Biology I CH 13

Evolution

4 basic principles of life:

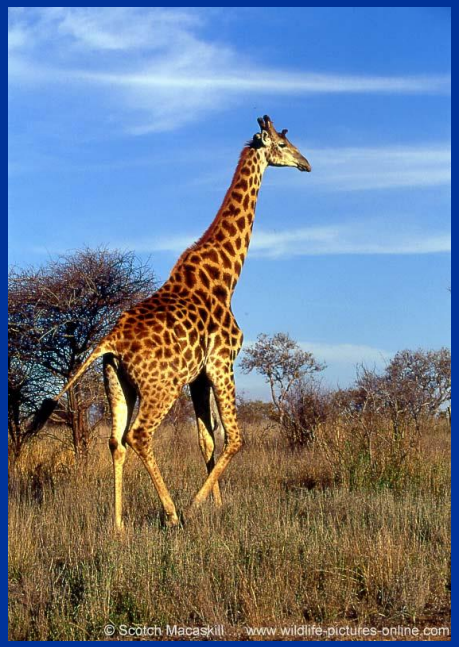
1. More organisms are eventually born than can survive in any environment

4 basic principles of life:

2. There is a natural variance of traits in every population

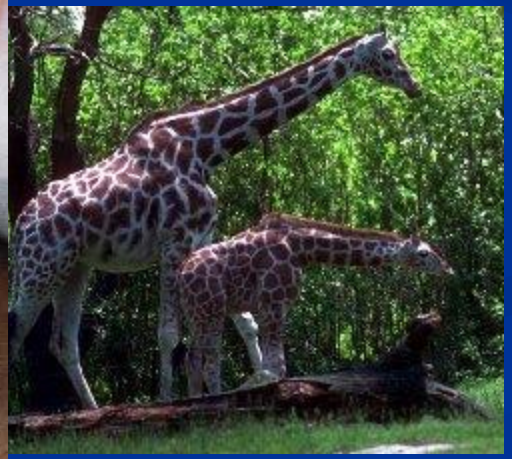
4 basic principles of life:

3. Some traits help an organism to survive in its environment



4 basic principles of life:

4. Beneficial traits are passed down to offspring

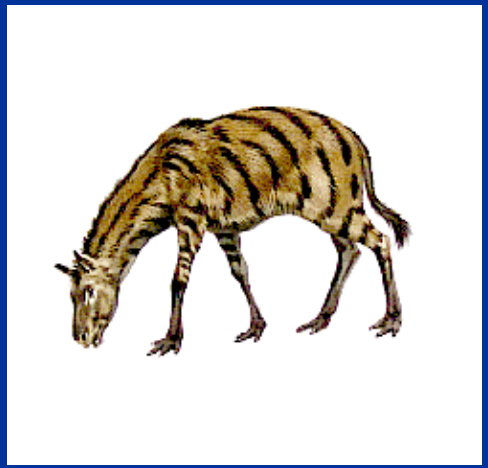


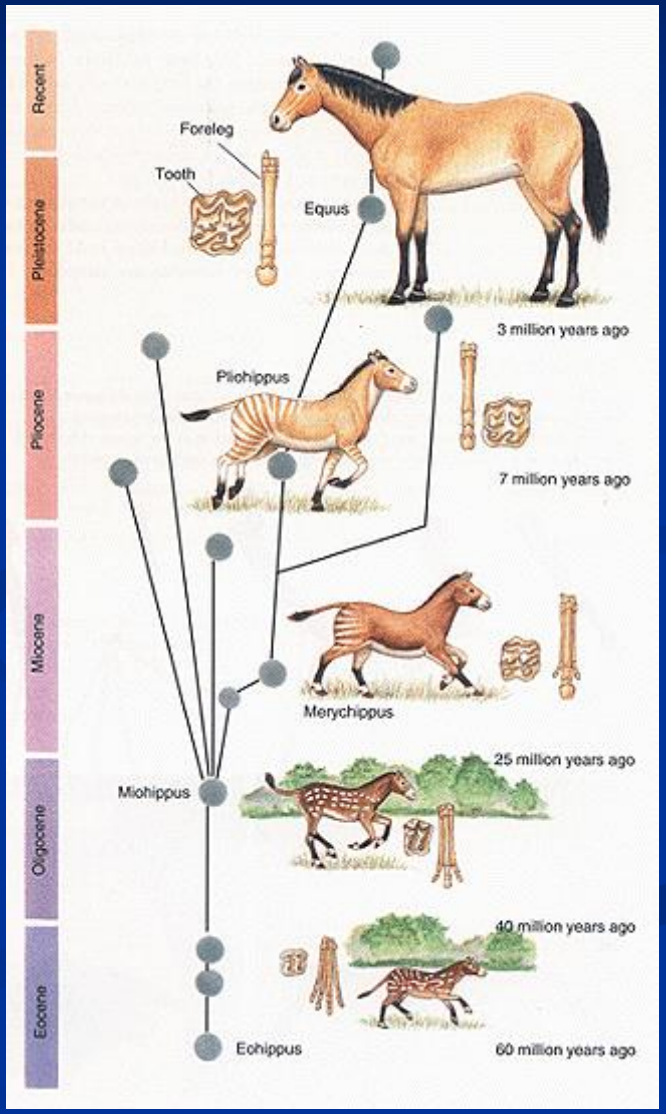
All together:

1. More organisms are eventually born than can survive in any environment
2. There is a natural variance of traits in every population
3. Some traits help an organism to survive in its environment
4. Beneficial traits are passed down to offspring

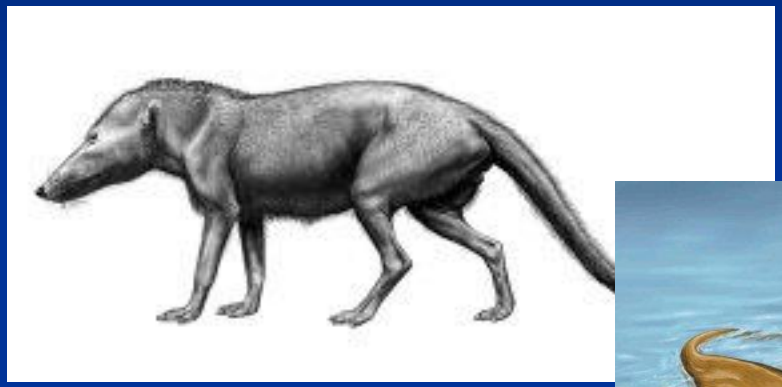
This Is Evolution

- Evolution states that organisms are constantly changing and species are becoming more complex over time





Decent with modification-change over time.

