BIO2011 – Ecology Notes

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Week 3
-NICHES & ADAPTATIONS
-PLANTS

Environmental Gradients

- Temperature
- Humidity
- Oxygen Concentration
- pH
- Salinity
- Advection
- Soil Structure

All these factors are often correlated and working together

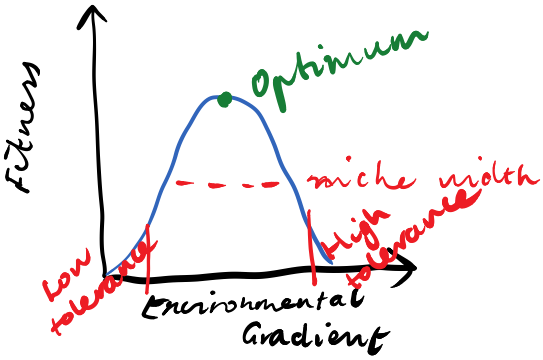
Lethal – Causes death

Sub lethal – Reduced growth rates and reduced reproduction

Ecological Niche

The limits, for all important environmental variables within which individuals of a species can survive, grow and reproduce

- Restricts species to certain spaces



Endotherms

- Regulate body temperature by producing heat within their bodies
- Endothermic plants (H_m)

Ectotherms

- Rely on external sources of heat
- Ectothermic plants (H_r)

Acclimation

A compensatory response that alters an organisms tolerances

- Short term physiological adjustments
- Responses due to temperature
- Physiological changes, not genetic

Developmental Flexibility

Different morphs under different conditions

- Rainfall / drought

Storage

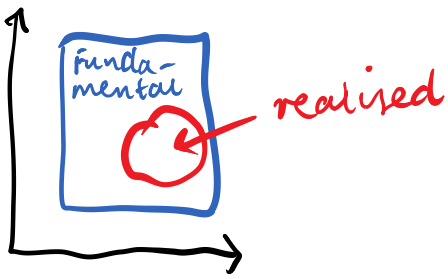
Assist organisms to get through unpredictable extremes

Hibernation: Winter torpor

Aestivation: Summer torpor

Fundamental Niche & Realised Niche

- Fundamental
    - Largest niches that a species can occupy in the absence of interspecific interactions such as competition
- Realised
    - Portion of the fundamental niche actually occupied by a species



Plants

Autotrophs: Fix energy directly from sunlight

Heterotrophs: Rely on energy already fixed by other organisms

Chemotrophs: Fix energy from chemical transformations

Plant Resources

- Solar radiation
- CO2
- Nutrient ions
- Water

TROPHIC = FOOD OR FEEDING

Two Main Photosynthetic Pathways

C_3 Plants

- Evolved first
- More efficient at elevated CO2 concentrations
- Less water efficient
- Examples: Rice and Wheat
- RuDP carboxylase
- Higher altitudes

C_4 Plants

- More efficient at lower CO2 levels
- More water efficient
- Better than C_3 at higher temperatures, light intensity and dryness
- Example: Corn and grasses
- PEP carboxylase
- Often in tropical areas
- Lower altitudes

Leaf Spectral Characteristics

Absorbs: 0.4 – 0.7 micrometres

Reflects: 0.7 – 1.1 micrometres

Resource Acquisition for Non- Plants

- Herbivores
- Carnivores
- Detritivores

Diet Breadth Categorisation

- Specialists: monophagous

- Generalists: polyphagous

Hypotheses For Green World

H1: *Top Down Control* - Predators, parasites and diseases keep herbivores rare

H2: *Bottom Up Control* – All that's green is not edible and plants are responsible for the rarity of herbivores

H3: Herbivores are caught between the devil (natural enemies) and the deep blue sea (poor food quality)

Most Support

Readings: Textbook Chapter 5, 6 & 7