„Metódy organizácie poznania: klasifikácia, taxonómia, systematizácia, typologizácia…“

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Classification

- **Hull 1998**: "Any set of entities can be classified in indefinitely many ways. Books can be classified according to author, title, subject matter, and so on…"
- **Hull,** *ibid***. "**The **ultimate goal for scientific classifications** is to group entities so that these classes function in, or facilitate the formation of, **scientific laws**. **Aristotle** divided motion into super- and sub-lunar as well as forced and natural. The primary justification of his classification was the system of laws that he was able to generate using it. When **Newton** introduced his quite different system, his classification replaced Aristotle's because Newton's system of laws was more powerful, accurate and inclusive. In general, *systems of scientific classification are intimately connected to scientific theories and cannot be evaluated independently of them. Different sorts of theories require different classifications*… One major difference is between **structural and historical classifications**. "

Classification

- **Bailey, 1994**: “classification is the general process of grouping entities by similarity;”
- Ibid.: “In its simplest form, classification is merely defined as *the ordering of entities* into *groups or classes* on the basis of their *similarity*... This means that we arrange a set of entities into groups, so that *each group is as different as possible from all other groups*, but each group is *internally as homogeneous as possible...* classification is both **a process** and **an end result**.”
- **Classification** can either be
  - ***unidimensional,*** being based solely on **a single dimension or characteristic** or
  - ***multidimensional,*** being based on **a number of dimensions.**

  - **Structural** – Mendeleyev periodic table…
  - **historical** – evolution tree; classification of languages…

Typology

- **conceptually** separates a given set of items multidimensionally
- dimensions are based on the notion of **an ideal type** (a mental construct that deliberately accentuates certain characteristics and not necessarily something that is found in empirical reality) (Weber, 1949)
- its dimensions represent **concepts** rather than **empirical cases**
- typologies create **useful heuristics,** provide a **systematic basis for comparison**
- Hempel / Oppenheim (1936): **a fixed number of properties that forms propriety space**;
- Lazarsfeld (1962) "In a formal sense these are all variates but they can be of considerable diversity: quantitative variables such as age, ranks such as position in a competitive examination, dichotomies such as sex, or even unordered classes such as country of birth. These variates form **a property space**, and their combinations are what today we call a Cartesian product. Typologies, Hempel and Oppenheim pointed out, are *selected sectors of this property space* which come about by a variety of procedures they called reduction."
- Their central drawbacks are **categories** that are **neither exhaustive nor mutually exclusive**
- Adams, 1991 - a **collection** of **entities** is **sorted** into types in such a way that each **entity** can be a **member** of one and only one type.
- often based on **arbitrary or ad hoc criteria**
- **descriptive rather than explanatory or predictive**
- frequently subject to **the problem of reification** (Bailey, 1994)

A Hypothetical Fourfold Typology

	Motivated	Unmotivated
Intelligent	Success 1	Underachiever 2
Unintelligent	Overachiever 3	Failure 4

Definition – Division – Classification

- Cohen & Nagel, p. 241
- **Division** is therefore related to definition, because it marks off *the limits of the extension of a class denoted by a term*.
- If, however, division is looked at from the point of view not of its constituent species, but of its individual members, the process is allied to **classification**.
- While **division breaks up a genus into species**, **classification is the grouping of individuals into classes**, and these classes into wider ones.

Typology - Classification?

- Cohen & Nagel, p. 224
- Thus suppose we wish to classify the population of the United States on the bases of sex, of being over thirty years of age, and of being in good or exceptional health. Let 1 represent, as usual, the universe of discourse; *a* those of male sex, *a′* those of female sex; b those over thirty, *b′* those thirty or under thirty; *c* those in good or exceptional health, *c′* those in poor health. Then the population of the United States is divided into eight groups as follows:
- 1 = *(a + a′) = (a + a′) (b + b′) = (a + a′) (b + b′) (c + c′) = abc + abc′ + ab‘c + ab‘c′ + a′bc + a′be′ + a′b′e + a′b′c′*
- The symbol *abc* will then represent the males over thirty and in good health; *a′bc′* will represent the females over thirty who are in poor health, and so on.

- Set of previous conditions:
  - **exhaustive & mutually exclusive** +
  - each **entity** can be a **member** of one and only one type +
  - **concepts** rather than **empirical cases** +
  - **useful heuristics,** provide a **systematic basis for comparison** +

Adams & Adams, *Archaeological typology and practical reality*, 1991:

- *Type concept.* A type concept is **the purely mental aspect of "typehood."** It is a body of ideas about the nature and characteristics of a group of entities which make it possible for us to think of them in a collective way and under a collective label. In archaeology the type concept will nearly always involve two components: a mental picture of what the type members will look like (type identity), and ideas about where the members are likely to be found, what function they may have performed, and other associations and inferences (type meaning).
- *Type description.* If a type concept is to be shared between two or more individuals, it must first be communicated in the form of a type description. This is a verbal and/or pictorial representation of the type concept which depicts **as many of its known characteristics as possible**.
- *Type definition.* Every type necessarily has a diagnostic attribute or diagnostic attribute cluster; that is, a recognizable quality or qualities that set it apart from all other types. We therefore say that every type is theoretically capable of having a type definition: **a statement or depiction of its diagnostic features which is sufficient to distinguish it verbally and/or pictorially from all other types.**
- *Type category.* According to our usage, every type is by definition a sorting category: that is, it is a theoretical "pigeonhole" into which entities (type members) can be placed **in order to differentiate them in some meaningful way from other entities which are members of other types.**
- *Type members.* A type member is an entity **that has been identified as exemplifying the characteristics of a particular type**, and has therefore been put into **that type category**.