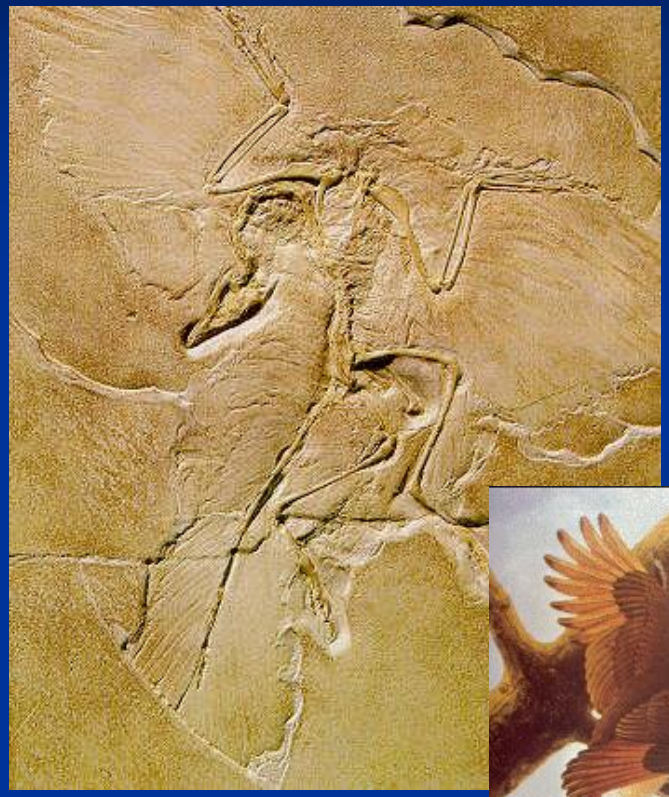


Natural Selection

- Fitness
- Adaptations
- Survival of the fittest

Fossil Evidence

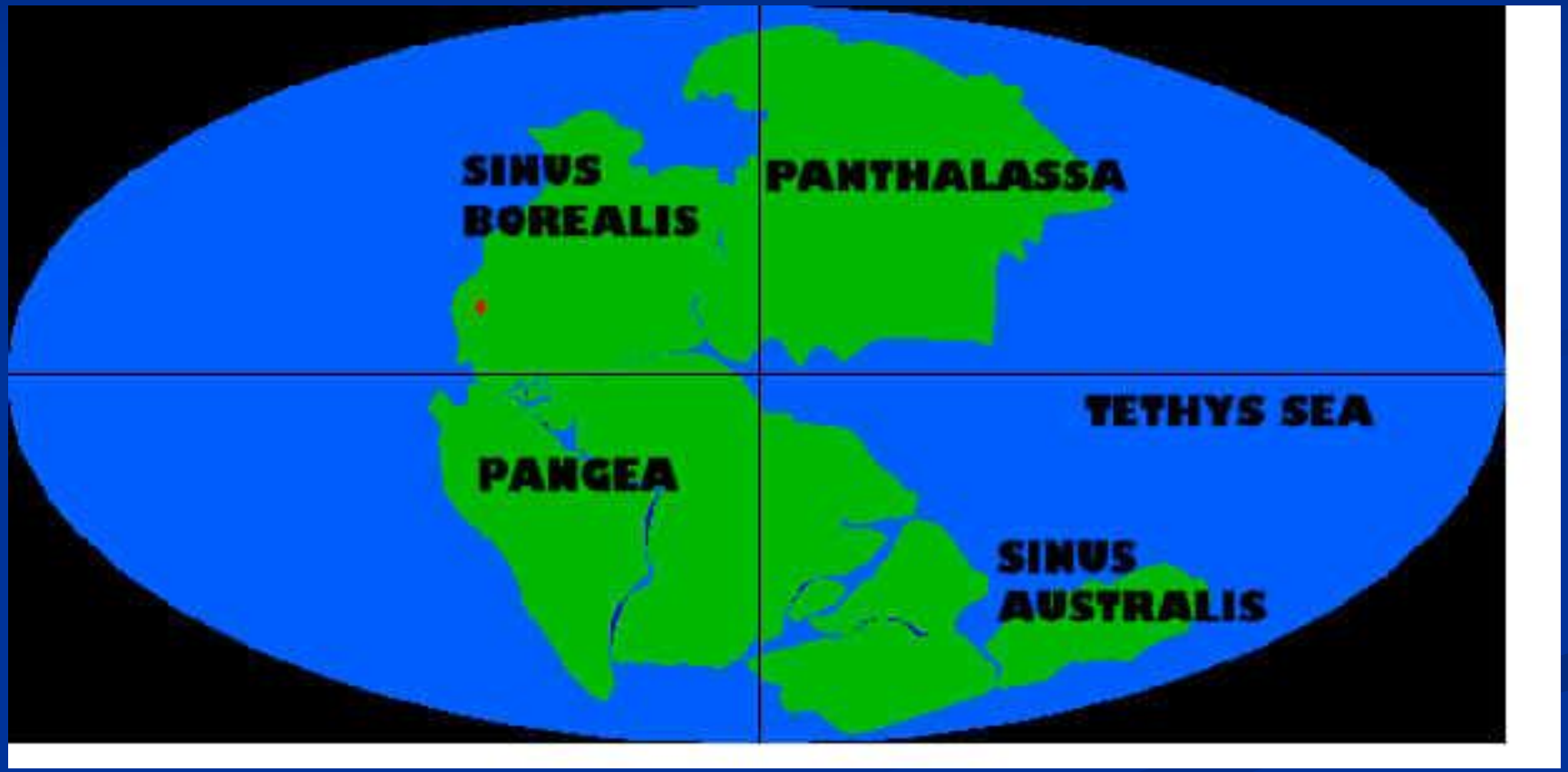
- There are thousands of examples of fossil evidence for evolution
- Modern species have many relatives that can be traced back through time using fossils



