

Assignment: Text, W/KM Chapter 4, p. 59-60 and skim rest; Ch. 6, p. 89-95; Ch. 17, p.473

I. DEVELOPMENT OF CLASSIFICATION

A. TRANSITION FROM CREATIONIST VIEW

1. Taxonomic classification in the 1700's and 1800's – See Chapter 6, p. 89-ff.
 - a. The emphasis of classification of this period? _____

 - b. The aim of classification in this period: _____
2. Linnaeus – part of this effort as a “creationist” – author avoids calling him “creationist”
3. Your authors’ allude (p 473) and other taxonomists see creationists believing that “each species was created individually by God and remained unchanged through time”¹
 - a. Is this a view held by most Creationists today?
 - b. If not, what is the most common creationists view of “species?” _____

B. Effect of Darwin on classification – EVOLUTION PRESUPPOSITIONS

1. One Origin – the belief that all species descended from one ancestor
2. Close morphology, chemical makeup, etc. → close phylogeny (e.g. WK, 4th ed. p. 463)
> WKM 5th ed.: Darwin caused botanists to speculate about...[see p. 91]
3. PRINCIPLE: “[Darwinism] did not radically alter previous classifications”¹
4. QUESTION: Why didn’t the evolution model alter previous classifications?

II. TWO BROAD TYPES OF CLASSIFICATION:

A. ARTIFICIAL CLASSIFICATION – based upon easily recognized characters selected in an *a priori* manner, often for convenience in classifying

1. LINNAEUS (1753) – used number of _____ (regardless of other differences)
 - a. **Class** Monandria, or Diandria, Triandria, Tetrandria, etc.
 - b. Orders formed within classes according to number of _____
2. WILDFLOWER GUIDES -- based on flower color or number of parts
3. Benefits of “artificial classification” – _____

¹ Jones, S.B. and A.E. Luchsinger. 1986. *Plant Systematics*, 2nd ed. McGraw-Hill, Inc. New York.

- B. NATURAL CLASSIFICATION -- grouping according to " _____ "
1. Worldview-dependent – reflects the “ORIGINS” view of the taxonomist
 2. Approach is to compare taxa based on a large number of traits and groups are recognized only after observed similarities become evident – *i.e. a posteriori*).
 3. Early taxonomists – formed classification system based upon “morphological similarity”
 4. RESULT: classification revealed pattern of similarity ---> began to doubt creation
 5. TEMPTATION – "DID GOD REALLY SAY HE CREATED...?"

III. MODERN APPROACHES TO CLASSIFICATION – *i.e.* Synthesis and Experimental phases

A. PHYLOGENETIC SYSTEMS

1. Scheme attempts to represent genetic and evolutionary relationships among taxa
 - a. Genus = grouping of species with common ancestor
 - b. Family = all genera from common ancestor, etc.

2. MONOPHYLETIC REQUIREMENT of categories – page 65 and Figure 4-4, p 68
 - a. Monophyletic groupings reflect _____
i.e. No taxon can have species (or higher taxa) that are believed to have descended from two different ancestral lines (polyphyletic; see p. 66)
 - b. Because of limited fossil record (see p. 94), groupings are based upon modern characters
 - c. Arrangement based on presupposition noted in Parts I.B.2 and II.B.2 above

3. HOW “SOLID” ARE THE GROUPINGS IN THE HIERARCHY?
 - a. SPECIES – problems with hybridization → hard to use the biological species definition of “interbreeding groups”
 - b. GENERA ≡ aggregates of closely related species — presumably one ancestor
 - c. FAMILIES – some (*e.g.* Asteraceae) are well defined; others contain very diverse genera
 - d. ORDERS – see *HANDOUT* – Lyman Benson, Plant Classification, 2nd ed. (1979)

4. CONCLUSION:
 - a. Due to the subjectivity of phylogenetic classifications, many taxonomists have long sought more objective approaches to identification and schematic representation of “natural affinities” among species
 - b. Three such classification systems will be discussed below

- B. PHENETIC SYSTEMS – (first by de Jussieu, 1789; revived in 1960's with computers)
1. Classification based on large numbers of phenotypic characters – observable traits
 2. “O _____ T _____ U _____ (OTU) x Character Tables” to compare large numbers of character states (assigned numerical values or presence/absence)
 3. Identify taxa based on “cluster analysis” to sort out groups based on greater overall similarity within “clusters” of species
 4. Dendrogram (Phenogram) – diagram showing relative closeness of groups (Figure 6-2)
 5. Pheneticists seek objectivity that is lacking in phylogenetic systems. The latter have been more subjective because of the incompleteness of the fossil record (page 94).
Example: See page 93: “The dendrogram is **not** a phylogenetic tree.”

- C. CLADISTIC SYSTEMS – (Willi Hennig, 1950) – based on pursuit of monophyletic groups
1. Monophyletic group \equiv _____
 2. Shared-derived characters \equiv “those which changed states when the ancestor to the monophyletic group evolved (p. 59).” Monoph. group would all share these characters.
 3. Cladograms (branching diagrams) are used to portray closeness of species (Fig 4-1)

Note: Both Phenetic and Cladistic approaches have been adapted to evolutionary theorizing
For example: Cladogram nodes need not imply existence of a common ancestor, but phylogeneticists will attempt to “force” this interpretation in absence of fossil transitional forms

D. DISCONTINUITY SYSTEMATICS

1. BASIS – the belief that discontinuities exist in nature – i.e. typological approach
2. APPROACH – discontinuities between and among created forms reflect their origin
3. TYPOLOGY = grouping according to an array of distinct characters forming a TYPE
> Note: A broader attention to “form”; like phenetics, many morphol. features considered
4. BARAMINOLOGY – discontinuity systematics when combined with Biblical Revelation
 - a. QUEST – to develop a classification system to reflect the origin of created “kinds”
 - b. Leaders – Kurt Wyse and Todd Wood (Bryan College), Wayne Frair, and others.

IV. PROBLEMS WITH THE HIERARCHICAL APPROACH:

- A. Accommodating new species both extinct and extant is flooding the Linnaean system
- B. When new data requires name or rank changes at the species or genus level, the suffixes that indicate rank make it necessary to change names in multiple ranks

e.g. If *Acer* was displaced as the type genus of Aceraceae, the family name must change
- C. Current changes in taxonomic classification – reflected in the fact that the 4th ed. (WK) used the Cronquist system (p. 98) whereas WKM in the 5th ed. has adapted the Antioperm Plant Group (APG) system (see <http://www.mobot.org/MOBOT/research/APweb>)