

## Biological Organisation

### Levels of Taxonomic Classification

Kingdom  
Division  
Class  
Order  
Family  
Genus  
Species

### Levels of Ecological Organisation

Population  
Community  
Ecosystem  
Biosphere

### Five major branches of Botany

- Plant Anatomy
- Plant Ecology
- Plant Morphology
- Plant Physiology
- Plant Taxonomy

### Group of Plants:

Algae	–	found in aquatic medium
Bryophytes	-	aquatic/wet area
Pteridophytes	-	aquatic, land, water logged
Gymnosperms	-	on land
Angiosperms / Flowering Plants	-	Land

### Land Plants Evolution

Algae as possible ancestors

Problems faced by earlier land plants:

desiccation

support

-water availability

Adaptations (solutions)

-roots

-vascularity

-cuticle

-stomata

-storage

## Sporophyte evolution

- Haploid / diploid phase
- Sporophyte most conspicuous
- Angiosperm – flowers
- Insects/for pollination – self/cross fertilization
- Increased vigour
- Seed/fruit dispersal mechanisms

## Why study of plants are important

- Plants are primary producers
- Source of food
- Plants are the bases of drugs (medicine)
- Source of building materials

## Agronomic usefulness of plants

Inter-cropping can make a variety of food crops available throughout the year if the crops have different harvest times.

Increased food production will involve genetically altered plants thereby improving growing practices and more efficient food distribution.

## Processes Occuring in Living Plants

- i. Photosynthesis
- ii. Stomatal opening and closing
- iii. Ion absorption
- iv. Translocation
- v. Respiration
- vi. Transpiration
- vii. Flowering
- viii. Seed formation

## Physical environment from which plants obtain their nutrients

Atmosphere (air)

Hydrosphere (water)

Geosphere (land/soil)

Binomial nomenclature Scientific method of naming organisms whereby an organism is given two names (Genus and species).

Example of binomial system of naming:

*Mangifera indica* – mango

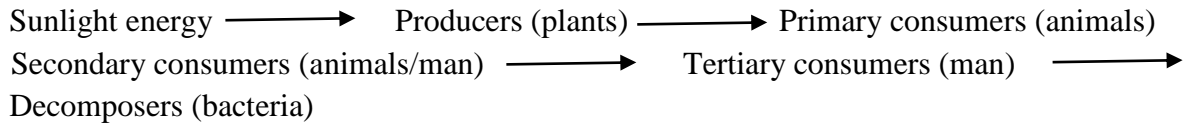
*Oryza sativa* - rice

Swedish scientist Carl Linnaeus introduced the binomial system of classification.

## Energy flow

Energy flow is the passage of energy in a one-way direction, through an ecosystem it enters an ecosystem as sunlight energy (photosynthetic) – in chemical form, energy is stored as carbon containing molecules such as glucose.

### One-way energy flow



### Energy sources in living things:

Light energy / Chemical energy

Three steps involved in generating scientific theories

- (a) Observation of objects or events in the physical universe (weighing of samples, measurement of samples to generate data)
- (b) Analysis of data
- (c) Formulation of hypothesis and testing

### Scientific methods

Scientific methods involve a series of ordered steps and is a framework commonly used by scientists

- Careful Observations
- Asking critical questions
- Develop hypothesis (testable statements)
- Making predictions that can be tested
- Interpreting the results of experiments and draw conclusions from them.

### Origin of Life

The universe came into being about 20 billion years ago.

The oldest known fossil is 3.5 billion years old.

The eukaryotic cells came into being 1.4 billion years ago.

Five (5) theories accounting for origin of life on earth

Special creation

Spontaneous generation

Steady state theory

Cosmozoan theory

Biochemical evolution

Theory “*Omnis cellula e cellula*” – Cells come from pre-existing cells according to Rudalf Virchow

Theodor Schwan in 1839 concluded thus;

- (i) The cell is the unit of structure, physiology and organisation in living things – True
- (ii) The cell retains a dual existence as a distinct entity and a building block in the construction of organisms – True
- (iii) Cells form by free cell formation, similar to the formation of crystals (Spontaneous generation) – False

Cosmozoan theory of the origin of life

Evidence:

- Bacteria-like organism found on rock from Mars
- Organic particles drop from space

Three scientists that presented evidence that life can arise only from pre-existing life

- Francesco Redi
- Lazzaro Spallanzi
- Louis Pasteur

*For further reading:*

BIOLOGICAL SCIENCE

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