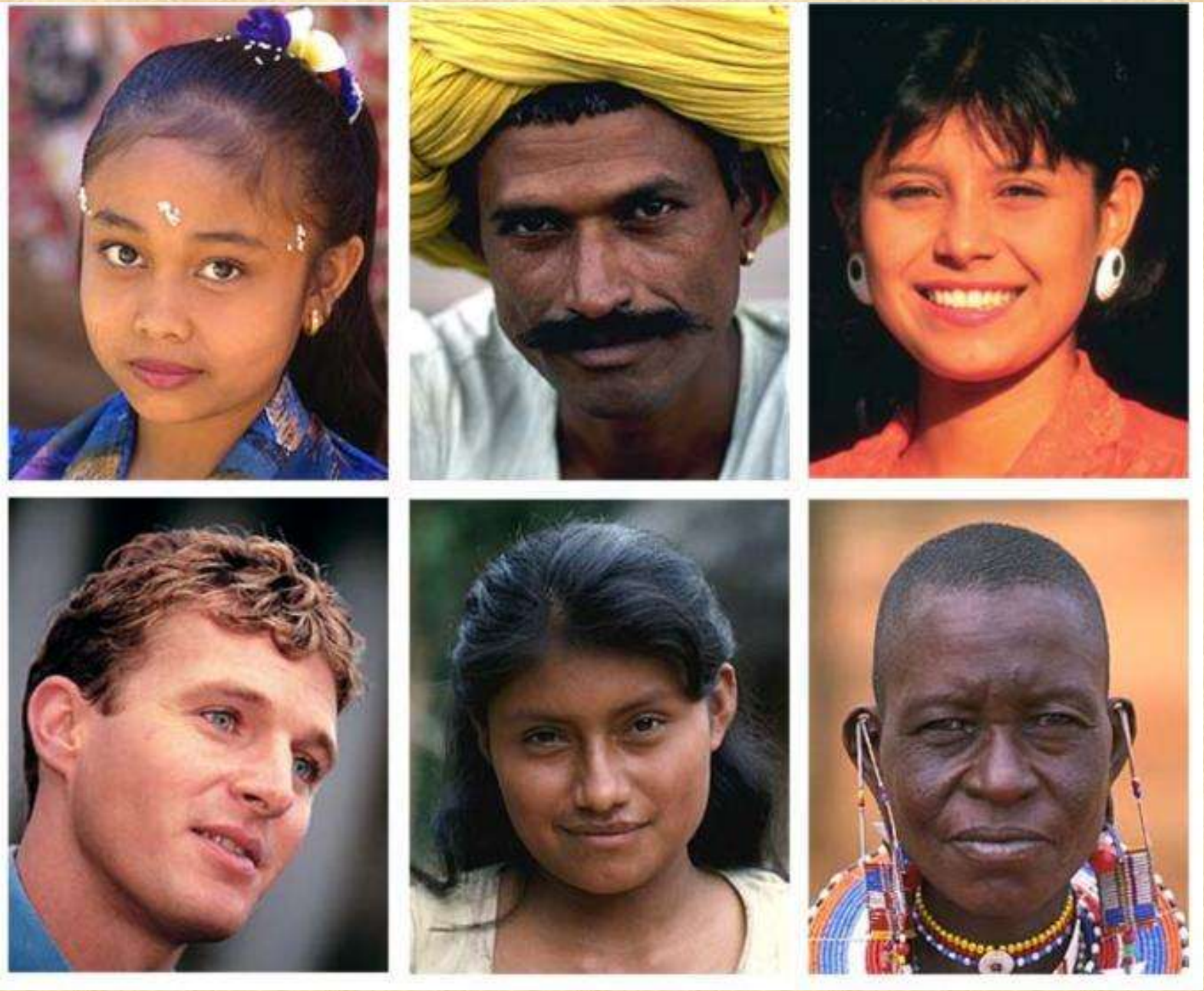
SPECIES AND SPECIATION

SPECIES

SPECIES

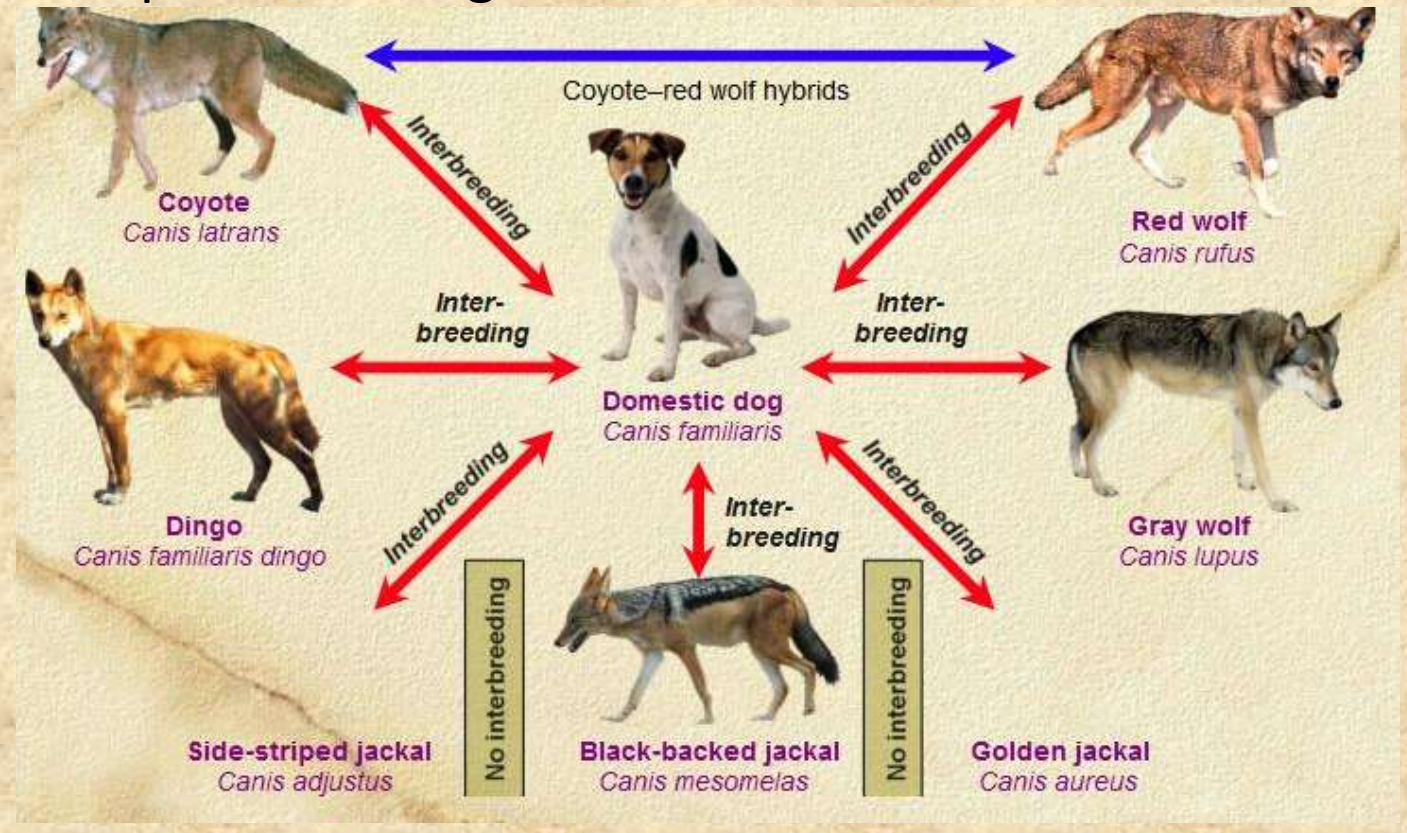
- A biological species is:
- a group of interbreeding (or potentially interbreeding) individuals, reproductively isolated from other such groups.
- Species are often composed of different populations (often in different habitats) that are quite distinct. These are often called subspecies or varieties depending on the degree of reproductive isolation


Benjamin
Cummings



SPECIES

- The boundaries of a species gene pool can be sometimes unclear, such as the genus to which all dogs, wolves, and related species belong:



