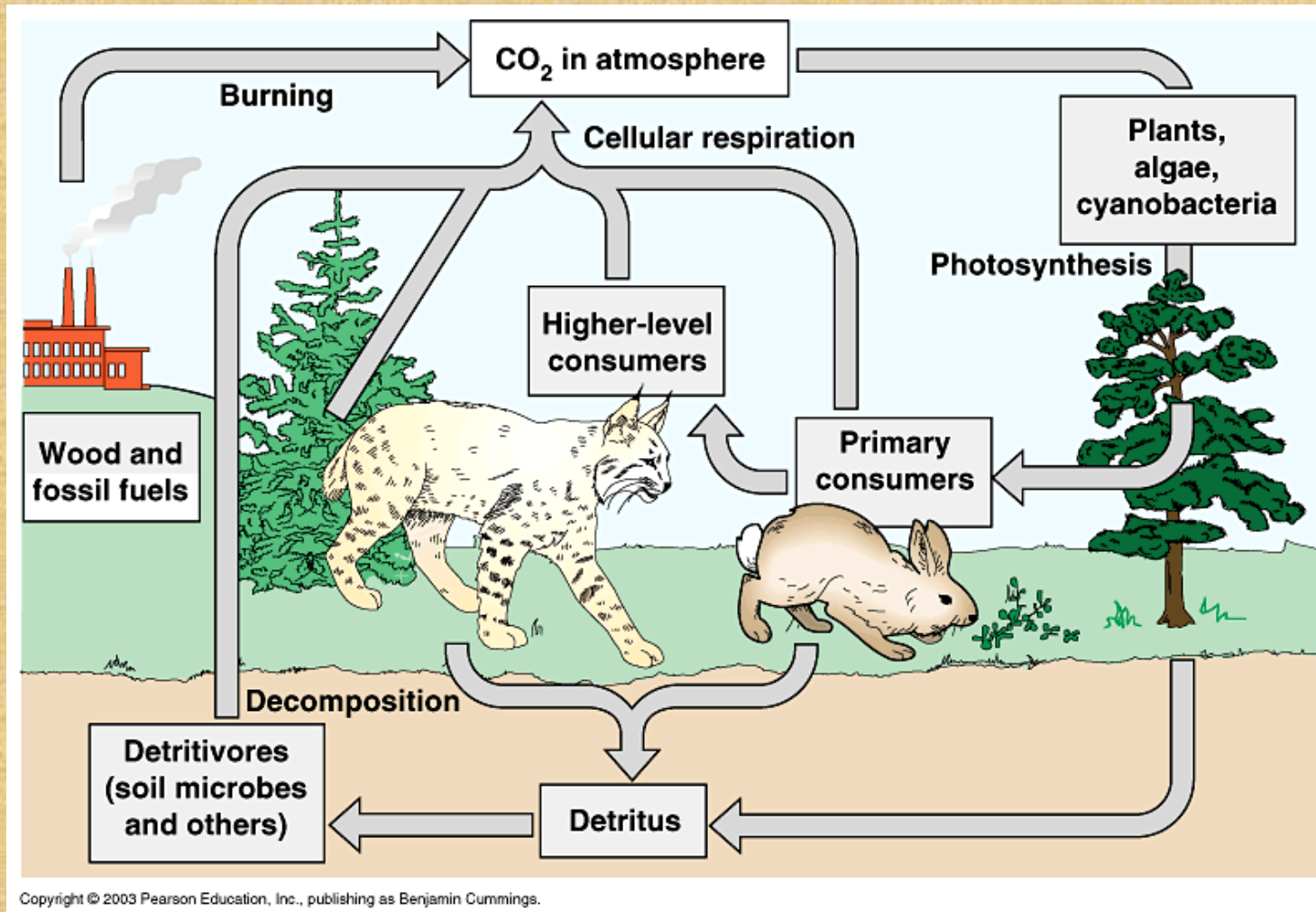
