

22. Dynamics of Ecosystems

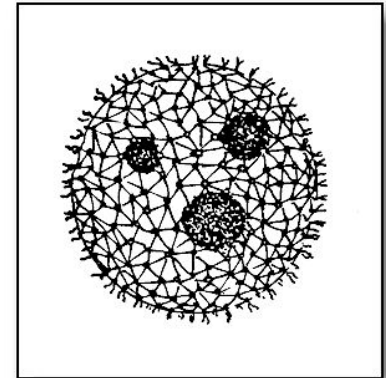
A- Trophic Relationships

from Greek *trophikos*, from *trophē* 'nourishment'

- Describes the trophic levels (producers, consumers, decomposers)
- Explains the relationships between the trophic levels of a food web

a) What is a **producer**? Give examples.

• A producer is an organism that makes its own food, usually through photosynthesis. Examples include algae and land plants.



b) Why is a producer said to convert inorganic matter into organic matter? Give examples.

Organic compounds contain at least C and H
Inorganic compounds don't have both C and H
Photosynthesis converts CO_2 and H_2O (both inorganic) into $\text{C}_6\text{H}_{12}\text{O}_6$ (sugar is organic)



2.a) What is a consumer in an ecological context?

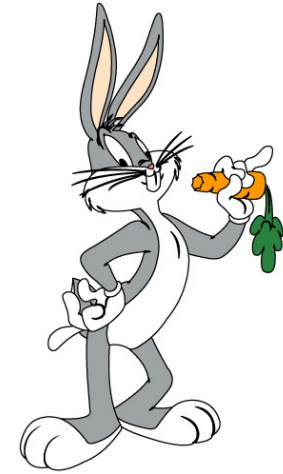
A consumer does not make its own food and instead eats either producers or other consumers.

b) What is the difference between a first order, second order consumer and an omnivore?

