



Volume 9, Issue 2  
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The newsletter of the Western Pennsylvania Mushroom Club is published and distributed 5 times per year: April/May, June/July, Aug/Sept, Oct/Nov, and Dec. Articles, photos, news items, and other submissions should be sent to the editor at least 6-8 weeks prior to targeted distribution for the best chance of inclusion. The editor cannot guarantee that submissions will be included in the next newsletter. However, all submissions will be included in future newsletters as long as it relates in some way to fungi. The editor reserves the right to make spelling or grammatical corrections and may suggest content changes to the author. Material published in our newsletters may be used in other non-profit publications only with expressed permission and with appropriate acknowledgements.

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## The Lycoperdon, Part 1 of 2

Article and Photos by John Plischke III

Puffballs are one of the first dozen or so of the mushrooms that I started collecting and eating. The first 3 of them I learned were the Giant Puffball which often gets basketball sized. The Skull Shaped Puffball which is often softball sized, and the small Pear Shaped Puffball.

There are a large number of puffballs, enough to fill a book, so only a few of the Lycoperdon are discussed below.

It should be noted that puffballs have a number of look-alikes, some of which are poisonous such as Sclerodermas; the most common species in our area is the Pig Skin Poison Puffball (*Scleroderma citrina*). Scleroderma tend to have a really thick, football like skin and are very hard and firm, unlike many puffballs which feel more marshmallowy. The poisonous scleroderma can be white inside at first but soon become purplish or purplish black.

Mature Amanita mushrooms do not look at all like a puffball, since they have a cap, gills and stalk, but small immature button stage amanitas can look a lot like a small puffball. I personally know several people who have confused a poisonous amanita button with a puffball. One of the things to do is to make sure to cut the puffballs in half and make sure that they are even in texture, and color. You should not see faint traces of an immature undeveloped cap, gills and stalk that an Amanita button should have.

### Colored Lycoperdon (*Lycoperdon coloratum*)

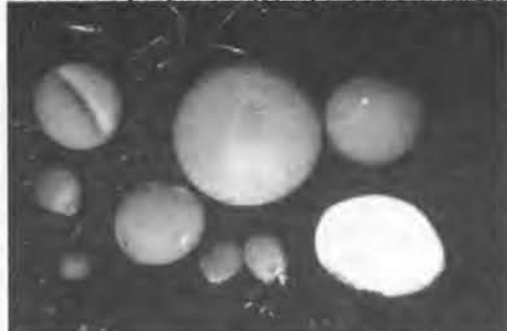


Photo from the Ellis Becker Mushroom Collection

Family: Lycoperdaceae

Description:  $\frac{1}{2}$  to  $1\frac{1}{2}$  inches wide; almost round or with a very slight base; the exterior can be finely warted at first; yellow to yellow-orange and can have green, brown, or gold tones; the interior is white ageing yellowish brown to greenish olive brown.

Range: North America.

Where To Look: On rotten, often bark-less, fallen logs and branches and on the soil under conifers.

How Often They're Found: Rare.

How They're Grouped: Singly or in small groups.

Social Plants: Moss can be present.

When To Look: August-October

Edibility: Edible if white when cut in half.

Microscopic Features: Spores 3.5-4um, round.



### (*Lycoperdon curtisii*) Berk (*Lycoperdon wrightii*) (*Vascellum curtisii*)

Family: Lycoperdaceae

Description:  $\frac{1}{4}$  to  $\frac{3}{4}$  inches wide; irregularly round; exterior is white turning light brown with age; covered with little but distinctive spines that are easily brushed off and a few can also come off on ones hands when picking them. The spine tops can be fused together in small groups or clumps. It gets a single hole in the center of the top for the spores to release. The interior is white when fresh but soon ageing olive with age.

