Microevolution is the change in allele frequencies within a population over a few generations.

Insects that carry the allele which makes them able to tolerate DDT increased in number significantly from 1955 to 1984.
Microevolution Antibiotic Resistance

Initial population has rare resistant mutant

Surviving cells are all resistant

First round of incomplete antibiotic treatment

Second round of antibiotic treatment

Antibiotic treatment discontinued

Population expands in absence of antibiotic

Evolution in Action - Antibiotic Resistance in "TB Bacteria" (example of Microevolution Antibiotic Resistance)
SPECIATION

Speciation is the formation of a new species from existing species.
This is also called macroevolution.

The definition of a species is a group of individuals capable of interbreeding to produce fertile offspring.
REPRODUCTIVE ISOLATING MECHANISMS

Two populations may become reproductively isolated over time (become two different species) if there is little or no gene flow between the populations.

A reproductive isolating mechanism is any behavioural, structural, or biochemical trait that prevents successful interbreeding between closely related organisms.

Two types of reproductive isolating mechanisms:
1. Pre-zygotic - a barrier that prevents fertilization and formation of zygote
2. Post-zygotic - post-fertilization barriers that prevent the formation of viable fertile offspring
PRE-ZYGOTIC ISOLATING MECHANISMS

1. Habitat Isolation
2. Temporal Isolation
3. Mechanical Isolation
4. Behavioral Isolation
5. Gametic Isolation
PRE-ZYGOTIC ISOLATING MECHANISMS

Habitat Isolating Mechanisms: Different species can live in the same general location, but occupy different habitats. Examples- grassland versus jungles. Swampy areas versus dry areas. A good example of habitat isolation is the lion and the tiger.

Lions remained in savannas
Tigers in jungles
Eventually they became distinct enough, and were no longer able to mate
PRE-ZYGOTIC ISOLATING MECHANISMS

Temporal Isolating – are timing Barriers. Species may occupy the same habitat, but mate at different times of the day or year.

Figure 43-3 TEMPORAL ISOLATION IN BREEDING OF AMPHIBIANS.

Four kinds of frogs are seen to have maximal reproductive behavior at different times; this helps to ensure that interbreeding is reduced or absent.
PRE-ZYGOTIC ISOLATING MECHANISMS

Mechanical Isolating Mechanisms- Species may attempt to mate, however they may be anatomically incompatible. Some species of snails have shells that are in opposite directions. Many insects have distinctive genital anatomy.
PRE-ZYGOTIC ISOLATING MECHANISMS

**Behavioural Isolating Mechanisms:** are signals and species specific behaviours that prevent interbreeding.

Example: Different courtship behaviours

*Mating dance of birds of paradise*
PRE-ZYGOTIC ISOLATING MECHANISMS

Gametic Isolating Mechanisms – Even if mating occurs there can be incompatibilities between the egg and the sperm, or the sperm and the female reproductive tract.
POST-ZYGOTIC ISOLATING MECHANISMS

In rare cases the sperm of one species fertilizes the egg of another species and a zygote is produced. Post-zygotic mechanisms prevent viable, fertile offspring from developing.

1. Hybrid Inviability
2. Hybrid Sterility
3. Hybrid Breakdown.
POST-ZYGOTIC ISOLATING MECHANISMS

Hybrid Inviability – Fertilization occurs, but hybrid does not survive. Genetic incompatibility prevents the development of a healthy embryo. For example, the hybrid of a sheep and a goat dies before birth.

Hybrid Sterility – Hybrid survives but is sterile & cannot reproduce, mules (horse and donkey) and zebroids (horses and zebras)

Hybrid Breakdown – First generation hybrids are fertile, but successive generations breakdown and become weak or sterile. Common in plants.
Liger - from a male lion and a female tiger - these are often MUCH bigger than either tigers or lions!

Tigon - from a male tiger and a female lion
ZEBROID

HOMEWORK
Read pp. 360-373
Complete questions 13, 15, 16, 18, p. 363