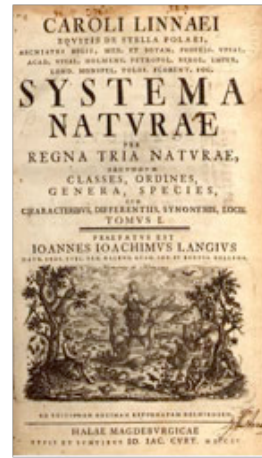


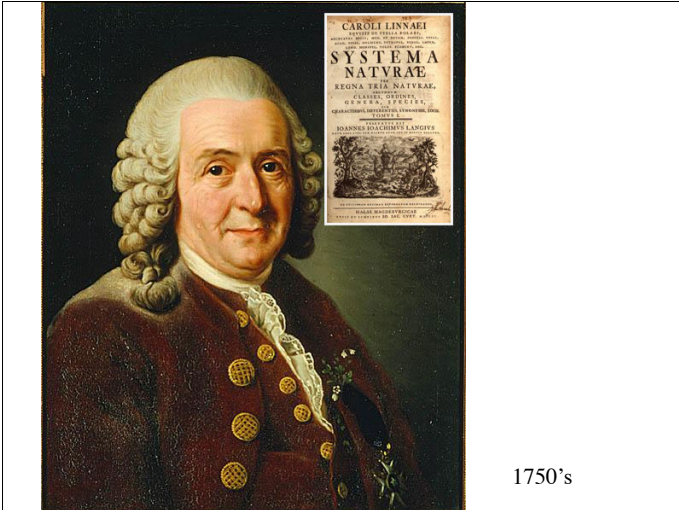
Sources of Evidence

1



"Deus creavit,
Linnaeus disposuit."

4

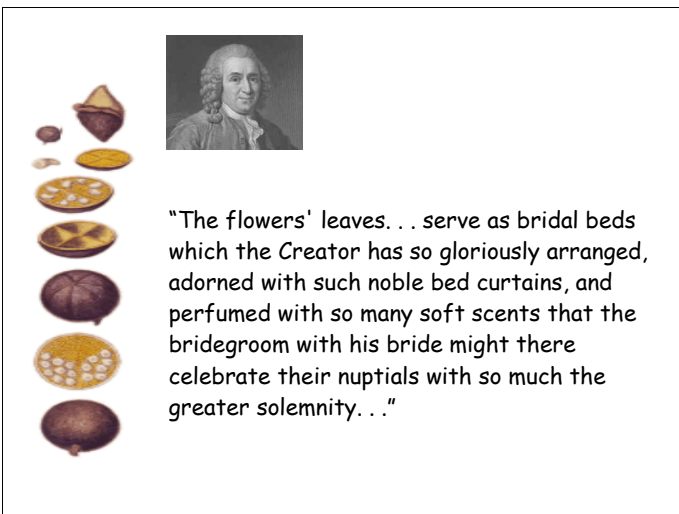


1750's

2



5



"The flowers' leaves. . . serve as bridal beds which the Creator has so gloriously arranged, adorned with such noble bed curtains, and perfumed with so many soft scents that the bridegroom with his bride might there celebrate their nuptials with so much the greater solemnity. . ."

