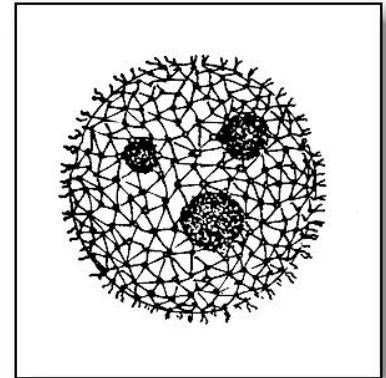


Dynamics of Ecosystems

A- Trophic Relationships

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



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

A producer is an organism that produces its own food. Examples include herbs, moss, ferns, trees, algae, blue green algae.

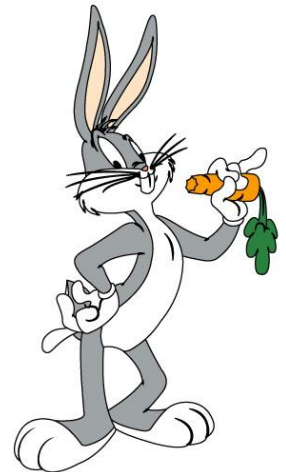
- b) Why is a producer said to convert inorganic matter into organic matter? Give examples.

Organic matter is composed of compounds that have **at least both** carbon and hydrogen. Inorganic matter is missing **both carbon and hydrogen**. In photosynthesis carbon dioxide and water (both inorganic) are converted into oxygen and glucose($C_6H_{12}O_6$). The latter is organic.

Using nitrate(NO_3^-) or ammonium ions(NH_4^+) and phosphate(PO_4^{-3}) (all inorganic), producers also have the ability to convert sugar derivatives into proteins, lipids, DNA and RNA, all of which are organic.

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

A consumer is an organism that eats producers, consumers or both.



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

First order= eats producers

Second order= eats other consumers

Omnivore = eats producers and other consumers



1st order consumer

2nd order consumer

omnivore

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

Fungi and certain bacteria act as decomposers when they break down organic matter into simpler molecules. Unlike consumers, decomposers do not kill producers or prey. Fungi actually release enzymes and the breakdown occurs outside of their cells. They subsequently absorb nutrients.



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 (photosynthesizers), shrew, woodpecker, field mouse,

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. Explains 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)

Light: if there's too little it inhibits photosynthesis

Water: needed for photosynthesis to return electrons to chlorophyll

Temperature: controls the rate at which sugars are produced

Fertilizer: without an adequate supply of nitrates, potassium, phosphates plants cannot make organic compounds as quickly

C- Material and Energy Flow

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

From sun to producer to first order consumer to second order consumer etc.

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

In each exchange between levels, energy is lost in the form of heat, so that after eating, not all the energy stored in one trophic level is passed on to the next.

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

No. The sun is the continuous source of energy

Exercises

1. What is the energy source of producers?

sun

2. What carbon -containing inorganic gas is needed by most producers?

Carbon dioxide

3. What nitrogen containing ion is also needed by producers?

Nitrate or ammonium

4. What organic material is the primary product of producers?

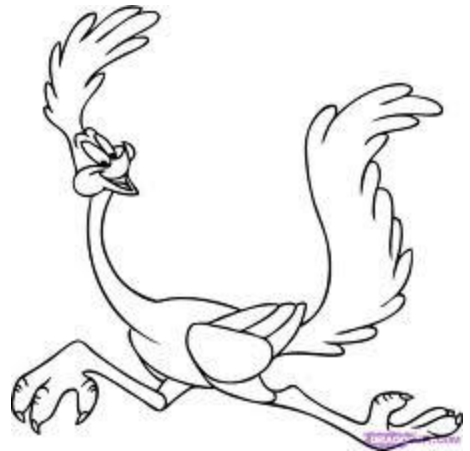
sugar

5. Give an example of the primary producer found in deserts.

cactus

6. What first order consumers are found in temperate forests?

Field mice, deer, moose, squirrels, chipmunks



7. What first order consumers are found in coral reefs?

Corals, fish

8. A road runner`s consists of 90% of animal matter (insects, scorpions, lizards, snakes, rodents and other small birds) and the remainder is fruit and seeds.

