

* Remedial Biology *

BPI06RBT

Descending order
of Taxonomy

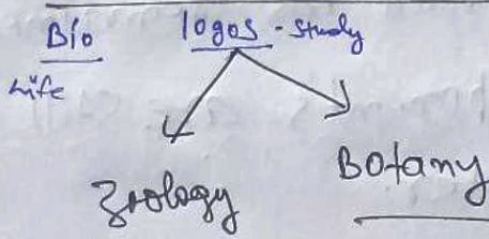
Kingdom
Class
Family
Genus
Species

Introduction of Biology

Five Kingdoms

Animalia
Fungi
Protista
Monera
Plantae

Father of Biology Biology - Study of life
Aristotle



* Science or branch of Biology dealing with animals

Father of Zoology
Aristotle

* The Branch of Biology that deals with plant life

Father of Botany
Theophrastus

Biology :- Biology is a ^{branch of} science

Bio + logos
that deals with the living organisms and their functions. It is a study of life - all living. Present, Past and future are linked to one other by sharing common genetic materials to varying degrees.

Living world :-

Definition :- The living world can be described as the world around us. It comprises all living creatures, plants and microorganisms that we cannot see. It has changed over the course of billions of years but the general composition has remained the same. The main components are still organic and inorganic matter.

Characters of living organisms.

Living → characteristics like growth, reproduction, ability to sense environment & give response.

⇒ Other characteristics like metabolism, ability to self replicate, self-organism, interact etc.

Growth :- → ↑ in mass and number of individuals.

Multicellular organism → grows by cell-division.

Plants → Cell division occurs throughout their life span.

Unit - 1 (6)
Animals → growth occurs upto a certain age, though cell division occurs in some tissues to replace old cells.

Unicellular → grow by cell division
→ observed in in-vitro cultures by counting no. of cells under microscope.

In higher animals & plants → growth & reproduction are exclusive ↑ in body mass.

Reproduction :-

Multicellular organisms → production of progeny possessing features similar to parents → Sexual reproduction's mainly.
→ Asexual

eg:- Fungi through Spores.
yeast & hydra by budding
Flat worms → regeneration by fragmentation.

Unicellular like bacteria, Amoeba → Reproduction \approx growth i.e. ↑ in number of cells.

Some organisms that don't reproduce → mules, sterile worker bees, infertile humans.

⇒

⇒

Metabolism:- All living organisms are made of chemicals these chemicals have different functions & are being continuously made & changed into other biomolecules.

These conversions are metabolic reactions. All plants, animals, fungi & microbes exhibit metabolism.

Consciousness:- defining property of living organisms.

⇒ Ability to sense their surroundings & respond to this external stimuli by physical, chemical or biological means.

⇒ use of sense organs in animals.

⇒ Plants respond to light, water, temperature, other organisms, pollutants etc.

“ All living phenomena are due to interactions. Living organisms are self-replicating and self-regulating interactive systems capable of responding to external - Stimuli ”

DIVERSITY IN THE LIVING WORLD

Biodiversity → Number and types of organisms on earth. The number of species known are around 1.7 - 1.8 million and new ones are still being identified by exploring both old & new areas.

⇒ Local names vary from place to place

⇒ To standardise the naming → nomenclature.

⇒ For plants → Scientific names based on

* Specific Criteria, provided in International Code for Botanical Nomenclature (ICBN)

* ⇒ For animals → International Code of Zoological Nomenclature (ICZN)

Binomial Nomenclature (by Carolus Linnaeus - US)

