Activity 23C: Interrelationships

1. Key *terms* in ecology include:

organism species population ecological community ecosystem habitat environment biotic abiotic ecological niche adaptations tolerance stratification zonation succession producers consumers decomposers competition predation

Match these *terms* to the correct definition given in the list following.

a. living factors in the environment of an organism
b. occurs between organisms when resources are in short supply
c. sequence of stages by which a mature ecological community develops
d. the specific set of environmental conditions where an organism lives
e. all the plants and animals that live in the same area and interact
f. the structural, behavioural and physiological features of an organism that enable it to live successfully (in its niche)
g. non-living factors in the environment of an organism
h. all plants that produce food in photosynthesis and therefore start all food chains/webs
i. broad general conditions, both biotic and abiotic, where an organism lives
j. the distinct bands of life that occur; e.g. up a mountain as altitude changes, on an intertidal rocky shore as tidal exposure changes
k. animals that hunt, kill, and consume other animals; have a role in population control of herbivores
l. any living thing
m. organisms of the same kind which look alike and freely interbreed to form fertile offspring
n. all organisms that have to eat organic material for food
o. members of the same species that live in the same area
p. vertical layering of plants in an ecological community, e.g. forest
q. role of an organism in its community as determined by its habitat, adaptations and way of life
r. ability of an organism to cope with the range of any of the abiotic factors in its environment
s. the ecological community together with its physical environment
t. bacteria and fungi that break down wastes and bodies

2. Key trophic levels within an ecological community include the following:

autotroph, carnivore, consumer, decomposer, detritus feeder, filter feeder, herbivore heterotroph, omnivore, parasite, producer, saprophyte, scavenger

Match these terms to the correct definition given in the list following.

a. feed on dead matter
b. animal that feeds on organic particles in water

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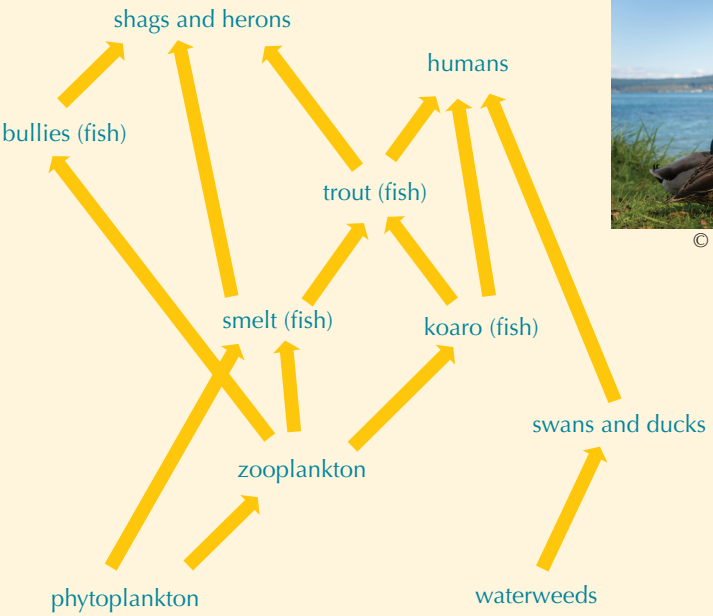
c. organism that feeds on other living organisms
d. green plants that produce their own food in photosynthesis
e. animal that feeds on organic particles in soil/sand/mud
f. animal that feeds on other animals
g. animal that feeds on food scraps and organic remains
h. organism that needs or consumes organic material for food
i. a 'self-feeder' producing its own food using energy from the Sun (photosynthesising plants) or chemical reactions (chemosynthesising bacteria)
j. animal that feeds on plants
k. break down (decompose) wastes and bodies
l. animal that feeds on both plants and animals
m. organism that can't produce its own food and must feed on organic matter

3. Distinguish between the following pairs of terms:
a. photosynthesiser and chemosynthesiser
b. producer and consumer
c. herbivore and carnivore
d. filter feeders and detritus feeders.

4. Distinguish between the following pairs of terms:
a. interspecific and intraspecific competition
b. commensalism and mutualism
c. predation and parasitism.

5. The diagram shows part of a food web in Lake Taupo.



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Identify organisms from the food web that are:

a. producers
b. 1st-order consumers
c. 2nd-order consumers
d. 3rd-order consumers
e. herbivores
f. 1st-order carnivores
g. 2nd-order carnivores
h. 3rd-order carnivores

6. Read the following extract and then answer the questions that follow.

> Approximately 30 years ago a small flatworm native to New Zealand was accidentally introduced into Ireland. The flatworm lives in the soil where it catches live earthworms. It secretes digestive enzymes onto them and then sucks up the soluble digested material. The flatworm takes about half an hour to digest a single earthworm.

