1.4.5 Environmental Factors

Environmental factors that affect organisms

Abiotic	These are non-living factors
Biotic	These are living factors
Climatic	These are the average weather conditions that affect the community in an ecosystem
Edaphic	These refer to the soil

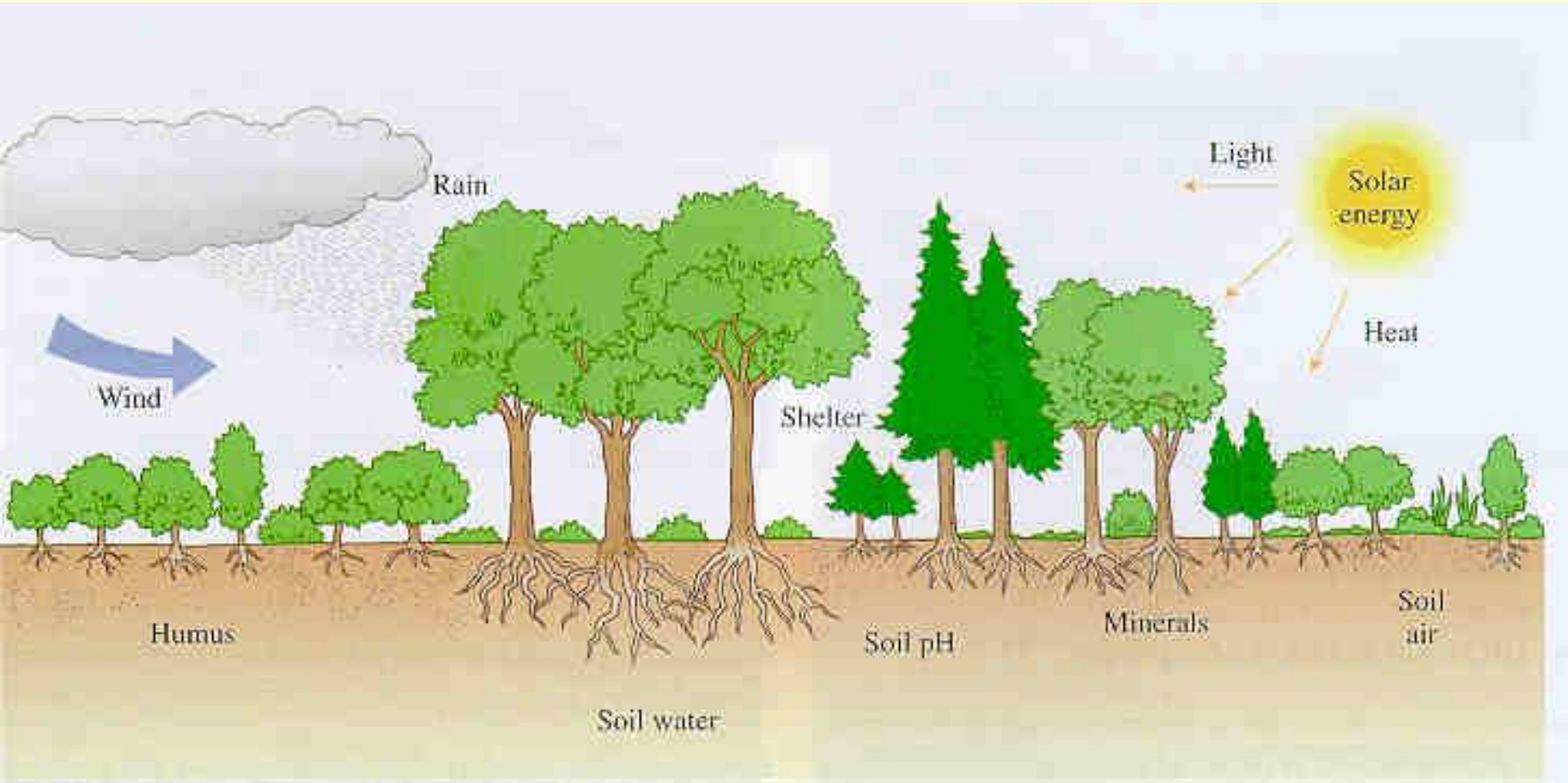
Abiotic factors

These are the non-living features of an ecosystem (i.e. the physical and chemical conditions) that affect the community.

Abiotic factors include:

- Temperature
- Light intensity
- Air speed
- Water current
- Humidity
- pH
- Dissolved oxygen
- Salinity
- Nitrate, phosphate and other plant nutrients

Abiotic factors in a woodland



Biotic factors

These are the living features of an ecosystem that affect the other members of the community.

Biotic factors include:

- Plants for food and shelter
- Predators
- Prey
- Parasites and pathogens
- Decomposers
- Competitors
- Pollinators

Climatic factors

These are elements of the climate (weather) that influence the life and distribution of the organisms that live in a particular environment.

Climatic factors include:

- Temperature
- Rainfall
- Humidity
- Wind
- Light intensity (including seasonal variations)
- Day length

Edaphic factors

These are the physical, chemical and biological characteristics of the soil that influence the community.

