Introduction to Ecology

An introduction to key concepts

Section 3

8 Ecological Maxims

1 **Interconnectivity in Nature**: Organisms interact with their physical environment and each other, causing interconnected events; what affects one can affect others.

2 **Population Limits**: No population can increase indefinitely due to resource limits.

3 **Resource Trade-offs**: Inputs into one function (like reproduction) necessitate trade-offs, reducing other functions (like growth).

4 **Continuous Evolution**: Organisms evolve continually, responding to new challenges from both living and nonliving components of their environment.

5 **Influence of Time**: Ecosystems change over time, influenced by past events and impacting future conditions.

6 **Spatial Variation**: Environmental conditions vary over distances, influencing organisms at local, regional, and global scales.

7 **Species Interdependence**: Species interactions are crucial for acquiring energy, nutrients, and habitats, making life possible.

8 **Persistence of Waste**: Waste materials do not disappear but go somewhere, as there is no "away".

Section 4

Ecological Flow of Matter & Energy

1 **Sun is the ultimate source of energy in the biosphere**. Plants make their biomass using the energy of light. This biomass is the source of energy for all other organisms.

2 **For some microbes simple chemical reactions are also sources of energy**: It is called Chemoautotrophy

3 **Autotrophy**: Ability to make ones own food using inorganic raw materials like CO2, H2O, NH3 etc.

4 **Heterotrophy**: Organisms depending on other organisms' biomass to meet their food requirements.

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2 Types of autotrophy based on the source of energy

1. Photo-autotrophy
2. Chemoautotrophy

6

3 types of heterotrophy based on what is eaten:

1. Herbivory
2. Carnivory
3. Omnivory

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2 types of heterotrophy based on how food is eaten:

