SPECIATION

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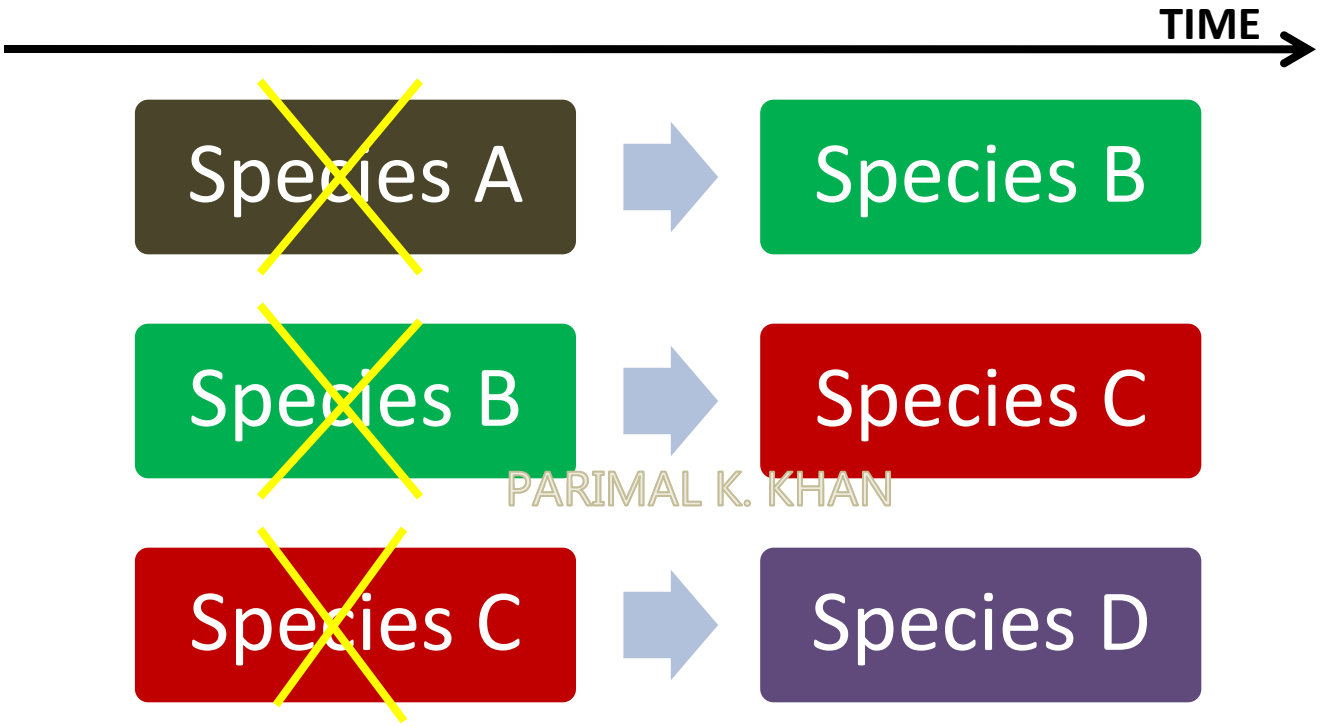
SPECIATION

- Speciation means the formation of a new species.
- Darwin, however, used the term in sense of descent with modification.
- He proposed that evolutionary changes in species A may accumulate over time and lead to the formation of a new species B.
- Species A will have disappeared in the process, leaving only species B.

