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## Iowa's Mushrooms and Nonflowering Plants -- Iowa's Plants

Iowa Association of Naturalists

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*Iowa Association of Naturalists*

*Iowa's Plants*



## **Iowa's Mushrooms and Nonflowering Plants**



# Iowa Association of Naturalists

The Iowa Association of Naturalists (IAN) is a nonprofit organization of people interested in promoting the development of skills and education within the art of interpreting the natural and cultural environment. IAN was founded in 1978 and may be contacted by writing the Conservation Education Center, RR 1, Box 53, Guthrie Center, IA 50115.

## Iowa's Plants Booklet Series

Plants are a beautiful and important part of the nature in Iowa. To assist educators in teaching their students about the common plants of Iowa, the Iowa Association of Naturalists has created a series of booklets which offer a basic, understandable overview of Iowa's plants, their ecology, and their benefits and dangers to people. The seven booklets in this series include:

- Iowa's Spring Wildflowers** (IAN-301)
- Iowa's Summer and Fall Wildflowers** (IAN-302)
- Benefits and Dangers of Iowa Plants** (IAN-303)
- Iowa's Trees** (IAN-304)
- Seeds, Nuts, and Fruits of Iowa Plants** (IAN-305)
- Iowa's Mushrooms and Nonflowering Plants** (IAN-306)
- Iowa's Shrubs and Vines** (IAN-307)

For ordering information about these and other IAN publications, please see the back cover of this booklet.



The Iowa Plants booklet series is published by the Iowa Association of Naturalists with grants from the REAP Conservation Education Board and the Iowa Conservation Education Council (ICEC), 1994.



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# Iowa's Mushrooms and Nonflowering Plants

## *Iowa's Nonflowering Plants*

Most plants have life cycles that include flowering, pollination, and producing seeds, but a few types of plants have a different way of life. These plants do not flower and make seeds. Instead they may produce seed-like spores or reproduce asexually. A wide variety of fungi, ferns, horsetails, mosses, algae, lichens, and liverworts do not produce flowers or seeds. They play a valuable part in the nature of Iowa.



### **The Fungi**

The fungi include mushrooms and are a main component of lichens. They lack the green pigment, chlorophyll, which is used by green plants to convert sunlight into food. Fungi reproduce by means of spores and never produce flowers or seeds. They also lack “true” stems and leaves and do not have a vascular system like that of true plants. The fungi are such a unique form of life that scientists disagree as to their classification. Many scientists consider the fungi as neither plant nor animal.

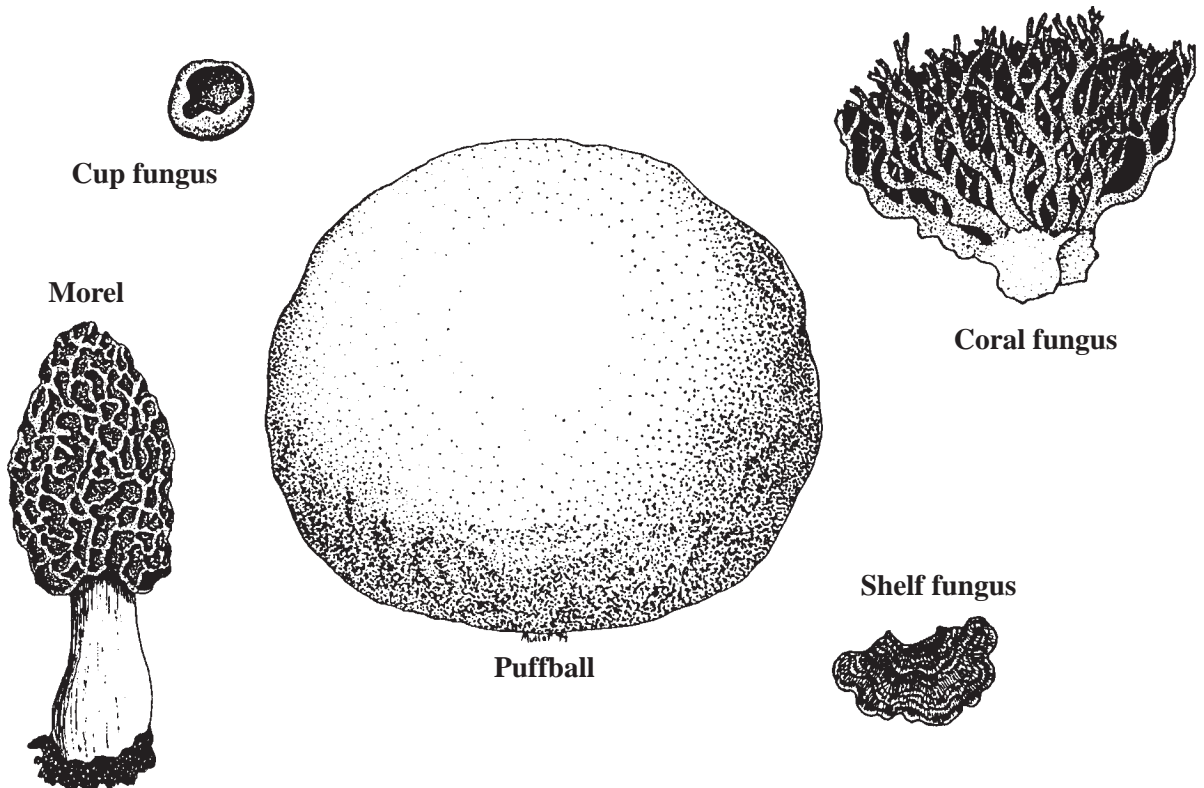
There are many different types of fungi including the molds, mildews, yeasts, rusts, and smuts. While

these fungi are very important (penicillin is a product of a mold fungus), this booklet will concentrate on the fleshy, fruiting fungi known as mushrooms, puffballs, morels, and shelf fungi that are most likely to be noticed while hiking through an Iowa woodland, wetland, or grassland.

## Mushrooms and Related Fungi

The fleshy fungi are found in a variety of colors, shapes, sizes, and environments. These fungi include the **mushrooms** which typically have the characteristic cap, stalk, and spore-producing gills. Some mushrooms and other fungi are edible, while others may be deadly poisonous if eaten.

The common names of fungi often describe their shape. The word "toadstool" is a nonscientific term that means different things to different people. The word probably originated to describe the stool-like shape of some types of fungi. **Puffballs** produce their spores in a ball-shaped structure. In fall they become dry and, when crushed or cracked open, emit a puff of spores. As their names imply, **coral fungi** resemble the coral that lives in oceans, and cup fungi have a disc-shaped structure lined with



special spore-producing cells. Included in the **cup fungi** are the highly sought **morels**. Morels, also called sponge mushrooms, have a fruiting body with many grooves and pits that resemble the fabric of a sponge. **Bracket** or **shelf fungi** grow as a ledge or series of shelves on dead and living tree trunks, limbs, bark, and sticks.