Continued on Page 3, see "Lycoperdons"

## President's Corner

By John Stuart

The bad thing about mushrooming is that there are over 5,000 known species in North America with many others undescribed, there is a constantly changing upheaval in taxonomy, and you will never be able to identify all the mushrooms you collect. The good thing about mushrooming is that there are over 5,000 species with many more undescribed and you will always have something new to look forward to. Despite these large formidable numbers, Elio Schaechter, in his book "In the Company of Mushrooms - A Biologist's Tale" estimates that in a given area approximately 80% of the mushrooms collected will encompass some 200 species. This is still a significant number but it is manageable and with some effort is within grasp. Especially in our club where each walk usually has a competent identifier ready to assist you in identification. We also are very fortunate in having diversified habitats that yield a plentiful amount of material. You can also enjoy mushrooming without ever learning any Latin genus or species names at all. Many common names apply and anyone can appreciate the varied colors, forms, and delicacy of these woodland wonders. But watch out. The more you know, the more you want to learn. It's addicting.

With this in mind we are in the process of putting together two mushroom courses - 1.) "An Introduction to Mushrooming", for the beginner, and 2.) a more advanced course on "How to Identify as to Genus" with both macroscopic and microscopic components. Jim Tunney, Chairman of the Education Committee, is the course director and he will be assisted by our mycologists and identifiers. This should be ready to go before the Lincoff Foray in time to put your new found knowledge to work. We will have some great handout materials and have a lot of good information distilled into these two programs. Hope to see you there.

## WPMC News Items

### WPMC Mushroom Items For Sale

A number of mushroom-related items are sold at our meetings: caps and t-shirts, mushroom cookbooks, loupes, waxpaper bags, and Field Guides to Mushrooms (both Lincoff's and Russell's). See Mary Ellen Dougall at the sales table at our meetings.

### WPMC Yahoo Groups

Yahoo Groups is a great resource for our club members and other mushroom enthusiasts from across the country. There are always interesting discussions in the 'Message' section on all kinds of subjects involving wild mushrooms. Find out what mushrooms are up, where people are finding them, recipes, weather, latest announcements, and other things. Also find award winning photos in the 'Photo' section, and articles, lists, and other files in the 'Files' section. <http://groups.yahoo.com/group/wpamushroomclub/>

### WPMC Website

Reference our professionally designed website for information and links pertaining to our club: walks, meetings, species lists and Java data miner among other things. [www.wpamushroomclub.org](http://www.wpamushroomclub.org)

### Request for Chinese Auction Donations

The club is requesting donations for the Chinese Auction that we sponsor every year at the Gary Lincoff Mid-Atlantic Mushroom Foray event. Donations may be any mushroom-related item. Proceeds help the club offset event costs. Please contact John Stuart or Dick Dougall (see contact information on back page).

## WPMC Wild Mushroom Cookbook, Volume 3

We are working on compiling WPMC Cookbook, Volume 3, but we need more recipes. We are waiting for your addition to Vol. 3. Volumes 1 and 2 have been great successes and are both available for sale. We cannot use copyrighted material or anything you have not tested and enjoyed. Send your recipes to Becky Plischke at [morelbp@aol.com](mailto:morelbp@aol.com) or mail to 129 Grant St, Greensburg, PA 15601

### Used Mushroom Book Sale

There will be a used mushroom book sale at 6:30pm before the June 17, 2008 meeting selling the remainder of the Becker collection. There are many one of a kind and unusual books that will be a great addition to your home library. These include *The Mushroom Handbook* by Louis Krieger, *Twenty Common Mushrooms and How to Cook Them* by Coffin and Lewis, *Common Edible Mushrooms* by Clyde Christensen, and the unforgettable *Pilze Mitteleuropas Speisepilze II Und Giftpilze*. Don't miss this event as material of this caliber will not be available again.

### Monthly Meetings

Our meetings are held on the third Tuesday of every month from March until November. They begin at 7:00pm at Beechwood Nature Reserve in Dorseyville. Please see their website ([www.awsp.org](http://www.awsp.org)) for directions and other information.