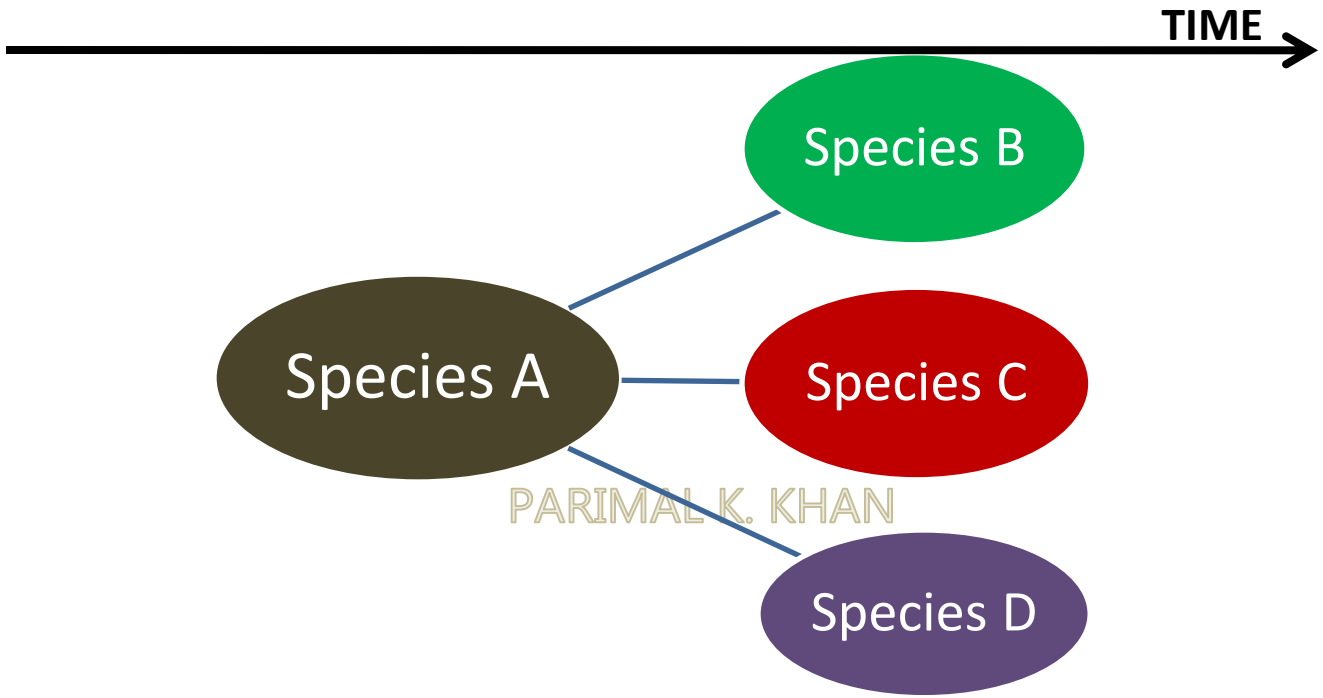
Darwin's idea



• But speciation should stand for multiplication of species where a species may give rise to many other species and not just the changing of one species to another.

•According to Mayr, speciation means the splitting of one species into several species as a result of gradual divergence of a population of a species.