Fossils

- Molds
- Casts

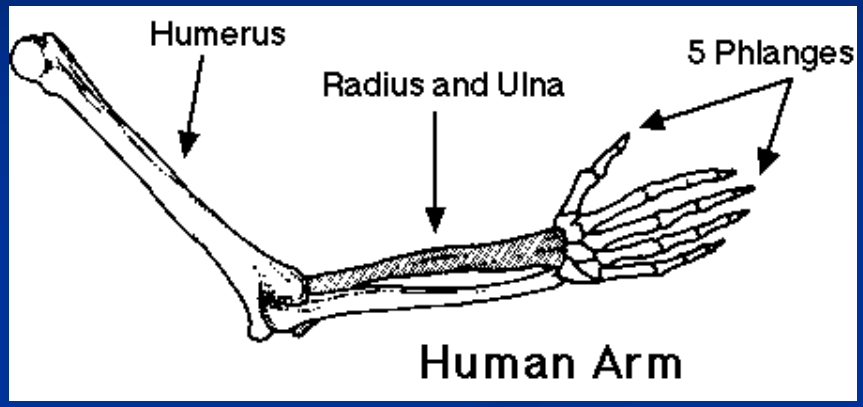
Biogeography

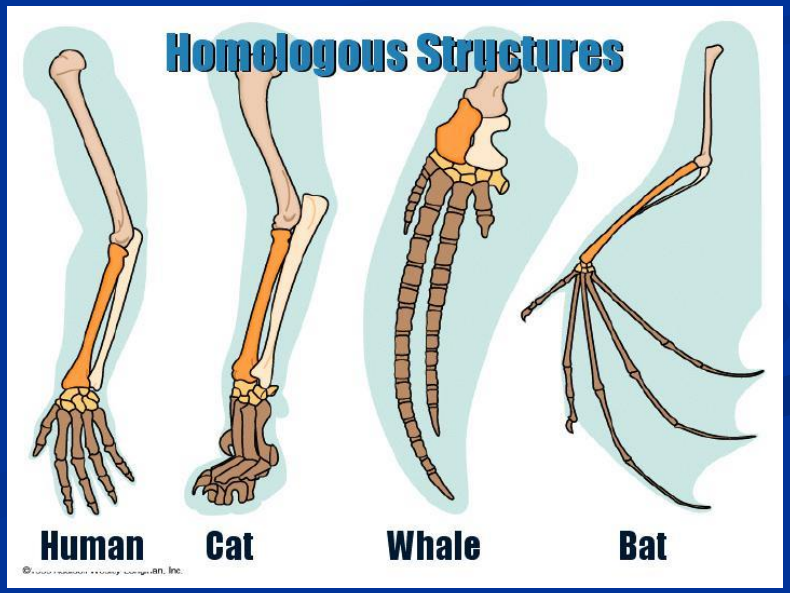


Proof Of Evolution

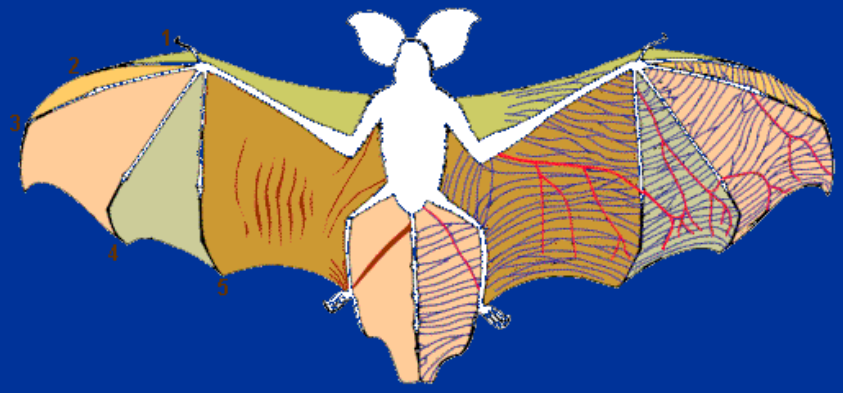
- Homologous structures-

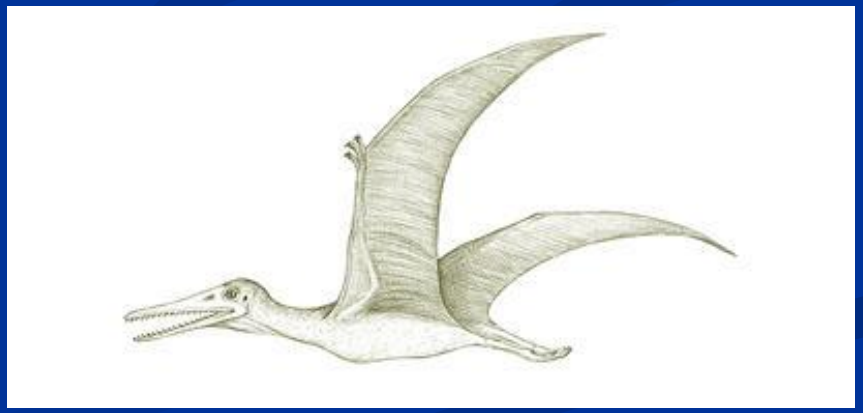
Same structures in different species from ancestors



