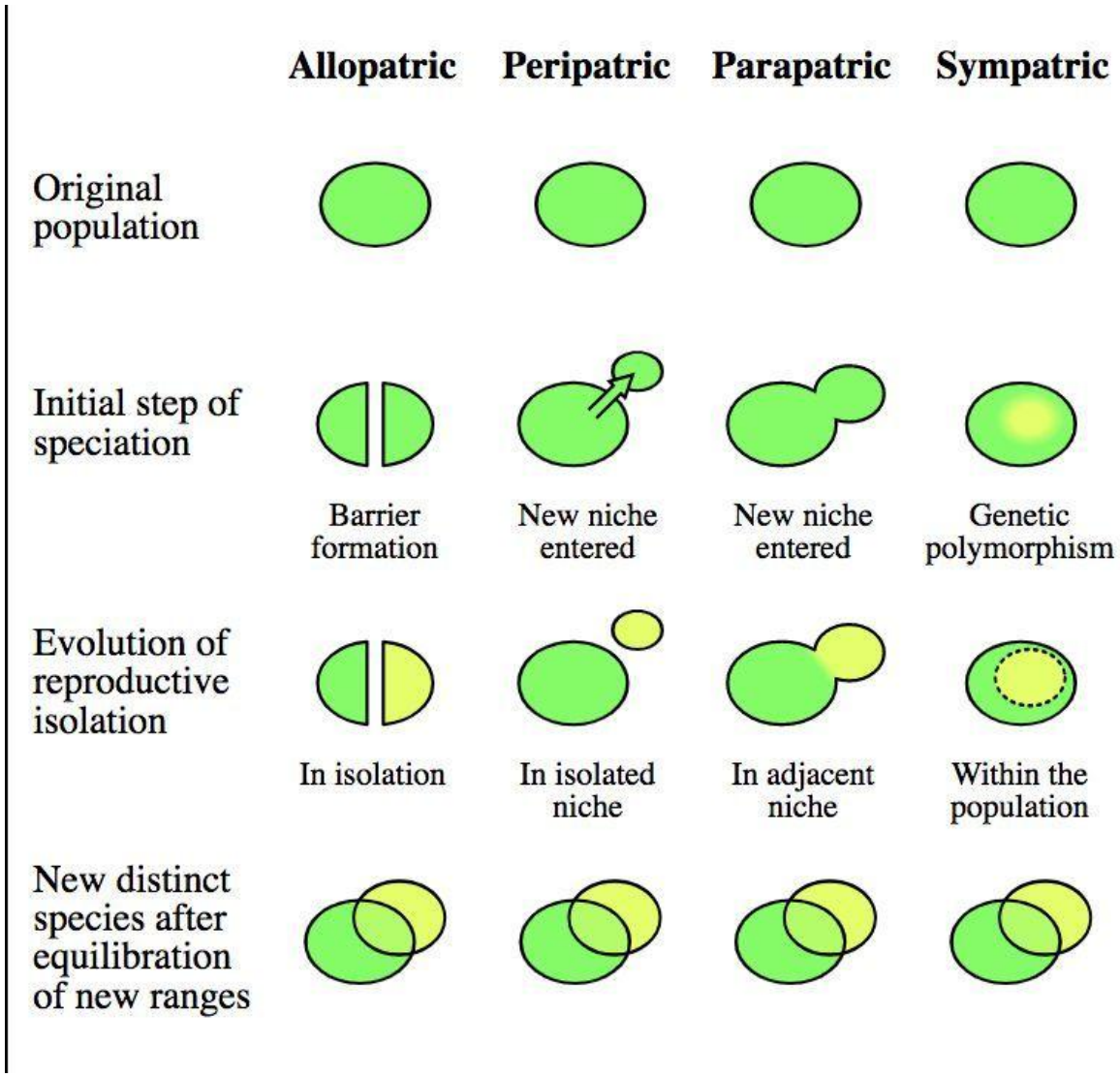
SPECIATION

A species is a group of organisms with similar characteristics and can interbreed to give fertile offspring. Speciation is an evolutionary process of the formation of new and distinct species. The species evolve by genetic modification. The new species are reproductively isolated from the previous species, i.e. the new species cannot mate with the old species.

