THE PROTISTA KINGDOM:
LIFE CYCLES

Material:

Paper and pencil.

Presentation:

1. The children research the life cycle of a particular protist.
2. The children draw a picture of the life cycle of the protist and write the information about the life cycle on the picture or on a separate paper.
3. The children present their research to the class.
4. All the life cycles may be placed in a book to be shared.
THE PROTISTA KINGDOM:
HOW THE PROTIST Satisfies Its Needs

Material:

Protist pictures.
Large labels for the questions.
Small labels for the answers.
Pen or pencil.

Presentation:

1. Generate the questions and answers with the children.

2. The children or the adult write the labels.

3. Examples of questions from Elementary I that can be modified:
   a) “In which element do they live?”
      “in the water” “on the land” “in the air” “inside another organism”
   b) “In what climatic region do they live?”
      “frigid zone” “temperate zone” “torrid zone”
   c) “How are they considered in relation to people?”
      “useful” “harmful” “neither useful nor harmful”
   d) “How do they reproduce themselves?”
      “born alive” “by means of eggs” “by binary fission”
      “by conjugation”
e) “How do they care for their offspring?”
   “provide food for their young” “take no care of their offspring”
   “suckle their offspring”

f) “How do they feed?”
   “photosynthesize” “chemosynthesize” “parasitic” “ingestion”

g) “How do they move?”
   “flagellum” “cilia” “pseudopodia” “appendages”

4. The children may use the moveable material for each of the protist pictures.
5. The children may then use the labels to describe many different protists.
6. The children may generate a worksheet to use for any organism.
THE PROTISTA KINGDOM:
WHO AM I? STORIES

Material:

Paper and pencil.

Presentation:

1. The children research a protist and prepare information on the protist. The protist needs to be one that is familiar to the other children.

2. The children draw a picture of their protist and label it on the back.

3. On a piece of paper, the children write a four sentence description of their protist with the most general information first and the most specific information last.

4. In a group, each child reads her story, pausing after each sentence to give the other children a chance to guess the protist. If no one guesses after the last clue, the child may show the picture of the protist as the last clue.

5. All the stories may be placed on the shelf as an activity for the children to work with on their own.

6. Stories may also be prepared by the adult and placed on the shelf as an activity for the children to learn the different protists.

7. Example:

   I reproduce by means of cell division. I am green. I move by means of a flagellum. I can photosynthesize in the sunlight and ingest food in the dark. Who am I?

   Euglena
CHAPTER 5: THE FUNGUS KINGDOM
Origins of Fungi:

Fungus comes from the Latin ‘fungus’. The first fungus appeared in the Paleozoic Silurian Period, about 430 million years ago. These fossil fungi were intimately associated with fossil plant tissue, an association that has persisted for more than 400 million years. Some scientists think that the fungi made it possible for plants to become terrestrial, transporting the nutrients to the plants and preventing them from drying out.

The actual origin of the fungi is not really understood. They may have descended from conjugating protists, sharing a common ancestor with the rhodophytes. The ascomycetes and basidomycetes appear related to each other and probably had a common ancestor. The deuteromycetes descended from either the ascomycetes or the basidomycetes, losing their sexual reproductive stage in the process.
**Life Cycle of the Fungus:**

The fungi are eukaryotic cells that form *spores* and lack flagella. There are about 100,000 species of fungi, most of which are terrestrial, although there are a few truly marine fungi.

When fungal spores germinate, they grow slender tubes called *hyphae* that are divided into cells by cross walls called *septa*. Each cell may contain more than one nucleus, the actual number depending on the species of fungus. The septa do not usually separate the cells completely, allowing the cytoplasm to move freely through the hyphae. Some fungi have no septa.

A large mass of hyphae forms the *mycelium*, the growing form of most fungi. When reproductive structures made of hyphae are formed, they are called the mold, morel, or mushroom stage. Some mushrooms and shelf fungi form from mycelia meters in diameter, while others are microscopic.

During sexual reproduction, called *conjugation*, hyphae of different mating types come together and fuse. The nuclei in the hyphae contain only one set of chromosomes. The parent nuclei continue to grow and divide within the hyphae, often for long periods of time. The nuclei are paired with one nucleus from each parent. Several hyphae form a mycelium called a *dikaryon*.