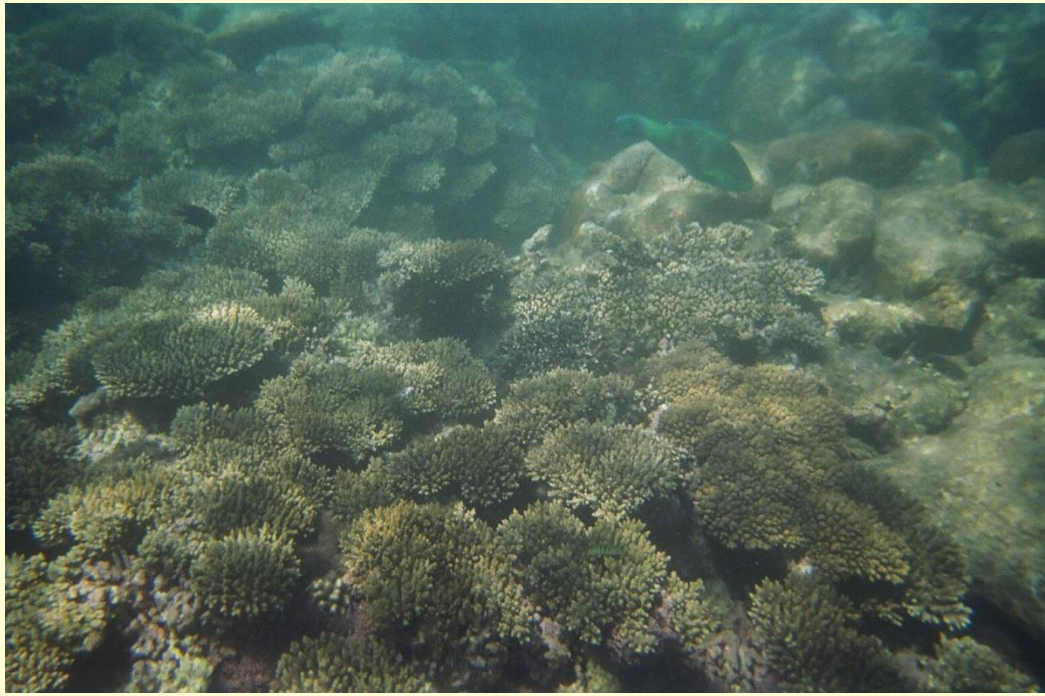
Edaphic factors include:

- Soil type,
- Soil pH,
- Available (soil) water,
- Air and Mineral content,
- Humus,
- Soil texture and Structure.

Aquatic Environmental Factors

The following are also considered as factors:

- Light penetration
- Currents
- Wave action



Learning check

What are edaphic factors?

- These are the physical, chemical and biological characteristics of the soil that influence the community.

Give examples

- Soil type, Soil pH, Available (soil) water,
- Air and Mineral content, Humus,
- Soil texture and Structure

1.4.6 Energy Flow

What is an ecosystem?

a community of living organisms interacting with one another and their non-living environment within a particular area, e.g. woodland, etc.

Energy Flow

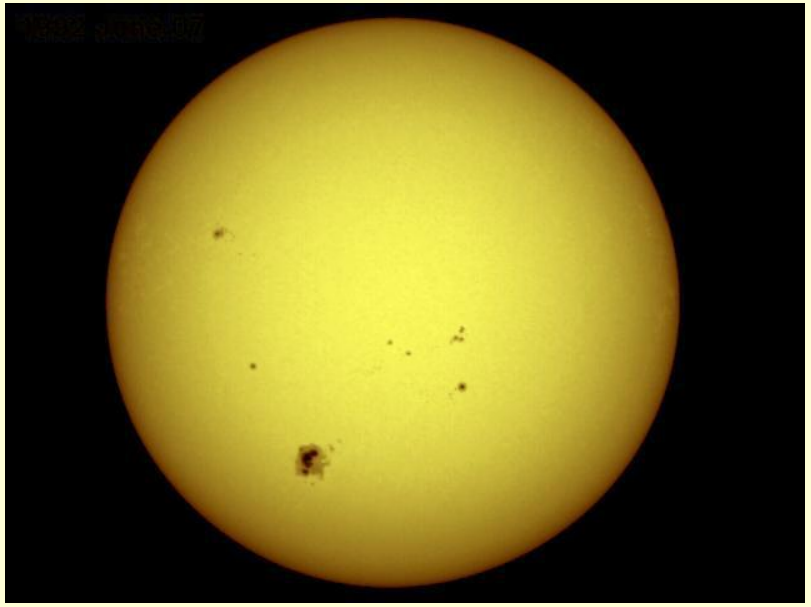
Ecosystems are unable to function unless there is a constant input of energy from an external source.

Where does this energy come from?

The Sun

The Sun

The sun is the primary source of energy for our planet.

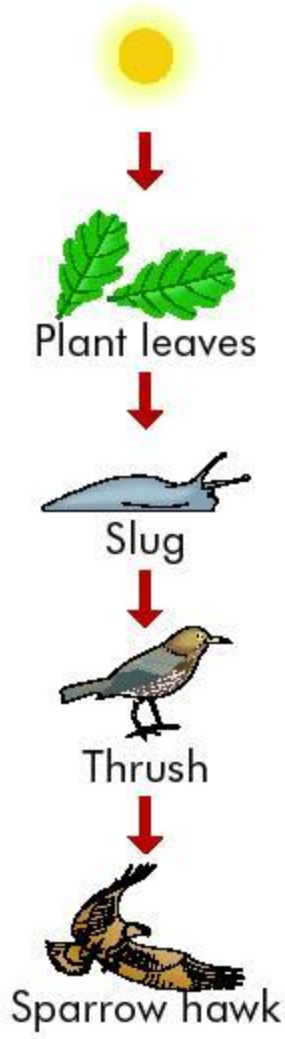


Energy Flow

is the pathway of energy transfer from one organism to the next in an ecosystem due to feeding, e.g. along a food chain

Feeding allows energy to flow from one organism to another in an ecosystem.

Energy flow in the ecosystem



SOLAR ENERGY

Transfer of energy

PRIMARY PRODUCERS
(green plants)

Transfer of energy

PRIMARY CONSUMERS
(herbivores)

Transfer of energy

SECONDARY CONSUMERS
(carnivores)

Transfer of energy

TERTIARY CONSUMERS
(top carnivores)

Food Chain

Is a flow diagram that begins with a plant and shows how food/energy is passed through a series of organisms in a community.

Each organism feeds on the one before it.

A food chain ends when there is not enough energy to support another organism.

An example of a food chain:

Learning check

What is meant by primary source?