May 20<sup>th</sup> "More Good and Bad Mushrooms" by Dick Dougall, club identifier and past-president. Everyone who starts hunting wild mushrooms is at first overwhelmed by the surprising number and variety of different mushrooms that are found on a typical walk. Dick will expand on his talk last year by presenting more common mushrooms everybody should know. This includes edibles, poisonous and unusual mushroom. More experienced mushroom hunters in the audience will be encouraged to share their experiences as to when and where these mushrooms can be found.

### June 17<sup>th</sup> "Classifying the Edibility of Mushrooms" by Lamonte Yarroll

Most people develop an interest in wild mushrooms through a desire to eat them. They may come to a club meeting or walk and be exposed to twenty or thirty species. It can be very overwhelming. As a club member gains experience, the question of which mushrooms to really try to learn well comes up again and again. The speaker presents a system for classifying mushrooms by their safety when collecting for the table: beginner, intermediate, or advanced. There will be a little something for everyone—beginners can expect to learn a couple easy and safe mushrooms, intermediate collectors will hopefully see something they haven't tried before, and advanced collectors will be invited to help classify all our club favorites.

July 15<sup>th</sup> Craft Workshop by members of the Workshop Committee. Artists can use mushrooms to make a number of interesting craft projects. Members of the workshop committee are brainstorming about which project to present for this meeting. Based on past projects, we should have more fun at this meeting.

August 19<sup>th</sup> "Foray in the Grocery Store" by Mark Spear & Jim Tunney, Club Cultivation Experts.

September 16<sup>th</sup> "Mushroom Trivia" by Frank Lotrich

October 21<sup>st</sup> Election of Officers & Open Forum: Officers for next year will be elected. Club members will be encouraged to share

*Continued on Page 4, see "WPMC News"*

**Range:** North Eastern United States, North Western North America.

**Where To Look:** On the soil in yards, parks, fields, golf courses, cemeteries and other grassy areas that are often mown. In pastures often with cows or horses.

**How Often They're Found:** Uncommon to occasional.

**How They're Grouped:** In groups and clusters.

**Social Plants:** Grass.

**When To Look:** October.

**Look-alikes:** (*Lycoperdon subincarnatum*) grows on wood. (*Lycoperdon pulcherrimum*) differs by having larger spores 4-4.5 um. They are round.

**Edibility:** Unknown.

**Microscopic Features:** Spores 3-3.5um, round.

**Spiny Puffball (*Lycoperdon echinatum*)**



(*Lycoperdon gemmatum* var. *echinatum*)  
(*Lycoperdon hoylei*)

**Family:** Lycoperdaceae

**Description:** From 3/4 to 1 3/4 inch wide and 3/4 to 2 1/4 inch tall. It is round and has spines. The exterior is white becoming darker with tans with age. It has lots of spines. It gets a single hole in the center of the top for the spores to release. The interior is white and turns greenish brown to olive brown with age. It has a base.

**Range:** North Eastern United States and eastern Canada.

**Where To Look:** On the soil in the woods.

**How Often They're Found:** Occasional.

**How They're Grouped:** Singly or in small groups to scattered.

**When To Look:** August - October.

**Look-alikes:** (*Lycoperdon nigrescens*) = (*Lycoperdon foetidum*). (*Lycoperdon perlatum*). (*Lycoperdon marginatum*) differs by having spines that fleck off in clumps. See Text.

**Edibility:** Edible if white when cut in half.

**Microscopic Features:** Spores 3.5-4.5um, round.

**Macrochemical Reactions:** I tested the white exterior and the yellow ageing flesh. Ferrous sulfate and Formaldehyde did not have a reaction. KOH and Sodium Hydroxide discolored the yellow interior. Melzer's Reagent oranges it. Muratic acid did not have a reaction. Sulfuric acid makes the interior a light pinkish brown.

**Puffballs and Potatoes**



Pear Shaped Puffball mushrooms  
Diced red potatoes  
1/4 c red & green pepper chopped 1/2  
c onion  
1 teaspoon garlic  
Salt & Pepper  
Oil

Sauté mushrooms in a small pan for a few minutes, then add rest of ingredients & cook for about 20 minutes or until done.

