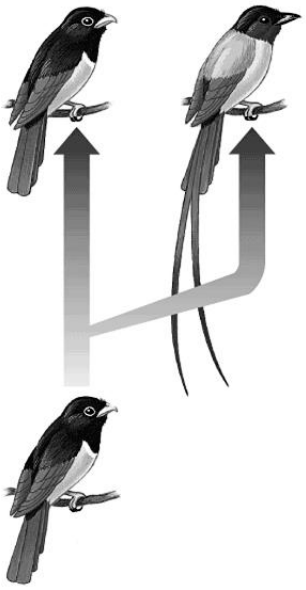
macro- =	large (*macroevolution*: evolutionary change on a grand scale, encompassing the origin of novel designs, evolutionary trends, adaptive radiation, and mass extinction)

Guided Reading: Chapter 24

(p.464) **1.** Label the diagrams below and use them to describe the two **patterns** of ***speciation***.

Anagenesis:
(*phyletic evolution)*
The accumulation of heritable changes in a population, transforming that population into a new species.

Cladogenesis:
BRANCHING evolution, in which a new species arises from a population that buds from a parent species, Cladogenesis is the basis for biological diversity.



(a) Anagenesis
Up

(b) Cladogenesis
Branching

(p.464) **2.** What was Darwin's "mystery of mysteries"?

Darwin's "mystery of mysteries" was the first appearance of new species on the Earth - the beginnings of forms of life - the origin of species
.

(p.464) **3.** Define ***speciation***.

Speciation is the origin of new species.

4. Distinguish between **microevolution** and **macroevolution**. (Glossary)

Microevolution is the change in the gene pool of a population from generation to generation while **macroevolution** is change on a grand or large scale, encompassing the origin of new taxonomic groups, evolutionary trends, adaptive radiation and mass extinction.

(p.465) **5.** Use the biological species concept to define ***species***.

The biological species concept defines a species as a population or group of populations whose members have the potential to interbreed with one another in nature to produce viable, fertile offspring.

(p.465) **6.** What is required for the formation of new species?

Reproductive compatibility and reproductive isolation is what is required for the formation of a new species.

(p.465) **7.** What are *hybrids*?

Hybrids are organisms produced from the genetic recombination from two different species.

(p.466/467)

8. **Explain** the two types of barriers that maintain *reproductive isolation*.

The two types of barriers that maintain reproductive isolation are PREzygotic and POSTzygotic barriers.
PREzygotic barriers function BEFORE fertilization and the formation of zygotes by impeding the mating between species or hinder the fertilization of ova if members of different species attempt to mate. POSTzygotic barriers function AFTER fertilization and the formation of zygotes and prevent the hybrid zygote from developing into a viable, fertile adult.

(p.466/467)

9. The following charts summarize the various ways that *reproductive isolation* is maintained. Explain and give an example of each type of isolating mechanism.

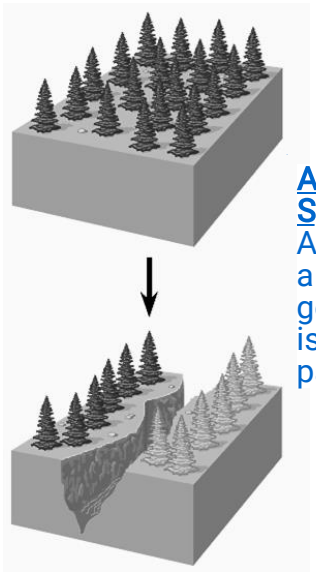
PREZYGOTIC BARRIERS	Explanation	Example
Habitat Isolation	Two species that live in different habitats within the same area may encounter each other rarely, if at all, even though that are not technically geographically isolated	Garter Snakes
Behavioral Isolation	Special signals that attract mates, as well as elaborate behaviors unique to a species.	Fireflies Western Meadowlark
Temporal Isolation	When two species breed during different times of day, different seasons, or different years.	Western and Eastern Spotted Skunk
Mechanical Isolation	When closely related species cannot successfully reproduce because they are anatomically incompatible.	Flowers Insects
Gametic Isolation	When sex cells or gametes (sperm and egg) cannot recognize each other's cell surface receptors	Aquatic Animals Flowers

POSTZYGOTIC BARRIERS	Explanation	Example
Reduced Hybrid Viability	When prezygotic barriers are crossed and hybrid zygotes are formed, genetic incompatibility between the the species may abort development of the hybrid.	Frogs (*genus Rana*)
Reduced Hybrid Fertility	The creation of hybrids that are sterile.	Mules

(p.465) **10.** Name and briefly explain the concept of species that remains to be the way most biologists distinguish a species.