Main source

What is the primary source of energy?

The sun

A Grazing food chain

is one where the initial plant is living e.g.

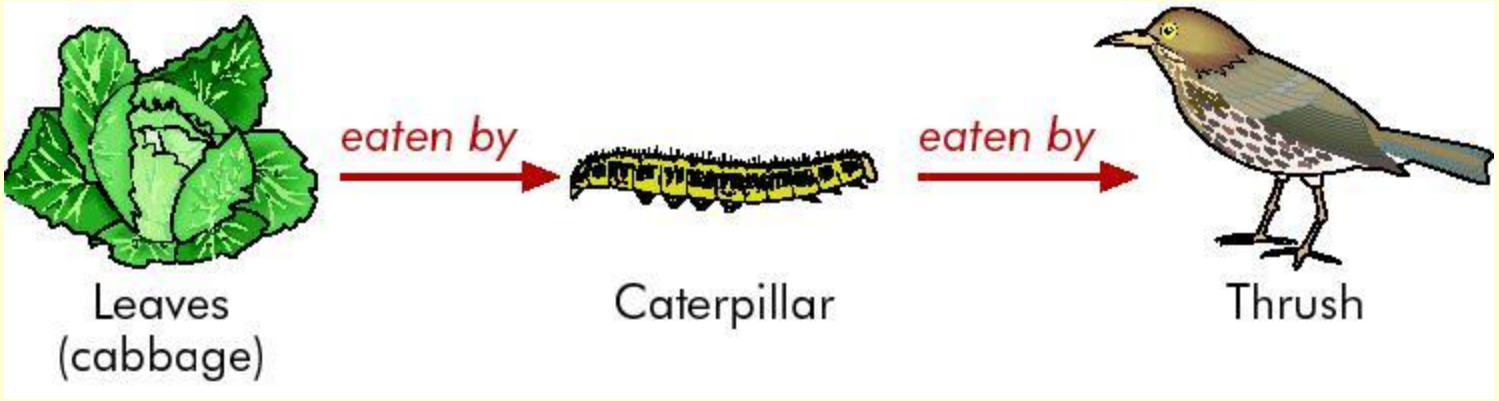
Grass → grasshoppers → frogs → hawks

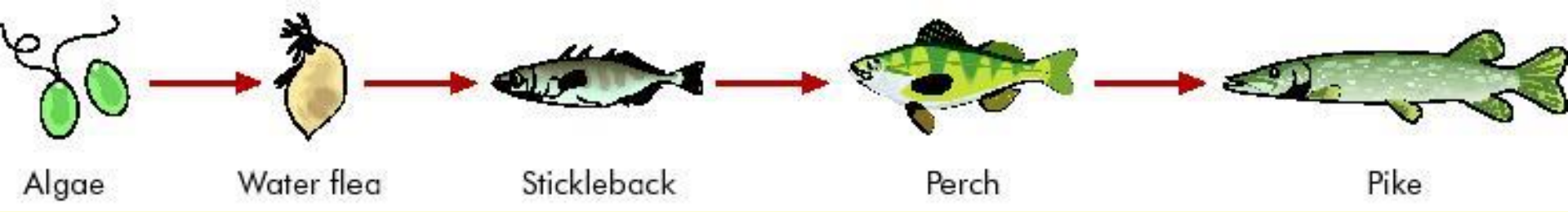
Honeysuckle → aphids → ladybirds → thrushes

Seaweed → winkles → crabs → herring gulls

Phytoplankton → zooplankton → copepod →

Grazing Food Chains





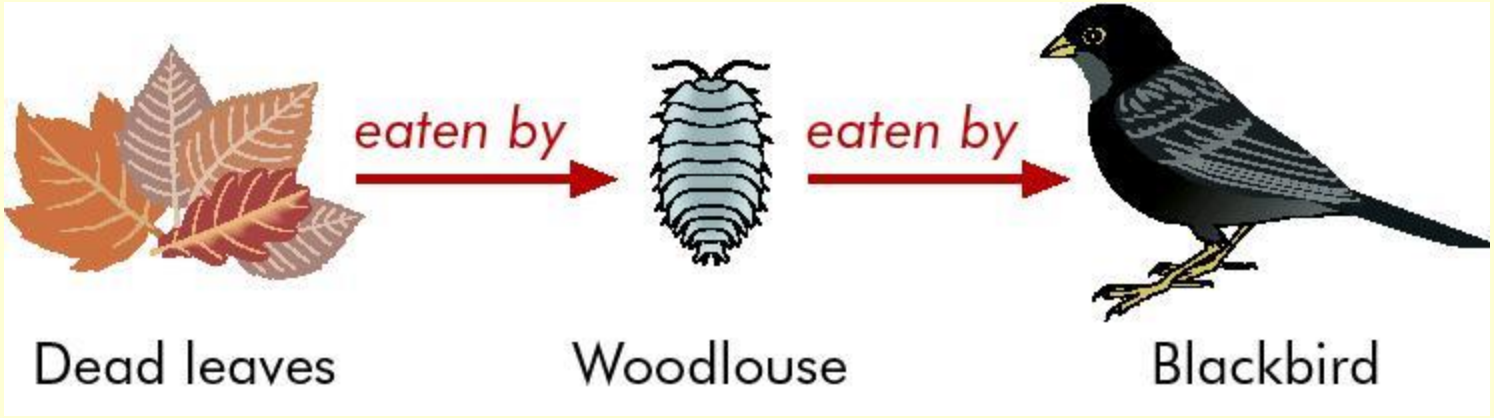
A Detritus food chain

is one where the chain begins with dead organic matter and animal waste (detritus) e.g.