1. Heterophagy
2. Absorption

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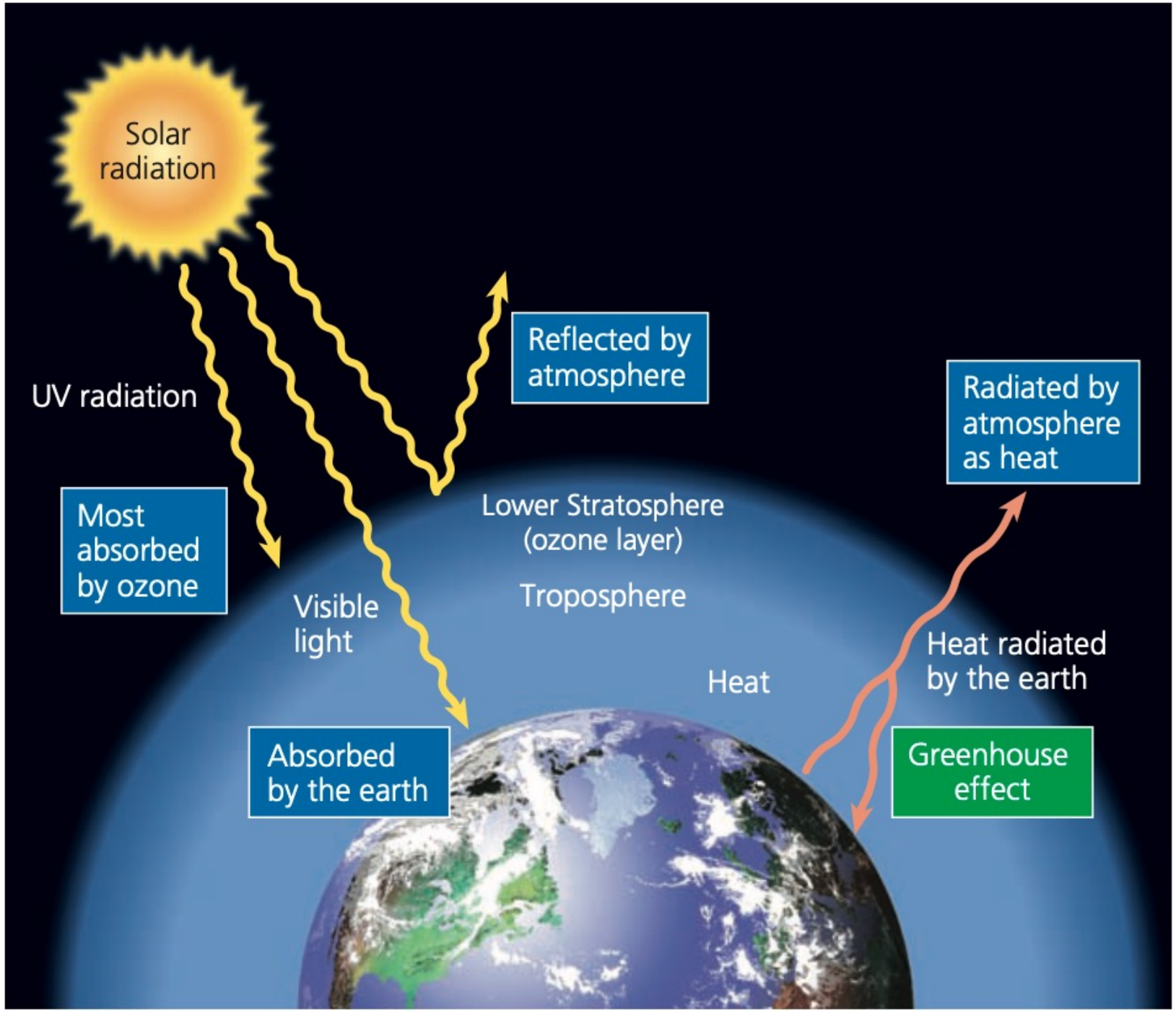
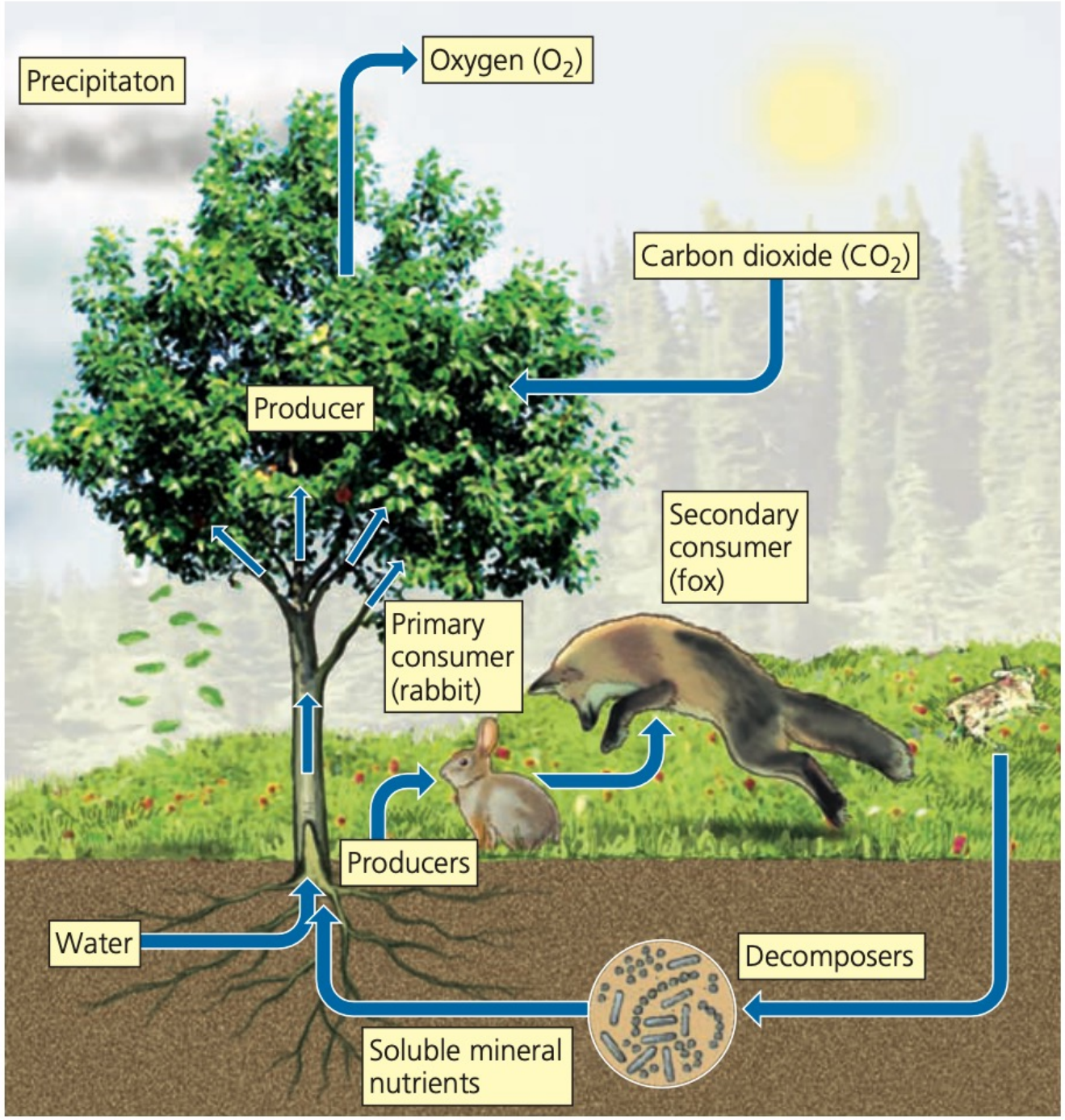
Decomposition: Organisms depending on other organisms' dead or waste biological material