- Different specifications of classification and typology - Adams*, Classification and Typology:*
  - "Archaeologists often **use the terms classification and typology interchangeably**, but in this article a distinction will be made. *A classification is any set of formal categories into which a particular field of data is partitioned*. In contrast, a typology is a particular type of rigorous classification in which a field of data is divided up into categories that are all defined according to the same set of criteria, and **that are mutually exclusive**. As will be shown, **most archaeological classifications of artifacts are typologies**, while **most classifications of cultures are not**."

Taxonomy

- **Taxonomies differ from typologies** in that they classify items on the basis of **empirically observable and measurable characteristics** (Bailey, 1994, p. 6). Although associated more with the biological than the social sciences (Sokal & Sneath, 1964), **taxonomic methods**–essentially a family of methods generically referred to as **cluster analysis**–are usefully employed in numerous disciplines that face the need for classification schemes (Lorr, 1983; Mezzich & Solomon, 1980).
- According to Mayr (1969, 2), "[t]axonomy is **the theory and practice of classifying organisms**."
- "Purist definition of a taxonomy – terms have **parent/child relationship**." (Earley, 2005).
- "A taxonomy is not simply a neutral structure for categorizing specimens. *It implicitly embodies a theory of the universe from which those specimens are drawn…* " Landweh et al. (1994).
- "Taxonomy (the science of classification) is often undervalued as a glorified form of filing—with each species in its prescribed place in an album; but taxonomy is a fundamental and dynamic science, **dedicated to exploring the causes of relationships and similarities among organisms**. Classifications are theories about the basis of natural order, not dull catalogues compiled only to avoid chaos." (Gould, 1989, p.98)

Taxonomy

- **Taxonomy** is often employed synonymously with **systematics** (**and/or classification**):
- Mayr 1942/1982: 6n.1: "The terms systematics and taxonomy are considered by me as approximately synonymous…[; i]n America…[,] the term taxonomy seems to be preferred…[; i]n the rest of the world…[,] the term systematics seems to be more widely used„

Classification / Typology / Taxonomy ?

- Bailey, 1994, p.4: „Typology is another term for a classification...“
- Adams, 1991, 296-7: “Some participants in the Typological Debate prefer to talk about classification (Linton 1936: 382-400; Rouse 1960; Dunnell 1986), some about typology (Krieger 1944; 1960; J. A. Ford 1954b; Kluckhohn 1960), and some about taxonomy (Brew 1946: 44-66), **but to a large extent these terms have been used interchangeably**.”

Systematics

- Simpson (1961, p. 7): Systematics is "the scientific **study of the kinds and diversity** of organisms and of any and **all relationships among them**."

- The majority view is that "systematics" is the more general term, being defined as **the study of organismal diversity**, whereas "taxonomy" is more narrowly the set of procedures and rules for naming entities (taxa) and producing "classifications" (ordering and/or nesting of taxa)." (Mishler, 2006)

- Biological systematics does not provide methods for constructing classifications (that is the job of biological taxonomy); **instead it studies how organisms and taxa are related in the natural world.** Nevertheless, many biologists and philosophers hold that the results of biological systematics – what it says about the relations among organisms and taxa – should influence the principles one adopts in a school of taxonomy.

- **Classification**, however, is only one aspect of the much larger field of **phylogenetic systematics**.

- **Systematics** is **an attempt to understand the evolutionary interrelationships of living things**, trying to interpret the way in which life has diversified and changed over time. While classification is primarily the creation of names for groups, systematics goes beyond this to elucidate new theories of the mechanisms of evolution.

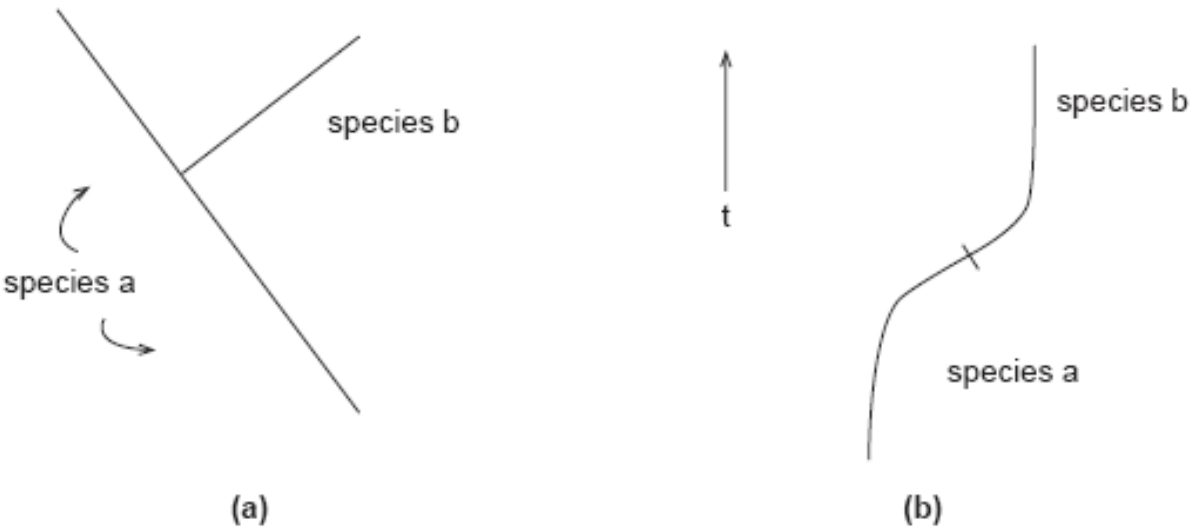
- **Systematics (i.e. model), is the study of the pattern of relationships among taxa;** it is no less than understanding the history of all life. But history is not something we can see. It has happened once and leaves only clues as to the actual events. Biologists in general and systematists in particular use these clues to build hypotheses or models of the history. Only with a hypothesis of history can we truly discuss evolution.