Mushrooms and related fungi grow scattered or clumped in groups in a variety of habitats. Like all fungi, they obtain their food from dead or living plant material either in or on the soil. They grow on fallen leaves, twigs, logs, and stumps; on the ground, and even on living roots, burnt wood or dung; and on other fungi. Some of these fungi, such as velvet stem which is most often found on elm logs and stumps, have somewhat specific food requirements. Others, like the puffballs, grow on a variety of plant material.

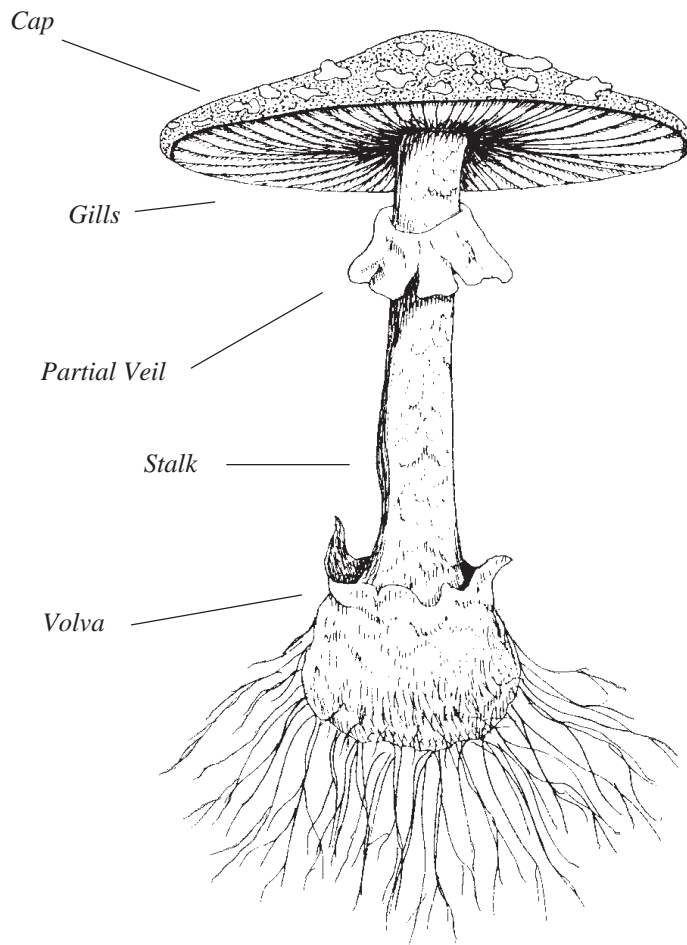
### Parts of a Mushroom

The typical mushroom has several identifying parts. The rounded "seat" is made up of the fleshy **cap** which has numerous thin, feathery **gills** on the underside. Tiny seedlike **spores** are produced in special structures located in the gills. The cap and gills grow atop a **stalk**, giving the mushroom an umbrella-like shape.

At the base of the stalk is a cuplike **volva**, a remnant of the **universal veil** which once encompassed the developing mushroom. Residue from the universal veil may also be found stuck to the outer surface of the cap. Where the cap was once attached to the stalk, there may be a **partial veil** that forms a ring around the stalk.

Some mushrooms may lack one or several of these structures. For example, the common group of mushrooms called **boletes** lacks gills. Instead, boletes have a spongy layer on the cap underside. The spores are released from tiny pores in the spongy tissue.

The cap, gills, spores, volva, universal veil, and partial veil are useful structures to know when trying to identify mushrooms. The illustration shows these structures.

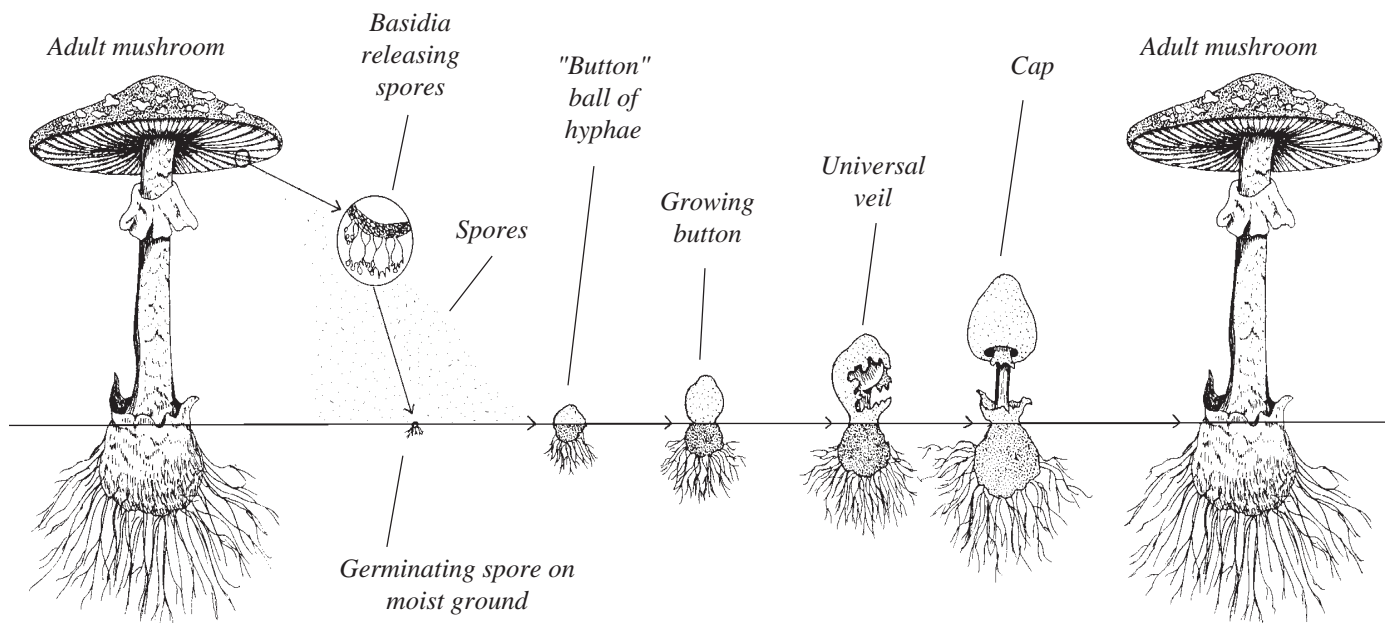


## The Mushroom Life Cycle

Unlike flowering plants, mushrooms do not produce seeds. Instead, they produce many tiny dust-like spores that are usually transported by the wind. The spores germinate when they land in a place with sufficient moisture and quickly develop into a mass of threadlike strands called **hyphae**. The nonreproductive hyphae are made up of many filaments which absorb food and moisture and may grow for several years before fruiting occurs.