After the formation of the dikaryon, the nuclei fuse to form *zygotes* that contain two sets of chromosomes. The zygote immediately divides into two parts, to form *spores*. The spores can germinate into hyphae.
In many species of fungi, the spores form in special structures called **sporangia, asci, or basidia**. Most fungi, even those that have sexual conjugation, can form spores directly through asexual means. There are asexual spores called **conidia** that form at the tips of the hyphae in structures called **conidiophores**. The conidia are scattered by the wind and are very tough, enduring heat, cold, and desiccation that the fungus could not survive. When favorable conditions return, the conidia grow into hyphae and form mycelia.

**How Fungi Feed:**

Almost all fungi are **aerobes**, requiring gaseous oxygen, and all are **heterotrophs**, obtaining carbon and energy from organic compounds produced by other organisms. Fungi absorb their food by excreting powerful enzymes that break food down into molecules outside the fungi, then transporting the food through the fungal membrane into the fungi (absorption). Some fungi produce complex organic compounds that are poisonous to mammals as a protective strategy.
Environment:

Most fungi are terrestrial, although there are a few truly marine fungi. Some grow in acid, and others in environments with very little nitrogen. They are the most resilient of the eukaryotes, surviving even severe desiccation (lack of water). They have cell walls made of a nitrogenous polysaccharide called chitin, that is hard and stiff and resists the loss of water.

The Role of the Fungi:

Many of the fungi cause diseases, especially in plants, but many others have beneficial associations with plants. Most tracheophytes (vascular plants with xylem and phloem) have symbiotic fungi with their roots that allow the rapid transportation of the nutrients, such as nitrates and phosphates, that the plant needs. For example, most orchid seeds require a specific fungus in order to germinate. The fungi in the roots of forest trees are responsible for the transport of nutrients from the soil to the plant. Some fungi are important sources of antibiotics, such as Penicillium chrysogenum, the source of penicillin. Molds and yeasts are used to make cheese, bread, and beer.
The Fungus Kingdom is not represented on the Time Line of Life. The first fungus appeared in the Silurian Period, about 430 million years ago. The fungus fossils were associated with plants.
Material:

Different kinds of mushrooms.

Paper and pencil.

Knife and cutting board.

Magnifying glasses; microscopes and slides; prepared slides.

Presentation:

1. The children examine the different kinds of mushrooms.
2. Draw pictures of the mushrooms. Label and define the parts.

A. **The Mushroom** - The mushroom is the reproductive structure of some fungi. Most of the fungus grows underground as moist, thread-like filaments called hyphae. The whole branching web of hyphae is called the mycelium. When the fungus is ready to reproduce, small knots of hyphae called primordia are formed. As the primordia grow larger, the hyphae form two parts: the mushroom cap and the stem. When optimum growth is reached, the stem elongates to push the mushroom cap above the ground, the cap expands, and the mushroom is formed.

B. **The Basidioma** - The basidioma is the reproductive structure (cap) composed of tightly packed hyphae. The whole mushroom is the basidium (cap and stem). The plural of basidioma is basidiomata.
C. **The Cap (Pileus)** - The cap or pileus is the top part of the mushroom that contains the basidia with basidiospores (spores). The cap protects the gills and the spores.

D. **The Basidium** - The basidium is the location of sexual reproduction in the cap. The basidium opens into the tubes (gills) in the cap. Each basidium produces four spores at the end of microscopic spines called sterigma. When the spores are mature, they are discharged the short distance into the space between the gills. The spores fall out of the cap and are dispersed by the wind. The plural of basidium is basidia.

E. **The Tubes (Gills)** - The tubes are tissue-thin hanging plates under the basidia. The basidiospores travel from the basidia down the tubes to the outside of the mushroom.

F. **The Basidiospores** - The basidiospores (spores) are the product of reproduction. A mushroom produces millions of microscopic spores. The spore is a single cell protected by a cell wall. The spore contains all the chemicals necessary to form a new fungus. From the spore, new hyphae will grow. The spores are dispersed by the wind.

G. **The Stalk or Stem** - The stalk or stem connects the cap of the mushroom to the underground hyphae.

H. **The Hyphae** - The hyphae are moist, thread-like, underground filaments that form when the basidiospore germinates.

I. **The Mycelium** - The mycelium is a large mass of hyphae.

3. Cut open the various mushrooms and examine with magnifying glasses.
4. Cut thin slices of the mushroom cap and examine under a microscope.

5. Each child places a mushroom cap on a piece of white paper. Observe after several hours. (The mushroom will produce spores. These will be tiny dots on the paper.)


7. Grow your own mushrooms in the classroom. What are the requirements for mushrooms? Compare to the requirements of plants.

