Ecology

## Food chains and webs

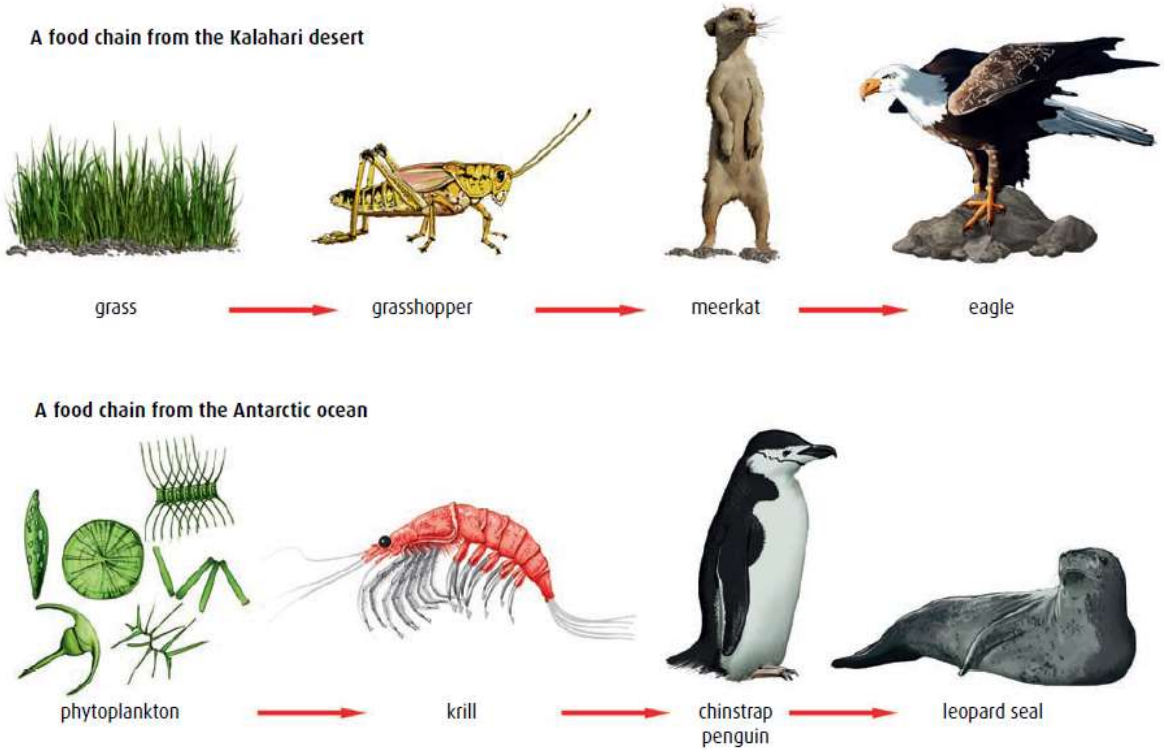
Every organism needs food to survive but eventually it is eaten too. In any ecosystem, there is a hierarchy of feeding relationships that influences how nutrients and energy pass through it. The sequence of organisms that provide food for one another is known as a **food chain**.

Consider a hyena eating a cheetah. The cheetah could have eaten an antelope, which in turn had eaten leaves from a plant. Thus, the four organisms form a food chain:

**plant → antelope → cheetah → hyena**

Every organism fits somewhere in a food chain, and although the organisms that make up the food chain will vary from place to place, almost every food chain starts with a green plant. It may be any part of the plant – the leaves, roots, stems, fruits, flowers or nectar. Green plants start food chains because they are able to capture light energy from the Sun and synthesise sugars, amino acids, lipids and vitamins, using simple inorganic substances such as water, carbon dioxide and minerals. Plants are called **autotrophs** (which means 'self feeding') or **producers** because they 'produce' organic compounds by photosynthesis. Every other organism in a food chain gets its organic compounds from its food and so is called a **heterotroph** or **consumer**.

There are two examples of food chains from different ecosystems. Notices that the arrows in a food chain always point in the direction in which the energy and nutrients flow.




