

Chapter 11-8: A Food Web

The sequence of relationships between predators and prey in a community manifests itself in a system known as the food chain, as we discussed in the previous plate. All of the food chains in an ecosystem form a food web. A food web includes the food sources and feeding patterns of all of the organisms in a particular ecosystem.

Food chains are deceptively simple, and they do not necessarily reflect all of the interrelationships in nature. Food webs, by comparison, are quite complex, and as it may be impossible to identify all the feeding relationships that exist, they only indicate probable feeding relationships.

This plate consists of a single, large diagram that shows the relationships between numerous living organisms. Begin your work at the bottom of the diagram and work toward the top.

Communities that have complex food webs and contain large numbers of species exhibit stable population sizes, while those with fewer species are more subject to changes in size. In a food web, consumers rely on more than one species for sustenance, so it is unlikely that any one of these species will be eliminated through overexploitation. In simple systems, by contrast, fewer species of plants and animals live, and if one heavily-relied upon species in the food chain disappears, the entire system might fall apart.

In this plate, we begin the food web at the bottom, where there are three different types of **producers (A)**. The bracket indicating the three plants should be colored in a bold color. To the far left, we see the **grasses (A₁)**. These engage in photosynthesis to produce simple and complex carbohydrates. They also extract minerals from the soil and incorporate them into organic materials.

In the center are the **water plants (A₂)**, represented by a periwinkle. Living at the water's edge, these plants also produce carbohydrates. Like the grasses, they are known as autotrophs because they produce their own food. The **terrestrial plants (A₃)** are represented by goldenrods.

Having surveyed the producers in the food web, we now turn to the primary consumers. Your attention should now be directed to the next level as you continue your reading below.

Animals that feed only on plants are herbivores. In our food web, the **primary consumers (B)** are herbivores. The **field mouse (B₁)** feeds on grass, which is also consumed by the **grasshopper (B₂)**. The grasshopper also feeds on periwinkles and terrestrial plants such as the goldenrod. As the diagram shows, two plants are consumed by the **butterfly (B₃)**, and the goldenrod serves as a food source for both the butterfly and common **housefly (B₄)**. Already we see that the flow of nutrients in a food web is more complex than in a food chain.

We now focus on the higher levels of the food web. Notice that many of the primary consumers are prey for consumers that are higher on the food web. Your focus should be on the upper level of the plate and the animals in bracket C. Continue your reading as you examine the food web.

