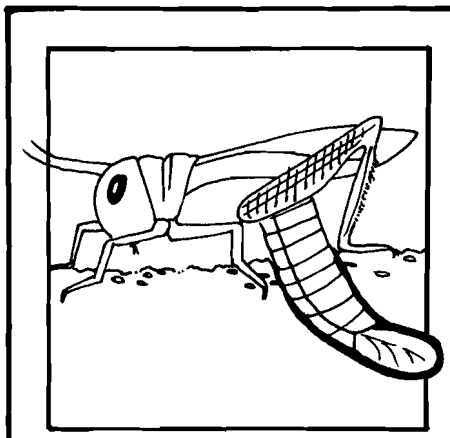
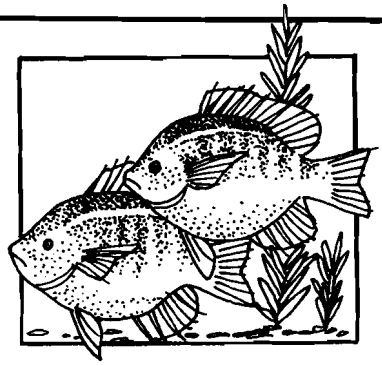
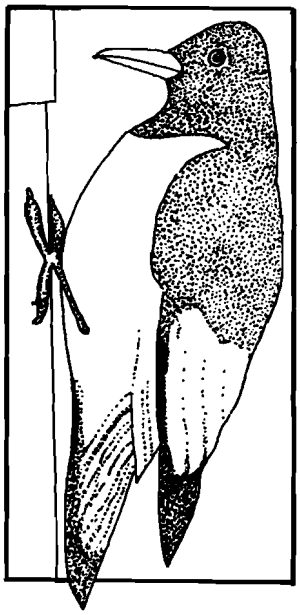
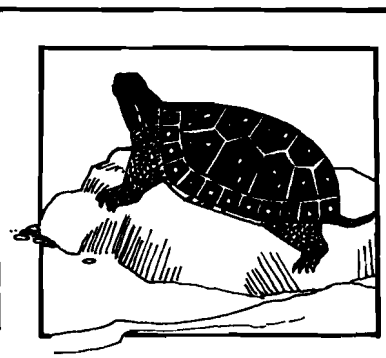
Circular 543



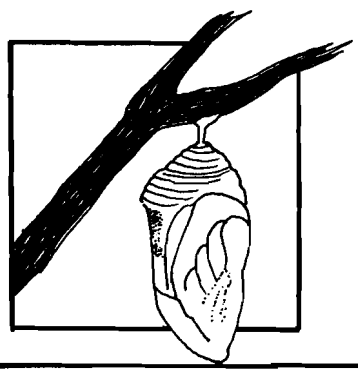


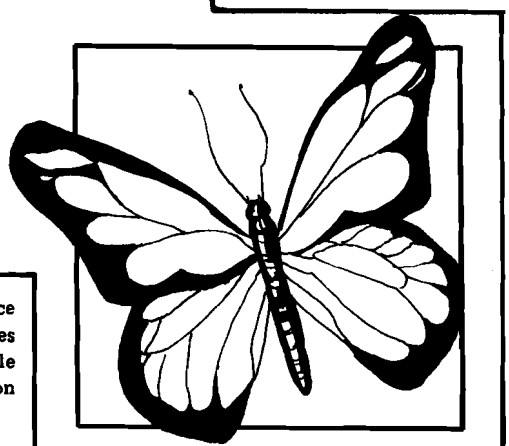
ALL ABOUT PESTS





IPM made easy





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Sections of this unit adapted from **Apply Pesticides Properly: A Guide for Pesticide Applications.**

All About Pests

C. A. Boyles and P. G. Koehler

To Help You

As you use this publication, watch for words written in *italics*. Look in the glossary in the back for an explanation of these words.

Statement of Purpose

In the 1960's and 1970's, people began to worry about the harmful effects of *pesticides* and other poisons. Pesticides are needed to manage many pests of man, his crops and animals. To help protect soil, water and air (the *environment*), man no longer uses some pesticides.

Integrated Pest Management (IPM) is an effective but less harmful way of managing pests of all kinds. An IPM user looks at the whole picture — the pest, the host, and the environment. Then following IPM methods, the user chooses one or several ways to manage the pest.

Most pesticides are made from the same materials as gas and oil. Gas and oil are also used to apply pesticides. Through IPM, wiser use of pesticides helps to save energy.

The purpose of this book is for you to learn the basic ideas of IPM. You should be able to manage pests safely, with less energy and lower cost.

All About Pests helps explain the kinds of pests we try to manage in IPM programs. It will help you identify the beneficial as well as pest organisms.

For more information, check these publications, available from your County Extension Agent:

Pest Management — Where to Start? — Circular 548
Using Natural Enemies to Manage Pests — Circular 545
Cultural Practices to Manage Pests — Circular 547
Spraying Away Pests — Circular 544
Plants Protected from Pests — Circular 546
The ABC's of IPM — Circular 549

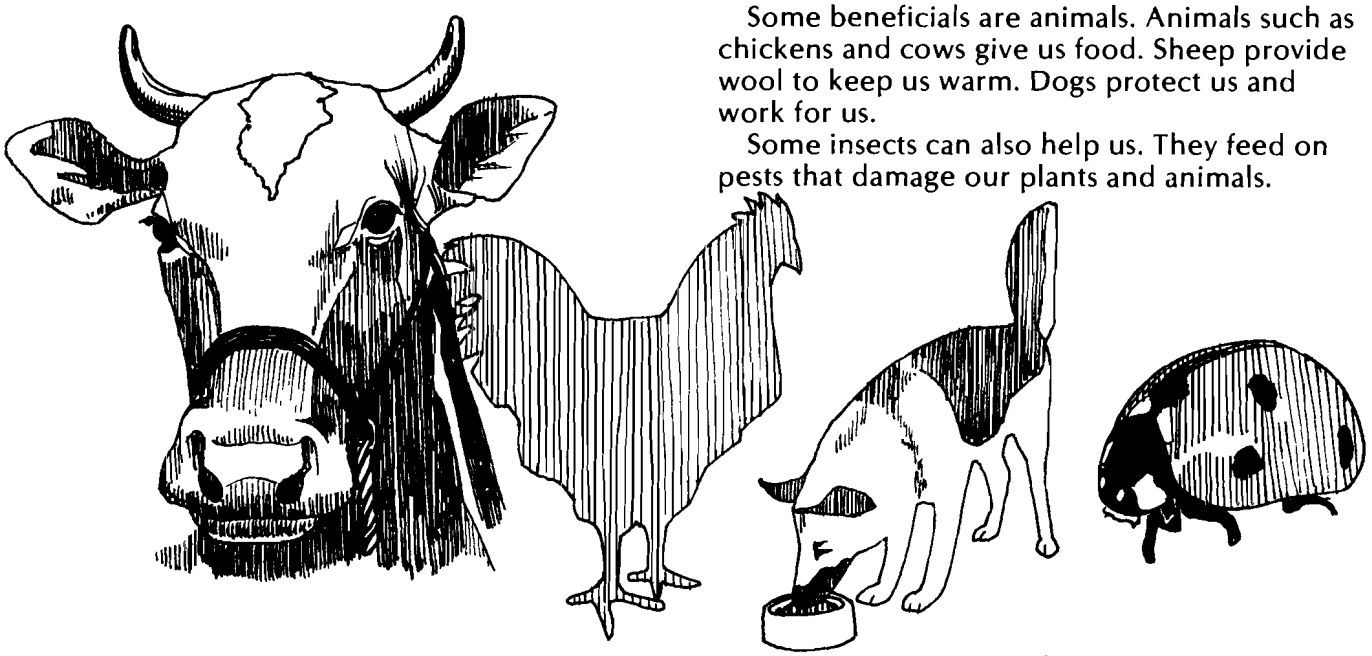
Do They Help or Hurt?

Do you know the difference between a *beneficial* and a *pest*?

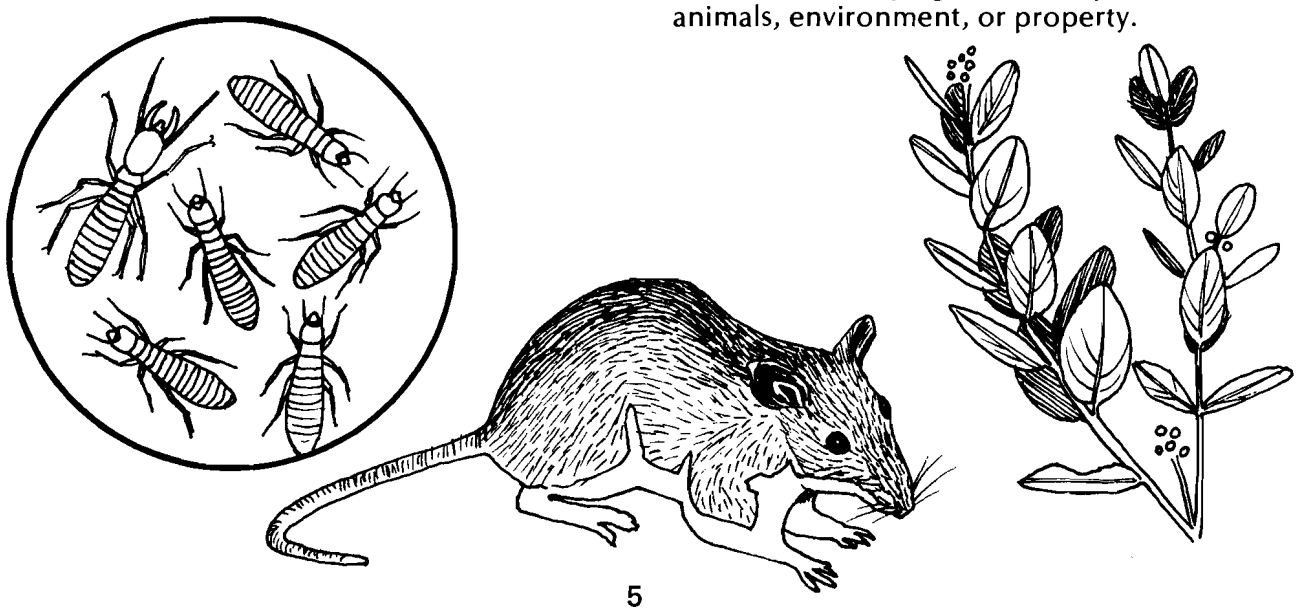
A beneficial is an *organism* (a plant or an animal) that helps man. It may be a plant that gives us something like lumber (from trees) or fabric (from cotton plants). All of these plants are called crop plants.

