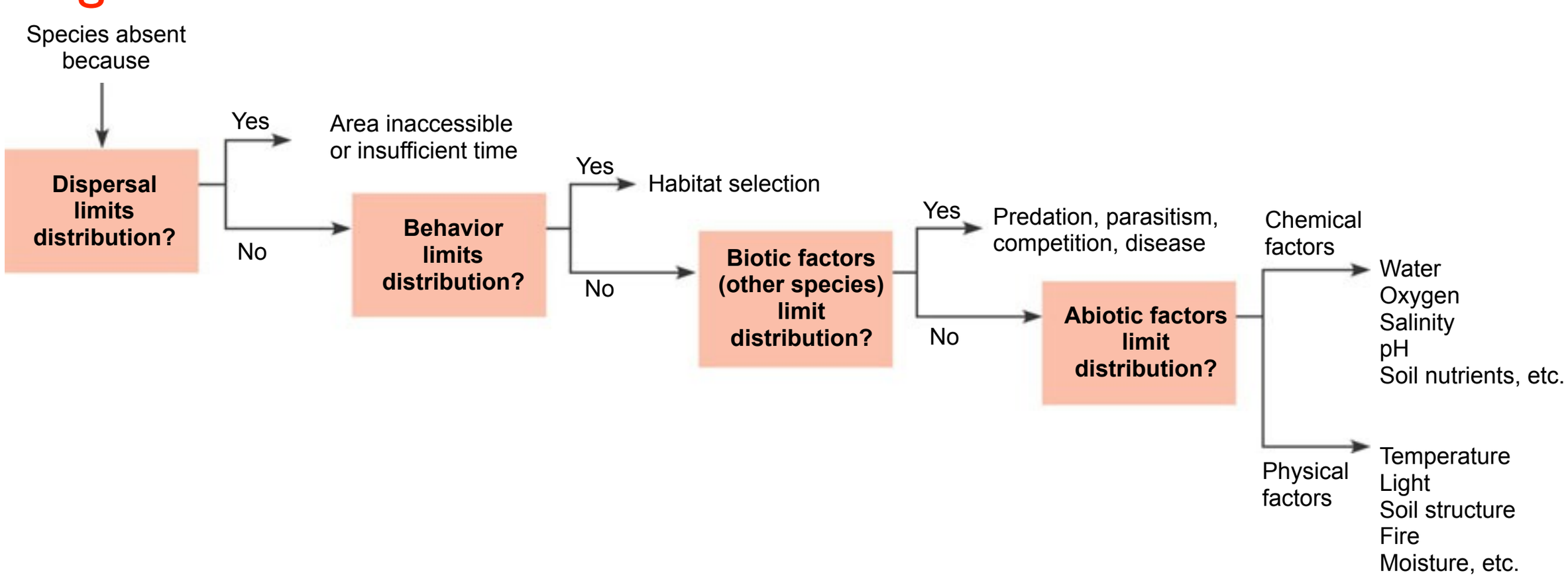
MYP Biology
An Introduction to Biogeography

Ecology/Biosphere

I.

Main Idea: Interactions between organisms (biotic factors) along with the physical environment (abiotic factors) and are responsible for the global and regional distribution (biogeography) of organisms.



DISTRIBUTION OF SPECIES

A. Dispersal and Distribution

- Movement of individuals or gametes away from their area of origin or high population density

1. Natural Range Expansion

2. Species Transplants

B. Behavior and Habitat

- When individuals seem to avoid suitable habitats their distribution may be limited by their behavior