Detritus → edible crab → seagull

Fallen leaves → earthworms → blackbirds → hawks

Detritus Food Chain



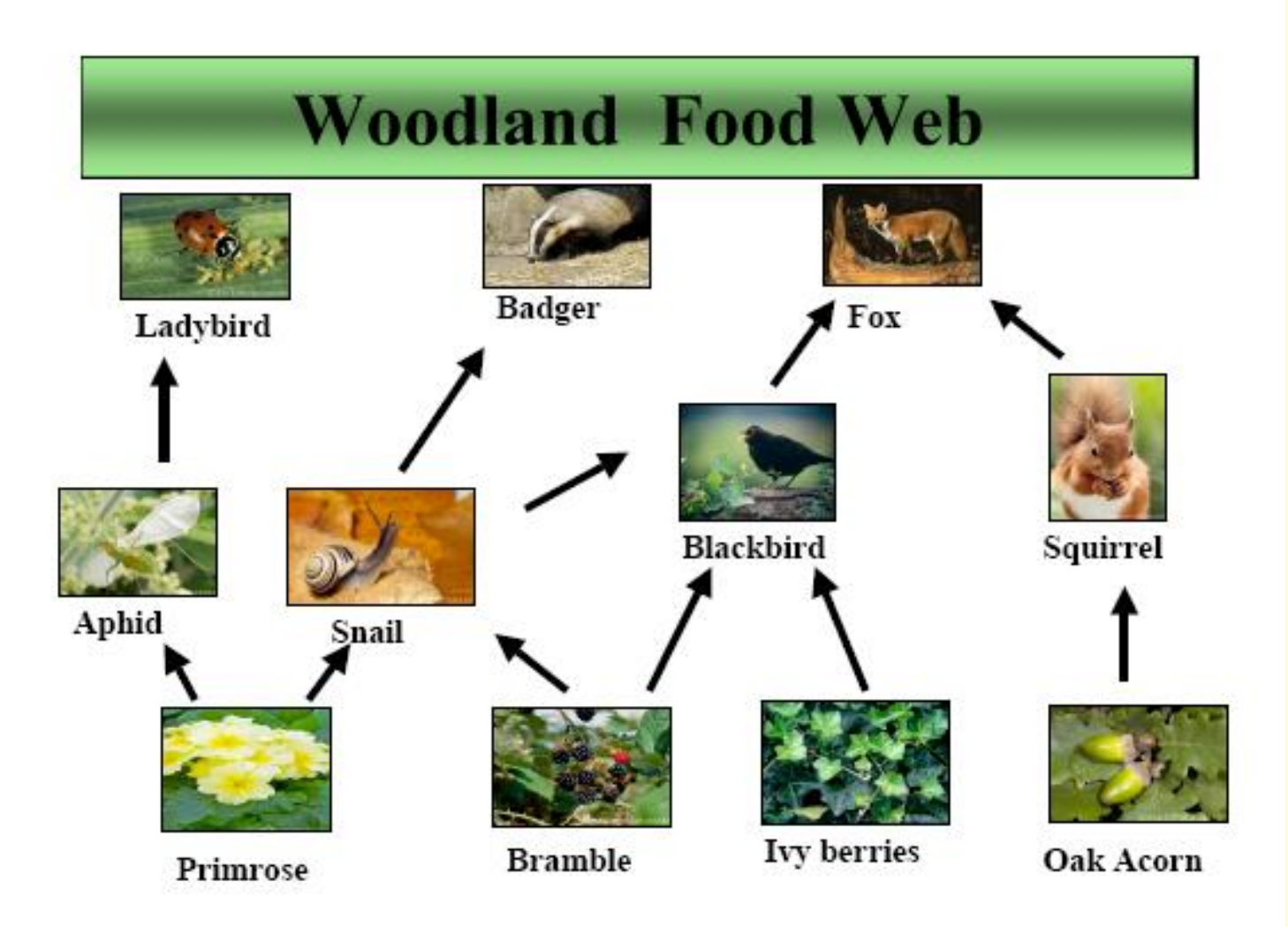
Food Web

This is a chart showing all the feeding connections in the habitat/ecosystem.

Constructed by showing the links between all the interconnecting food chains in the habitat.