Vocabulary of biological classification

- *phenetics*, *i.e.* looking for similarities and differences to create systematics. Not only gross morphology was used to find characters, but anatomy, chromosomes, pollen, biochemistry and eventually proteins.
- *phylogeny*, the history of the evolution of a species or group, especially in reference to lines of descent and relationships among broad groups

Vocabulary of biological classification: cladogenesis - anagenesis

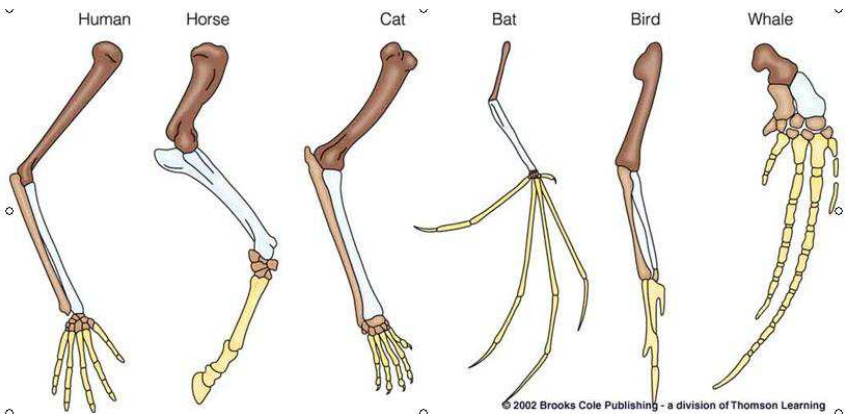
"evolutionary taxonomists . . . aim to construct classifications that reflect both of the two major evolutionary processes, branching and divergence (cladogenesis and anagenesis)" (Mayr (1981[1994], 290).



cladogenesis	anagenesis
A population of species A becomes geographically isolated from the rest of the species. It undergoes a **genetic revolution** and becomes a distinct species, B. In cladogenesis, a species are split in two.	Species A **gradually evolves** until it becomes a new species, B. Evolutionary taxonomists accepts both (Cladists ignores anagenesis divergence)

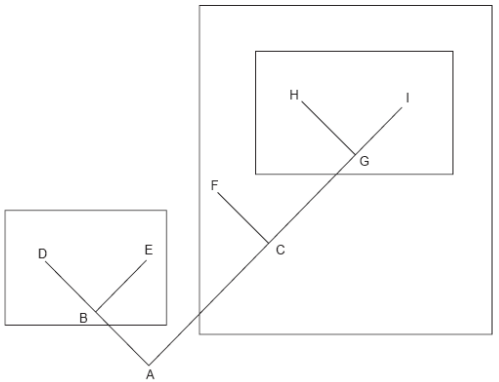
Vocabulary - Homoplasy vs. homology

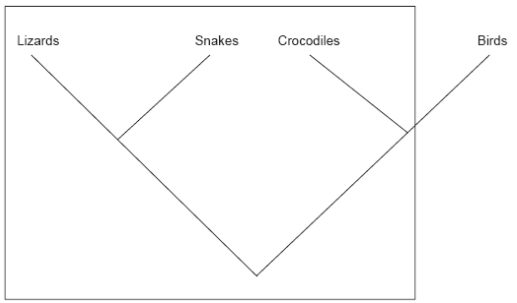
- **Homoplasy** occurs when characters are similar, but are **not derived from a common ancestor**.

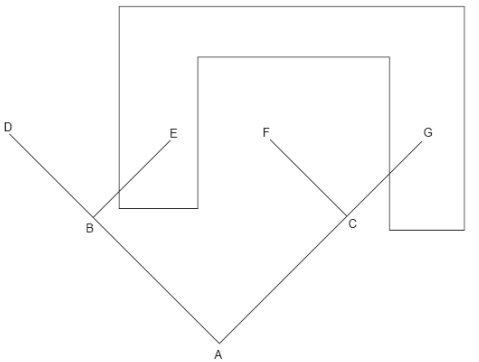


Homology is any similarity between characters **that is due to their shared ancestry.**

Vocabulary of biological classification







monophyletic taxa

- The taxon consisting of D, E, and B is a monophyletic taxon; so is the taxon containing H, I, and G, and the taxon containing H, I, G, F, and C.
- Each contains an ancestor and all of its descendants.
- One single ancestor (the rule of monophyly)

paraphyletic taxa

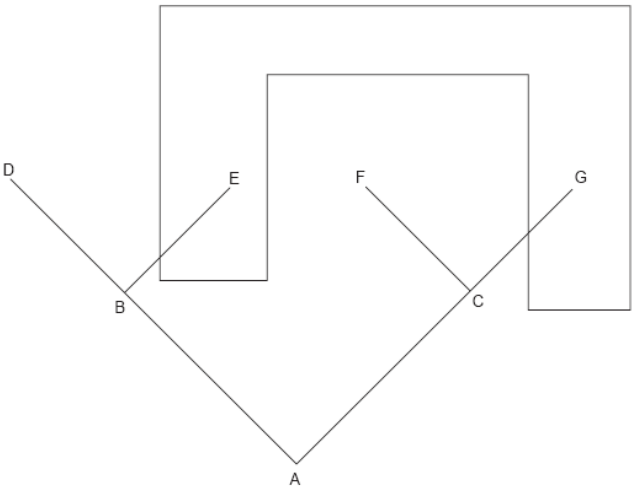
- The taxon *Reptilia* contains lizards, snakes, and crocodiles, but does not contain birds. *Reptilia* is a **paraphyletic taxon.**
- it contains an ancestor and some but not all of its descendants.

polyphyletic taxa

- The taxon containing only E and G is **polyphyletic**.
- E and G share similar traits (homoplasies) that were not present in their common ancestor, A, but evolved independently in E and G.

- **Monophyletic** and **paraphyletic** taxa contain organisms that have ***homologies***: traits shared by different lineages that were passed down from a common ancestor.

