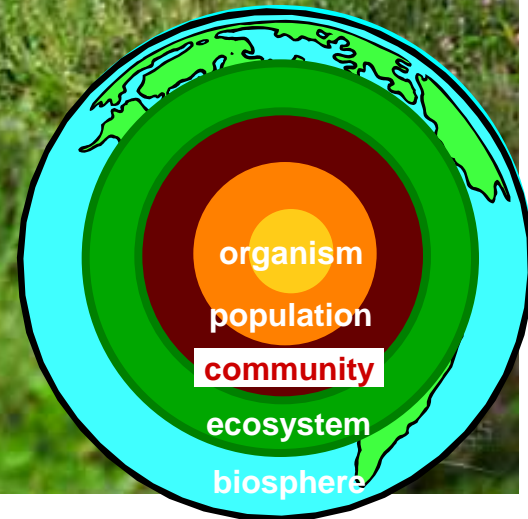


Community Ecology

AP Biology



Community Ecology

- **Community**

- ◆ all the organisms that _____

- interactions

- **Community Ecology**

- ◆ study of _____

- in a common environment

To answer:
**In what way do the
populations interact?**



Niche

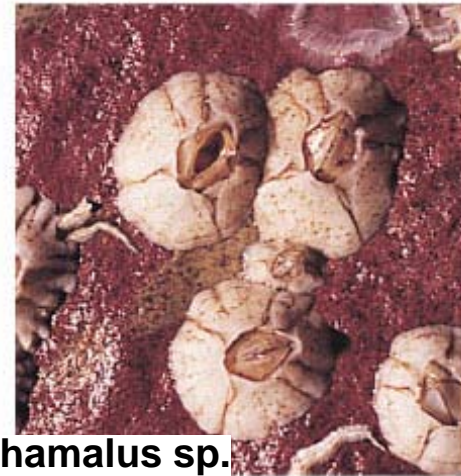
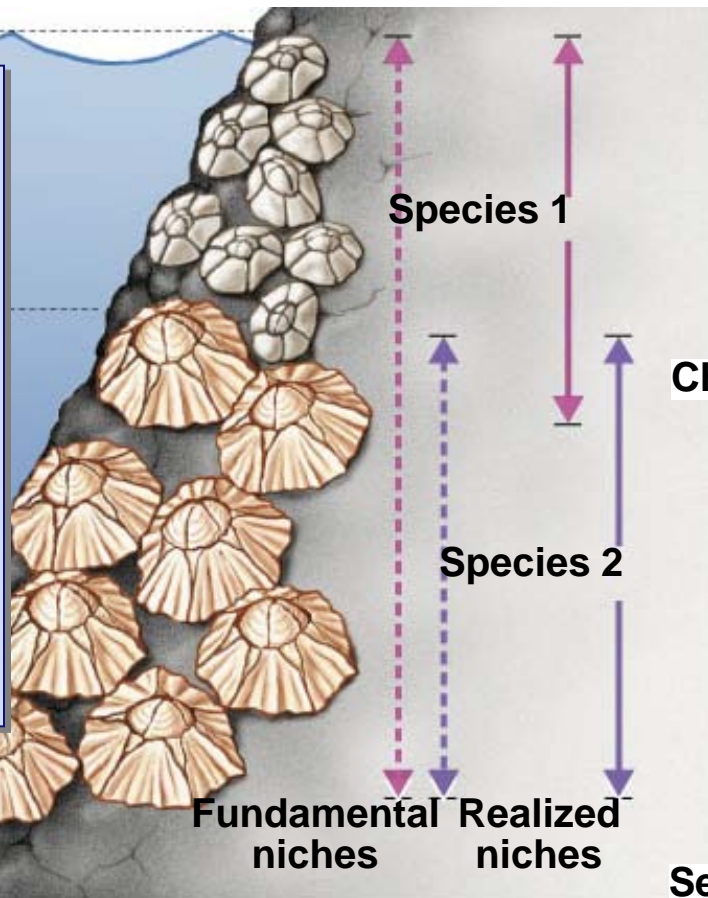
- An organism's niche is its ecological role



High tide

Competitive Exclusion

If Species 2 is removed, then Species 1 will occupy whole tidal zone. But at lower depths Species 2 out-competes Species 1, excluding it from its potential (fundamental) niche.