Some beneficials are animals. Animals such as chickens and cows give us food. Sheep provide wool to keep us warm. Dogs protect us and work for us.

Some insects can also help us. They feed on pests that damage our plants and animals.

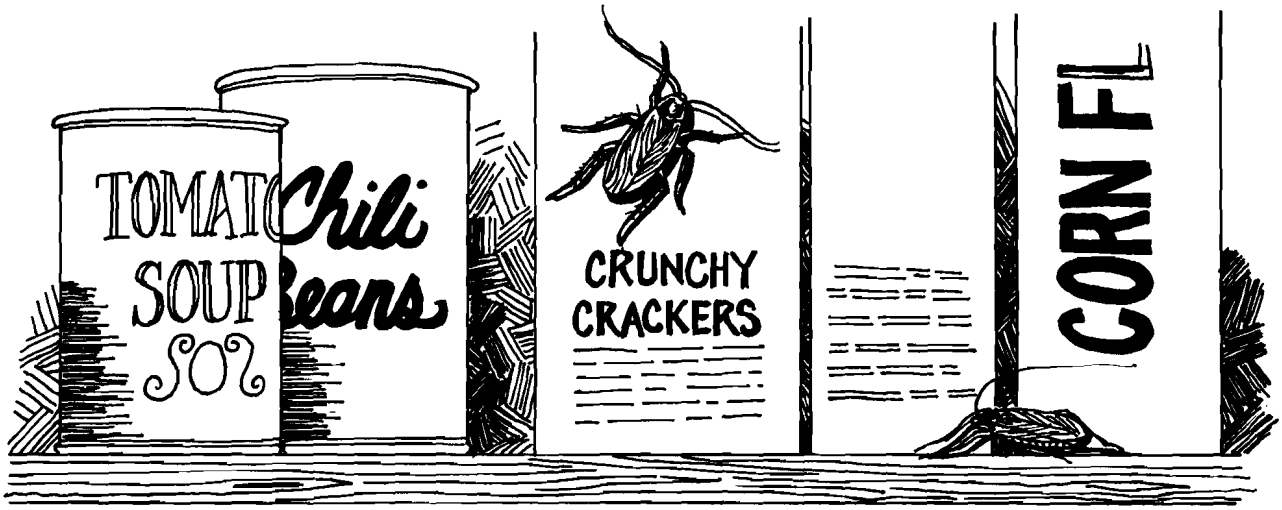


A pest is an organism that man sees as harmful or annoying. Pests many affect man, animals, environment, or property.



Some pests live closer to us than the ones on our crops. Cockroaches live in and around our houses. Pests like mosquitoes and fleas actually bite us.

The plants or animals that pests feed or live on are called *hosts*.



When you think about pests, there is one important thing to remember. The organism is a pest because of how it affects man. For instance, a rabbit eating plants in the garden is a pest but a rabbit in the woods is not a pest.

Five Groups of Pests

Different kinds of pests cause different kinds of damage. To understand what damage a pest causes, it would help to be able to identify the pest.

Pests can be divided into five groups:

1. *Arthropods* — Insects, Mites, Ticks and Spiders
2. *Vertebrates* — Animals with backbones
3. *Weeds*
4. *Pathogens* — Disease-causing organisms
5. *Nematodes*

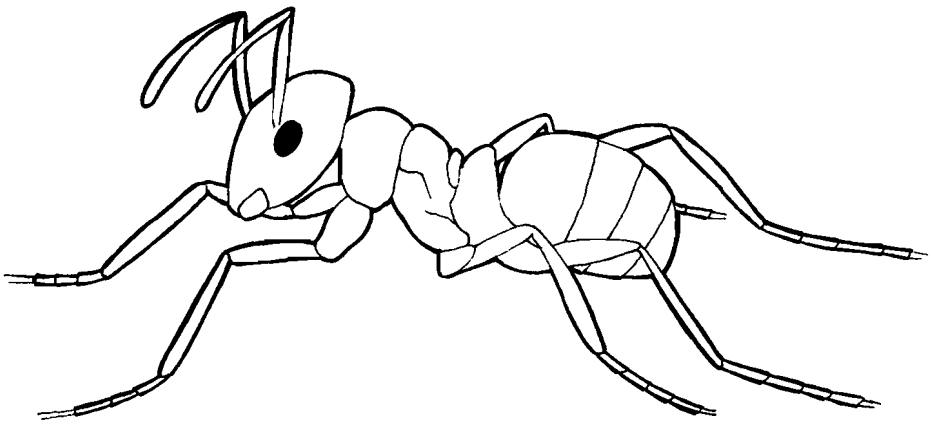
This section will tell you something about each of these groups.

1. Arthropods — Insects, Mites, Ticks, and Spiders

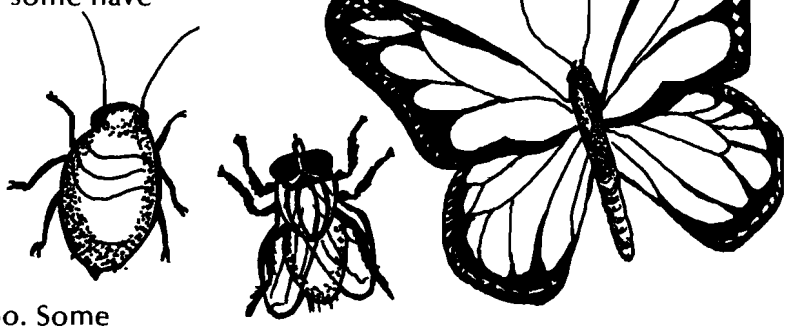
Arthropod means jointed feet. (If you look at an insect's legs, you'll see why.)

Arthropods can live almost anywhere. Some live above the ground, some live in soil, and some live in water. They may live in forests, or the desert, in houses, or on animals.

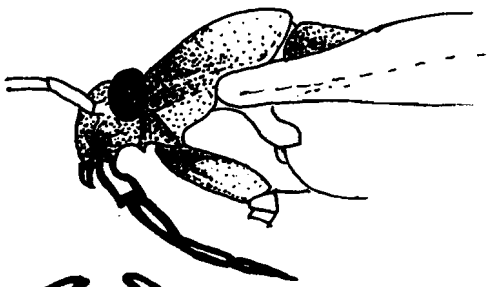
Insects. The largest group of arthropods is insects. Two things will help you tell adult insects from other arthropods. Adult insects have six legs and three body parts.



All insects are not alike. Some insects have no wings. Some have one pair and some have two pairs of wings.



Insect mouthparts may differ, too. Some insects have mouthparts that chew. Others have mouthparts that pierce and suck.



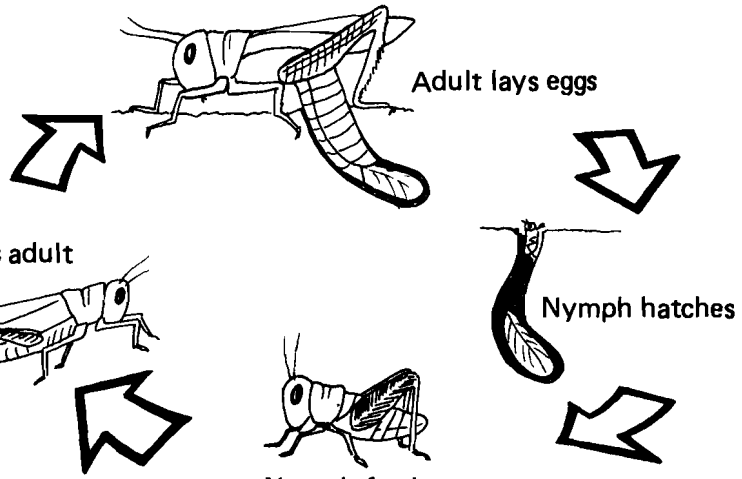
Almost all insects change shape and size during their lives. This change is called *metamorphosis.*

Some insects change size, and change shape just a little or not at all.

The adult lays eggs. A wingless *nymph* hatches from each egg. The nymph feeds and grows until it becomes an adult with wings.

Pests like these can do harm during all stages of their lives except while they are eggs.