Vocabulary - polyphyletic taxa



- **Polyphyletic taxa** contain organisms that have ***homoplasies***: traits shared by different lineages **but not present in their common ancestor.**
- From a genealogical perspective, **polyphyletic taxa are aggregates of independently working processes**.
- For the evolutionary taxonomists, **polyphyletic taxa are not natural taxa** and should be excluded from classification.
- A major task of evolutionary taxonomists has been to remove polyphyletic taxa from earlier classifications.
- For evolutionary taxonomists, the taxon Aves is an example of a portion of a lineage entering a new adaptive zone and acquiring a new suite of adaptations. They call such lineages “grades.” According (grades) **to know whether a character is a homology rather than a homoplasy requires knowing the genealogy of the taxa in question**.

The three general approaches to species (explanatory models).

- Interbreeding (reproductive) approach
  - Mayr's (1970) biological species concept and Paterson's (1985) mate recognition concept. According to these concepts, **species are groups of organisms that interbreed and produce fertile offspring**. A species' stability is due to interbreeding among its members.
- Ecological approach
  - Ehrlich and Raven 1969,Van Valen 1976 [1992], Andersson (1990): **environmental rather than reproductive factors are primarily responsible for the stability of species**. They cite numerous examples that, they argue, illustrate **the primacy of selection** *over interbreeding in maintaining species*. One set of examples highlights species consisting of geographically isolated populations that do not exchange genetic material. Those species nevertheless remain ecologically, genetically, and morphologically distinct
- Phylogenetic approach
  - Hennig believes that **descent from a common ancestor** – the bare bones of genealogical evolution – is the primary process responsible for the existence of taxa. Accordingly, Hennig argues that classifications should highlight **only those groups that are the result of common descent**. Taxa should be "monophyletic."
- All three assume that species are lineages.

Classification method – essentialist attempts

- Linnaeus in 1758: Kingdom, **Phylum, Class, Order, Family, Genus, and finally a Species**. This classification system is based largely on the animal's **physical characteristics.**
- Linnaeus used **the method of logical division** as the foundation for his method of classification. An organic species is distinguished by its *differentia* from the other species in its *genus* (1731[1938], sec. 257). Yet the "real distinction," or essence, of a species cannot be given without the definition of its genus (1731[1938], sec. 256).
- Okasha's (2002) **essences are relational rather than intrinsic properties**. LaPorte (2004) and Griffiths (1999), essences are certain ancestor-descendant relationships.
- Sober (1980) suggests that Kripke's argument for origin essentialism might be extended to biological species.
- Ideal morphologists, Creationists…

Essencialism?

- **Non-gradualism**; species are **discrete entities** (theory of **punctuated equilibria**), not continual; Essentialism requires **sharp boundaries and precise essences**; yet speciation is often a vague process in which no set of traits marks **a species' boundary**. Consequently, species essentialism is at odds with how speciation often occurs.
- Problem - absence of causes. Problem with explaining their evoulution and transformations and **explaining their causes.**
- **Kinds with different pasts could have the same essence! (**GMO, artificial viruses, etc.**)**
- **Neither Linnaeus nor Ideal morphologists were strict essentialists**: the standards that Linnaeus placed on knowing the essences of genera or species are hard to meet. Linnaeus was well aware of this problem (Cain 1959a, 159–60; Larson 1971, 148ff.; Atran 1990, 174–5). He often lacked representatives of all the species of a genus and thus was unable to determine the unique fructification system of a genus.
- **Vague essences**? Sober's solution to essentialism (1980 [1992], 252ff.): the vagueness of speciation events is not fatal for essentialism. He suggests that essentialism is consistent with vague boundaries **so long as essences are correspondingly vague**.
- How many "*essential essences*"?

- **Polemics about natural kinds**
  - Briant, 2001, 89ff (debate over Realism): Putnam vs. Donellan – one important propriety vs. more important proprieties; should we define natural kinds on the basis of their surface features or should we define them on the basis of some kind of essential, inner or microstructural properties?
  - D. H. Mellor: scientists concentrate on **microstructural properties** (it explains development of biological classifications)

Main approaches

- **Cluster analysis**
  - All forms of cluster analysis make two common assumptions: the members of a taxonomic group must share a *cluster* of similar traits, and those traits need not occur in all and only the members of a group. Hempel advocates a cluster approach to classification.

- **Evolutipnary taxonomist (Darwinian classification):**
  - **Causal connections**: *Homo sapiens* to be a particular genealogical chunk causally connected on the tree of life. all historical entities consist of objects that are causally connected over time.
  - taxa (and so species) are **historical (individual) entities**;
  - monophyletic and paraphyletic taxa but not polyphyletic taxa should be classified.

- **Pheneticism (taximetrics) –** "any similarity" (matrix of ressemblance) maximum likelihood method; phenogram; many trees (phenetic trees); own species concept;
  - Pheneticists (Sneath and Sokal 1973) recommend constructing classifications according to those groups of organisms with **the most overall similarity**. Taxonomic units, in other words, should be groups of entities that share **a large number of common properties**.
  - study of relationships among a group of organisms on the basis of the **degree of similarity** between them, be that similarity **molecular, phenotypic, or anatomical.**
  - Independent of any theoretical assumptions concerning evolutionary relations
  - **No character is preferred over another**, and as many characters are recorded as possible.
  - **The statistical similarities between organisms.** Classifications based on only several characteristics may be biased by the particular nature of those characteristics. For example, a classification based on immunoglobulin concentration would probably differ from one based on body length (Ridley 1986, 38–9).To avoid the idiosyncrasies of particular characters, pheneticists recommend performing **phenetic studies involving dozens if not hundreds of characteristics**.
  - species groups in a matrix of resemblances between species.
  - biological classifications should be made **independent of any theoretical assumptions concerning evolutionary relations (against the ideal morphology) (many theories approach?).**
  - Algorithms for cladograms: (**U**nweighted **P**air **G**roup **M**ethod with **A**rithmetic Mean) a simple agglomerative (bottom-up) hierarchical clustering method) include least squares, neighbor-joining, parsimony, maximum likelihood, and Bayesian inference.

