

Major Events in the History of Biology: PreDarwin Biology

Term	Definition (3 points)
Ages of Sand	<ul style="list-style-type: none"> - Douglas Adams - history of sciences based on sand/silica - 1st -Telescope 1608 (math & astronomy) - 2nd - Microscope 1678 (smaller and MRI) - 3rd - Computer Chip 1961 (binary code, calculation, knowledge stored) - 4th - Fibre Optics 1980s - sharing, collaboration, DNA moulds substrates (diseases)
Al-Dinawari	<ul style="list-style-type: none"> - 825- 896 (medieval ages - Byzantium world) - added plants to Theophrastus -6 volumes, plant evolution and growth
Alhazen	<ul style="list-style-type: none"> - 965- 1040 (medieval ages - Byzantium world) - scientific method for understanding various topics - observe, problem, hypotheses, testing, analysis, interpretation, publication - still used today
Al-Jahiz	<ul style="list-style-type: none"> - 781- 869 (medieval ages - Byzantium world) - took greek and roman info and wrote in arabic - described evolution in book ("animals survive to breed can pass on their successful characteristics to offspring)
Aristotle	<ul style="list-style-type: none"> - looked at diverse amount of organism and put it together - created hierarchical system —>lasted for 2000 years ('scala nature —> humans on top) - first to attempt to order animals - classification: disorder to order, organization not challenged (human on top)
Artificial taxonomy	<ul style="list-style-type: none"> -plato and students Aristotle (animals) and Theophrastus(plants) were first to use -to organize living world -greek texts translated into latin and arabic -lists grew longer and were based on detailed descriptions of the objects being classified rather than unique name for the animals or plants
Avicenna	<ul style="list-style-type: none"> - 980-1037 (medieval ages - Byzantium world) - philosopher, medicine - took Hippocratic corpus and added more medicine from sub contents (middle east, asia etc)

Binomen	<ul style="list-style-type: none"> -binomial naming of a species -Linnaeus's technique, still used today -binomen name - genus species
Binomial nomenclature	<ul style="list-style-type: none"> - the system of nomenclature in which two term safe used to denote a spices of living organism , the first one indicating the genus and the second the species name -Latin - Linnaeus hierarchal system helped
Biogeograph	<ul style="list-style-type: none"> -branch of biology that deals with the geographical distribution of plants and animals -NEXT LECTURE -
Chronological prediction	<ul style="list-style-type: none"> -gp: chronological event (prediction of future) -science is logical not chronological (tests) -simple prediction → tested → hypothesis → theory
Classification	<ul style="list-style-type: none"> - disorder to order - large amount of things put into order -ex of Aristotle classifying organism in <i>scala naturae</i>
Control	<ul style="list-style-type: none"> -experimental components -control of variables
Cuvier	<ul style="list-style-type: none"> - -NEXT LECTURE -
Deduction	<ul style="list-style-type: none"> - From the general to specific -physical science -ex. all insects have wings and this animals is an insect, this animal has wings
Empirical observation	<ul style="list-style-type: none"> -physical sciences -verifiable or provable y means of experiment (experimental data, as opposed to theoretical) -relying on or derived from observation or experiment
essentialism	<ul style="list-style-type: none"> - essences in every living thing - unknown characteristic that gives life - has not changed - similar structure to scala nature, bishop named usher calculated magic day where everything started
extinction	<ul style="list-style-type: none"> -NEXT LECUTRE - -