Food Web

the interconnected food chains in an ecosys

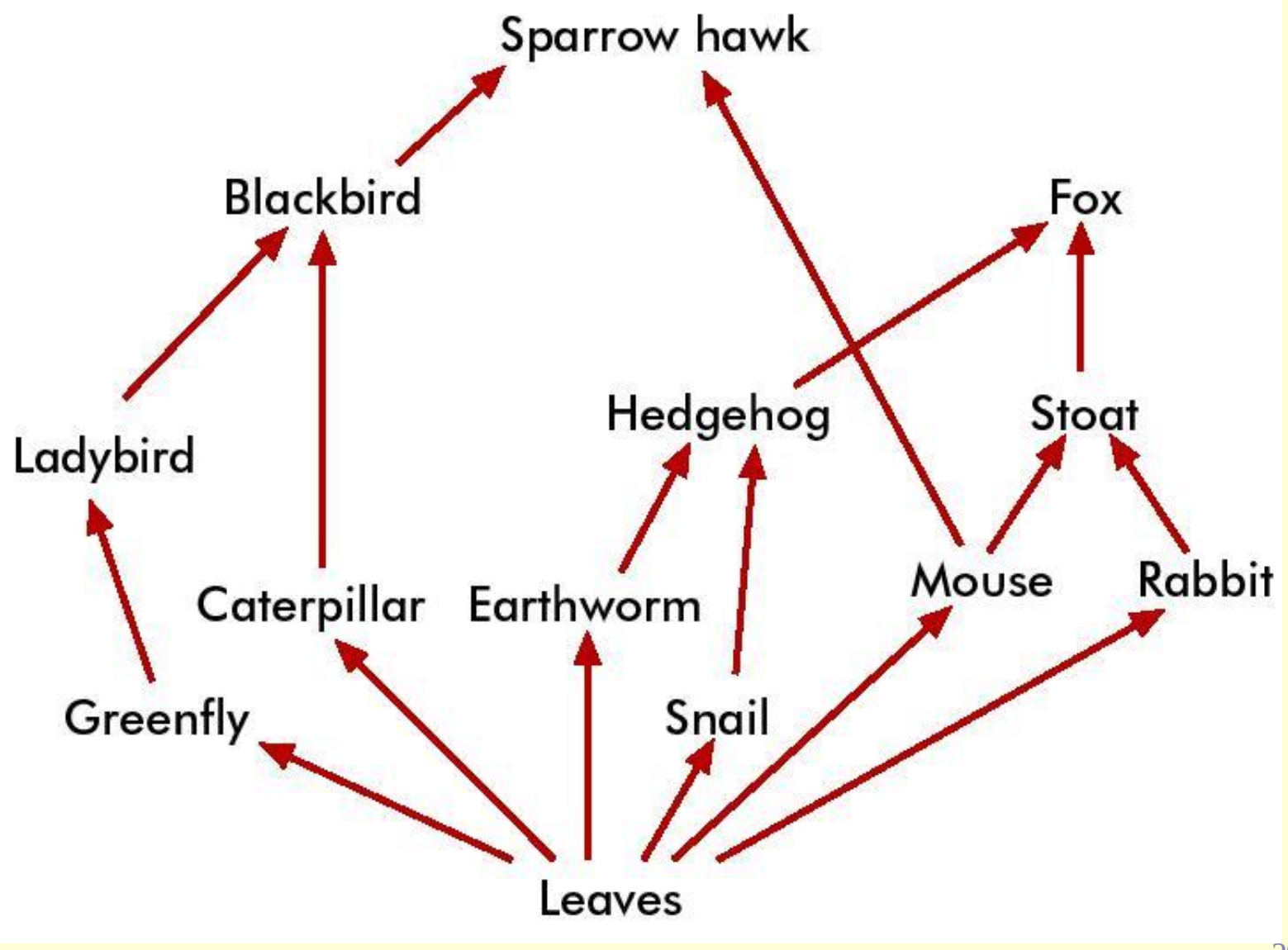


Learning check

Energy flow/transfer through an ecosystem is achieved by …

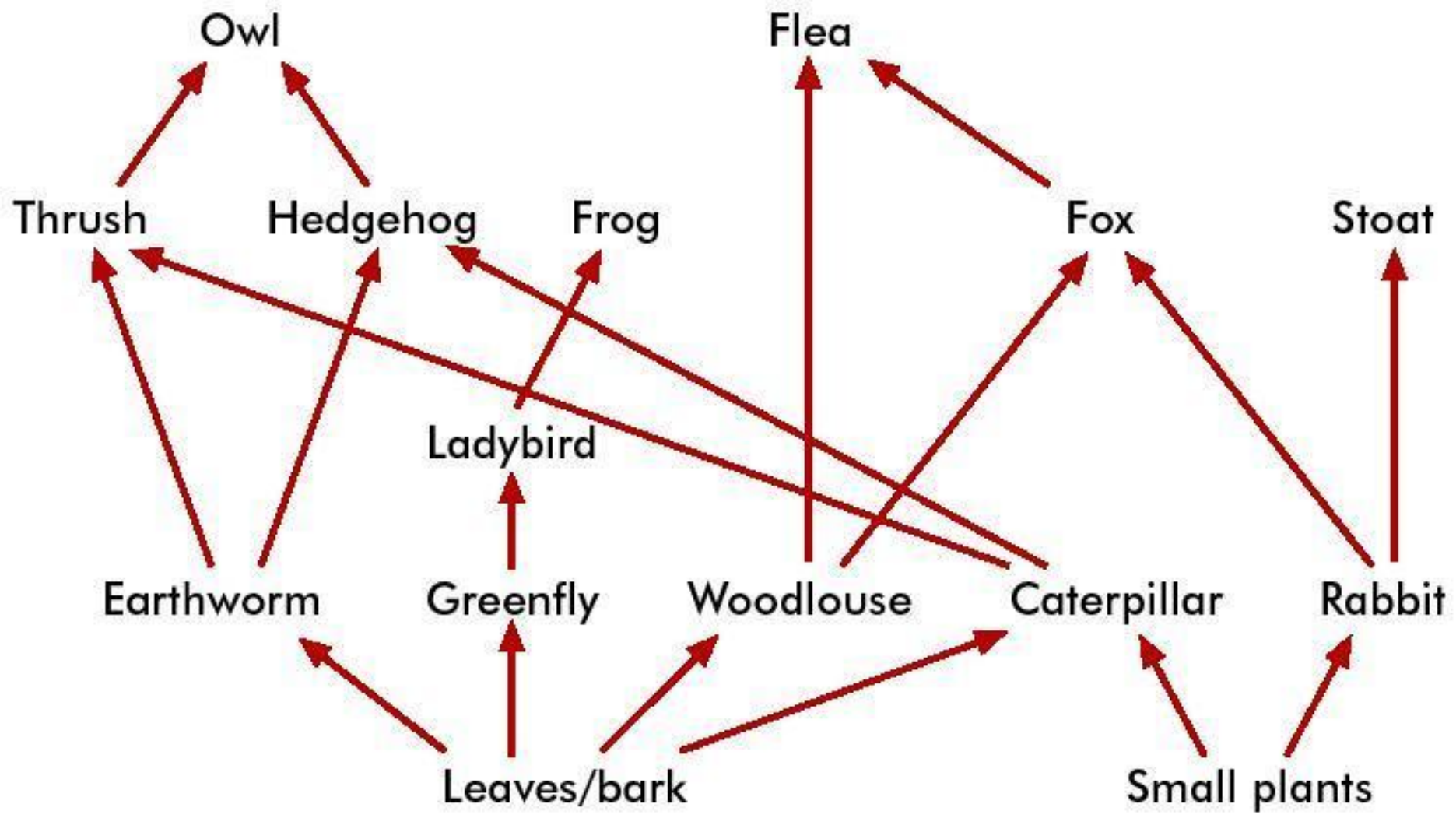
Feeding

A woodland food web



Construct two food chains from the above food web

Another food web



What is the longest food chain you can construct from this food web?