1st order: eats producer

2nd order: eats consumers

Omnivore: eats producers and consumers

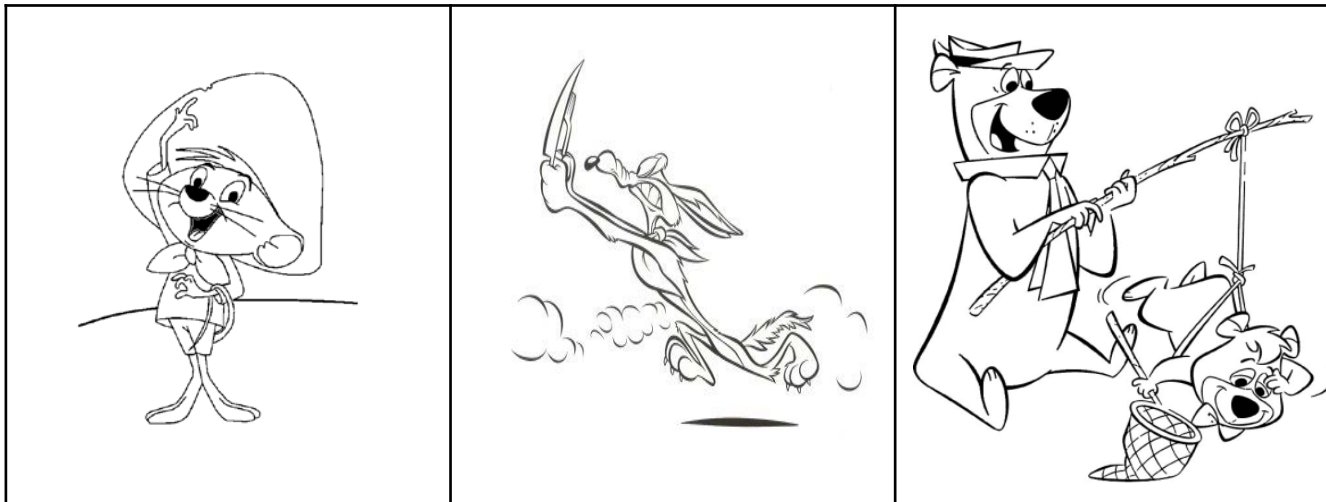


1st order

1st order

omnivore

omnivore



Eats seeds

eats mice, cactus

eats berries, baby goats

African lion: 2nd order consumer

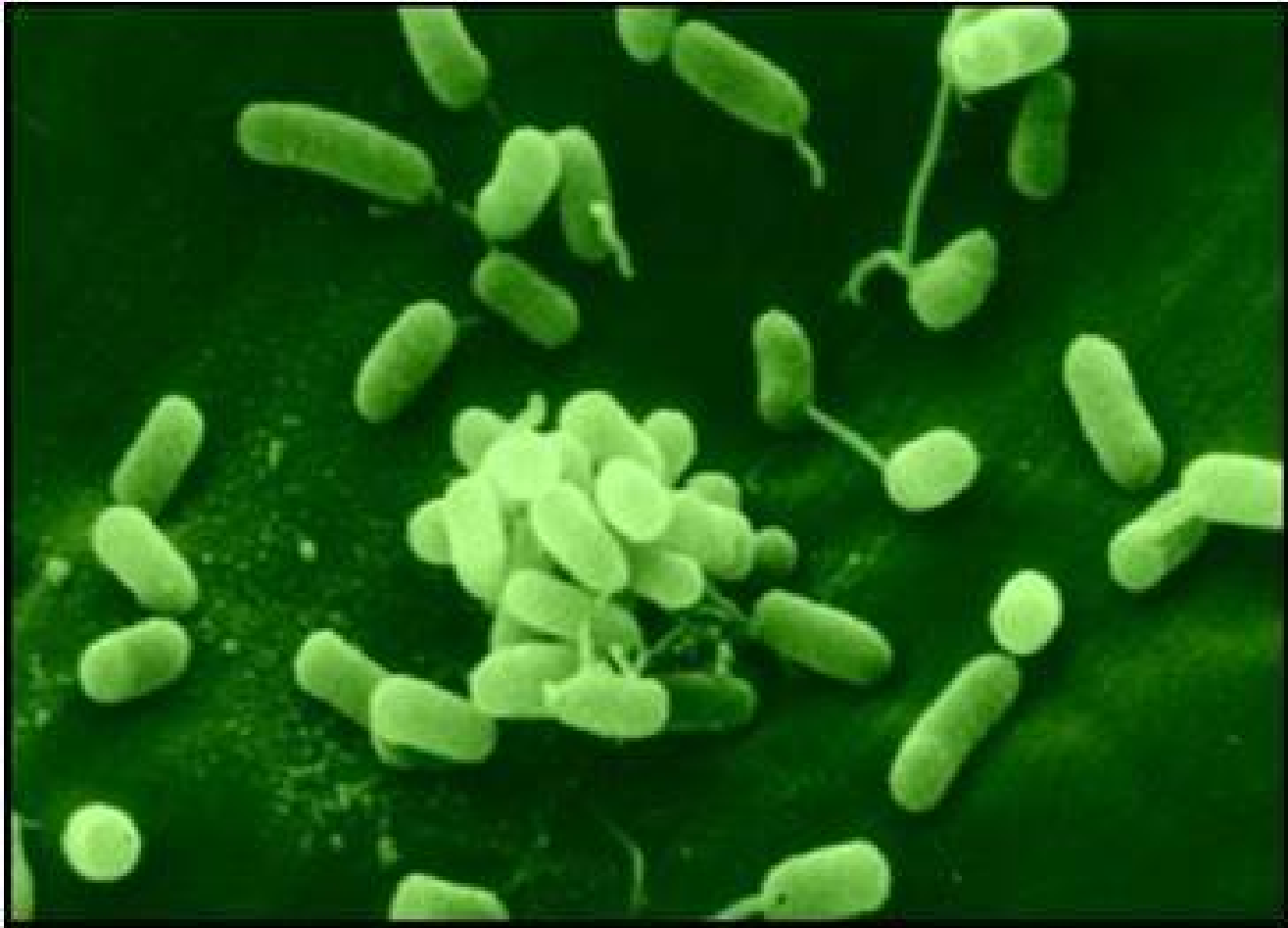