8. Slice the mushrooms purchased from a grocery store and eat them.

9. Go on a field trip to the forest to examine mushrooms in their natural habitat. Remind the children not to touch or eat the mushrooms in the wild. Many are poisonous.

10. **Follow-Up Work:**

    A. The children may draw and label the different kinds of mushrooms.

    B. The children may make nomenclature cards, wall charts or booklets of their mushrooms.

    C. The class may make a booklet of their drawings to be shared.

    D. The children may do experiments with the mushrooms - vary the growing conditions.

    E. The children may do experiments with different kinds of fungi such as bread molds, yeasts, etc.
The Parts of the Mushroom
**THE FUNGUS KINGDOM: EXPERIMENTS WITH YEAST**

**Material:**
narrow necked bottle
one package dry yeast
one teaspoon sugar
warm water
balloon

**Procedure:**
1. Half-fill the bottle with warm water.
2. Add one teaspoon sugar. Shake gently.
3. Add the package of yeast. Shake gently.
4. Place the balloon over the bottle neck.
5. Observe.

**Observations:**
The yeast grew in size. The balloon inflated.

**Conclusions and Discussion:**
The yeast used the sugar as food to grow and reproduce, growing in size. This process resulted in the production of carbon dioxide gas which inflated the balloon.

**Further Experimentation:**
Make bread with some yeast. Observe how the dough grows in size. Observe how the bread does not grow in size after the bread dough has been placed in the oven. The hot temperature of the oven kills the yeast.
**THE FUNGUS KINGDOM CHART**

**Material:**

The Fungus Kingdom Charts and moveable material.

Paper and pencil.

**Presentation:**

1. Say, “This chart shows the different Phyla in the Fungus Kingdom.”
2. Discuss the characteristics of and the fungi in each of the Phyla. (see following pages)
3. **Follow-Up Work:**
   A. The children may work with the charts and the moveable material.
   B. The children may draw their own chart and write the characteristics of each of the Phyla in their own words.
   C. The children may do research on each of the Phyla and record the information they discovered on their own chart.
   D. The children may make nomenclature cards, wall charts or booklets of the Fungus Kingdom.
Phylum Chytridiomycota

Chytrids are the most primitive fungi. They live in fresh water or soil. Some chytrids are single-celled. Most chytrids form hyphae, branched filaments that make up the body of the chytrid. Some chytrids are parasites (organisms that live inside other organisms) of algae, protozoa, aquatic invertebrates, and the spores, pollen grains, and other parts of plants. Some chytrids are saprobes, organisms that excrete digestive enzymes into dead organic matter, such as dead insects, then absorb the nutrients. They extend their thread-like hyphae or rhizoids into living hosts or dead organic matter, excrete digestive enzymes into the host or organic matter and absorb the nutrients that are formed. An example is Physoderma zea-maydis which causes the brown-spot disease of corn.

All the chytrids feed within the cells of the host. The more complex ones have the reproductive structure on the surface of the host. Their cell walls are made of chitin and may have cellulose as well.

The thallus of the chytrid has many nuclei that are not separated by cell walls. Each reproductive organ of the thallus is separated from the thallus by a septum, a solid plate made of the same material as the cell wall. Some chytrids have pseudosepta that have the appearance of plugs rather than plates and made of a different material than the cell walls.

Chytrids reproduce asexually and sexually.

In asexual reproduction, the chytrid produces zoospores that move by the whiplash movement of the flagellum. The chytrids are the only fungi that have flagella for movement.
In sexual reproduction, the male and female cells (gametangia) unite to form a zoospore with no flagellum. The zoospores develop in the sporangium.

There are four classes.

Class Chytridia are unicellular with no mycelium. They reproduce sexually by the fusion of two equal gametes into the zygote.

Class Blastocladiocladiella emersonii which has a very complex life cycle, depending on the amount of food, moisture, carbon dioxide and degree of crowding. Sexual reproduction occurs by the fusion of gametes with flagella produced by the thick-walled sporangia.

Class Monoblepharida have specialized hyphae called the male gametangium or antheridium and the female gametangium or oogonium. Inside the oogonium, the protoplasm develops into an oosphere or egg that has one nucleus, and is nonmotile. The motile male gamete fertilizes the oosphere and a zygote is formed. The zygote divides and germinates to form the hyphae of the mycelium. The organism grows and forms sporangia with zoospores or develops into male and female gametangia.

Chytrids are able to synthesize the amino acid lysine.

