

Ecological Community

What is a community?

- A group of populations
 - Of different species
 - In the same ecosystem
 - At the same point of time
 - Showing interactions among themselves
 - Direct
 - Indirect

The concept

- British ecologist Charles Elton, in his foundational work "Animal Ecology" (1927), introduced several key concepts about
 1. communities
 2. Ecosystems
 3. the food chain.

Types

Classification of Communities by Growth, Composition, and Habitat

- Forests: Dense woody vegetation and a variety of organisms.
- Deserts: Arid conditions with sparse vegetation and specific adapted organisms.
- Grasslands: Dominated by grass species and contain a variety of herbivorous organisms.
- Tundra: Exist in extremely cold climates with limited vegetation and hardy organisms.

Types

Classification of communities by water availability

- Hydrophytic communities exist in predominantly aquatic habitats.
- Mesophytic communities exist in moderately moist soils.
- Xerophytic communities exist in arid or dry conditions.

The attributes

Species Composition	Identity and variety of species in a community, determines structure and function.
Species Diversity	Richness (number of species) and evenness (distribution among species). Higher diversity leads to resilience against disturbances.
Trophic Structure	Organization based on feeding levels (producers, consumers, decomposers).
Dominant Species	Species with significant influence due to size, abundance, or impact.

The attributes

Functional Groups	Species with similar roles, not necessarily related (e.g., pollinators).
Interaction Strength	Degree of interaction between species, influencing community structure.
Spatial Distribution	Pattern of organism placement (random, uniform, clumped).
Successional Stage	Stage of community development due to disturbances or interactions.

Attributes

Keystone Species

Species with disproportionately large impact relative to abundance. Removal drastically alters the community.

Ecological Guilds

Groups of species exploiting resources in similar ways, regardless of taxonomic relationship.

Ecological Equivalents

Species in different geographic areas filling similar ecological roles.

Ecological Niche

Species' role within the environment, including resource use and interactions with other species.

Keystone species

Keystone Species	Description of Role
Sea Otters	Control sea urchin populations, which helps maintain healthy kelp forests that provide habitat for many other species.
Wolves	Regulate populations of herbivores like deer and elk, preventing overgrazing and protecting plant diversity.
Beavers	Create dams that form wetlands, increasing habitat diversity and supporting other species.
African Elephants	Uproot trees and create open areas in savannas, maintaining diverse plant and animal communities.
Fig Trees	Produce fruit year-round, providing a key food source for many animals during lean seasons

