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COMMUNITIES

No living organism exists entirely by itself. It is always profoundly influenced by its environment. The branch of biology that studies the relationships between living organisms and their environments is known as ecology (Greek: *oikos,* "house"). Ecologists concentrate much of their study on communities and ecosystems. A community is defined as all of the organisms living in a given area and interacting with one another. An ecosystem is a community plus all of the nonliving components of its environment. This plate shows some of the components of a typical biological community and their relationships.

Color the heading "Trophic Levels," title A, and the corresponding part of the illustration.

Within a community, organisms are categorized into different "trophic levels" according to how they nourish themselves (Greek: *trophe,* "nourishment"). The most important organisms are the *producers,* the green plants that capture the energy of sunlight to make the energy-rich organic molecules on which all the rest of the community depends. (In some communities, algae or even certain bacteria may be the important producers.)

Color title B and the corresponding parts of the illustration.

Feeding directly on the producers are the *herbivores* (Latin: *herba,* "grass"; *vorare,* "to devour"), also known as *primary consumers.* Familiar members of this group include grasshoppers, butterflies, and other herbivorous insects, rabbits, squirrels, mice, and seed-eating birds.

Color title C and the corresponding parts of the illustration.

Animals that feed on the herbivores are called *primary carnivores* (Latin: *caro,* "flesh"). They are also called *secondary consumers.* It's unfortunate that they are "primary" one time and "secondary" another, but both naming systems are widely used. If you think about what the words actually mean, it really isn't too difficult to keep them straight. Included among the primary carnivores are such animals as foxes, owls, frogs, insectivorous (insect-eating) birds, and predatory insects such as the praying mantis.

Color title D and the corresponding parts of the illustration.

Animals that feed on primary carnivores are called *secondary carnivores* (or *tertiary consumers*). A snake that eats a frog is a secondary carnivore. So is a hawk that eats an insectivorous bird. Nature, of course, does not entirely cooperate with our desire for nice, neat categories. A fox may eat a frog, becoming a primary carnivore in the process; it may then eat a snake, becoming a tertiary carnivore in that process. Similarly, a mouse may eat an occasional insect, becoming thereby a primary or even a secondary carnivore, depending on what kind of insect it eats. Some animals, such as humans, baboons, and rats, routinely feed at all levels and are called omnivores (Latin: *omni,* "all"). Recognizing that the various categories of carnivores are oversimplifications, ecologists still find them useful, and carnivores and omnivores are traditionally assigned to the highest trophic level at which they feed.

Color title E and the corresponding part of the illustration.

Feeding on all the other levels is the group called *decomposers.* (They are sometimes called reducers, but they do not reduce things in the chemical sense; they live by oxidation.) We don't apply the term "omnivore" to the members of this group, bacteria and fungi, because they do nearly all their feeding on dead organisms. The decomposers break down the dead remains of all species (including their own) into small, inorganic molecules that are released into the soil and water to be recycled as nutrients for the producers.

Color the heading "Food Web," titles F and G, and the associated parts of the illustration.

The pattern of the flow of energy and matter within a community is often referred to as a "food web." In the community illustrated here, that pattern is shown by the arrows, which indicate the transfer of energy and matter from one organism to the next. Only the direction of flow is shown, not the quantity of energy or matter. Those quantities are customarily shown by means of ecological pyramids, illustrated in the next plate.

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TROPHIC LEVELS★

PRODUCER$_A$
HERBIVORE (PRIMARY CONSUMER)$_B$
PRIMARY CARNIVORE (SECONDARY CONSUMER)$_C$
SECONDARY CARNIVORE (TERTIARY CONSUMER)$_D$
DECOMPOSER$_E$

FOOD WEB★

CONSUMPTION$_F$ DECOMPOSITION$_G$