**Scleroderma sp. - POISONOUS**



Photo From The Ellis Becker Mushroom Collection. Note the white turning purple interior.

**Tinted Yellow Puffball (*Lycoperdon flavotinctum*)**



**Family:** Lycoperdaceae

**Description:** 1/2 to 1 1/2 inches tall; exterior is yellow-white then turning brown with great age; interior is white turning yellow-brown to olive-green with age. Its sterile base is less than half the height of the mushroom. It has white colored mycelium. It gets a single hole in the center of the top for the spores to release.

**Range:** Northern North America.

**Where To Look:** Often on sandy soil.

**How Often They're Found:** Uncommon to very uncommon and even rare in some locations.

**How They're Grouped:** Singly or in groups to scattered.

**Social Plants:** Grass can be present.

**When To Look:** August - September.

**Edibility:** Edible if white when cut in half.

**Microscopic Features:** Spores 4-4.5 um.

**Puffball Potato Pancakes**



## Peeling Puffball (*Lycoperdon marginatum*)



Family: Lycoperdaceae

**Description:** It is 3/4 to 2 inches wide and 1/2 to 1 1/4 inches tall. The exterior is white and covered with distinctive spines that fleck off in clumps. Under them it is brownish sometimes with red or olive tones. It gets a single hole in the center of the top for the spores to release. The inside is white becoming olive to grayish brown. It has a small base.

**Range:** North America.

**Where To Look:** On the soil in the woods. Often the soil is sandy.

**How Often They're Found:** Occasional.

**How They're Grouped:** Singly or in small groups to scattered.

**When To Look:** June-October in east.

**Look-alikes:** (*Lycoperdon pulcherrimum*) has longer spines.

**Edibility:** Edible if white when cut in half.

**Microscopic Features:** Spores 3.5 - 4.5 um., round



(*Lycoperdon molle*)  
(*Lycoperdon gemmatum* var. *molle*)

FAMILY: Lycoperdaceae

**Description:** 3/4 to 1 1/2 inches wide and 1 to 2 inches tall. It is shaped like an upside down pear. The exterior spines age grayish brown to brownish. Its base is lighter in color. It gets a single hole in the center of the top for the spores to release. The interior is whitish turning yellowish then brownish with age. Its sterile base is less than 1/3 the height of the mushroom.

**Range:** North America.

**Where To Look:** On the soil or humus.

**How Often They're Found:** Uncommon.

**How They're Grouped:** Singly or in small groups to scattered

**Look-alikes:** (*Lycoperdon foetidum*) and (*Lycoperdon umbrinum*) see descriptions in text.

**Edibility:** Edible if white when cut in half.

**Microscopic Features:** spores 4.5 - 5 um., round.



*Although not quite still a button amanita, you can see how this Poisonous amanita is just starting to open and it looks a lot like a puffball. Photo From The Ellis Becker Mushroom Collection*

**HINT:** I like to push down on top of puffballs and pick the firm, marshmallow feeling ones. If they are too soft and squishy they are probably too old to eat

"WPMC News", cont'd from page 2

mushroom stories, experiences and slides. Results of the club's photography contest will also be presented.

November 18<sup>th</sup> "Mushrooms and Art" by Joyce Gross, Club Historian & Workshop Chair.

## Walks and Forays

Walks and forays are held almost every weekend from April through October. They are led by a walk leader and an identifier. Each walk will be at a designated location where participants will forage for wild mushrooms of all species. After the walk the identifier will discuss the mushrooms that were found and answer any questions. Walks usually last 2 or 3 hours and participants are welcome to stay longer if they want. It's a great way to learn about wild mushrooms. Please see our website [www.wpamushroomclub.org](http://www.wpamushroomclub.org) and our yahoo groups message board for updated information.

