agricultural boundaries and on marginal, private lands, in combination with agricultural crops is known as agro-forestry. The land can be used to raise agricultural crops and trees and to rear animals.

MORE TO KNOW

Cutting down forests increases the amount of carbon dioxide in the atmosphere, which can affect climate and destroy homes of many animals and plants. Deforestation leads to soil erosion, irregular rainfall and global warming.

2.3. FLORA AND FAUNA

India has a large variety of plants, about 45,000 species in number. Of these

Flowering plants – 15,000

Algae – 1,676

Lichens – 1,940

Fungi – 12,480

Gymnosperms – 64

DEFORESTATION

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Lion tailed monkey

o Bryophytes – 2,843

o Pteridophytes – 1,012

India can be divided into eight distinct floristic regions.

India has a great variety of fauna numbering 81,251 species, which represent 6.67 % of the world's fauna. Of these,

0 Insects – 60,000

Mollusca – 5,000
 Mammals – 372
 Birds– 1,228
 Reptiles – 446
 Amphibians – 204
 Fishes – 2, 546

The Zoological Survey of India (ZSI)
 is responsible for carrying out surveys
 of the faunal resources of the country.

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Deforestation refers to the
 indiscriminate cutting down of
 forest trees for use in wood-based
 industries (furniture making, paper,
 plywood) as domestic fuel and
 to accommodate agriculture and
 industries, in many parts of our
 country natural vegetation is being
 destroyed illegally.

ACTIVITY 2.1 WE DO

0 We identify the different plants
 in our school campus and label
 them with common names and
 botanical names.

0 We grow medicinally important
 plants like *Acalypha indica*
 (Kuppaimeni), *Phyllanthus*
amarus (Keezhanelli) etc. in the
 school garden.

2.4. ENDANGERED SPECIES

Why did animals begin to live on
 land?

The very earliest creatures lived in
 water. Then, plants began to grow on
 land. These provided a new source
 of food and some animals came
 away from water to the land. They
 developed lungs instead of gills for
 breathing.

- Molluscs I Insects

I Fishes

I Birds

I Reptiles I Mammals

The first to come on land were the amphibians.

How did the dinosaurs become extinct?

They are prehistoric animals and disappeared due to natural calamities. Their names are of Greek terms. The word dinosaur means 'terrible lizard'

Today many species of animals are in danger of extinction. They include rhinos, whales, wolves, eagles and a few rain forest birds. Some are being killed for their horns, skins, bones or the land they live on. Others are being poisoned by man – made chemicals and are caught in traps. In ancient clays, kings and high officials of Royal Britain hunted many wild animals. Today, poachers keep hunting the animals for their own benefits. Monal found in Himachal Pradesh is one of the most beautiful birds and it has been hunted to the level of extinction. Species that are less in number and are in considerable danger of becoming extinct are termed as Endangered Species.

There are many Projects which were

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proposed by the Government of India. such as Project Tiger, Project Elephant, Operation Rhino, Gir Lion Project and the Crocodile Breeding Project.

"Project Tiger" The population of tigers (*Panthera tigris*) reduced from 40,000 in 1972. On 13th, April 1973, Project Tiger was launched by the Government of India, it resulted in the increase of population of tiger.

"Project Elephant" Elephant is our National heritage animal. The population of the Indian elephant- *Elephas maximus*, is threatened due to habitat destruction and poaching for ivory. An ambitious programme "Project Elephant" was launched by the Ministry of Environment and Forests, which focuses on solving the problems of humans and elephants competing for the same habitat.

“Operation Rhino” Number of Indian rhinos or one horned Rhinoceroses (Runicornis) are lost due to hunting and natural calamities. To protect the Indian species, a centrally sponsored

Due to deforestation and various causes, the populations of several species of plants and animals are at the verge of extinction and are considered endangered.

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rehabilitation programme was undertaken in Dudhwa National Park.