Some keystone animals

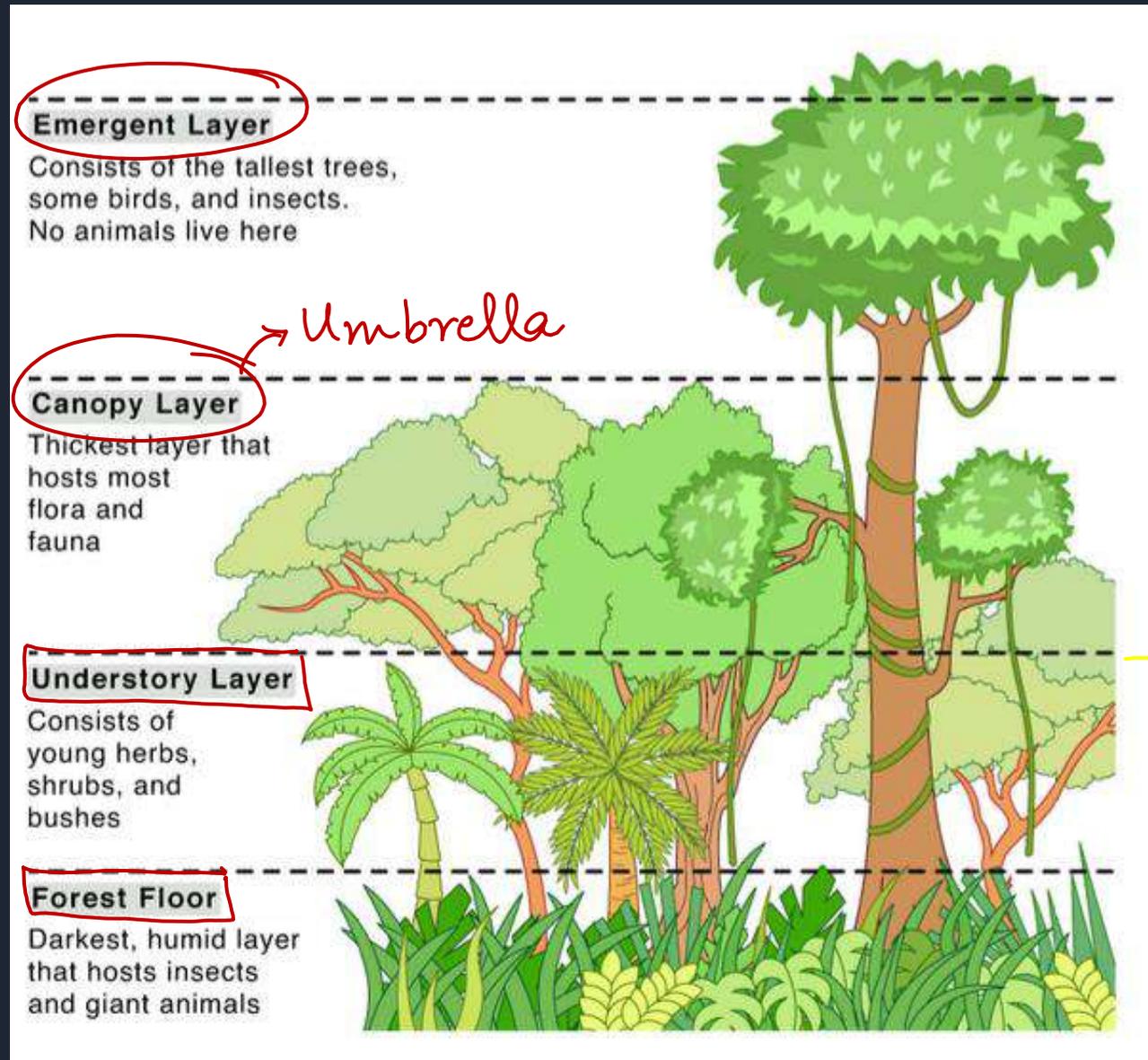


Sea Otter



Beaver

Stratification



A property
of:

- (1) Rainforests
- (2) Aquatic communities

Not clear in:

- (1) Grasslands
- (2) Conifer forests
- (3) Desert

Inter-species relations

(Already done
under

Biotic
Ecological
Factors)

Neutralism	Neither population is affected by the other.	A desert tortoise and a desert bird that do not share resources.
Competition (Direct Interference Type)	Both populations actively inhibit each other.	Crows and starlings competing for nesting sites.
Competition (Resource Type)	Each population adversely affects the other indirectly in the struggle for resources.	Various grass species in a grassland competing for water.
Amensalism	One population is inhibited and the other is not affected.	A large tree shading out smaller plants beneath it.

