TOPIC: SYSTEMATICS AND BINOMIAL SYSTEM OF NOMENCLATURE

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CLASSIFICATION

Biological classification

- The art of identifying distinctions among organisms and placing them into groups that reflect their most significant features and the relationship is called biological classification.
- The purpose of biological classification is to organize the vast number of known organisms into categories that could be named, remembered and studied.

- **According to"A.P. de Candolle", Classification is of two types:**

(A) Empirical Classification

Fig: Flora

- In this type, the actual nature or character of plants is not considered.
- Plants are classified on the basis of their alphabetical order, i.e. on the basis of the name of plant.
- On the basis of name, plant kingdom can be classified in 26 groups. (Their are 26 alphabets in English - According to this classification, all plants having same initial alphabet, are placed in one group.

- **Example:** If the name of plants, starts from 'A', then it is placed in "A -group". Similarly if it starts with 'B', then it is placed in 'B - group
- This is not a true classification. It has only one application :- "Listing of flora".
- If any scientist, writes the flora of a particular area then he uses empirical classification.
- Flora → Plants growing in a particular area.
- Two books in which flora of India is written:
  (i) Flora British Indica → By J.D. Hooker
  (ii) Flora Indica → By William Rouxburgh

(B) Rational Classification

In this classification, plants are classified on the basis of their actual character or nature i.e. by viewing the characters.

Type of rational classification

(i) Practical classification:- In this type of classification, plants are classified on the basis of their economic importance. In this type of classification morphology of plants is not considered. Example: Oil yielding plants (Coconut, Walnut), Soybean Fibre yielding plants (Jute, Cotton), Medicinal plants (Rauwolfia, Cinchona, Eucalyptus)

- **Example:** Turmeric - Multi uses plant, it gives both medicines and spices.

Note: In this classification, any one plant can be a member of more than one group.

(ii) Artificial classification:- In this type of classification plants are classified on the basis of one or two morphological characters. i.e. overall morphology is not considered.
Example: Classification proposed by Linnaeus is Artificial
Linnaeus classified plant kingdom on the basis of only two characters:

- Stamens
- Carpel

On the basis of stamens and style, Linnaeus classified plant kingdom in to 24 classes

- Monandria — Those flowers in which only 1 stamen is present.
- Diandria — 2 stamens in flower
- Triandria — 3 stamens in flower

- Polyandria — Many stamens
- Nonandria/Cryptogamia — No stamens

Note: Linnaeus divided flowering plants into 23 classes starting with class monandria with a single stamen, (Example - Canna) and plants with twenty or more stamens attached with calyx were assigned to class Icosandria. He also included all non-flowering plants such as algae, fungi, lichens, mosses and ferns in a separate class called **Cryptogamia or nonandria.**

(iii) Natural classification:- In this type, plants are classified on the basis of their complete morphological characters of stem, root, leaves, flowers etc. Maximum characters are taken as base in this classification.

Importance:

- Natural classification is believed to be the best classification, because it represents the natural similarities and dissimilarities of plants i.e. it represents the interrelationship among plants.
- In this classification, the plants belonging to the same group shows many similarities, while in artificial classification, the plants belonging to the same group shows only, 1 or 2 similar characters. They have many dissimilarities.

Natural classification is of two types:

(a) **Natural formal** → In this classification, the phylogeny of the plant is not considered i.e. only the morphology of the plant is

considered.

(b) **Natural phylogenetic** → In this classification, both morphology and phylogeny are considered. In phylogenetic classification, the plants are arranged on the basis of their evolution.

Fig: Brassica oleracea

Note: Phylogenetic classification also known as cladistic classification. Proposed by "Sokeland Sneath". In it plants are classified on the basis of numbers of similarities and dissimilarities.

(iv) Adansonian system or phenetic classification or Numerical classification:-

In this, importance to any one character is not given, all characters have same importance. While in natural classification floral (reproductive) characters have more importance than vegetative (root, stem, and leaves) characters.

