

Topic :

P. G. 2nd Semester

Biosystematics & Taxonomy

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Biosystematics is the study of diversification and relationship of life forms of extinct and extant. The word systematics is derived from Latinized Greek word 'Systema' developed by Linnaeus in the 4th edition of his historical book Systema Nature in 1735.

Today's Systematics/Biosystematics generally makes extensive use of molecular biology and Computer programs to study organisms.

Definition

A/c to Blackwelder (1967) Biosystematics is that science which includes both taxonomy and classification, and all other aspects of dealing with kinds of organisms and data accumulated about them.

Christofferson (1995) defined systematic as the theory, principles and practice of identifying systems, i.e., of ordering the diversity of organisms into more general systems of taxa according to the most general causal processes.

A/c to Padian (1999), Systematics can be seen as the philosophy of organization nature, taxonomy as the use of sets of organic data guided by systematic principles and classification as the tabular hierarchical end result of this activity.

Taxonomy

Taxonomy is the theory and practice of identifying plants and animals. In fact, taxonomy deals with the principles involved in the study of classification of organisms.

Taxonomy is the functional science which

deals with the identification, nomenclature and classification of different kinds of organisms all over the world.

The word Taxonomy is derived from the Greek words 'taxis' and 'nomos' (law). The term Taxonomy was coined by A. P. de Candolle in 1813.

Different workers such as Mason (1950), Harrison (1959), Simpson (1961), Heywood (1967), Blackwelder (1967), Christoffersen (1995) define taxonomy from their view points.

A/c to Christoffersen (1995) define Taxonomy as the practice of recognizing, naming and ordering taxa into a system of words consistent with any kind of relationship among the taxa that the investigator has discovered in nature.

Relationship of Taxonomy to the Biosystematics

Kapoor (1998) considered that the relationship of taxonomy to systematics is somewhat like that of theoretical physics to the whole field of physics.

Taxonomy includes classification and nomenclature, but Biosystematics includes both Taxonomy & Evolution.

Taxonomy = classification + Nomenclature

Biosystematics = Taxonomy + Evolution.

A/c to Wägele (2005), although theoretically the term taxonomy and Systematics could be synonyms, in practice, however, differences in uses are obvious and a systematist and a taxonomist can conduct different analyses.

Major differences between Taxonomy & Biosystematics

- Taxonomy is the most important branch of Systematics, and thus systematics is a broader area than taxonomy.
- Taxonomy is concerned with nomenclature, description, classification and identification of a species, but systematics is important to provide layout for all those taxonomic functions.
- Evolutionary history of a species is studied under Systematics, but not in Taxonomy.
- The environmental factors are directly related with systematics but in taxonomy it is indirectly related.
- Taxonomy is subjected to change in course of time, but systematics is not changed if it was properly done.

Stages of Taxonomy

- (1) Alpha taxonomy - In this stage species are identified and characterized on the basis of gross morphological features.
- (2) Beta-taxonomy - In this stage species are arranged from lower to higher categories, i.e., hierarchic system of classification.
- (3) Gamma taxonomy - In this stage intraspecific differences and evolutionary history are studied.

AIMS & TASKS of Taxonomist

- To Catalogue and preserve the biodiversity collected from different sources.
- To differentiate the variations among organisms and arranged them on the basis of their relationships or associations.
- To provide scientific name to the taxa, so that one can recorded, store and retrieved when needed.
- To establish a set of rules to choice characters for arranging species into hierarchic classification.
- To study the genetic and phylogenetic relationships among life forms.
- To make extensive use of Computer to analyze and differentiate the intra and interspecific relationships among organisms.

Importance of Biosystematics

- Biosystematics gives us a vivid picture of the existing organic biodiversity of our earth.
- It provides much of the information permitting a reconstruction of the phylogeny of the life.
- It reveals numerous evolutionary phenomena and thus makes them available for causal study by the other branches of biology.
- It supplies, almost exclusively, the information needed for entire branches of biology.
- It is indispensable in the study of ecologically and medically important organisms.

