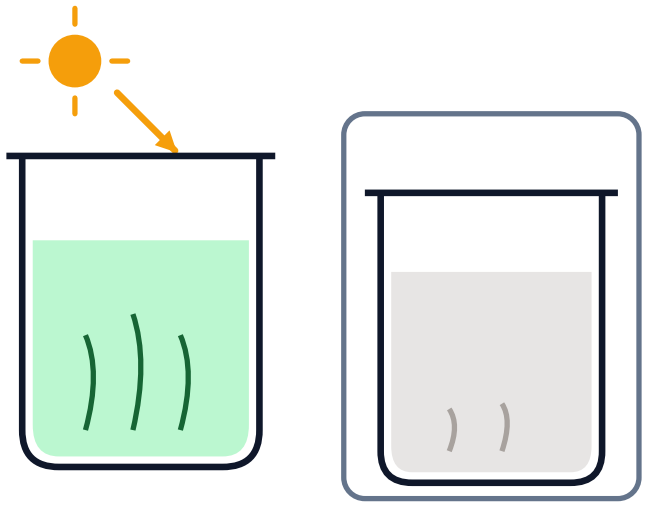
Biology 20

Unit A: Energy and matter in the biosphere

One-way energy through the biosphere

One jar stays green and warm

- A sealed pond jar on a bright windowsill stays green because algae keep growing, and the glass feels slightly warm.
- The matching jar in a dark cupboard cools, and the green algae fade until the water looks brown.



Windowsill jar: green and warm

Cupboard jar: brown and cool

Energy inputs and heat loss

- Sunlight is the energy input for the green algae in the windowsill jar.
- The energy stored in the algae's sugars is the chemical store inside the producers.
- Cellular respiration moves that store into cell work and heat.

Key terms

biosphere

The global system of organisms together with the air, water, and crust they use.

one-way energy flow

Energy enters a living system and leaves that system as heat.

chemosynthesis

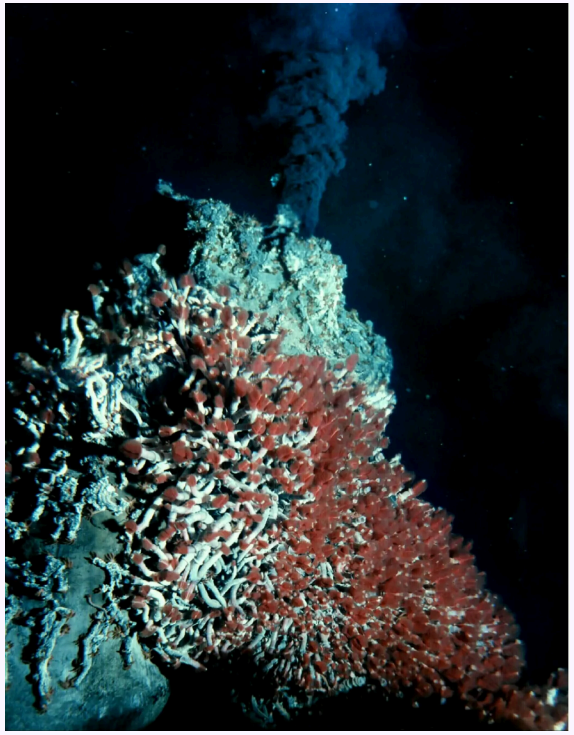
Building organic molecules with energy released by inorganic chemical reactions.

cellular respiration

Transfer of energy from organic molecules into cell work and heat.

Energy enters and heat leaves

- Photosynthetic communities take in light and store a fraction in carbohydrate.
- Chemosynthetic communities at deep-sea vents, hot cracks in the ocean floor with no sunlight, take in energy from inorganic reactions such as hydrogen sulfide.
- Cellular respiration and decomposition release heat in both kinds of community.



Tracking energy in the sunlit jar

- Write the input, the chemical store, and the heat exit on one card.
- Repeat the card for a deep-sea vent community so the exit stays heat in both rows.

A testable question

- A useful question names the light condition and the chemical store you will compare.
- The prediction states how the store changes when the light changes.

Input and exit

- Name the energy input and the heat exit for a sunlit pond and for a deep-sea vent.
- State what the carbon atoms do while the joules leave.

Food chains carry this energy onward

- The next lesson places this same heat exit at every link of a food chain.
- Producers, consumers, and decomposers will share one energy ledger.

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University of Washington; NOAA/OAR/OER, Tube worms at a hydrothermal vent (NOAA Photo Library, expl2366), public domain