Unit V
Ecology

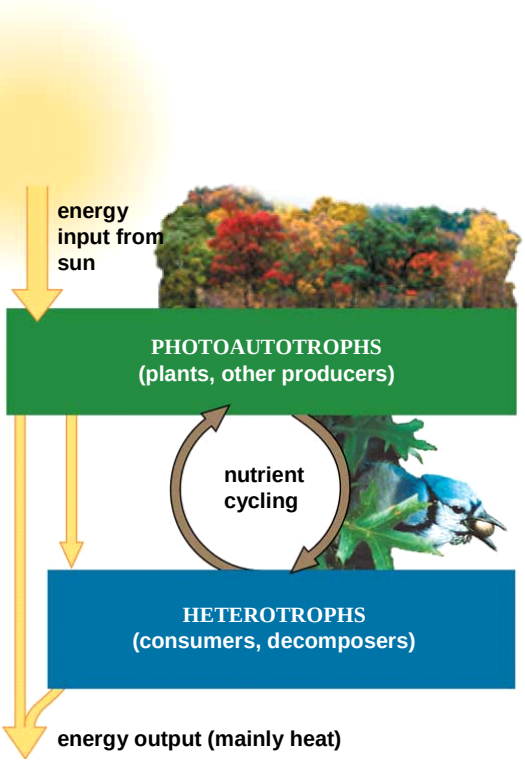


Fig. 43.2, p. 738

I. **Ecology**

1. Defined: The Interrelationships between organisms and their environment.
2. Ecosystem Structure- Trophic Levels
    - A. Autotrophic - Producers
    - B. Heterotrophic -
        - Consumers
            - Primary
            - Secondary
            - Tertiary
        - Decomposers
    - C. Abiotic
3. Energy Relationships
    - A. Food Chains
    - Predator
    - Parasitic
    - Saprophytic