Eats wildebeest, zebras, buffalo, and warthogs

3. What is a **decomposer**? Give examples.

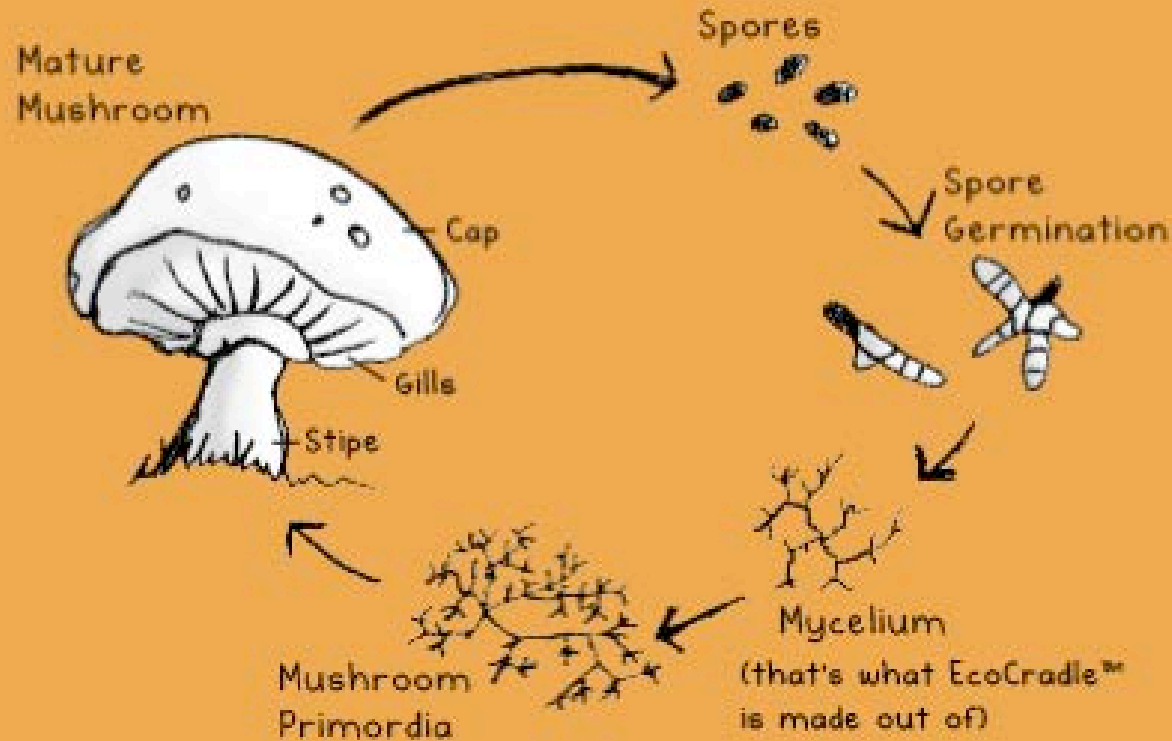
A decomposer is an organism who is not a plant or animal and whose role is to recycle nutrients from dead or decaying organisms.
Examples: fungi (mold, mushrooms)
bacteria