A young mushroom develops inside an egg-shaped ball of hyphae called the universal veil. As the mushroom grows, it breaks out of the universal veil. In some mushrooms, a partial veil attaches the cap to the mushroom stalk. As the mushroom grows, the cap expands and breaks free from the partial veil. A ring of tissue is often left on the stalk.

In most mushrooms, spores begin to develop from specialized cells located on the gills. As the spores mature, they sometimes change color. Mature spores are often tinted brown but may also be white, pink, rust, yellow, purple, or black. When the spores are mature, they are flung into the air and drift slowly to the ground or onto living or dead plants where they germinate and continue the mushroom life cycle.

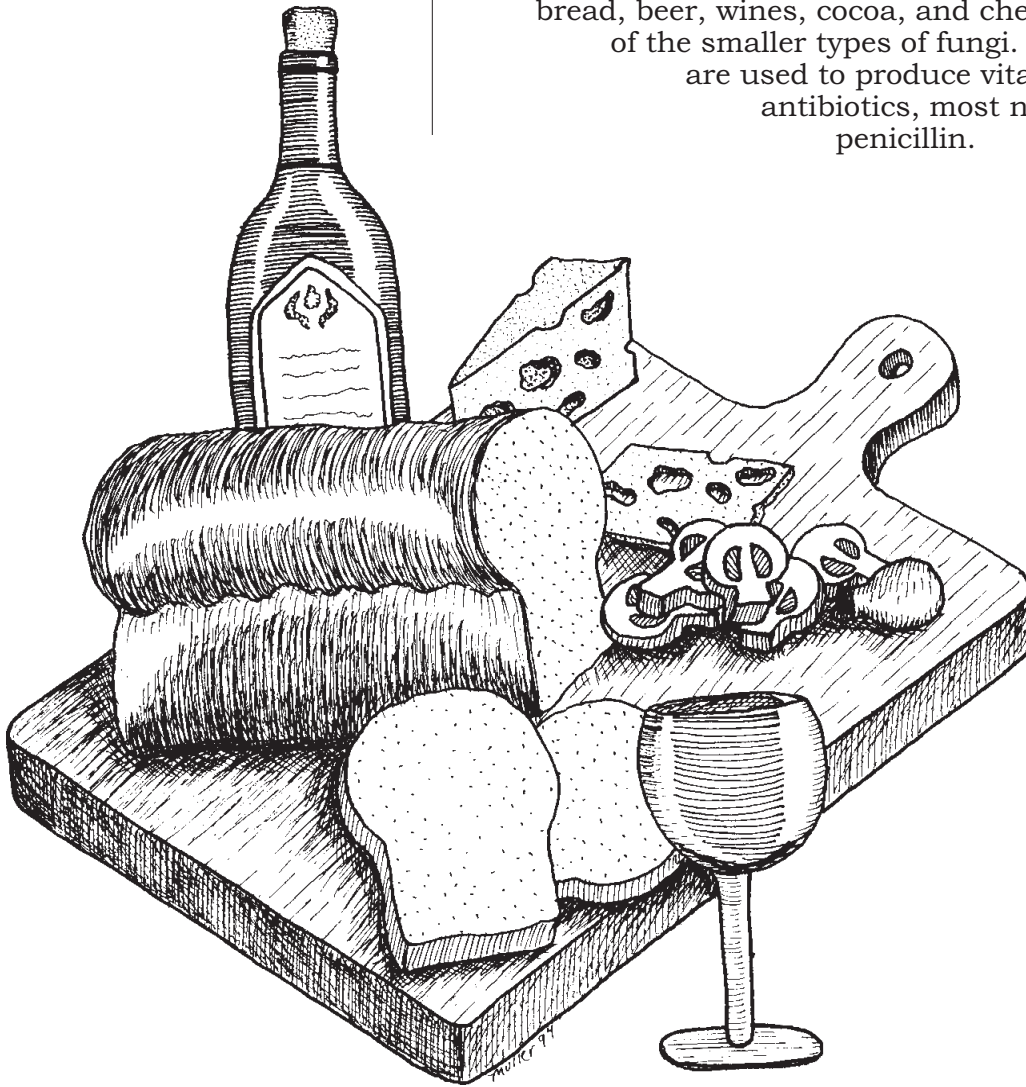


## The Importance of Fungi

Fungi that feed on dead animal and plant material are responsible for much of the natural decomposition needed to cycle nutrients in natural communities. They play an important role in recycling nutrients in nature.

In human communities fungi are equally important. Food and fabrics are prone to disintegration by fungal attacks, and fungi are responsible for the majority of plant and crop diseases. However, fungi also perform many useful functions. Processes that involve fermentation such as the production of

bread, beer, wines, cocoa, and cheese use some of the smaller types of fungi. And fungi are used to produce vitamins and antibiotics, most notably penicillin.



Of all the ways fungi impact people, the one that attracts most attention is their edibility. Since ancient times, mushrooms have been used for food. Edible mushrooms have a variety of flavors and provide more protein than green vegetables. They are also high in carbohydrates, fiber, and vitamins. Puffballs, morels, chanterelles, shaggy mane, and oyster mushrooms are edible when correctly identified and properly prepared.



The danger with collecting and eating wild mushrooms is that several species are poisonous. It is a myth and a dangerous misconception that any fungus that grows on wood is safe to eat. A wide variety of mushrooms may be poisonous if eaten. Members of the genus *Amanita* are especially deadly. Because identification of mushrooms is often difficult and because some edible species closely resemble some poisonous species, special care must be taken before eating any wild-growing mushroom. The following are important rules for collecting mushrooms:

## **Rules for Collecting Mushrooms**

1. Use a good mushroom book and identify mushrooms very carefully. Know the mushrooms you eat and how to prepare them.
2. Do not eat any mushroom that you have not identified as to genus and species. If you have any doubt, do not eat it. Members of the genus *Amanita* are especially poisonous.
3. When eating a mushroom species new to you, eat only a small amount.
4. The poisonous effects of some mushrooms can vary. Do not eat too much. Some mushrooms may be eaten in small quantities, but large quantities may be deadly.
5. Consider possible allergic reactions. In these cases, mushrooms may sensitize a person and the next meal will result in serious problems.

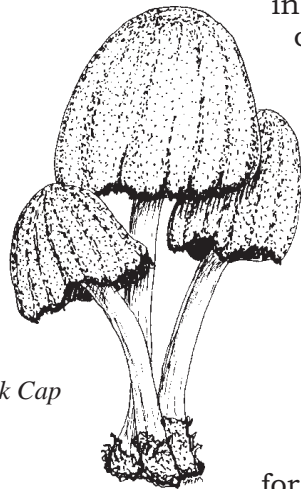
# The Mushrooms of Iowa

The following are examples of some mushrooms and other fungi that can be found in Iowa woodlands, wetlands, and grasslands. **These examples are not meant to be a guide for identifying mushrooms for consumption.** For a more detailed description or if you intend to eat any wild mushrooms, consult a mushroom book. The pamphlet "Mushrooms and Other Related Fungi" by Tiffany, Knaphus and Nyvall, will further help in identifying edible mushrooms. This pamphlet is available through your county's ISU Extension Office.