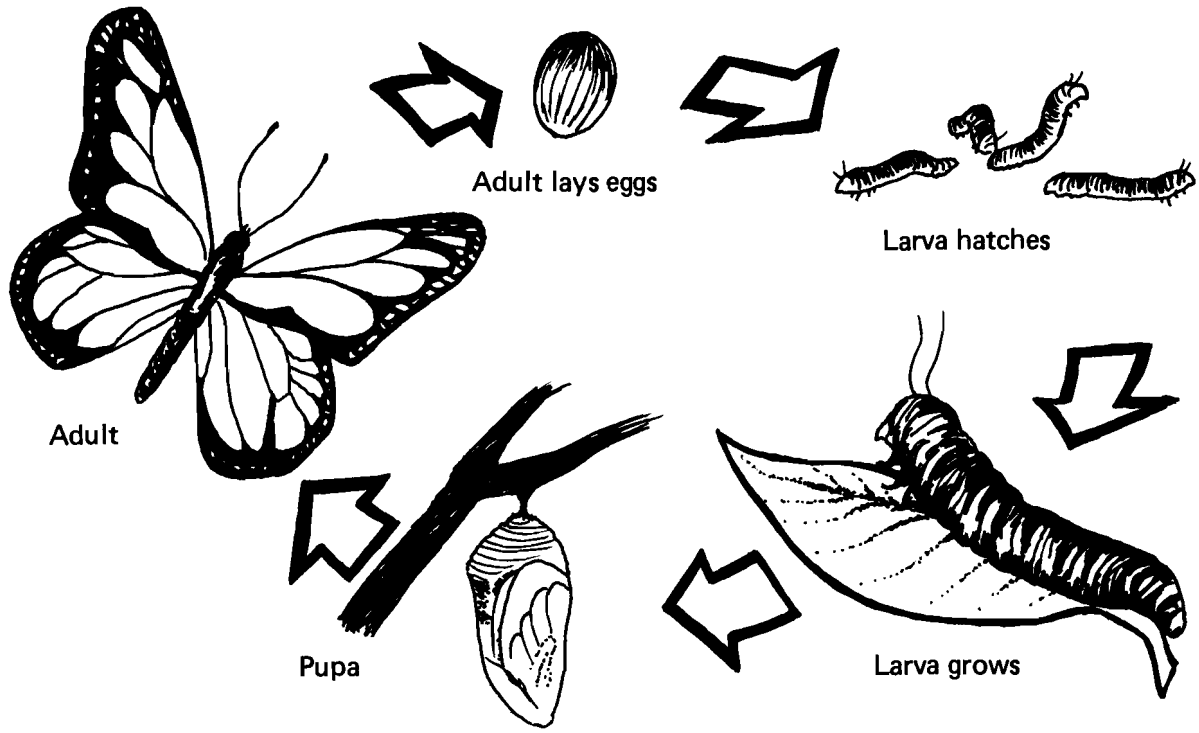
Grasshoppers, lice, termites, and stinkbugs belong to this group.



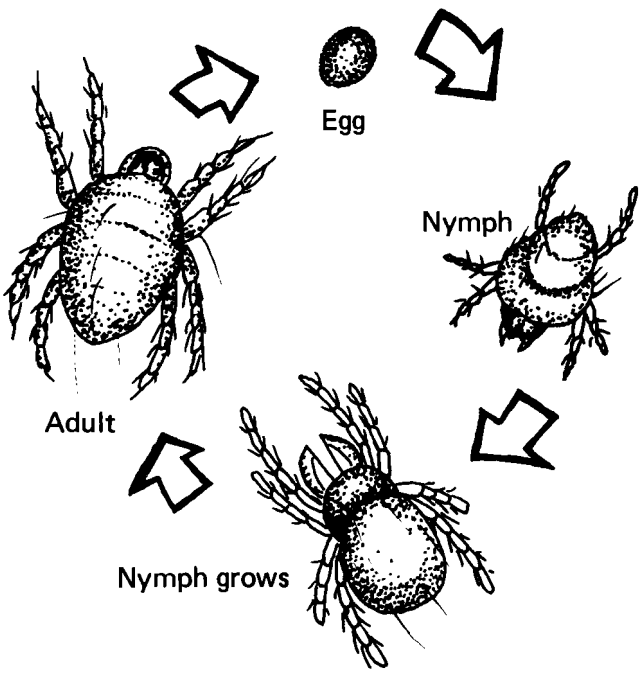
Other insects change completely. They go through four stages. The adult lays eggs. A *larva* hatches from each egg. The larva grows in size without changing shape and then enters a *pupa* or changing stage. The adult emerges from the pupa.

Insects of this kind cause most or all of their harm while they are larvae.

Butterflies, moths, beetles, mosquitoes, bees, and wasps belong to this group of insects.



Mites, Ticks and Spiders. Mites, ticks, and spiders are all related to insects. They grow in similar ways. Most mites are only about the size of the period at the end of this sentence. They do not have wings. Some mites feed on plants. Some kinds feed on animals and others live and feed on insects.

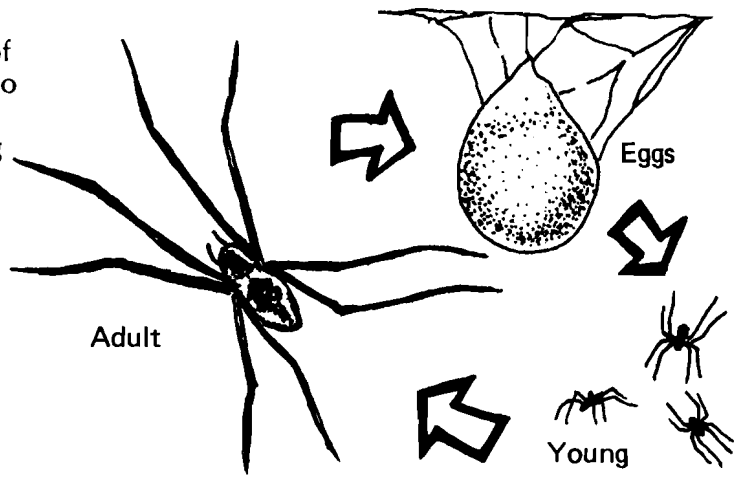


An adult mite lays eggs. A six-legged nymph hatches from each egg. As the nymph grows, it develops two more legs. It grows until it becomes an adult mite.

Ticks grow the same way mites do but they are larger than mites. They live on animals, including man. They suck blood. They need to feed on blood to complete their life cycle.

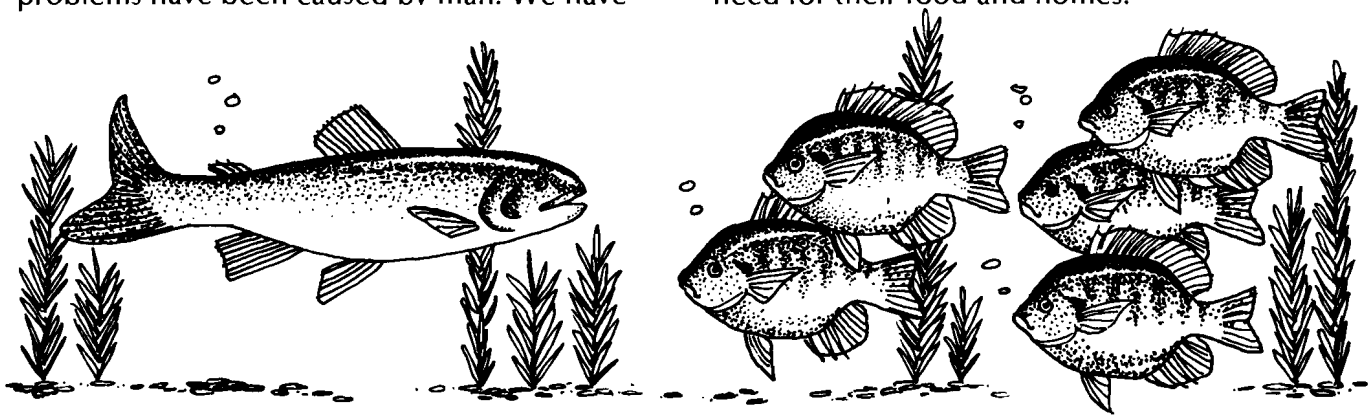
Only a few kinds of spiders are harmful to man. Most of them eat insects. Some kinds of spiders are very small, but others may grow to six inches across.

An adult spider lays eggs, usually in an egg sac. Each egg hatches into a tiny spider that looks like an adult. The spider grows in size until it becomes an adult.