fact	<ul style="list-style-type: none"> - observation repeatedly confirmed - accepted true until proven false - never final - scientific facts distributed: journal selection, manuscript prep, peer review, revision, publication
folk taxonomy	<ul style="list-style-type: none"> -record of organism and objects that have passed through generation (knowledge from one to another) - each group characterized different things - similarities: 500 objects in classification system (cognitive limitation), 3-4 systems: inanimate, animate, plants and living,
Great chain of being	<ul style="list-style-type: none"> -scala natura e (medieval ages) -single god on top instead of multiples -god, angles, saints, humans , wild animals, plants -show order
harvey	<ul style="list-style-type: none"> -1578-1657 physiology -worked on circulation of parts of body, understanding of flow of blood (circulatory system) -father of physiology
Hierarchal system	<ul style="list-style-type: none"> -created by Linnaeus (father of modern taxonomy) -system nature with organisms (humans at the top) - 6 parts of kingdom, species and genus - kingdom, phylum,class, order, family, genus, species - autapomorphy: defining characteristics of a group
Hippocrates	<ul style="list-style-type: none"> - greek/roman ages -famous for 'inventing medicine' ; gathered info about human biology -wrote hippocratic corpus (record of human conditions, made case should be own science, knowledge base created medicine)
historical narrative	<ul style="list-style-type: none"> -natural sciences that believe that placed on earth on special day (there's only one world) - range of response, hiding in genetic variation - all observations (inductive reasoning)
hypothesis	<ul style="list-style-type: none"> -as he proves and tests, it then goes to theory -derived from extensive observation -gp: think it's a guess, but based observation and literature review
Ibn al_Baitar	<ul style="list-style-type: none"> - 1197 -1248 (Byzantium world) -took plants that Theophrastus and al dinwari recorded and added medical connections between plants -compendium of pharmaceutical

Induction	<ul style="list-style-type: none"> -used by natural sciences (can only explain what you see) -from specific to general -ex.this animal is an insect and it has wings therefore all insects have wings -many observations (extrapolating)
Industrial melanism	<ul style="list-style-type: none"> - first time which helped show natural selection (specifically the allele frequency change in pepper moths) - caused the trees bark to change colour - darkness of features acquired by a population of animals living in industrial region - Melanism: unusual darkening of body, color change in animals
Lamarck (Jean-Baptiste)	<ul style="list-style-type: none"> - -NEXT LECTURE -
Law	<ul style="list-style-type: none"> -Gp: how come darwin's not a theory ? - not universal yet, only seen on earth. cannot be law due to definition of law -universal thing that ties it together is water (if we can find water, potential for life) -one biologist with laws: Mendel → math behind, shuffling pair structures though generations (punnett squares)
Leclerc (George-Louis -Buffon)	<ul style="list-style-type: none"> - -NEXT LECTURE -
Linnaean taxonomy	<ul style="list-style-type: none"> -system naturae -hierarchal system -different classes: mammals, birds, amphibian, fish insects and worms
Carolus Linnaeus	<ul style="list-style-type: none"> -scientific revolution, start of modern sciences -father of modern taxonomy -organized large list of various organisms from different places, looked for a pattern -first published 1735
logical prediction	<ul style="list-style-type: none"> -gp:chronological event (prediction of future) -science:logical, hypothesis (not chronological, tests) -simple prediction → tested → hypothesis → theory

mechanical taxonomy	<ul style="list-style-type: none"> -how biologist name and group organisms have changed -initially identified by description and passed through generations by words -lists were written later as human travelled -in 1700's lists were essential and kept growing -list were written in universal language of scholars - Latin -difficult to manage
middle ages	<ul style="list-style-type: none"> -after rome collapses only survival = great amount of knowledge is not studied -400-700 early middle ages (dark ages) -1000-1300 high middle ages <ul style="list-style-type: none"> -resources start coming back -success, cathedrals and engineering -1300-1500 late middle ages <ul style="list-style-type: none"> - black plague - 1500 dominant culture, exploring again
natural sciences	<ul style="list-style-type: none"> -scientific revolution 16th-18th century -animate objects -more than physical and chemical laws(genetics) -special vital force -not universal, believe placed on earth on special day -based on historical narratives, range of response -hiding in genetic variation, based only on observation -inductive reasoning -multiple reasoning admits to not seeing all possibilities, accept that -multiple theory: sigl falsification not necessary to abandon a theory
null hypothesis	<ul style="list-style-type: none"> - an assumption or proposition where an observed difference between two samples of a statistical pollution is purely accidental and not due to systematic causes -they hypothesis to be investigated through statistical hypothetic testing so that when refuted indicated that the alternative hypothesis is true -true until invalidated (cannot be rejected)