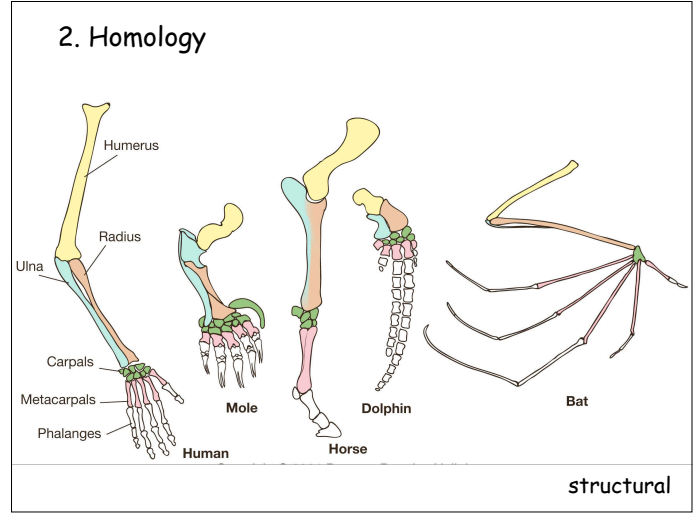
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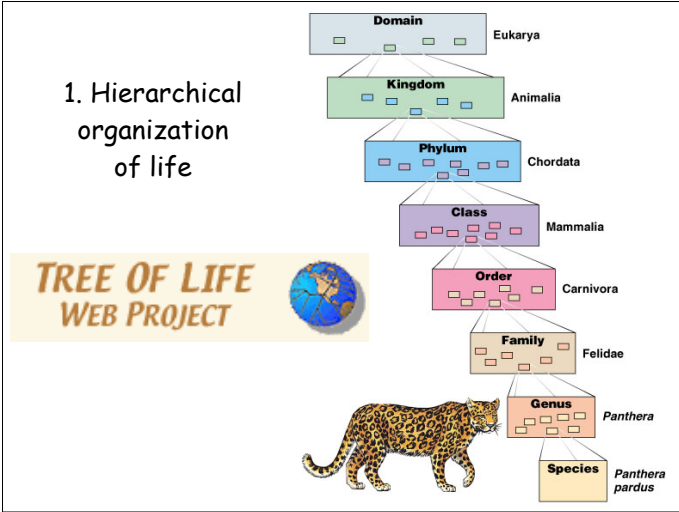
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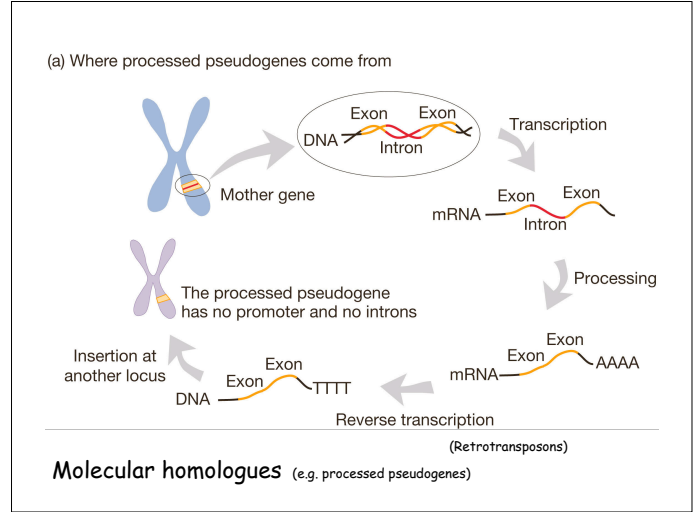
7



10



8



11

First base	Second base					Third base
	U		C			
U	UUU	Phenylalanine	F	UCU	Serine	S
	UUC	Phenylalanine	F	UCC	Serine	S
	UUA	Leucine	L	UCA	Serine	S
	UUG	Leucine	L	UCG	Serine	S
C	CUU	Leucine	L	CCU	Proline	P
	CUC	Leucine	L	CCC	Proline	P
	CUA	Leucine	L	CCA	Proline	P
	CUG	Leucine	L	CCG	Proline	P
A	AUU	Isoleucine	I	ACU	Threonine	T
	AUC	Isoleucine	I	ACC	Threonine	T
	AUA	Isoleucine	I	ACA	Threonine	T
	AUG	Start (Methionine)	M	ACG	Threonine	T
G	GUU	Valine	V	GCU	Alanine	A
	GUC	Valine	V	GCC	Alanine	A
	GUA	Valine	V	GCA	Alanine	A
	GUG	Valine	V	GCG	Alanine	A
G	GAU	Aspartic Acid	D	GGU	Glycine	G
	GAC	Aspartic Acid	D	GGC	Glycine	G
	GAA	Glutamic Acid	E	GGA	Glycine	G
	GAG	Glutamic Acid	E	GGG	Glycine	G