When an organism dies, its remains provide nutrients for other groups of organisms called **detritivores** and **saprotrophs**. Detritivores are organisms that ingest dead organic matter, whereas saprotrophs are organisms that secrete digestive enzymes onto the organic matter and then absorb their nutrients in a digested form. Saprotrophs are therefore responsible for the decomposition of organic matter and are often referred to as **decomposers**. Saprotrophic bacteria and fungi are the most important decomposers for most ecosystems and are crucial to the recycling of nutrients such as nitrogen compounds.

Walpole B. and col. (2011): Biology for the IB Diploma. Cambridge University Press

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**Food webs**

Few consumers feed on only one source of food. For example, following food chain describes one set of feeding relationships:

grass → beetle → tree creeper → sparrow hawk

But beetles eat a wide range of plants, tree creepers eat other types of insect and sparrow hawks eat other birds. So this food chain could be interlinked with many others. A food web like the one shown in Figure 2 shows a much more realistic picture of the feeding relations of the organisms in a habitat. Notice how organisms change trophic levels depending on what they are eating at any particular time. In Figure 2, for example, the fox is a primary consumer when it is eating a crab apple but a secondary consumer when it is eating a wood mouse.

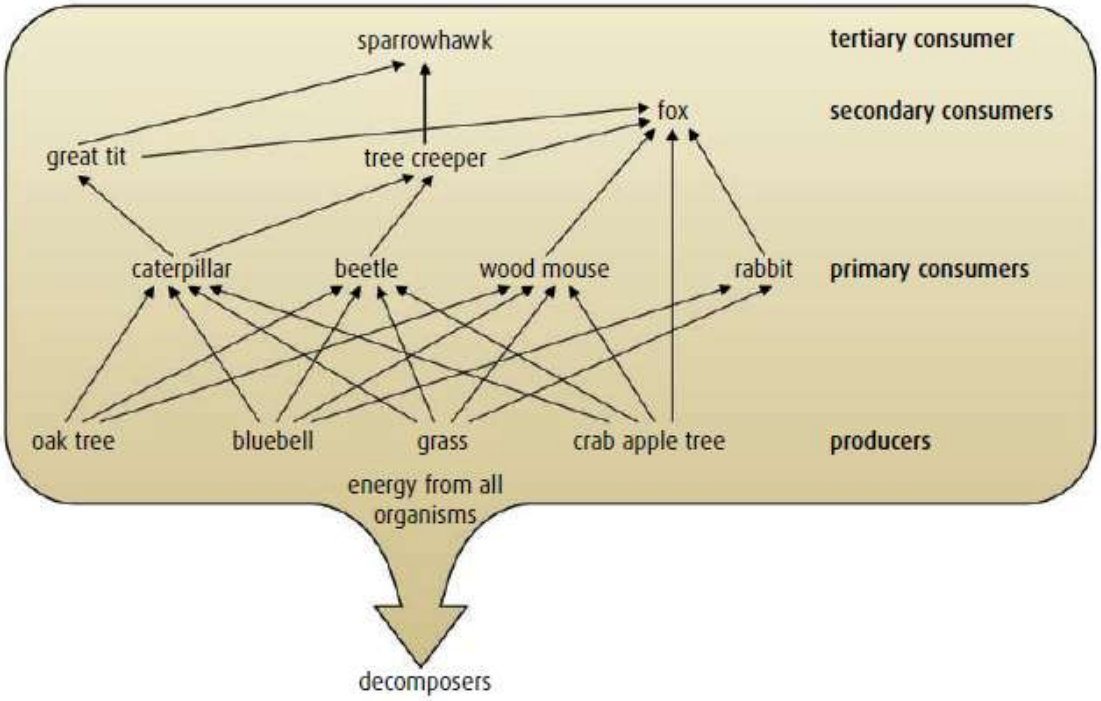


**Figure 2** A food web in oak woodland.

In the food web in picture above, what is the trophic level of:

a) the tree creeper when eating a caterpillar?

b) the fox when eating a great tit?