Niche & competition



Resource partitioning

Reduce competition through microhabitats

“the ghost of competition past”

A. ricordii



A. insolitus

A. christophei

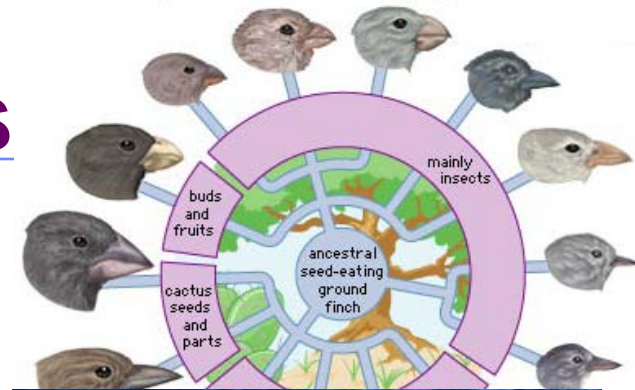
A. aliniger

A. distichus

A. cybotes

A. etheridgei





Interspecific interactions

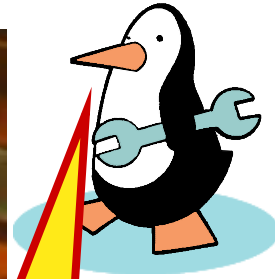
-
- ◆
 - compete for limited resource
 - competitive exclusion!

- ◆
- ◆
 - lichens (algae & fungus)

- ◆
 - barnacles attached to whale



Symbiosis



...not very funny
for a clown fish



What relationship is this?



Predation drives evolution

- **Predators adaptations**
 - ◆ locate & subdue prey
- **Prey adaptations**
 - ◆ elude & defend

horns, speed, coloration



spines, thorns, toxins



Predation provides a strong selection pressure on both prey & predator

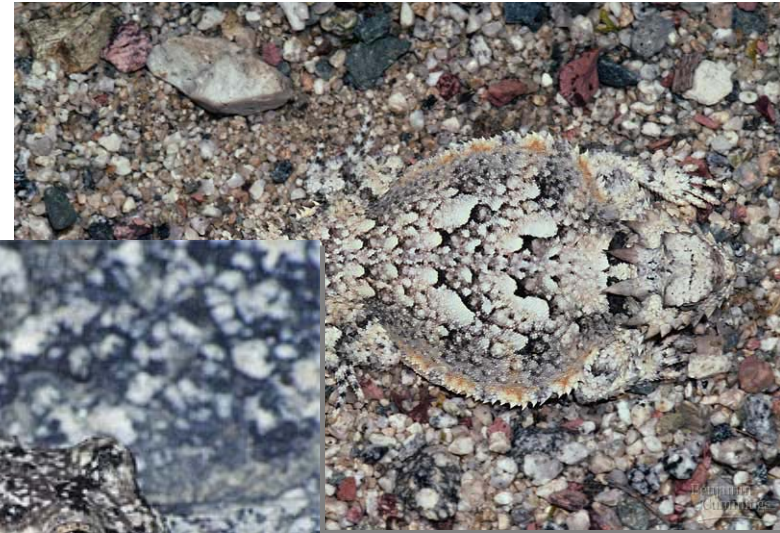


Anti-predator adaptations

- Hide from predators
 - ◆ avoid detection
 - ◆ camouflage
- Warn predators
 - ◆ advertise how undesirable you are as prey
 - ◆ aposematic coloration
 - *apo = away & sematic = sign/meaning*
 - Batesian mimicry
 - Mullerian mimicry