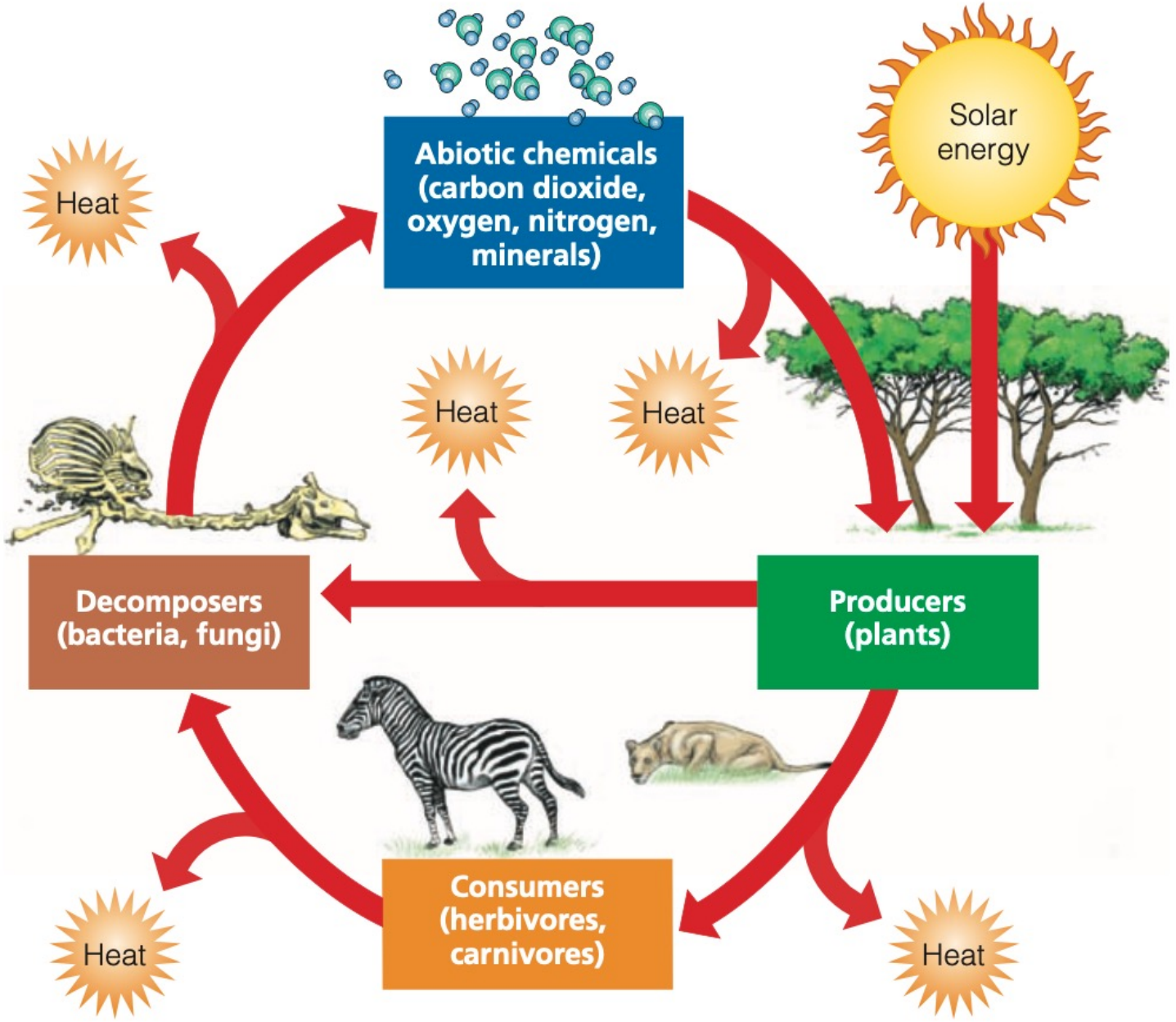
Solar Energy Flow



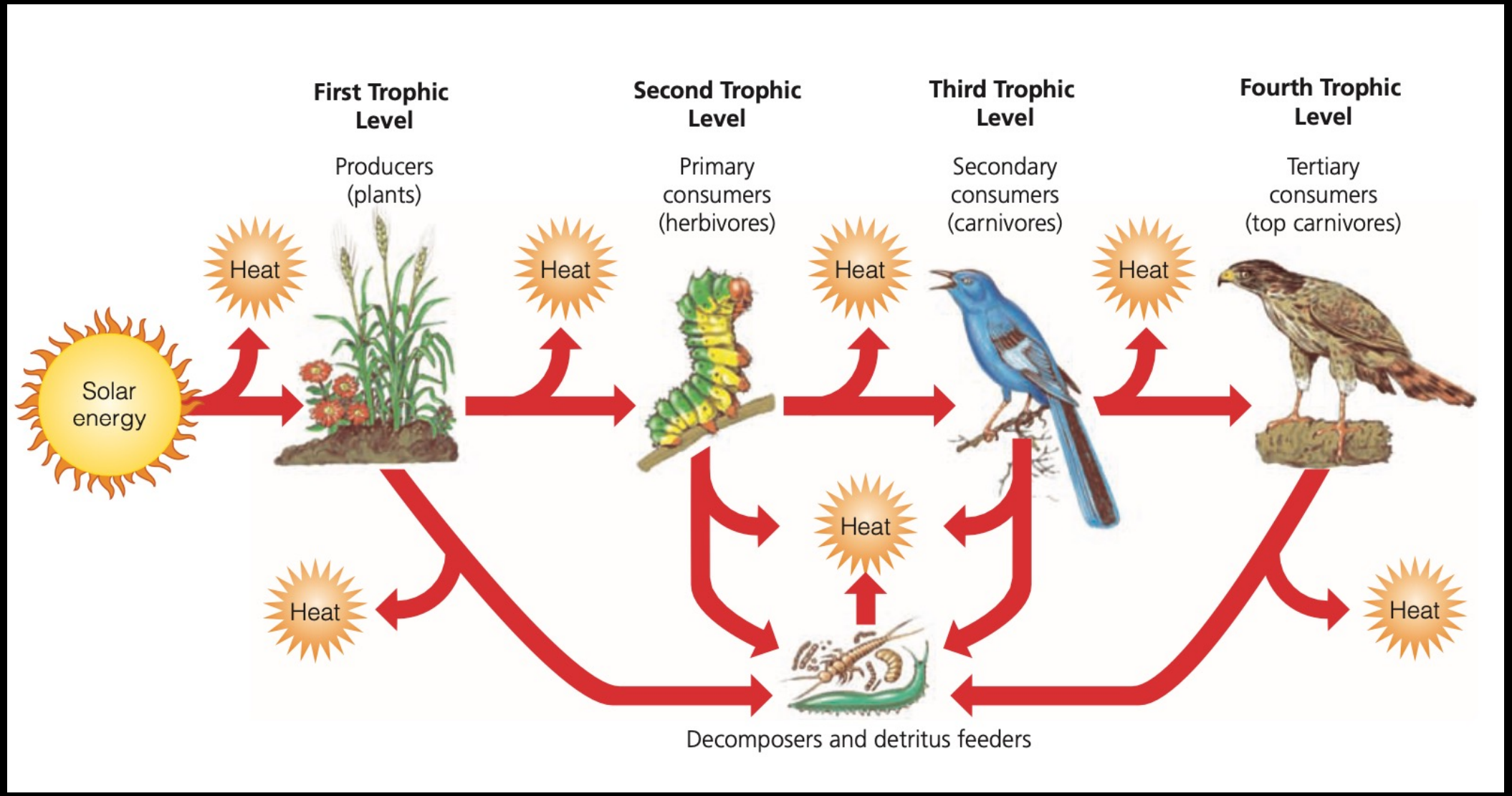
Ecosystem Flow of matter & energy



Ecosystem Flow of matter & energy



Trophic Levels



Section 4

Mass Extinctions change the biota

Mass Extinction Events

444-416 Million Years Ago
Ordovician-Silurian Extinction: Up to 85% of species wiped out, likely due to glaciation and climate change.

251 Million Years Ago
Permian-Triassic Extinction: The most severe mass extinction, eliminating 96% of marine species and 70% of terrestrial vertebrates, caused by volcanic activity and global warming.

66 Million Years Ago
Cretaceous-Paleogene Extinction: Dinosaurs and other species wiped out, likely caused by an asteroid impact.

372-359 Million Years Ago
Late Devonian Extinction: Around 75% of species extinct, potentially linked to an asteroid impact.

200 Million Years Ago
Triassic-Jurassic Extinction: Around 80% of species lost, possibly due to massive volcanic eruptions.

Present Day
Holocene or Sixth Mass Extinction: Ongoing rapid extinction of species, driven primarily by human activities like habitat destruction and climate change.