RNA Codon Amino acid Abbreviation

Shared genetic code

9

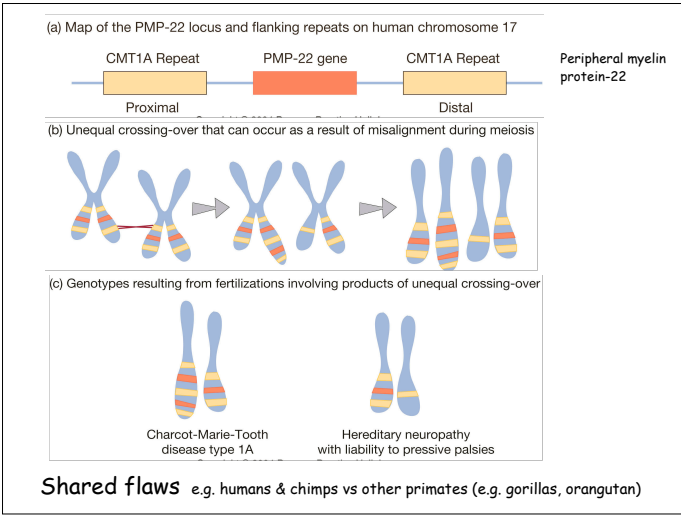
- functionless
- accumulate mutations

(c) Distribution of six human pseudogenes of various ages

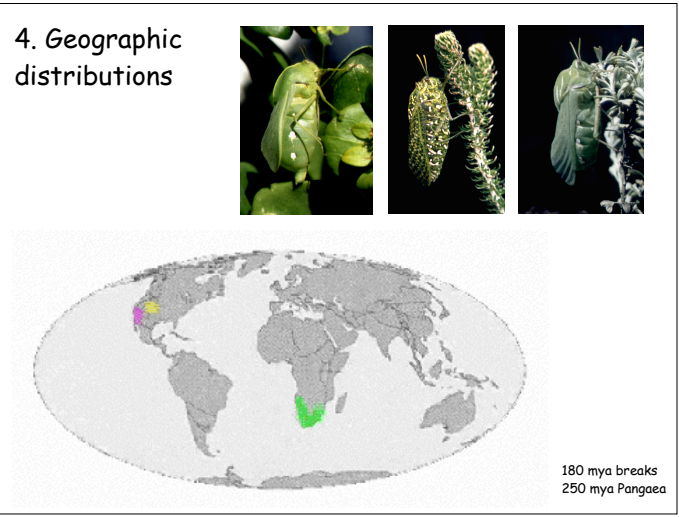
Pseudogene	Estimated age	Human	Chimp	Gorilla	Orangutan	Rhesus monkey	Capuchin monkey	Hamster
α-Enolase Ψ ₁	11 Myr	●	●	●				
AS Ψ ₇	16 Myr	●	●		●			
CALM II Ψ ₂	19 Myr	●	●	●				
AS Ψ ₁	21 Myr	●	●	●		●		
AS Ψ ₃	25 Myr	●	●	●		●		
CALM II Ψ ₃	36 Myr	●	●	●		●	●	