Defense mechanisms



Convergent evolution

Mimicry



hawkmoth larvae



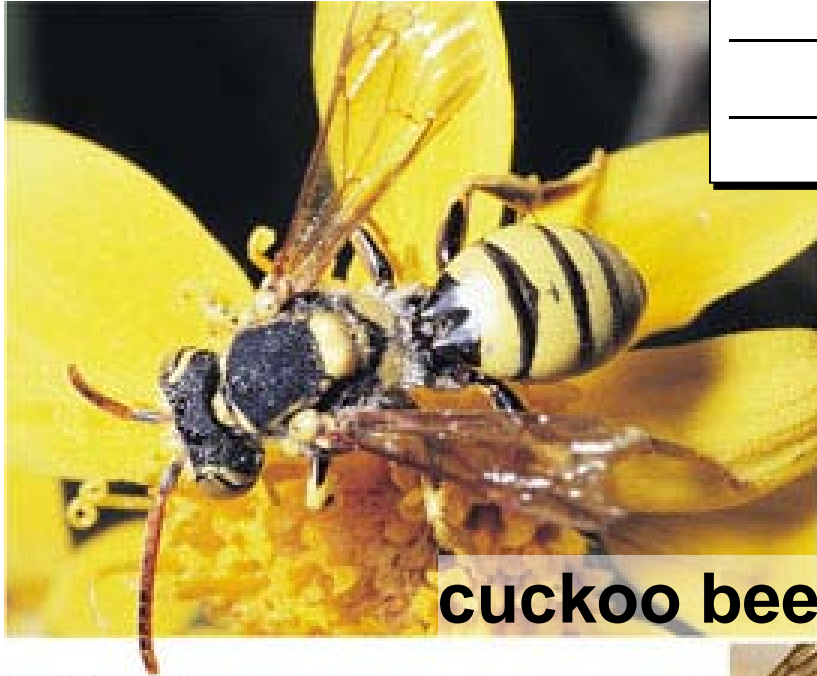
green parrot snake

Hawkmoth larva puffs up to look like poisonous snake

Convergent evolution

Batesian mimicry





cuckoo bee



yellow jacket



Mullerian mimicry

ense?

may evolve innate avoidance

Common warning coloration

- Aposematic species come to resemble each other



black, red,
orange & yellow
means:
DON'T EAT ME!



What kind of mimicry?



**Coral snake
is poisonous**

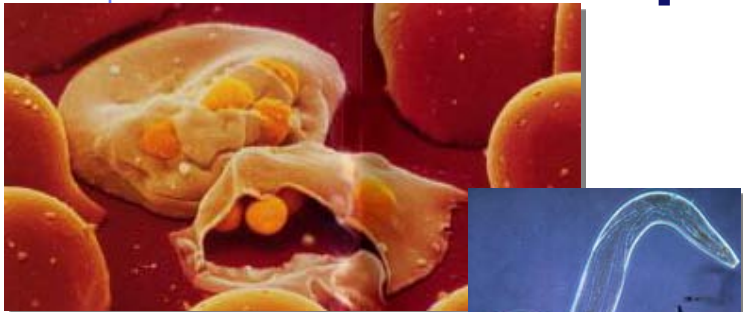
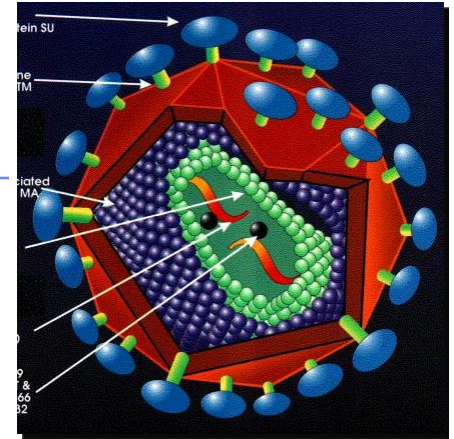


King snake is not

**Red on yellow, poison fellow;
red on black, safe from attack**

Coevolution in Community

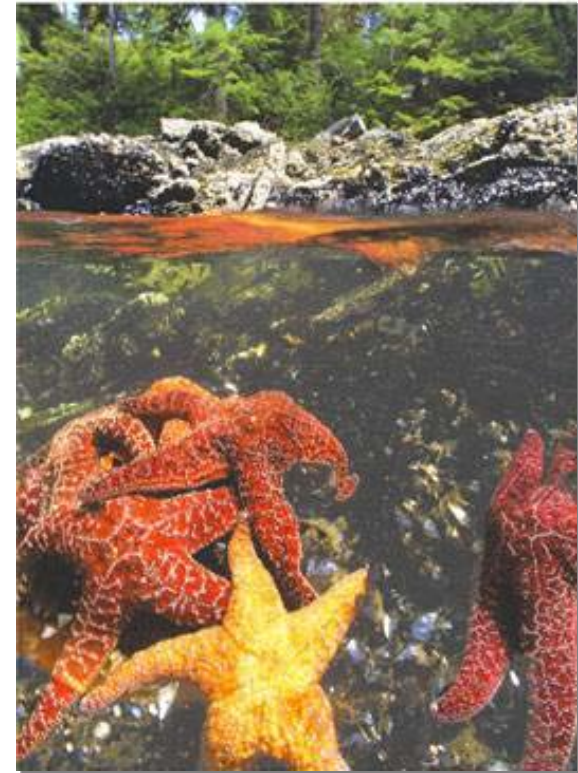
- Predator-prey relationships
- Parasite-host relationships
- Flowers & pollinators



