



LS1201

Introduction to Biology II

Part B - Evolution

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Support for Theory of Natural Selection

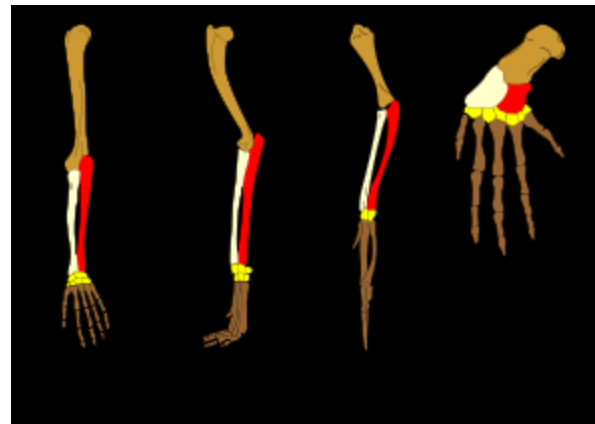
- **Hierarchical organization of life forms**

Time dependent branching and divergence

- **Homology** – Similarity of structure despite differences in function as a result of modification from common ancestors.

Eg - modification of forelimbs with the same structure but different functions

Eg - Arbitrary genetic code

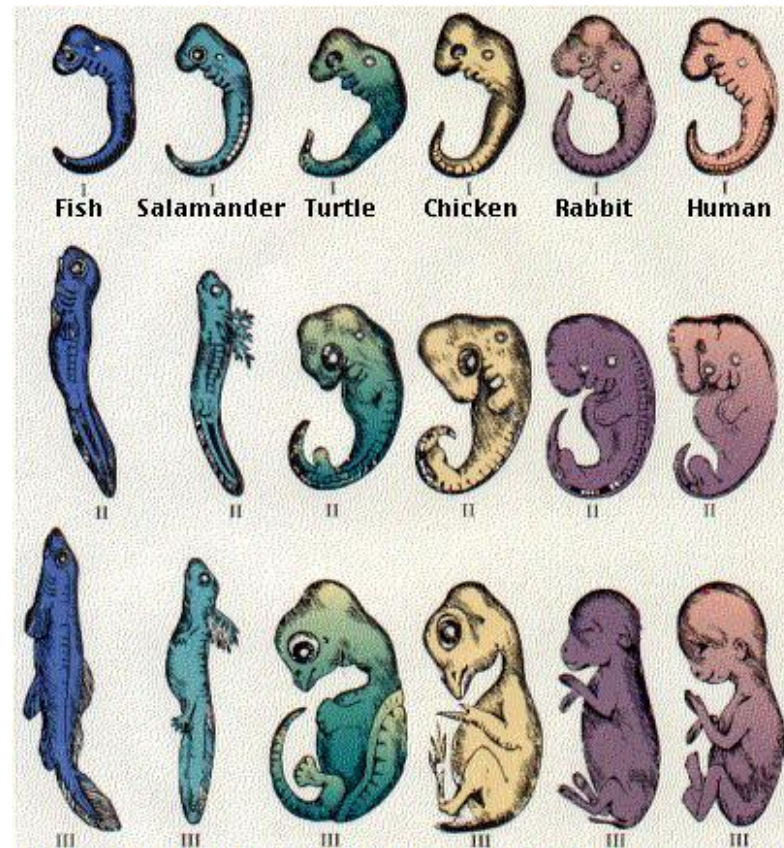


Human Dog Bird Whale

- **Embryological similarities**

Characters that appear during development and is unnecessary.

Eg - Human embryo – display bronchial pouches similar to gill slits of fish embryo



Eg - Tooth primordia – fetal ant eaters

Eg - Some species of Frogs & Salamanders – hatch with adult morphology, but pass through larval stages inside the egg which is typical of aquatic larvae



- **Vestigial characters**

Organs or part of body that do not have a function.
Darwin listed some in the human body