- older processed pseudogenes occur in a broader array of spp

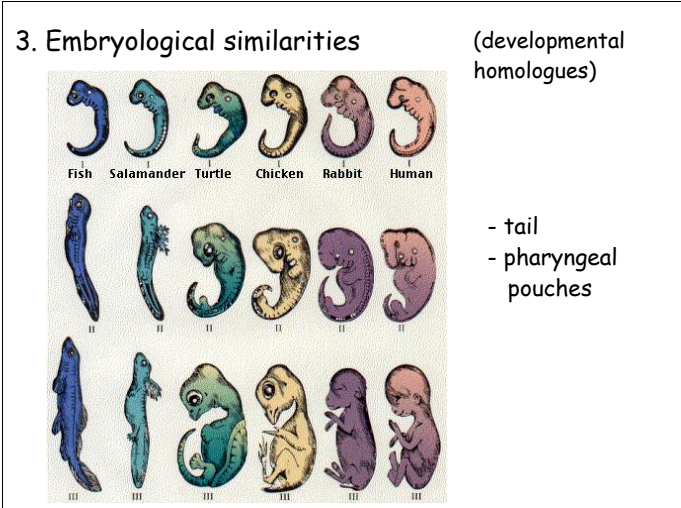
12



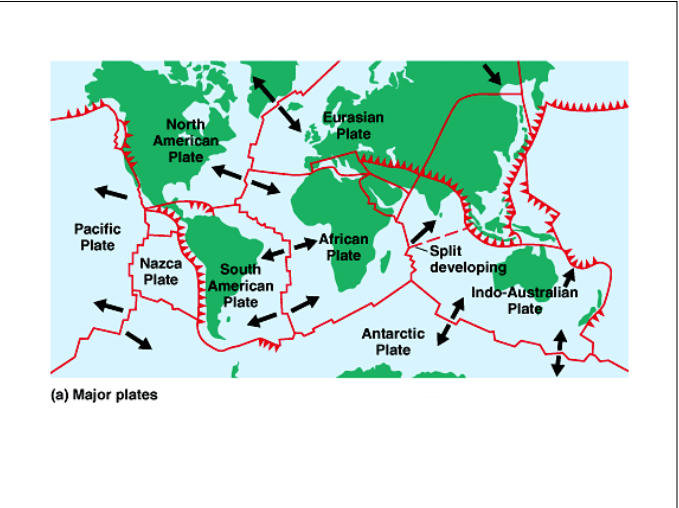
13



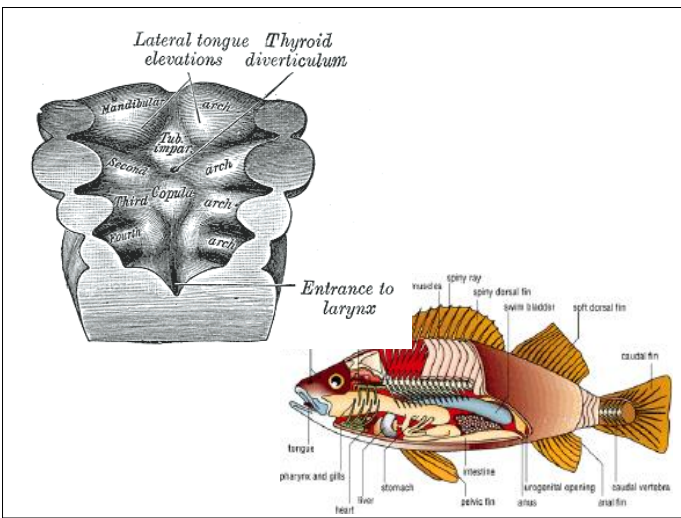
16



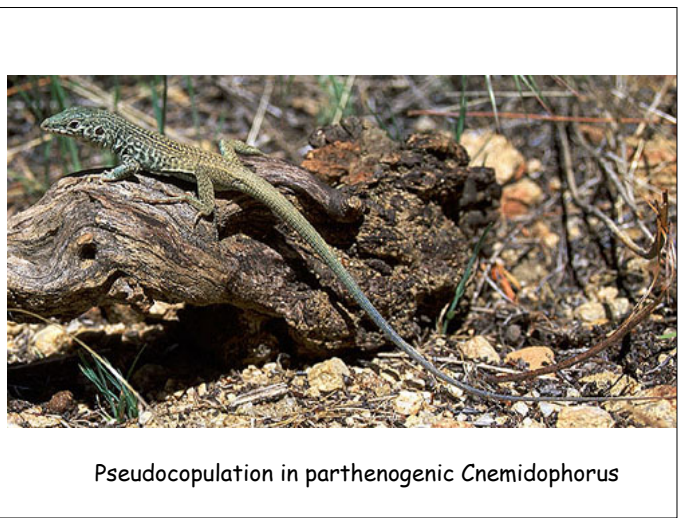
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17