Greek: chytra - little earthen cooking pot
mykes - fungus
**Phylum Zygomycota**

Zygomycetes live mostly on land. Zygomycetes are fungi that can be single-celled, such as yeast. Most zygomycetes are saprobes that live on decaying plant and animal material. Some zygomycetes are parasites of plants, animals, and other zygomycetes. Some zygomycetes form symbiotic associations with the roots of plants and are named mycorrhizae. There are about 600 species.

The *zygomycetes* do not have cross walls or septa, but there are separations between reproductive structures and the rest of the mycelium.

Zygomycetes reproduce asexually and sexually.

In asexual reproduction, a sturdy upright hypha develops a dark, round swelling at the top of the hypha, named the sporangium. Spores, called *sporangiospores*, develop in the sporangium from a single cell. The spores then produce hyphae that contain a nucleus with one set of chromosomes. This is asexual reproduction because two cells do not unite to form the spore.

In *sexual conjugation*, there are special hyphae called *gametangia* that have opposite mating types. They grow toward each other until they touch. Then the ends of the hyphae swell and the two cytoplasms mix together. The nuclei from both parents enter the joined swellings and develop into a thick-walled *zygospore*. Within the zygospore, the nuclei fuse, then divide to form spores that disperse. Often more than two nuclei are brought together, fusing, and dividing.
Class Mucorales: These fungi are mainly saprobes, although some are parasitic on plants or vertebrates. They reproduce both by asexual and sexual conjugation means. The spores form in sporangia, one or many at a time. The sporangia have conspicuous walls that break open when they dry out. The common black bread mold Rhizopus stolonifer, Mucor, and Phycomyces are in this class. Phycomyces are very sensitive to light, forming reproductive bodies with just a few photons of light. They have a photoreceptor, the B vitamin riboflavin, which absorbs blue light. The fungus Pilobolus grows on horse dung and is able to shoot its sporangia two meters into the air.

Class Entomophthorales: Most of these fungi are parasites on animals, especially insects. They reproduce asexually by sporangia, although the spores are not released while attached to the fungus. The sporangia is forcibly discharged as a unit, then the spores are released. Basidiobolus, a fungus that grows on frog dung, is an example.

Class Zoopagales: These fungi are parasites on amoebas, nematodes, and other protists, and small animals. There are about 65 species in 10 genera. Most produce a mycelium that sends penetrating hyphae into the host organism. Some have hyphae that form short, thick, spiral coils that are released violently into the host, rendering it nonfunctional. The gametangia emerge from the destroyed host and fuse to become zygospores. Cochlonema, Endocochlus, and Stylopage are examples.

Greek: zygon - pair                mykes - fungus
**Phylum Ascomycota**

Greek: *askos* - bladder, *mykes* - fungus

The ascomycetes are **yeasts, bread molds, morels, and truffles**. There are tens of thousands of species that are economically important. All of these fungi possess an **ascus**, a microscopic reproductive structure. All have long, slender, branched hyphae that form a visible mass called the mycelium.

Ascomycetes live in marine and fresh water, and on land. Ascomycetes are fungi that can be single-celled, such as yeast. Some ascomycetes are saprobes that live on decaying plant and animal material. Some ascomycetes are parasites of living plants and animals. Some ascomycetes form symbiotic associations with the roots of plants and are named mycorrhizae. The mycorrhizae aid in breaking down the minerals in the soil, allowing the plant to absorb the minerals. Some ascomycetes live in leaves on the surface of the mesophyll cells and protect the leaves from insects by releasing toxic compounds. Nearly all lichens are a symbiotic association of ascomycetes and algae. Some ascomycetes are edible, such as truffles and morels.

Ascomycetes reproduce asexually and sexually.

In asexual reproduction, the tips of modified hyphae form special cells named **conidiophores**. Long chains or clusters of spores, named **conidia**, are formed externally on the conidiophores. There are no sporangia. The conidia are usually dispersed by the wind.

In sexual reproduction, many hyphae form a tightly interwoven mass named the **ascoma**. Male and female cells (gametangia) are formed. The cells touch and the proplasts fuse. New hyphae form a sac named the **ascus**. Within the ascus, **ascospores** are formed. At maturity, the ascus bursts to release the ascospores.
Class Hemiascomycetae: These are very simple fungi with short or no mycelia, a small ascus and no ascocarps. The best known are the yeasts, such as Saccharomyces cerevisiae. Yeasts usually do not grow hyphae and are single celled. The cells conjugate to form a zygote that forms an ascus and ascospores arranged in a tetrahedral configuration. The ascospores germinate by budding. Yeasts ferment sugars such as glucose and sucrose to ethyl alcohol and are used to make wine and beer. Yeasts also oxidize sugars to carbon dioxide in the presence of gaseous oxygen and are used to make bread. Yeasts have been used in this manner for thousands of years.