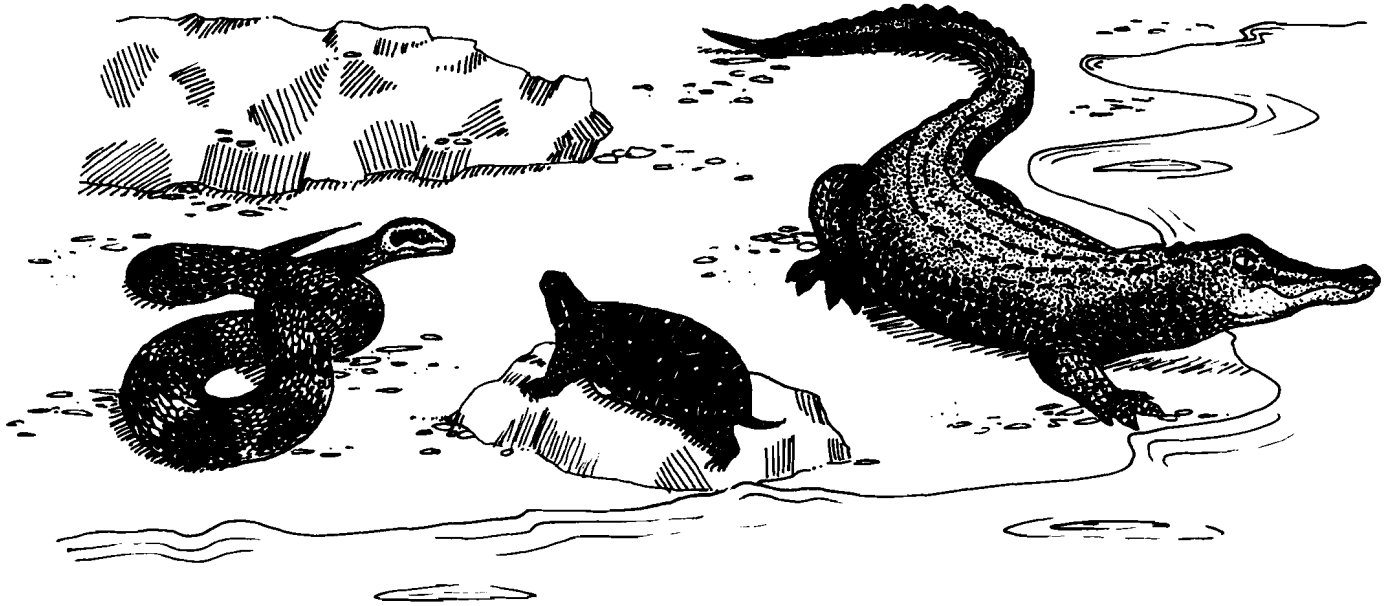


2. Vertebrates — Animals With Backbones

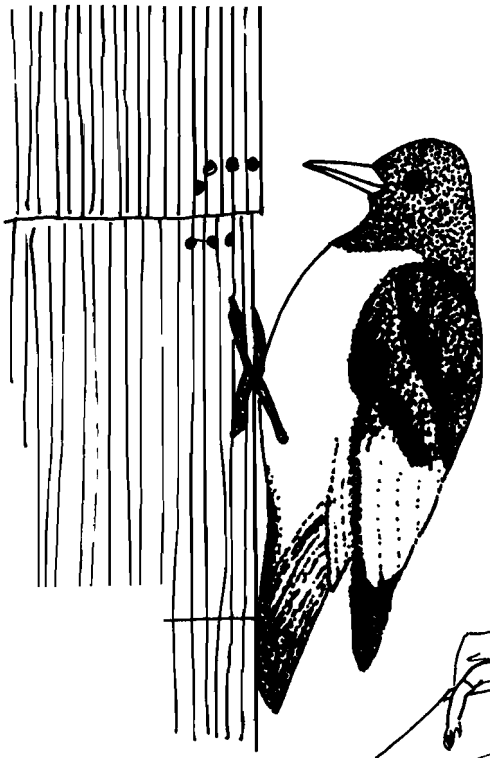
Fish. Fish can be pests. However, most fish problems have been caused by man. We have put fish from other places into local lakes and streams with native fish. Sometimes these imported fish *compete* with the local fish that we eat. They may eat vegetation that local fish need for their food and homes.



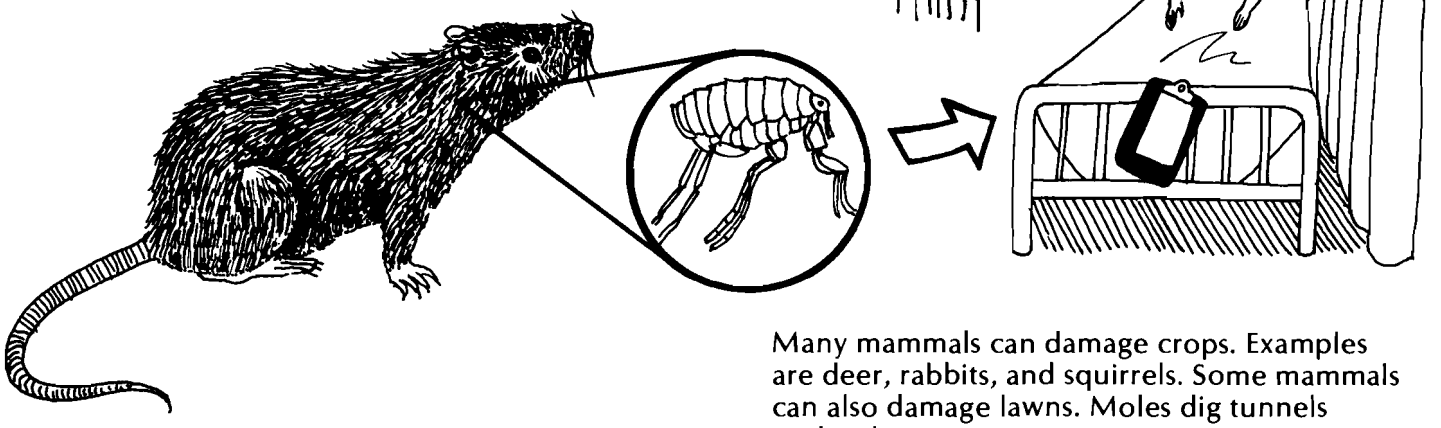
Snakes, Alligators and Turtles. Alligators, certain kinds of turtles and poisonous snakes can be a real problem sometimes. This is especially true where fish are being raised.



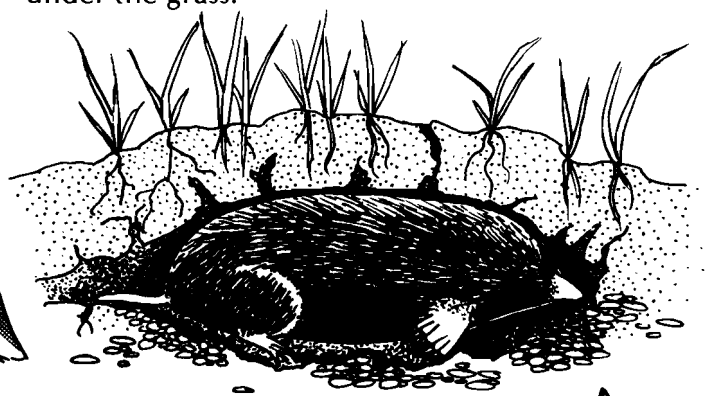
Birds. Different kinds of birds can cause different problems. Woodpeckers can damage houses and other buildings. Some birds eat seeds, nuts and fruit that people grow.

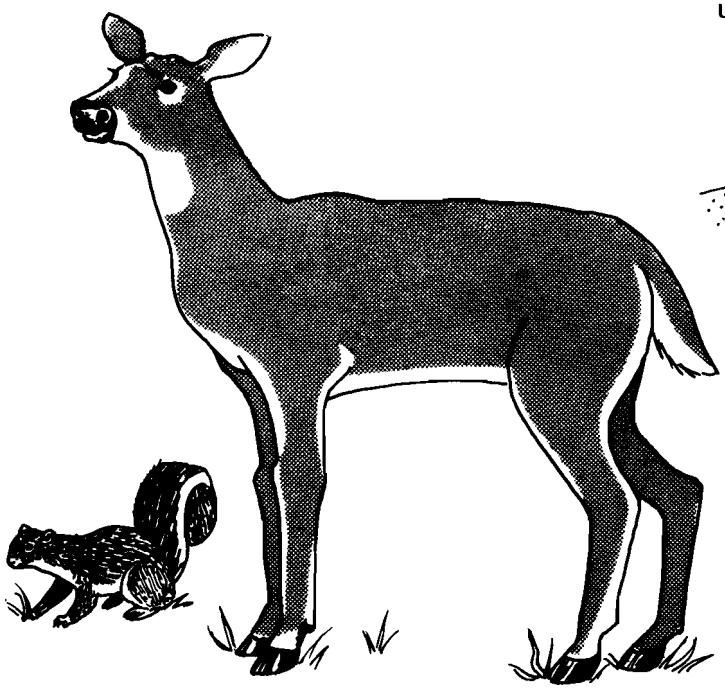


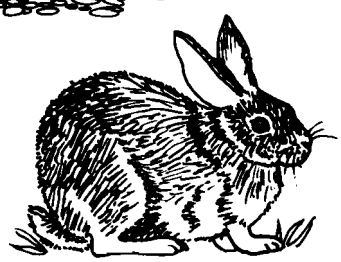
Mammals. Many different kinds of mammals can cause problems. Rats and mice can sometimes carry diseases that infect man. Some of these diseases can be transferred by insects.



Many mammals can damage crops. Examples are deer, rabbits, and squirrels. Some mammals can also damage lawns. Moles dig tunnels under the grass.