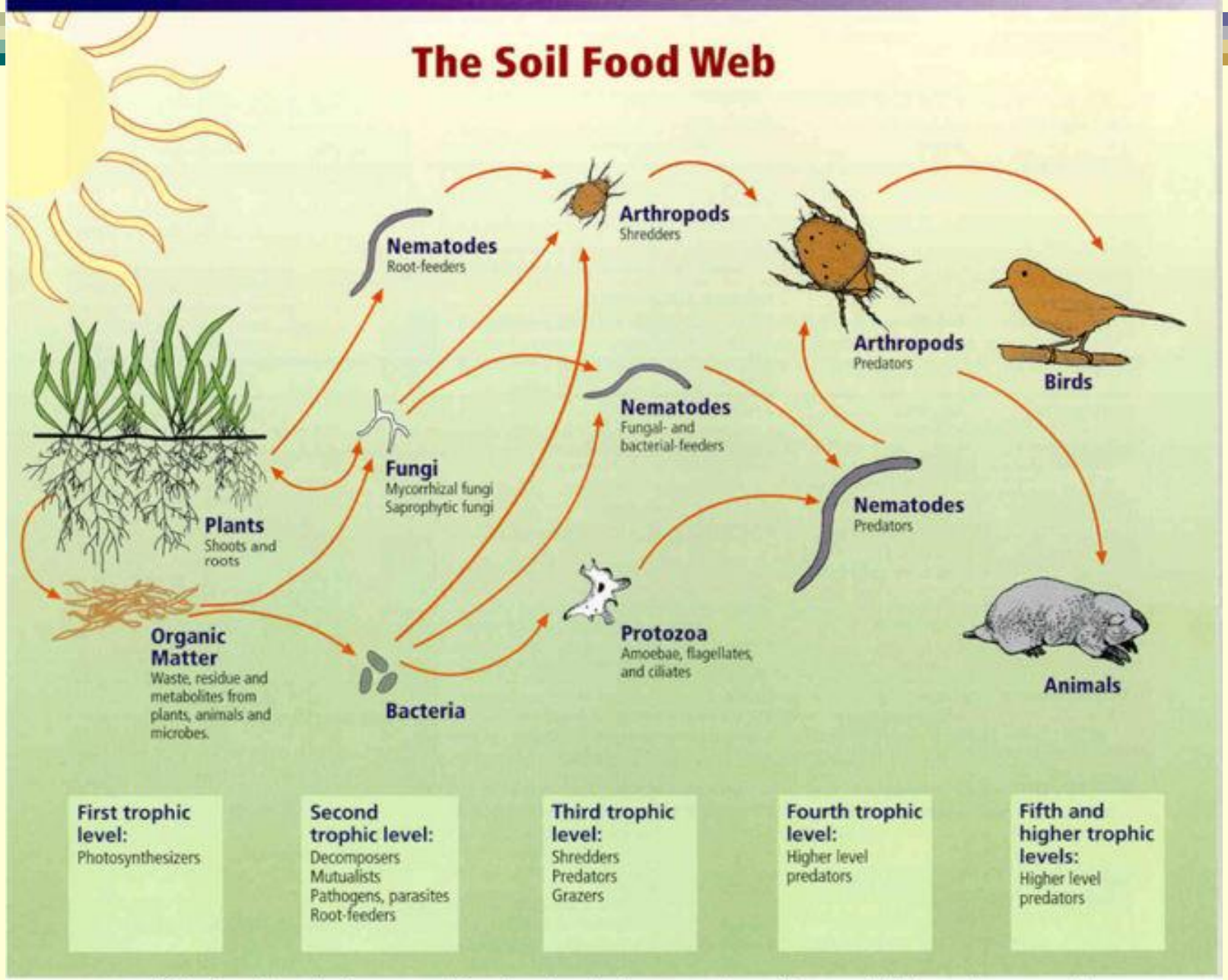
Learning check

What is meant by a Grazing food chain?

- is a food chain where the initial plant is living

Give an example

1. Grass → grasshoppers → frogs → hawks
2. Honeysuckle → aphids → ladybirds → thrushes
3. Seaweed → winkles → crabs → herring gulls
4. Phytoplankton → zooplankton → copepod → herring



Relationships between soil food web, plants, organic matter, and birds and mammals
Image courtesy of USDA Natural Resources Conservation Service
http://soils.usda.gov/sqi/soil_quality/soil_biology/soil_food_web.html.

Producers

Producers are organisms capable of making their own food by photosynthesis, e.g. green plants.