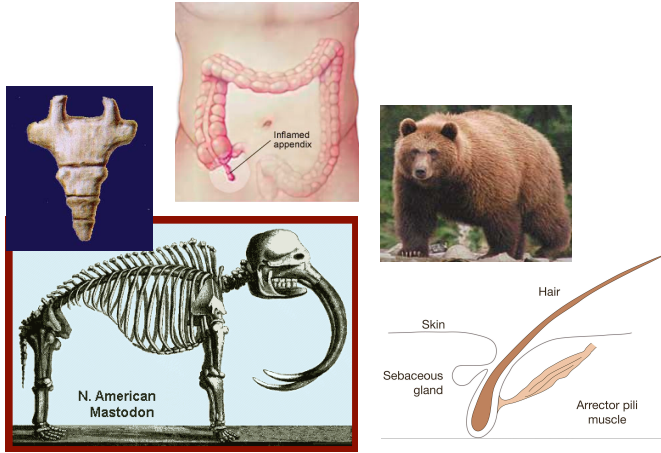


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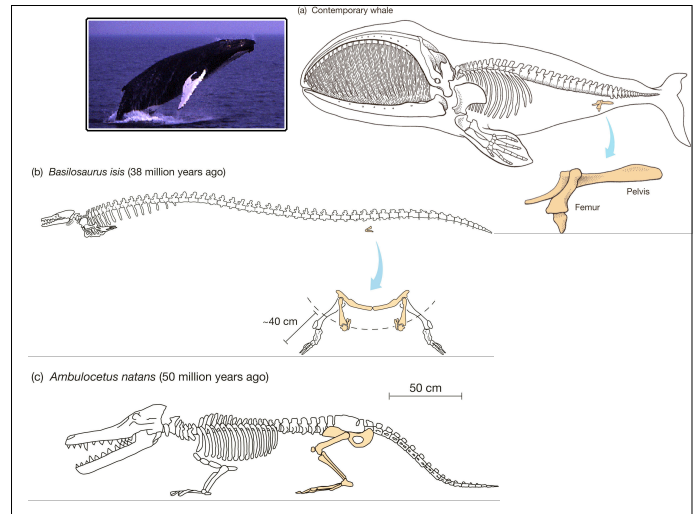