Limitations of the Species Concept

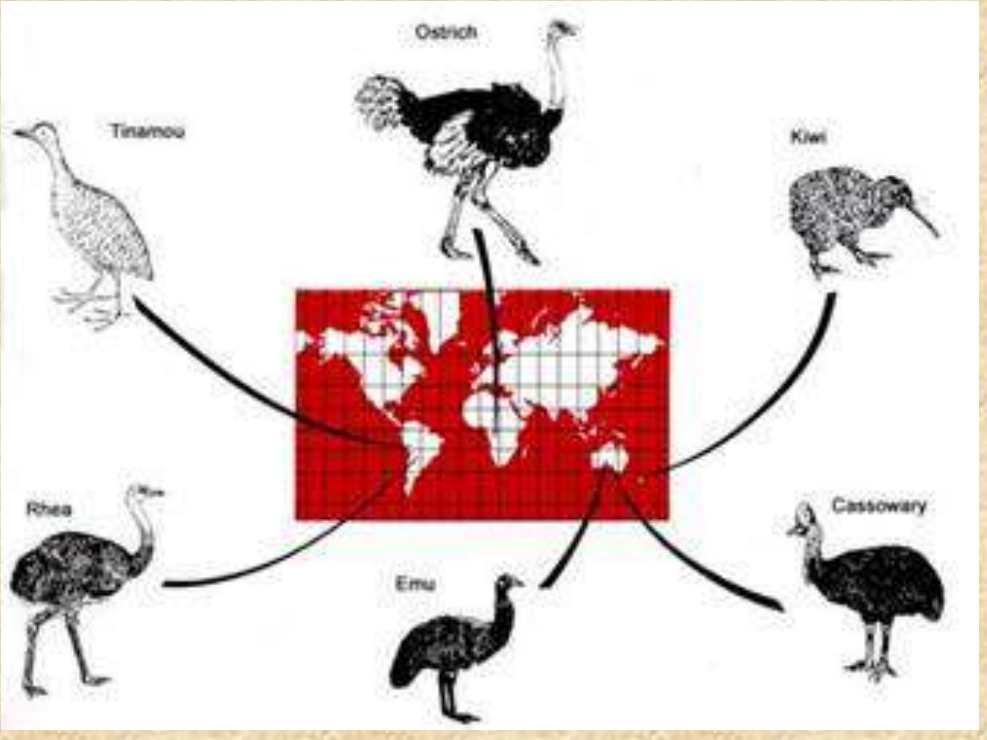
- The concept of a species being able to interbreed can't apply to extinct populations because this is unknown: extinct forms must usually be classified on morphological grounds
- Asexually reproducing organisms do not breed with each other and so are assigned to species on the basis of appearance or biochemical similarities

Barriers Between Gene Pools

- Species stopped from reproducing because of barriers
  - Geographical isolation
  - Temporal isolation
  - Behavioural isolation
  - Hybrids