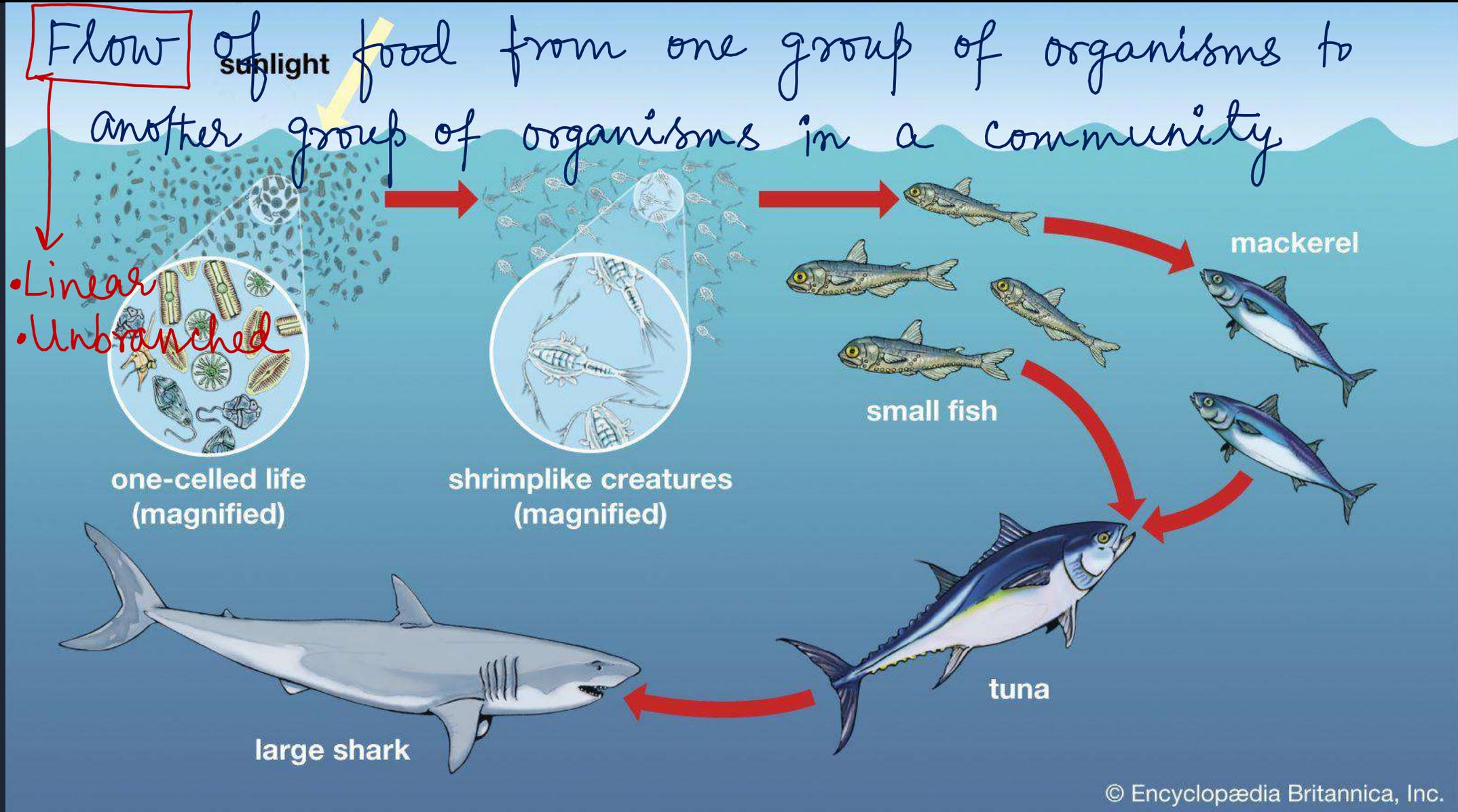
Inter-species relations

Commensalism	One population benefits, but the other is not affected.	Barnacles attached to a whale; the barnacles benefit from transportation and food sources.
Parasitism	One population adversely affects the other by continuous attachment and slow withdrawal of food resources.	Tapeworms in humans.
Predation	One population adversely affects the other by direct attack for food.	A lion hunting a deer.
Protocooperation (Facultative Cooperation)	Both populations benefit by the association but can survive independently.	Honeybees pollinating flowers; both species benefit, but they can survive independently.