Bacteria decomposing molasses

Life Cycle of Fungi

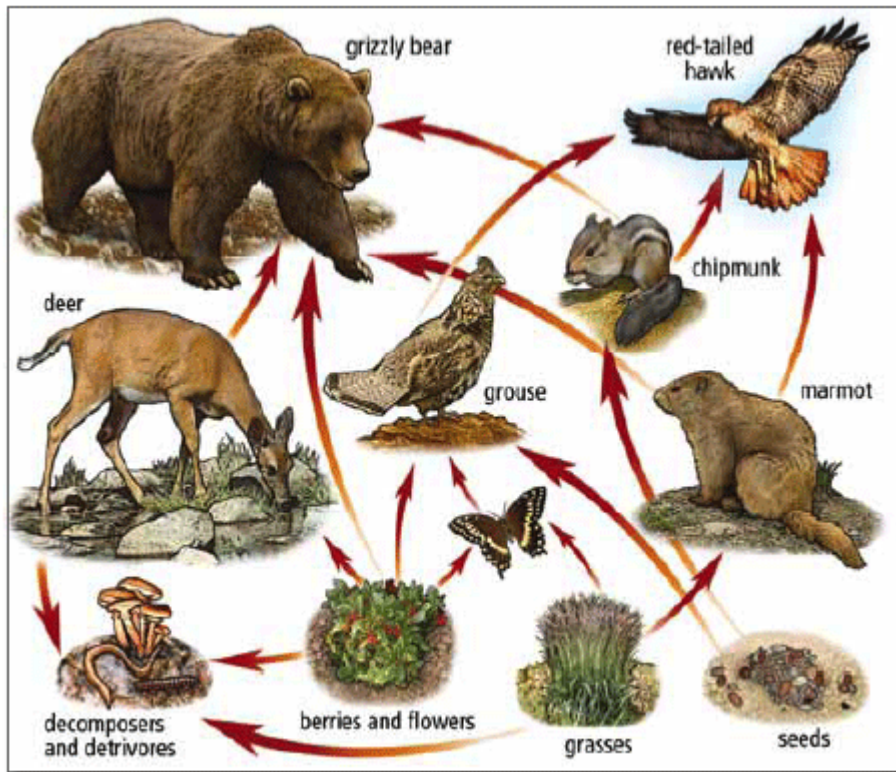


The mycelium is the true decomposing part of the life cycle; the mushroom is just the reproductive structure.

4. Trophic relationships are the feeding connections among the living organisms in an ecosystem.

Example Draw a food web for the following:
Hare, fox, snake, fungi, bacteria, grasshopper, termite, autotrophs (producers or photosynthesizers), shrew, woodpecker, field mouse,

If the grass had a poison in it (pesticide)
What would be affected in the food web?
Initially it'll show up in
The butterfly, grouse, hawk, marmot & bear, but eventually due to decomposers, it spreads everywhere.



B- Primary productivity

1. What term is used to describe the quantity of organic matter produced by plants in a given territory?

Primary productivity

2. Explain the effects of certain factors on primary productivity

- (e.g. bees help pollinate fruit trees, pathogenic microorganisms hinder plant growth;
- other factors: light, water, temperature, fertilizer)

Fertilizer increases primary productivity. Think of nitrogen cycle's fertilizer & its influence on growth. PO_4^{3-} and K^+ also stimulate plant growth.

In eutrophication the growth from extra nutrients is unwanted.

Temperature increases growth up to a certain point when water loss is counterproductive

Light : length of day and intensity helps photosynthesis.

Water: is a reactant in primary productivity(photosynthesis) and it dissolves phosphates, ammonium and potassium ions

