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Phylogenetic classification

1. Undertake a phylogenetic analysis to determine the phylogenetic relationships of the group.
2. Only monophyletic groups allowed.
3. Apply names to monophyletic taxa that are consistent with the traditional classification – as long as this does not result in names being applied to non-monophyletic groups.
4. If both sister taxa are named, they should have the same Linnaean rank.

Phyletic sequencing

If you want to be able to extract the phylogeny exactly, then every branching point must be assigned a category. This can result in lots of names being invented.

Phyletic sequencing is a convention that allows us to reduce the number of required names. When a classification uses phyletic sequencing, and we see

- taxa within the same group (same parent grouping), and
- at the same indentation level, then
- each taxon is the sister to the groups below it.

Phyletic sequencing

Genus 1

Species A

Species B

Species C

Species D

Sedis mutabilis after taxon name to indicate uncertain relationships among a set of monophyletic taxa (polytomies):

Genus 1

Species A

Species B

Species C *Sedis mutabilis*

Species D *Sedis mutabilis*

Species E *Sedis mutabilis*

Taxa of uncertain/conflicting evidence of relationships -should be placed within lowest rank group that there is evidence it belongs to, followed by the words *incertae sedis*.

Reasons Classifications Change

1. nomenclatorial rules
2. differences in philosophy (evolutionary systematists vs phylogenetic systematists)
3. New knowledge about the phylogeny.

Effect of Classification Change

1. new names - same taxon, but a different name (tracking information becomes more difficult; we must maintain synonymic lists)
2. different composition of groups. The original named taxon (or taxa), no longer refers to the same group of organisms. We use the word *sensu* in front of a citation to indicate “in the sense of” or “as used by” a certain publication.
3. Effect on politics and conservation policies.

Nomenclature

Nomenclature is the set of rules for assigning names to taxa.

Chief goals are

1. uniqueness of a name
2. universality of the name
3. stability

Format of Names

Scientific names have a very specific and codified format:

Name, the name of its author, and the year the name was established.

Apis mellifera Linnaeus, 1758

Genus *Oligochlora* Engel, 1996

Family Megachilidae Latreille, 1802

Format of Names

Parentheses around the author indicate that the author introduced the name, but in a different combination.

Zoological code: The taxon *Andrena metallica* Fabricius, 1797 was later moved to the genus *Augochloropsis* , becoming:
Augochloropsis metallica (Fabricius, 1797)

Botanical: In 1814 Cavanilles move *Malva rosea* Linnaeus into the genus *Althea*:
Althea rosea (Linnaeus) Cavanilles, 1814

Principle of Priority

Each taxonomic group with a particular circumscription, position, and rank can bear only one valid (i.e., correct) name.

Synonyms: Two (or more) different names for the same taxon

The Principle of Priority: the **oldest available** name is the **valid** name for the taxon.

In Botanical lingo: The oldest *legitimate* name is the *correct* name for the taxon.

Available name is one that has been properly published (an unavailable name is a *nomen nudum*).

Apis mellifera Linnaeus, 1758

Apis socialis Latreille, 1802

Later discovered that *Apis socialis* is just a dark variant of *Apis mellifera*, so the valid name for both forms is *Apis mellifera* Linnaeus, 1758.

Homonymy

Homonyms are identical names for two or more taxa.

Calliopsis hurdi Rozen, 1958 (a sand bee)

1966 Alvin Shinn described a new species from Mexico:
Calliopsis hurdi Shinn, 1966. He was unaware of the species described by Rozen.

These names are homonyms, Rozen's name is the **senior homonym**, Shinn's name is the **junior homonym**.

Thus, the name established by Shinn had to be replaced to avoid confusion with an already existing, identical name.

Types

Each species name is “attached” to a type a specimen. The type of a species is a specimen.

- holotype - the single name-bearing specimen designated by the author as type of the species in the original publication.
- paratype - a specimens of the type series that were not designated as holotype (no special status in nomenclature).
- syntypes - any of two or more specimens used in the original description, when no holotype is designated (cotypes or types).
- lectotype - a syntypes promoted to name-bearing status after the original description
- neotype - a selected by a reviser to be the name-bearing specimen after destruction of the original material

- isotype - (Botany) any specimen that is a duplicate of the holotype. (Often other specimens are made from the same plant.)
- allotype a specimen of opposite sex of the holotype; has the status of a paratype.
- topotype - from same locality as holotype

Higher groups also have types. Higher taxa have a type that is a lower taxon contained within them taxon.

Differences between codes

For zoological nomenclature regulates names within three basic groups:

- Family-group: superfamily, family, subfamily, tribe, and any other rank below superfamily and above genus that may be desired.
- Genus-group: genus and subgenus.
- Species-group: species and subspecies.

“Principle of Coordination”: a name established for a taxon at any rank within is deemed to be simultaneously established with the same author and date for a taxon based upon the same name-bearing type at any other rank in the group.

Subtribe Electrapina Engel, 1998, with type genus *Electrapis* Cockerell, 1906.

Michener later in 2000 elevated the subtribe to:

Subfamily Electrapinae Engel, 1998

Both taxa are based on the same name-bearing type, and it is a change in rank within a group (i.e., based on the same name-bearing type), the authorship and date remain the same.

Botanists do not use a system of “rank groups” – each rank is treated as a separate entity and has its own system of priority.

Names have priority within their original rank over names that were subsequently transferred to that rank.

Genus *Campanula* subgenus *Plato* Someauthor 1810
then elevated to the level of a genus rather than subgenus:
Genus *Wahlenbergia* Someotherauthor 1821

Notice that *Plato* is the older name sub-genus rank only.