31 oct

Metaphor of life: how did we perceive it?

Systematics: discipline focused on classifying organisms and determining their evolutionnary relationships.
-Phylogeny: evolutionnary history of species or group of species
Taxonomy: scientific discipline concerned with naming and classifying the diversity of life
-Taxon: named taxonomic unit at any level of phylogenetic hiearchy or classification

Graphical representation of life
-new discoveries meant we knew more and more about the chain (ladder of beings)
-with darwin, every thing change. First to indicate ancestry. TREE!!
-presented the chain in a more systematic fashion; a tree was best representation of how life was organized.
-bottom of tree = inferior, simple organisms. Farther up = more complex. Upper= superior animal. Top of tree= humans (ultimate species)
-evolutionary view
⁻trunk doesnt make sense: we have bacteria on skin, differences between us, and were living species. If trunk is wrong how do we represent life??:
-spherical bush: tree without trunk
-outside of tree = current species, all come from the inside.
-species that disappeared are species that are extinct, did not continue evolving
-ex cheetah & humans on tip. Shows we all have a common ancestor;
-how long did it take??
-all living species have the same time frame
-3500 MYR since LUCA (first living being = last universal common ancestor)
-we all have the same evolutionary history
-the human species is only one terminal twig in the bush of life

Bonnet (1745)
Darwin (1837)
Haeckel (1879)

-what did LUCA look like? Carachteristics??
-oldest living being probably looked like a bacteria, transmitted a system to transmit genetic information (DNA) to every species
-same strand of DNA
-LUCA not in the middle of all 3, its on the side (lil graph thing slide 6)

Homologous structure: indicative of a common ancestor and the data that is used to reconstruct phylogenies
-evidence of common ancestor
-different function of same structure for diff animals

Homoplasy: carachters that are not indicative of common ancestry
-after you do analysis that you realise theyre homoplasy
-evolved independently, not from common ancestor
Ex: convergent evolution: ability to hover in sugar gliders vs flying squirrel. Morphologically similar but sugar glider is closer to kangaroos. Flying squirrel is closer to squirrels.
American cheetah vs african cheetah. Each have closer relationship to cats in their continent
Evolutionary reversion: absence of fur in whales, all mammals have hair, but whales. Whales might not have hair, but a whole bunch of other characteristics found in all mammals. Lost its hair in evolution. So, evolutionary reversion. They have lots of fat to keep heat

Taxonomy and classification & Phylogenetics:
-classification: system of words used to group species into generalized catagories
-hierchial system (sequential and orderly arrangement of catagories)
-taxonomic rank: taxon
-classification need to reflect the phylogeny
-cladograms, words are all ways to classify
Ex:phylogenetic tree with dichotomus branches (common ancestor, you get 2 species)
-bifurcation point : common ancestor denotes related groups. Cayote and gray wolf have a common ancestor here.
-cladogram indicates sequence of appearence of taxa
-no time frame in cladogram
-classification reflects ramification of the cladogram
-just want to compare relationship
-family name, genus name, order name.

-branching point, related groups and polytomy: branching (nodes) to new level = shared a closest common ancestor where along the tree.
-polytomy: on result of unresolved pattern of divergance

Cladistics:
Taxa should be based on shared derieved carachters
-not shared ancestral carachters
-only valid group: **monophyletic group*** need to know**
-monophyletic group: contains all and only the descendant from a common ancestor
Ex: group 1 contain a, b and c: it is mono.

Paraphyletic group: does not contain all the descendants from a common ancestor
Polypheletic group: contains descendants from several ancestors

Why is monophyletic important:
-repitiles = paraphyletic group
-common ancestor of crocodiles, dinosaurs and birds.
-birds are included, but reptiles and birds are two seperate groups.
-cant find one carachter that defines and is unique to reptiles; you have to include birds in them.
-dont have a derieved carachteristic and common ancestry to describe reptiles
-cladistics help organize groups through shared derieved carachters

-fish = paraphyletic: dont have one carachter thats unique to just them.

-reference group (outgroup, fundamental group): used to distinguish the derived carachter traits from ancestral carachter traits

-cladistic:
Ex: vertabral column
-shared derived carachter that defines vertebrates as monophyletic OR
Common ancestral traits that do not define mammals as monophyletic.

Conflicts in cladistics:
-principle of parsimony: must offer the simplest explination based on facts
-hypothesis with the fewest amount of steps (carachters) is the most parsimonious and this hypothesis is presumed the best approximation of the true relationships

-branching point age: fossils or by an estimation of the rate of change from a molecular clock
-length of branches can indicate time
-not a pat of analysis, added on to it

Did dinosaurs take care of their offspring?
-birds have parental care
-crocodiles dont, related to dinosaurs, so share a common ancestor