Class Euascomycetae: This is the largest class of ascomycetes. Morels, truffles, and most of the fungi in lichens are in this class. These fungi develop asci and ascocarps. The walls of the ascus are rigid and do not separate when the spores are ejected. Neurospora is an example that is used in genetic research.

Class Loculoascomycetae: The asci of these fungi have an inner wall that is elastic and that expands beyond the outer wall when the spores are released. The ascocarps form in a mass of supporting tissue. Mycosphaerella has more than a thousand species, many of which are parasites on important food plants. Elsinoe causes diseases of citrus, raspberry, and avocado plants.

Class Laboulbeniomycetae: These fungi are parasites of insects. They are highly host specific, and may parasitize only one sex or one body part of the insect. Their ascospores germinate directly into reproductive structures, the number of cells of which is species specific. Examples are Rhizomyces and Amorphomyces.

Many ascomycetes form symbiotic relationships with other trees and are necessary for the healthy growth of these trees.
**Phylum Basidiomycota**

Basidiomycetes live on land. The basidiomycetes include the **smuts**, **rusts**, **shelf fungi**, **mushrooms**, **toadstools**, **puffballs**, and **stinkhorns**. Basidiomycetes are fungi that can be single-celled, such as yeast. There are about 25,000 species.

Many are parasites on agricultural crops and forest trees. Some are saprobes that live on decaying plant material, especially wood. Others form symbiotic relationships, **mycorrhizae**, with forest trees and shrubs. These fungi are intimately involved with the transfer of phosphorus and nitrogen to the tree or shrub. Many other fungi, such as the domesticated mushroom, Agaricus, are important food items.

Basidiomycetes typically reproduce sexually.

In sexual **conjugation**, many hyphae of opposite mating types form a tightly interwoven mass named the mycelium. The mycelium develops into a club-shaped, fleshy body such as the mushroom cap, called a **basidium**. Each basidium contains several spores, usually four. The mushroom cap contains the spores, called **basidiospores**. At maturity, the spores are released and dispersed by the wind. A mushroom can release up to one billion spores.

Class Heterobasidiomycetae: This class contains the **jelly fungi**, **rusts**, and **smuts**. They have more than one type of basidiospore-producing structure and have very complex life cycles linked to seasonal conditions and the developing biology of their host plants.
Class Homobasidiomycetae: This class have basidia without septa that contain four basidiospores. Subclass Hymenomycetes, the common mushrooms, shelf fungi, and coral fungi, all have the basidia in a well-developed structure called the hymenium that is exposed while the basidiospores develop. In the gilled mushrooms, the basidia are on the lower surface of the gills. In the pore mushrooms, the basidia line the inside of tubes that lead to exterior pores. Subclass Gasteromycetes, the puffballs, earthstars, stinkhorns, and bird's nest fungi, all have their spores mature inside an enclosing structure called a basidiocarp which releases the spores when it decays or is ruptured.

Greek: basidion - small base mykes - fungus
Deuteromycetes

Deuteromycetes (molds) are not a phylum. Deuteromycetes describes the asexual reproduction process of certain fungi in Phylum Ascomycota, and to a lesser degree in Phylum Basidiomycota and Phylum Zygomycota. Deuteromycetes have been named ‘Fungi Imperfecti’ because they do not have sexual reproduction or do not use sexual reproduction as the main method of reproduction. They have asexual reproduction.

The asexual reproduction is by conidium-producing features. The asexual fungal spores, named conidia, are not contained within a sporangium. Conidial reproduction can be produced as single spores, or as chains of spores. Most conidia are multi-nucleated.

Penicillium is a deuteromycetes that is used to make cheese, and medicine. Other deuteromycetes are used to make soy sauce, sake, and laundry detergent, and to control other fungi that destroy crops or trees. Some deuteromycetes cause diseases such as cancer, ringworm, athlete’s foot, and other skin diseases.

Greek: deuteros - second mykes - fungus
Lichens (Mycophycophyta)

Lichens are not a phylum. Lichen describes the symbiotic association of millions of photosynthetic green algae or cyanobacteria held within the hyphae of a fungus. The green algae can be single-celled or filamentous. The fungus is almost always ascomycetes.