*We request that no one hunts a walk or foray location for at least two weeks prior to a walk or foray. It is only through your cooperation that we can have successful walks and forays. All walks and forays will be held rain or shine. All walks start on time.*

**May 24 - 10:00-12:00** Moraine State Park, Butler County. Meet Jim Tunney. From Butler take US 422 west 8.7 miles to PA 528 N and turn right, then an immediately left just before a lawn & garden store with a John Deere sign. Go about .8 miles to the parking lot at the end of the road near the boat launch by the lake. OR take I-79 N to 422 E for about 4 1/2 miles and turn left on PA 528 N, follow the directions above. We will drive to a secret location.

**May 31 - 10:00 - 2:00** McConnell's Mill, Butler County. Meet Joyce & George Gross. From the North or South: Take I-79 to the PA 422 exit. Go West on 422 for about a mile, turn left at the sign to McConnell's Mill onto McConnell's Mill Road. The sign is not obvious and is immediately at the turn. Follow this road to the parking lot and picnic area at the end. This area has been very productive on past walks.

**June 7 - 10:00-12:00** Emmerling Park, Indiana Township, Allegheny County. Meet Dick Dougall. Enjoy this mushroom walk along a part of the Rachel Carson Trail. From Route 8, go east on Route 910, or from Route 28, go west on Route 910. The park is on Cove Road almost directly across from the Indiana Township Municipal Building. Meet at the large parking lot in the park.

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THE SEVENTH ANNUAL  
GARY LINCOFF  
MID-ATLANTIC MUSHROOM FORAY  
Saturday, Sept. 20, 2008  
7:30-8:15 Registration, 8:30-7:30 Program

*SPECIAL EARLY REGISTRATION FORM FOR CLUB MEMBERS ONLY*

Featured speaker will be Gary Lincoff, author of the *Audubon Society Field Guide to North American Mushrooms*. Gary is the nation's best known mushroom expert. He is past president of the North American Mycological Association (NAMA). He is a very charismatic and entertaining speaker and has a way of making learning about fungi fun and interesting. His end-of-the-day table walk discussions are not to be missed.



Coleman McCleneghan, Ph.D., began her interest in mycology in 1988 when she stumbled onto a King Boletus that was as tall as her knees. Shortly thereafter she did a mycological master at Humboldt State University in northern California. She moved east in 1991 and continued her mycological endeavors at the University of Tennessee in Knoxville where she spent years collecting fungi in the Great Smokey Mountains for graduate research in the genus *Pholiota*. Over the last decade she has taught numerous fungal courses including mycology, fleshy fungi, and lichen courses at Appalachian St.

University, the Smokey Mountain Field School, and the Smoky Mountain Institute at Tremont. She has been involved with amateur mushroom clubs giving presentations and leading forays.

Also joining us will be Jon Ellifritz, President of the Mushroom Association of Washington D.C., MAW. Jon has been with us in past years as guest speaker and walk identifier. He's very knowledgeable about fungi, plants, ecology, and virtually all other aspects of nature. He's a great person to follow around in the woods.

Join us for an exciting day of fungi, fun, and friends and mushroom exploration. It's a day filled with foraging, learning, feasting and fun!

**Fungi Fun Friends**

Cost is only \$50 at the door or only \$23\* each pre-registered and paid by May 10, (\*does not include club membership). Children 11 & under free. Registration is limited. Send your registration in today!

Contact John Stuart (724-443-6878, [jstuart@nauticom.net](mailto:jstuart@nauticom.net)) or Dick Dougal (412-486-7504, [rsdme@imap.pitt.edu](mailto:rsdme@imap.pitt.edu))

Signing and dating the release is an absolute requirement for attendance. No refunds  
Make check payable to: Western PA Mushroom Club, 1848 Fairhill Road, Allison Park, PA 15101

Name 1 \_\_\_\_\_

Name 2 \_\_\_\_\_

Name 3 \_\_\_\_\_

Address \_\_\_\_\_ City/State/Zip \_\_\_\_\_

Phone \_\_\_\_\_ E-mail \_\_\_\_\_

**RELEASE**

Knowing the risks, I (we) agree to assume the risks, and agree to release, hold harmless, and to indemnify the Western Pennsylvania Mushroom Club, and any officer or member thereof, from any and all legal responsibility for injuries or accidents incurred by myself or my family during or as a result of any mushroom identification, field trip, excursion, meeting or dining, sponsored by the club.