⇒ Naming System using 2 word format

Each name has two components - Generic name and specific epithet

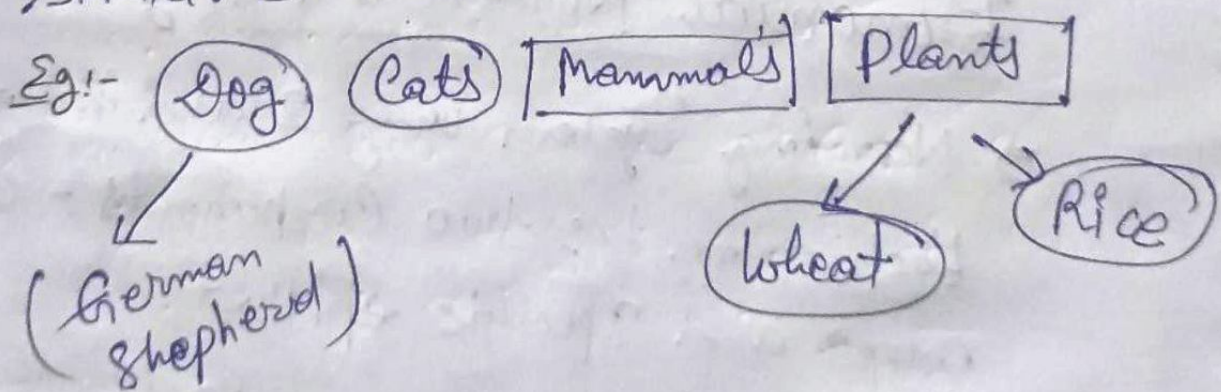
eg:- Mango ⇒ Mangifera indica
 ↙ represent genus. ↓ represent a particular species.

Rules of nomenclature :-

- * Biological names are in Latin & written in italics.
- * First word represents Genus & second word → specific epithet.
- * When handwritten, both words written separately and underlined, when printed → they are in italics to represent Latin origin.
- * First of the author appears after the specific epithet and is written in abbreviated form.

eg:- Mangifera indica (Linn)
↳ Linnaeus

Classification ⇒ grouping based on similar characters.



Scientific terms for all such categories -

- is → TAXA

(Can indicate categories at different levels) ⇒

Taxonomy Classification of living organisms, based on characteristic features into different taxa.

TAXONOMIC CATEGORIES :-

Taxonomical studies of all known organisms have led to the development of common categories such as Kingdom, Phylum or division (for plants) class, order, family, genus and Species.
↳ lowest category.

Species :-

⇒ A group of individual organisms with fundamental similarities.
⇒ One species is closely related species based on the morphological differences.

eg:- ^(Mango) Mangifera indica, Solanum tuberosum (-
(Potato) and Panthera leo (Lion),
Homo sapiens (Human's)

Here, indica, tuberosum and leo → Specific epithets. Mangifera, Solanum and Panthera → Genera

⇒ Each genus may have one or more than one specific epithets representing different organisms but having morphological - similarities.

⇒

Genus

⇒ A group of related species which has more characters in common in comparison to species of other genera.

⇒ Genera are aggregates of closely related species.

eg:- Potato & brinjal are two different species but both belong to the genus Solanum, Lion (Panthera leo), Leopard

(P. pardus) & Tiger (P. tigris) are all species of the genus Panthera because of several common features.

Family

⇒ A group of related genera with still less number of similarities as compared to genus and species.

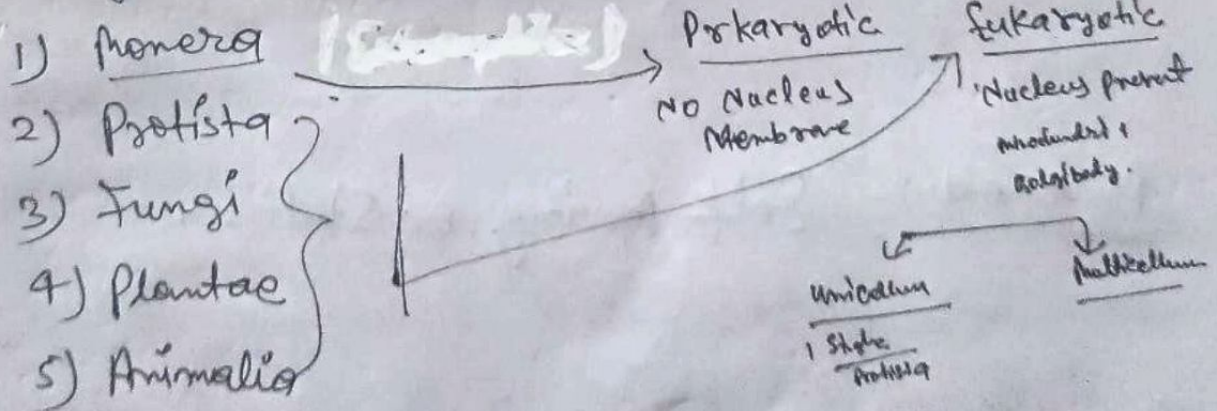
⇒ Families are characterized on the basis of both vegetative and reproductive features of plant specific species.