“Lion Sanctuary” In 1972, a five year plan was proposed by the Government of Gujarat, to protect this magnificent feline species in the Gir Sanctuary. Its National Park and ecological balance of the habitat are properly protected. This has resulted in an increase in lion population.

Crocodile Breeding Project:
Crocodile Breeding and Management Project was launched by the

Government of India in 1975 for all the three endangered crocodile species namely, the fresh water crocodile (Crocodylus palustris), saltwater crocodile (Cricidylus porosus) and the rare gharial (Cravialis gangeticus)

ACTIVITY 2.2

IDO

o If I find stray dogs disturbing the

public, I inform the Blue cross and request them to take care of the dogs.

2.5. RED DATA BOOK

It is a record book. The International Union for Conservation of Nature and Natural Resources (IUCN) maintains the Red Data Book. The Red Data Book contains a record of animals which are identified as endangered species or animals which are on the verge of extinction.

In India, animals like the Indian one – horned Rhino, Nilgiri Tahr, Lion – tailed Macaque, Asiatic Lion, Indian Tiger, Olive Ridley turtle and birds like Hornbill, Monal, Great Indian Bustard,

and Pheasant are on the verge of extinction.

MORE TO KNOW

NGC (National Green Corps) of the Ministry of Environment and Forests, Government of India.

National Animal – Tiger

National Bird – Peacock
National Flower – Lotus

National Fruit – Mango

National Tree Banyan tree
National heritage – Elephant

Lion, Tiger, Leopard, Snow leopard and Clouded leopard are found in

India. Cheetahs became extinct in the 1950s.

The breeding area of the famous Olive Ridley's turtle is the Coast of Odisha while the Hawksbill Turtle is on the Coast of Tamil Nadu.

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MORE TO KNOW

OUR STATE SYMBOLS

STATE TREE

STATE ANIMAL

STATE BIRD

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All animals have an instinctive perception of the changes in temperature and just as people seek or spend their summer in cool places and their winter in warm places, all animals that can do so, shift their habitat in various

seasons

ARISTOTLE, 384 – 322 B.C, History of animals

Aristotle recognized the seasonal movements of animals 2000 years ago. Migration is the phenomenon of the movement of animals from their habitat to some other habitat for a particular time or period every year for a specific function like safe breeding. The Vedanthangal Bird Sanctuary is one of the most spectacular breeding grounds in India. This Sanctuary has

been protected by the local people for

over 250 years. Vedanthangal is a home for migratory birds such as pintail, garganey, grey wagtail, blue-winged tail, common sandpiper and other birds.

Navigation Databanks of Migratory Birds

Each year as the days shorten and the food supply dwindles, many bird species prepare themselves for a long flight to warmer and more congenial

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climates. Then one day, driven by deep ancestral urges, they set out for unknown destinations. For example, the swallows of Northern Europe may fly 6800 miles (11,000 km) or so, to their African wintering grounds. When they move in groups they are protected from their predators. Many birds that migrate may be sensitive, to variations that occur in the earth's magnetic field. With the help of that, they find their destinations. Racing pigeons find their way home only by this method.

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When a swarm of desert locust is on the move (a single swarm is about 50,000 million) it eats 3000 tons of vegetation in one day. The salmon fish travel up to 1500 miles (2400 km) from the sea to fresh water for breeding. Most of them die after breeding due to exhaustion.

The Brazilian turtles travel up to 1250 miles (2000 km) in eight weeks time for breeding

Barren grounds Caribou of North America travel over 3700 miles (5000 km) the longest annual migration of any mammal

Why do herds of elephants enter the villages ?

It is not the herd of wild elephants that enter the village, or field etc. Humans have occupied their habitat (territory).

The Government has taken many steps to protect wild life by creating Sanctuaries and National Parks.

