Classification & Taxonomy

- **Classification**: classifying organisms into groups
- **Taxonomy**: naming organisms and groups of organisms

These two generally go hand in hand, but keep in mind that you can put things into groups without naming them (and vice versa).
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- **Systematics**: classifying organisms according to some criterion; e.g. phylogeny
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• **Nomenclature**: rules for giving names; a criterion for taxonomy

Carl Linnaeus (1707-1778)

Systema Naturae
Linnaeus introduced our current system of classification and taxonomy in his 10th edition of Systemae Naturae in 1758.

He also introduced the first rules of nomenclature in that edition:
• two-part (binomial) name (nomenclature) for each species
• in Latin -- *Bufo americanus*

His rules are still in use today.
However, the 10th edition of Systemae Naturae was not widely accepted - or even known.
• communication was slow in 1758
• it was written and printed in Latin

Other rules of nomenclature were being used in other countries. So, in 1895, the International Commission on Zoological Nomenclature (ICZN) was formed and the first Code was written.
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- applies to extant and extinct animals
- all ranks (species, genus, family) have Latin names
- all names are capitalized, except species and subspecies
- a type is designated for each rank
- only one name may be used for each rank
- species descriptions should be in a permissible publication and clearly differentiate it from existing species
- when a revised code is published, it supercedes all before
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International Commission on Zoological Nomenclature decides all questions about interpretation of the Code and publishes them in the Bulletin of the ICZN.

This establishes precedents for similar cases in the future, much like in law.
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The Type Specimen

• Holotype - a single specimen is designated in the original description
• Syntype - a series of specimens designated in the original description

NOTE: this was disallowed in the second edition of the code.

The type specimen serves as the physical representative of the species.

It should be physically examined before similar species are named, to ensure only one name is given to a species.
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What happens if a species is given two names?

• First, someone has to figure it out and present the evidence.
• If the evidence is convincing, the oldest name wins (usually).

Let’s step back and see how this double naming happens.

• The second describer didn’t know about the first’s
• The latter knew about the former, but thought they “saw”
a difference
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The first situation is the easiest to illustrate.

*Clemmys guttata* SCHNEIDER 1792
*Testudo punctata* SCHOEPFF 1792

In this case it took until 1862 for someone to “figure it out”
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The second is a little more complicated.

*Hyla leonhard-schultzei* Ahl, 1934
*Hyla adipoventris* Taylor, 1944
*Hyla milleri* Shannon, 1951
*Hyla leonhardschultzei* Duellman, 1960
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*Hyla leonhard-schultzei* Ahl, 1934
*Hyla adipoventris* Taylor, 1944
*Hyla milleri* Shannon, 1951
*Hyla leonhardschultzei* Duellman, 1960

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Each of these duplicate names are now Junior Synonyms of *Hyla leonhardschultzei* and a “full synonymy” of *Hyla leonhardschultzei* is as follows:

*Hyla leonhard-schultzei* Ahl, 1934 ZMB 24353
*Hyla adipoventris* Taylor, 1944 UIMNH 25047
*Hyla milleri* Shannon, 1951 USNM 123700
*Hyla leonhardschultzei* Duellman, 1960
And an annotated synonymy of *Hyla leonhardschultzei* is as follows:

*Hyla leonhard-schultzei* Ahl, 1934; original description; ZMB 24353

*Hyla adipoventris* Taylor, 1944; jr. synonym; UIMNH 25047

*Hyla milleri* Shannon, 1951; jr. synonym; USNM 123700

*Placed in synonymy of Hyla leonhardschultzei* and emmended by Duellman, 1960
This is a very simple synonymy. They can be much more complicated. And they are never really “full” in the sense of knowing you have found all the published synonyms.

So why go through all the trouble of compiling synonymies?

• It puts the history of this species’ nomenclature in one place for future use - it’s like a road map for future taxonomic work on this species, perhaps using new techniques.
• It’s fun.
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Is the current system of taxonomy, with the Linnean rules of nomenclature the best?

Some say “no” because the current system does not reflect phylogeny, rather it is character based.

One of the other (more practical) reasons for deviating from the current system of nomenclature is that it is unstable-- mainly because it ties a species name to a genus. A new proposed nomenclature, called “PhyloCode” would remove all ties of a species name to all higher ranks.
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This instability can be illustrated as follows:
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So under this new phylogeny, the genus *Bufo* is not monophyletic. To fix this only one of these groups of *Bufo* species can remain in the genus *Bufo*. The others must be re-assigned to another genus.
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This instability can be illustrated as follows:
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So *Bufo americanus* and all the other New World *Bufo* species need a new genus. This is one of the name changes we are ignoring.