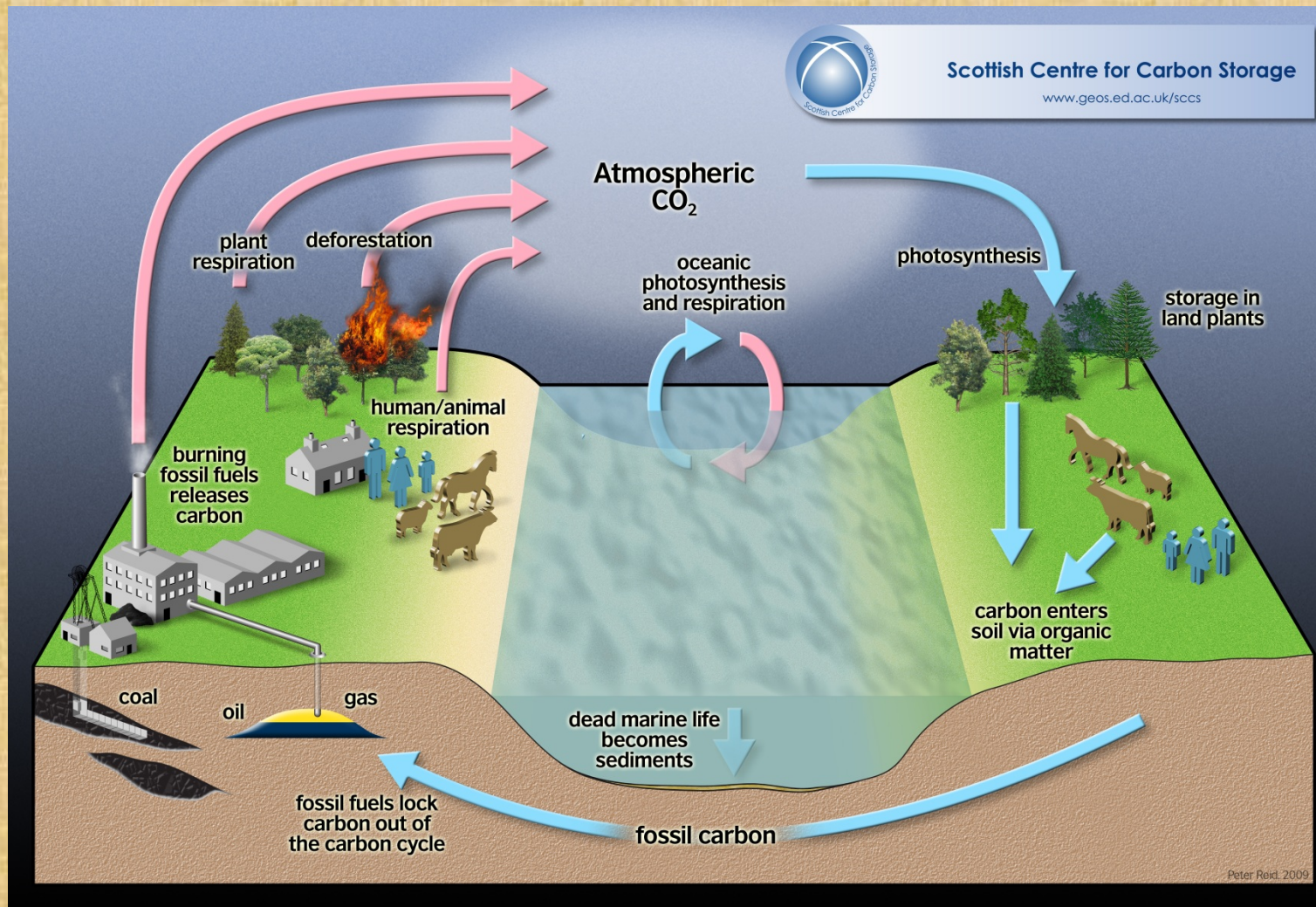