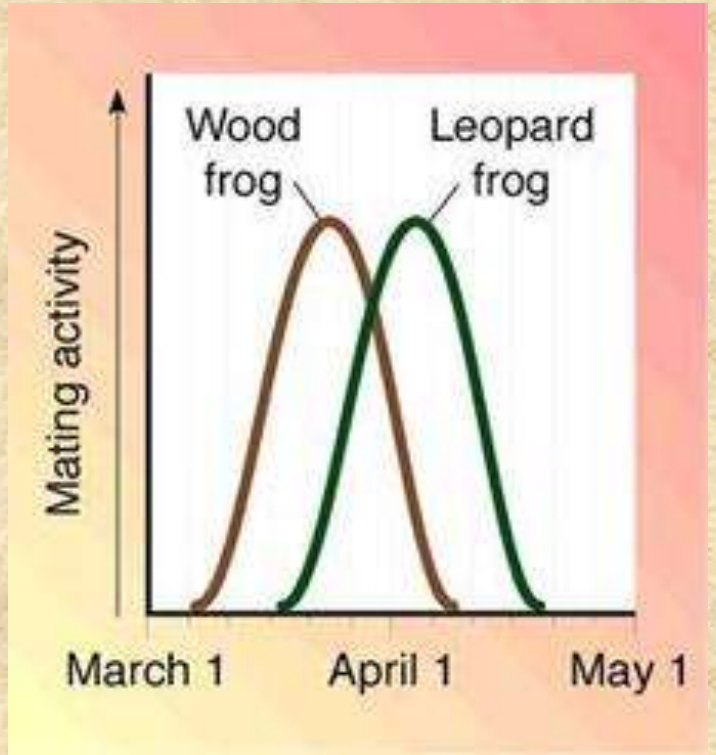
Barriers Between Gene Pools

- Geographical isolation
  - Physical barriers prevent males and females from finding each other.



Barriers Between Gene Pools

- Temporal isolation
  - Refers to incompatible time frames which prevent the populations from encountering each other



Barriers Between Gene Pools

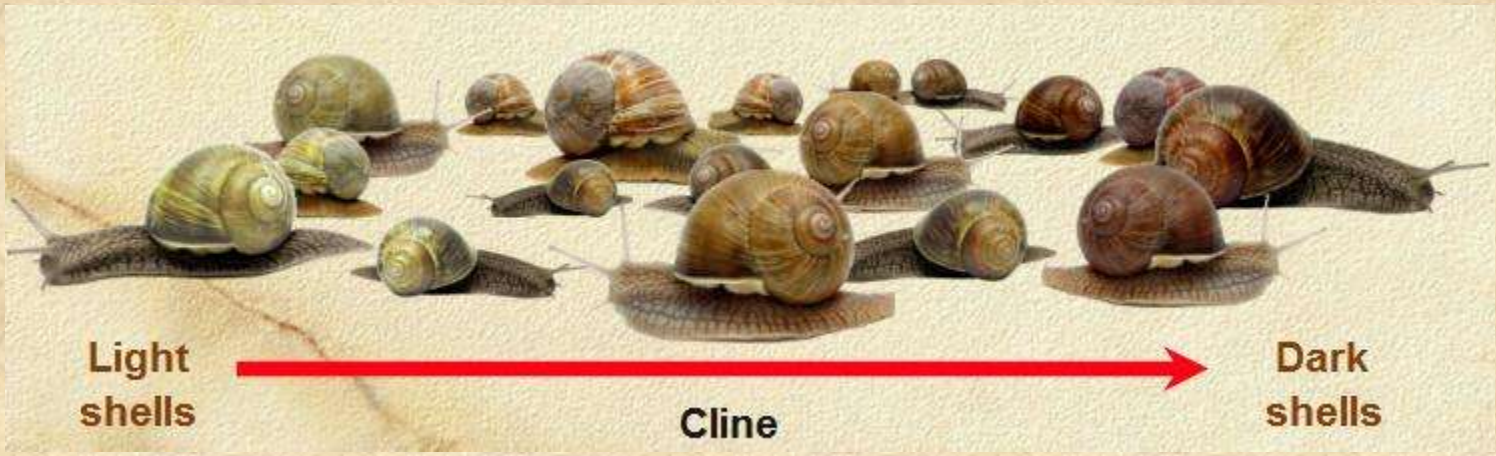
- Behavioural isolation
  - When one population's lifestyle and habits are not compatible with those of another population

Barriers Between Gene Pools

- Hybrids
  - May are infertile

Clines

- Even for sexually reproducing organisms, a species may show a gradual change in phenotype over a geographic area
  - Such as continuous gradual change is called cline and often occurs along the length of a country or continent
  - All populations are of the same species as long as interbreeding populations link them
  - A particular kind of cline variation occurs with ring species.