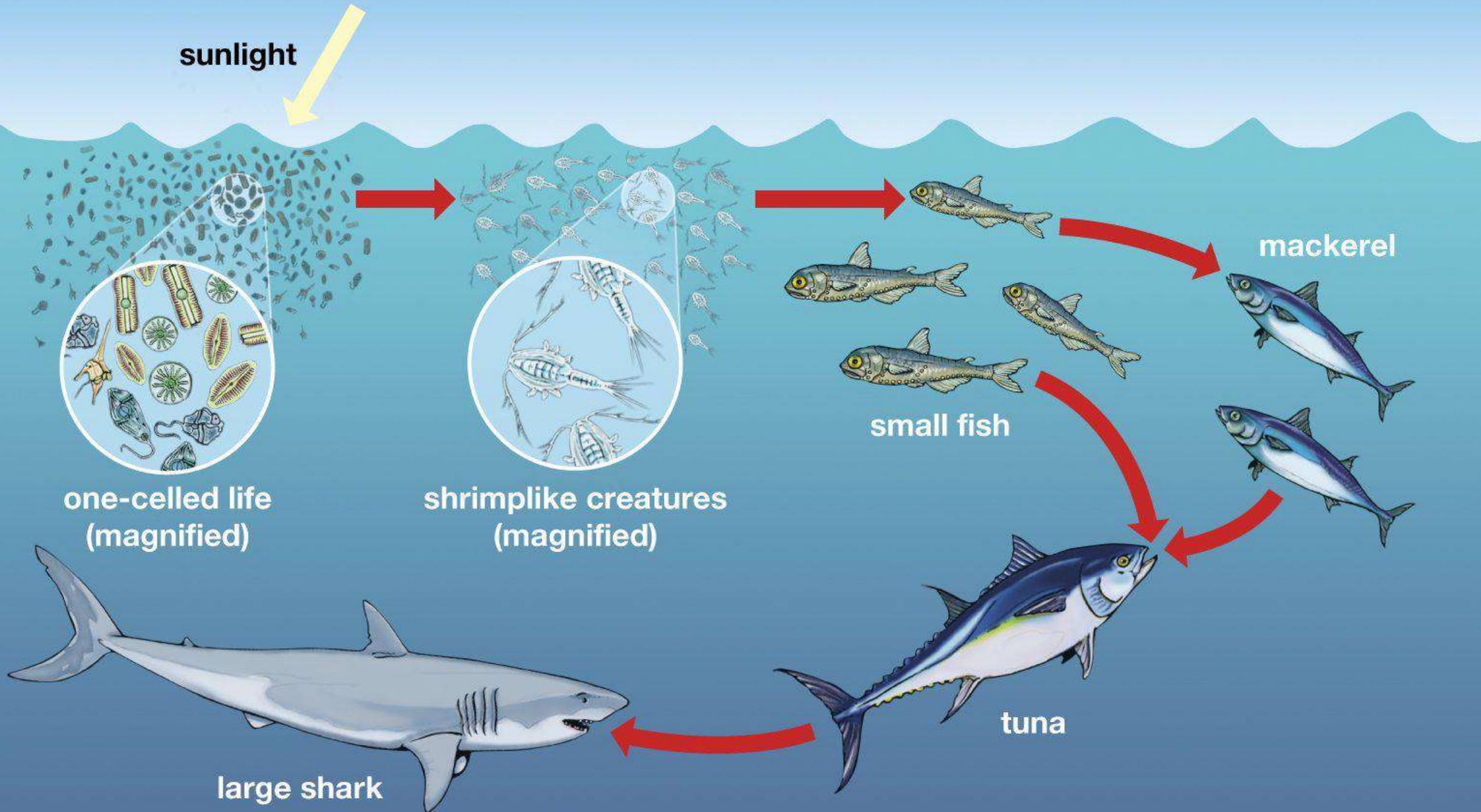
Already
done



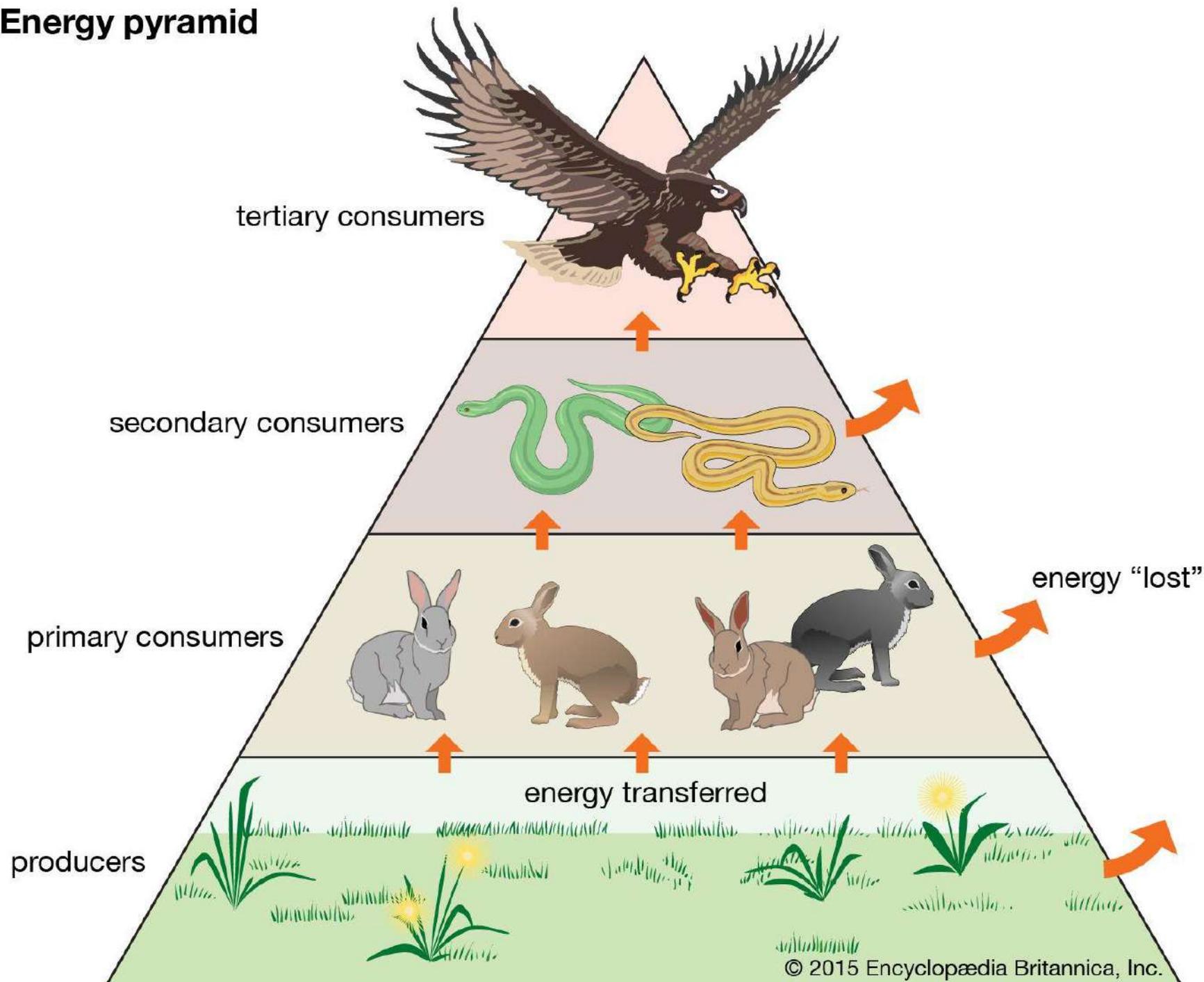
Food chain = Trophic chain



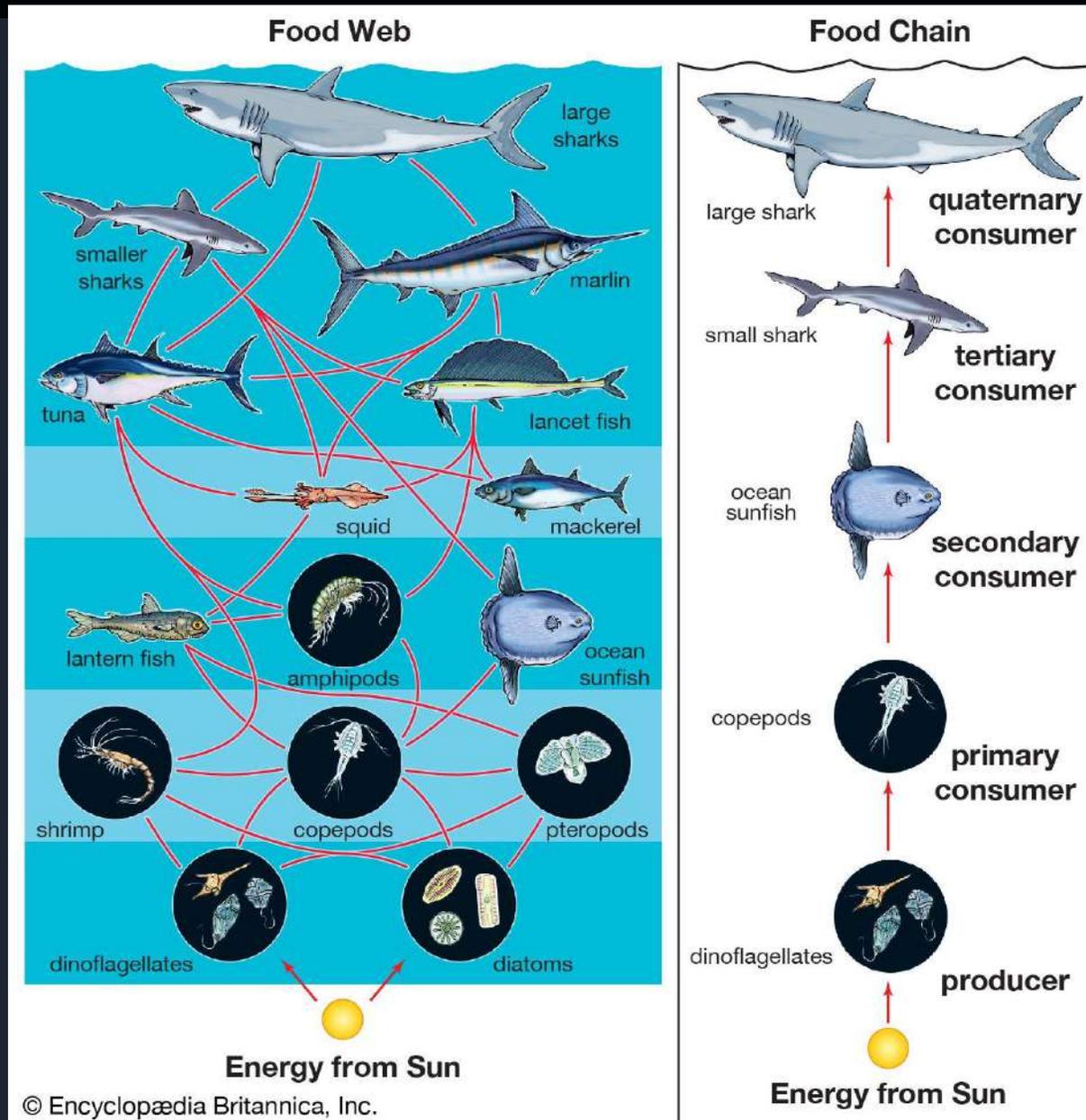
sunlight



Energy pyramid



Food web



Succession