Five Kingdom's (R.H. Whittaker) 1969.

Introduction :- Presently the Planet Earth is home to more than 8 Million Species, and continuously the new ones keep being discovered. In 1969, Robert Whittaker was the biologist who prepared the Five Kingdom classification, which is based on cell structure, thallus organization mode of nutrition, reproduction and phylogenetic relationships.

The Five Kingdom Classification.

R.H. Whittaker prepared the Five Kingdom Classification and this classification made it easier to classify organisms into five different Kingdoms -



Classification basis for Five Kingdom classification

- 1) Cell type
- 2) Cell wall
- 3) Nuclear membrane
- 4) Cell organization
- 5) Nutrition mode.

Nutrition: Autotrophic (makes its own food) or Heterotrophic (Feeds on other living things)

Cell organisation: Unicellular (having only one cell) or Multicellular (having two or more cells).

Cell type :- Eukaryotes (the genetic material is surrounded by a membrane) or Prokaryotes (lacking a membrane)

Respiration :- Aerobic (needs oxygen) or anaerobic (does not use oxygen).

Reproduction :- Sexual, asexual or through spores.

^m Genetic

^{non} clonal

Movement :- Self moving or Static.



Classification of Five Kingdoms

01) Animal Kingdom :- The Kingdom Animalia is the most evolved and is divided into two large groups - vertebrates and invertebrates. These animals are Multi-celled, Heterotrophic Eukaryotes with aerobic respiration, sexual - reproduction and the ability to move.

02) Plant Kingdom :- Trees, plants and other species of vegetation make up part of the Plantae Kingdom - one of the oldest, and characterised by its immobile, multicellular and Eukaryotic nature. These autotrophic things, whose cell contain cellulose and chlorophyll are essential for life on Earth since they release oxygen through photosynthesis.

03) Fungi Kingdom :- This name is used to designate the Fungi Kingdom which includes yeasts ~~and~~, moulds and all species of mushrooms and toad stools. These multicellular aerobic ~~heterotrophic~~ heterotrophic eukaryotes have chitin in their cell wall.

04) Protista Kingdom :-

This group is the most primitive of the Eukaryotes and all the others are descendants of it. ⇒

The protista kingdom is paraphyletic
- and it includes these eukaryotic organisms
that are not deemed to be animals, plants
or fungi. Eg:- Blue green alga, Amoeba, Euglena
Plasmodium

05) Monera Kingdom :-

This is the kingdom of microscopic living
things and groups together the prokaryotes
(archaea and bacteria) This group is
present in all habitats and is made
up of single-celled things with no defined
nucleus.

Morphology of Flowering Plants

Morphology is the name given to the science that deals with the study of the form and structure of things. No matter which plant you take, the morphology of a flowering plant includes the roots, stem, leaves, flowers and fruits.

Let us have a look at the flowering plants and morphology of flowering plants notes in details.