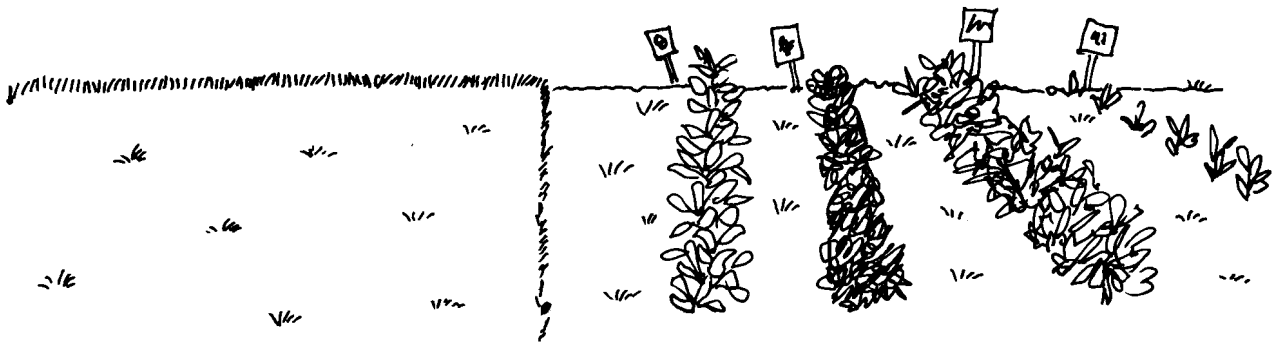






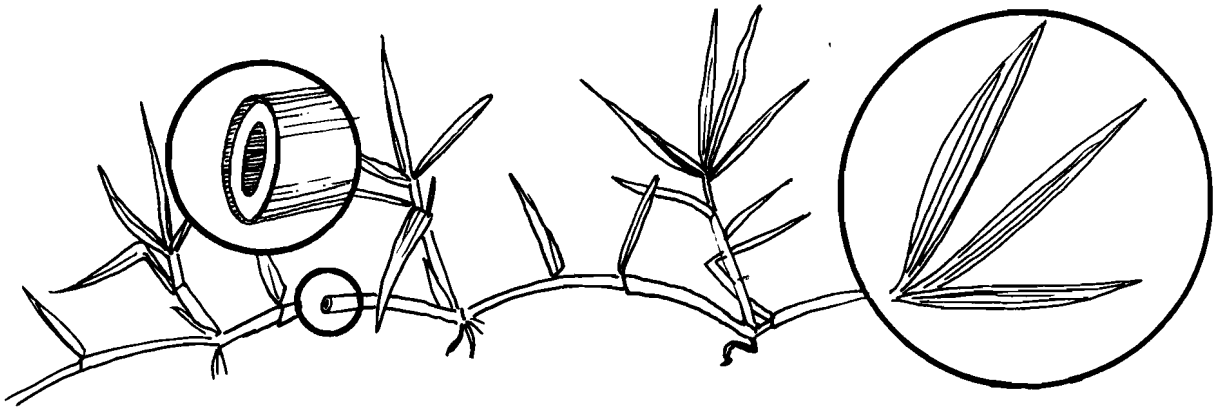
3. Weeds

A weed is a plant growing in the wrong place. For example, grass in a lawn is where it should be. Grass in a vegetable garden is a weed.

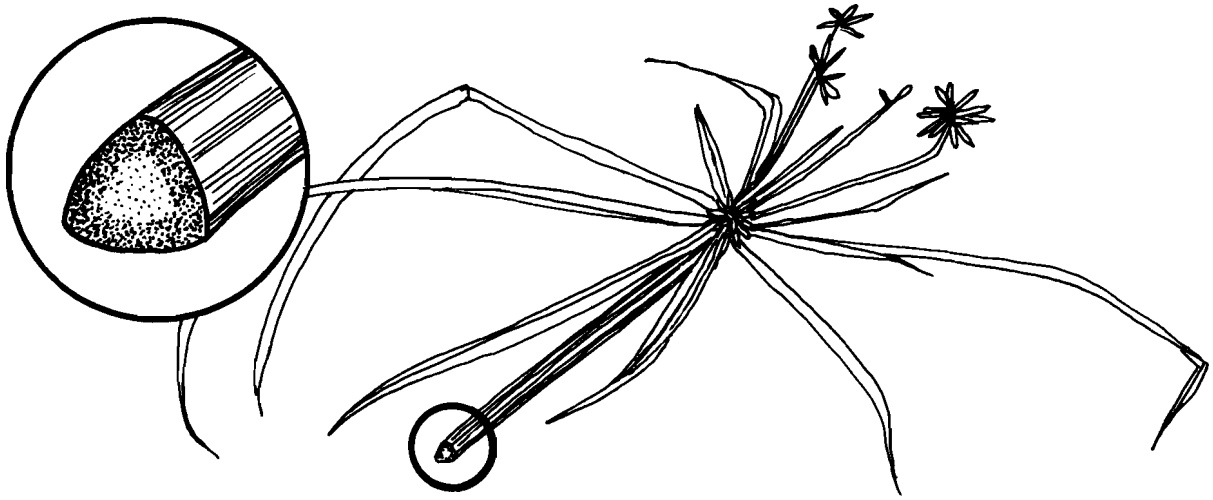


You should know about several groups of weeds. Each group needs different controls. The three most common groups of weeds are grasses, sedges, and broadleaves.

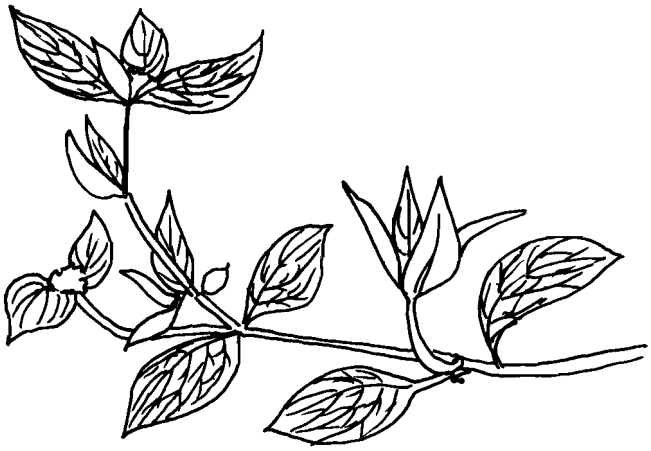
Grasses. Grasses have long, narrow leaves. The leaf veins are side-by-side. The stems are mostly hollow, except at the joints where they are solid.

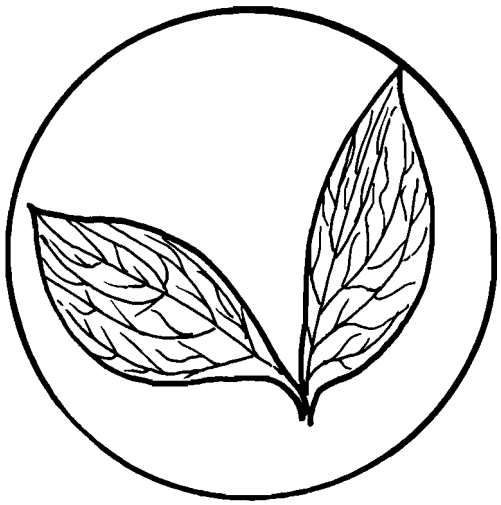


Sedges. Sedges look a lot like grasses. They have long narrow leaves that stick out from the stems in three directions. The stems are solid inside, and are triangular.



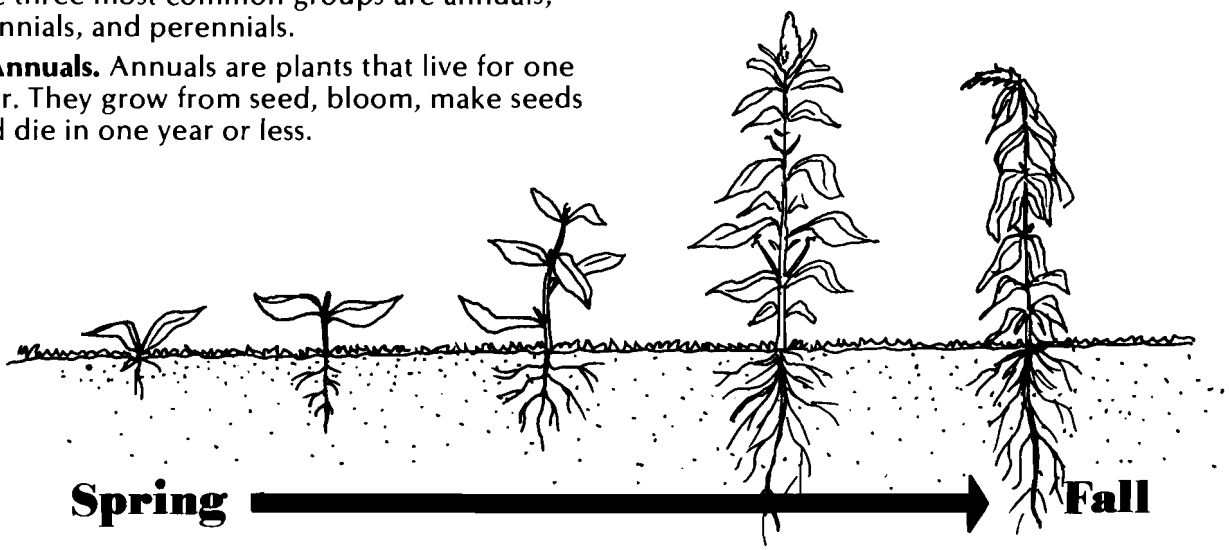
Broadleaves. Broadleaves have leaves of almost any shape. Leaf veins usually form a net-like pattern. Broadleaf plants usually have bright flowers.