organicists	<ul style="list-style-type: none"> - vital force replaced by genetic program and the importance of emergencies - everything we do has 5 chemical bases to it - life is expression of genetic program and is very complex - emergence: not only to understand genetics, but some of outcomes is more than the parts (as a group works differently than individually) - Swarm behaviour (emergence): flying together to survey population and determine where to go - outcomes; determining population, parts: flying
physical sciences	<ul style="list-style-type: none"> -inanimate objects -physical and chemical laws (universal laws) -based on empirical observations and equations -experiments preferred method -think as natural as inferior -deductive reasoning: from general to specific (all insects have wings and this animal is an insect. This animal has wings) -single theory: single falsification enough to abandon a theory -if anything destroys theory, theory is abandon (except Einstein, which were rewritten)
physicalists	<ul style="list-style-type: none"> -with the exception of humans all living hints are machines (Descartes, 17th century) -mathematical applied sciences, explain how life works -living things are small machines and we can see how they work -simple explanation based on chem and physics for understanding living things (except humans)
primary reference	<ul style="list-style-type: none"> -type of literature -publication, scientists has experiments, peer reviewed and available to public to read (literature state)
proximate causes	<ul style="list-style-type: none"> -scientific explanation: how? -plug in equation and get result (physical) -phenotype (morphology behaviour), mechanical (predictable), here and now, genes in action and experiments
sampling error	<ul style="list-style-type: none"> -bio: can never get the precise value of measurements -take various measurement and get a distribution -math states the mean equals measurement (sampling error measurements need to be balanced - not too little or too big) -test is repeated

Scala Naturae	<ul style="list-style-type: none"> -the great chain of being -form of superiority -assuming everything places and nothing has changed -evolves over the years -Aristotle creates the 'ladder of life' → not challenged for 2000 years
Secondary reference	<ul style="list-style-type: none"> -type of literature -review article, person who wrote it is an expert in field, may have not done all the work in literature, but references colleagues
special creation	<ul style="list-style-type: none"> -pattern: calculation from usher -species don't change -earth species created on Oct 23rd, 4004 BCE (Saturday) -Species are not old -arrived all at one day and put by something -process: a designer of some sort -only new thin in medieval ages, instead of multiple gods only one
Taxon(taxa)	<ul style="list-style-type: none"> -a taxonomic group of any rank, such as species, family or class -a name designating a group of organisms included within a category in the Linnaean taxonomic hierarchy (kingdom, phylum, class, order, family, genus)
taxonomy	<ul style="list-style-type: none"> -a system with a rule applied too it -Aristotle order based on birth types: fold (stories), Artificial (written lists), Mechanical, Natural (evolutionary), cladistic (phylogenetic)
tertiary reference	<ul style="list-style-type: none"> -types of literature -person who wrote it (not an expert) has marginal connections to works, not referred back to original source (ex. textbook, national geographic, wikipedia)
Theophrastus	<ul style="list-style-type: none"> -371-287 BCE -compendium of all plants in world -classified plants (still same way) -still used in 1500s -ancient father of taxonomy and classification

theory	<ul style="list-style-type: none"> -strongest investigated way to support -Darwins, found a large amount of observation and theories were constant -still works (inductive reason, natural science because willing to open to other options if it is broken -applying physical sciences to biology -a supposition or a system of ideas intended to explain something, especially one based on general principles independent of the things to be explained
ultimate causes	<ul style="list-style-type: none"> -anatomy of scientific explanation (theory) -ultimate causes: why is it there, purpose (natural) -genotype (genes and history), variable (probabilistic), evolutionary past, changes in genetic programs, historical narratives
van leeuwnhoek	<ul style="list-style-type: none"> -(1632-1723) first microscope -only one who made them -microscope used glass bead which was embedded into plate and thumb screws to move things, use glass bead magnified -biological world
vesalius	<ul style="list-style-type: none"> -1514-1564 Anatomy -dissected cadavers and mapped human body (muscles) -father of anatomy
vitalist	<ul style="list-style-type: none"> -scientific revolution -physical and alchemical laws apply but living things have a vital force (essence) -everything behaves with the laws of physics -unusual part which can't be defined (etc. life force, something special) -no knowledge of ATP high energy bonds etc.)