Long term evolutionary adjustments between species

Characterizing a community

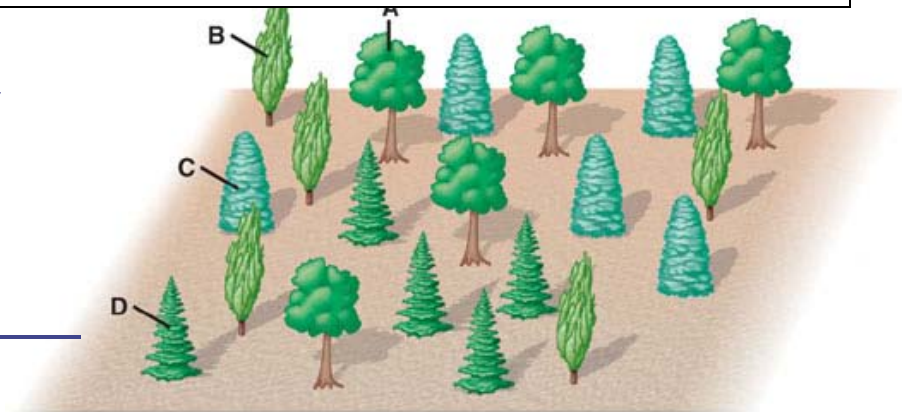
- Community structure
 - ◆ species diversity
 - how many different species
 - ◆ composition
 - dominant species
 - most abundant species or highest biomass (total weight)
 - keystone species
 - changes over time
 - ◆ succession



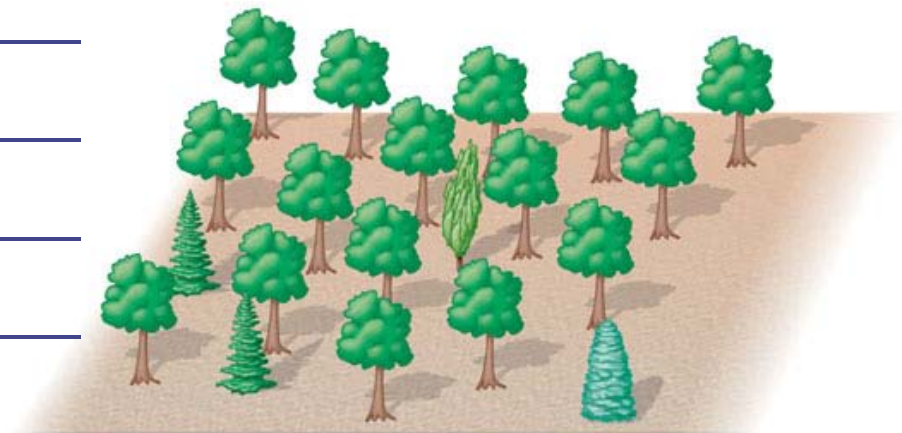
Species diversity

■ Greater biodiversity offers:

- ◆ _____
- ◆ _____
- ◆ _____
- _____
- _____
- _____
- _____



Community 1
A: 25% B: 25% C: 25% D: 25%



Community 2
A: 80% B: 5% C: 5% D: 10%

The impact of reduced biodiversity

compare these communities



agricultural
“**monoculture**”

AP Biology



“old field”

- Irish potato famine
- 1970 US corn crop failure

Keystone species

■ Influential ecological role

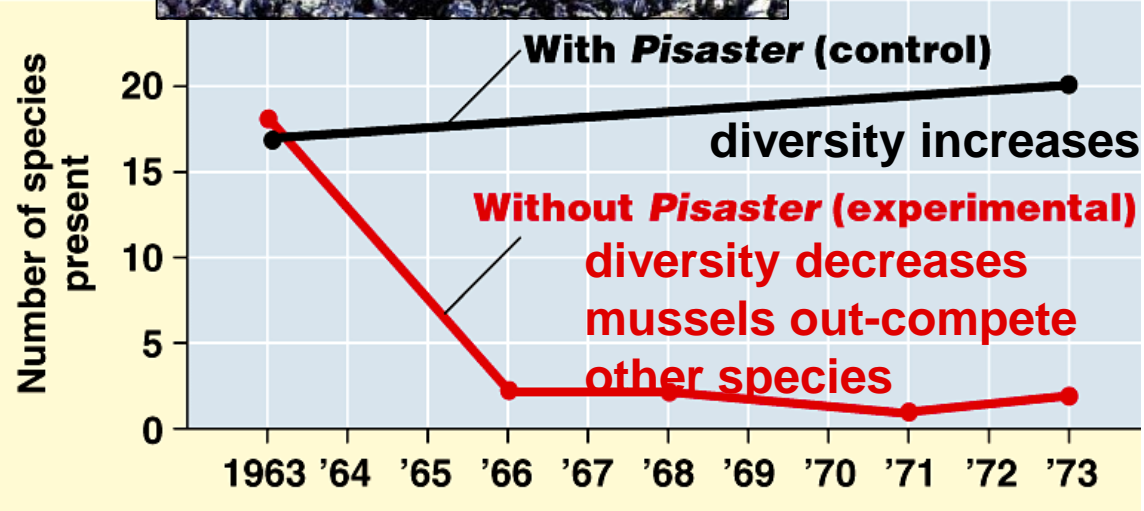
- ◆ exert important regulating effect on other species in community