    - B. Food Webs

4. Concept of Habitat vs Niche

5. Biogeochemical Cycles

Ex. Nitrogen Cycle

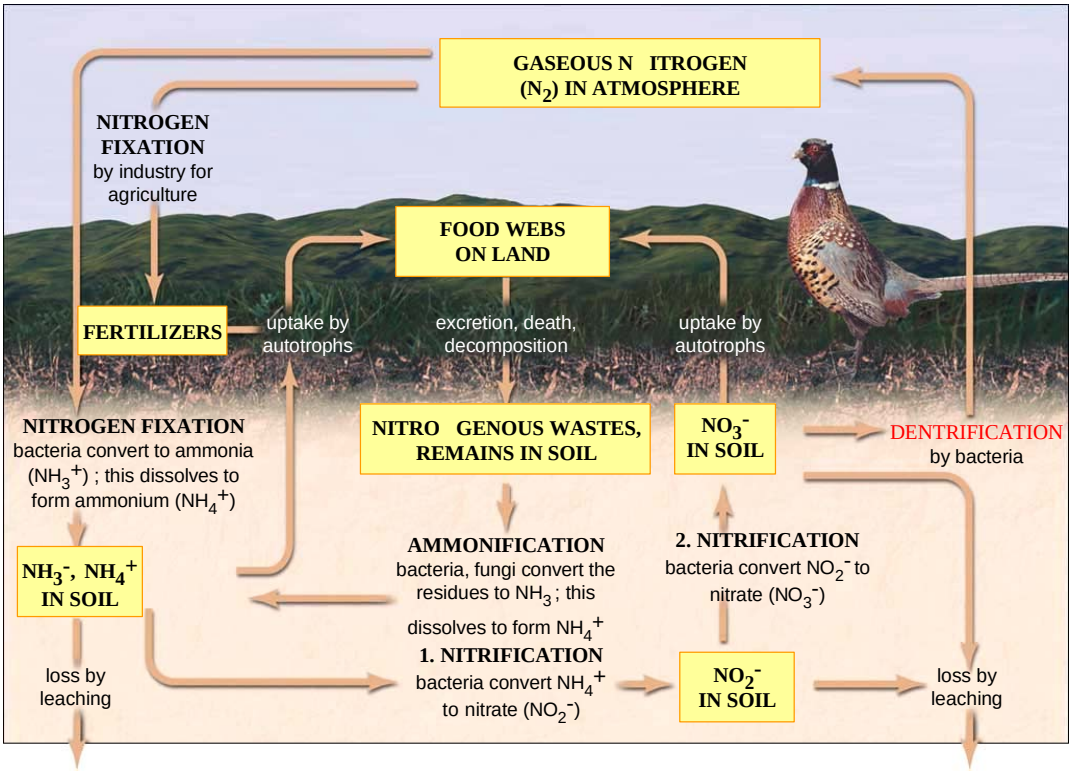


Fig. 43.23, p. 752

6. Productivity

Measurements

Standing Crop

O_2 Method

C^{14} Method

II Limiting Factors

1. **Liebig**'s Law of the Minimum

2. **Shelford**'s Law of Tolerance

Eury vs Steno

Thermal Hydric

Haline Phagic

3. Factors

A. **Temperature**
1) Low Temperature effects
2) High Temperature effects

3) Animals
a. **Poikilotherms**
most aquatic animals
some terrestrial animals
b. **Homotherms**
keeping warm
keeping cool

4) Plants -transpiration

B. **Light**
1) **Wavelength** or color
ex:Seaweeds, seed germination.

2) **Intensity** or brightness photosynthesis loss due to heat and radiation. Animals can be damaged by irradiation.

3) **Duration**- Photoperiod

a) Day length in plants- Long day, short day, day neutral

b) Day length in animals- Bird reproduction, Jet lag.

C. **Water**

1)Rainfall -Hydrological Cycle.

Rainfall Classification
0"-10" Desert
10"-30" Grassland,Dry Forest, Open woodland
30"-50" Dry Forest
over 50" Wet Forest

2) Humidity
Absolute
Relative

3) Available Surface Water Supply
    Level of Water Table
    Type of Soil
        Sandy soils
        Clay soils
        Aggregated soils

D. **Gases**- Oxygen and Carbon Dioxide

1) On terrestrial environment
2) In Aquatic environment
    Solubility of the gas with changes in temperature and salinity.

3)How gases get into water
    Atmosphere
    Plants
    Animals
    Decomposers
    Rocks

E. **Currents and Pressures**

1) Currents

    atmospheric- winds
    water currents

2) Pressures
    Barometric
    Hydrostatic

F. **Soils**- Stratification

1) Soil profile

"O" horizon organic
"A" horizon "humification"
"B" horizon "mineralization"
"C" horizon "transported materials"
"R" horizon "bedrock"

2) Soil Comparisons
Coniferous Forest
Deciduous Forest
Grassland

3) Edaphic vs Climatic Soils

G. **Fire**

1) Types
Surface
Crown
Fire Storms

2) Fire Communities
fire dependent
fire independent

H. Ecological Indicators
Eury vs Steno indicators

III Organization of the Community

1. Major vs Minor Communities

2. Naming of communities
   physical habitat
   structural features

3. Ecological Succession

   A. Defined: The process of orderly community change

   B. **Primary Succession**: begins in an area where no biological community existed before.

   C. **Secondary Succession**: community development from where a previous community had been removed.

   D. Serial Stage

   E. Climax Stage
      Climatic
      Edaphic
      Disclimax

   F. Sere- successional story

4. Community **Stratification** : formation of layers within the community.

5. Community **Periodicity**

   A. Daily Rhythms
      1) Diurnal -Ex: photosynthesis
      2) Nocturnal
      3) Crepuscular

   B. Seasonal Rhythms
      1) Hibernal
      2) Prevernal
      3) Vernal
      4) Aestival
      5) Serotinal
      6) Autumnal

