Biogeography

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Lecture 12

Outline

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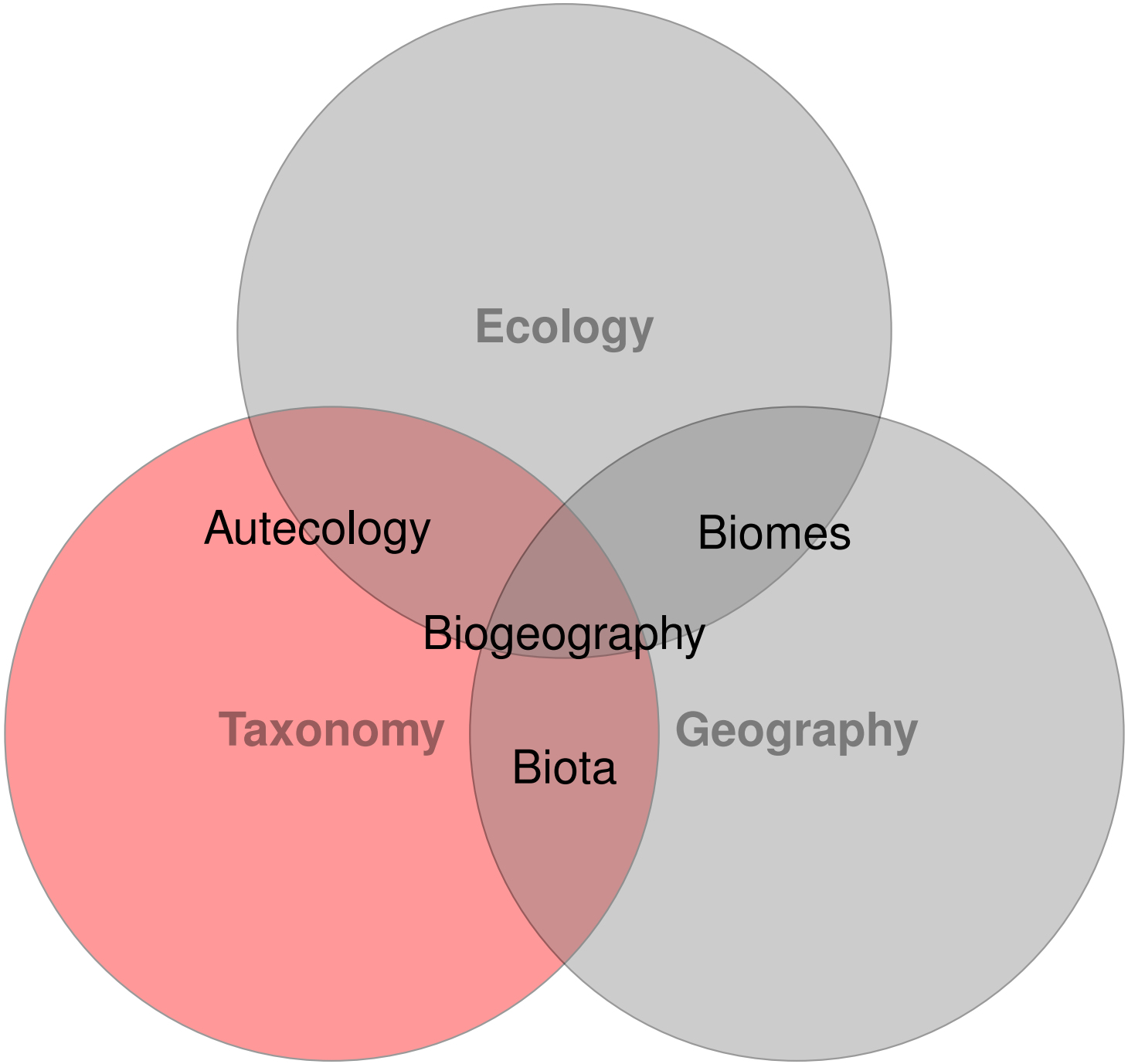
Taxonomy
Basic principles


Ecology
Autecology
Biomes
Biogeography
Taxonomy
Biota
Geography

Two corner stones

- The diversity around us has a structure
- This structure is hierarchical

How to describe hierarchy

- With ranks
  Simple, efficient, practical. However, for every name you will need to remember a rank*. Also, number of ranks is restricted so some potentially useful information will be ignored. Last but not least, no clear definition of any rank exists. The working definition is "*we call this* genus *because in the neighbor* family *we apply the genus rank to similarly segregated groups*".
  *There are multiple workarounds, e.g. endings and numerical ranks.
- With trees
  More objective, no need to remember rank, no restrictions for numbers of levels. However, you should remember the graphic object instead of text, interpretation is not easy, conflicts are not simple to resolve. As a result, it is much easier to become lost with trees than with ranks.

