

CHAPTER 4	Biological Barriers	BLM 4.3.1
HANDOUT		

Use the following information to answer the questions below.

Barriers that lead to speciation can be geographical or biological. There are two general categories of biological barriers: prezygotic and postzygotic.

Prezygotic barriers are mechanisms that prevent the fusion of the egg and the sperm so that no zygote can form. Pre-zygotic barriers include:

- **Habitat Isolation:** When two closely related species live in entirely different habitats, they will seldom encounter each other and therefore there will be few opportunities to mate.
- **Behavioural Isolation:** Each species may use different signals to attract a mate. If one species does not recognize the signals of the other, the two species will not mate.
- **Temporal Isolation:** If two species breed at different times of the day or in different seasons, they cannot mix their gametes because when one species is ready to breed, the other is not.
- **Mechanical Isolation:** Many species cannot mate because their reproductive anatomies are incompatible.
- **Gametic Isolation:** This mechanism is due to the incompatibility of sperm and eggs from different species. The gametes do not fuse because they do not recognize each other.

Postzygotic barriers are mechanisms that prevent a zygote from developing into a fertile adult offspring. Post-zygotic barriers include:

- **Reduced Hybrid Viability:** Genetic incompatibility between the two species may abort the development of the embryo at an early stage.
- **Reduced Hybrid Fertility:** If two species can produce hybrid offspring that are viable, reproductive isolation is intact if these offspring are sterile and cannot breed.
- **Hybrid Breakdown:** When some species cross-mate, the first generation of offspring is viable and fertile. However when these hybrids mate with each other or with either of the parent species, offspring of the next generation are feeble or sterile.

Read each of the following scenarios carefully. Identify and describe the reproductive barriers in effect. Be sure to indicate if they are prezygotic or postzygotic. In most cases there could be more than one barrier.

1. Two distinct species of ant live in the same national park. Little is know about their natural history, but they have been observed working during the day and resting at night in similar habitats. These species look different, and scientists have discovered that they produce different pheromones.

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2. Bats in the genus *Myotis* look identical and have always been classified as one species, even though behavioural differences have been observed. Recently, scientists using molecular biology techniques have discovered that there are many different and genetically distinct species within this genus. In one case, two genetically distinct species of *Myotis* were found sharing the same roost over a period of years.

3. Several species of frogs of the genus *Rana* can live in the same pond. Sometimes hybrid zygotes form, but these fail to develop.