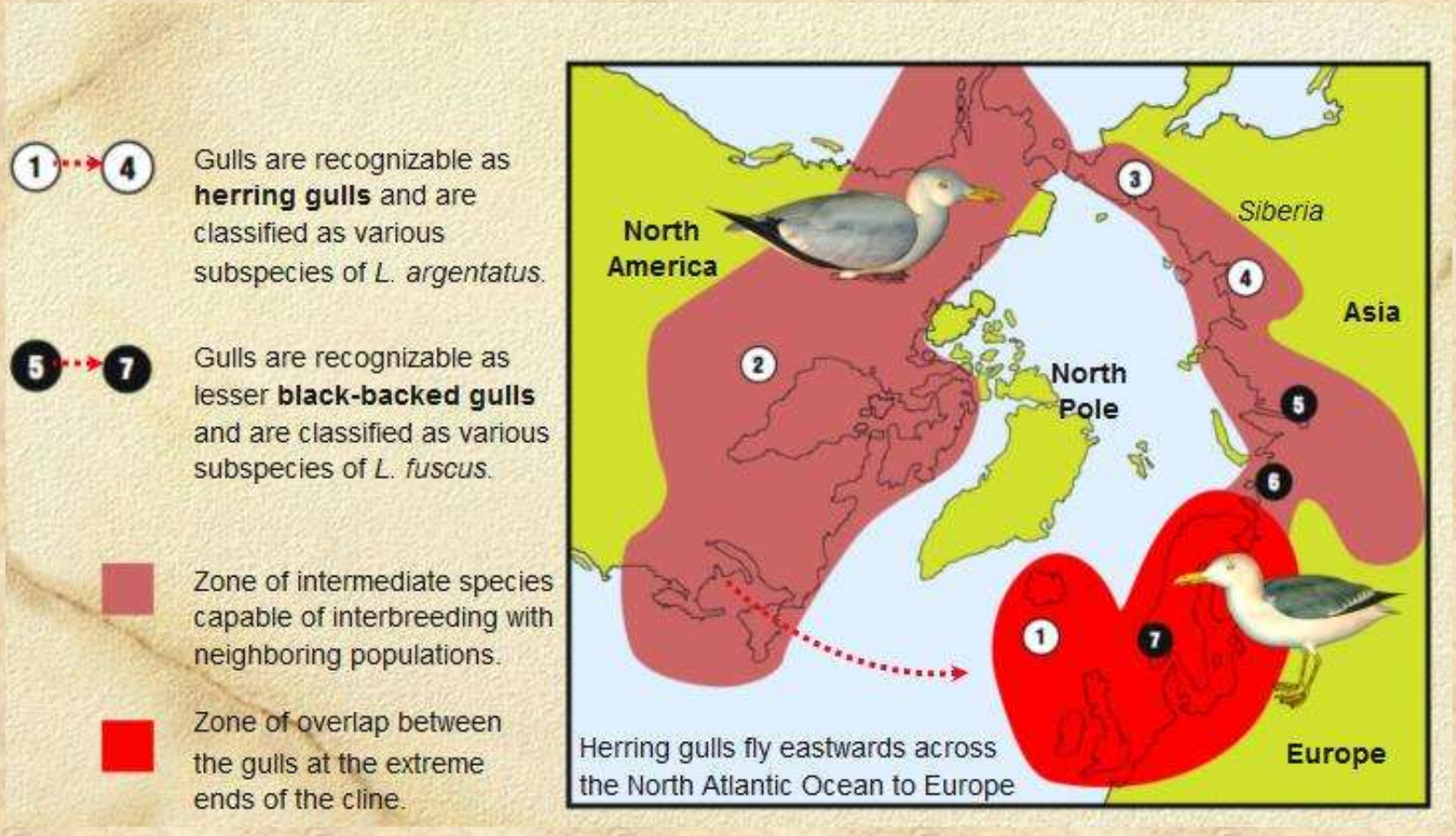


Ring Species

- A ring species is a special type of cline that forms a loop, resulting in the two ends of cline overlapping with each other
- In such cases, the species occupies a very wide geographic area, where individuals at the ends of the cline can be very different from one another
- Herring gull and lesser black-backed gull
  - Distribution forms a complete circle around the North Pole
  - Form overlap in Britain and Western Europe
  - Connected by a series of intermediate, interbreeding population

Ring Species

- Geographical distribution and clinal variation in the herring gull and the lesser black-backed gull