- A process of gradual changes in the ecological community over a period of time
- Can be driven by
 - Forces of nature
 - Slow acting
 - Fast acting
 - Human activities

Stages

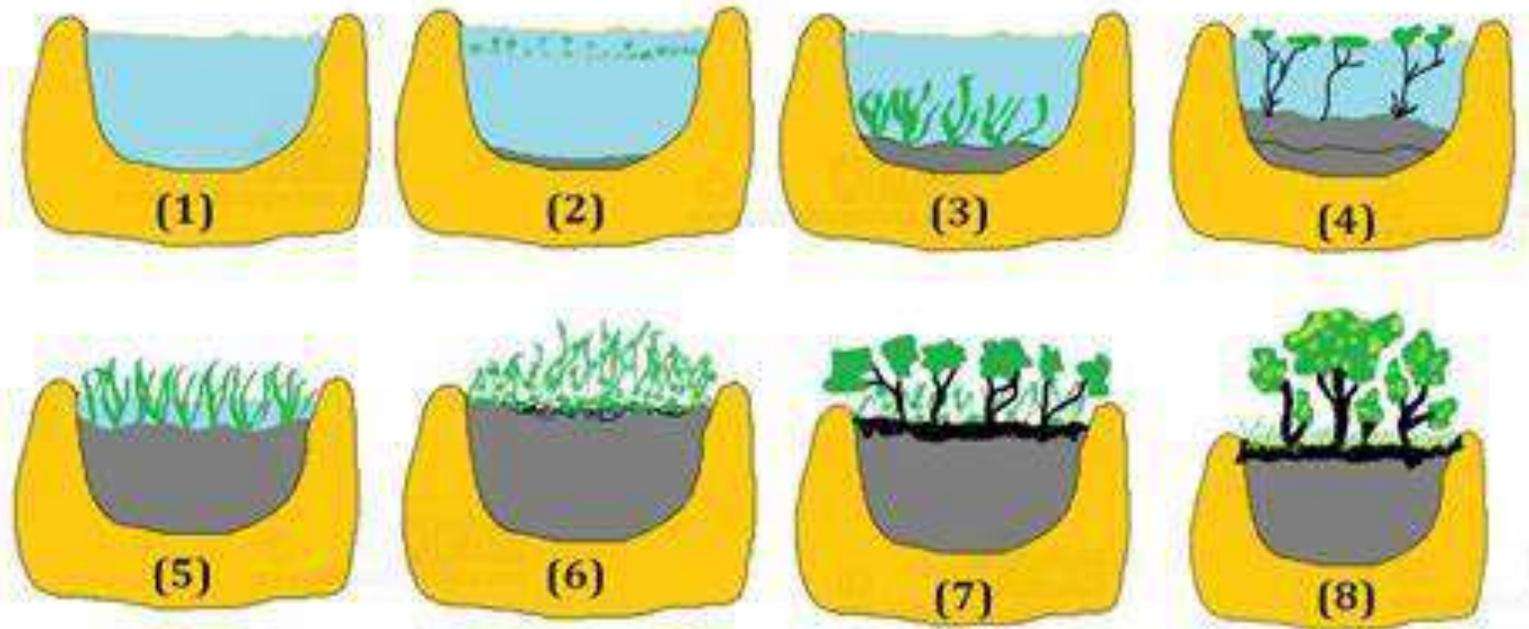
- Succession passes through several stages
- The starting point = Pioneer community
- All intermediate stages → Seres
 - There may be many seres in the process
- The final and most stable community = Climax Community

