

INTRODUCTION TO ANTHROPOLOGY



ANTH 101

PROF. KURT REYMERS (DR. K)

WEEKLY ASSIGNMENTS AT:
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B. Evolution and Genetics

1. Notable Figures in Evolution



- 1750: Linnaeus** – zoologic taxonomy (classification system)
- 1800: Lamarck** – environment shapes organisms (giraffe example)
- 1859: Darwin** – natural selection
- 1866: Mendel** – inheritance
- 1953: Franklin, Watson & Crick** – discover DNA

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Lamarck's Evolutionary Theory

Charles Darwin, author of "The Origin of Species" (1859)

Mendel's dominant and recessive Genes

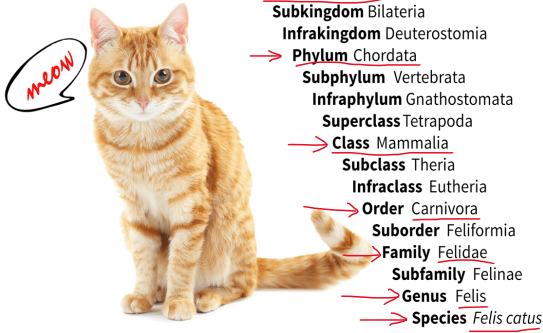
F ₂ generation		Sperm	s
S	SS	Ss	
Eggs	Ss	Ss	
s	Ss	ss	

Linnaeus' Classification of Dogs and Humans

- Kingdom: Animalia
- Phylum: Chordata
- Class: Mammalia
- Order: Carnivora (Dogs) Primates (Humans)
- Family: Canidae Hominidae
- Genus: Canis Homo
- Species: familiaris sapiens

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Scientific Classification of a Domestic Cat



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B. Evolution and Genetics

2. Why do scientists support the evolutionary explanation of life relatedness?



Evidence exists in many sciences:

- Geology and Stratigraphy**
Fossils show a gradual increase in complexity (order) with time; (James Hutton)
- Radiometric dating (Physics)**
- Comparative Anatomy (Biology)**
- Microevolution (Ecology)** (British Moths)
- Genetics (Microbiology)**

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B. Evolution and Genetics

3. Principles of Natural Selection (Darwinian Evolution/ "Descent with Modification")



- Variation** – unique individuals;
- Inheritance** – traits come from ancestry/heritage;
- Survival** – "Differential Reproductive Success"
Genetic traits linked to *survival* are passed on.

V.I.S.

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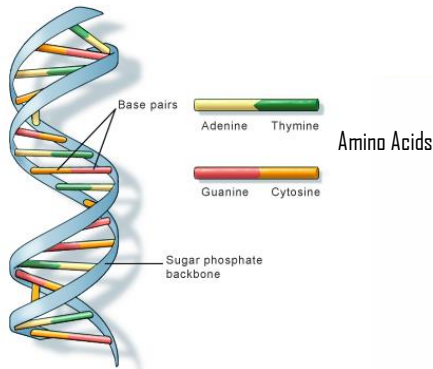
B. Evolution and Genetics

4. The Mechanism of Evolution: DNA



- i. **Deoxyribonucleic acid** was discovered by Watson and Crick (w/ Franklin) in 1953;
- ii. DNA is the “blueprint” for life; **genes pass on our traits**.
Genotype: gene “blueprint” in DNA strand
Phenotype: trait created in organism;
- iii. **Dominant genes** express themselves at a **higher ratio** than **recessive genes (Mendels peas)**
- iv. **Messenger RNA (mRNA) and ribosomes** produce the proteins that build the body.
- v. **Epigenetics explains variation.**