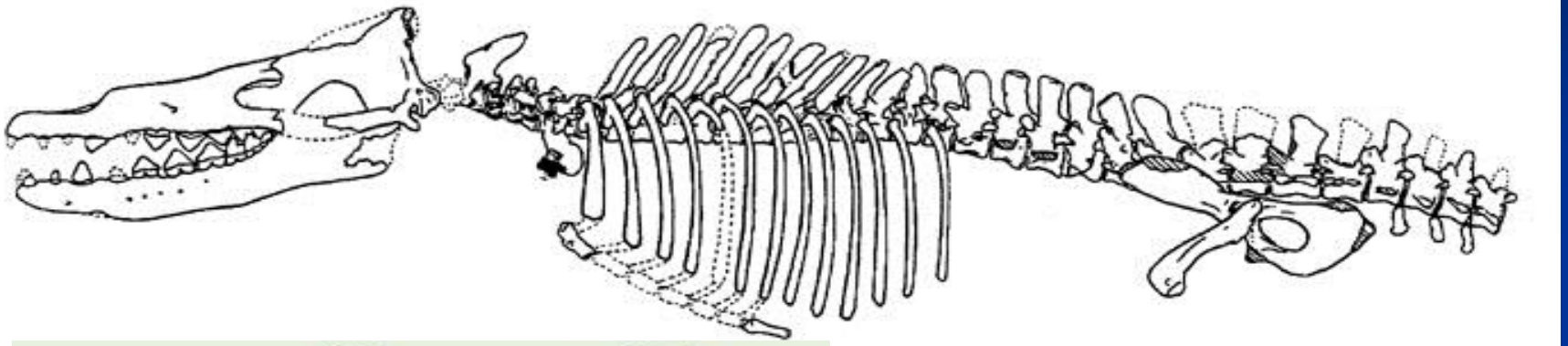


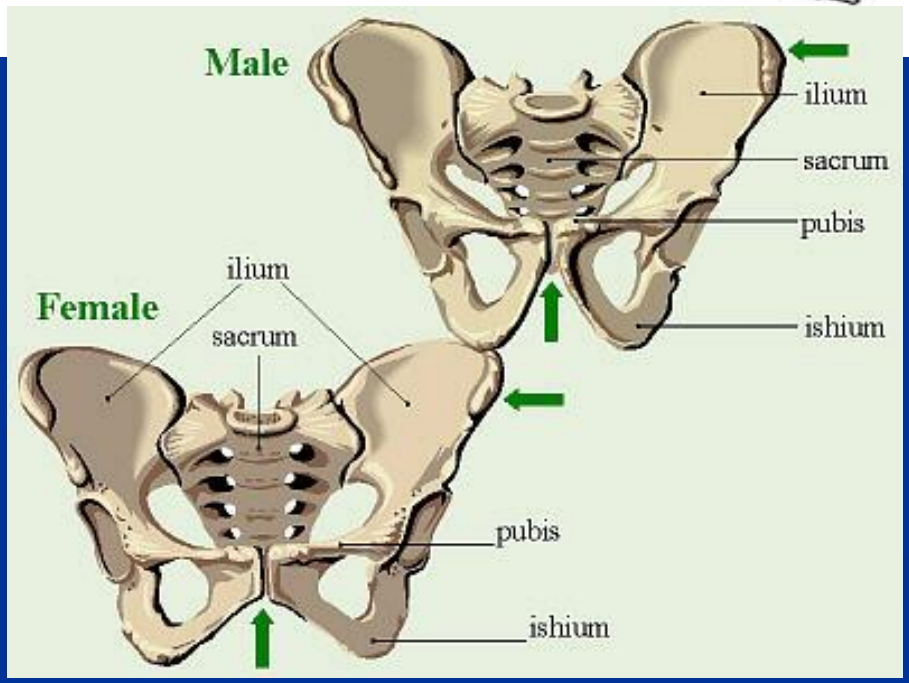
Analogous Structures-different species with same function