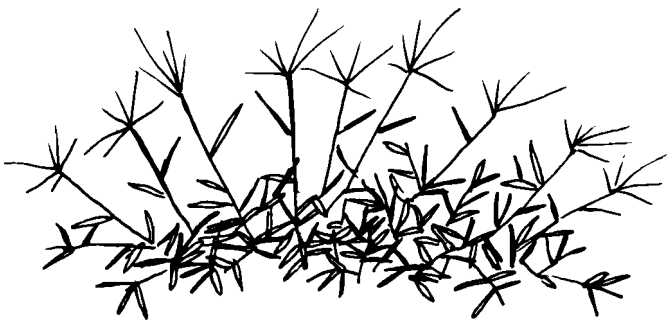




Weeds can also be separated by life cycle. The three most common groups are annuals, biennials, and perennials.

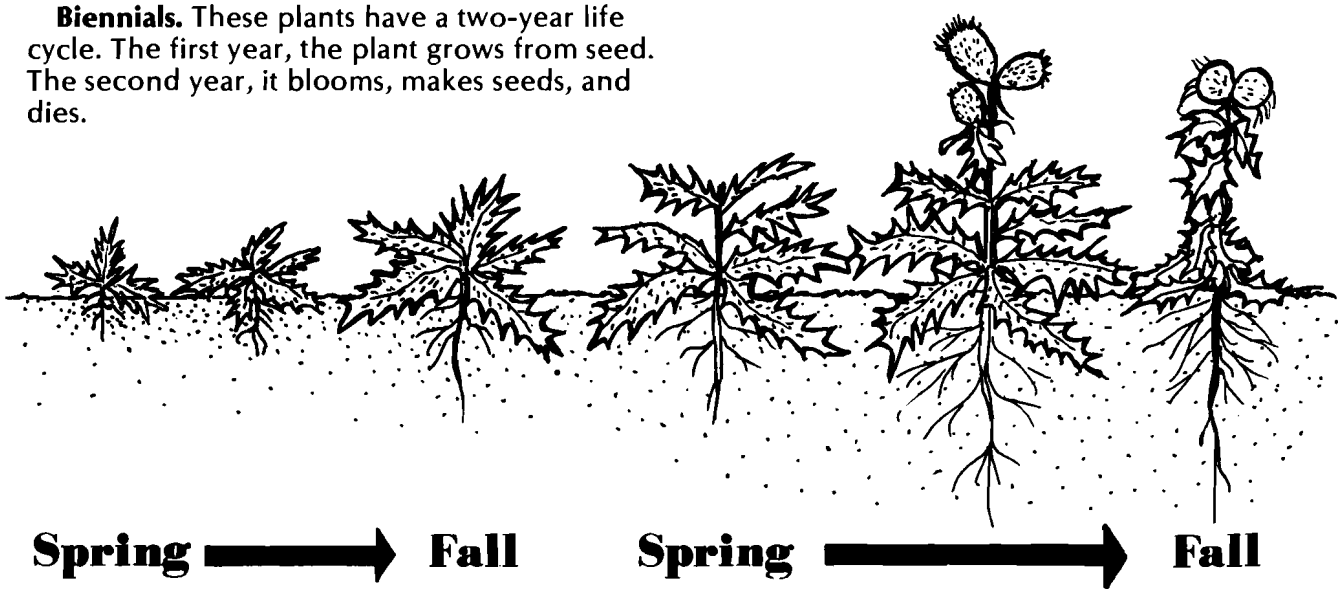
Annuals. Annuals are plants that live for one year. They grow from seed, bloom, make seeds and die in one year or less.



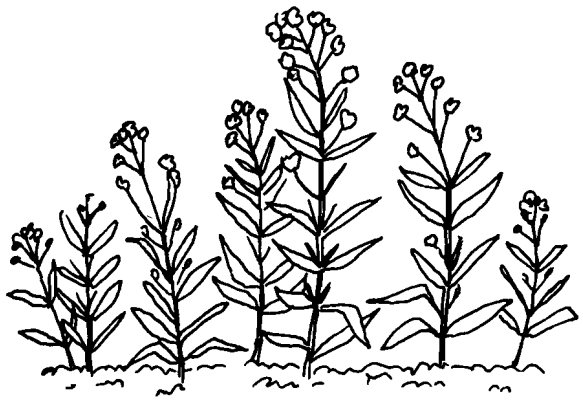


Examples of annual weeds are crabgrass and *Oxalis*.

Biennials. These plants have a two-year life cycle. The first year, the plant grows from seed. The second year, it blooms, makes seeds, and dies.



Examples of biennial weeds are false dandelion and cudweed.



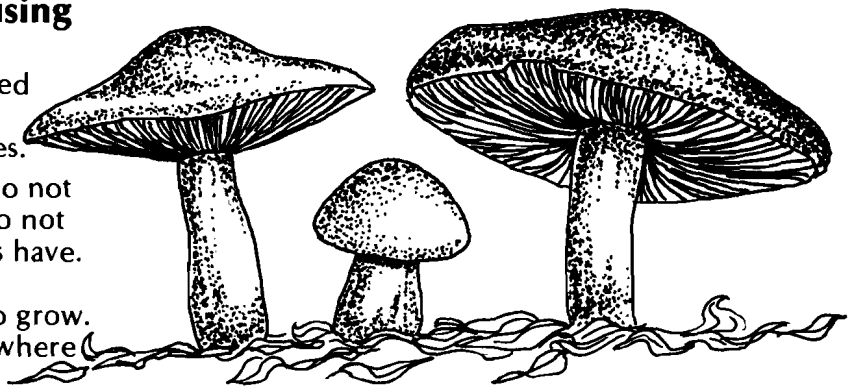
Perennials. These plants live two years or longer.

Some grow from seeds. Others grow from large roots or underground stems. Many die back during the winter.

Examples of perennial weeds are dogfennel and dollarweed.

4. Pathogens — Disease-Causing Organisms

Organisms that cause diseases are called pathogens. The three main groups of pathogens are fungi, *bacteria,* and viruses.



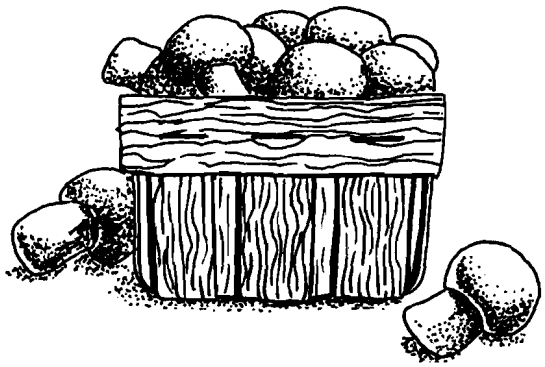
Fungi. These are simple plants. They do not have roots, stems, or leaves. They also do not have the green coloring that most plants have.

Without this green coloring, called *chlorophyll,* fungi cannot use sunlight to grow. Instead, fungi must get food from somewhere else.

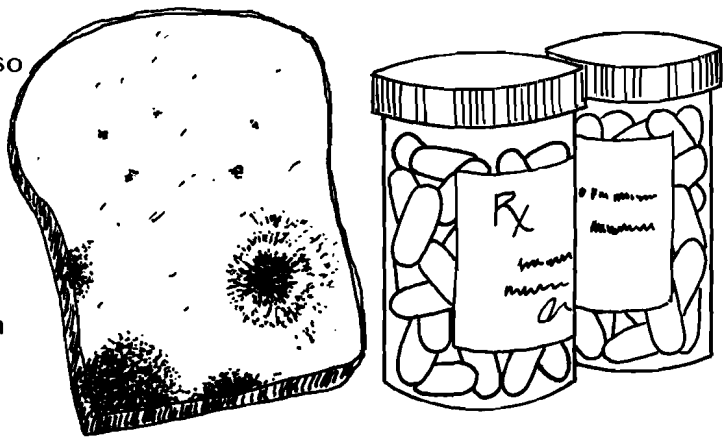
Some fungi live and feed on other organisms. They are called *parasites.*

Some fungi live on dead plant or animal matter. They are called *saprophytes.*

Different kinds of fungi are all around us. Not all of them cause diseases. Mushrooms you buy at the grocery store are one kind of fungus. *Mold* or *mildew* on your shoes is another kind.

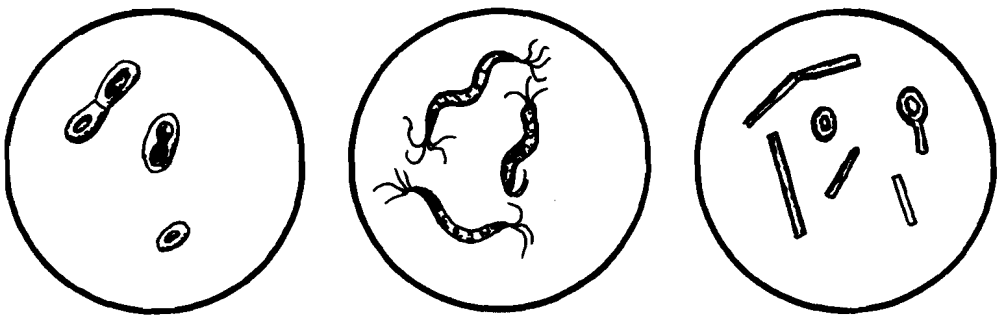


Some fungi are very important to us. For example, some of the molds that spoil food also can be used to produce drugs. These drugs cure some of our diseases.