Main Types

- Based on vegetational history
 1. Primary Succession
 2. Secondary Succession
- Based on the flow of the process
 1. Linear
 2. Cyclic
- Based on causal agent
 1. Internal processes
 2. External Natural Phenomena
 3. Human Activities

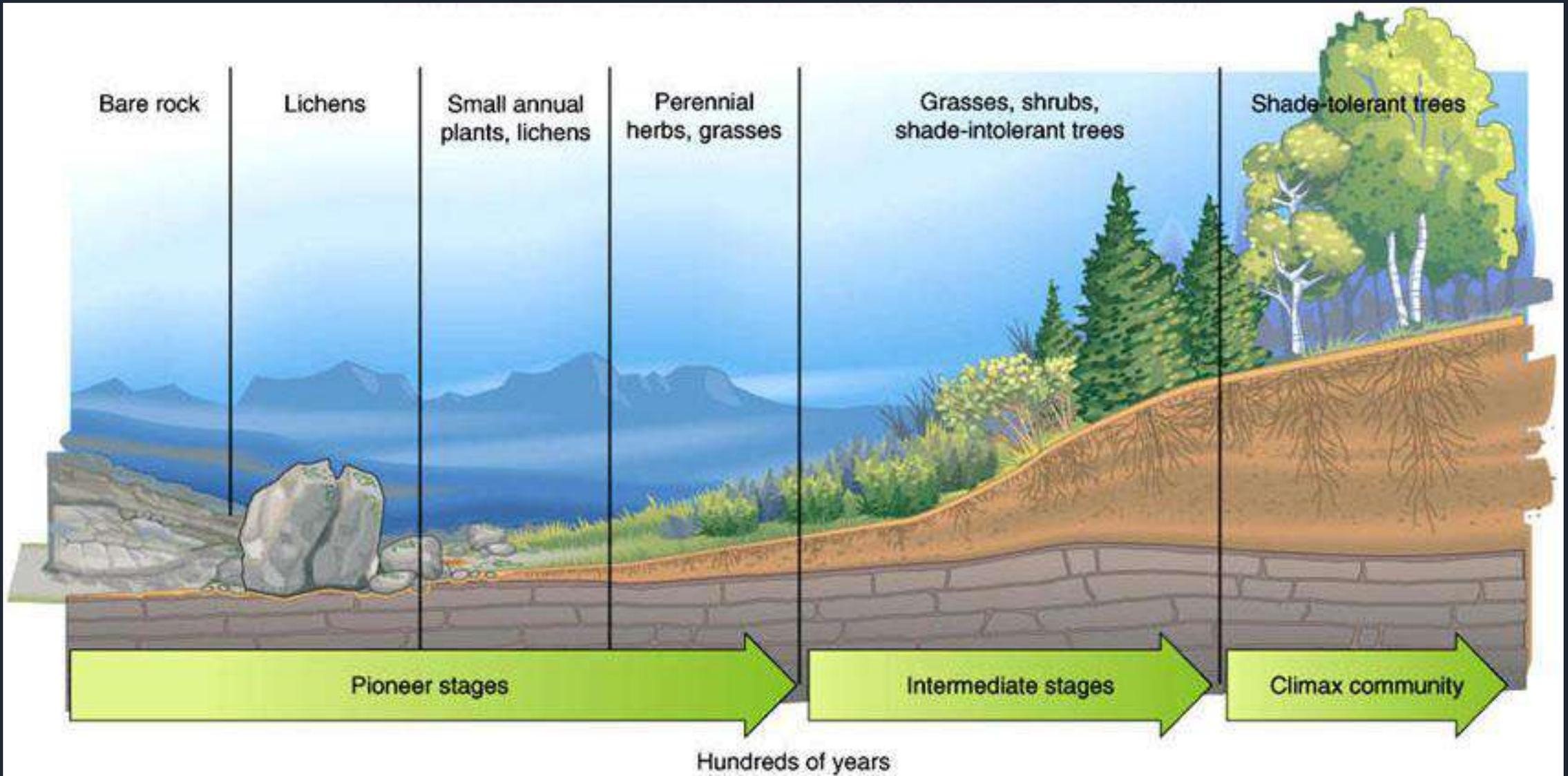
Some Examples