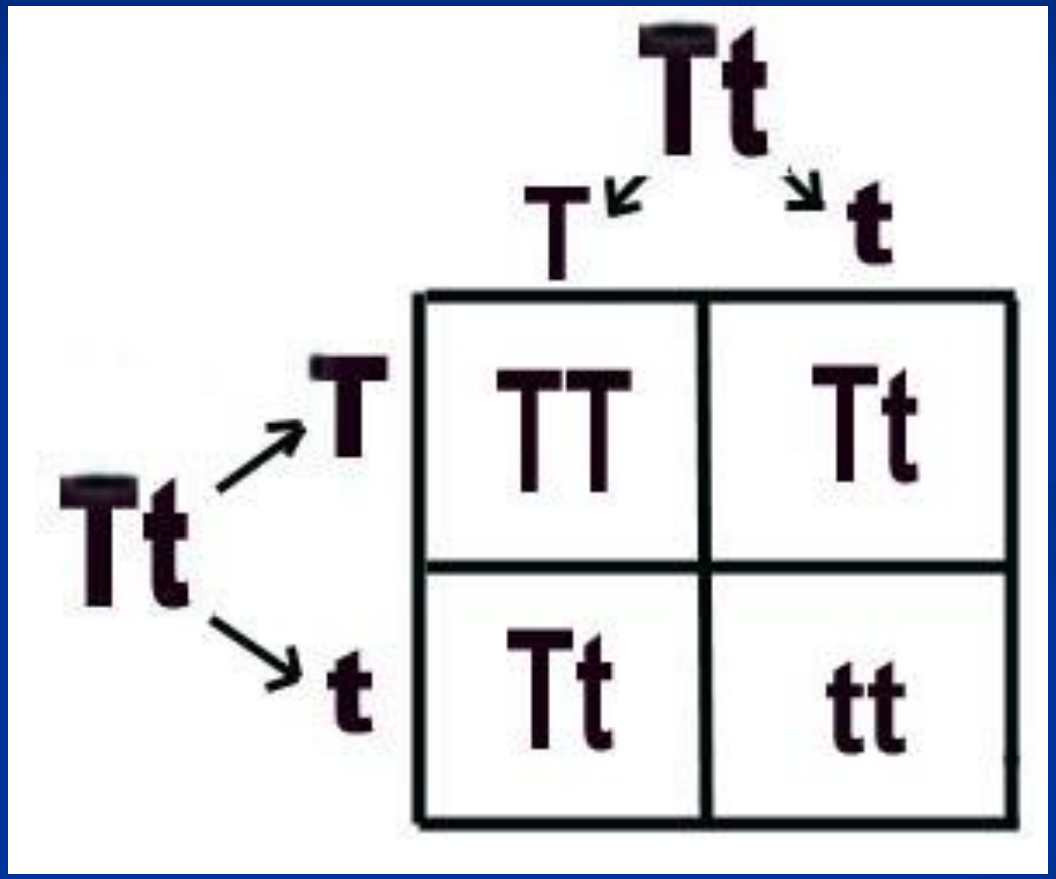


Vestigial Structures-no longer used structures

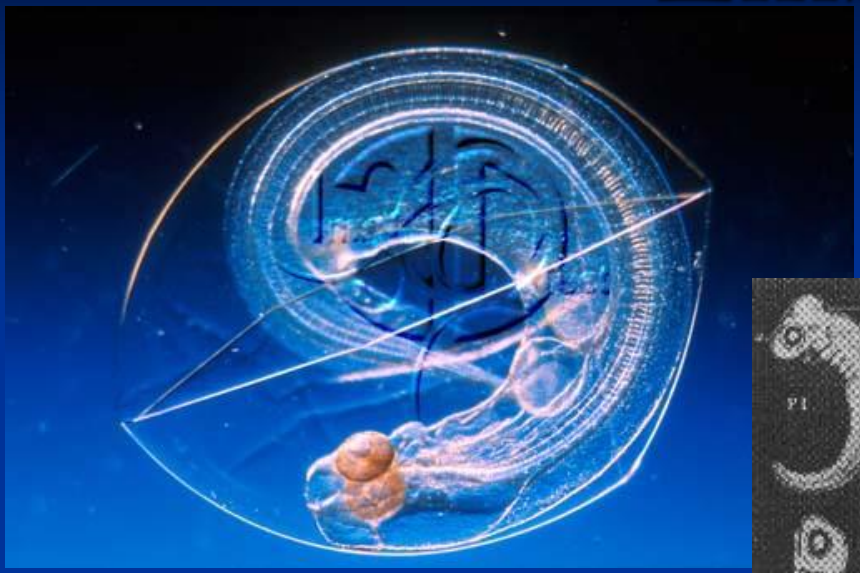


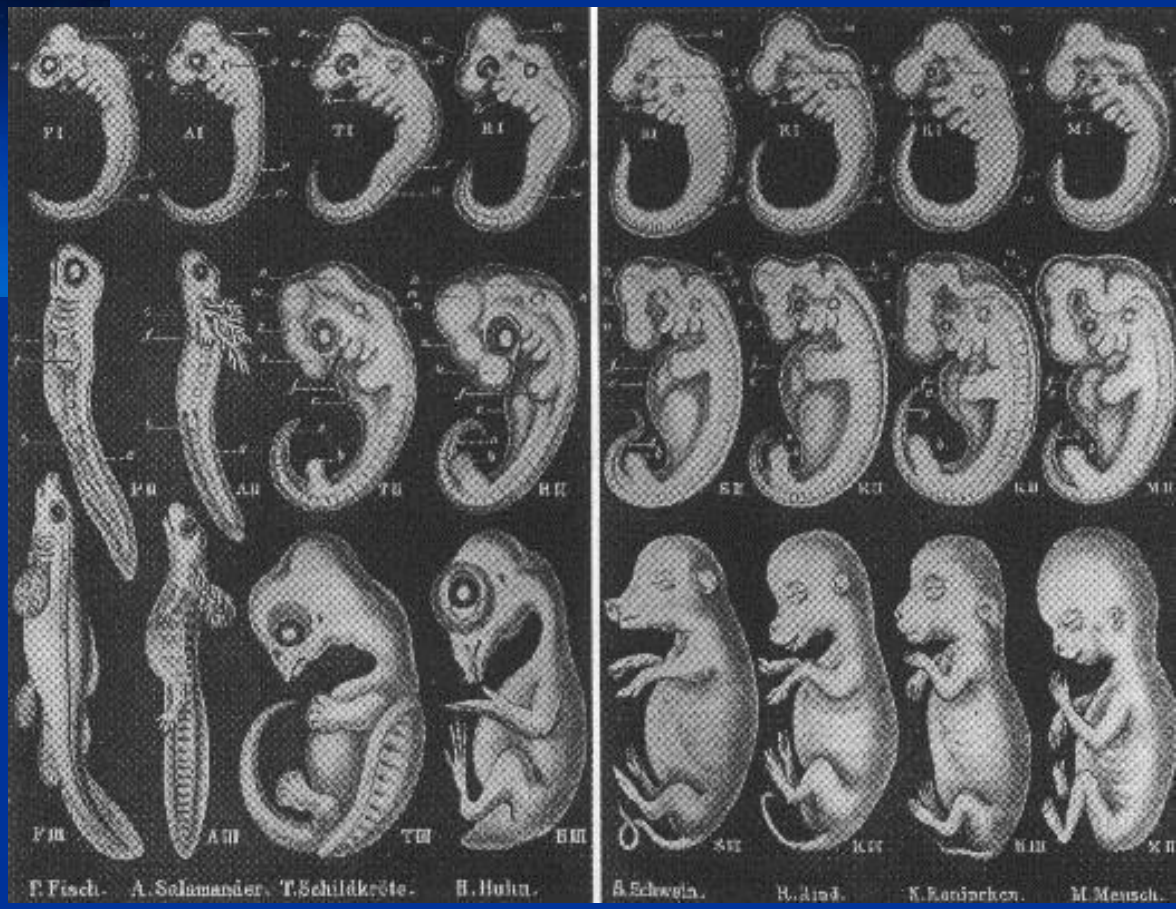


Genetics and heredity laws



Embryology




F. Fisch.
A. Salamander.
T. Schildkröte.
H. Huhn.
S. Schwein.
R. Rind.
K. Kaninchen.
M. Mensch.

Macromolecules

- Hemoglobin
- Protein structure

Key:
- Identical amino acids
- Conservative substitutions
- Nonconservative substitutions

Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Human	G	L	S	D	G	E	W	Q	L	V	L	N	V	W	G
Whale	V	L	S	E	G	E	W	Q	L	V	L	H	V	W	A

Number	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Human	K	V	E	A	D	I	P	G	H	G	Q	E	V	L	I
Whale	K	V	E	A	D	V	A	G	H	G	Q	D	I	L	I

Number	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
Human	R	L	F	K	G	H	P	E	T	L	E	K	F	D	K
Whale	R	L	F	K	S	H	P	E	T	L	E	K	F	D	R

Number	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Human	F	K	H	L	K	S	E	D	E	M	K	A	S	E	D
Whale	F	K	H	L	K	T	E	A	E	M	K	A	S	E	D

Number	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75
Human	L	K	K	H	G	A	T	V	L	T	A	L	G	G	I
Whale	L	K	K	H	G	V	T	V	L	T	A	L	G	A	I

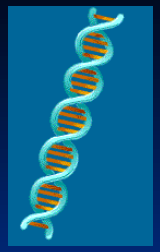
Number	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90
Human	L	K	K	K	G	H	H	E	A	E	I	K	P	L	A
Whale	L	K	K	K	G	H	H	E	A	E	L	K	P	L	A

Number	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105
Human	Q	S	H	A	T	K	H	K	I	P	V	K	Y	L	E
Whale	Q	S	H	A	T	K	H	K	I	P	I	K	Y	L	E

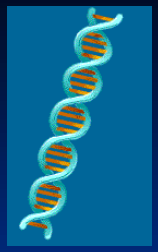
Number	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120
Human	F	I	S	E	C	I	I	Q	V	L	Q	S	K	H	P
Whale	F	I	S	E	A	I	I	H	V	L	H	S	R	H	P

Number	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135
Human	G	D	F	G	A	D	A	Q	G	A	M	N	K	A	L
Whale	G	N	F	G	A	D	A	Q	G	A	M	N	K	A	L

