OBELISK

Ohio Bryology *et* Lichenology, Identification, Species, Knowledge

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LEFT HAND CORNER
The topics of previous Left Hand Corners have been fairly serious. This time I thought that I would try something a little lighter.

NEW LICHEN FOUND!
This year my wife and I traveled to the beautiful country of New Zealand. As you Middle Earth fans know, Lord of the Rings and The Hobbit were both filmed entirely in New Zealand by Peter Jackson. The scenery captured in these films is fantastic and gives you an idea of the rugged beauty of the country. While there, we visited the movie set of Hobbiton, the home of Bilbo and Frodo Baggins. After The Hobbit was finished the set has been maintained as a tourist destination.

Hobbit hole at Hobbiton. **Photo by Ray Showman.**

The actual set was as detailed as it appears in the movies. One thing that I noticed was that most of the exposed wood was covered with lichens (notice the lichens on the fence in the photo above).

However, on closer examination these were not lichens at all, but splatters of thick paint or perhaps a plaster-like substance made to appear as lichens. The set designers went to amazing lengths to create a realistic looking Hobbit village.

Close-up of "lichens" at Hobbiton. **Photo by Ray Showman.**

I have been trying to think of an appropriate name for this new lichen – perhaps *Pseudolichen hobbitonensis*, or maybe *Cinemalichen hobbitonensis*? This seems to be an extremely variable species and I'm sure that a legion of

graduate students will soon be splitting it into a number of new related species, separated by minute and esoteric differences.

I try to look at lichens, and sometimes find a little humor, wherever I go.
– Ray Showman

FLENNIKEN AWARD
Congratulations to Brandon Ashcraft (Kent State University) for submitting a student article and winning the Flenniken Award of $100 for his efforts.

BROWN COUNTY 2015 SUMMER FORAY – A STUDENT'S PERSPECTIVE

The Ohio Moss and Lichen Association's annual summer foray took place in Brown County, located in southwestern Ohio. Our group of about a dozen researchers, botanists and students went to several locations in the area and collected samples of local mosses and lichens.

Our first collection site was Indian Creek Wildlife Area, an expanse of 1,799 acres consisting of open fields, forests (dominated by pin oak, maple and hickory), and 50 individual wetland sites.

Brown County only had 25 documented species of mosses and 63 documented species of lichens. Our goal was to inventory known species and document any new additions to the area. After collecting most of the day on June 13th, I was able to collect 32 different mosses and one lichen species. I collected this lichen and later worked with Ray Showman, a respected lichenologist, to identify the species. We established that it was, in fact (*Usnea mutabilis*), new to the county.

We then traveled south through Mount Orab to the Grant Lake Wildlife Area. This location was a densely forested area surrounding a large lake. This area had a lot of dead trees on the forest floor and a small wetland near the boat ramps. I was able to collect different species of mosses along the water. Next, we traveled to the Mount Orab cemetery where we collected mosses off of the large sugar maple trees and the stone wall. Both of these areas were great locations to find mosses and lichens.

After returning to the hotel, we gathered our microscopes and identified our collections. Working alongside established botanists and lichenologist was a great opportunity for me to ask questions and learn from the other members of OMLA.

Brown County had very few natural areas for us to visit, so we left the hotel early June 14th and traveled north to Highland County. We visited Miller State Nature Preserve. This was a beautiful preserve that is home to a geological feature called Rocky Fork Gorge. These limestone faces were covered with liverworts, mosses, and rare ferns. This preserve was my favorite place we visited and the limestone cliffs were beautiful. Dr. Barb Andreas and I climbed up and down the gorge, collecting by the river for a while and then deciding to climb up the gorge. This was a task easier said than done, the vegetation was so dense that finding a clear path was difficult, and it seems as though every other plant was covered in thorns or spines.

After a long weekend of scraping mosses off of trees, climbing up steep hills and collecting off of limestone cliffs. I had the task to take all of my collections back up to Kent State University where I spent almost four months identifying them. I have been studying bryology for less than a year; I found that identifying all of these species was challenging, but very interesting. This was the largest number of mosses I have ever identified at once. This gave me the opportunity to see some of the diversity of mosses in Ohio. After identifying them to the best of my ability, I sent them to Dr. Andreas for verification.