Sanctuaries : Sanctuaries are places where the animals are well protected from any danger. Hunting or capturing is highly prohibited there. In our country there are about 500 sanctuaries. One of the most important missions of sanctuaries, beyond caring for the

animals is educating the people. The individuals should be educated about the importance of animals so that the

. K' I p I
Migration of turtle

animals can be protected, and a good ecological balance can be maintained.

Bio-diversity Loss

Loss of bio-diversity occurs when either the habitat essential for the survival of a species is destroyed or a particular species is destroyed. The former is more common. The latter reason is

encountered when particular species are exploited for economical gain and hunted for sports or food.

Peacock

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The main objectives and advantages of o It provides immediate benefits bio-diversity conservation are as follows: to the society such as recreation

0 To preserve the continuity of and tourism
food Chain 0 It ensures the sustainable

utilization of life supporting

o The genetic diversity of plants
systems on earth.

and animals is preserved
Some important Sanctuaries in Tamilnadu

NAME OF THE SANCTUARY/
LOCATION
Mundanthurai and Kalakkadu

1. SanCtuary__|_irUne|Ve" Lion- tailed monkey, Tiger

S.No ANIMALS

2. Srivilliputtur sanctuary – Virudhunagar Grizzled squirrel, Barking Deer

3. Vedanthangal sanctuary – Kancheepuram Cormorants, Grey Heron

4. Mudhumalai sanctuary – The Nilgiris Elephants, Gaur, Langur

5. Viralimalai sanctuary – Tiruchirappalli Wild Peacocks

Lu 6. Kodikkarai sanctuary – Nagapattinam Chital, Wild Bear

CZ) NATIONAL PARKS: National Park is an area dedicated to protect the
E environment, the natural objects and the wild life there in. Many National
Parks

0 were initially wild life sanctuaries. There are about 89 National Parks in
India.

"3 Some important National Parks in India

Name and Location Important Species

1. Bandipur National Park, elephant, panther, barking deer, tiger, Mysore – Karnataka sambar.
2. Corbett National Park, four horned antelope, elephant, chital, Garhwal – Uttarpradesh tiger, nilgai.
3. Gir National Park, Asiatic lion, panther, nilgai wild boar, Junagarh – Gujarat chinkara.
4. Kaziranga National Park, elephant, one horned rhinoceros, wild Jorhat – Assam buffalo, tiger, leopard.
5. Periyar Sanctuary, elephant, chital, nilgai, sambar, tiger, Idukki – Kerala barking deer.

ACTIVITY 2.3 WE OBSERVE

We try to have a pet corner at school so that an awareness about the love and care of animals is created among students. eg. aquarium, birds.

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Currently bio-diversity is estimated to range from 10 to 100 million species, of which only 1.4 million have been formally catalogued. There are 12 mega diversity centres in the world. India is one among them. Diversity among the living organisms is known as Bio-diversity. The bio-diversity of the earth is unimaginable.

The natural causes for the loss of bio-diversity are floods, earthquakes, landslides, natural competition between species, lack of pollination and diseases.

At the same time, man is the only cause for the loss of bio-diversity. Destruction of habitats occurs in the wake of developmental activities like

Nature

Big Cats of India

Tigers and lions belong to the cat family.

They are commonly known as "Big Cats".

housing, agriculture, construction of dams, reservoirs, roads, railway tracks etc. These developmental activities affects bio-diversity.

Even the loss of a single species is a tragedy, because each form of life is a storehouse of irreplaceable genetic resources. Extinction is an irreversible process and when a species becomes extinct it leads to a cascade of extinctions.

All life on earth is interdependent and man is only a strand in this delicate web of relationships.

We keep rapidly eliminating the conditions necessary for the continued existence of bio-diversity due to over exploitation and ignorance.

India is the only country having 5 species of big cats
In its forests.

But, we should have, had six.

Unfortunately, Cheetahs became extinct in 1950s

No other country has this diversity.

But have you realized its significance ?