Primary producers are the first members of a food chain

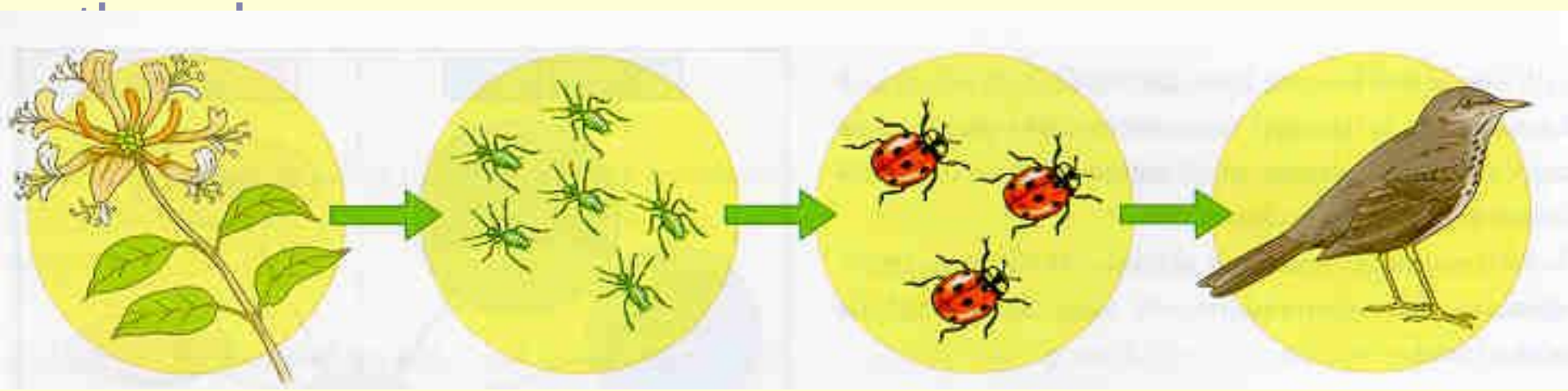
Consumers

Consumers are organisms that feed on other organisms. They cannot make their own food. There are three types:

- **Primary consumers** – feed on producers
- **Secondary consumers** – feed on primary consumers
- **Tertiary consumers** – feed on secondary consumers

Woodland food chain

Honeysuckle → aphids → ladybirds →



Producer → Primary consumer → Secondary consumer → Tertiary consumer

Learning check

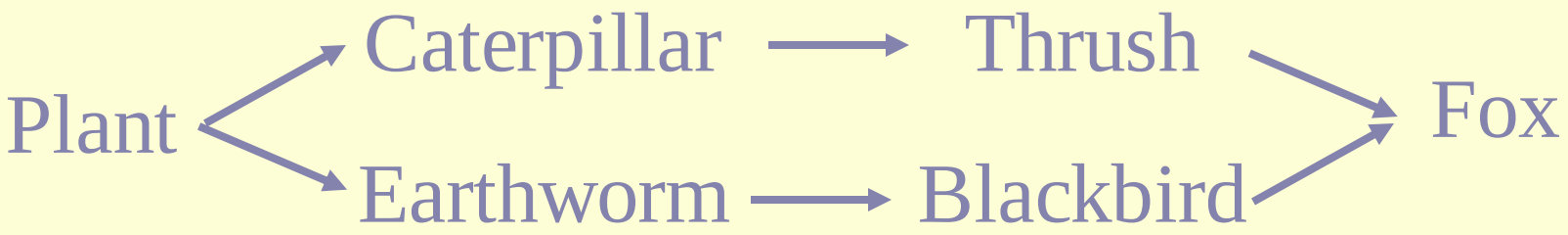
Construct a simple food web

Two food chains e.g.

Plant → caterpillar → thrush → fox

Plant → earthworm → blackbird → fox

Combine them to form a food web



Trophic Level

This refers to the position of an organism in a food chain.

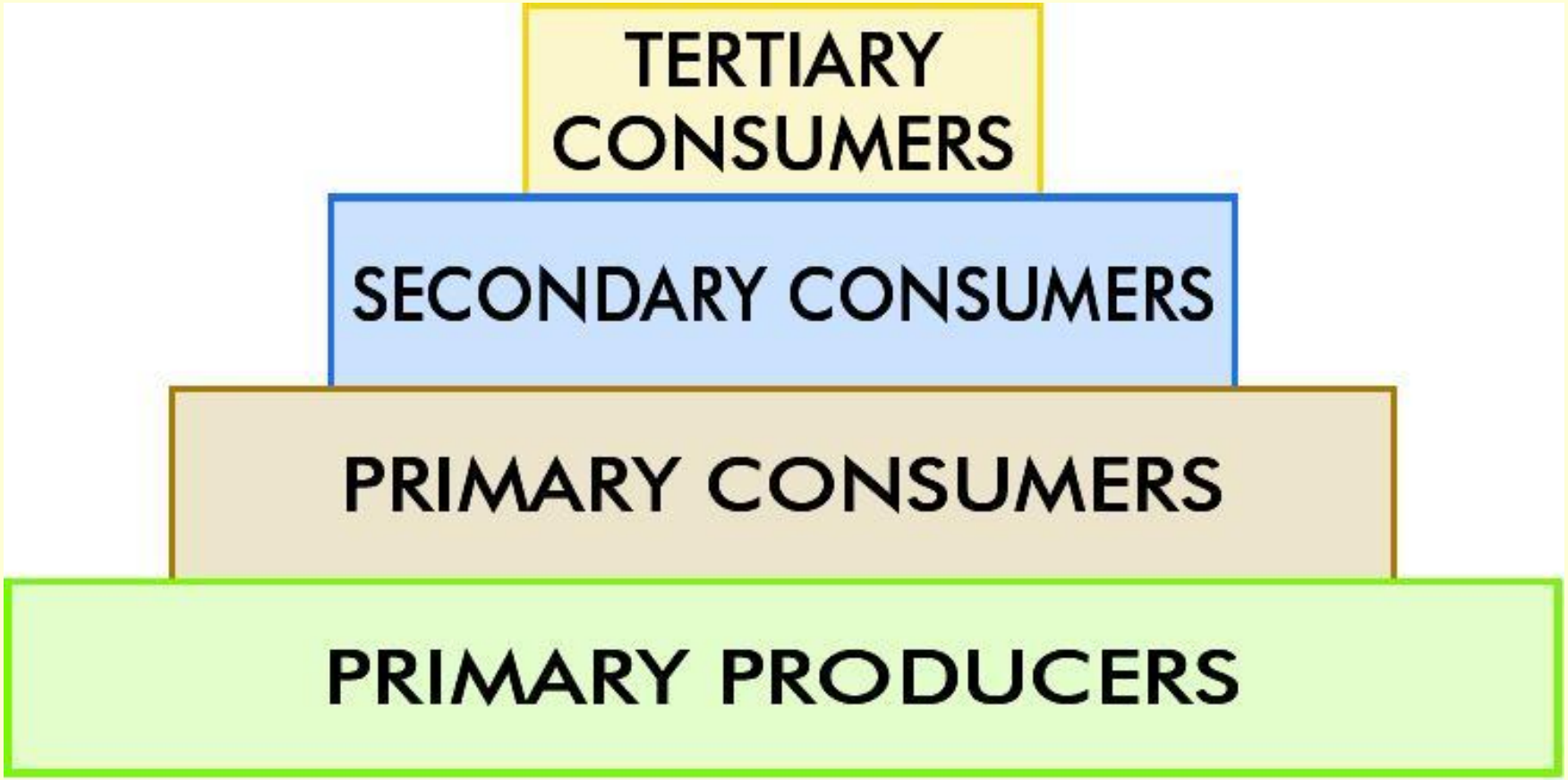
Plants are at the 1st trophic level (T1) and