Signature \_\_\_\_\_ Date \_\_\_\_\_

Signature \_\_\_\_\_ Date \_\_\_\_\_

**June 14 -- 10:00-12:00, Deer Lakes Park, Allegheny County, Russelton.** Meet Jim Wilson and Shirley Caseman From the PA Turnpike get off at the Allegheny Valley Exit 5. Turn toward New Kensington. Turn left onto Route 28. Follow to Pearl Avenue and turn left. Continue on Pearl Ave, it becomes Russelton Road. In Russelton, turn right at the first intersection, look for a drug store, bank and liquor store and turn right. Go a short distance you will see a Deer Lakes Park sign, turn left into the park. Just past the first lake, there is a large parking lot, meet there

**June 21 - 10:00-2:00 Hartwood Acres, Allegheny County.** Meet Glenn Carr and Jean Petrisek at the parking lot in front of the Mansion (on the opposite side of the park from the Performance Center). We will hunt mushrooms and help you identify them. Directions below.

**June 28 -10:00-2:00, The Dorothy Fornof Memorial Walk at Deer Lakes Park, Allegheny County, Russelton.** Meet Jim Tunney. From the PA Turnpike get off at the Allegheny Valley Exit 5. Turn toward New Kensington. Turn left onto Route 28. Follow to Pearl Avenue and turn left. Continue on Pearl Ave, it becomes Russelton Road. In Russelton, turn right at the first intersection, look for a drug store, bank and liquor store and turn right. Go a short distance you will see a Deer Lakes Park sign, turn left into the park. Just past the first lake, there is a large parking lot, meet there

**July 5 - 10:00-12:00 Ohiopyle State Park, Fayette County.** Meet Jim Strutz at the Train Station in downtown Ohiopyle for a walk. Camping is available at the campground, which gets very busy. If you plan to camp, call early for reservations. From PA turnpike, get off at Donegal exit and turn left onto Rt. 31 for 2 miles. Make a right onto 381/711. Go 9 miles and turn left onto 381 South, 11 miles to Ohiopyle.

**July 12- 1:30 10:00-12:00, Deer Lakes Park, Allegheny County, Russelton.** Meet Jim Wilson and LaMonte Yarroll From the PA off at the Allegheny Valley Exit 5. Turn toward New Kensington. Turn left onto Route 28. Follow to Pearl Avenue and turn left. Continue on Pearl Ave, it becomes Russelton Road. In Russelton, turn right at the first intersection, look for a drug store, bank and liquor store and turn right. Go a short distance you will see a Deer Lakes Park sign, turn left into the park. Just past the first lake, there is a large parking lot, meet there

**July 19 - 10:00-12:00 Chanterelle Mania at North Park, Allegheny County.** Meet Valerie and Jack Baker at Deer Browse #2 pavillion Turnpike beside the Swimming Pool parking lot. Last year this spot produced beautiful chanterelles. There were also a good number of boletes and other species. You never know what the season will bring, but it could be very good again. North Park has a variety of habitats, although the area abounds in large oaks there is a large variety of trees and habitats that make this an exceptional place for hunting mushrooms. Directions below.

**July 19-20 - Dawes Arboretum, Meet the Ohio Mushroom Society** for their Summer Foray near Newark, Ohio. Walt Sturgeon has told us this is an excellent place to find mushrooms. For further info check their website at:  
<http://www.ohiomushroom.org/oms/Events.htm>

**July 26 - 10:00-12:00 North Park, Allegheny County.** Meet John Stuart and LaMonte Yarroll at the intersection of Babcock and

Pearce Mill Road near Beaver Shelter. North Park has a variety of habitats, we always find mushrooms here. Directions below.