Carbon Cycle

Carbon Cycle



Carbon Cycle



Carbon

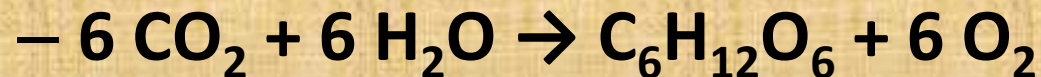
- Carbon is an element. It is part of oceans, air, rocks, soil and all living things. Carbon doesn't stay in one place. It is always on the move!



Carbon moves from the atmosphere to plants.

- In the atmosphere, carbon is attached to oxygen in a gas called carbon dioxide (CO₂). With the help of the Sun, through the process of photosynthesis, carbon dioxide is pulled from the air to make plant food from carbon.

- Carbon dioxide + Water + Light energy → Glucose + Oxygen



Carbon Cycle Question

- We enjoy the taste of an apple because it is sweet. From where did the apple tree get the carbon to make sugar?
 - A. air
 - B. water
 - C. soil
 - D. nitrate fertilizer

Carbon Cycle Question

- The most abundant element in a wooden stick is carbon. Where did the carbon come from?
 - A. water
 - B. air
 - C. soil
 - D. fertilizer

Carbon moves from plants to animals.

- Through food chains, the carbon that is in plants moves to the animals that eat them. Animals that eat other animals get the carbon from their food too.

Carbon Cycle Question

- Where do animals get the carbon found in their bodies?
 - A. from the air
 - B. from eating food
 - C. from the soil
 - D. from vitamins and minerals

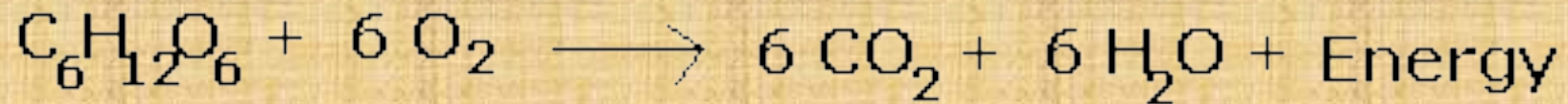
Carbon moves from plants and animals to the ground.

- When plants and animals die, their bodies, wood and leaves decay bringing the carbon into the ground. Some becomes buried miles underground and will become fossil fuels in millions and millions of years.

Carbon moves from living things to the atmosphere.

- Each time you exhale, you are releasing carbon dioxide gas (CO₂) into the atmosphere. Animals and plants get rid of carbon dioxide gas through a process called respiration.

Cellular Respiration



Carbon moves from fossil fuels to the atmosphere when fuels are burned.

- When humans burn fossil fuels to power factories, power plants, cars and trucks, most of the carbon quickly enters the atmosphere as carbon dioxide gas. Each year, five and a half billion tons of carbon is released by burning fossil fuels. That's the weight of 100 million adult African elephants! Of the huge amount of carbon that is released from fuels, 3.3 billion tons enters the atmosphere and most of the rest becomes dissolved in seawater.

Carbon moves from the atmosphere to the oceans.

- The oceans, and other bodies of water, soak up some carbon from the atmosphere. Animals that live in the ocean use the carbon to build their skeletons and shells.
- When the animals die their skeletons and shells drop to the ocean floor. There they will eventually form into limestone.

Carbon in the Atmosphere

- Carbon dioxide is a greenhouse gas and traps heat in the atmosphere. Without it and other greenhouse gases, Earth would be a frozen world. But humans have burned so much fuel that there is about 30% more carbon dioxide in the air today than there was about 150 years ago. The atmosphere has not held this much carbon for at least 420,000 years according to data from ice cores. More greenhouse gasses such as carbon dioxide in our atmosphere are causing our planet to become warmer.

Carbon Cycle Question

- For millions of years the carbon cycle has been in balance. Climatologists are concerned because data indicates the amount of carbon in the air is increasing. Which theory best explains this loss of atmospheric balance?
 - A. CFAs have created a hole in the ozone.
 - B. Society has increased the burning of fossil fuels.
 - C. Environmentalists have increased the size of rain forests.
 - D. Our society has recognized the danger of nuclear fission.

Carbon Cycle Question

- If the carbon dioxide in the atmosphere increases due to human activities, what do scientists predict will be the result?
 - A. increased cases of sunburn
 - B. warmer temperatures
 - C. increased incidence of earthquakes
 - D. more snowfall in the winter

Summary

- Carbon moves through our planet over longer time scales as well. For example, over millions of years weathering of rocks on land may add carbon to surface water which eventually runs off to the ocean. Chemical weathering of silicate minerals, in particular, can have an effect on the amount of carbon dioxide in the atmosphere. Additionally, over long time scales, carbon is removed from seawater when the shells and bones of marine animals and plankton collect on the sea floor. These shells and bones are made of limestone, which contains carbon. When they are deposited on the sea floor, carbon is stored from the rest of the carbon cycle for some amount of time. The amount of limestone deposited in the ocean depends somewhat on the amount of warm, tropical, shallow oceans on the planet because this is where prolific limestone-producing organisms such as corals live. The carbon can be released back to the atmosphere if the limestone melts or is metamorphosed in a subduction zone.