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5. Vestigial characters

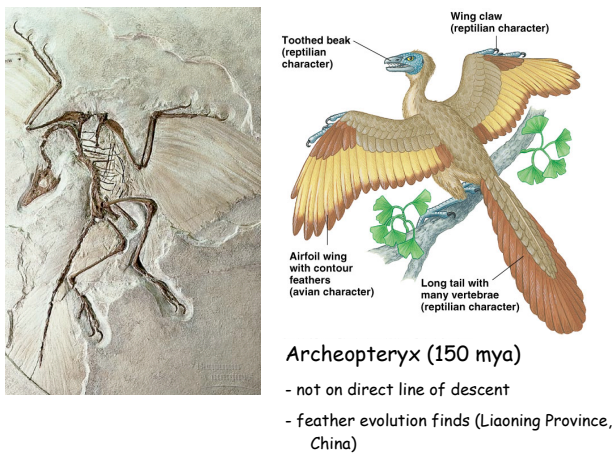


19

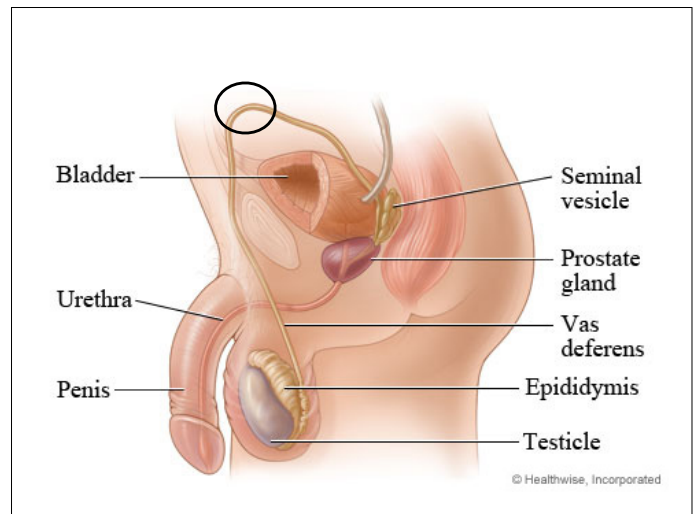


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6. Intermediate/transitional forms



20



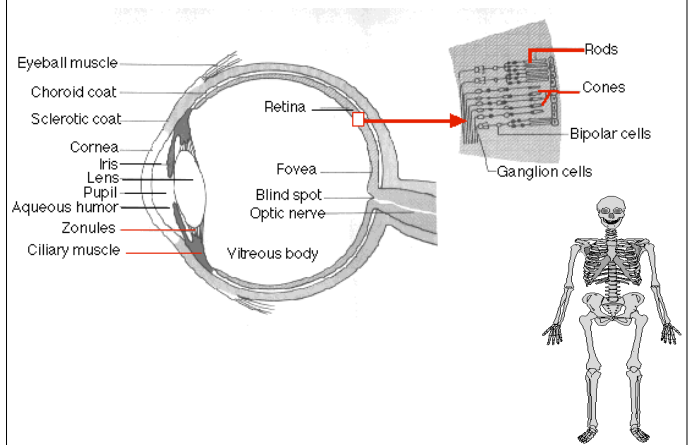
23

Caudipteryx zoui
flightless dinosaur
(120 -136 mya)