**July 31 - August 3 - the 32nd ANNUAL NORTHEAST MYCOLOGICAL FORAY.** The Connecticut Valley Mycological Society takes pleasure in inviting all mycophiles to join us at - the Samuel Ristich Foray - at Connecticut College in New London, CT. See their website for details. <http://www.nemf.org>

**Sept 20 - Gary Lincoff Mid Atlantic Mushroom Foray** Don't miss it, register today!

**September 26 - 28 Join the Eastern Penn Mushroomers for the Helen Miknis Memorial Foray.** This year's annual EPM foray will be held at King's Gap Environmental and Training Center near Carlisle, PA. Contact Bill Miknis at [fivebill@verizon.net](mailto:fivebill@verizon.net) or see their website for more information <http://www.epennmushroomers.org>  
**DIRECTIONS to North Park**

[www.county.allegheny.pa.us/parks/parkphon.asp](http://www.county.allegheny.pa.us/parks/parkphon.asp) From Pittsburgh go north on Rt. 8. Turn left onto Wildwood Road onto the Yellow Belt (Ford Dealer and Boston Market on the right). Go 1.3 mi. to a red light; go straight (W Hardies). Continue another 1.6 mi. to a red light at North Park Entrance, road name changes to Ingomar Road at this intersection, Turn left on Babcock Blvd. Follow the signs to the Swimming Pool parking lot and find the car with a mushroom basket and walking stick.

**DIRECTIONS to Hartwood Acres:** From PA Turnpike: Take Allegheny Valley (Exit 5). Stay right on the exit ramp. Turn right onto Route 910 West. Go 4 1/2 miles and turn left onto Saxonburg Blvd. at the red blinking light. Follow Saxonburg Blvd. about 2 1/2 miles, entrance will be on your right. This is about a mile and a half from Beechwood Farms Nature Reserve.

*Mushroom walks begin promptly at the designated time and place. Your walk leader will brief you on walk details and when to return. The walk identifier, at the end of the walk, will name and discuss the mushrooms found, and answer any questions. You are responsible for bringing your own lunch, water, mushroom gathering paraphernalia, camera, notebook, compass, whistle, etc. Dress for the weather and for comfort. Most importantly, identify any mushroom you intend to eat very carefully. We are not responsible for the consequences of you eating the wrong mushrooms.*



*I included this photo of a cluster of chanterelles because I'm looking forward to chanterelle season, and because it's unusual. You don't often see so many chanterelles clustered together. I started a watercolor painting of this photo but never finished it. Photo by Jim Strutz.*

# The World of Lichens

Article and Photograph by Jim Strutz

I've always had a sort of passing interest in lichens. If I happen to be with somebody in the woods and they ask about the greenish thing on the rock, I know enough to identify it as lichen and explain that it's a symbiotic union of fungi and algae. That's pretty much the extent of my knowledge of lichens and it is usually enough to answer the question. Thus, I was excited to learn that the guest speaker at the club meeting last November would speak on the subject of lichens. The presentation inspired me to research lichens for myself.

I found it useful to review algae as a prerequisite to lichens. Algae are simple plants that photosynthesize sunlight into food as other plants do. They convert carbon dioxide from the atmosphere into organic carbon sugars and produce oxygen as a byproduct. Algae are usually found in moist areas since they have no vascular system to transport water internally. They range from single cell to multi-cellular forms that differentiate or clump into larger structures. Algae lack leaves, flowers, seeds, and other characteristics of higher plants.

Two kinds of algae that are associated with lichens are green algae and cyanobacteria. Ubiquitous green algae are an important oxygen producer for our planet. Cyanobacteria, also known as blue-green algae, are photosynthesizing plants with some interesting elements of bacteria. They produce ammonium which combines with oxygen to form nitrates and then nitrites. The ability to "fix" nitrogen makes them an important part of ecosystems.

Lichens are the symbiotic union of fungi and green algae, cyanobacteria, or both. Increasingly accepted thought is that the fungal partner engages in a form of "controlled parasitism" of the algal partner. Some studies have shown that the algal partner's growth is somewhat inhibited by the fungal partner, but that the fungal partner serves as a "protector" which enables algal growth in places where it would not otherwise survive by itself. The fungal partner is thought to share water and minerals that it absorbs from the atmosphere and from the substrate, while the algal partner photosynthesizes food for both.