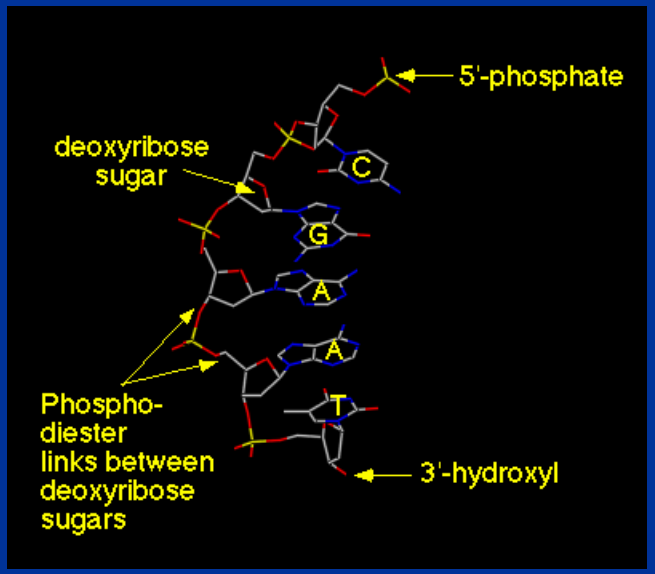
Number	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153
Human	E	L	F	R	K	D	M	A	S	N	Y	K	E	L	G	F	Q	G
Whale	E	L	F	R	K	D	I	A	A	K	Y	K	E	L	G	Y	Q	G

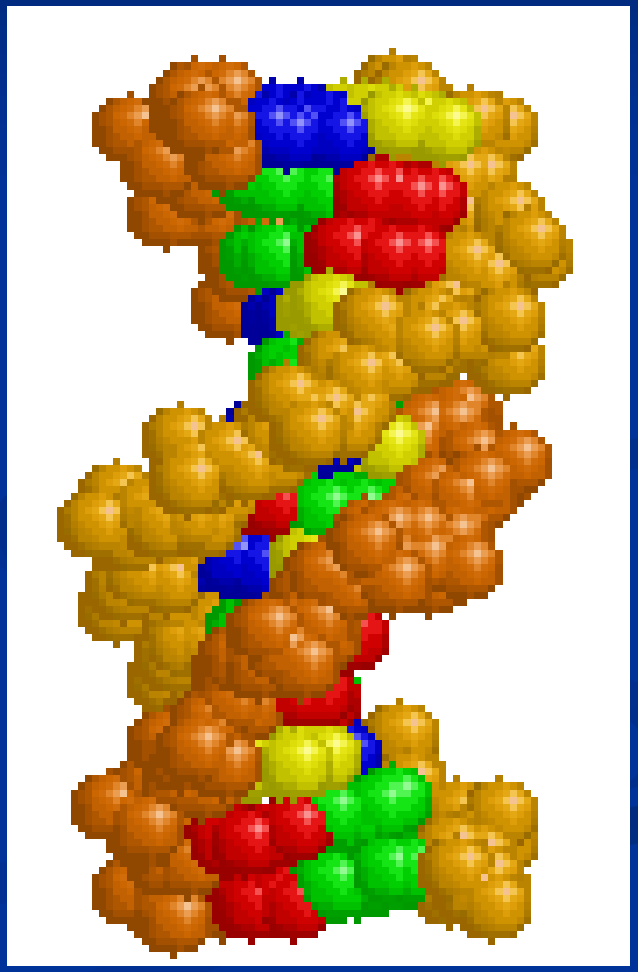


DNA



- Modern Investigations have centered on DNA
- Tens of thousands of pieces of evidence





Coevolution

Symbiosis-two species effect change

Convergent evolution- development of same trait in different species

Divergent evolution-similar species develop different traits.

- Artificial (Unnatural) selection

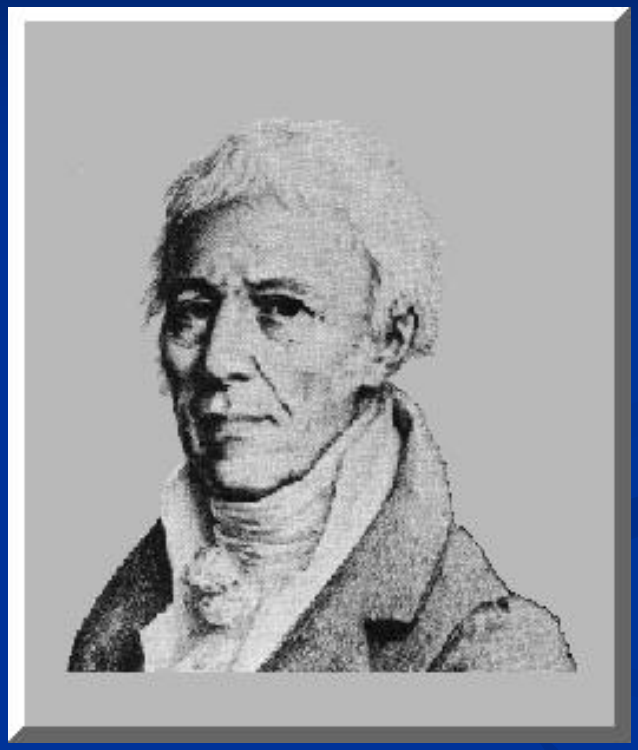
Finch-like drepanids
e.g. *Psittirostra* & *Pseudonestor*

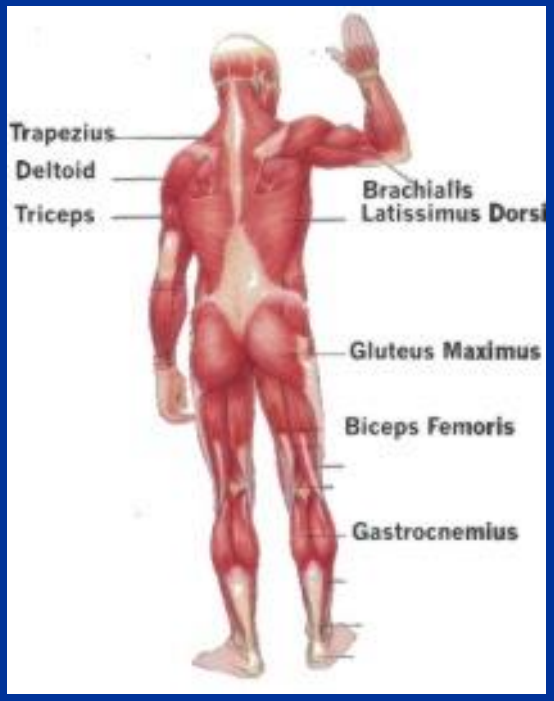
Insect-eating drepanids
g. *Paroreomyza* & *Hemignathus*