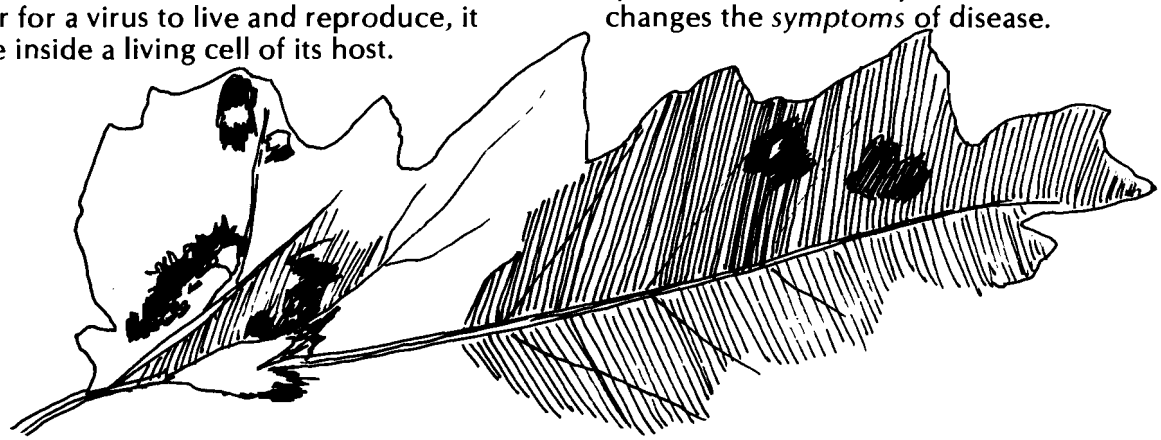
Bacteria. Bacteria are so tiny that you would need a microscope to see them. Bacteria are everywhere.

Bacteria can sometimes be a problem in the house. They can get into food that is not handled or stored properly. Some of them can produce poisons in food. These poisons can make you very sick. Some bacteria can cause disease in man.



Viruses. Viruses are even smaller than bacteria. Some viruses cause plant diseases. Other kinds cause diseases of animals or man. In order for a virus to live and reproduce, it must be inside a living cell of its host.

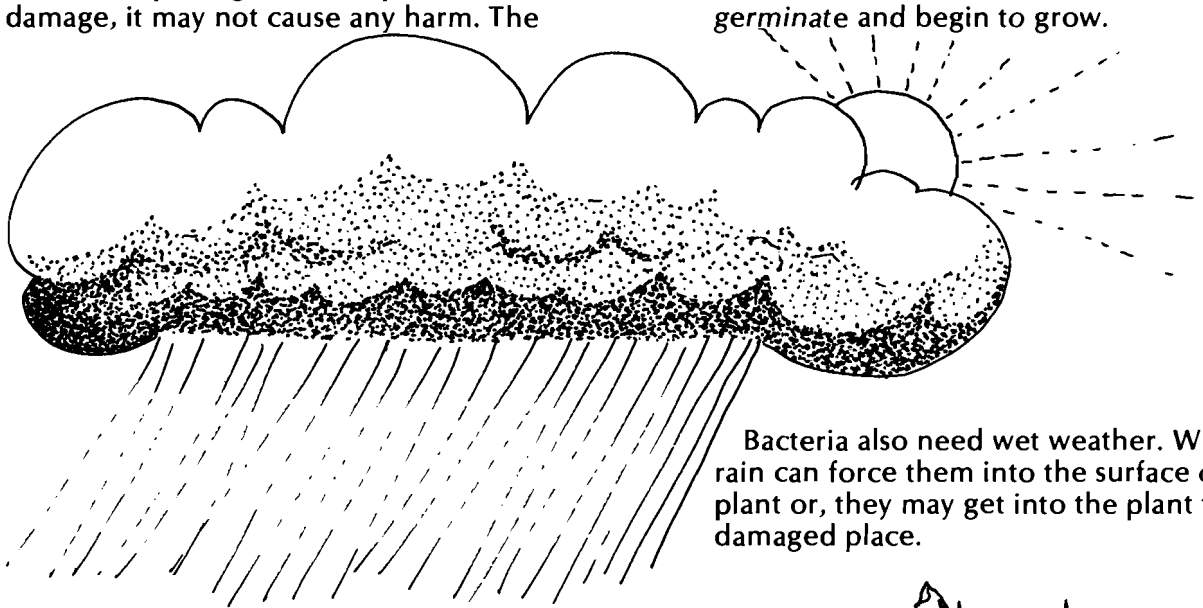
When a pathogen attacks a plant, the plant may change in some way. It may wilt, or get spots on fruit, or turn yellow. We call these changes the *symptoms* of disease.



Some kinds of plants have few disease problems. One reason is that not all pathogens affect all plants. Most kinds of pathogens affect only one or a few kinds of plants.

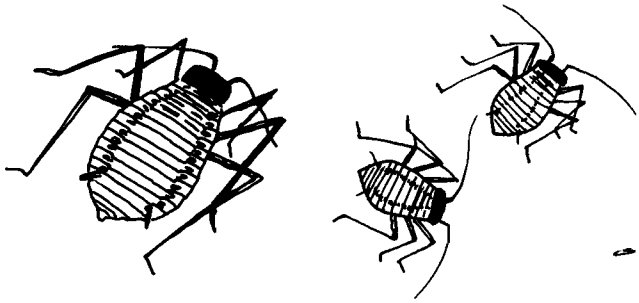
Even if a pathogen is on a plant that it can damage, it may not cause any harm. The environment must be right for the pathogen to damage the plant.

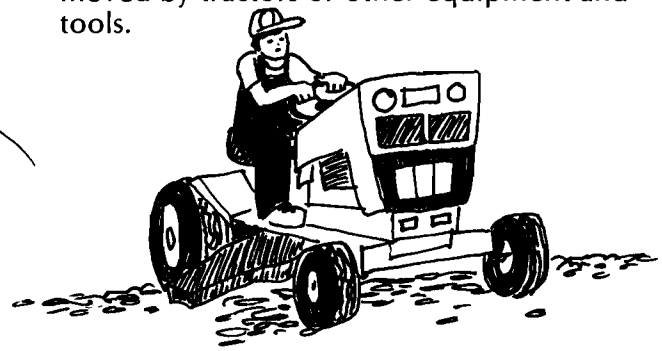
For example, fungi need wet weather before they damage a plant. They have seed-like structures that need water before they *germinate* and begin to grow.

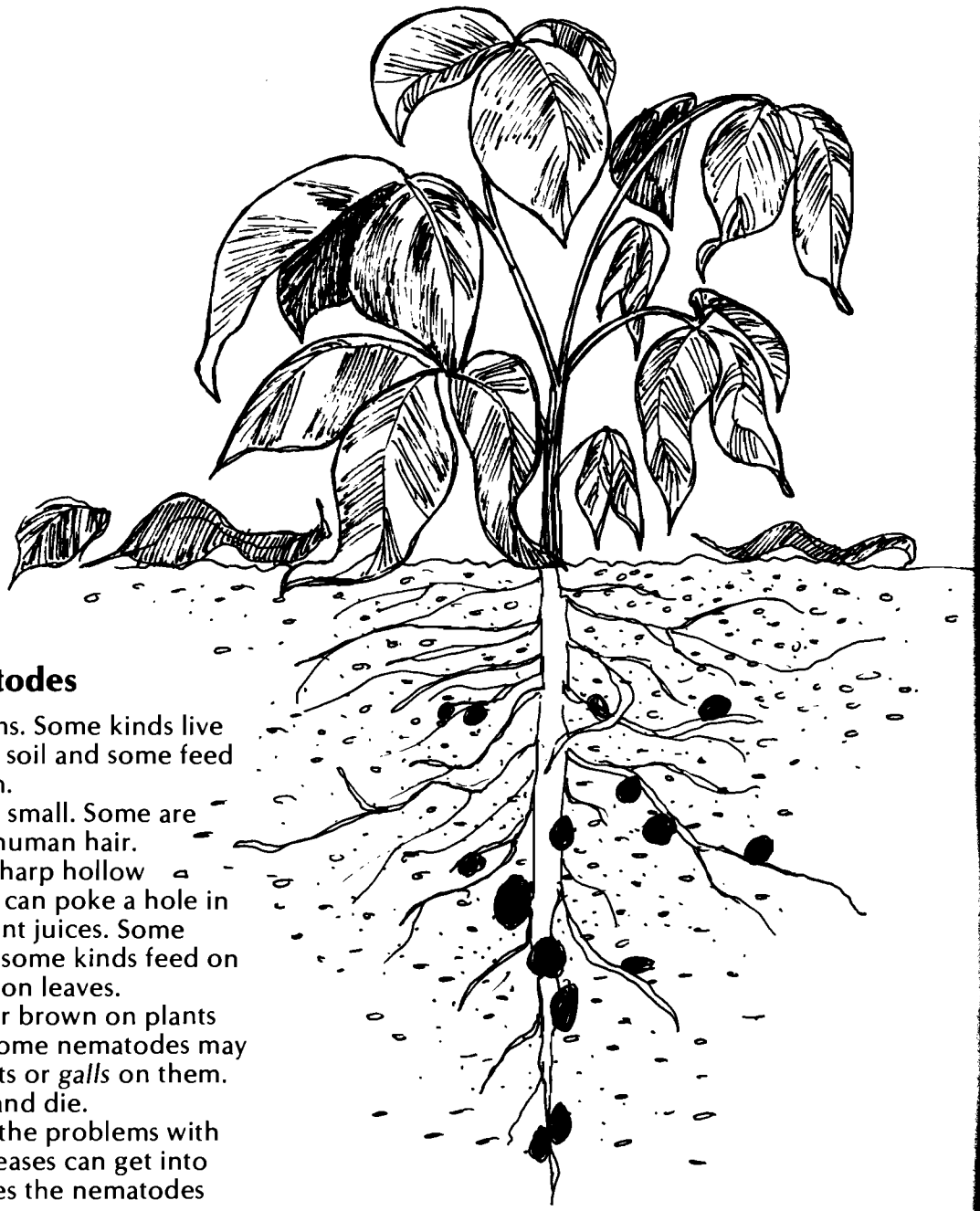


Bacteria also need wet weather. Wind and rain can force them into the surface of the plant or, they may get into the plant through a damaged place.

