

2. Cladists or phylogenetic classification

- does not use binomial nomenclature or ranks

- only examines the branching patterns of evolution using phylogenetic trees that reflect monophyletic groups

- only recognizes monophyletic groups, so birds part of Reptilia

- only recognizes cladogram using DNA sequence data

Monophyletic group-taxon that includes most recent common ancestor and all its descendents

- groups taxonomists try to form
- give information that is critical for breeding programs and search for useful products

Paraphyletic group-taxon that includes common ancestor but not all its descendents

- accepted by traditional taxonomist when group is phenetically different and can be identified by its morphology.

Polyphyletic group-taxon having species derived from more than one common ancestor

- taxonomist has made a mistake due to convergent evolution where species are not genetically closely related but have adapted to similar environments

- ⊙ Taxa are grouped according to two main schools of taxonomists:

1. Traditional taxonomists

- use Linnaean system of binomial nomenclature and hierarchical ranks to reflect evolutionary history

- look at overall similarity or phonetics which may recognize

paraphyletic groups like Asclepiadaceae and Reptiles

- Cronquist System is a widely used traditional classification and uses monophyletic and paraphyletic groups

IMPORTANCE OF TAXONOMY

- ◉ **Biodiversity:** In last two and a half century only one million animals and 0.5 million plants identified. This forms 10% of worlds organisms. Many may extinct before discovered. Status to be studied to conserve.
- ◉ Base of research & studies:
- ◉ Use in Medicine:
- ◉ Agriculture and pest management-
- ◉ Identification of pests-
- ◉ Identification of natural enemies-
- ◉ Fisheries-
- ◉ Conservation

ANIMAL SYSTEMATICS:

1. Identify and describe all animals of world

@55,000 species of vertebrates known. Many more undiscovered. Undiscovered species are much more case of invertebrates.

2. Develop a uniform, practical, and stable system of naming animals that can be used by both animal taxonomists and others needing to communicate about animals

International Code of Zoological Nomenclature (ICZN) provides rules for naming and classification that is uniform and stable

3. Form groups that reflect their evolutionary relationships

SYSTEMATICS

(GREEK, SYSTEMA = A WHOLE MADE OF SEVERAL PARTS)

- ☺ Develops the classification of organisms
- ☺ Species comparison and grouping into higher categories
- ☺ Organisms are arranged in definite, hierarchical order
- ☺ The order of the system is based on hypotheses of common descent
- ⊙ (“ Study of the kinds and diversity of organisms and the relationships between them”)

TAXONOMY

- - **theory and practice of classifying organisms**
- - **study of classification, identification, nomenclature, & faunistics**
- **Classification-** arrangement of animals into groups having common characteristics that express evolutionary relationships
- **Identification or Determination-** identifying animals by the recognition of certain characters
- **Nomenclature-** naming of organisms according to the International Code of Zoological Nomenclature (ICZN)
- **Faunistics-** inventory of the native or naturalized animals of an area; called a fauna

TAXONOMY & SYSTEMATIC

Hawksworth and Bisby (1988) suggest that.....

- ⦿ Taxonomy is only a part of systematic.
- ⦿ **Taxonomy** in this sense includes a range of different areas from description and naming of new taxa (nomenclature), classification and construction of identification system for particular groups of organisms.
- ⦿ **Systematic** includes traditional taxonomy with the addition of theoretical and practical aspects of evolution, genetics and speciation.
- ⦿ The study of the evolutionary relationship between organisms is usually referred to as **phylogenetics**.

WHAT IS TAXONOMY

- ◉ It is the science of grouping biodiversity into species, describing the species, and classifying this diversity into higher-level taxa that reflect evolutionary history.
- ◉ (1) It introduces the main concepts and goals of taxonomy and systematics.
- ◉ (2) It teaches the qualitative and quantitative techniques that are today used to describe/identify species and higher-level taxa based on the analysis of morphological and DNA sequence evidence.
- ◉ The aim is to equip environmental as well as other biologists with a thorough understanding of taxonomic/systematic units and the tools needed for evaluating and quantifying diversity in samples of plants and animal specimens.