As the only student on this OMLA foray, I felt privileged to be working directly with the professionals I hope to emulate. Getting to talk and work with people in the field was a rare opportunity. As a student, their advice about education, careers and field work was extremely valuable. The experience was exciting and beneficial and I look forward to attending more forays in the future.

– Brandon Ashcraft

DIPHYSCIUM MUCRONIFOLIUM REDISCOVERED IN OHIO

Cumberland Grain O' Wheat Moss, *Diphyscium mucronifolium* Mitten in F. Dozy and J.H. Molkenborer (*D. cumberlandianum* Harvill), was first reported in Ohio by Dr. Jerry Snider. His first collection was in Jackson County in 1988 (*Snider & He 3100* (CINC)), and then again in Hocking County in 1989 *(Snider & He 3773* (CINC)). Both collections were from sandstone ravines with hardwood and hemlock forests. In 1992, this species was listed as Endangered on the Ohio rare plant list. In 2012, *D. mucronifolium* was moved to the extirpated list.

While on field trips with Rick Gardner, the Ohio Heritage Botanist, I was fortunate to re-discover *Diphyscium mucronifolium* at the Jackson County locality on 25 September, 2015 (*Andreas 18516* and *Andreas 18523* (KE)), and the Hocking County locality on 6 October, 2015 (*Andreas 18527* (KE)). At both sites, *D. mucronifolium* was growing in wet seeps coming directly out of sandstone rock faces, in deeply shaded hemlock ravines.

Crum and Anderson, in the *Mosses of Eastern North America,* Vol. 2, (1981), listed *Diphyscium mucronifolium* as an endemic to the mountains of the southeastern U.S. Schofield (*Flora of North America*, Vol. 27) considered it to be a disjunctive species, found in East Asia and in southeastern U.S. (AL, GA, KY, NC, TN, VA). By any definition, it is a global rarity, and Snider's Ohio collections expand the taxon's northern range.

Diphyscium mucronifolium. **Photo courtesy of Duke University.**

Diphyscium foliosum (Hedwig) D. Mohr (Grain O' Wheat Moss) commonly occurs in Ohio, and is a species that can easily be confused with *D. mucronifolium*. *Diphyscium foliosum* has been documented from 29 Ohio counties, with an additional 5 counties recorded from literature citations. It is found in a wide range of habitats, including soil banks, streambanks, bases of trees, and cliff faces. *Diphyscium foliosum* is found in every state east of the Mississippi River (except AL, FL and TN), and in all the eastern Canadian provinces.

Diphyscium foliosum. **Photo by Michael Luth.**

In Ohio, especially in the sandstone-dominated region of the Unglaciated Allegheny Plateau, *Diphyscium foliosum* commonly forms large sterile patches on moist, shaded sandstone rock outcrops and cliffs. Seldom have I seen it with sporophytes in this habitat. However, when on soil, it frequently forms sporophytes which are visible in the fall, maturing in early summer. From my Ohio experience, *D. mucronifolium* is found in similar, but much wetter, habitats. My OH and NC collections show that *D. mucronifolium* forms capsules while growing on sandstone rock surfaces.

The two species are easy to separate based on the following features: 1) the vegetative leaves of *Diphyscium foliosum* are blunt while those of *D. mucronifolium* are acute; 2) the leaf margins of *D. foliosum* are unistratose while those of *D. mucronifolium* are bistratose; 3) the perichaetial leaves of *D. foliosum* end in a spinulose awn while those of *D. mucronifolium* end in a smooth awn; and 4) the leaf cells of *D. foliosum* are mammillose or papillose, while those of *D. mucronifolium* are smooth.

Dr. Jerry Snider, who first discovered *Diphyscium mucronifolium* in Ohio, is now Emeritus Faculty at the University of Cincinnati. He taught bryology and was curator of the university's Margaret H. Fulford Herbarium. He assisted Dr. Howard Crum in bryology courses for many summers at the University of Michigan Biological Station. He collected and published reports of the bryophytes at numerous Ohio natural areas, including Cedar Bog, Crane Hollow, Lake Katharine, and Clifton Gorge. He published numerous peer-reviewed articles, often focusing on small acrocarpous mosses. Prior to his retirement, he served on the Ohio Division of Natural Areas and Preserves' committee that determines the status of rare Ohio plants.