Eg – Appendix, Coccyx (fused tail bones), Muscles that move our ears

Eg - Rudimentary wings in flightless beetles

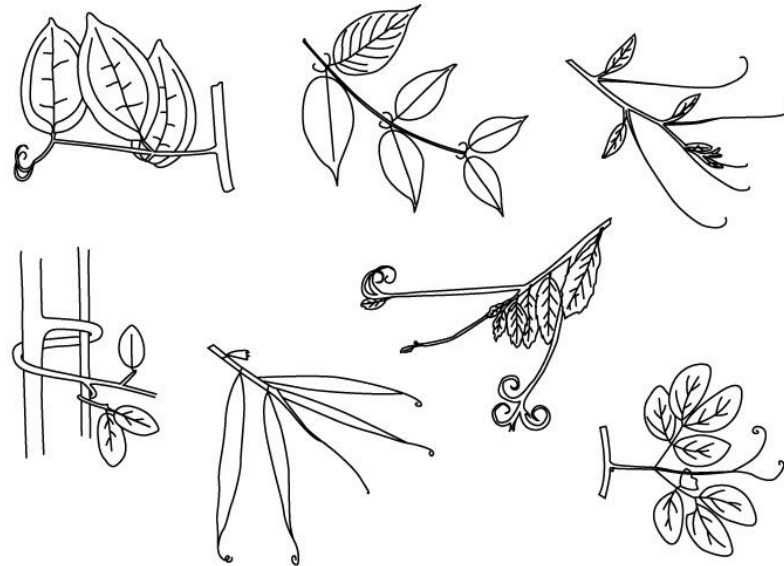
Eg - Eyes in cave dwelling fishes

- **Convergence** – Functionally similar organs working on different principles. Expected only if different ancestral forms were modified.

Analogous organs

Eg – wings of butterflies and birds

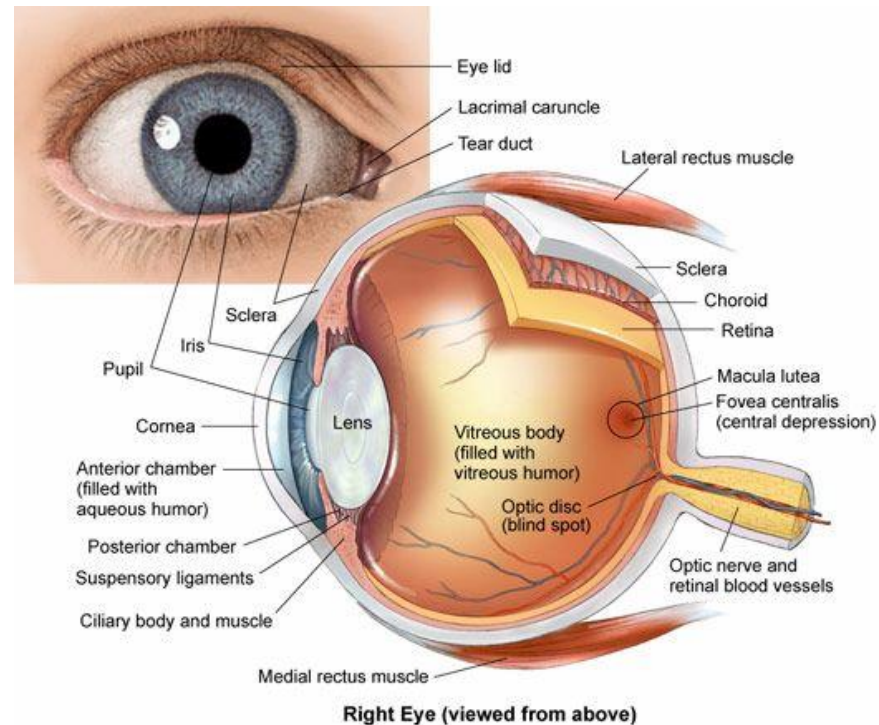
Eg – Climbing organs in plants



- **Suboptimal design** – Many organs are not designed in the optimal/best manner

Eg – Food pipe and air pipe cross over each other risking choking on food.

Eg – Human eye – blind spot as the optical nerve covers a part of the retina



Natural selection fails to explain

- Origin of life
- Differences between males and females within a species
- Why some organisms never produce their own offspring
- Why some organisms sacrifice their lives

Internal assessment 5

2 marks

- Write your name and roll number
- What is the expected result in terms of guppies phenotype in the experiment1?
- What is the expected result in terms of guppies phenotype in the experiment2?

Baseline Pool – We build a baseline pool with all kinds of Guppies (big, small and highly colorful to grey colored ones) and have no predators in this pond

Experiment 1

Introduce subset of guppies
to another pond with Pike

Experiment 2

Introduce subset of guppies to
another pond with Killifish

Remember – Pikes tend to eat large guppies with colorful spots on their body and Killifish tend to eat small guppies which do not have color spots on their body

Results:

Experiment 1 – Males are expected to become smaller and have less coloured tails

Experiment 2 – Males are expected to become larger and have more colourful tails.

