CLASSIFICATION

*The systematic grouping of organisms into recognizable categories (groups) based on evolutionary or structural relationships between them.

*Classification facilitates reference to them and transmission of information about them.

Species is the basic unit of the classification system.

*A **species** is a group of morphologically similar organisms that can/do interbreed, thus sharing the similar gene pool.

*Closely related species (those sharing one or more significant morphological features) are grouped together in the next highest category, the genus.

* Related genera make up a family.
* Related families are grouped into an order.
*Related orders are grouped into a class,
*Related classes are grouped into a phylum.
*Taxonomic systems used by biologists are hierarchical, that is, each higher group contains all the groups below it.

*Knowing phylogenetic relationships is essential for interpreting the evolution of traits of organisms.

*Many different traits are used to classify organisms because no one type of information is always the most appropriate.

*Any trait that is variable and measurable is referred to as Ordinary Taxanomic Unit (OTU) .

Goals of classification

*Biological classification systems should reflect evolutionary relationships among organisms.

*Classification must be easy to use.

*It must be stable.

*It should serve as an aid to memory.

*It must be predictive.

*It must be concise.

Principles of Classification

*While developing a system of classification of organisms, certain basic principles are observed.

1. Morphology criteria:

Morphology forms the primary basis for classifying organisms into various taxonomic groups or taxa.

*In earlier artificial systems, only one or a few morphological characters were taken into consideration (e.g. plants were classified into herbs, shrubs, trees, climbers, etc. on the basis of their habit).

* The sexual system proposed by Linnaeus was based mainly on the characteristics of stamens and carpels.

*Later on, Bentham and Hooker's natural systems of classification of plants) took into effect, a large number of morphological characters.

*As a result, classification of plant groups was more satisfactory and their arrangement showed natural relationships with each other well.

*The similarities in the morphological characters are used for grouping the plants together. Because, these similarities indicate their relationships.

*On the other hand, differences or dissimilarities of characters are used for separating the plant groups from each other. Plant groups with greater differences are considered to be unrelated or distantly related

(ii) Phylogenetic considerations :

*In the more recent systems of classification of plants.

* a greater emphasis is given on the phylogenetic arrangement of plant groups, ie. an arrangement which is based on the evolutionary sequence of the plant groups.

* These systems also reflect on the genetic similarities of the plants.

*Some of the phylogenetic systems of classification of plants are the ones proposed by Engler and Prantle (1887-1899), Bessey (1915), Hutchinson (1926 and 1934), etc.
*However, none of these or any other systems is a perfect phylogenetic system.
*This is because, our present knowledge of the evolutionary history of plant groups is very fragmentary and incomplete.

*Modern taxonomy takes into consideration data available from all disciplines of botany for classification of plants.

*This helps immensely in establishing inter-relationships of various plant groups.

*As a result, taxonomic arrangement becomes more authentic and convincing.

Iii) Chemical Taxanomy/ Chemotaxanomy

*It is a comparatively recent discipline. Chemotaxonomy is the application of phyto-chemical data to the problems of systematic botany.

*The presence and distribution of various chemical compounds in plants serve as taxonomic evidences.

*Nearly 33 different groups of chemical compounds have been found to be of taxonomic significance.

iv) Numerical taxanomy

*Application of numerical methods (data) in the classification of taxonomic units is called numerical taxonomy.

*It involves exhaustive quantitative estimation of taxonomic characters (OTU) from all parts of the plant as well as from all stages in the life cycle.

*The numerical data collected for various plant groups is tabulated systematically. *Computers are used for this purpose.

*The main objective of numerical taxonomy is to clarify and illustrate degrees of relationship or similarity in an objective manner.

*This branch is becoming an indispensable aid in modern systematics.

*Edgar Anderson (1949) was the first to make use of numerical taxonomy in the classification of flowering plants.

Functions of classification

1. The size and diversity of plant and animal kingdoms make classification necessary.
In this light they serve as an aid to memory.
*They help us remember organisms and their traits.
It is an impossible task to record and remember the character and properties of each one of these organisms, individually

2. Classification systems improve our ability to explain relationships among things.

*For biologists, this is especially important when we attempt to reconstruct the evolutionary pathways that have produced the diversity of organisms living today.

3. Classification systems greatly improve our predictive powers.

Eg. the effect of pollution on a species at one location should be similar to the effect on a close relative living in a different area.

4. Classification systems improve our ability to explain relationships among things.

For biologists, this is especially important when we attempt to reconstruct the evolutionary pathways that have produced the diversity of organisms living today.

5. Taxonomic systems provide relatively stable, unique, and unequivocal names for organisms.

* If those names are changed, the systems provide means of tracing the changes.

Common names, even if they exist (most organisms do not have common names at all), are unreliable and often confusing.