



# **GEOGRAPHICAL ISOLATION AS ONE OF THE FACTORS OF EVOLUTION**

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# Geographical Isolation

Geographic isolation is a term that refers to a population of animals, plants, or other organisms that are separated from exchanging genetic material with other organisms of the same species. Typically geographic isolation is the result of an accident or coincidence

- Since the two groups are in their own unique ecosystems and each experience unique pressures, they will adapt to their environment over time and can eventually become very different from each other. This has the end result of speciation.
- For example, if snails slowly travel beyond a big canyon, the snails on one side will adapt to that environment and the snails on the other side will do the same with their environment. On one side, dark shells might hide them from predators. On the other side, bright coloring might let them stay cool in strong sunlight.
- Over time, the two populations become more genetically differentiated and might become two distinct species with independent geographic ranges.
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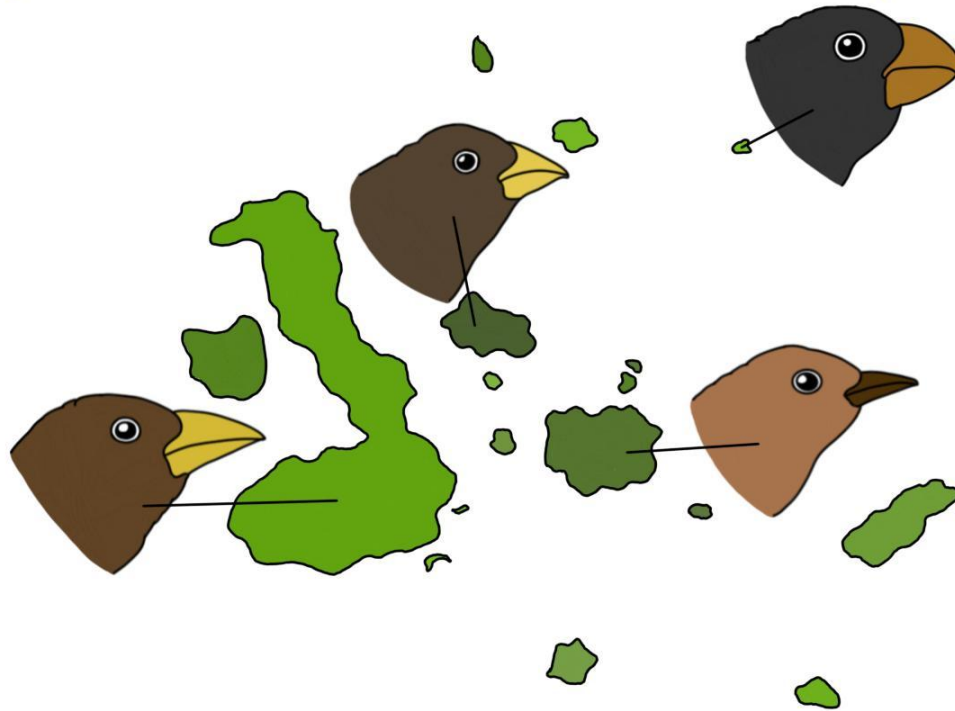
# Geographic isolation can be caused by many factors such as:

- ▣ Isolation by Barriers
- ▣ Isolation by Distance
- ▣ Isolation after an Event
- ▣ Isolation by Separation