Pisaster ochraceous



Sea star



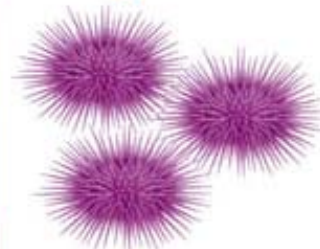
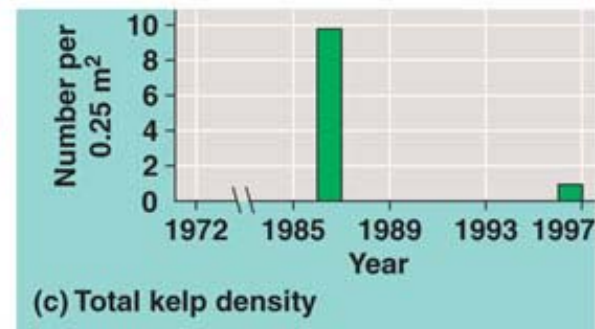
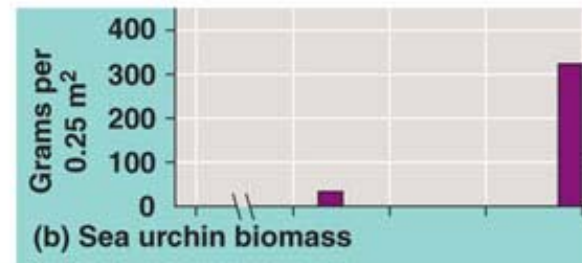
Keystone species

Sea otter is a keystone predator in North Pacific

What is the impact of the Orca whale?



Food chain before killer whale involvement in chain



Food chain after killer whales started preying on otters

Keystone species

Beaver is a keystone species in Northeast & West



dams transform flowing streams into ponds creating new habitat

Ecological succession

- - ◆
 - years or decades
 - ◆ usually after a disturbance



Primary succession

- Begins with virtually lifeless area without soil, then...