## Mushrooms Found Throughout the Year (Spring through Fall)

Several types of Iowa mushrooms have especially long fruiting seasons. The examples below are fungi that develop in spring and persist into fall or even winter.

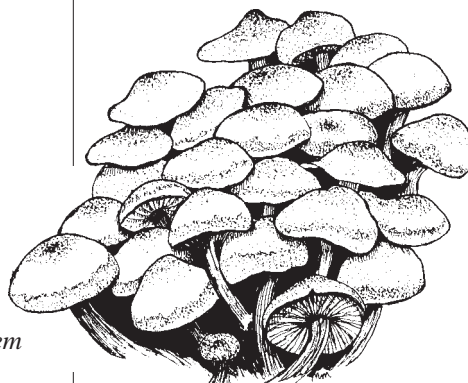
**Common ink cap** (*Coprinus atramentarius*) is found growing at the base of tree stumps, usually in open areas. It has a whitish gray bell-shaped cap with fine grooves extending toward the cap margin. The cap is approximately two to three inches wide growing on a three- to six-inch stem. Ink caps get their name from their gills which become black and slimy as they pass maturity. This mushroom is edible when the gills are still white, except when consumed with alcohol. Although individual ink caps are short-lived, as a group they persist from April through September.



*Common Ink Cap*

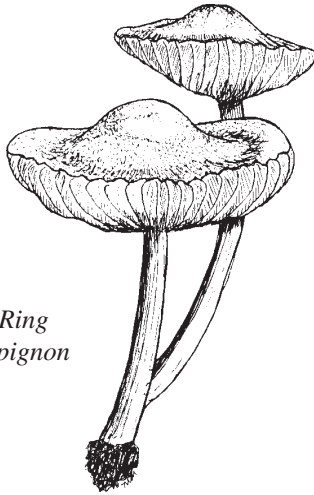
**Velvet stem** (*Flammulina velutipes*) is named for its velvety stems. The slimy cap is orange-brown and from one to two inches in diameter.

On the inner surface of the cap are broad gills in which the white spores are produced. Velvet stem is most common on elm trees and stumps. It persists into winter and is edible. A cultivated variety, called "Eno-take," looks very different.



*Velvet Stem*

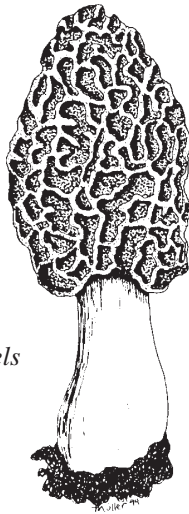
Fairy Ring  
Champignon



**Fairy ring champignon** (*Marasmius oreades*) is one of several mushrooms that forms circles, called fairy rings, that may persist for many years. Fairy ring champignon is one of the last of the “fairy ring” mushrooms to emerge. The pale brown cap may be less than an inch to two inches wide and has a wavy margin. Broad white gills are found in the cap’s under surface. Fairy ring champignon often grows in lawns where its perennial nature may make it unpopular. It is edible, but it should not be confused with the poisonous, white *Clitocybe* which sometimes grows among the fairy rings. Other types of mushrooms, such as the poisonous green-spotted lepiota, may also grow as fairy rings.

### Fungi of Early Spring (April and May)

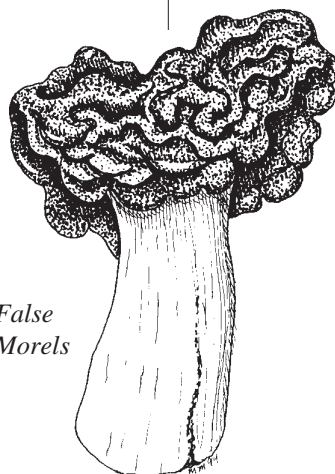
Morels



Few mushrooms reach their peak in early spring, but spring mushrooms include some of the most prized edible species. Mushroom collectors search the woods for the tasty members of the morel family, including morels and thimble caps. These mushrooms should not be confused with the false morels which, in instances, have been reported as poisonous and even fatal if eaten.

**Morels** (*Morchella* spp.) include several species of edible fungi. The caps are convoluted with many pits and ridges. They are often cone-shaped with yellowish brown or white pits and grayish ridges. Depending on the species, morels may be two to six inches tall. Do not confuse edible morels with poisonous false morels. False morels also have a convoluted cap, but the ridges are more lobed and are reddish-brown in color.

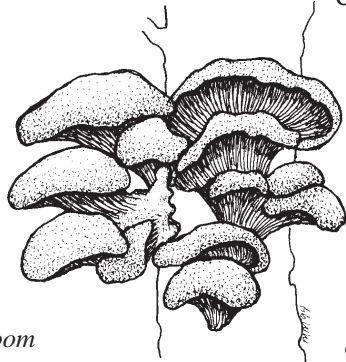
False  
Morels



**False morels** (*Gyromitra esculenta*) grow in the same type of woodland habitat as true morels. They have a brain-like reddish brown convoluted cap that may be one to more than three inches wide. The white stalk is short and stumpy. False morels can be deadly if eaten raw and may still be poisonous when cooked. Sometimes the poison has a delayed effect.

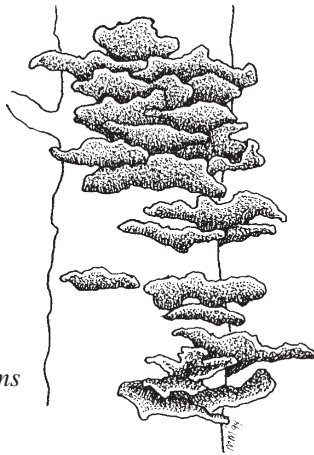
**Fungi of the Summer and Fall  
(June through October)**

Late summer and fall are peak times for mushrooms in Iowa. The large variety of mushrooms in late summer and fall makes identification of edible mushrooms more difficult. The presence of members of the genus *Amanita* makes correct identification of edible mushrooms crucial.



Oyster  
Mushroom

**Oyster mushroom** (*Pleurotus ostreatus*) is a short-stalked edible mushroom with irregular wavy-edged caps. The caps are somewhat fan-shaped and become more ruffled with age. Gills are located on the underside of the cap. Colors of oyster mushrooms vary from white to tan. Oyster mushrooms are found throughout the summer and fall months. They are especially common on fallen elm logs and stumps.