# Isolation by Barriers

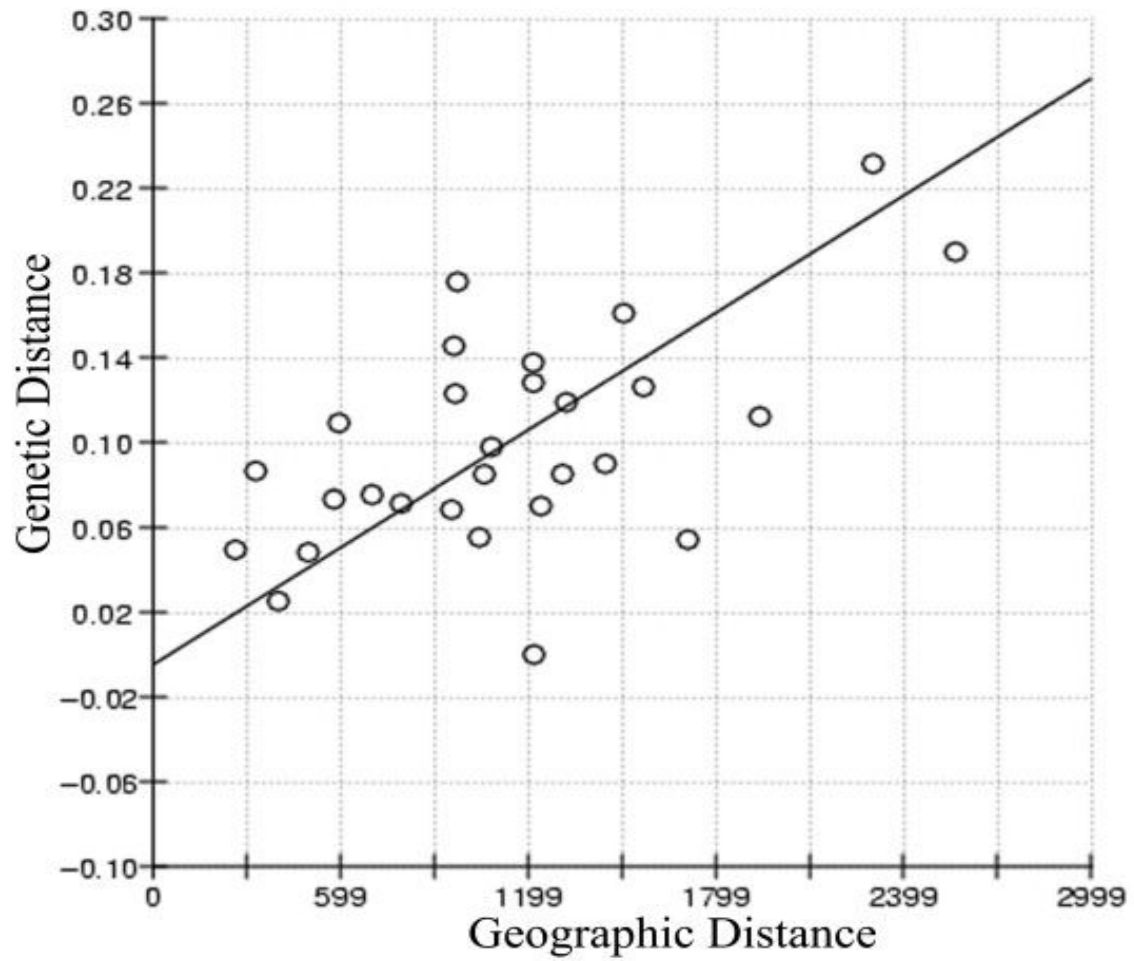
- ❑ The people of Finland, who are secluded to some degree from the rest of the world by water, develop certain diseases due to the lack of genetic material from other ethnicities and races.
- ❑ Physical barriers prevent fish from one stream from mating with fish from another stream, leading to a less varied gene pool among those fish. As time passes, the fish become unable to successfully mate with other groups.
- ❑ A mountain range prevents two types of goat from mating, causing the gene pool to become less varied.