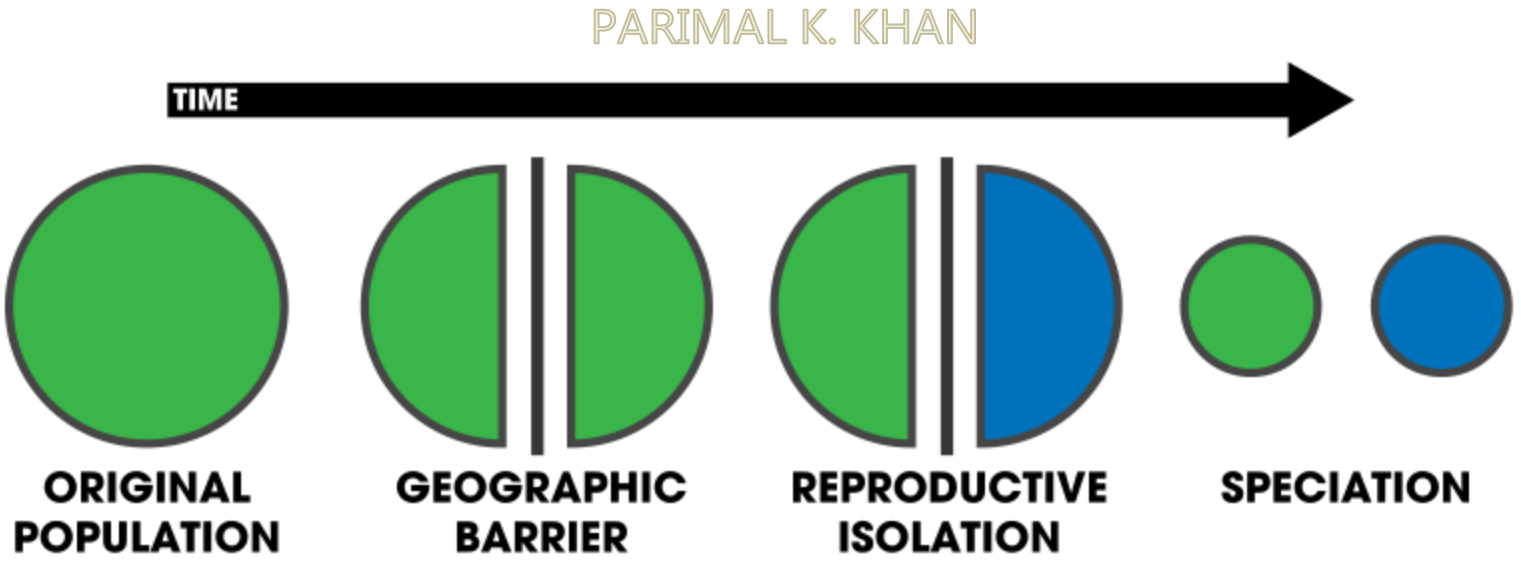
Mayr's idea



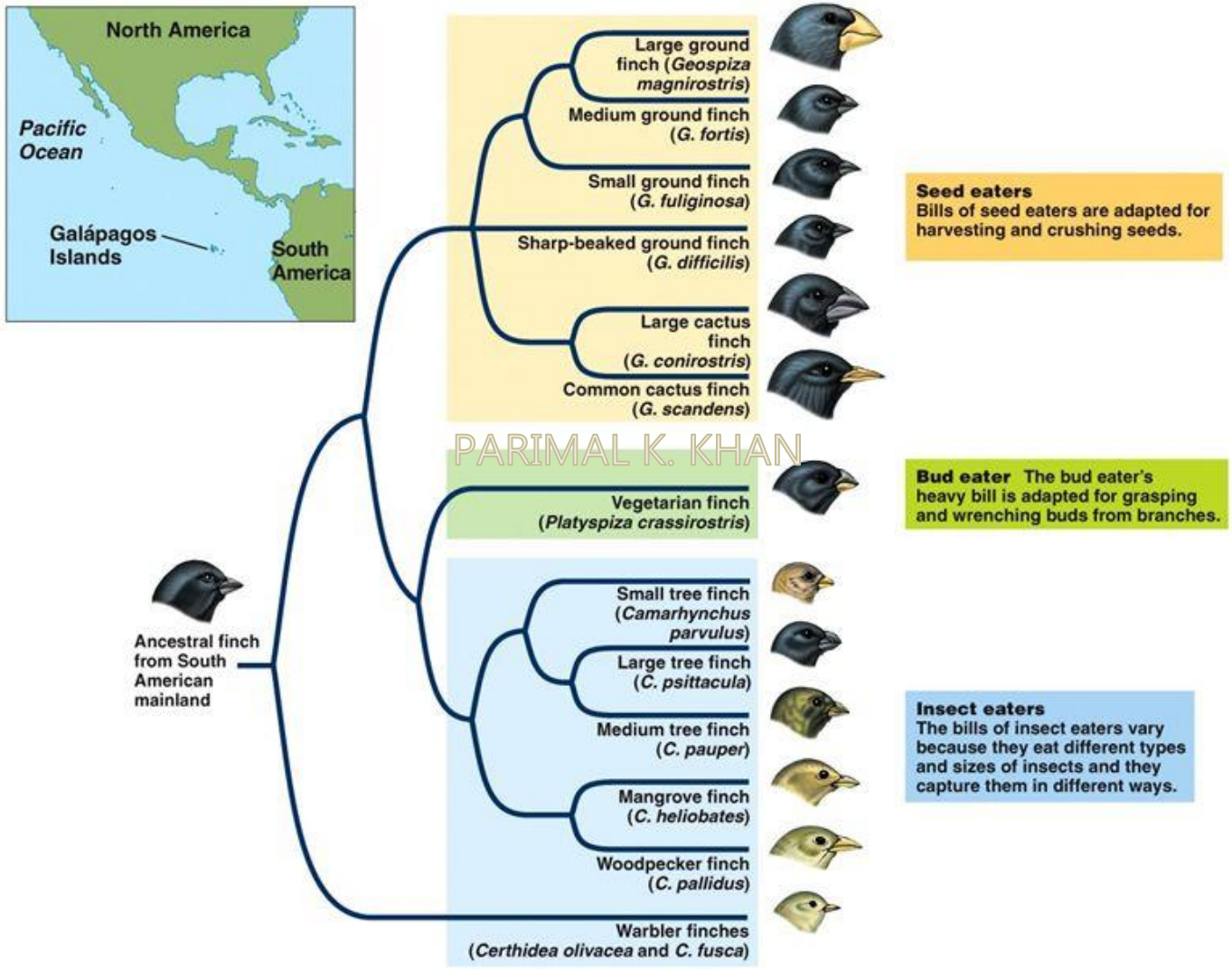
- There are two modes by which speciation is achieved.
- Allopatric speciation (the most usual mode) depends upon geographical isolation of populations.
- Sympatric speciation (mainly observed in plants) is caused by genetic divergence even in absence of geographical barriers.