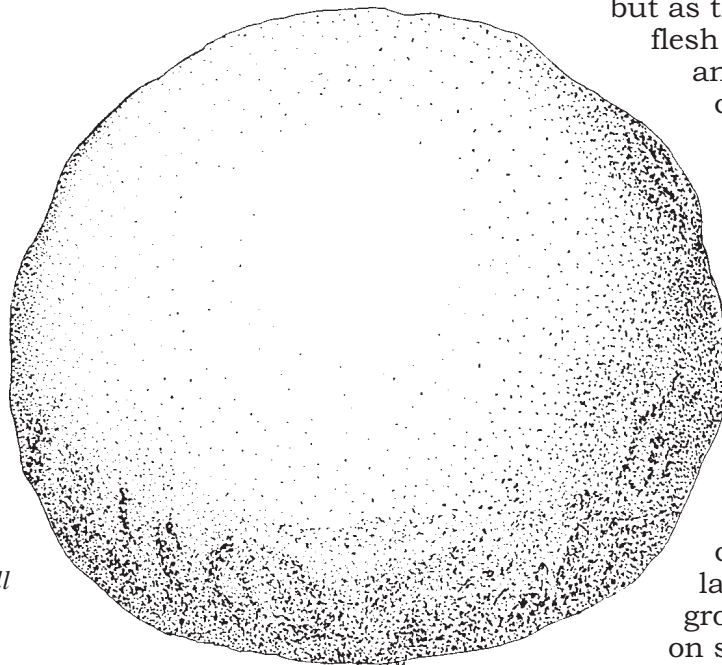
Sulphur  
Mushrooms

**Sulphur mushrooms** (*Polyporus sulphureus*) are bright yellow or orange-yellow fungi that form shelf-like ledges on living and dead wood. They lack gills, with spores being produced in tubular pores similar to the boletes. Some people describe the flavor of sulphur mushrooms, especially young mushrooms, as delicious and chicken-flavored, while others have reported allergic reactions to these common fungi.

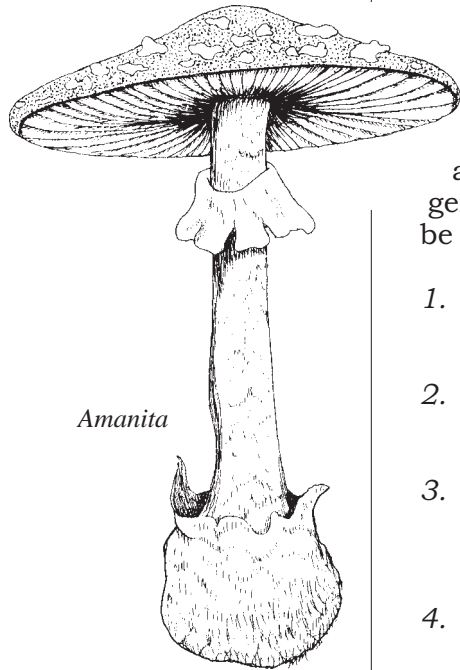
**Giant puffball** (*Calvatia gigantea*) is the largest of the puffballs, growing to a diameter of eight to 20 inches. Like all puffballs, they produce a cloud of spores when the mature mushroom is squished or cracked open.

Young puffballs have white flesh that is edible, but as they mature, the flesh becomes yellow and eventually becomes a dark mass of spores.

Giant  
Puffball



Edible puffballs always have a thin outer covering that distinguishes them from some poisonous mushrooms that otherwise may resemble puffballs. Puffballs are most common in woodlands where they grow on the ground or on stumps and logs from August to October.



Amanita

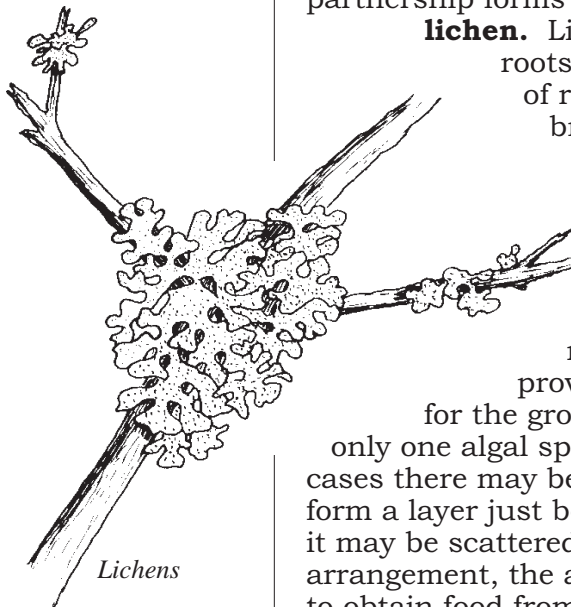
**Amanita** is a genus that contains several species of deadly poisonous mushrooms. The most common Iowa species is white and grows scattered in Iowa woodlands, especially beneath oak trees. Other species have an olive-yellow cap. It is very important to identify and avoid eating these mushrooms. The following are general characteristics of the *Amanita* that should be remembered:

1. *The gills do not attach to the stem and do not produce white spores.*
2. *The ring, that is a vestige of the partial veil, may or may not be present (see page 4).*
3. *There is distinct volva at the base of the stem, or buried, that is a vestige of the universal veil (see page 4).*
4. *Some species are extremely poisonous, even in small amounts. Wash hands after picking.*

## Lichens

In nature, plants and animals often enter into beneficial relationships. Lichens are the result of a mutually beneficial and interdependent relationship between fungi and algae. They are a combination of a green or blue-green alga and a fungus, most commonly a sac fungus. Together, the alga and fungus partnership forms a distinct form of life known as a

**lichen.** Lichens lack leaves, stems, and roots. They often have bright colors of red, orange, and yellow or gray and brown which add color to Iowa woodlands and wetlands.



Lichens

The hypha of the fungal component of a lichen attaches and grows on a variety of surfaces, from wet wood or plant material in the soil to dry rock. This fungal component provides the necessary environment for the growth of the alga. Usually there is only one algal species in a lichen, but in some cases there may be more than one. The alga may form a layer just below the surface of the fungus, or it may be scattered throughout the fungus. In either arrangement, the alga is able to use photosynthesis to obtain food from sunlight. The formation of the lichen provides a means for the fungus to obtain the carbohydrates it needs for growth.