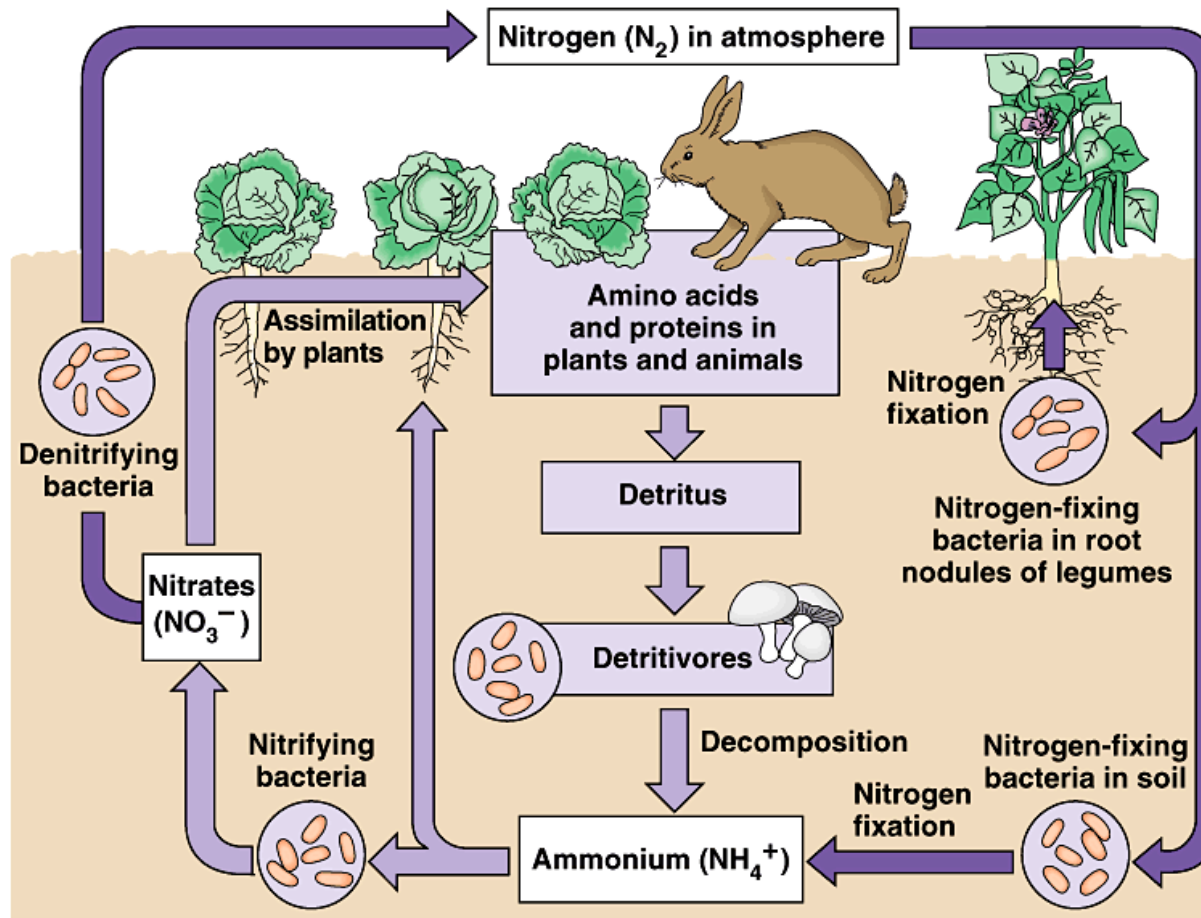
Nitrogen Cycle

Nitrogen

- Nitrogen is an element. It is found in living things like plants and animals. It is also an important part of non-living things like the air above and the dirt below. Atoms of nitrogen don't just stay in one place. They move slowly between living things, dead things, the air, soil and water. These movements are called the nitrogen cycle.

N

Nitrogen Cycle



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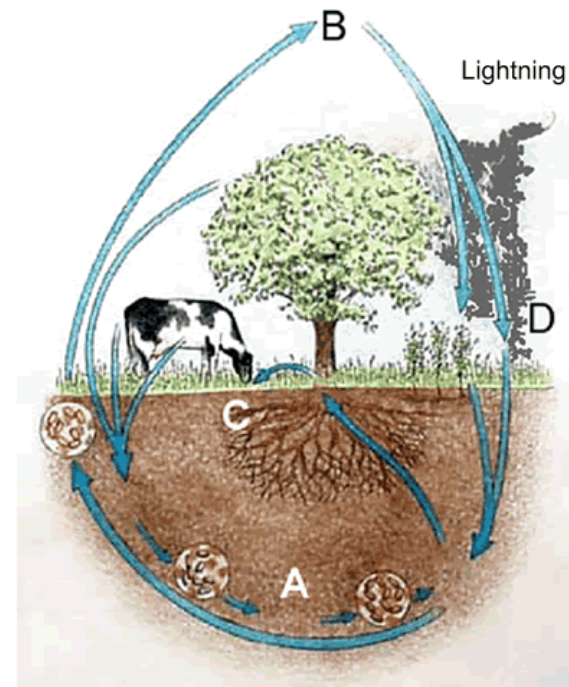
Nitrogen moves from the atmosphere to soil to plants