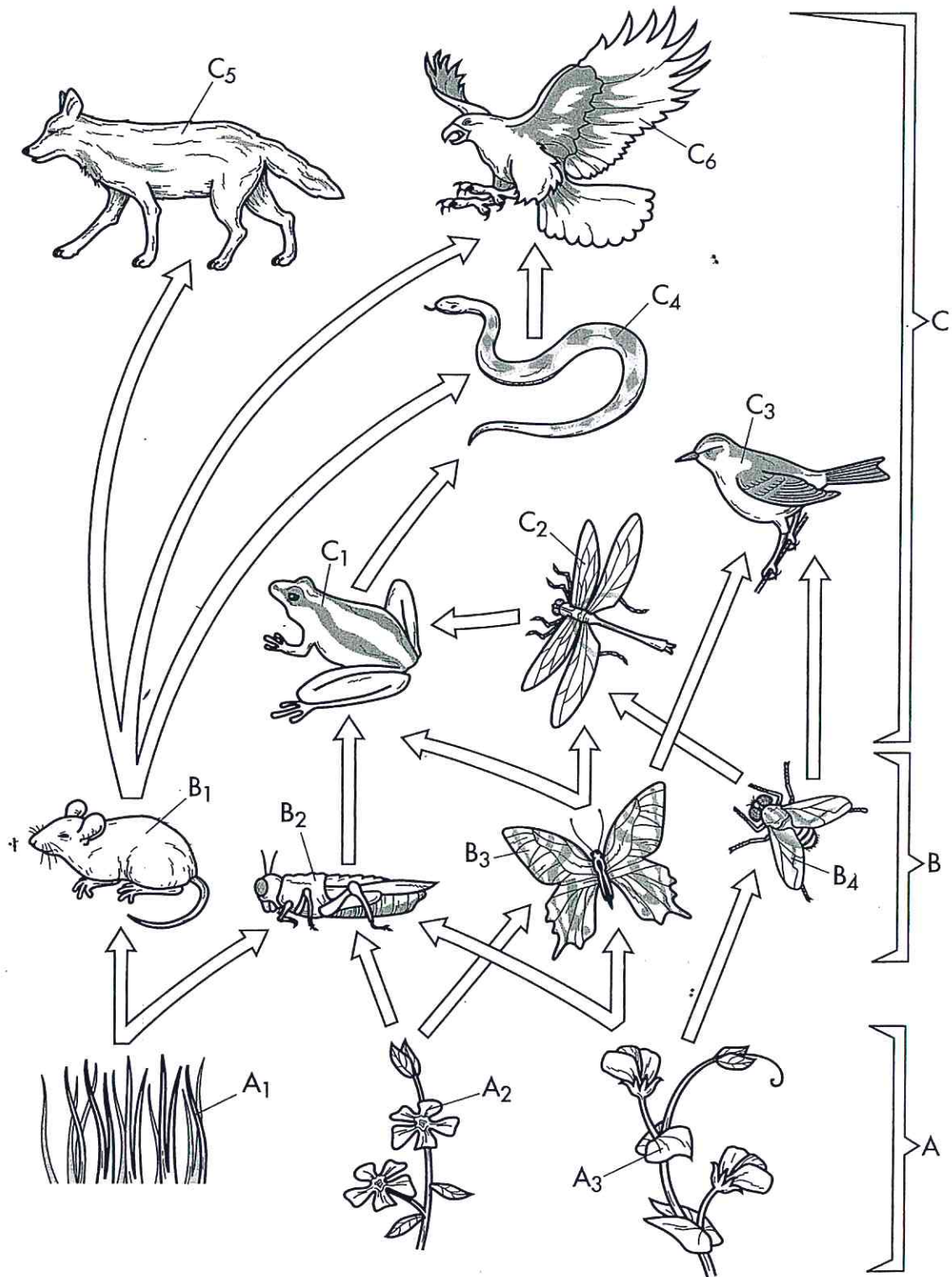
The animals that feed directly on the primary consumers are **secondary consumers (C)**. The secondary consumers provide food for tertiary consumers, who in turn provide food for quaternary consumers.

Focus for a moment on the grasshopper. It is a primary consumer and is preyed on by the **frog (C₁)**, a secondary consumer. The **snake (C₄)** is a tertiary consumer, since it eats the frog, and the **hawk (C₆)** is a quaternary consumer, since it eats the snake. The hawk (C₆) is also a secondary consumer because it feeds on the **field mouse (B₁)**. Now focus on the **coyote (C₅)**. This animal feeds on the field mouse, so it is a secondary consumer.

Consider the **dragonfly (C₂)**. This animal is a secondary consumer since it feeds on the **housefly (B₄)**, a primary consumer. Follow the food chain from the goldenrod, to the housefly, to the dragonfly, and on to the frog, snake, and hawk. Note that there are many trophic (feeding) levels in these relationships.

Conclude your work by focusing on the **bird (C₃)**. It feeds on both the butterfly (B₃) and the housefly (B₄). It is clear that should the housefly disappear, the bird could continue to live on the butterfly. This is why the food web yields a stable population. If the bird relied solely on the housefly, then it would become extinct if the housefly disappeared.

We have not included all possible predator-prey relationships in this food web. You may complete the plate by drawing arrows between various animals that may feed on others. For example, the bird may be considered food for the hawk. See if you can determine any other possible relationships in this food web.



A Food Web

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|------------------------------------------------------------|-------------------------------------------------------|-----------------------------------------------------|
| <input type="radio"/> ProducersA | <input type="radio"/> Field MouseB ₁ | <input type="radio"/> DragonflyC ₂ |
| <input type="radio"/> GrassesA ₁ | <input type="radio"/> GrasshopperB ₂ | <input type="radio"/> Bird.....C ₃ |
| <input type="radio"/> Water PlantsA ₂ | <input type="radio"/> ButterflyB ₃ | <input type="radio"/> SnakeC ₄ |
| <input type="radio"/> Terrestrial Plants....A ₃ | <input type="radio"/> Housefly.....B ₄ | <input type="radio"/> Coyote.....C ₅ |
| <input type="radio"/> Primary ConsumersB | <input type="radio"/> Secondary Consumers ..C | <input type="radio"/> Hawk.....C ₆ |
| | <input type="radio"/> Frog.....C ₁ | |