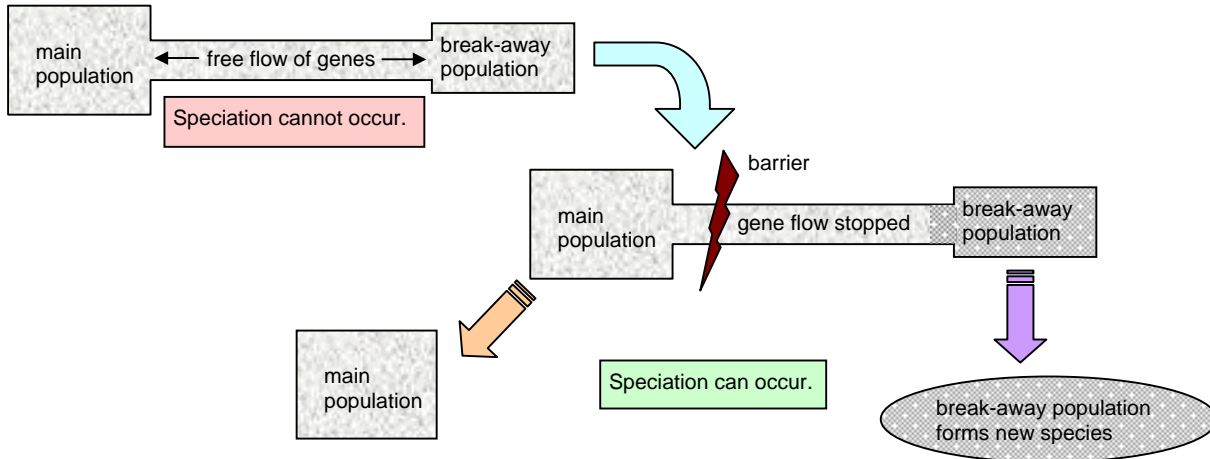


Adaptation (or micro-evolutionary steps) may occur as the result of an allele frequency increasing in a population's gene pool over a number of generations.

Key facts

- Speciation is the evolution of one species into another;
- A break-away population can be formed during migration;
 - eg. a storm blowing a group of birds off route (possibly Galapagos finches) or a group being left behind when the main population moves.
- The break-away population, being small, is likely to have a different balance of alleles from the main population;
- This could make it more susceptible to different selection pressures;
- For speciation to occur the populations must be separated by some barrier to gene flow;



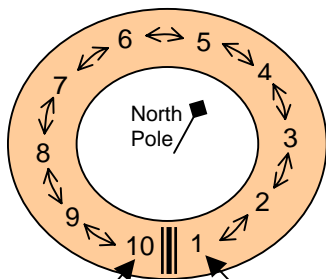
Sanguinus fuscicollis fuscicollis photographed by Roy Fontaine at Monkey Jungle, Miami, Florida. Reproduced by kind permission of the photographer Roy Fontaine.

The barrier could be -

- Geographical, eg. water, mountain range:
 - Example – the saddle-backed tamarin on the banks of the Rio Jurua in western Brazil;
 - Tamarins on the west bank have dark coats and belong to the subspecies *Sanguinus fuscicollis fuscicollis*;
 - Tamarins on the east bank have pale coats and belong to the subspecies *Sanguinus fuscicollis melanoleucus*;
 - In places where the river breaks through a wide meander a group of west bankers may find itself on the east bank and vice versa;
 - In such cases hybrids form between the two subspecies;
 - Over a longer period of time more genetic differences may occur and the subspecies may become separate species.

- Ecological eg different habitats in the same area:

- Example – *Larus* gull ring cline.
- These birds form a ring of 10 subspecies around the North Pole. Each subspecies can interbreed with the adjacent ones except in the British Isles, Netherlands and Germany where the two 'ends' of the ring meet.



↔ interbreeding can occur
 ||| interbreeding can, but rarely does, occur because species 1 and 10 differ in appearance, call, and migratory pattern.

Herring gull
 Grey back and pink legs



Lesser black-backed gull.
 Black back. Winter adults have pink legs; summer adults have yellow legs.



- The original species probably spread in one direction (in the diagram this would be anticlockwise) and selection produced minor variations along the way. When the end of the ring closed back at the starting point there was so much variation between the starting form and the final form that interbreeding was inhibited.