Main approaches

- **Cladism (only phylogenetic features; morphological data; cladogram)**
  - Cladistic desire: classification reflect **recency of common ancestry**
  - a **cladogram** refers to the topology of a rooted phylogenetic tree (mostly DNA)**.**
  - ignores similarities (reject the existence of paraphyletic taxa – e.g. Reptilia);
  - primary relations are causal (genealogical & embriological);
  - only monophyletic taxa reflects common ancestry

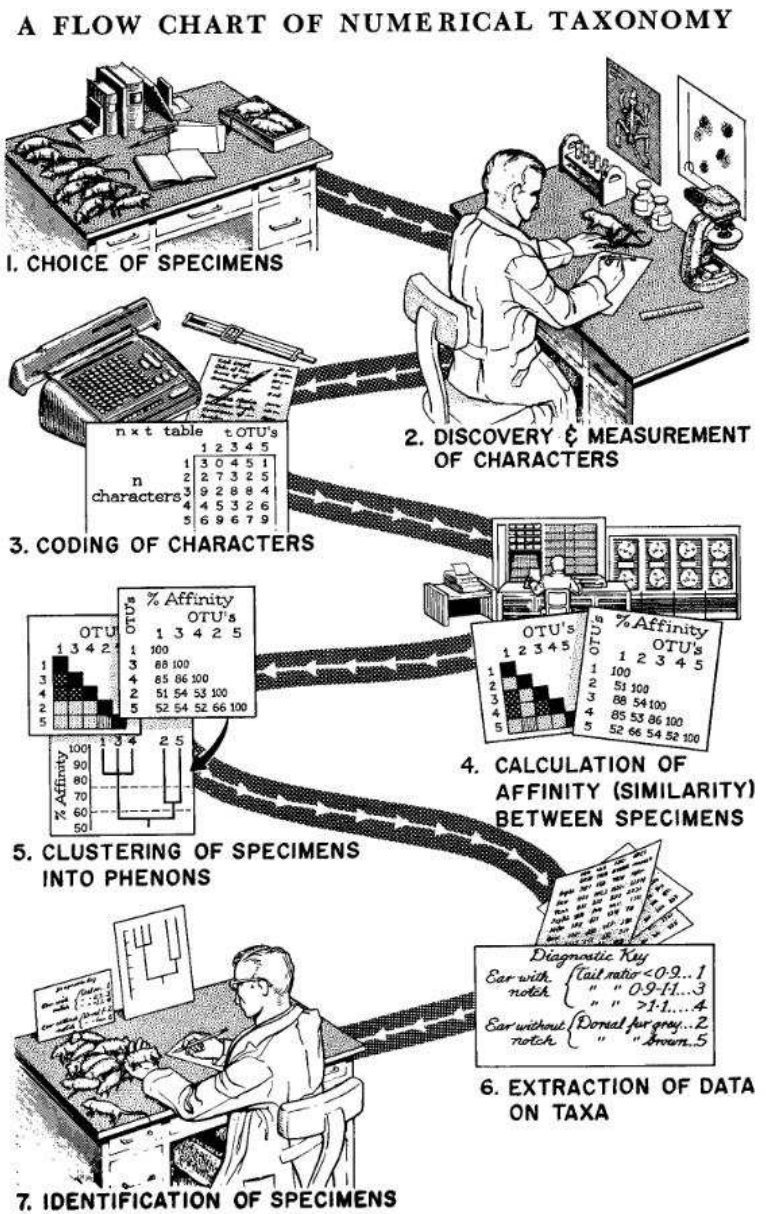
- **A) Pattern cladism (o "transformed cladism"):**
  - As the theory of cladistics has developed, it has been realized that more and more of **the evolutionary framework is inessential, and may be dropped**. . . . Platnick refers to the new theory as "transformed cladistics" and the transformation is away from a dependence on evolutionary theory (Patterson 1980 [1982, 118])

- **B) Process cladism (against the ideal morphology)** (**many-theories approach**).
  - Hennig (1965, 1966) considers two contending systems of classification: one based on phylogeny and the other stemming from ideal morphology. Ideal morphologists see no need to know anything about the evolutionary history of the organisms under study.
  - Hennig writes that **ideal morphologists mistakenly believe that we can construct scientific classifications without making any theoretical assumptions about evolutionary relations** (1966, 8, 11–12)
  - Hennig: ideal morphologists wrongly assume that the primary relations among organisms are similarity relations. Alternatively, Hennig suggests that **the primary relations among organisms <u>are causal</u> ones** such as genealogical and embryological relations (1966, 12).

- Both **evolutionary taxonomists** and **process cladists** believe that **process assumptions concerning evolution are essential for constructing classifications.**
- **Pheneticists** and **pattern cladists**, on the other hand, argue that **such assumptions are not essential**. Moreover, they contend that the principles of taxonomy should be void of such assumptions.

Sokal, 1963

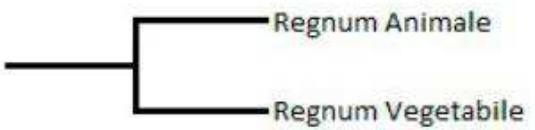
Pheneticism (taximetrics)



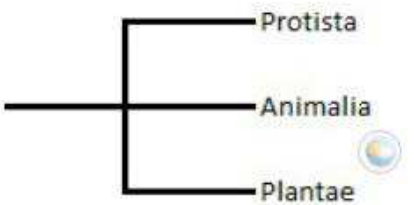
Classificaton development

Linnaeus 1735[8]	Haeckel 1866[7]	Chatton 1925[8][9]	Copeland 1938[10][11]	Whittaker 1969[12]	Woese et al. 1977[13][14]	Woese et al. 1990[15]	Cavalier-Smith 2004[5]
2 kingdoms	3 kingdoms	2 empires	4 kingdoms	5 kingdoms	6 kingdoms	3 domains	6 kingdoms
		Prokaryota	Monera	Monera	Eubacteria	Bacteria	Bacteria
					Archaebacteria	Archaea	
(not treated)	Protista	Eukaryota	Protoctista	Protista	Protista	Eukarya	Protozoa
							Chromista
Vegetabilia	Plantae			Fungi	Fungi		Fungi
			Plantae	Plantae	Plantae		Plantae
Animalia	Animalia		Animalia	Animalia	Animalia		Animalia