# geographic isolation of the Galapagos finches



# Isolation by Distance

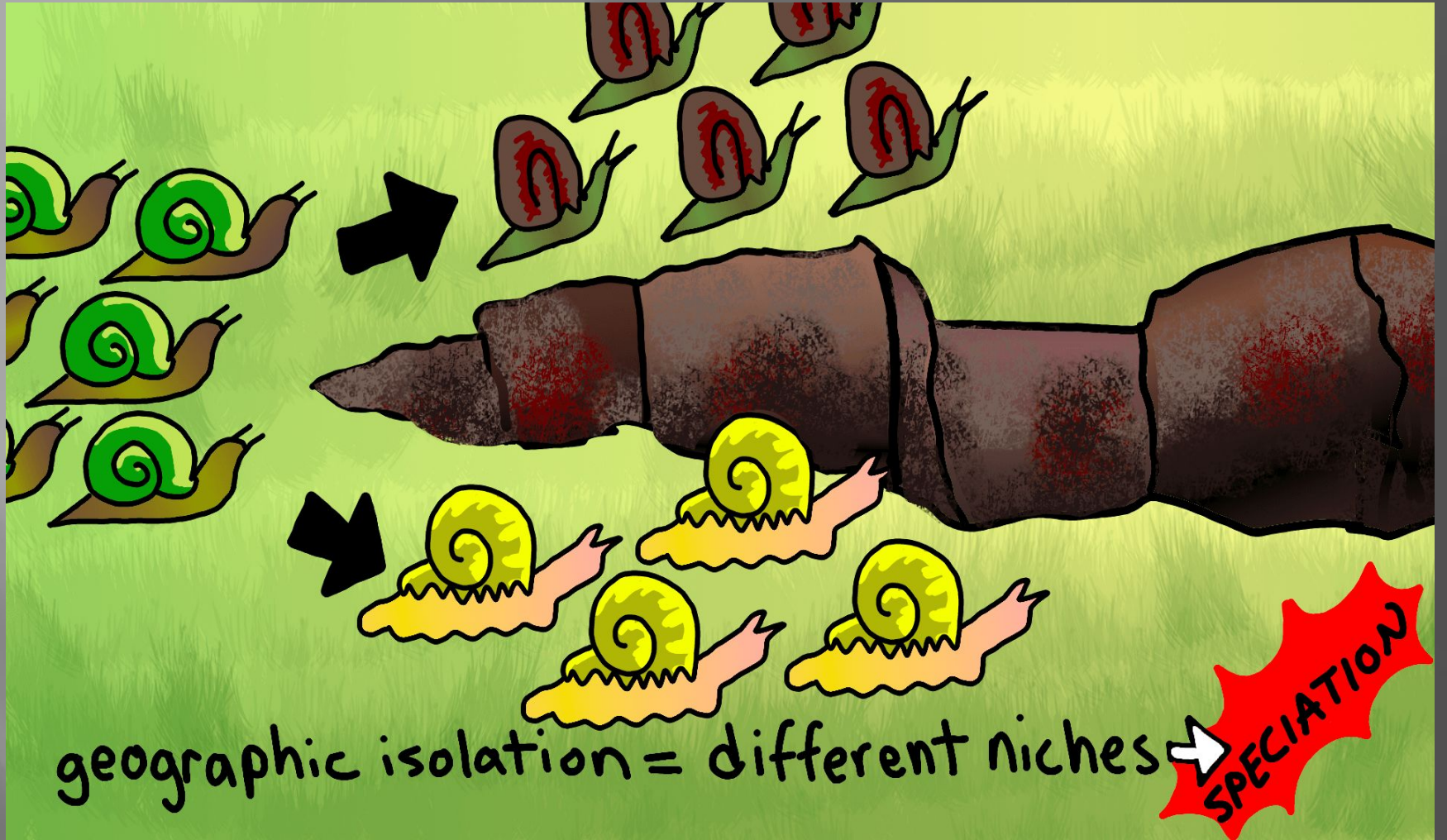
- ▣ Cheetahs separated from a larger group mate with each other, resulting in a less varied gene pool.
- ▣ Genetic interchange between finches is prevented when a flock becomes isolated from the rest on an island. Eventually, the isolated group emerges as a completely separate species.
- ▣ A group of genetically differentiated chimpanzees is unable to mate with any other chimpanzees outside of their group due to physical isolation, leading to the development of certain diseases that genetic material from the other chimpanzees would have prevented.
- ▣ A group of genetically differentiated bottlenose dolphins is separated from other members of its species and eventually goes extinct.
- ▣





# Isolation after an Event

- ▣ An earthquake causes two populations to become separate from each other. Over time, each species experiences genetic makeup specific only to their own smaller, less diverse populations.
- ▣ When a piece of land breaks off from a continent, the animals on the piece of land are only able to reproduce with their own populations. This results in the animals becoming entirely separate species over time.
- ▣ Temporary isolation from a larger population of flies results in species behavior that causes a subgroup of flies not to mate with one another. When the subgroup joins the larger group, the two are now unable to produce fertile offspring.
- ▣ A forest fire causes the permanent separation of a group of deer from their native population, causing the small group to interbreed only with one another. Over time, the group becomes an entirely different species.