Clouded Leopard

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2.9. TRADITIONAL KNOWLEDGE & PEOPLE'S INITIATIVES IN BIO-DIVERSITY

Sacred grove

These are the tracts of forests that are communally protected. As they have a temple or a deity pertaining to a particular forest, conservation of the sacred grove is of high priority and the whole community is involved in it. Tradition of tree worship (to protect) is observed all over India.

Worship of the species varies according to community, region, as well as use value as per availability. Because of traditions these species are protected. Traditional practices still followed by the tribals do not commercialize forest products and they never exploit them in an unsustainable manner.

Sacred grove

Traditional knowledge is transmitted orally from generation to generation. It tends to be collectively owned and takes the form of stories, songs, folklore, proverbs, cultural value beliefs and rituals including the development of plant species and animal breeds.

Sheelan: Thank you, sir. I have gained a lot of knowledge about the importance of conserving our forests, I promise to spread this awareness to my friends and others.

ACTIVITY 2.4 I DO

Ø I present a sapling to the school on my birthday.

Ø I grow new plants in the empty places near my surroundings

including the space inside my house and on the terrace of my house too.

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2.10. HUMAN WILD LIFE CONFLICTS

It is a well known fact that man has been the sole creature responsible for the destruction of a large number of habitats, by over population, crowding, over exploitation etc. As human population keeps on increasing, we move into the forest land and occupy the habitats of plants and animals. So conflicts arise between the animals and man. Animals like elephants, wild buffaloes, and tigers come in groups to the farmlands for food and water and destroy them. Human beings encroach their lands for their benefits. So the animals are not to be blamed.

Protecting the environment is every one's responsibility. There is an increased awareness among the people towards the conservation of ecologically sensitive areas. Green Peace – a group devoted to environmental protection was responsible for the ban on whaling. In India, the Chipko movement was initiated by Sunderlal Bahuguna who stopped the felling of trees in some parts of the Himalayas.

Some of the activities in the areas of environmental conservation include:

Ø Holding rallies and marches to

Sunderlal Bahuguna

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bring about a mass awakening
to environmental issues

0 Spreading awareness through
mass media

0 Introducing environmental
legislation to tackle the issue

ACTIVITY 2.5 I DO

1. | list the factories disturbing
the bio-diversity of my area.
Some of these factories and
human activities may disturb
bio-diversity unknowingly. I list these
human activities and analyse how
these can be checked.

2. | find the endemic (confined to my
area alone) plants and animals
of the region where I live, and I
specify how many varieties are very
rare.

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EVALUATION

1. Choose the best answer:

- a) Species with low population numbers that are in considerable danger of elimination are termed as (endangered species / extinct)
- b) All non-domesticated and non-cultivated biota in the natural environment are termed (wildlife / ordinary life)
- c) The natural vegetation in a particular area is termed as (flora / forest)
- d) All the organisms of the animal kingdom are termed as (fauna / protozoans)
- e) The word 'dinosaur' means (terrible lizard / dragon lizard)

2. In India, Social Forestry was started in 1976. its aim is to promote natural forests and create man made forests on unused lands. Suggest some steps to convert a sterile land into a cultivable one.

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3. Wildlife is essential for ecological balance and is a big attraction to tourism. Support the statement with your suggestions.

4. People tried several methods to keep wild animals away from the fields and villages.

Power fences were erected around the fields against animals. Is it a healthy practice? Do you have any alternative that would help both animals and man?

5. Planting trees is known as afforestation and cutting down trees is deforestation. Is there any permanent solution to the problem of deforestation?

6. Deforestation leads to many changes in the following but they are not in the right order. Arrange them in proper sequence.

a) Earth b) cities (urban area) c) environment d) wild animals
e) villages f) rural areas g) the next generation

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7. What will happen if

- a. we go on cutting down trees.?
- b. the habitat of an animal is disturbed ?.
- c. the top layer of the soil is exposed ?.

8. Indiscriminate cutting of trees will lead to deforestation. How does it reduce rainfall on the one hand and lead to floods on the other hand?

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