POLYPLOIDY

Polyploidy

- Situation in which cells contain three or more sets of chromosomes
  - 3n = triploid
  - 4n = tetraploid
  - 5n = pentaploid

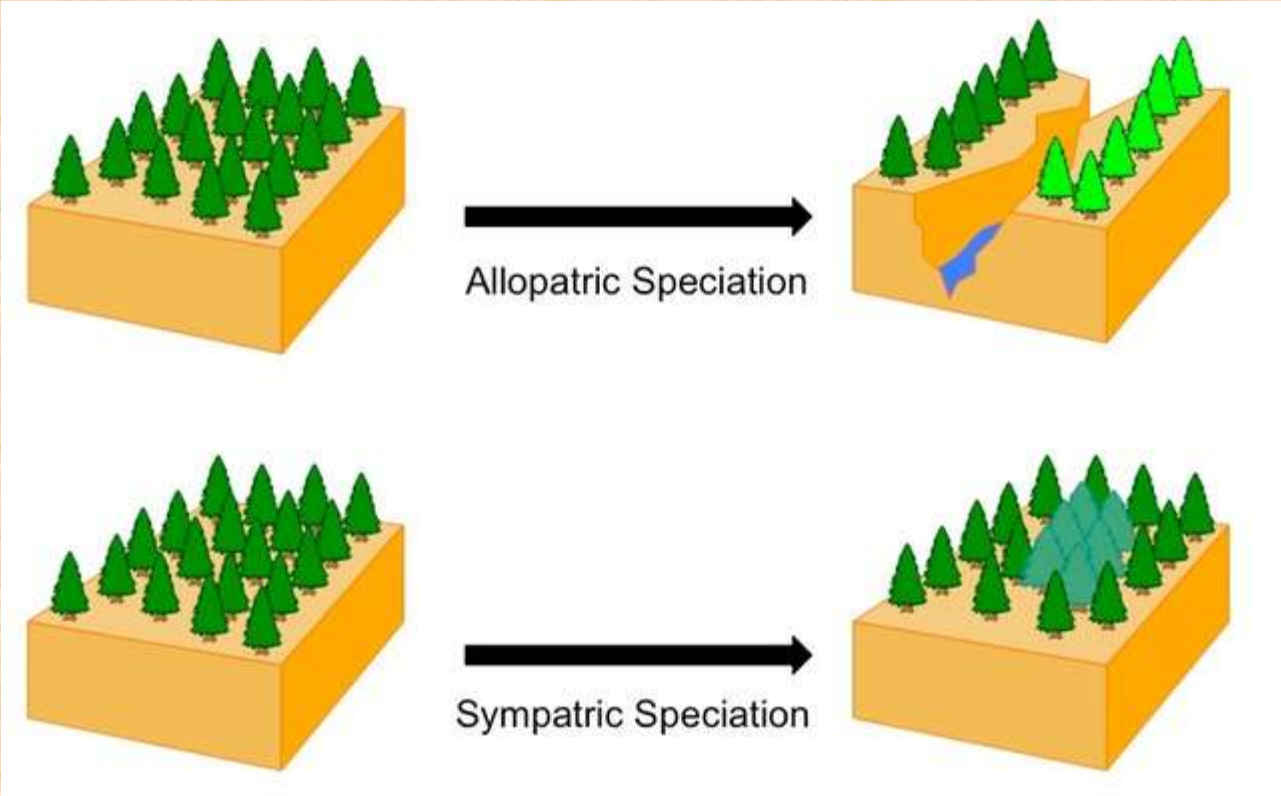
Polyploidy

- Have the consequence of making errors in replication
- It the evolving population changes enough so that reproduction cannot occur it is called speciation
- A new species has been formed from an old one and they continue their separate ways