Many current approaches try to cross ranks and trees.

Names and ranks

- Ranks (including species) are very useful practically but do not have explicit criteria
- 7 basic ranks: species, genus, family, order, class, phylum, kingdom
- Names of species are binomial. This is again extremely useful but will result in instability—binomial names are not perfect IDs

Priority, starting dates and conservation

- Names only look like meaningful words. In fact, they are IDs. So it is impossible is to change name if it looks “incorrect”, like *Simmondsia chinensis* (jojoba) which does not grow in China.
- The earlier name is always preferred. Good rule, but adds to the instability of names.
- Starting dates allow to disregard all names published before 1753 (for plants) or 1758 (for animals)
- Conservation allows to disregard older names if the newer name is conserved

Taxonomy

Names

Who is *Homo troglodytes*, or why binomial system is not very well made?

- This is a chimp (*Pan troglodytes*) if we move it into *Homo* genus.
- If we move chimp to human genus, its name should be "*Homo troglodytes*"
- Linnaeus described **another** "*Homo troglodytes*" so some biologists want to name chimp "*Homo arboreus*".
- However, this older name is **invalid** because it was proved that it was based on the materiel consisting of orang and human bones mixture.
- So quite fortunately, there is no conflict. There are plenty of these conflicts in less famous situations.
- The worst is that moving species from one genus to another is based on the **opinion** but results in **name change**!

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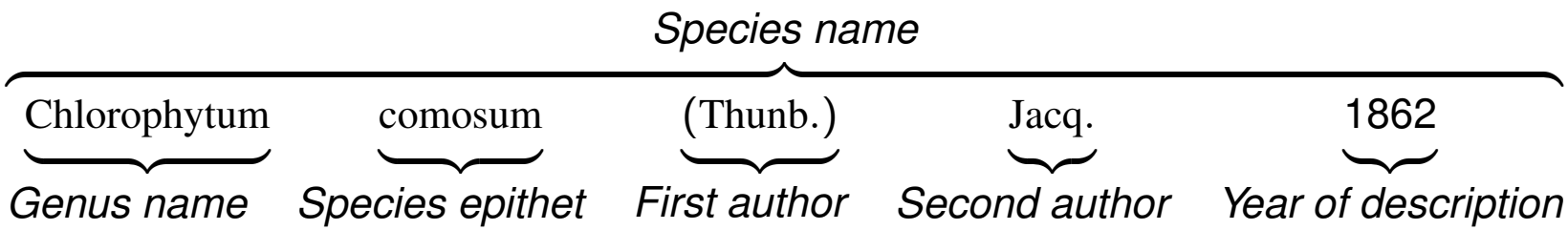
Names and endings examples

English	Latin	Example 1	Example 2
Kingdom	Regnum	Vegetabilia	Animalia
Phylum	Phylum	Spermatophyta	Chordata
Class	Classis	Angiospermae (Magnoliopsida)	Mammalia
Order	Ordo	Liliales	Primates
Family	Familia	Asparagaceae	Hominidae
Genus	Genus	*Chlorophytum*	*Homo*
Species	Species	*Chlorophytum comosum* (Thunb.) Jacq. 1862	*Homo sapiens* L.



Synonyms, homonyms and hemihomonyms

How many species? 2,000,000 described; the feasible estimation is 4–5,000,000. There are also 20,000,000 names—most of them are *synonyms* and *homonyms*.

- **Synomyms** are younger names, we can use it but it is better to avoid them
- **Homonyms** are same names for different taxa (like two *Homo troglodytes*), we must eliminate one of them
- **Hemihomonyms** are “legal homonyms”, same names under different codes of nomenclature, e.g. *Oenanthe* (bird) and *Oenanthe* (plant).

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Miscellanea

- Intermediate ranks.
- Subspecies and cultivars. Many subspecies are “geographical races”. Cultivars are result of artificial selection.
- Shortcuts: “sp.” (one species, unknown omitted), “spp.” (many species), “s. l.” (wide sense), “s. str.” (strict sense), “i. s.” (position unknown)

Taxonomy workflow

- Collection
- α-taxonomy: species description
- β-taxonomy: work with existing descriptions.

Summary

- There are seven main taxonomic ranks
- Subspecies are geographical races

For Further Reading

A. Shipunov.
Biogeography [Electronic resource].
2014—onwards.
Mode of access:
http://ashipunov.info/shipunov/school/biol_330

A. Shipunov.
Introduction to Biogegraphy and Tropical Biology [Electronic resource].
2017—onwards.
Mode of access: http://ashipunov.info/shipunov/school/biol_330/intr_biogeogr_trop_biol/intr_biogeogr_trop_biol.pdf