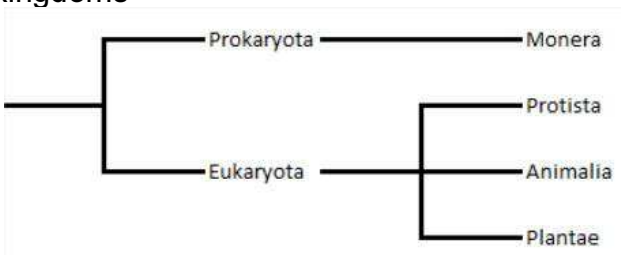
Linnaeus and the two kingdoms of life.



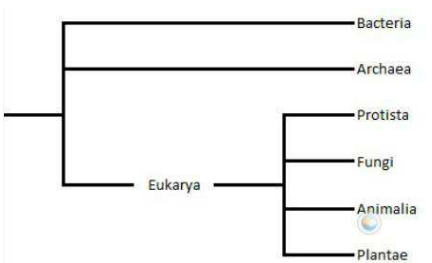
Haeckel and the three kingdoms.



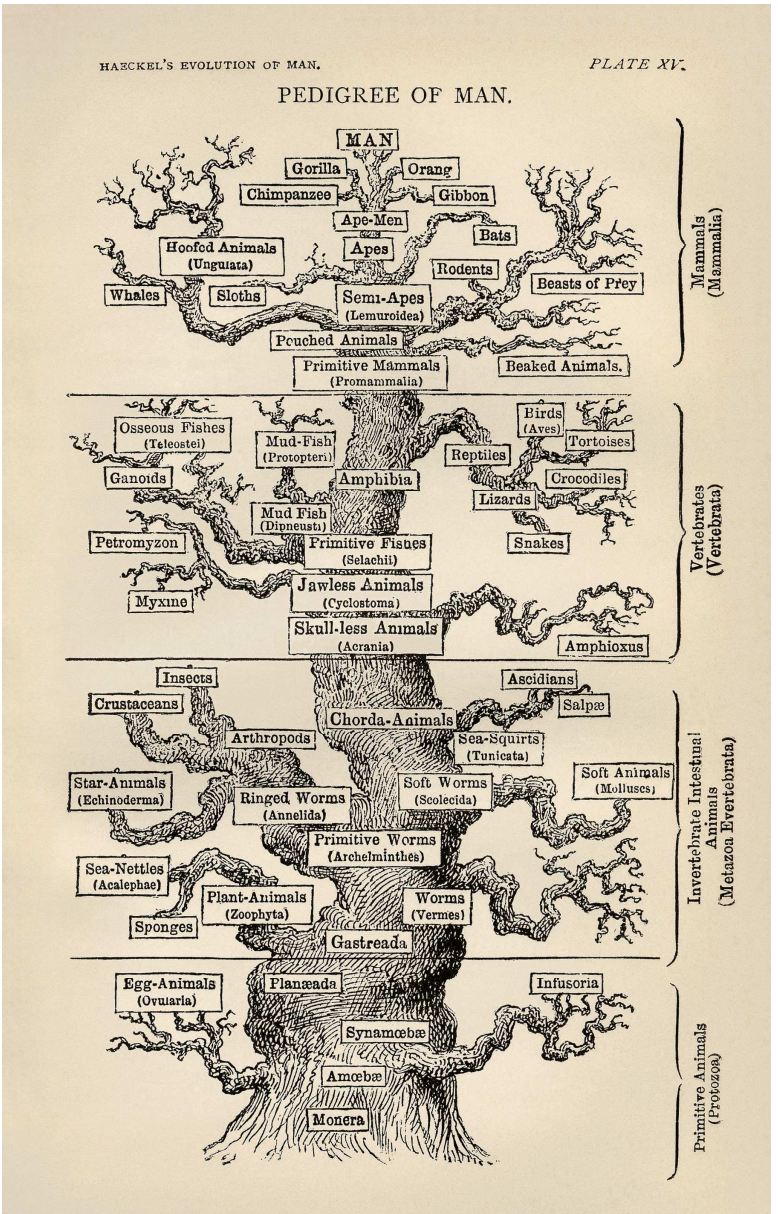
Whittaker (1969) Two empires and four kingdoms



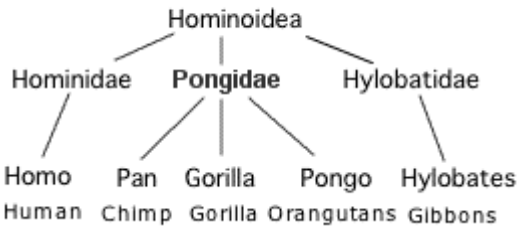
Carl Woese (1977) and the three domains.