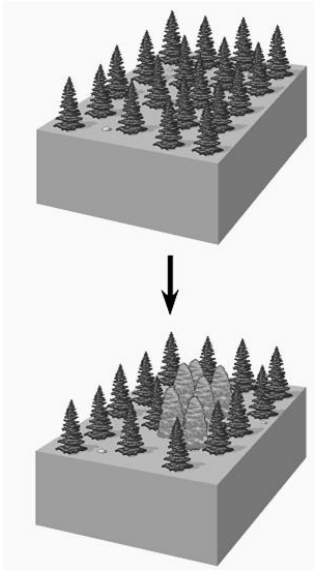
The biological species concept remains to be the way most biologist distinguish a species as a population or group of populations whose members have the potential to interbreed with one another in nature to produce viable, fertile offspring. Biologists also rely on the morphological species concept which characterizes each species in terms of a unique set of structural features.

(p.468) **11.** Label the diagrams below and use them to describe the two **modes** of speciation based on how gene flow among populations is initially interrupted.



Allopatric Speciation: A population forms a new species while geographically isolated from its parent population.

Sympatric Speciation: A small population becomes a new species without geographically separation from its parent population. Biological factors such as chromosomal changes and nonrandom mating reduce gene flow.



(a) Allopatric Speciation

"other" "homeland"

(b) Sympatric Speciation

"together"

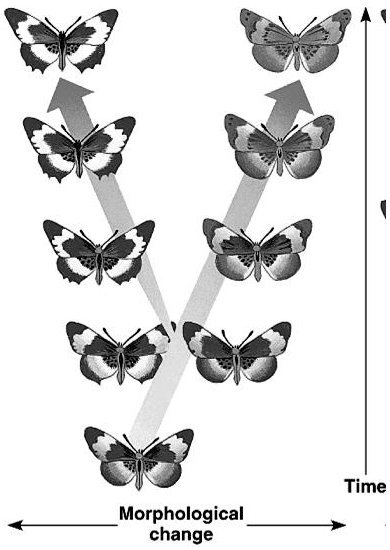
(p.471) **12.** Using Darwin's Finches as an example, define a form of ***allopatric speciation*** known as **adaptive radiation**.

Adaptive Radiation is the evolution of many diversely adapted species from a common ancestor. Darwin's Finches evolved after a single, small population of finches that gave rise to many more species.

(p.474) **13.** ***Sympatric speciation*** occurs in populations that live in the same geographic area. How is this possible?

Sympatric speciation can occur in populations that live in the same geographic area through the emergence of some type of reproductive barrier that isolates the gene pool of a subset of a population.

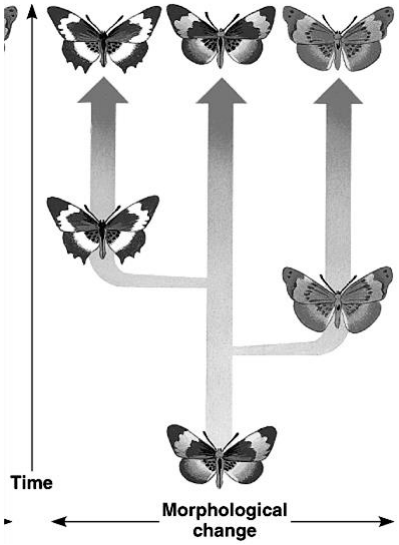
(p.476) **14.** Label the diagrams below and use them to describe the two models for the **tempo** of speciation.



(a) Gradualism

Gradualism:
Species descended from a common ancestor gradually diverge more and more in morphology as they acquire unique adaptations.

Punctuated Equilibrium:
A new species changes most as it buds from a parent species, and then changes little for the rest of its existence.



(b) Punctuated Equilibrium

(p.479) **15.** What are **homeotic** genes?

Homeotic genes control the placement and spatial organization of body parts.

16. What are ***Hox* genes**?

Hox genes are a group of related **genes** that specify regions of the body plan of an embryo.

(p.479) **17.** Changes in ***Hox* genes** can have a profound effect on morphology.