Herbivores occupy the 2nd trophic level (T2).

Carnivores that eat herbivores are at the 3rd trophic level (T3).

The 4th trophic level (T4) is often occupied by the top carnivore.

Trophic levels



Pyramid of Numbers

A diagram that represents the numbers of organisms at each trophic level in a food chain.

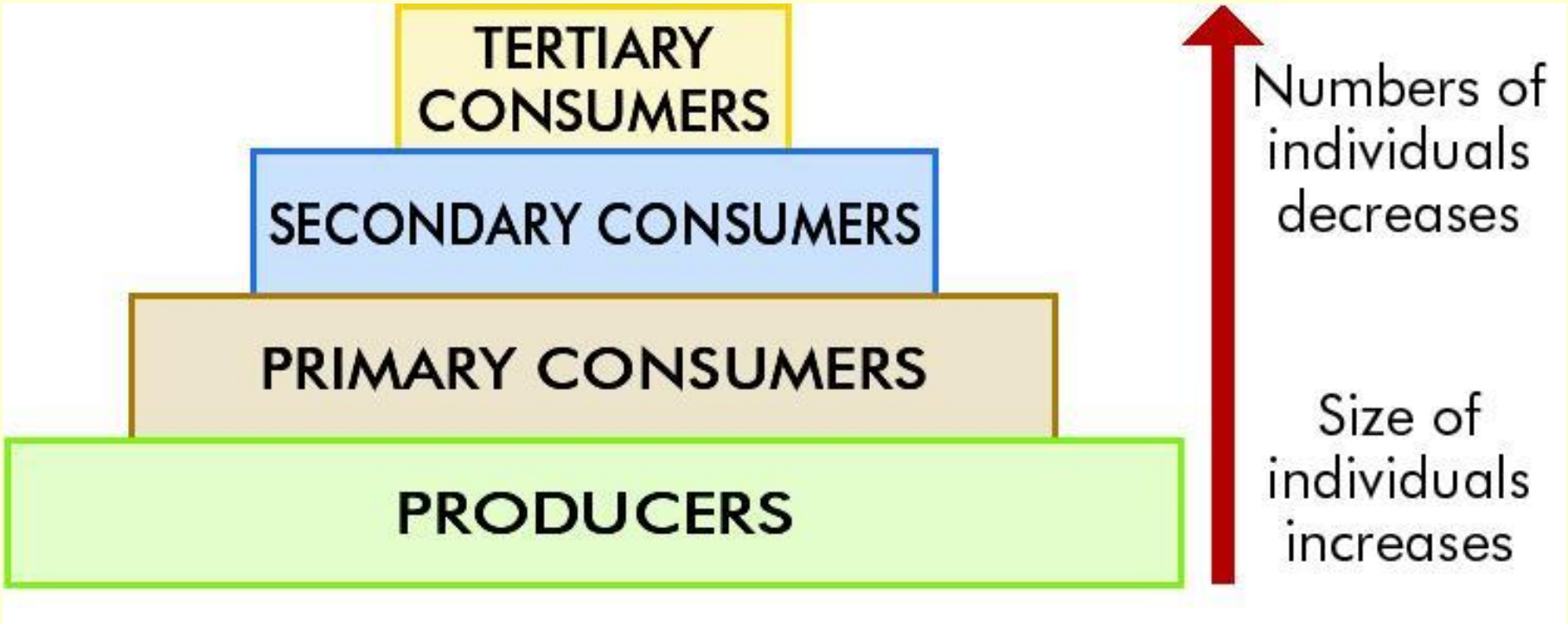
Bottom layer is the largest and represents a very large number of primary producers

The next layer smaller and represents a smaller number of primary consumers

The next layer – the no. of secondary consumers

The uppermost layer where there may be only

Pyramid of Numbers



Learning check

Explain the following terms:

- Producer
  - organism capable of making its own food by photosynthesis
- Consumer
  - organism that feeds on other organisms – cannot make their own food
- Primary Consumer
  - organism that feeds on producers
- Secondary Consumer
  - organism that feeds on primary consumers
- Tertiary Consumer
  - organism that feeds on secondary consumers

To construct a pyramid of numbers

1. Count the primary producers and place them at the base of the pyramid
2. Count each consumer and include them according to their status (primary or secondary consumer) in the pyramid
3. The apex of the pyramid should include tertiary or top carnivores
4. Draw the pyramid so that the area/volume of each level is

Learning check

What is meant by trophic level?

This refers to the position of an organism in a food chain.

T1 = 1st trophic level = Plants

T2 = 2nd trophic level = Herbivores

T3 = 3rd trophic level = Carnivores

T4 = 4th trophic level = (T4) Top Carnivore.

Learning check

Construct a pyramid of numbers and explain its use.

Construct:

1. …
2. …
3. …
4. …

Use:

attempts to show the energy structure of an ecosystem as a chart by counting the number of individuals at each trophic level