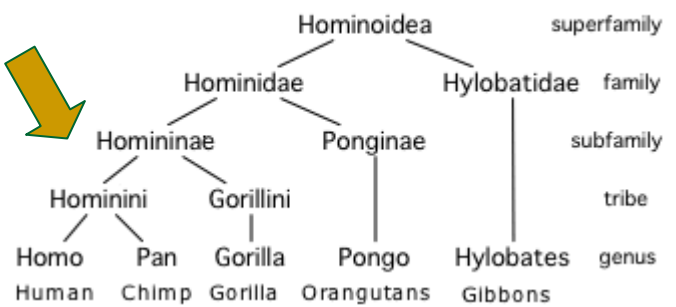
Haeckel's tree



Traditional Hominoid Classification



Modern Hominoid Classification



New cladogram of Homo sapiens

Domain - *Eucarya* - Multi-celled with nucleus
Kingdom - *Animala* or *Metazoa* - Can move around, specalized sense organs,...
(Subkingdom) - *Metazoa* or *Eumetazoa* - Distinguishes the rest of the animals from sponges
Note: The second classification above, K: Metazoa and SK: Eumetazoa, tends to be more popular now.
(Branches) - *bilateria: coelomate: deuterostome*
(Grade) - *Bilateral* - bilaterally symmetrical (left/right)
(sub-grade) - *Coelomata* - True body cavities
(SuperPhylum) - *Deuterostomia* - Develop (embryo) mouth second
Phylum - *Chordata* - Hollow nerve cord
Some places show SuperPhylum = *Chordata* and
Phylum = *Craniata* - bilateral symmetry, bone and/or cartilage
(Plants use **Division** instead of phylum)
(Subphylum) - *Vertebrate* - backbone
Euteleostomi - Bony vertebrates
(Superclass or Infraphylum) - *Gnathostomata* - jawed vertebrates.
Newer, cladistic, classifications include 3 other levels here:
Teleostomi (Dermal bone, fin rays)
Euteleostomi (bony vertebrates)
Sarcopterygii (Lobe-Fin)
Tetrapoda - Four footed gnathostomes - Can live on land.
Class - *Mammalia* - Hair, Mammary glands for nursing young
(Subclass) - *Theria* - Live births.
All mammals except monotremes - egg laying e.g. platypus.
(Infraclass) - *Eutheria* - Placental (unborn children carried in the uterus)
(SuperOrder) - Euarchontoglires
Order - *Primate* - (Monkeys) - Binocular vision (forward eyes) - opposable thumbs
(Suborder) - *Haplorrhini* (*Anthropoidea & Tarsiodea*) - Simple dry nose
Rotating sholder and elbow joints allowing them to swing from their arms.
(Infraorder) - *Catarrhini* - Downward facing, narrow nostrils
or *Simiiformes*
(Parvorder) - Catarrhini
(Superfamily) - Hominoidea (Apes) Absence of tails, rounded molars, color vision.
Family - *Hominidae* - (Great apes) - Complex social behaviors, larger body,
Skeletal modifications for semi-upright posture, 32 teeth
(SubFamily) - *Homininae* (hominines) - Gorilla, Chimp, Human
(Tribe) - *Hominini or hominins* - canine tooth, which looks more like an incisor.
Toe bone improved for moving bipedally.
Genus - *Homo* "man" - Larger brain
Species - *Homo Sapien* "wise" - Language, more sophisticated tools.
Sub-species (breed, race 3 , strain)
Variety (plants)
Form or cultivar (plants)
Individual (Plants)

New cladogram of Homo sapiens

- The Hominoid tree (family = Hominidae) has been revised several times in the last 25 years.
- The modern classification is based on genetic research which shows chimps and bonobos more closely related to humans (98% of DNA shared) than to gorillas or orangutans (97% of DNA shared). Recent proposals have put chimps in the Homo genus with humans.
- Another gene product that differs between the two species is the protein **FoxP2**. FoxP2 is a transcription factor. Rare humans with only one copy of the gene (*FOXP2*) have severe language defects.
- One gene **product** that **is** different between the two species is a protein designated myosin heavy chain16 (**MYH16**). In the 25 March 2004 issue of **Nature**, Stedman *et al* report; the *MYH16* gene is expressed almost exclusively in their jaw muscles where it transcribed and translated to produce one form of myosin that is used in the thick filaments of their jaw muscle fibers.
- **DNA:** the chimpanzee has an extra chromosome 24 instead of 23 in humans or a 4% difference. But the human chromosome 2 is a combination of 2 chimp chromosomes with most of the same genes.
  Some reports say there is a 4-5% difference between humans and chimps, but the most common number used is 1.2%.
- **Amino Acid Sequence of hemoglobin:** To compare differences in species is to look at the number of amino acids that differ from a human hemoglobin chain with 146 acids. Gorilla - 1, Rhesus monkey - 8, Mouse - 27, Chicken - 45, Frog - 67.