TAXONOMIC CATEGORIES

There are seven main taxonomic categories. They are obligate categories i.e. they are strictly used at the time of any plant classification.

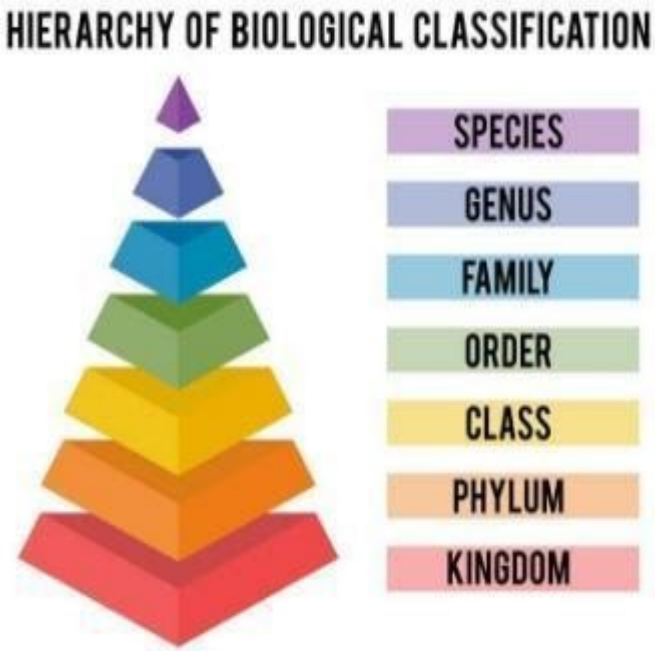

Fig: Taxonomic categories

1. Species: Species (used both as singular and plural) is a natural population of individuals or group of population which resemble one another in all essential morphological and also reproductive characters so that they are able to interbreed freely and produce fertile offspring.
Mango is species indica of genus mangifera (mangifera indica).
Potato is species tuberosum of genus solanum (solanum tuberosum).

2. Genus: It is a group or assemblage of relate species which resemble one another in certain correlated characters. Correlated

Characters are those similar or common features which are used in delimitation of a taxon above the rank of species. All the species of genus are presumed to have evolved from a common ancestor.

3. Family: It is taxonomic category which contains one or more related genera. All the genera of a family have some common features or correlated characters. They are separable from genera of a related family by important and characteristic differences in both vegetative and reproductive features.
Thus the genera of cats (felis) and leopard (panther) are included in the family felidae.

4. Order: The category includes one or more related families. Thus the family solanaceae is placed in the order polemoniales along with four other related families (convolvulaceae, boraginaceae, hydrophyllaceae and polemoniaceae).
Similarly, the families felidae and canidae are included under the order carnivore along with hyaenidae (hyaenas) and ursidae (bears).

5. Class: A class is made of one or more relates order. For example, the class dicotyledoneae (dicotyledonae, dicotoyledons) of flowering plants contains all dicots which are grouped into several orders.

- **Examples:** Rosales, passiflorales, polemoniales, sapindales, ranales, etc.

Likewise, class mammalian of animals includes all mammals which range from bats (order chiroptera), kangaroos (order marsupialia). Rodents (order rodentia), whales (order cetacean), carnivores (order carnivora) to great apes and man (order primate).

6. Division or phylum: It is a category higher than that of class. The term phylum is used for animals while division is commonly employed for plants. A division or phylum is formed of one or more classes. The phylum chordate of animals contains not class mammalian but also aves (birds), reptilian (reptiles), amphibian (amphibians), cyclostomata, chondrichthyes, osteichthyes (fishes) etc.

7. Kingdom: It is the highest taxonomic category. All plants are included in kingdom plantae while all animals belong to kingdom animalia. There are some extra categories, like sub division, sub order, sub family, tribe, sub tribe, etc. They are not regularly used. They are used only when they are needed.

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