Hydrosere: Stages of Hydrarch Succession

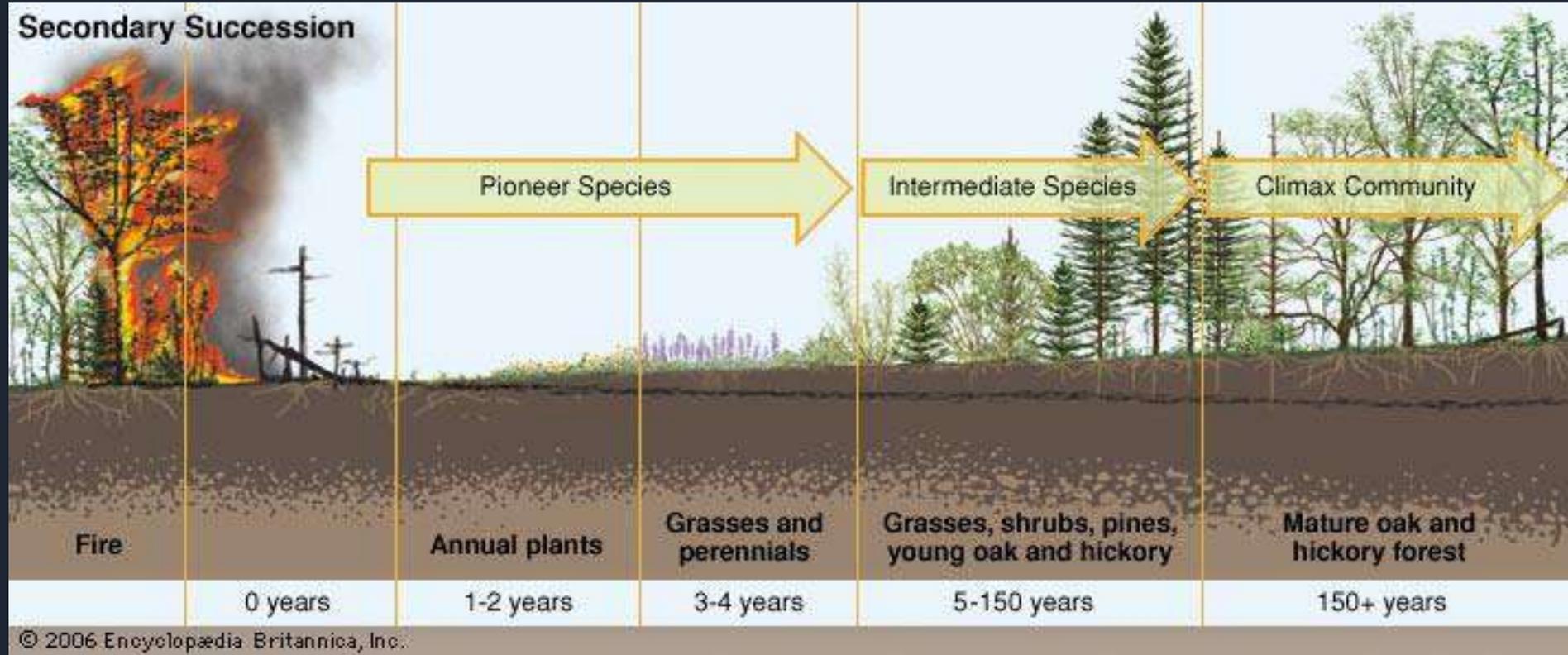


(1). Newly formed water body; (2). Phytoplankton Stage; (3). Rooted Submerged Stage; (4). Rooted Floating Stage; (5). Reed-Swamp Stage; (6). Sedge Marsh or Meadow Stage; (7). Woodland Stage; (8). Forest Stage

Some Examples



Some Examples



Thank you.