Introduction To Ecology

Chapter 19
Ecology

- Study of the interactions of organisms and their environment
Levels of Organization

- **Biosphere** - most inclusive; volume of Earth and atmosphere that support life
- **Ecosystem** - includes all organisms & nonliving environment in an area
- **Communities** - all the interacting organisms living in an area
- **Population** - includes all members of a species that live in an area at one time
- **Organism** - simplest level
Ecology of Organisms

- **Biotic factors** - living components of the environment
- **Abiotic factors** - nonliving factors; physical & chemical characteristics of environment
  - temperature, humidity, pH, salinity, oxygen, sunlight, nitrogen, precipitation
- Abiotic & biotic factors are not independent; organisms change their environment & are influenced by the changes (ex. amount of nitrogen affects how plants grow)
Responses to Changing Environment

1. Tolerance curves - graphs the organisms' performance versus values of an environmental variable.
   - Organisms are adapted to function within a specific range of abiotic factors.
   - Organism functions best in its optimal range.
   - Performance reduced outside its optimal range.
   - Organism cannot survive outside its tolerance.
The diagram illustrates the concept of the optimum range in population densities across different environmental gradients.

**Top Section:**
- **Y-axis:** Population Densities
- **X-axis:** Environmental Gradient
- **Label:** One species
- **Curves:** A single curve representing population densities for a single species, showing an optimum range.

**Bottom Section:**
- **Y-axis:** Population Densities
- **X-axis:** Environmental Gradient
- **Label:** Several species
- **Curves:** Multiple curves (purple, blue, red, yellow) showing population densities for several species, each with its own optimum range.
2. Acclimation - adjusting tolerance to abiotic factors

- Ex. Body produces more rbc’s at higher altitudes
- Occurs within the lifetime of the organism

- Adaptation is a genetic change that occurs over generations
3. Control of Internal Conditions

Conformers - organisms that do NOT regulate their internal conditions; they change with the environment

- Ex. Cold Blooded animals (Exothermic) - body temp changes with environment

Regulators - organisms that use energy to control some of their internal conditions

- Ex. Warm Blooded animals (Endothermic) - body temp remains constant
Conformer  Regulator
4. Escape from Unsuitable Conditions

- Temporarily escaping unfavorable conditions
- Dormancy - long term state of reduced activity
  - Hibernation, estivation
- Migration - move to favorable habitat; seasonable movements
5. Resources - energy & materials the species needs

Food, energy, nesting sites, water, sunlight
Niche

♀ Species’ way of life; role the species plays in its environment
♀ Includes:
♀ the range of conditions that the species can tolerate
♀ Method of obtaining resources
♀ Number of offspring it has
♀ Time of reproduction
♀ All interactions with the environment
Fundamental niche - range of conditions that a species can potentially tolerate & range of resources; broader range

Realized niche - range of resources it actually uses
Niche Differences

✧ Generalists - species with broad niches; tolerate a range of conditions & variety of resources
✧ Specialists - narrow niches & limited resources
Koala feeds only on eucalyptus

✠ Specialist

Opossum feeds on animal eggs, fruits, plants & dead animals

✠ Generalist