## Other Nonflowering Plants

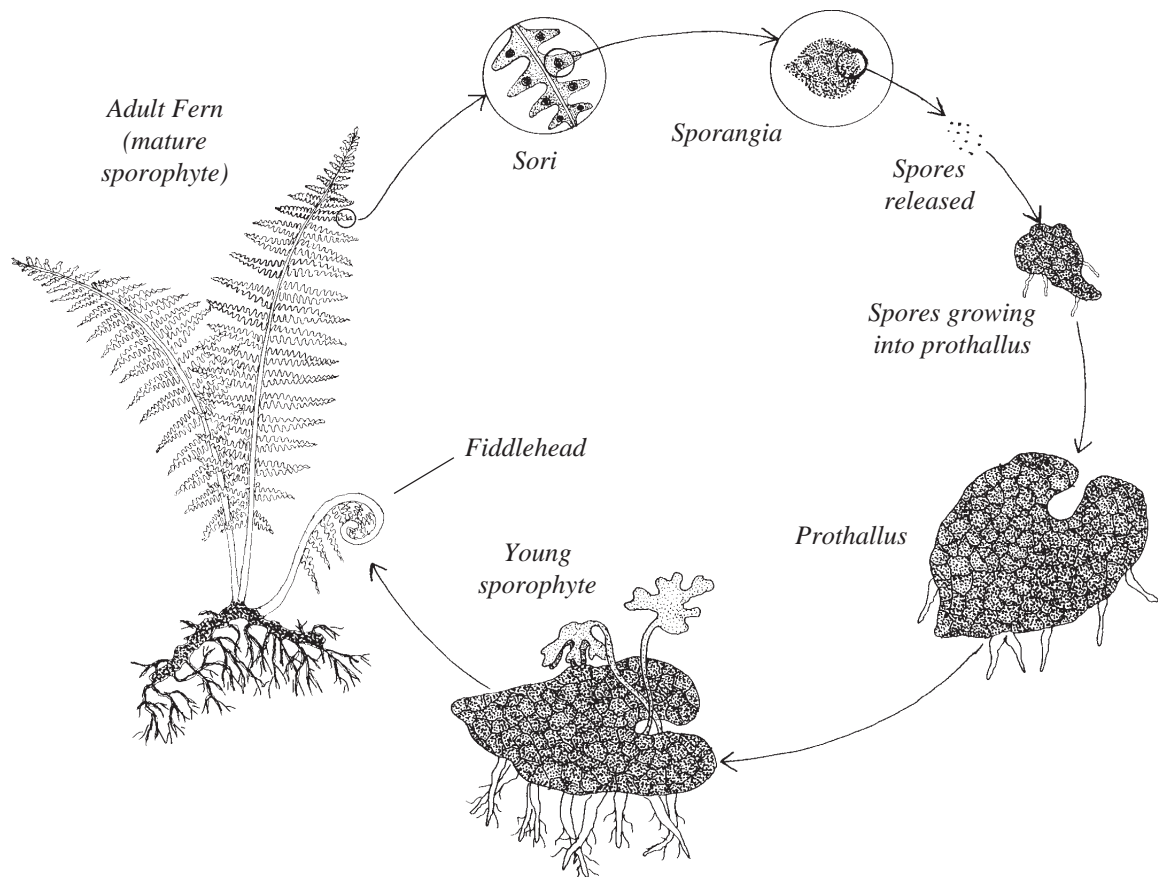
In addition to lichens, mushrooms, and other fungi, there are some "true plants" that do not produce flowers or seeds. Along a typical woodland trail you may encounter several types of **ferns**. In some places, **mosses** carpet the ground or cover rocks and logs. Plastered to the tree bark and on rocks, fallen sticks, and limbs are **liverworts**. A patch of **horsetails**, also called scouring rushes or **equisetum**, may block your path as you walk toward a creek. Rocks and logs in and along the creek will likely be covered with a slippery coat of **algae**.

Although ferns, mosses, horsetails, algae, and liverworts do not produce flowers and seeds, they do contain the green pigment chlorophyll and, like other green plants, are able to produce food from sunlight.

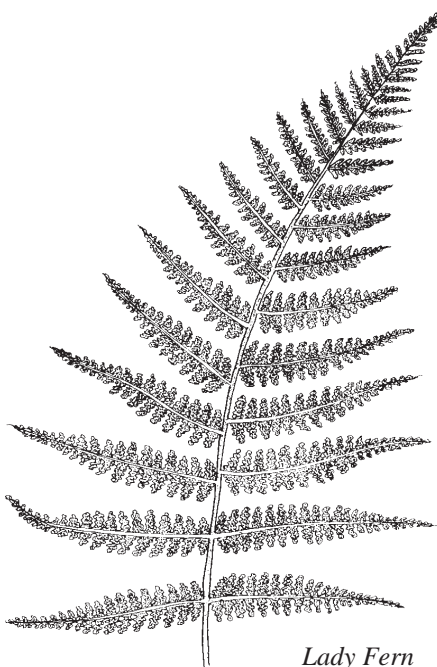
### Ferns

Ferns are nonflowering plants that have roots, underground stems called rhizoids, and leaves capable of photosynthesis. The leaves often consist of many leaflets, called **pinnae**, and subleaflets, called **pinnules**. Ferns reproduce by means of spores that are borne in special structures on the leaves. These structures, called **sori**, at first appear as numerous rusty spots on the underside of the leaves. Some sori are "naked," while others develop a protective covering called an **indusium**. Each sorus consists of clusters of tiny capsules called **sporangia** which contain the spores. As many as 64 spores can be produced by each sporangium, and a single fern plant may produce millions of spores.

When mature fern sporangia become dry, they break open and fling their spores into the air. Each spore that lands in a suitable moist environment has the potential of producing a new fern plant. A thin green **prothallus** or **gametophyte**, shaped somewhat like a heart and smaller than a dime, is formed from the germinating spore and eventually produces both the male and female sex organs. You can sometimes find the tiny prothallus at the base of young sporophytes, usually along stream banks. The fertilized embryo gives rise to a leafy fern plant. The prothallus "feeds" the developing fern until the leaves and root system become established. The emerging fern leaf is tightly coiled. Because it resembles the end of a fiddle, it is commonly called a **fiddlehead**.



Although ferns grow in a variety of habitats in Iowa, most ferns grow in moist areas and are most common in shady woodland or wetland conditions. The largest, and one of the most common ferns in eastern Iowa, is the **interrupted fern** (*Osmunda claytoniana*). The following are a few examples of ferns found throughout Iowa. For a more complete description of ferns, refer to a field guide.



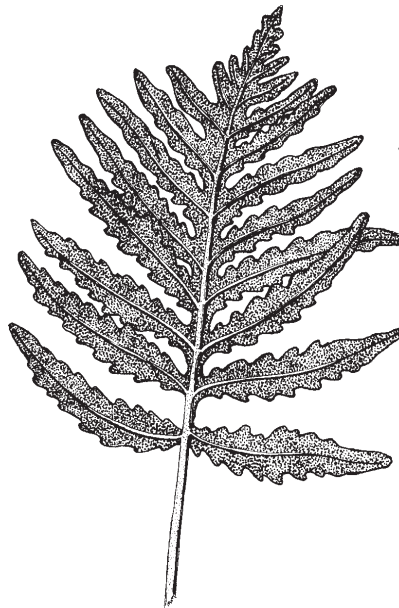
Lady Fern

**Lady fern** (*Athyrium felix-femina*) is perhaps the most common fern in Iowa. It occurs in any moist environment. The lady fern is a large plant with circular clusters of frilly leaves that may be 30 inches long and ten inches wide. Each leaf has approximately two dozen pinnae. And each pinna may have two dozen deeply lobed and toothed pinnales. The sori are short and may be horseshoe-shaped with a thick, hairy indusium.