They are the first organisms to grow on burned areas or new volcanic rock and often grow on bare rock. They are symbiotic relationships between a fungus, usually ascomycetes, and a chlorophyte or cyanobacterium. There are 25,000 species which refers to 25,000 different fungi.

The algae in the lichens are usually the chlorophytes Trebouxia or Pseudotrebouxia, or the cyanobacteria, Nostoc.

The habitats of lichens vary from the Antarctic and Arctic tundras, to the high mountains, the tropics, northern forests and supratidal zones of rocky coasts. They usually grow on the bark of trees or on rocks. They are very resistant to desiccation, but must have alternating dry and wet periods to exist. Continuous drought or dampness will kill them. Lichens grow very slowly, often only a few millimeters in a century.

By slowly wearing away and dissolving the rocks they grow on, they prepare the rock surface for the germination of plant seeds and make it possible for plant roots to grow into the rocks. Soil is also formed. Lichens are very sensitive to gases such as sulfur dioxide and other pollutants and can be used as pollution indicators.

Most of the mass, shape, and structure of the lichen is formed by the fungus. The algae or the cyanobacteria is usually located below the surface of the fungus. The green algae photosynthesize food and provide the fungus with
food also. The cyanobacteria fixes nitrogen and provides the fungus with nitrogen. The fungus provides the environment for the algae or cyanobacteria to grow. Even though lichens grow very slowly, they have a rapid metabolism. The algal partner, called phycobiont, is photosynthetic, producing sugar or sugar alcohol for the fungus, called mycobiont. It is thought that this process began as the algal response to an active attack by the fungus on the alga.

Lichens are often grouped according to their external appearance and growth habit: crustose lichens are low and crusty; foliose lichens are leafy; and fruticose lichens are bushy. This is the growing part, or thallus, of the lichen. They reproduce by ascospores that develop by nuclear division. The spores germinate to form fungal hyphae. The most common type of reproduction is the release of soredia, which are small fragments of at least one algal cell surrounded by fungal hyphae. The soredia are dispersed by air currents and germinate when they land in a suitable environment.

Lichens reproduce asexually and sexually.

In asexual reproduction, the parent lichen forms fragments that form new lichens with both the fungus and algae or cyanobacteria present. The parent lichen can also form soredia, specialized structures that contain the fungus and the embedded algae or cyanobacteria. The algae and cyanobacteria also reproduce by cell division.

In sexual reproduction, the fungus reproduces by ascospores or basidiospores.
Lichens are often classified with the fungus group to which the fungus in the symbiotic relationship belongs.

The ascomycetes produce open fruiting bodies. Examples are Lichina, Collema, and Cladonia. Cladonia is an important food source for caribou, reindeer, and sometimes people in the Arctic.

The basidiomycetes reproduce by basidia. The deuteromycetes such as Lepraria and Lichenothrix have no sexual structures.

Greek: mykes - fungus  phykos - seaweed, alga  phyton - plant
Asexual Reproduction of Lichen

A. The Lichen - The lichen is a symbiotic relationship between a fungus, usually ascomycetes, and green algae or cyanobacteria. The algae or cyanobacteria live between the hyphae of the fungus. The fungus provides a moist, sheltered environment for the algae or cyanobacteria to live. The algae or cyanobacteria provides the fungus with food (sugar) from photosynthesis. Cyanobacteria also fix nitrogen for the fungus to use. The algae or cyanobacteria is called the phycobiont. The fungus is called the mycobiont.

B. Asexual Reproduction - Asexual reproduction is the most common form of reproduction in lichens. The lichens release soredia, small fragments of at least one algal cell surrounded by the hyphae of the fungus. The soredia are dispersed by air currents. They germinate when they land in a suitable environment.

C. The Soredia - The soredia are small fragments of an algal cell surrounded by the hyphae of the fungus. When the lichen is ready to reproduce, the soredia break away from the lichen and are carried by air currents to a new location.

D. The Thallus - The thallus is the growing part of the lichen. The thallus grows as the algae and fungus reproduce. The thallus consists of the fungus layer and the algal layer.

E. The Fungus Layer - The fungus layer consists of the body of the fungus with the hyphae. The algae grow between the hyphae of the fungus.

F. The Algal Layer - The algal layer is below the fungal layer and between the hyphae of the fungus.
Asexual Reproduction of Lichen