Allopatric speciation

- A physical barrier is established which leads to separation of populations and prohibits gene exchange.

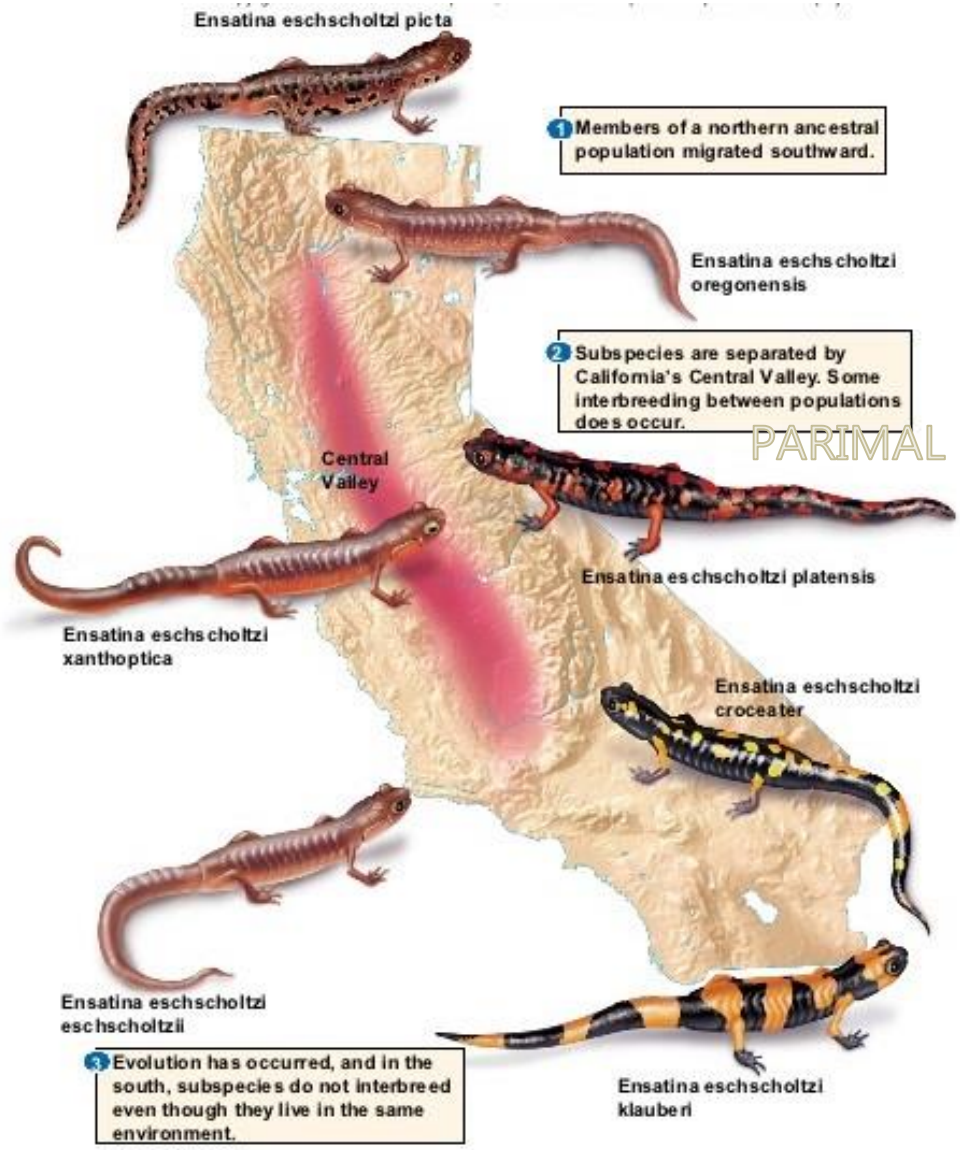