Why isn` t the roadrunner a second order consumer?

It eats nuts and first(insects) and second order consumers(snakes), so the road runner is an omnivore.

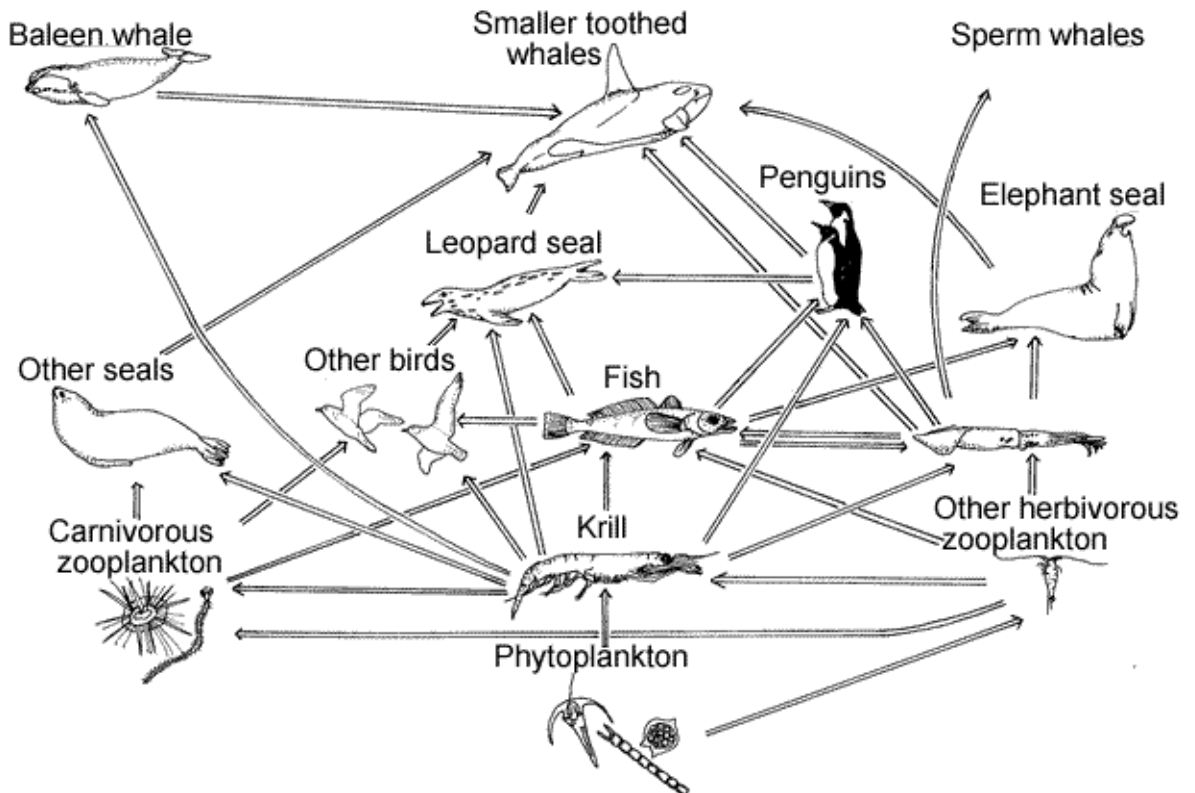
9. a) Aside from fungi, what other decomposers exist in nature?

Bacteria and flesh and blow flies.

b) In what cycles do decomposers play a role in? Give examples.

All cycles; in carbon cycle, fungi convert complex carbon compounds into simpler ones; in the phosphorus cycle, decomposers (bacteria) create phosphate out of waste; and in the nitrogen cycle, decomposers convert urea into ammonium.

10. Use the food web to identify two mammals that are secondary consumers.



Baleen whale, seals other than leopard seal

11. Which animal wastes the most energy if you consider all the trophic level exchanges needed to feed it?

Toothed whale wastes the most because it is on top of this food chain.

12. What factors can affect primary productivity in the sea?

Temperature, light (if water is too deep), nutrients (fertilizing ions)