The Four Types of Speciation

There are three other types of speciation besides allopatric speciation: peripatric, parapatric, and sympatric. Peripatric and parapatric speciation are similar to allopatric speciation because in these types, populations also get isolated and this causes speciation. Sympatric speciation, on the other hand, occurs when the members of different populations live in the same area but speciation still occurs.



Allopatric Speciation

Allopatric speciation is speciation that happens when two populations of the same species become isolated from each other due to geographic changes. Speciation is a gradual process by which populations evolve into different species. A species is itself defined as a population that can interbreed, so during speciation, members of a population form two or more distinct populations that can no longer breed with each other.

Steps of Allopatric Speciation

A geographic change separates members of a population into more than one group. Such changes could include the formation of a new mountain range or new waterway, or the development of new canyons, for example. Also, human activities such as civil engineering, agriculture, and pollution can have an effect on habitable environments and cause some members of a population to migrate.

Different gene mutations occur and build up in the different populations over time. The different variations of genes may lead to different characteristics between the two populations.

The populations become so different that members of the different populations can no longer breed with each other anymore if were they to be in the same habitat in the same time. If this is the case, allopatric speciation has occurred.

Peripatric Speciation

Peripatric speciation occurs when members on the periphery, or border, of a large population separate off from the main group and become a new species over time. It can be difficult to distinguish from allopatric speciation. Peripatric speciation occurs when the population that breaks off enters a different biological niche, such as eating a different food or living in a different environment. Also, these new populations that break away from the main one are usually small, so this can have an effect on the proportion of certain characteristics in the new population compared with the old one. For example, say there is a population of birds that are mostly blue, but some are red. A smaller group of birds breaks off from the main group, and most of this smaller group are red. Their offspring will probably also be mostly red, which is different than the main group. This type of change in the frequency of genes is called genetic drift. Over time, many changes may occur, and these combined with the effects of genetic drift can cause new species to arise.

Parapatric Speciation

Parapatric speciation occurs when subpopulations of the same species are mostly isolated from each other, but have a narrow area where their ranges overlap. This may be due to a partial geographic barrier or an unequal distribution of members of the subpopulations. It can occur between multiple subpopulations next to each other where all the populations next to each other can interbreed, but each subpopulation is so slightly different that the members on the extreme ends would not be able to interbreed with each other. This is known as a ring species.

Sympatric Speciation

Sympatric speciation is very different from the other forms because new species emerge from populations living in highly overlapping or even identical areas. It may be more common in bacteria than in multicellular organisms because bacteria can transfer genes to each other as well as transfer genes to offspring when they divide. It is not known how often sympatric speciation occurs, and it is much rarer than the other types of speciation, but there have been some examples seen in nature. One such example is seen in cichlid fish in Tanzania that live in a small volcanic crater lake. The population has two very different ectomorphs, or forms: a yellow-green one that lives by the shore, and a blue-black one that lives by the bottom of the lake. By looking at the fishes' DNA, researchers could see that the two ectomorphs were very different genetically. It is believed that these two forms are currently in the gradual process of speciation.

(Source: https://biologydictionary.net)

Factors Affecting Speciation

There are several factors which lead to speciation. Two of them are:

Geographical Isolation

Due to some geographical changes, few members of a species get isolated from other members. Later, this isolated group grows in a different land and eventually evolves as a new species with new adaptations according to its environment. Natural selection and genetic drift have a major role to play in this.

The new species are different from the flies in mainland A as well as from the flies who got introduced to land B by the flood. Even if this new species was reintroduced to the mainland A, they would not mate with those flies. New species start to mate amongst themselves. Thus a population of new species arrives.

Speciation

Hybridization

Hybridization is an artificial method of developing a new species. In animal husbandry, two parents from different species are mated to form a third species. Hybridization has numerous and various impacts on the process of speciation.

There are many hybrid animals, which have been crossed between the same species and the genus. Below is the list of a few successfully crossed hybrid animals:

Zebroid- It is a hybrid cross between a male zebra (*Equus quagga*) and a female donkey (*Equus asinus*) or with any other female members of the horse family.

Liger – It is a hybrid cross between a male lion (*Panthera leo*) and a tigress (*Panthera tigris*).