Allopatric Speciation among Darwin's Finches



***PRINCIPLES OF LIFE*, Figure 17.7**

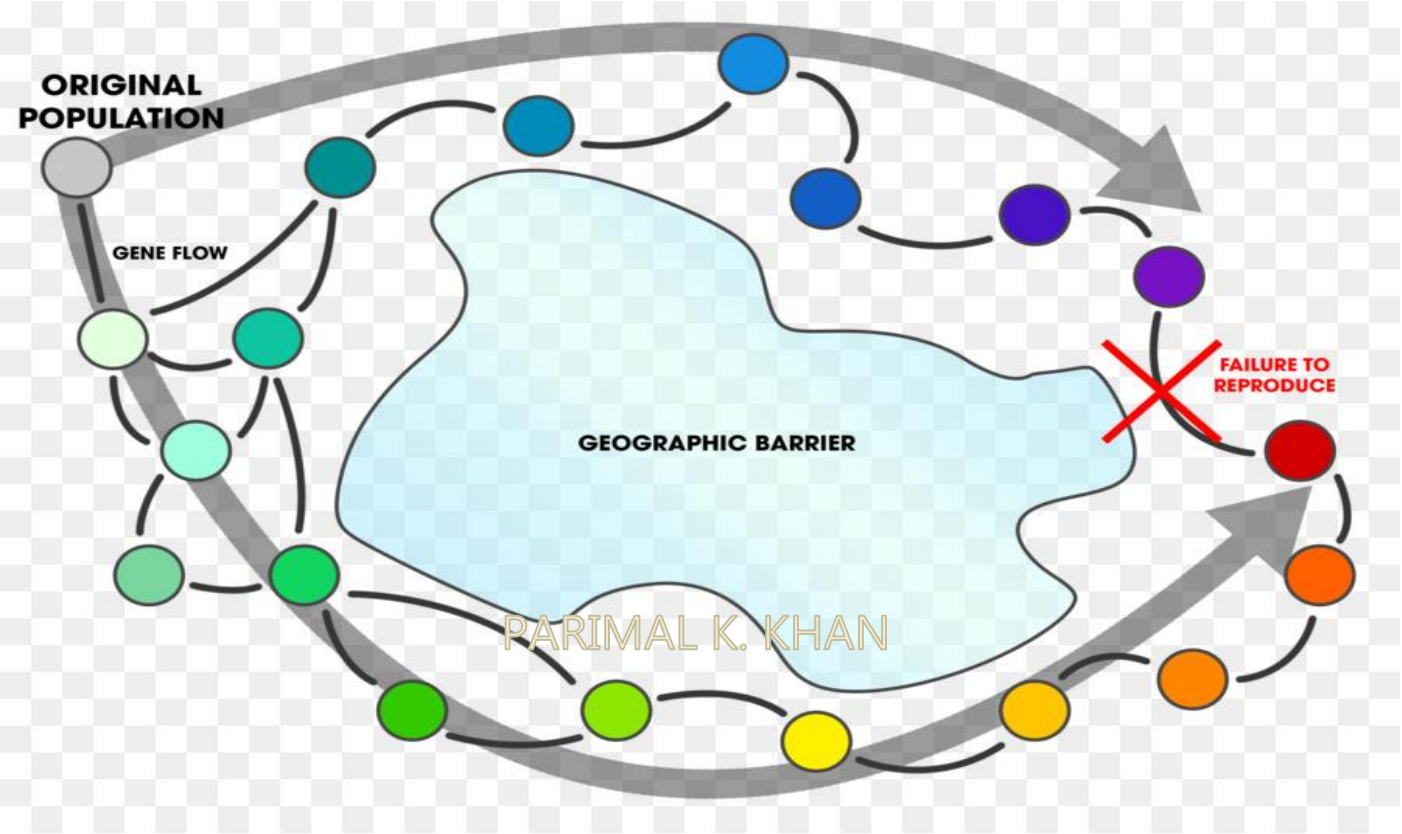
Process of speciation in an amphibian species: Ring species