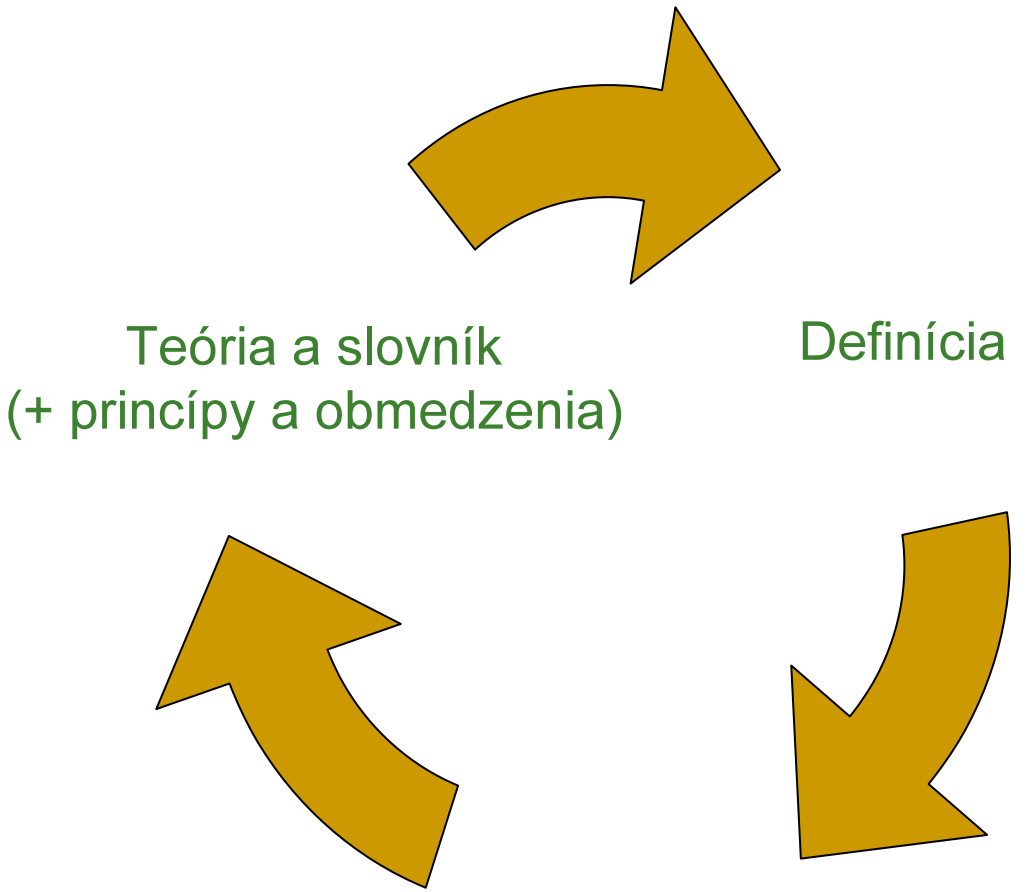
Rekapitulácia

- Klasifikácia (resp. taxonómia)
  - Klasifikácia má pevný teoretický a empirický základ
  - Klasifikácia je **aj** *spôsob* (resp. systematizácia) **aj** *výsledok* organizácie poznania (dát) **podľa závislosti** medzi elementmi
  - Nadväznosť medzi elementmi je evidentná a komplexná závislosť (umožňujúca systematizáciu)
  - Klasifikácia umožňuje rozšírenie poznania (vysvetlenie, predvídanie a falzifikáciu)
  - Teoretický základ klasifikácie (najčastejšie) predpokladá kauzálnu závislosť (buď cez priamu klasifikačnú teóriu alebo cez vedľajšie disciplíny)
  - (Mellor – rezolúcia pozorovania určuje základ a vlastnosti klasifikácie)

- Systematizácia
  - Hľadanie vzorov, ktoré sú zastúpené v klasifikácii

- Typológia
  - Typ sa (väčšinou) chápe ako monotetická klasa, ktorá obsahuje jednu vlastnosť a typológia je konceptuálny spôsob organizácie poznania (triedenia empirických údajov alebo udalostí) s ohľadom na určený typ (alebo konečný, **redukovaný**, počet) vlastností
  - Typ **nemusí byť reprezentačnou vlastnosťou** predmetu skúmania
  - *môže umožniť rozšírenie poznania* a viesť k jemnejšej štruktúre organizácie poznania
  - V spoločenských disciplínach má obmedzené explanačno-prediktívne vlastnosti
  - Závislosť medzi elementmi nie je explicitná a nemusí byť vždy transparentná

- Nedorozumenia často vznikajú aj tým, že klasifikácia a typológia môžu koincidovať a mať porovnateľnú štruktúru, ale nie sú identické s ohľadom na spôsob organizácie poznania
  - Napr. na Mendelejevov periodický systém elementov sa dá pozerať **aj** ako na *typológiu* (monotetická klasa: *Inázov elementu* X *atómové číslol*) **aj** ako na *klasifikáciu* (pevná a systematizovaná závislosť medzi elementmi).


Teória a slovník
(+ princípy a obmedzenia)
Definícia
Klasifikácia / taxonómia / typológia
systematizácia

Literatúra (výber):

- Adams & Adams - *Archaeological Typology and Practical Reality, A Dialectical Approach to Artifact Classification and Sorting* - Cambridge University Press (1991)
- Adams*, Classification and Typology, Encyclopedia of Life Support Systems* (EOLSS), Archeology vol. 1.
- Bailey, Kenneth D. - *Typologies and Taxonomies, An Introduction to Classification Techniques* (Quantitative Applications in the Social Sciences), 1994
- Baldwin J.T. (ed.), *Classification Theory*, 1988.
- Bryant, Rebecca - *Discovery and Decision - Exploring the Metaphysics and Epistemology of Scientific Classification*, 2001
- *Cohen,* Morris R. and Ernest. *Nagel*. An *Introduction to Logic* and Scientific Method. By New York, Harcourt Brace, 1934
- Ereshefsky, Marc. - *The poverty of the Linnaean hierarchy, a philosophical study of biological taxonomy* - Cambridge Univercity Press (2004)
- Hempel, C.G. -P. Oppenheim, *Der Typusbegriff im Lichte der neuen Logik* Leiden, 1936. (článok v jeho Aspects…)
- Gould, J.S, *Wonderful Life: The Burgess Shale and the Nature of History*, 1990
- Hull, D. L. (1998). Taxonomy. in: *Routledge Encyclopedia of Philosophy*, Version 1.0, London: Routledge.
- Lazersfeld, P.F., "Philosophy of Science and Empirical Social Research", in Nagel-P. Suppes-A. Tarski, *Logic, Methodology and Philosophy of Science, Proceeding of the* 1960 *International Congress,* Stanford University Press, 1962, pp. 463-473.
- Okasha, S., Darwinian Metaphysics: Species And The Question Of Essentialism, Synthese, 131, 2002, pp. 191-213
- Sivarajan V. V., N. K. P. Robson – *Introduction to the Principles of Plant Taxonomy*, 1991
- Sokal, Robert R, *Principles of numerical taxonomy* 1963
- Sneath, Peter H. A. *Numerical Taxonomy: The Principles and Practice of Numerical Classification* 1973
- Szostak, Rick - *Classifying Science, Phenomena, Data, Theory, Method, Practice*, Springer Netherlands (2004)
- Wolf, K.H. (Eds.), *Classifications and Historical Studies*, Elsevier (1976)

- Ďakujem za trpezlivú pozornosť