Natural selection fails to explain

Workers do not
reproduce they
can not mate or lay
eggs



Queen



Male



Normal-sized worker

Soldier

For queen and colony

Natural selection fails to explain



Natural selection fails to explain

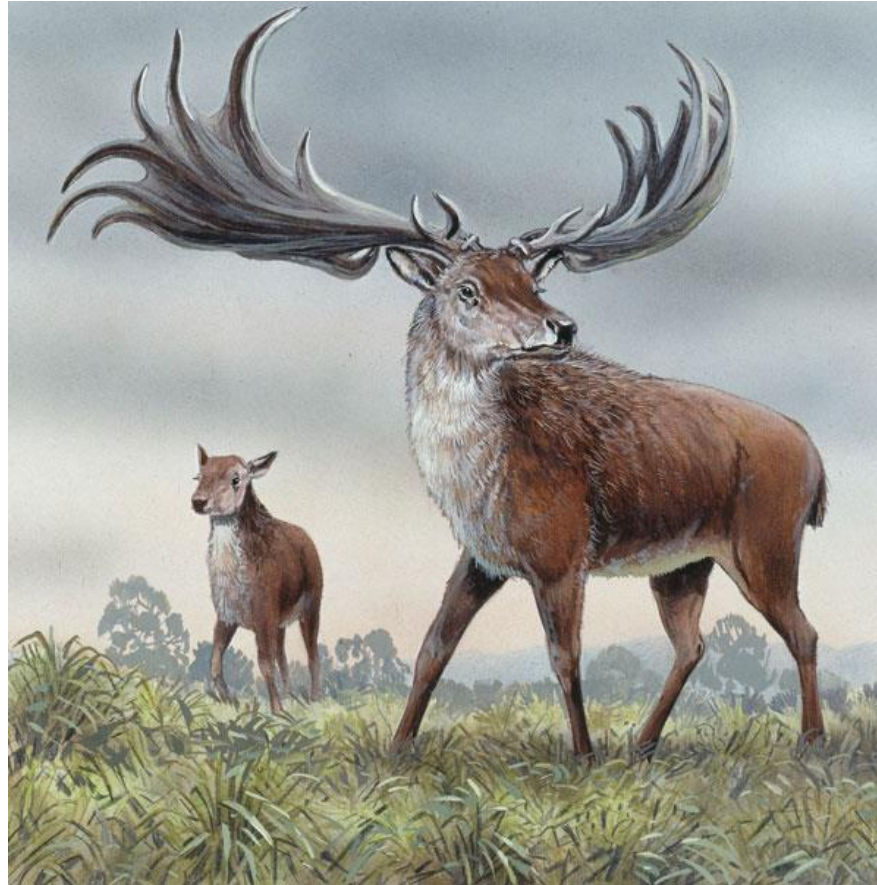
Suicide



sting

120 micron

Natural selection fails to explain

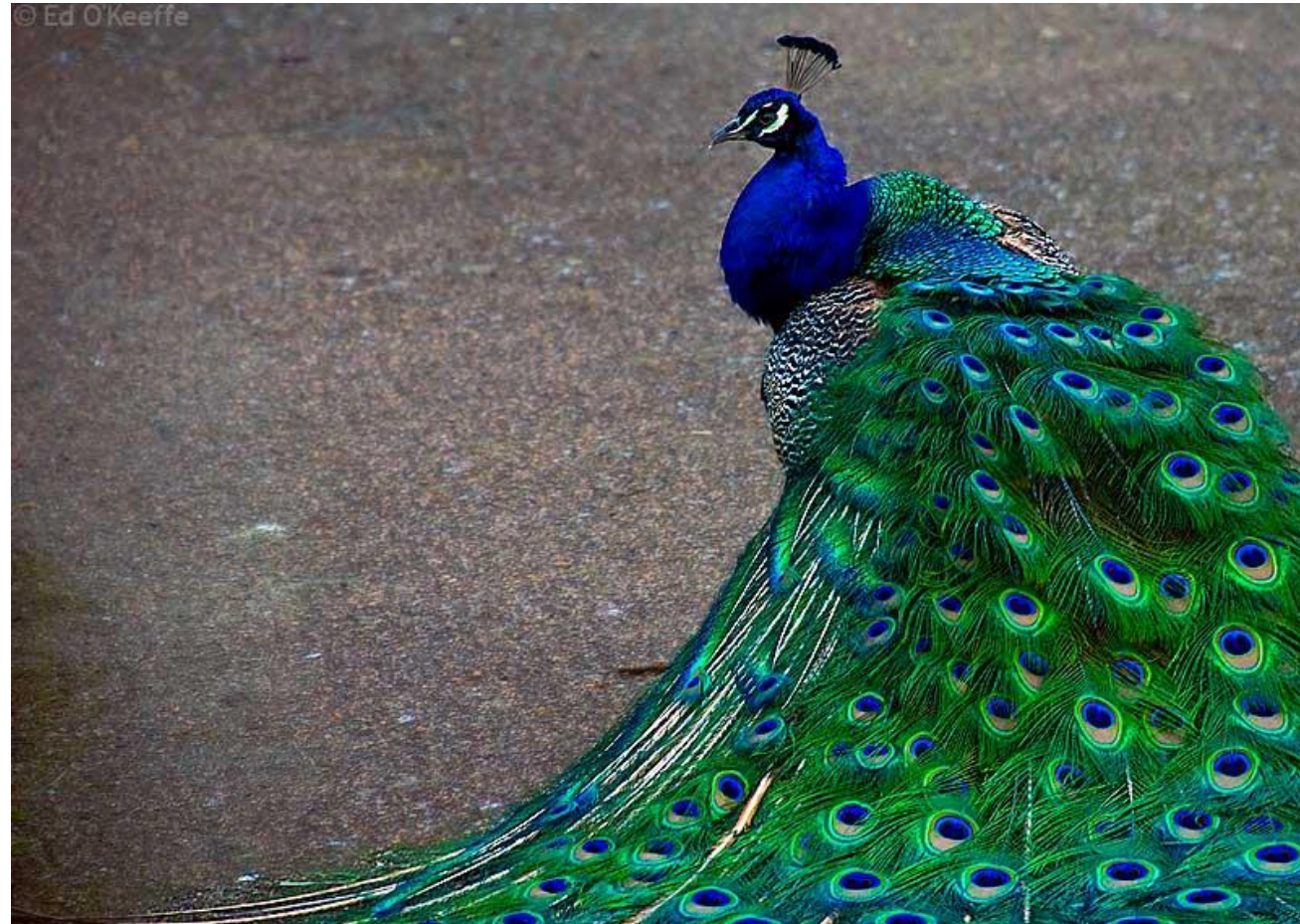


Giant Irish Elk

Antlers 11 feet wide and weighted 100 pounds

Natural selection fails to explain

Showoff

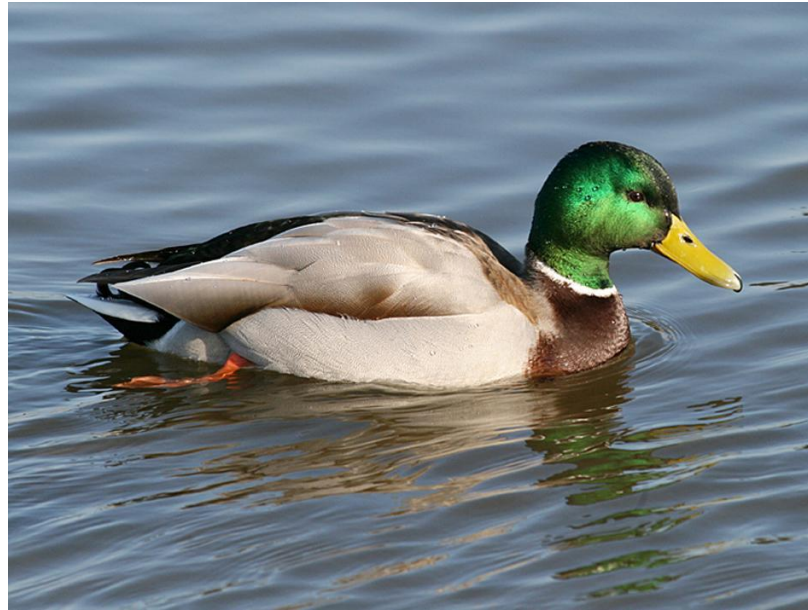




Think of the disadvantages.....

Sexual selection

Linnaeus's mistake



Sexual selection



Linnaeus's mistake

This is the female and male of the same species - Mallard duck

Sexual selection

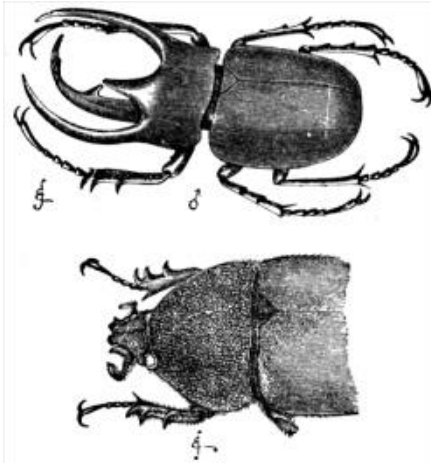
Why are the males and females so different in appearance?

How do extravagant traits evolve in the male as these conspicuous attributes will not improve the animals survival

Secondary sex characteristics

are features that distinguish the two sexes of a species, but that are not directly part of the reproductive system

Sexual selection



Sexual dimorphism -
Special case of polymorphism
based on the distinction
between the secondary sex
characteristics of males and
females



Sexual selection

Sexual dimorphism



Cuckoo

Its not just about physical appearance