C. Lunar Rhythms-tides

D. Inherent Rhythms - Biological Clocks Ex: Mice

6. **Ecotone** and **Edge Effect**

7. Species-numbers Relationships

8. Paleoecology - community structure of the past

IV. Organization at the Population Level

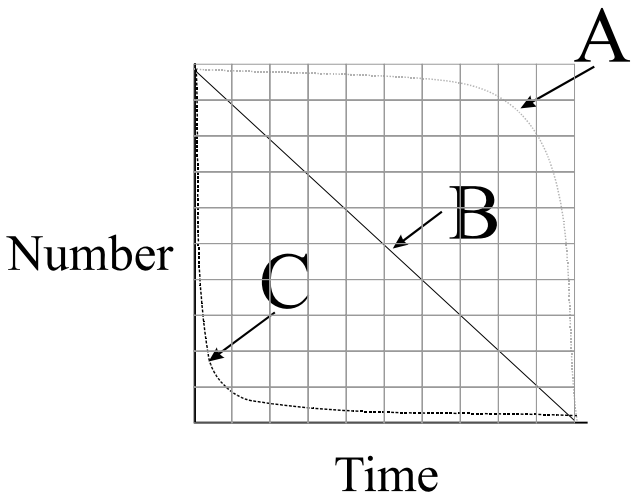
1. Population Density
   - A. Defined-
   - B. Crude Density
   - C. Ecological Density
   - D. Methods for estimating numbers
     - 1) Direct Counts
     - 2) Subsample counts
       - transect
       - quadrants
     - 3) Mark Recapture Methods

$$\frac{P_?}{M_1} \quad \frac{P_2}{M_2}$$

$P_?$ = Unknown Population size
M_1 = Animals captured and Marked
P_2 = Caught Population Number
M_2 = Number caught that are marked

2. Natality Rates
   - A. Absolute Natality
   - B. Ecological Natality

3. Mortality Rates
   - A. Minimum Mortality
   - B. Ecological Mortality
   - C. Survivorship Curves
     - Convex Curve
     - Concave Curve
     - Straight Line



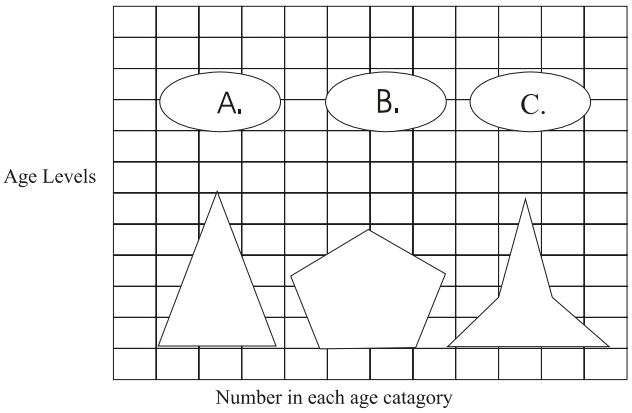
A. Convex, B. Straight Line, C. Concave

4. Population Age Distribution

A. Age Pyramids

1) Increasing Populations
2) Declining Populations
3) Stable Populations

B. Ecological Ages
1) Reproductive
2) Prereproductive
3) Postreproductive



Age Pyramids

5. **Biotic Potential** and **Environment Resistance**

$r = PZ^n (R^{n-1})$ r = biotic potential

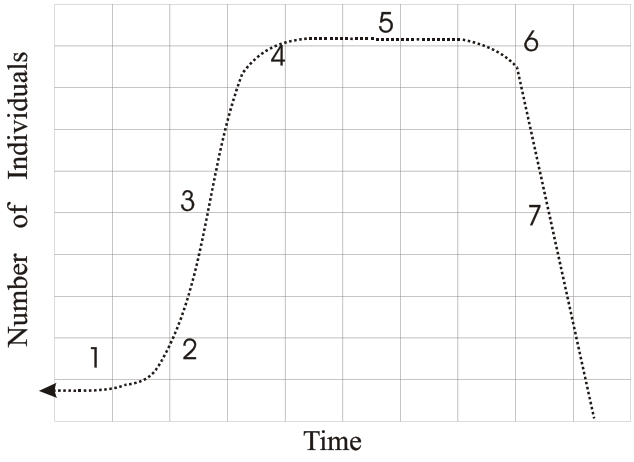
P = # of females in population
Z = # of young each female produces
n = # of generations per year
R = % of young which are female

Environmental Resistance is the sum total of the environmental limiting factors.

6. Population Growth Form and Carrying Capacity

A. **Sigmoid** Growth Curve

1) Lag Phase
2) Positive Growth Phase
3) Log growth phase
4) Negative growth phase
5) Stationary Growth phase
6) Death phase
7) Log death phase



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