Nectar-eating drepanids
e.g. *Loxops* & *Drepanis*

Jean Baptiste de Lamarck

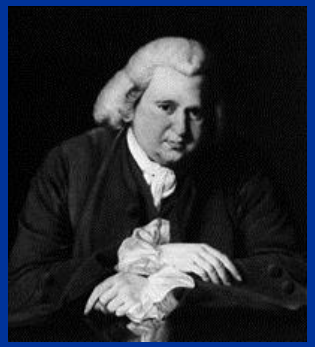
- 1744-1829
- Use and Disuse
- Acquired Traits



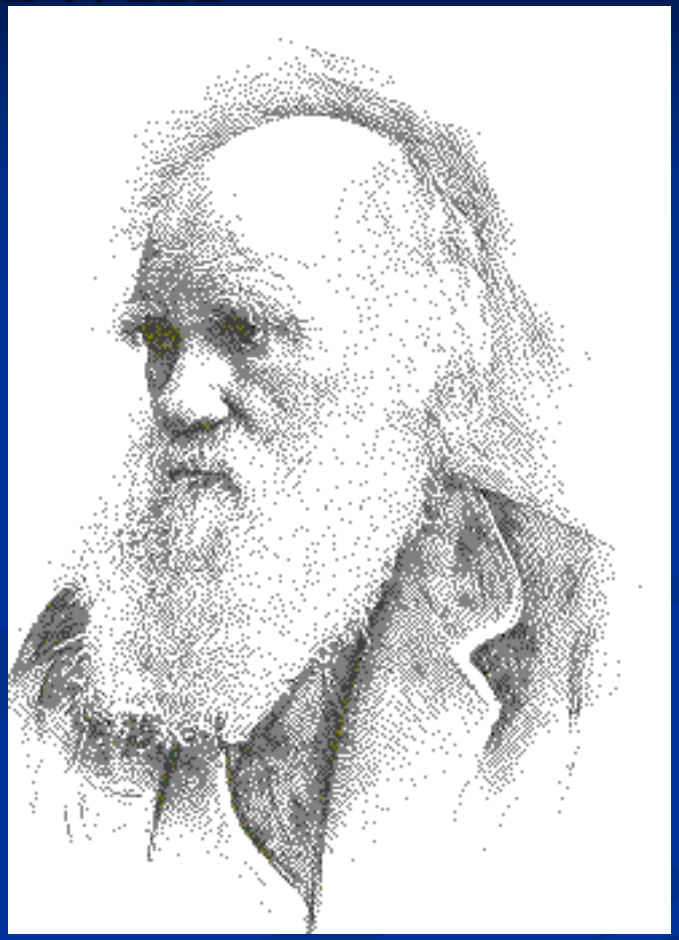


Charles Darwin

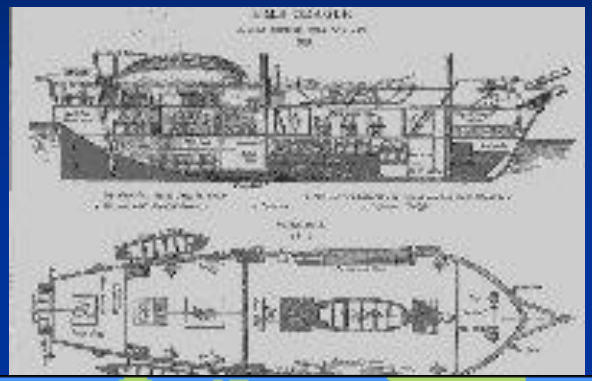
- 1823-1913
- Father of Evolution
- Bad Student



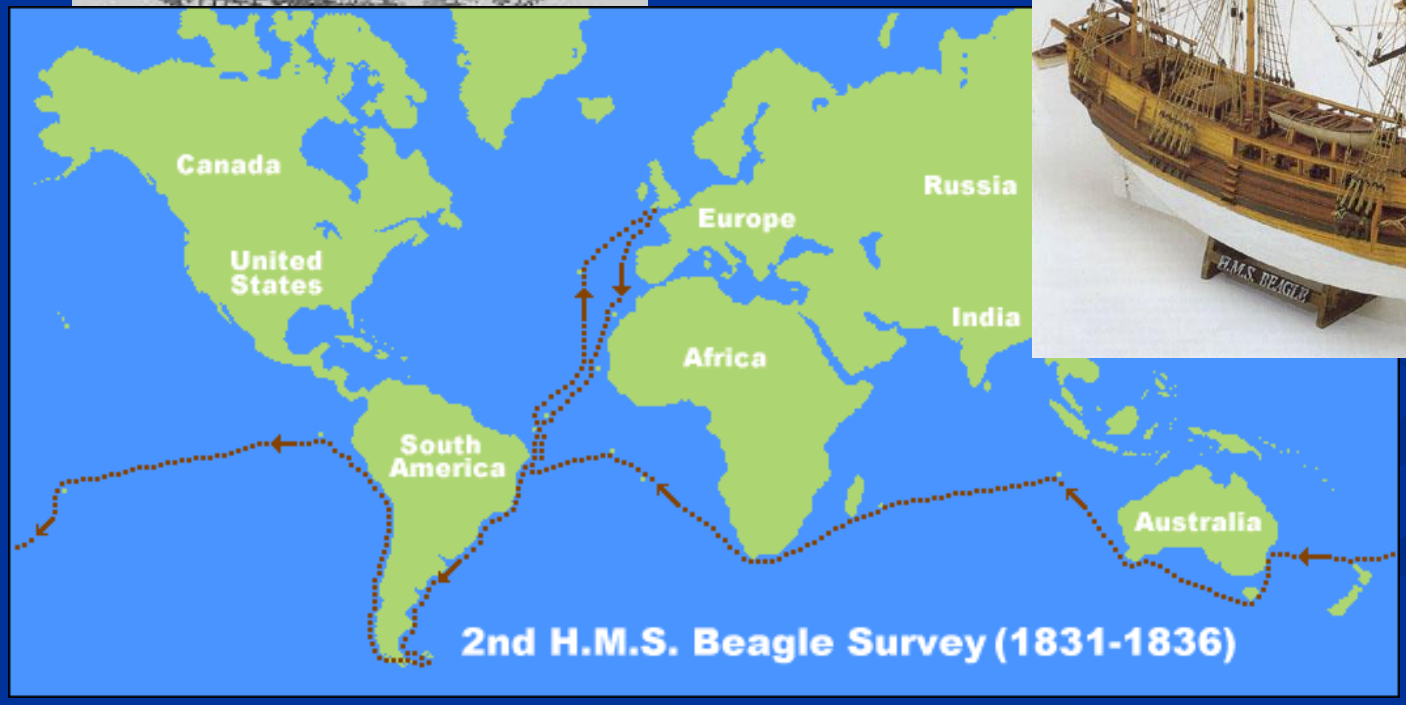
Charles Darwin, 1840 (Downe House, Downe,Kent, Great Britain/Art Resource, NY)