SPECIATION

SPECIATION

- ALLOPATRIC
- SYMPATRIC

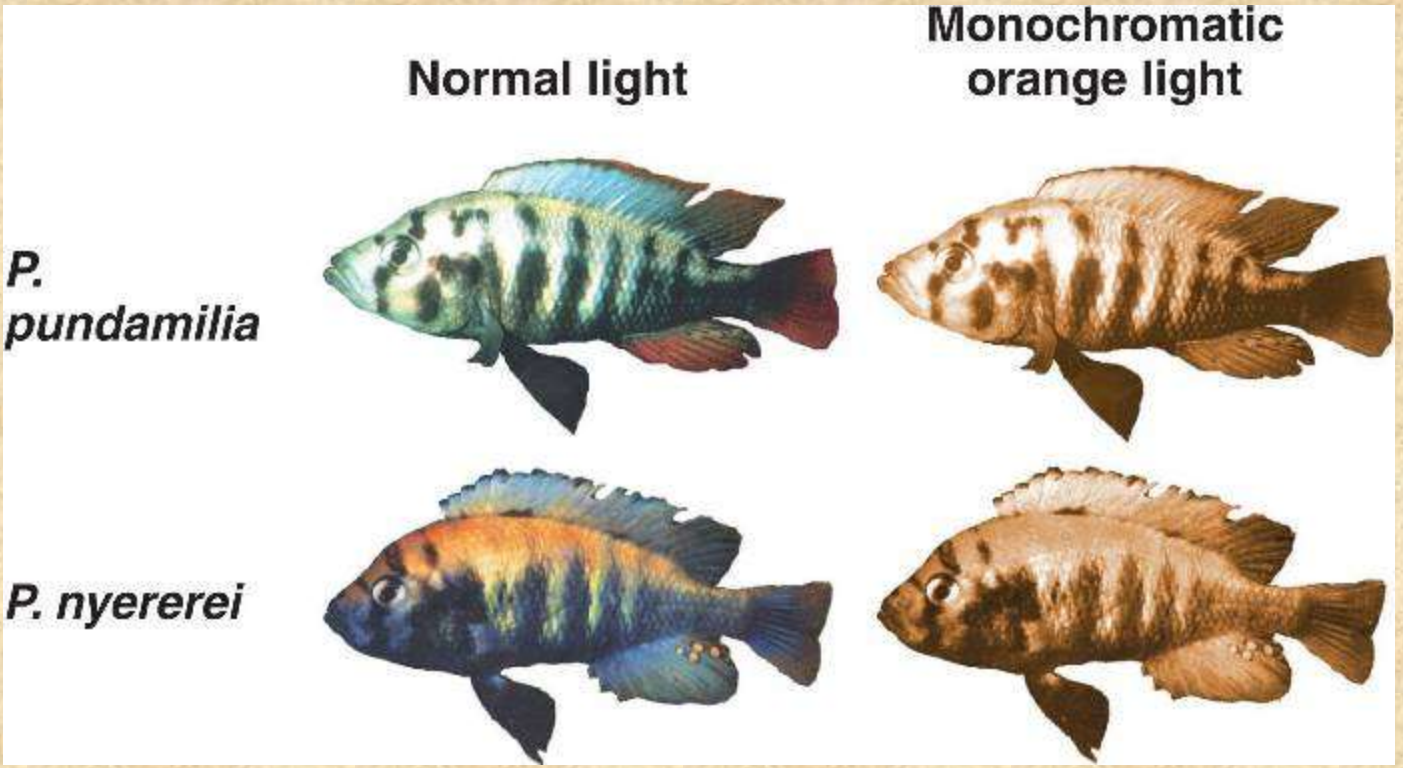


Allopatric Speciation

- New species formed by a physical barrier

Sympatric Speciation

- New species forms while living in the same geographical area



ADAPTIVE RADIATION

ADAPTIVE RADIATION

- Distinct species evolve relativity rapidly from a single species or from a small number of species.
- Variation allows certain members to exploit a slightly different niche
- By natural selection and one or more barriers new species evolve

ADAPTIVE RADIATION

- Four features can be used to identify an adaptive radiation:
  - A common ancestry
  - A phenotype - morphological and physiological traits used to exploit those environments.
  - Trait utility: the performance or fitness advantages of traits
  - Rapid speciation

ADAPTIVE RADIATION

- Four of the 14 finch species found on the Galápagos Archipelago, are thought to have evolved by an adaptive radiation that diversified their beak shapes to adapt them to different food sources