Viruses need other organisms to move them from place to place. Insects called aphids sometimes move viruses. Insects that move viruses are called *vectors*. Viruses can also be moved by tractors or other equipment and tools.







5. Nematodes

Nematodes are tiny worms. Some kinds live in water, some kinds live in soil and some feed on plants and damage them.

Plant nematodes are very small. Some are smaller in diameter than a human hair.

Plant nematodes have a sharp hollow "needle" for feeding. They can poke a hole in plant parts and suck the plant juices. Some kinds feed on and in roots, some kinds feed on stems and some kinds feed on leaves.

Leaves may turn yellow or brown on plants infested with nematodes. Some nematodes may cause roots to develop knots or *galls* on them. The plants may finally wilt and die.

Nematodes can increase the problems with diseases. Some kinds of diseases can get into the plant through little holes the nematodes make.

Pest Biology and IPM

Why do you need to know about pest biology? In **Pest Management — Where to Start,** the six steps of IPM are presented.

The six steps are:

1. Identification — This means knowing as much as possible about the pest. You need to find out what kind of pest it is, where and how it lives. Even the kind of weather the pest likes is important information.

2. Prevention — Sometimes pest problems can be prevented. This is done by changing certain factors to make it difficult for the pest to live.

3. Monitoring — Keeping track of pests by scouting. Scouting is done by counting the number of pests in a given area. If there are enough pests in the area a decision can be made to treat.

4. Prediction — The facts from scouting are important. They can be used to predict how much damage a pest could cause.

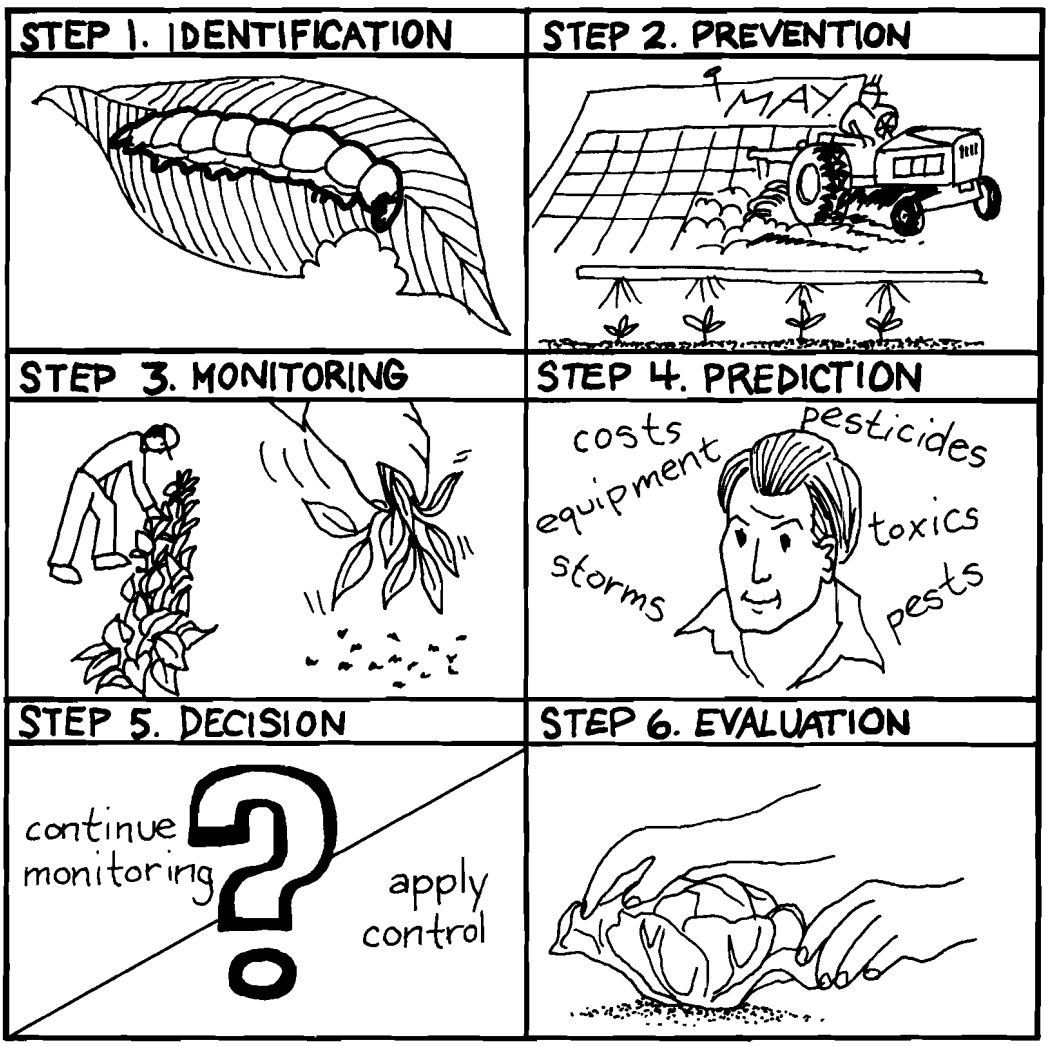
5. Decisions — Using facts gathered from the first four steps, the IPM user is able to decide what to do based on facts.

6. Evaluation — Throughout the program, the treatment may be evaluated. This allows any necessary changes in the treatment.

Knowing about pest biology is important in all of these steps. It will help you identify the pest and give you an idea of what to do to prevent the pest from being a problem. Knowing about pest biology will also help you know where to look for monitoring the pest and help you predict whether the numbers of the pest will stay the same, or increase, or decrease.

Then you will be able to make a decision about what you need to do and evaluate how well your management program is working.

In other words, you need to know something about the pest or pests you have. The more you know, the better you can manage them.



Glossary

1. Arthropod — An invertebrate animal with jointed legs and segmented body parts. Examples: insects, spiders and crabs.
2. Bacteria — Microscopic organisms that live in soil or water, on plants, or in the bodies of animals or man. Sometimes bacteria cause diseases.
3. Beneficial — Helpful; something that is good, or that helps something else.
4. Chlorophyll — The green coloring matter contained in leaves. It is needed for photosynthesis to provide plant food.
5. Compete, Competitors — Two or more plants or animals trying to use the same resource. Each one reduces the amount of the resource that the other one can use.
6. Environment — Surroundings, including anything that affects man, other animals or plants.
7. Gall — A hard, knobby swelling on some part of a plant.
8. Germinate (germinating) — The sprouting of a seed, and early growth of the tiny plant below the soil.
9. Host — Any plant or animal that shelters or gives a home to a parasite or other natural enemy.
10. Larva — One stage in the life of some insects. A larva hatches from an egg. When it has grown as large as it is going to. It becomes a pupa, and then an adult. Some kinds of larvae are caterpillars, maggots, or grubs.
11. Metamorphosis — The changes that an insect or other arthropod goes through from the time an egg is laid until it becomes an adult.
12. Mildew — A soft, fuzzy growth, usually whitish or gray.
13. Mold — A soft, fuzzy growth. Molds come in many colors.
14. Nematode — A tiny worm-like organism that lives in the soil and damages the roots of plants. Nematodes may live in the soil, in water, in animals, or in plants.
15. Nymph — An immature insect that is similar to the adult it will become.
16. Organisms — Living things; includes all animals and plants.
17. Parasites — An animal or plant that lives on or in another organism, from which it gets food and shelter. In IPM, a natural enemy that kills pests. Parasites are usually smaller than the pests. Example: fly maggots eating large caterpillars.
18. Pathogen — Very tiny organism that causes a disease. The three types of pathogens are fungi, bacteria, and viruses.
19. Pest — An organism that hurts something or is bad for something that belongs to man. A pest may be an insect, a plant, an animal, a disease, or any other kind of organism.
20. Pesticides — Poisons that are used to kill organisms that man regards as pests. Insecticides kill insects. Herbicides kill plants. Fungicides kill fungi.
21. Pupa — One stage in the life of some insects. Some pupae are also called cocoons. A pupa is the resting stage in the insect's life. An adult insect will hatch from it. Pupae — Plural of pupa.
22. Saprophyte — An organism that lives on dead or decaying organic matter.
23. Symptom — An indication or evidence of disease.
24. Vector — An organism that carries pathogens from one host to another.
25. Vertebrates — Animals that have a backbone. Examples: fish, birds or mammals.
26. Weed — A plant that is growing in the wrong place. To a farmer, a flower in the middle of a cornfield may be a weed. To a home gardener, the same flower may not be a weed at all, but a very desirable plant.

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