(Adapted from: *Ecology*, Peter Chenn, 1999, London.)

Explain the feeding relationship between the flatworm and the earthworm.

7. Broad bean plants (*Vicia faba)* often have populations of aphids living on them. Aphids are small winged insects with piercing sucking mouthparts with which they suck glucose from the stems of plants. Aphids are eaten by small red-and-black beetles called ladybirds.

a. Explain the feeding relationship between:
  i. the aphid and broad bean
  ii. the aphid and the ladybird.

b. Draw a food chain for this relationship.

8. Radiata pines have root systems which are associated with fine colourless strands of mycorrhiza fungus. These strands extend from within the root tissues of the pine trees out into the soil and may reach the surface over time. The fungus lives on carbohydrates from the pine, but their presence in the roots allows the tree to take up water and nutrients more effectively.

Explain the relationship between the fungus and the pine.

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9. The following photograph shows part of a population of the common mud snail, *Amphibola crenata*, on an estuarine mud flat.

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a. Give the likely food source for *Amphibola* and *Amphibola*'s type of feeding.
b. Describe two abiotic environmental factors that will affect *Amphibola*.
c. Describe two biotic environmental factors that might affect *Amphibola*.
d. Explain two adaptations to living in this environment that the snail, *Amphibola*, would display.

Activity 23C answers: Interrelationships

1.
a. biotic
b. competition
c. succession
d. habitat
e. ecological community
f. adaptations
g. abiotic
h. producers
i. environment
j. zonation
k. predators
l. organism
m. species
n. consumer
o. population
p. stratification
q. niche
r. tolerance
s. ecosystem
t. decomposers

2.
a. saprophyte
b. filter feeder
c. parasite
d. producer
e. detritus
f. carnivore
g. scavenger
h. consumer
i. autotroph
j. herbivore
k. decomposer
l. omnivore
m. heterotroph

3.
a. A photosynthesiser makes its food from CO_2 and H_2O using solar energy, while a chemosynthesiser uses the energy from chemical reactions to bind raw materials into food.
b. A producer is a plant that makes food in photosynthesis (can more rarely be chemosynthetic bacteria), while a consumer is an organism/animal that has to eat food/organic material as it cannot make its own.
c. A herbivore is an animal that eats plants/vegetation, while a carnivore is an animal that eats other animals/flesh eater.
d. A filter feeder filters microscopic organisms/organic material/plankton from the surrounding water, while a detritus feeder consumes organic material from the

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surface / in the substrate that it lives on/in.

4. **a.** Interspecific competition occurs between different species, while intraspecific competition occurs between members of the same species.
   b. Commensalism is a relationship between two organisms in which one benefits and the other is neither benefited or harmed, while mutualism is a relationship in which both organisms benefit.
   c. Predation occurs when one animal kills and eats another, while in parasitism one organism feeds off another living organism without (deliberately) killing it.
5. **a.** phytoplankton, waterweeds
   b. zooplankton, swans and ducks, smelt
   c. bullies, smelt, koaro, trout, humans, shags and herons
   d. shags and herons, humans, trout
   e. smelt, zooplankton, swans and ducks
   f. bullies, smelt, koaro, trout, humans, shags and herons
   g. shags and herons, trout, humans
   h. humans, shags and herons
6. The flatworm is a predator/carnivore of the earthworm; because it hunts and kills and eats earthworms.
7. **a.** **i.** The aphid is a(n) (ecto) parasite of the broad bean; because it is feeding on the glucose/food from the living plant.
      ii. The ladybird is a predator/carnivore of the aphid; because it is killing and eating the aphid.
   b. bean ➡ aphid ➡ ladybird
8. The relationship is mutualism; because both benefit – the pine because it gets better access to water and nutrients, and the fungus because it gets a source of food (carbohydrates).
9. **a.** *Amphibola crenata* feeds on the organic matter on the surface of the mud so is a detritus feeder.
   b. Marked change in salinity (lives in estuary) twice a day as tide and river ebb and flow; marked change in environmental temperature as water ebbs and flows.
   c. Possible intraspecific competition with other mud snails; possible interspecific competition with other detritus feeders; possible predation from, e.g. whelks and seagulls.
   d.

Two adaptations	Explanation
Snails must be tolerant to varying levels of salinity/temperature/exposure	Regular tidal movements cause great variations in these factors
Hard shell	Protection from water movement/ desiccation/predation
Muscular foot	Movement across the mud (e.g. for feeding, finding a mate)