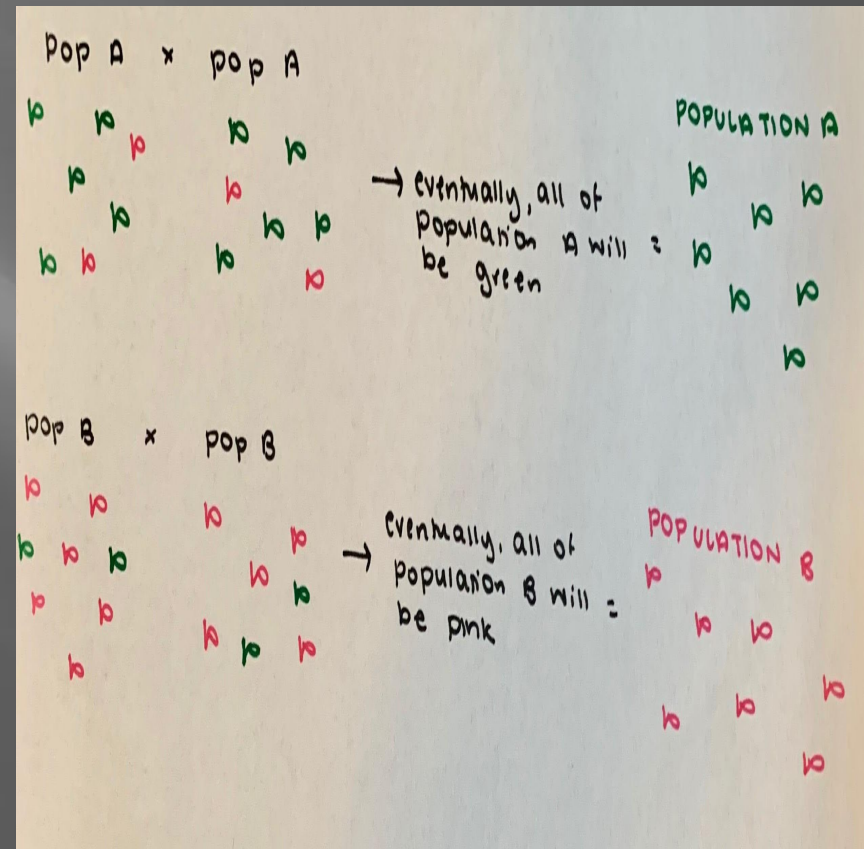
# Isolation by Separation

- ▣ An isolated group of beetles on a hill only work, eat and mate with one another. As a result, only genetic material within that small group is exchanged, leading to a less varied beetle population than others that mate with different subgroups.
- ▣ A population of brown-haired people is separated from those with other hair colors and, as such, does not mix genetically with populations of any other hair color, leading to a population that is of homogenous brown hair color.
- ▣ A small and isolated town contains individuals who do not marry anyone who was not raised in the town, resulting in a less diverse gene pool than a less homogenous population.

# Examples

- **Geographic isolation** occurs when two populations of the same species are divided by some type of geographic event or object. This event or object physically prevents two populations from being in the same area, preventing them from mating.
- As an example, let's look at a species of fish. These fish are all members of the same species, though some fish happen to have green scales and others happen to have pink scales. All the fish live in the east of the river.
- One day, strong rain caused the river to flood, and the currents in the river became overpowering, sweeping some fish to the west of the river. Once in the west, the fish were unable to get back to the east.
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- Population A happens to have more green fish than Population B. However, both groups are still members of the same species. Since the two populations will never be reunited, eventually the ratio of green fish will increase in Population A, and the ratio of pink fish will increase in Population B. Over time, each population will only have one color.



THANK YOU

# How nervous system can be damaged ?

- ▣ The nervous system is vulnerable to various disorders. It can be damaged by the following:
- ▣ Trauma
- ▣ Infections
- ▣ Degeneration
- ▣ Structural defects
- ▣ Tumors
- ▣ Blood flow disruption
- ▣ Autoimmune disorders
- ▣ Disorders of

# Signs and symptoms of nervous system disorders

- ▣ Persistent or sudden onset of a headache
- ▣ A headache that changes or is different
- ▣ Loss of feeling or tingling
- ▣ Weakness or loss of muscle strength
- ▣ Loss of sight or double vision
- ▣ Memory loss
- ▣ Impaired mental ability
- ▣ Lack of coordination
- ▣ Muscle rigidity
- ▣ Tremors and seizures
- ▣ Back pain which radiates to the feet, toes, or other parts of the body
- ▣ Muscle wasting and slurred speech
- ▣ New language impairment (expression or comprehension)



# These are some branch of medicine that deals with such disorders

- ▣ Neurology
- ▣ Neurological surgery
- ▣ Neuroradiologists and interventional radiologists
- ▣ Rehabilitation for neurological disorders

# Neurology

- ▣ The branch of medicine that manages nervous system disorders is called *neurology*. The medical healthcare providers who treat nervous system disorders are called neurologists. Some neurologists treat acute strokes and cerebral aneurysms using endovascular techniques.

# Rehabilitation for neurological disorders

- ▣ The branch of medicine that provides rehabilitative care for patients with nervous system disorders is called physical medicine and rehabilitation. Healthcare providers who work with patients in the rehabilitation process are called physiatrists.

Thank You