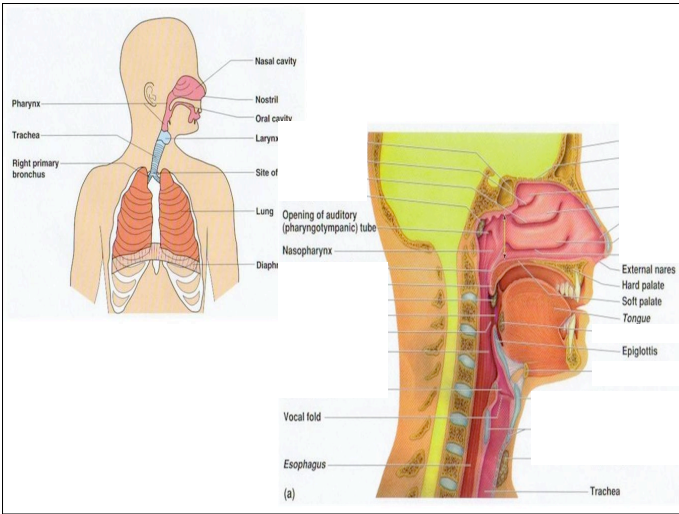


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7. Suboptimal design



24

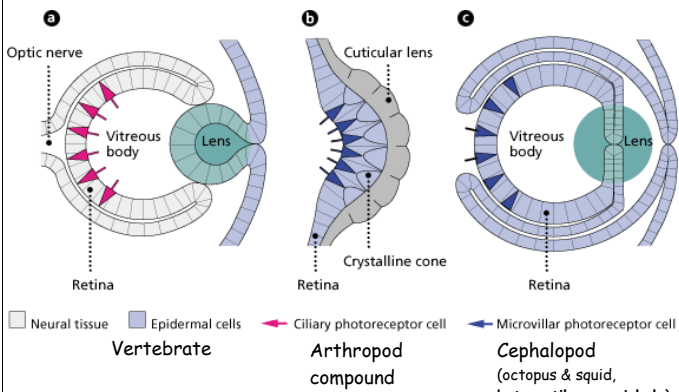


Indirect observations e.g. fossils, transitional forms



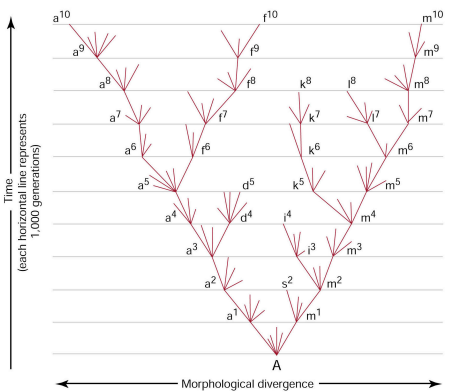
8. Convergence

- different (more efficient?) designs for same function

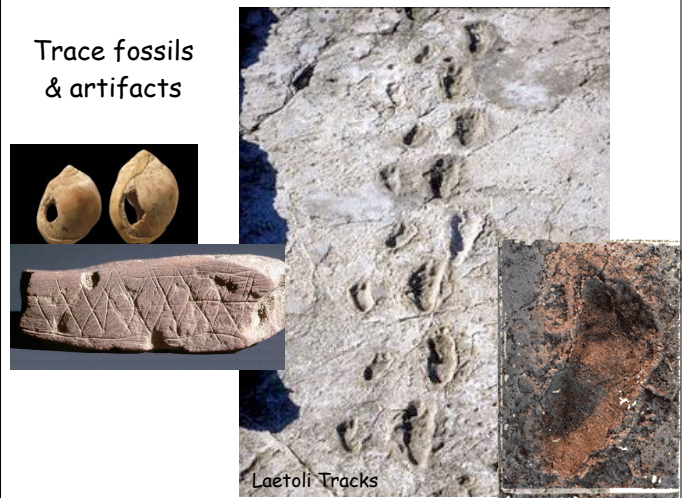


8 sources of evidence

1. Relatedness of life forms
2. Change through time (in/direct)
3. Great age of earth (Geological time scales, radio-metric dating)

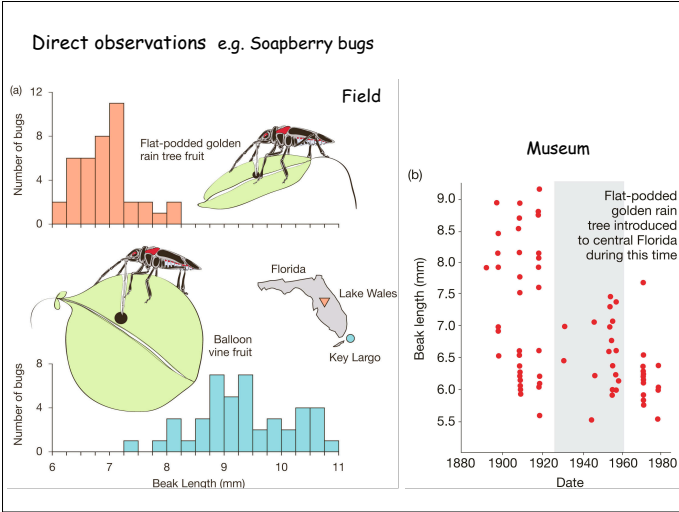


Trace fossils & artifacts





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15 Evolutionary Gems

Gems from the Fossil Record

1. Land-living ancestors of whales
2. From water to land
3. The origin of feathers
4. The evolutionary history of teeth
5. The origin of the vertebrate skeleton

Gems From Habitats

6. Natural selection in speciation
7. Natural selection in lizards
8. A case of co-evolution
9. Differential dispersal in wild birds
10. Selective survival in wild guppies
11. Evolutionary history matters

Gems From Molecular Process

12. Darwin's Galapagos finches
13. Microevolution meets macroevolution
14. Toxin resistance in snakes and clams
15. Variation versus stability

nature
www.nature.com/nature

<http://www.nature.com/nature/newspdf/evolutiongems.pdf>

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