The diversity of lichenized fungi is much greater than for lichenized algae. Species of algae that may be lichenized also can exist independently, while no species of lichenized fungi exists independently. Therefore, lichens are generally classified as lichenized fungi. Lichens are almost always associated with ascomycetes, the same broad order as morels, coral fungi and cup fungi among others. A few lichens are associated with basidiomycetes. These fungal partners produce mushroom shaped fruiting structures. It is interesting to note that some lichenized fungi species are not found living apart from the symbiot.

Lichens, as a symbiosis of unlike organisms, can only reproduce asexually by means of vegetative fragmentation or by producing microscopic clumps of algal cells enveloped by fungal hyphae (soredia). Lichen fragments or soredium may be dispersed by wind or water. The fungal partner itself can produce sexual spores which then must seek a compatible algal partner. The lichen fungus develops as an undifferentiated mass of hyphae in the absence of an algal partner. The algal partner is required for the development of a particular species of lichen.

There are generally three categories of lichens: crustose (crusty), foliose (leafy), and fruticose (shrubby). The four distinct layers of lichens are (from top to bottom): upper cortex, algal layer, medulla, and lower cortex. The upper cortex is a protective layer of densely

woven fungal hyphae. The algal layer is composed of algae cells embedded in densely woven fungal hyphae. The medulla is a loosely woven layer of fungal hyphae without algae cells. The lower cortex is similar to the upper cortex but often bears root-like structures called rhizines, which serves as anchors to the substrate.



Example of leafy lichen growing on a tree in Florida

Crustose lichens often begin successions of communities. Lichens can tolerate wide variations of environmental conditions and can grow in places where plants cannot, such as on bare rocks or on sand. They help to break down rocks into soil over long periods of time, often decades or centuries. Eventually, other lichens or more complex plants take root and begin to grow there. Thus, lichens are valuable contributors to ecology. People should avoid disturbing lichens in the woods because of their long-term ecological value.

Lichens show varying degrees of sensitivity to man-made pollutants, such as sulfur dioxide (a byproduct of coal burning power plants, oxidation of SO<sub>2</sub> contributes to acid rain). They tend to absorb and accumulate sulfur rapidly thus inhibiting photosynthesis in the algal partner. Crustose lichens are typically more tolerant to pollutants while fruticose lichens are less tolerant.

Identification of lichens is usually accomplished by visual recognition of characteristics and/or a series of chemical reaction tests, sometimes in combination with U/V light source. Some species may require the use of thin layer chromatography for identification. Three chemical reagents commonly used for lichen identification are: K (potassium hydroxide), C (chlorine), and Pd (para-phenylenediamine). Hydrochloric acid, nitric acid, and iodine are also sometimes used. K is extremely alkaline and is also called "caustic potash". A suitable substitute, sodium hydroxide, may be made by mixing a solution of 10% caustic soda with 90% water. Care must be used in handling caustic chemicals. C is easily obtained as household bleach. Look for brands which contain no other chemical additives. Pd should be probably be avoided by all but experienced lichenologists. It is a known skin irritant and carcinogen. A possible substitute is a solution of photographic "color developer #4" and anhydrous sodium sulphite (see paper: A. W. Archer, The Bulletin No. 60 Summer 1987, for more information).

I couldn't find a good general key on the web for eastern lichens. There is one at the New York Biological Gardens [http://www.nybg.org/bsci/lichens/elnlime\\_loving\\_lichens.htm](http://www.nybg.org/bsci/lichens/elnlime_loving_lichens.htm) for "lime loving" lichens only. It seems harder to find information on lichens than for fungi, perhaps because lichens are not as well studied. The authoritative text on lichens seems to be "Lichens of North America" by Brodo, Sharnoff, and Sharnoff. But it is a little pricey at almost \$90 on Amazon.

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