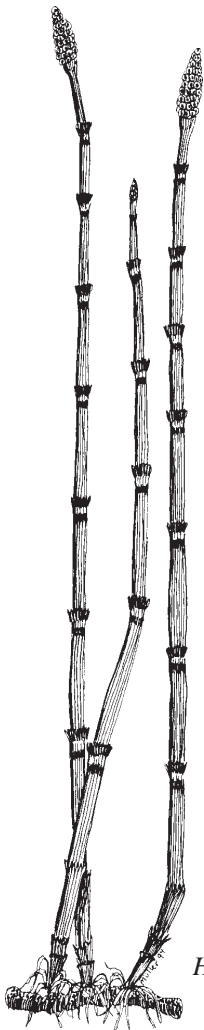
Maidenhair  
Fern

**Maidenhair fern** (*Adiantum pedatum*) is most common along rocky outcrops in moist shady soil. The leaves may be more than a foot long and up to ten inches wide. Each leaf has five or six pinnae that contain many pinnules. The pinnules are variable but somewhat fan-shaped and oblong. The fiddleheads are reddish. Sori have a thin indusium which may be white or yellowish green.



Sensitive  
Fern

**Sensitive fern** (*Onoclea sensibilis*) has an atypical fern appearance. The broad triangle-shaped leaves are prominent and may be a foot tall. The sori are contained in dark brown beadlike clusters of fertile pinnae. Sensitive ferns may grow in full sun or shade in both moist woodland and grassland areas.



**Horsetails**

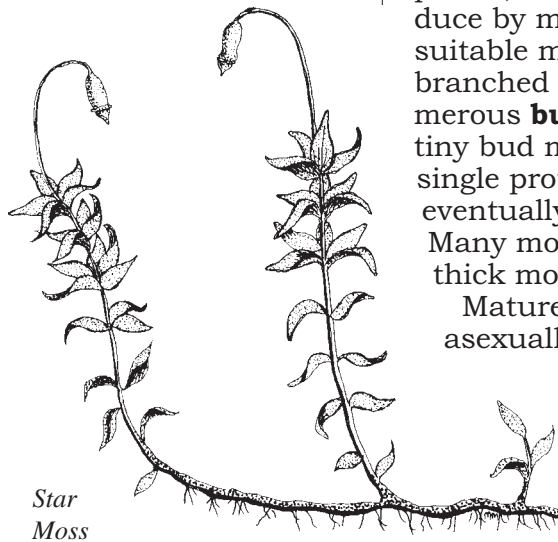
Horsetails

Plants in the genus *Equisetum*, commonly called horsetails, scouring rushes, snake weed, or joint grass, are plants with jointed hollow stems that have deep, long ridges. Some species, such as *Equisetum arvense*, have branched stems. Individual plants in a clump of *Equisetum* are connected underground by a network of rhizomes. Silica, imbedded in the stem tissue, gives the plant a gritty texture. The common name "scouring rush" refers to the American Indian and pioneer use of the gritty stems to scour pots and pans. Because the scalelike leaves are nonfunctional, horsetails depend on their rigid green stems to perform photosynthesis for the plant.

Horsetails reproduce by means of spores that are produced in a terminal cone, or **strobilus**, atop mature stems. When the mature strobilus becomes dry, the spores are released into the air. Spores that land in a suitable environment germinate in a similar manner as the ferns. Horsetails are most frequently found in fens, wet woodlands, or roadside ditches. They grow in clumps, with members of some species growing to a height of four feet.



## Mosses



Star  
Moss

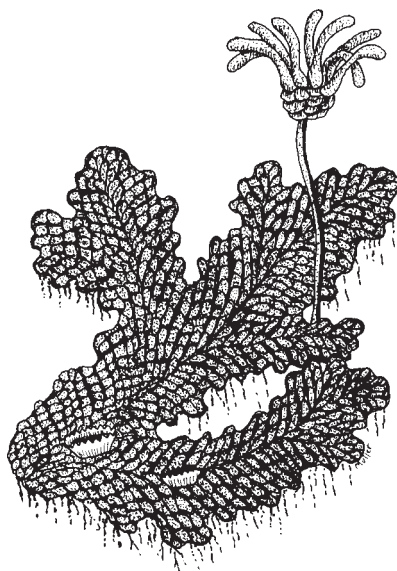
Mosses are small plants that have leaves and stems. They are anchored to the ground by a network of underground rhizomes. Mosses are short plants, usually less than two inches high, that reproduce by means of spores. When spores land in a suitable moist environment, they develop into branched green filaments called **protonemae**. Numerous **buds** develop on each protonema and each tiny bud may develop into one leafy moss plant. A single protonema can produce hundreds of buds and eventually cover several square inches of substrate. Many moss plants tend to clump together to form a thick mossy carpet.

Mature moss plants reproduce either sexually or asexually. Male and female gametes are located on stalked structures called **antheridia** and **archegonia**, respectively. Because the sperm must "swim" to the archegonia to reach the eggs, moisture is necessary for reproduction. Fertilized eggs quickly develop in spore-producing **sporophytes** that consists of a stalk and a capsule.

Spores are released when the cap becomes dry and falls off the capsule.

Mosses grow in a variety of habitats but favor shady, moist environments. They are, therefore, most common on the north and east sides of trees, rock outcrops, hills, and stream banks. Where they grow, mosses absorb water and hold soil in place. The leafy moss plants act like a sponge, able to soak up twice their weight in water.

## Liverworts



Liverworts

In damp shady woodlands growing on rocks, wood, or damp ground is a group of plants known as liverworts. These plants, which are closely related to the mosses, look like papery or leafy green scales or lobes with reproductive stalks. Underneath the leafy surface are numerous rhizoids that attach the plant to its habitat surface. Liverworts photosynthesize their food, absorbing the necessary water, carbon dioxide, and nutrients through their papery surface. They have specific moisture and temperature requirements and remain dormant until conditions become suitable for their growth.

Liverworts reproduce in a manner similar to the mosses. They produce antheridia and archegonia that lead to the development of a sporophyte capsule and the release of spores. In addition to this form of sexual reproduction, a common liverwort, called *Marchantia*, produces numerous disc-shaped **gemmae** which are produced on cup-shaped structures. When detached, the gemmae grow into new plants.

## Green Algae

Algae are a group of plants ranging in color and size from a single cell to ocean plants that are more than a hundred feet long. Freshwater green algae that live in Iowa are small plants that require moisture and sunlight. They are the plants that often give streams and ponds a greenish tint, the slippery ooze that covers rocks, and the green specks that color tree bark, rotting wood, and fence posts.

Unlike mosses, green algae have no leaves, stems, or rhizoids. Rather, they form tiny delicate strands or exist as single cells of various shapes. Green algae contain the green pigment chlorophyll which is necessary to convert sunlight, water, and

carbon dioxide into energy during photosynthesis.

Other pigments also exist in the green algae, but they are often masked by the chlorophyll.

Algae are arguably among the most important plants on earth. They are the basis of food chains in lakes and streams.