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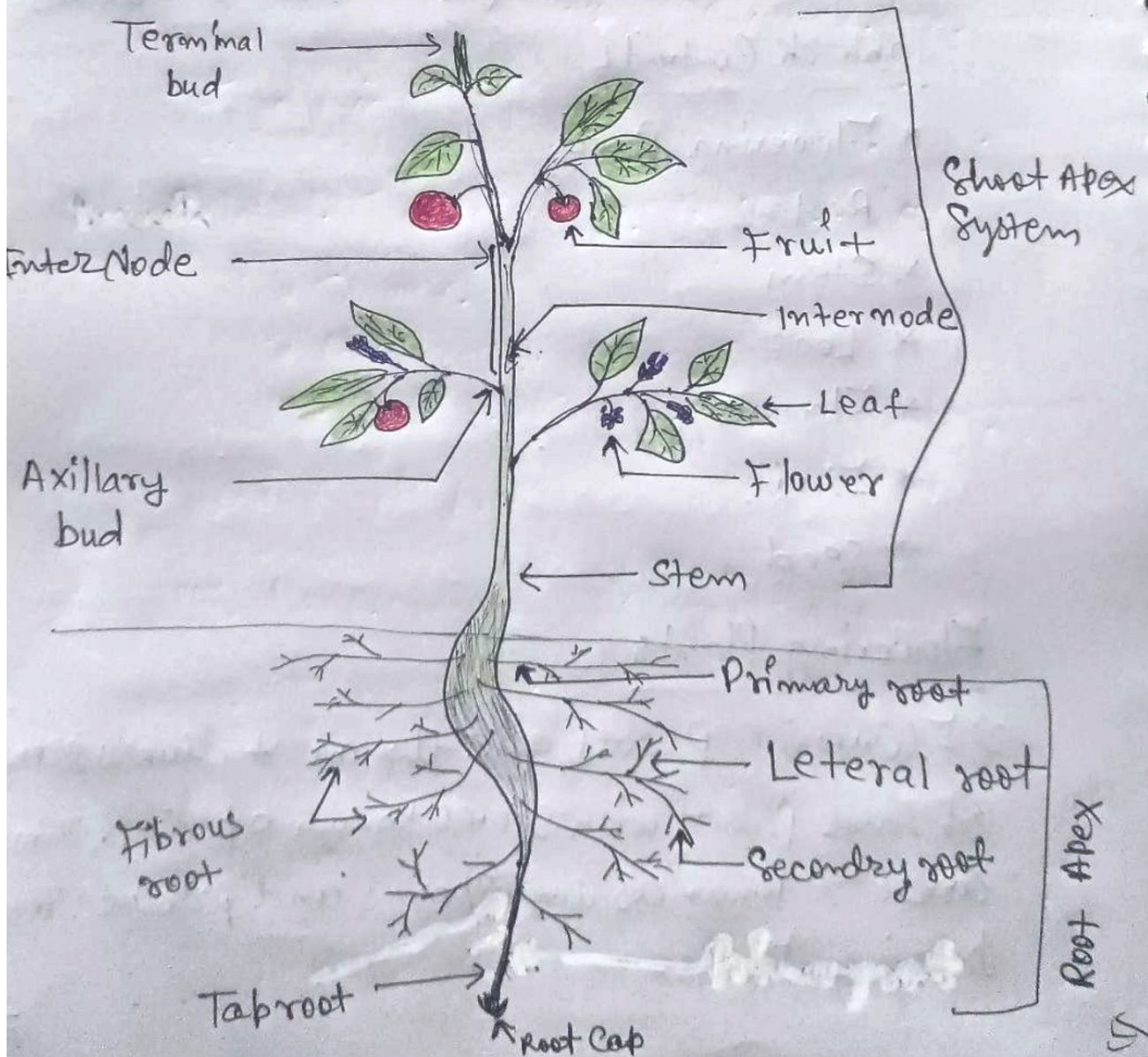
Flowering Plants

⇒ Flowering plants are the most diverse group of land plants with 300,000 known species. They are also known as angiosperms and produce seed-bearing fruits.



The flowering plants reproduce by the process of pollination. In this, the pollen grains transfer from the anther flower of the male of the male flower's to the stigma of the female flower where fertilization occurs and seed is formed.

Morphology of Flowering Plants



⇒ when we look into the morphology of flowering plants, a plant has two systems root system and shoot system. The underground part is called the root while the one above is named the shoot.

Root System :-

⇒ The root is a brown, non-green and underground part of a plant. Root with their branches is collectively called a root system. There are three types of the root system.

* Taproot System :-

⇒ The taproot is mainly found in dicotyledonous plants. It develops from the radicle of the germinating seed, along with its primary roots and branches, giving rise to the taproot system. Mustard seeds, mangoes, grams and banyan are a few examples of dicotyledonous plants with taproot system.

* The fibrous root system :-

⇒ The fibrous root is mainly found in ferns and in all monocotyledonous plants. This root develops from thin, moderately branching roots or primary roots, growing from the stem.

eg: wheat, radish, grass, carrots, onion.

⇒

* The adventitious root system:

⇒ The roots which originate from any part of the plant body other than radicle is called the adventitious root system. This mainly found in monocotyledonous plants. The root system is used for various purposes, like mechanical support, vegetative propagation, eg ⇒ Banyan tree, maize, oak tree, horsetails

Functions of root

General functions of a root include:

- * Storage.
- * Anchorage.
- * Absorption of water and minerals.

Regions of root

The three regions of a root are—

01. The root cap.
02. The region of maturation
03. The region of elongation

Root System

⇒ Another essential part of the plant is its

⇒ stem. It is the ascending part of the plant axis which bears branches, leaves, flowers, fruits and helps in the conduction of water and minerals.