The ensatina salamander (*Ensatina eschscholtzii*) occurs from Canada to Southern California with interbreeding between adjacent populations through this range

The Central Valley—a dry, hot lowland area—is divided into a coastal arm and inland arm

However, where these two arms of the species meet again in Southern California, interbreeding does not occur

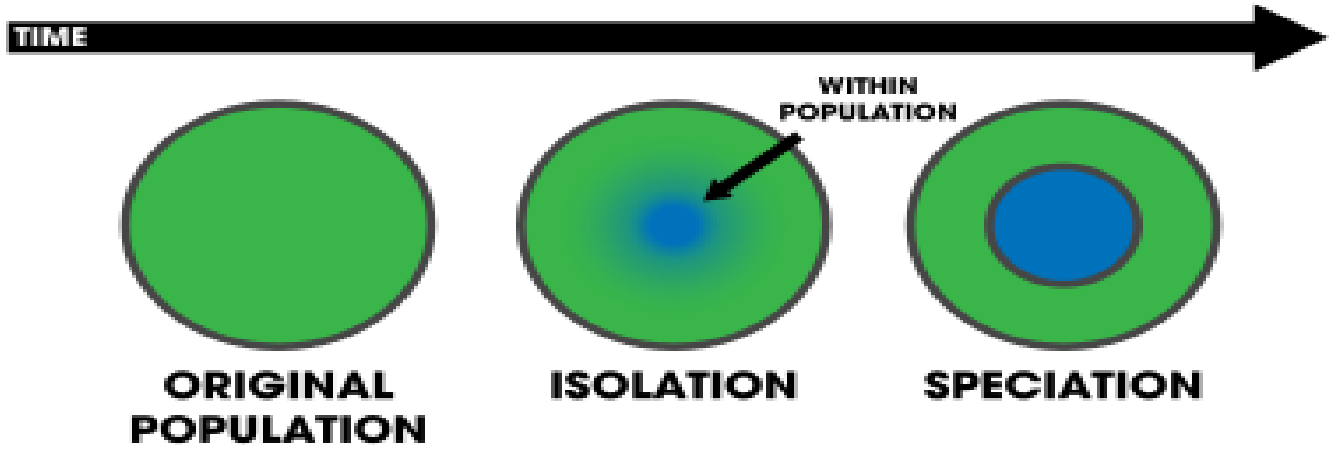


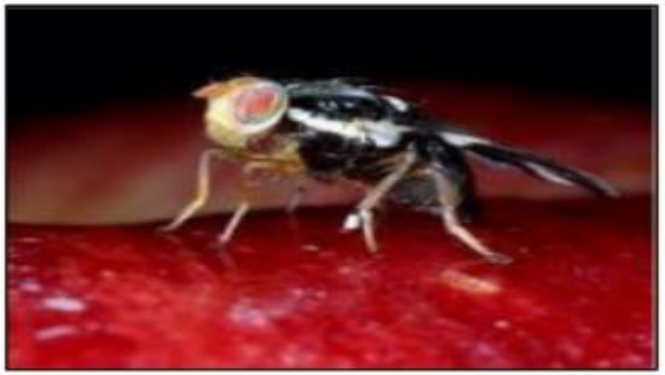
• As the pioneering populations moved South, they evolved into several sub-species with new colour patterns and adaptations for living in different environments.

• The poor locomotory powers of *Ensatina* ensured that it took them 100-1000 years to proceed from Canadian to Mexican border. This led to the formation of ring species.

Sympatric speciation

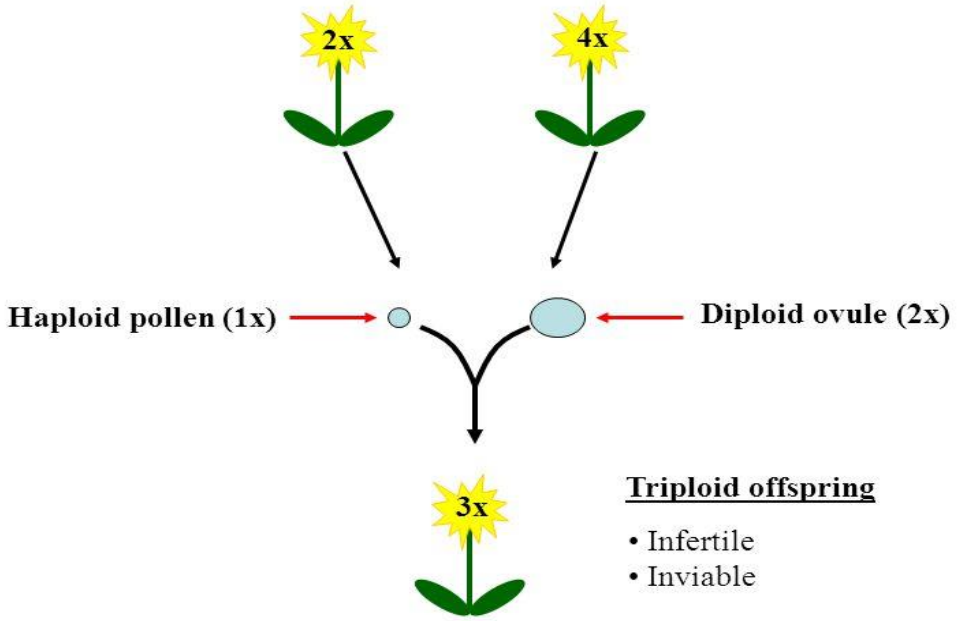
- Reproductive isolation among populations occupying the same geographical area may develop without any geographical isolation.
- Genetic divergence is caused by acquisition of polyploidy, hybridisation, apomixis etc.
- Population splits into groups that occupy different ecological zones and genetic exchange is prevented.
- This mode of speciation occurs commonly in plants.