C. Biotic Factors

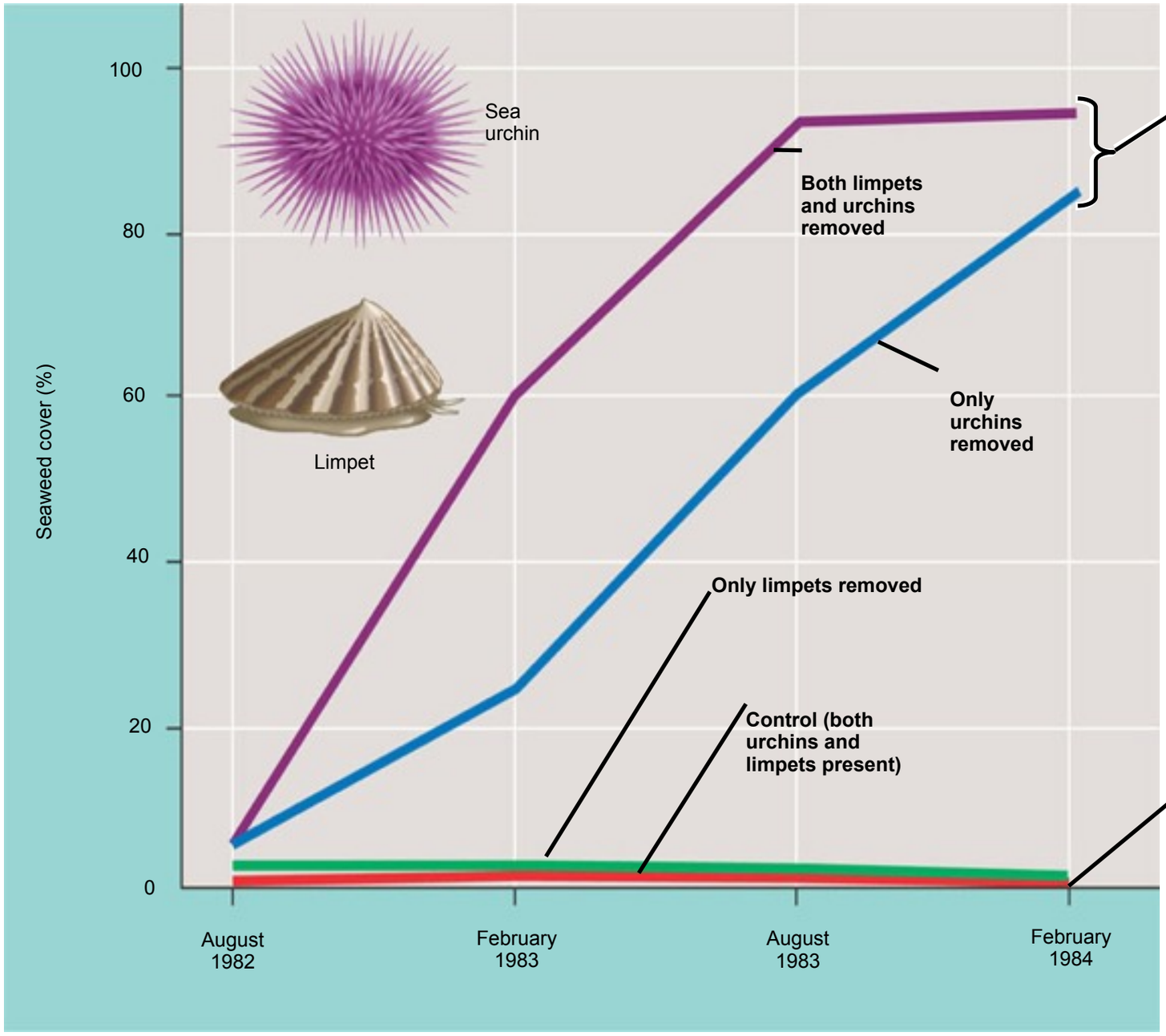
- *Predation* and *herbivory* are the most common biotic factors effecting the distribution of species

EXPERIMENT

W. J. Flecher tested the effects of two algae-eating animals, sea urchins and limpets, on seaweed abundance near Sydney, Australia. In areas adjacent to a control site, either the urchins, the limpets, or both were removed.

RESULTS

Fletcher observed a large difference in seaweed growth between areas with and without sea urchins.



CONCLUSION

Removing both limpets and urchins resulted in the greatest increase of seaweed cover, indicating that both species have some influence on seaweed distribution. But since removing only urchins greatly increased seaweed growth while removing only limpets had little effect, Fletcher concluded that sea urchins have a much greater effect than limpets in limiting seaweed distribution.

D. Abiotic Factors

- Temperature, Water, Oxygen, Salinity, Light, Soil
- If physical conditions of an area are not conducive for a species, then they will not be found there
  - abiotic factors can vary over space and time (short term and long term fluctuations)

1. Temperature

- very important factor because cells can rupture when temp drops below 0 degrees C and enzymes can denature at temps above 45 C
  - mammals and birds have to use lots of energy to maintain acceptable internal temps
  - some organisms have remarkable adaptations for living outside the normal ranges of temps

2. Water

- perhaps the most important in terrestrial habitats
- many organisms particularly terrestrial organisms face a constant threat of desiccation (drying out)
  - their challenge lies in obtaining and/or conserving water

3. Oxygen

- the oxygen concentration in water and soils can vary a great deal
  - rapidly moving water tends to have more oxygen
  - cold water can hold more oxygen than warm water
- oxygen is needed for cellular respiration and other fundamental processes

4. Salinity

- salts can pose a great challenge for organisms since they can effect water balance in organisms through osmosis
  - high salinity habitats generally have few species

5. Sunlight

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- The ultimate source of energy for most ecosystems and life on earth!
- Sunlight can effect distribution of life of on land but sunlight very much determines the distribution of aquatic life
    - Every meter of water depth absorbs 45% of red light and 2% of blue light...This explains why the ocean is blue
    - More importantly it explains why most autotrophs (the foundation of most food webs) are distributed at the surface of the water

6. Soil and Rocks

- The pH, Minerals and physical composition of the soil limits plants distribution
  - Once again if plants (the foundation are food webs) are limited then so will the animals that feed on them
  - Soil pH can directly limit plant growth or indirectly limit plant growth by altering solubility nutrients and toxins in the soil

Important Note to Students!

- Biogeography also involves historical factors not described in this powerpoint.
- Continental Drift, Glaciation, Speciation, Extinction are few examples that we will cover in the evolution unit.