Most animals that live in water either feed directly on algae or eat other animals that feed on algae. In

the oceans, the role of algae in the production of food and

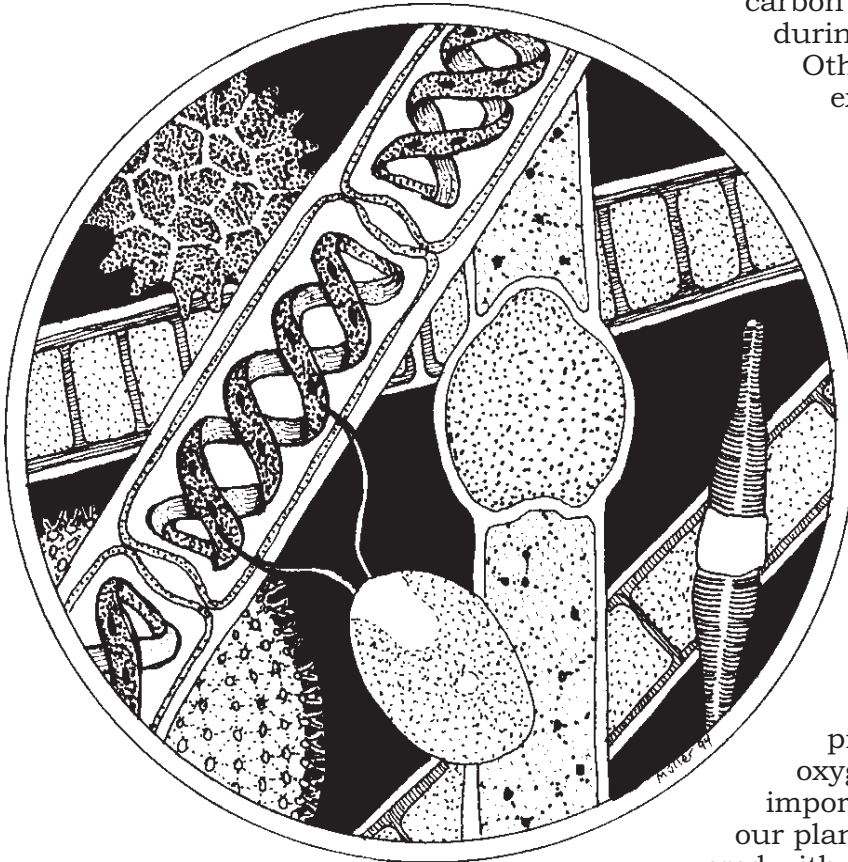
oxygen is especially important. More than half

our planet's surface is covered with deep ocean water,

and in these waters algae are the

sole producers of energy in the form of food that feeds the rest of the marine community and, ultimately, estuaries and land communities. Through photosynthesis, algae produce most of the oxygen in ocean waters.

Large amounts of nutrients in a waterway, sometimes the result of pollution, often lead to a large increase in algae growth, known as an algae bloom. Algae absorb carbon dioxide and release oxygen during the day as part of the process of photosynthesis. At night the process is reversed. In warm waters, which naturally hold less oxygen, algae blooms can drain the water of oxygen overnight, causing fish kills.



# Useful Resources

“Biology of Plants,” P. H. Raven, R. F. Evert, and S. E. Eichorn, Worthy, 1992.

“Field Guide to the Ferns,” Boughton Cobb, Peterson Field Guides, 1956.

“How To Know the Ferns and Fern Allies,” J. T. Mickel, 1979.

“How To Know the Lichens,” Mason E. Hale, 1979.

“How To Know the Mosses and Liverworts,” H. S. Conrad, 1972.

“The Mushroom Identifier,” David Pegler and Brian Spooner, Worthy and Smithmark, 1992.

“Mushrooms and Other Related Fungi,” Lois H. Tiffany, George Knaphus, and Robert F. Nyvall, Iowa State University Extension Service, 1982.

“Mushrooms and Other Fungi of the Midcontinental United States,” D. Huffman, Lois H. Tiffany, George Knaphus, ISU Press.

# Notes

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*Iowa's Mushrooms and Other Nonflowering Plants* is one in a series of seven booklets that are part of the *Iowa Plants Series*. The booklets in the series include:

### **Iowa Plants**

Iowa's Spring Wildflowers	(IAN-301)
Iowa's Summer and Fall Wildflowers	(IAN-302)
Benefits and Dangers of Iowa Plants	(IAN-303)
Iowa's Trees	(IAN-304)
Seeds, Nuts, and Fruits of Iowa Plants	(IAN-305)
Iowa's Mushrooms and Other Nonflowering Plants	(IAN-306)
Iowa's Shrubs and Vines	(IAN-307)

The Iowa Association of Naturalists also has produced five other booklet series that provide readers with a clear, understandable overview of topics concerning the Iowa environment and conservation. The booklets included in each of the other five series are listed below.

### **Iowa Physical Environment Series**

Iowa Weather	(IAN-701)
Iowa Geology and Fossils	(IAN-702)
Iowa Soils	(IAN-703)

### **Iowa Wildlife Series**

Iowa Mammals	(IAN-601)
Iowa Winter Birds	(IAN-602)
Iowa Nesting Birds	(IAN-603)
Iowa Reptiles and Amphibians	(IAN-604)
Iowa Fish	(IAN-605)
Iowa Insects and Other Invertebrates	(IAN-606)

### **Iowa's Natural Resource Heritage**

Changing Land Use and Values	(IAN-501)
Famous Iowa Conservationists	(IAN-502)
Iowa's Environmental Laws	(IAN-503)
Conservation Careers in Iowa	(IAN-504)

### **Iowa Wildlife and People**

Iowa Wildlife and Management	(IAN-401)
Keeping Iowa Wildlife Wild	(IAN-402)
Misconceptions About Iowa Wildlife	(IAN-403)
State Symbols of Iowa	(IAN-404)
Iowa Food Webs and Other Interrelationships	(IAN-405)
Natural Cycles in Iowa	(IAN-406)
Iowa Biodiversity	(IAN-407)
Adapting to Iowa	(IAN-408)

### **Iowa's Biological Communities**

Iowa's Biological Communities	(IAN-201)
Iowa Woodlands	(IAN-202)
Iowa Prairies	(IAN-203)
Iowa Wetlands	(IAN-204)
Iowa Waterways	(IAN-205)

### **Iowa Environmental Issues**

Iowa Habitat Loss and Disappearing Wildlife	(IAN-101)
Iowa Air Pollution	(IAN-102)
Iowa Water Pollution	(IAN-103)
Iowa Agricultural Practices and the Environment	(IAN-104)
People, Communities, and Their Iowa Environment	(IAN-105)
Energy In Iowa	(IAN-106)
Iowa Waste Management	(IAN-107)

These booklets are available to download via PDF on the ISU Extension Store:

[store.extension.iastate.edu](http://store.extension.iastate.edu)

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