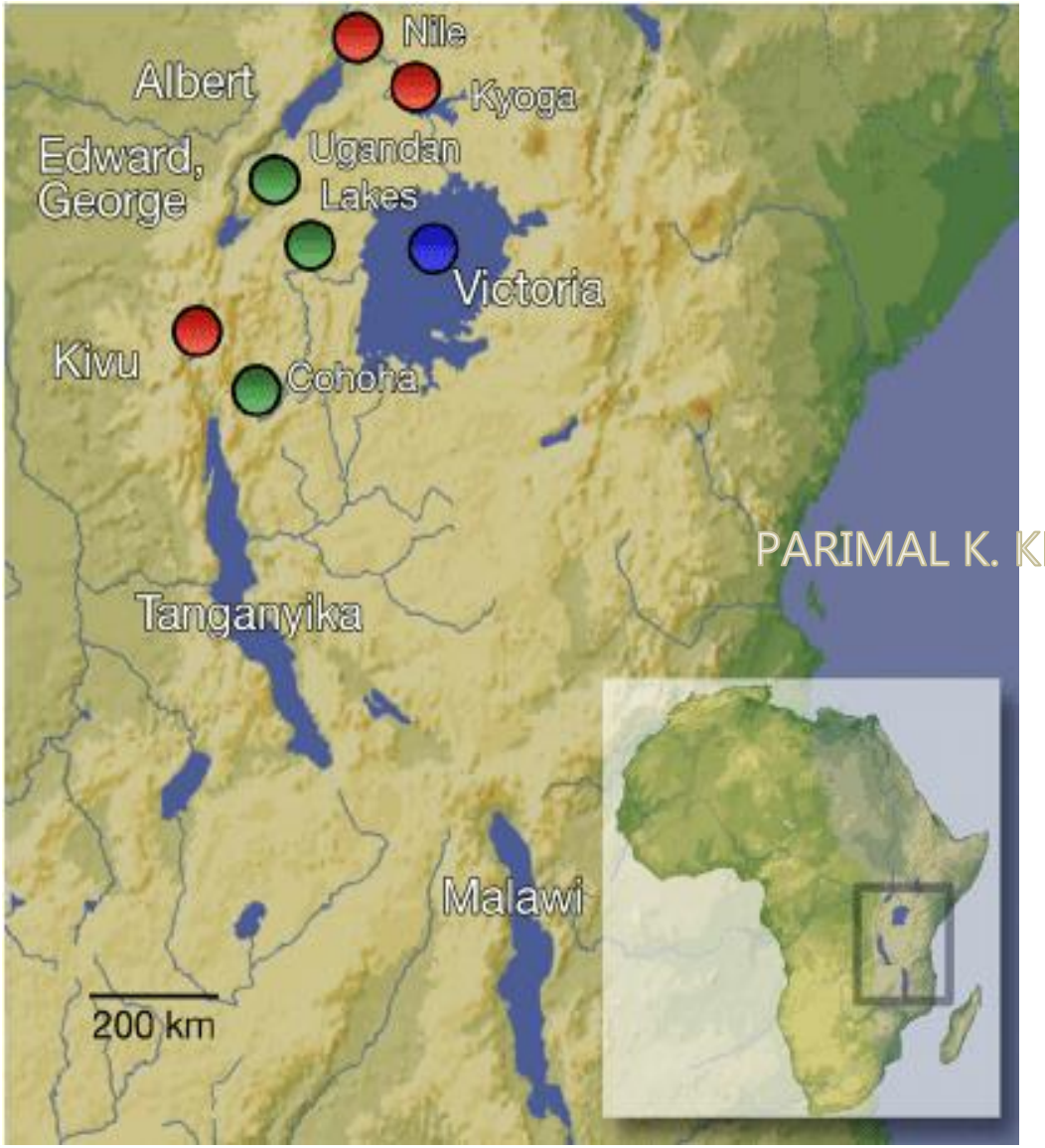


The hawthorn fly species (left) gave rise to apple maggot flies (right) , which prefer to eat apples instead of hawthorn fruits

The process of instantaneous sympatric speciation: polyploidy



As a result, polyploidy generates immediate reproductive isolation and sympatric speciation



- The Rift valley lakes of East Africa support 100s of species of Cichlid fishes.
- Lake Tanganyika is a 20 million year old lake having more than 200 species of Cichlids.
- In contrast, lake Victoria, only 4 lakh year old, has over 500 species of Cichlids which are thought to have diversified from a small number of founding species.
- The ancestry of Cichlids was traced by Norihiro okada using a SINE called AFC.

- Cichlids in Lake Victoria have diversified into hundreds of new species over the past 400,000 years, in a classic example of adaptive radiation.

- A combination of the specialized color vision and the range of light color in the water helps to reproductively isolate each cichlid species.

Image courtesy: Google India


THANK YOU.