Characteristics of Stem

Some of the important characteristics of the stem are:-

- 01) The stem develops from the plumule and epicotyl of the embryo.
- 02) The stem is erect and grows away from the soil towards the light.
- 03) There is a terminal bud at the apex of the stem.
- 04) In angiosperms, the shoot is differentiated into nodes and internodes.
- 05) young stems are green and photosynthetic.
- 06) Multicellular hair is present.
- 07) The stem and branches of mature plants bear fruits and flowers.

Different Forms of Stem

Stem is modified into the following different forms.

- 1) Suckers 2) Runners 3) Climbers 4) Tubers

→

1) Rhizome 2) Stems 3) Thorns 4) cladode.

Leaves

⇒ The leaf is a laterally borne structure and usually flattened. It is the main photosynthetic part of the plants. It absorbs light and helps in the exchange of gases through the stomata.

The main parts of the leaf include the leaf base, petiole and lamina. They grow at the node and bear a bud at the axil. The leaves are green because of the presence of the photosynthetic pigment called chlorophyll and have a tiny pore or opening called stomata, where the gaseous exchange takes place.

Characteristics of leaves

- 1) The leaf arises from the node.
- 2) It is exogenous in origin.
- 3) It has a bud at its axis.
- 4) The growth of the leaf is limited.
- 5) The leaves do not bear an apical bud.

Modifications of Leaves

⇒ Leaves are modified according to the functions they perform. The different structural forms of leaves include:

- * Leaf Tendrils.
- * Spines
- * Storage leaves.
- * Insect - Catching leaves.

Function of Leaves

⇒ Some of the important functions performed by leaves are:

- 1) Photosynthesis
- 2) Transpiration
- 3) Storage
- 4) Guttation
- 5) Defence

Flowers

⇒ The flowers are the reproductive part of the plant. The arrangement of flowers on the floral axis is called inflorescence, which has two major parts called racemose which let the main axis continue to grow and cymose.

The flower consists of four different whorls:

- * Calyx (the outermost)
- * Corolla (composed of petals)
- * Androecium (composed of stamens)
- * Gynoecium (composed of ovary and carpels)

The reproduction in plants occurs by the process of pollination. It is the process of transfer of pollen from the anther to the stigma of the same or different plants.

Functions of Flower's

⇒ The flower's performs the following important functions :-

- 01) They help in the process of reproduction.
- 02) They produce diaspores without fertilization.
- 03) The gametophytes develop inside the flower.
- 04) The flowers attract insects and birds which then act a medium to transfer the pollen from anther of one flower to the stigma of some other flower.
- 05) The ovary of the flower develops into a fruit that contains seed.

Fruit's

⇒ The fruit is the characteristic feature of flowering plants, which is a ripened or mature ovary and the seed is what the ovules develop into after fertilization. The fruit that develops without fertilization is known as parthenocarpic.

Types of Fruits

⇒ There are three different types of fruits and are classified mainly based on their mode of development.

01) Simple: - Developed from the monocarpellary ovary or multicarpellary syncarpous ovary.

02) Aggregate: - Developed from the multicarpellary apocarpous ovary. Examples of aggregate fruits.

03) Composite: These are false fruits, developed from the entire inflorescence rather than from single flower. Examples of Composite Fruits include blackberries, Raspberries, Strawberries etc.

The Seed: -

⇒ A seed is a basic part of a plant, which is found enclosed within the fruit. It is made up of a seed coat and an embryo. During the development of the fruits, the wall of the ovary becomes the pericarp. In some plants, the ovary wall dries out completely, while in some it remains fleshy.

⇒

Types of Seeds

⇒ Based on the number of cotyledons, seeds are further classified into two types - Dicotyledonous and monocotyledonous seeds.

01) Monocotyledonous :- The embryo consists of an embryo axis and has only one cotyledon. The monocotyledonous is also known as monocot seeds. Grains including rice, millet, wheat and other plants like onions, corn, ginger, banana, palm tree are examples of monocot seeds.

02) Dicotyledonous :- The embryo consists of an embryo axis and has two cotyledons. The dicotyledons are also known as dicots or dicot seeds. Legumes including beans, pea, peanut and tomato are examples of dicot seeds.