The Beagle

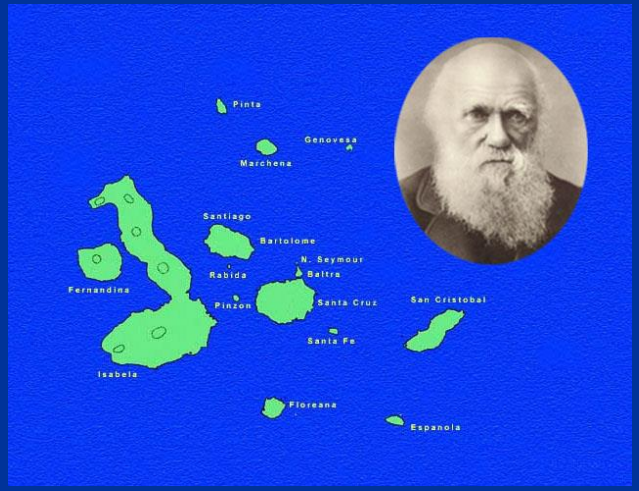



H.M.S. BEAGLE
dis. luigi volonté


Canada
United States
Russia
Europe
India
Africa
South America
Australia
2nd H.M.S. Beagle Survey (1831-1836)

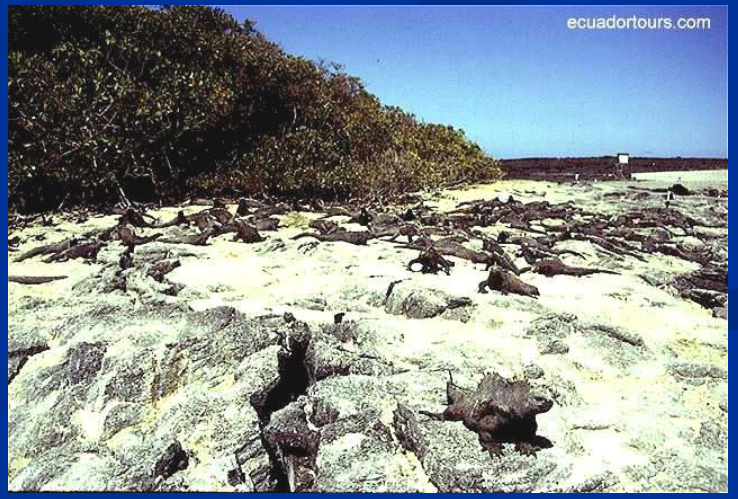
The Galapagos

- 5 million year old volcanic islands
- Finches and Iguanas



The Galapagos

- Iguanas

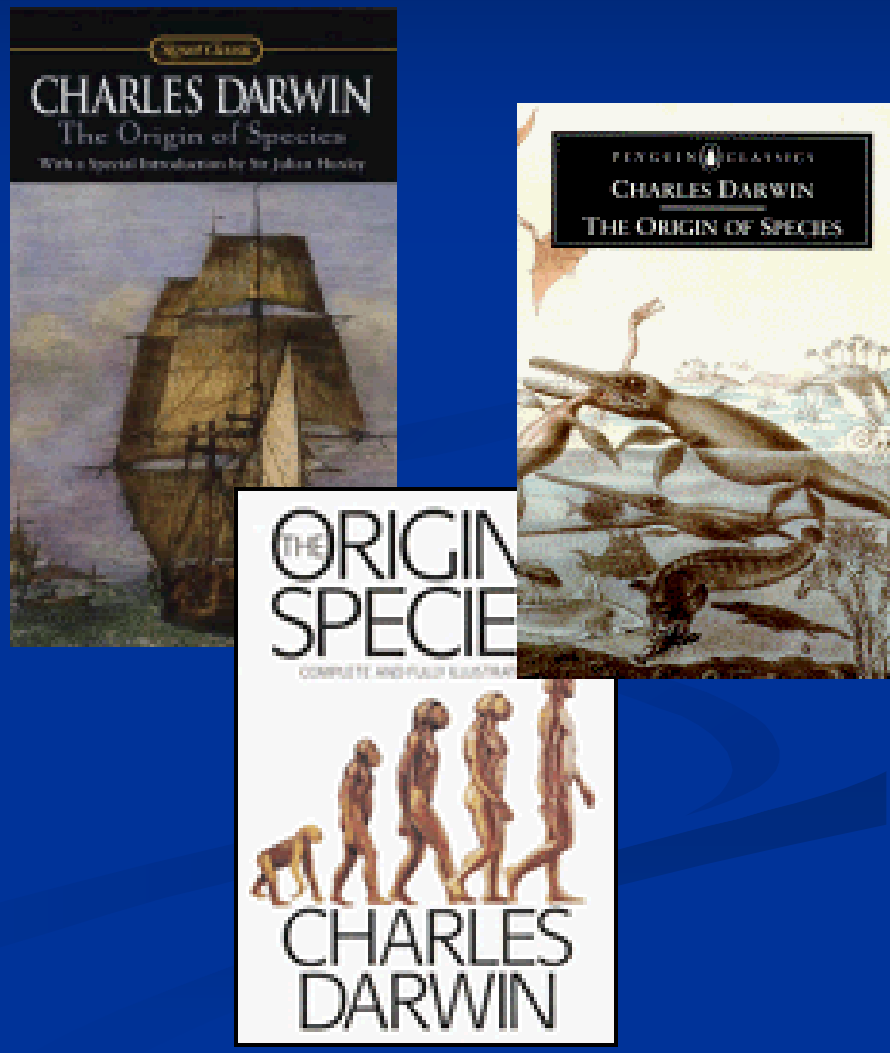


Home Again—after 5 years! Wrote a book.

Darwin's study at Down House

The Origin of Species

- 1859
- Full Title: "The origin of species by means of natural selection; or, The preservation of favored races in the struggle for life "



Artificial (Unnatural) Selection