- All plants and animals need nitrogen to make amino acids, proteins and DNA, but the nitrogen in the atmosphere is not in a form that they can use.
 - In the atmosphere: N_2
- The molecules of nitrogen in the atmosphere can become usable for living things when they are broken apart during lightning strikes or fires
- Nitrogen is mainly removed from the atmosphere by nitrogen-fixing bacteria.
 - Bacteria live in the soil and on the roots of plants
- The bacteria chemically change the nitrogen from the air into nitrogen compounds that plants use to grow.

Nitrogen Cycle Question

- Which letters on the cycle shows where nitrogen is being “fixed” into a useable form for plants?

- A. A, D
- B. B, C
- C. C, D
- D. A, B



Nitrogen Cycle Question

- How do plants get the nitrogen they require for growth?
 - A. the process of photosynthesis creates nitrogen from sugar
 - B. by absorbing it from holes in their leaves and combining it with oxygen
 - C. a symbiotic relationship with bacteria that “fixes” nitrogen in the roots
 - D. nitrogen from the air attaches itself to the stem and leaves of plants.

Nitrogen Cycle Question

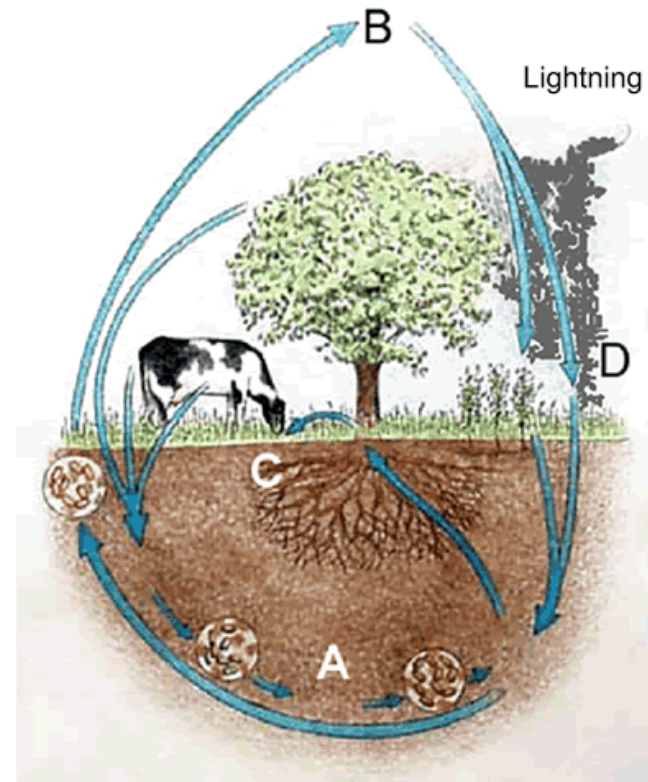
- Which of the following best explains why animal manure can be used as a fertilizer for crops and gardens? The plant uses the
 - A. carbon from the dead plant matter to make sugar
 - B. nitrogen to make proteins and DNA
 - C. oxygen for cellular respiration
 - D. hydrogen to form sugars

Nitrogen move from plants to animals to soil to the atmosphere

- When animals eat the plants the nitrogen compounds enter their bodies.
 - All plants and animals need nitrogen to make amino acids, proteins and DNA
- Nitrogen is returned to the soil either by animal waste or the decomposing of the animal.
- The decay of organism release the nitrogen back into the atmosphere

Carbon Cycle Question

- Which place on the nitrogen cycle shows nitrogen in its LEAST useable form?
 - A. A
 - B. B
 - C. C
 - D. D



Human impact on the Nitrogen Cycle

- Certain actions of humans are causing changes to the nitrogen cycle and the amount of nitrogen that is stored in the land, water, air, and organisms. The use of nitrogen-rich fertilizers can add too much nitrogen in nearby waterways as the fertilizer washes into streams and ponds. The waste associated with livestock farming also adds large amounts of nitrogen into soil and water. The increased nitrate levels cause plants to grow rapidly until they use up the supply and die. The number of plant-eating animals will increase when the plant supply increases and then the animals are left without any food when the plants die.