C- Material and Energy Flow

1. How do materials and energy flow in an ecosystem?

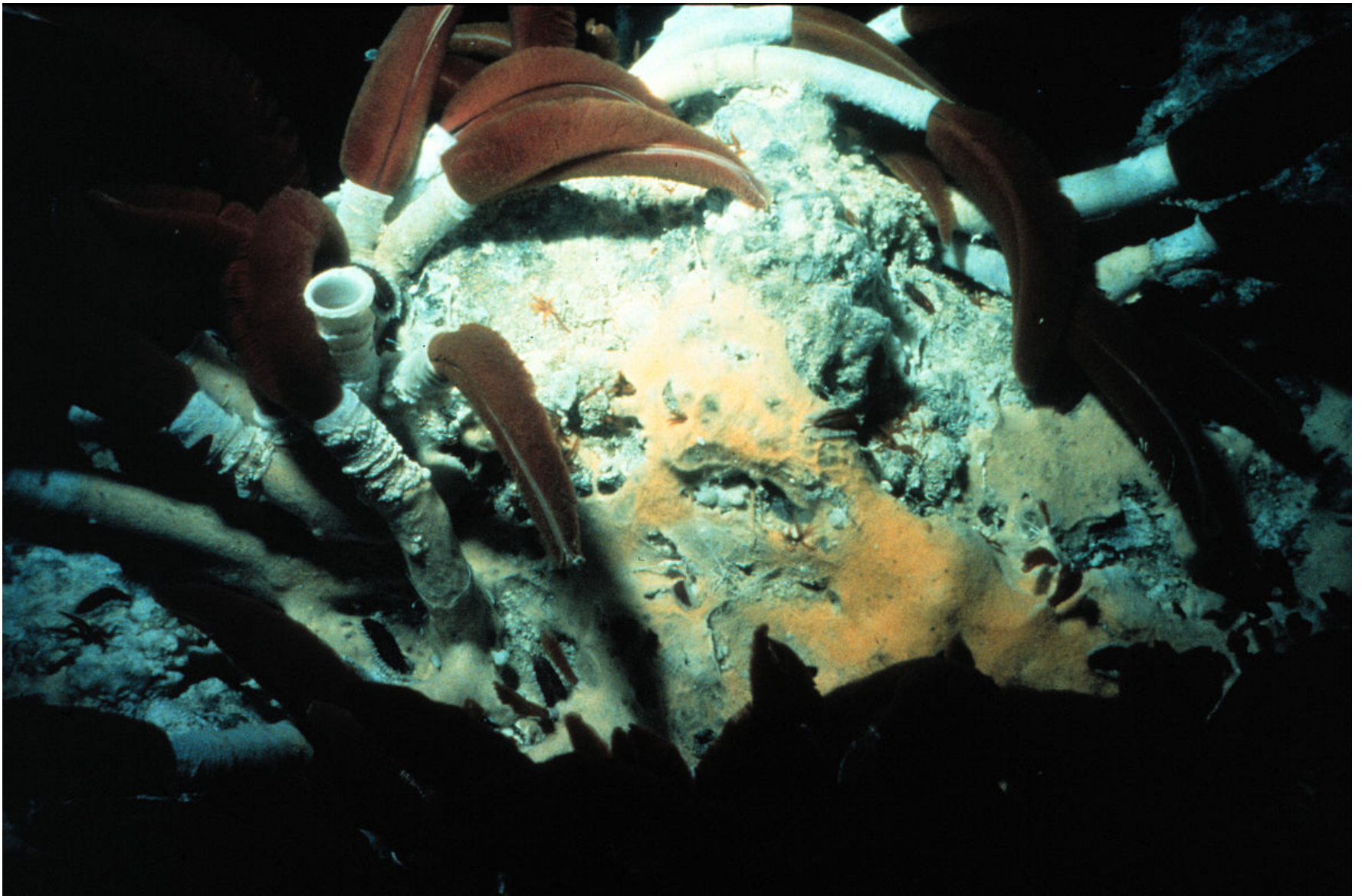
They move as producers absorb energy and fertilizer to produce
And then materials and energy flow again as they get eaten.

2. How does energy efficiency relate to the transfer of energy between trophic levels?

Not all energy is transferred in the chemical bonds of food.
A significant amount of food energy is lost as heat in every step.

3. Is energy recycled? If not where does can the continuous supply come from? Give two examples.

No. The sun ultimately supplies energy to most ecosystems.
Some marine ecosystems in the deep ocean rely on energy from thermal vents.



Riftia pachyptila lives over a mile deep, and up to several miles deep, on the floor of the Pacific Ocean near black smokers, and it can tolerate extremely high hydrogen sulfide levels. These worms can reach a length of 2.4 m , feed off symbiotic chemosynthetic bacteria's products.

