Department of biology

((Entomology II))

2 stage

المحاضرة الاولى

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Taxonomy, principles and procedures. Nomenclature and identification

Taxonomy is the science of classification. It can be defined as placing biological organisms or forms in order. Simpson (1961)has defined taxonomy as the theoretical study of classification including basis, principles, procedures and rules. Taxonomy includes nomenclature and classification.

Systematics: The science of study of kind and diversity of organisms and any or all relations among them. Systematics includes taxonomy and evolution.

Stages of taxonomy: The taxonomy of any group passes through several stages.

(i) Alpha taxonomy (α) : It is concerned with naming and characterisation of species.

(ii) Beta taxonomy (β) : Concerned with classification

(iii) Gama taxonomy (γ) : Concerned with evolutionary relations and phylogeny.

Basis for classification: Classification is the ordering of a large group of organisms based on certain characters into small groups. Classification is mainly based on evolutionary relationship and not based on superficial resemblance. Points considered while classifying are (i) external structure, (ii) internal characters, (iii) developmental history, (iv) physiological data and (v) cytogenetic data.

The biological system of classification is called hierarchial concept of classification. This
was introduced by Carl Von Linnaeus (1758). A large group of organism is successively
subdivided into small group. These groups are called taxa (taxon-singular). Each group is
at a particular level in this system. This level is called the rank. Groups of the same rank
are grouped together and that constitutes the taxonomic category. e.g. Class. Certain taxonomic categories are obligate, while others are optional. For describing and classifying any organism the basic taxonomic category is species. The lowermost category for classifying an organism is subspecies.

Systematic position of Indian honey-bee

* 1. Kingdom: Animalia
* 2. Phylum: Arthropoda
* 3. Class: Insecta

4. Sub class: Pterygota

*5.Order:Hymenoptera

6. Suborder: Apocrita
7. Super family: Apioidea
* 8. Family: Apidae
9. Subfamily: Apinae
* 10. Genus: Apis
* 11. Species: indica

(* - Obligate, while others optional)

Sub species is the geographic variety or race. Species is the natural reproductive unit among animals. It is a group of individuals having similar structure, development and behaviour which interbreed to produce viable offsprings. (Biological species concept says that a species is a natural, interbreeding population which is reproductively isolated from the individuals of other species).

Functions of species

i. **Reproductive community:** The individuals of the species are able to recognise each other as potential mate and seek each other for the purpose of reproduction.

ii. An ecological unit: Irrespective of the number of individuals they act as a unit and interact with the individuals of other species with which they share the habitat.

iii. A genetic unit: it consists of a large number of inter-communicating gene pool in which the individual is a temporary reservoir holding a portion of genes for a short period.

Body text young one by parthenogenesis.

i. Larval paedogenesis - e.g. gall midges.

26. Nomenclature and identification

A name is required for identification of any organism. Generally two types of names are used (i) common name (ii) scientific name.

I. Common name

(i) They are **inaccurate** because it varies from region to region and country to country and there is **no uniformity** followed in naming the organisms.

e.g. Locust is a bug referring cicada in European countries and normally locusts also refer to short horned grasshoppers living in groups.

(ii) Common name is not available for all organisms

e.g. **Squash bugs** present in cucurbitaceous plants are represented by many species, but no common name is available for each species. It is available only for a large group like order and family.

(iii) Same common name is used for insects of different orders.

e.g. Flies. A true fly has only 2 wings, whereas other insects like mayfly, dragonfly, etc., are also mentioned as flies.

(iv) Homonym - Same name is used for describing two different type of insects.

e.g. Boll worm is a common term used for more than five species of boll feeding insects.

(v) Synonym - More than one name denoting a single insect.

e.g. Gram pod borer, American bollworm denotes *Helicoverpa armigera*

II. **Scientific name:** The system of naming organisms using two words is called **Binomial nomenclature (Trinomial nomenclature** if three words are used). This system of naming gives accurate information. It is universal and is accepted in all parts of

the world. The rule regarding the naming of organisms is contained in **International code for zoological nomenclature.**

Normally there are two names, the first name is the generic name and the second name is the species name**.** The names that follow the generic name are called **Trivial names.** The trivial names may be either species or a subspecies name.

e.g. Head louse: *Pediculus humanus captis*

Body louse: *Pediculus humanus corporis*

The first letter of the generic name is in capital and the first letter of species and subspecies are in small letter. All the words are Latinized and written in italics or it should be written and underlined separately. The **authority** name is written after the species name. It starts with capital letter. The author name is put in bracket if the taxa has been reclassified and placed in another group. e.g. Moringa fruit fly *Gitona distigma* (Meigon)

IDENTIFICATION

All insects present in the world are not yet identified and described (about 25% of the insect species are unidentified). An already described species produce new **race** which requires further identification. Identification helps to understand about the organism and to take proper control measure. Insects can be identified through an expert, by comparing the available collections, using photographs and pictures and by using **taxonomic keys**. Key is a tabular statement presenting alternatives, describing about the features of an organism. Most of the keys are **dichotomous** i.e., always dividing into two or they are always in the form of couplets and give a clear cut alternative. Keys can be constructed based on single character (**monothetic key**) or many characters (**polythetic key**). Polythetic key is more advantageous. Monothetic key has three disadvantages (i) the organism may be an exception for a particular character (ii) chances of erring is more (iii) if the particular body part is broken on which the key is made, then the key cannot be used. Key can be classified based on evolutionary principles also as **phylogenetic key** and **arbitrary key**

(i) Phylogenetic key: The key is based on the evolutionary relationship. The group appears only once in the phylogenetic key.

(ii) Arbitrary key : The taxa or group appears at several places in the key. It has more advantages.