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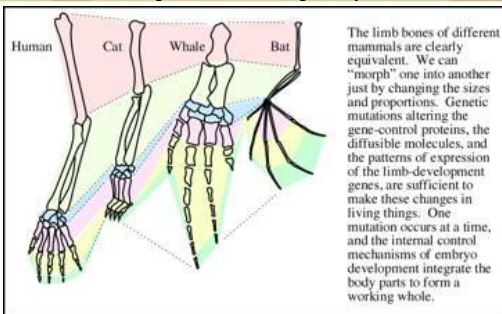
U.S. National Library of Medicine

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4a. Comparative Anatomy or “morphology”

Shows how organisms are linked together by lines of descent



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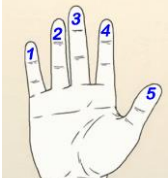
B. Evolution and Genetics

4b. MACROEVOLUTION = SPECIATION (species change)

Species Defined (simply): A population that consists of organisms able to interbreed and produce fertile and viable offspring.



Members of a species have in common the DNA code, but each one **varies**. The **total genes in the population** represents the **GENE POOL**. If the gene pool changes, evolution occurs.



What affects the **Gene Pool**? Remember the **FIVE FINGERS of EVOLUTION**:

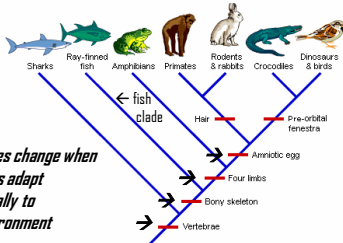
- 1) Small population
- 2) Non-random mating
- 3) Mutation
- 4) Gene Flow/Drift
- 5) Natural Selection == ADAPTATION

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B. Evolution and Genetics

4c. Evolutionary changes take lots of time:

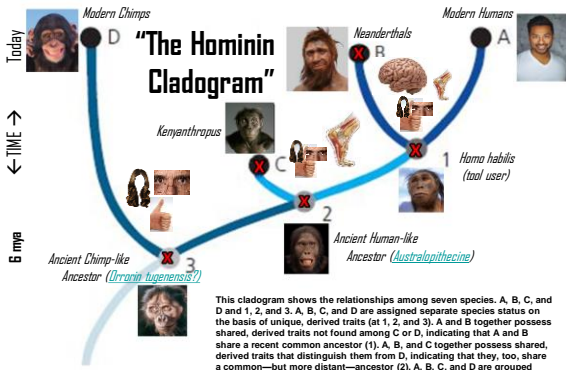
Lines of descent which describe and link biological changes are called **"clades"**.



Phenotypes change when organisms adapt differentially to their environment

Time and Complexity ↑

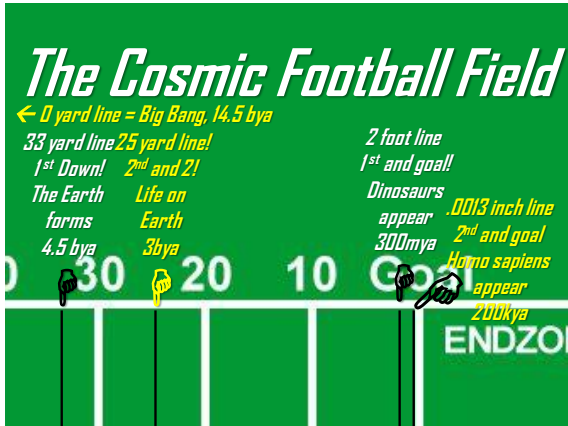
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This cladogram shows the relationships among seven species. A, B, C, and D and 1, 2, and 3. A, B, C, and D are assigned separate species status on the basis of unique, derived traits (at 1, 2, and 3). A and B together possess shared, derived traits not found among C or D, indicating that A and B share a recent common ancestor (1). A, B, and C together possess shared, derived traits that distinguish them from D, indicating that they, too, share a common—but more distant—ancestor (2). A, B, C, and D are grouped together for analysis on the basis of shared, primitive traits common to them all or shared, derived traits that distinguish their common ancestor (3) from an out-group not shown in the cladogram.

"Lines of Descent"

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