make
soil











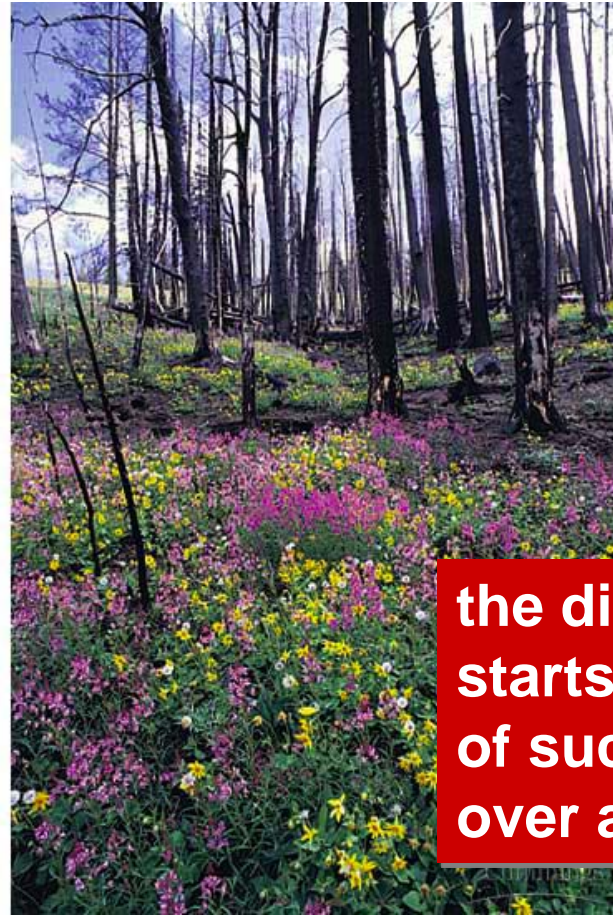


McBride glacier retreating

Secondary succession

- Existing community cleared, but base soil is still intact

burning releases nutrients formerly locked up in the tissues of tree



the disturbance starts the process of succession over again

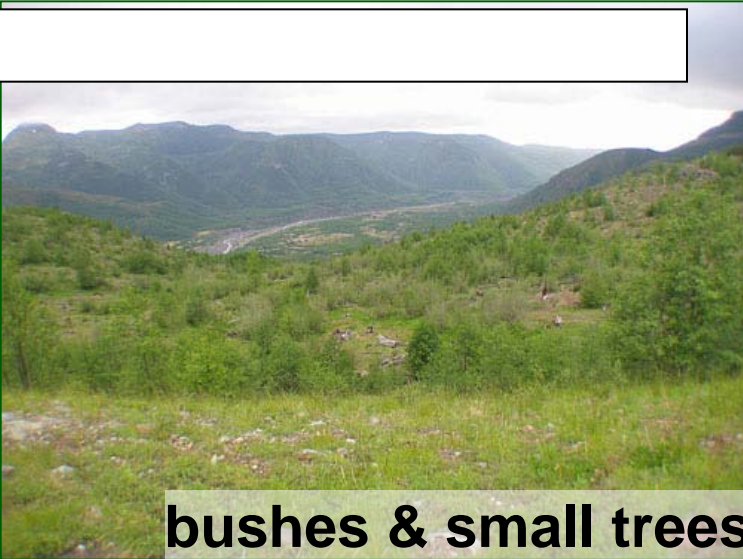
Succession of species



lichens & mosses



grasses



bushes & small trees



trees

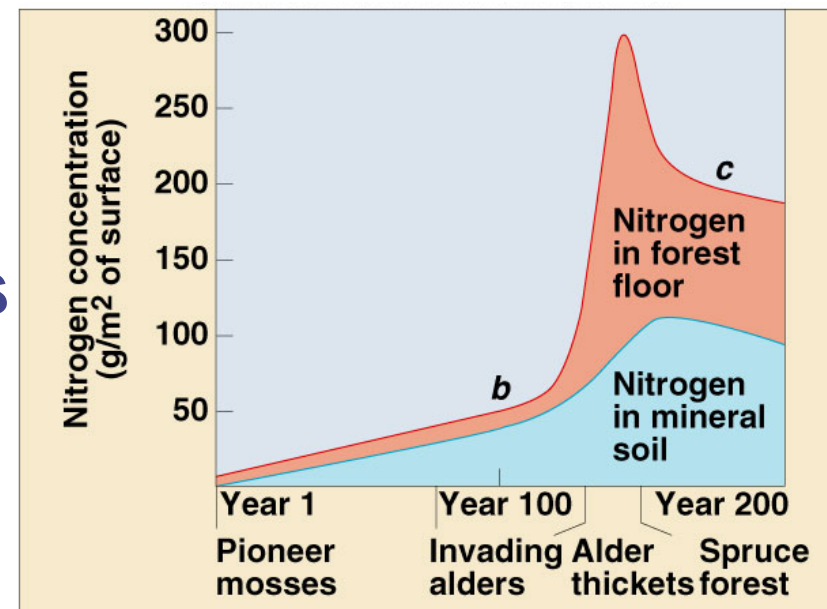
What causes succession?

■ Tolerance

- ◆ early species are weedy **r-selected**
- ◆ tolerant of harsh conditions

■ Facilitation & Inhibition

- ◆ early species facilitate habitat changes
 - change soil pH
 - change soil fertility
 - change light levels
- ◆ allows other species to out-compete



Climax forest

- Plant community dominated by trees
- Representing final stage of natural succession for specific location
 - ◆ stable plant community
 - ◆ remains essentially unchanged in species composition as long as site remains undisturbed
 - birch, beech, maple, hemlock
 - oak, hickory, pine



Climax forest

taiga



The species mix of climax forest is dependent on the abiotic factors of the region



birch, beech, maple, hemlock

Disturbances as natural cycle

- Disturbances are often necessary for community development & survival

- recycles nutrients
- increases biodiversity



- increases habitats
- rejuvenates community

Fire climax species

adaptations to survive
and reproduce in areas
than experience
frequent fires



When people don't learn ecology!

Building homes in fire climax zones



bad
idea!





**Don't blow
your top!
Ask
Questions!**