Dr. Snider was my mentor in my early years of learning to identify bryophytes. He was the driving force behind *A Catalog and Atlas of the Mosses of Ohio* (Snider and Andreas, 1996). This publication is the foundation of the distribution maps that now appear on OMLA's webpage. In many ways, he is responsible for the formation of OMLA.
– **Barbara K. Andreas**

CRUSTOSE LICHEN WORKSHOP AT THE EDGE OF APPALACHIA

In April of this year, the Cincinnati Museum of Natural History hosted a workshop on the biology and identification of crustose lichens at the Eulett Center in Adams County. The workshop was taught by Dr. James Lendemer from The New York Botanical Garden. The workshop was attended by 12 people, including 4 members of the OMLA. James did an excellent job of detailing the biology of lichens in general and crustose lichens in particular. He also demonstrated the techniques used in the identification of this difficult group.

In the course of preparing for the workshop, James visited some of the Edge of Appalachia preserves to collect study material and also specimens for his own herbarium. The lichens collected by James are listed below.

Lichens collected in Adams County by James Lendemer, April, 2015. NO = new for Ohio record.

Crustose Species

Acarospora dispersa
Acrocordia megalospora
Agonimia opuntiella
Amandinea polyspora
Arthonia caesia
Arthonia ruana
Bacidia diffracta
Bacidia schweinitzii
Biatora printzenii
Bilimbia sabuletorum
Buellia stillingiana
Caloplaca cirrochroa
Caloplaca flavocitrina
Caloplaca subsoluta
Coenogonium pineti
Crespoa crozalsiana
Endocarpon pallidulum
Gyalecta jenensis
Gyalideopsis ozarkensis
Japewiella dollypartoniana
Lecanora appalachensis
Lecanora hybocarpa
Lecanora nothocaesiella
Lecanora strobilina
Lepraria disjuncta
Lepraria finkii
Lepraria harrisiana
Mycocalicium subtile
Nadvornikia sorediata
Normandina pulchella
Ochrolechia arborea
Ochrolechia pseudopallescens
Opegrapha corticola
Opegrapha vulgata
Porina scabrida
Protoblastenia rupestris
Pseudosagedia cestrensis
Pyrenidium aggregatum
Pyrenula pseudobufonia
Pyrrhospora varians
Ropalospora viridis
Sarcogyne regularis
Trapeliopsis flexuosa
Trypethelium virens
Variolaria pustulata
Verrucaria calkinsiana
Verrucaria glaucina
Xyleborus sporodochifer

Macrolichens

Cladonia didyma var. *vulcanica*
Cladonia floerkeana **NO**
Cladonia furcata
Cladonia robbinsii
Cladonia subtenuis
Heterodermia obscurata
Hypotrachyna minarum

Leptogium juniperinum
Myelochroa aurulenta
Myelochroa galbina
Parmelia squarrosa
Parmotrema hypotropum
Parmotrema reticulatum
Phaeophyscia insignis **NO**
Phaeophyscia rubropulchra
Physcia americana
Physcia stellaris
Platismatia tuckermanii
Punctelia caseana
Punctelia missouriensis
Pyxine sorediata
Pyxine subcinerea

It is quite remarkable that in the short time that he was here James collected two species new to Ohio: *Cladonia floerkeana* (Gritty British soldiers), and *Phaeophyscia insignis* (no common name). *Cladonia floerkeana* is a red-fruited species very similar to the common British soldiers. It differs by having a sorediate podetia, while British soldiers has no soredia. The range of Gritty British soldiers is listed as eastern US west to Ohio and north into Canada. The preferred habitat is the same as British soldiers, so careful microscopic examination is necessary to separate the two.

Phaeophyscia insignis is thought to be a rare eastern US species (Lichens of North America). It has not been previously reported from Ohio and was found as new to West Virginia by Don Flenniken. *Physcia insignis* is similar to several other species of this genus in having a small, gray-brown thallus with narrow lobes. The upper surface has laminal, discrete, capitate soralia, often exceeding the width of the lobes. The lower surface is tan at the margins, shading to black at the center. It can grow on both bark and rock and might be mistaken for *Phaeophyscia adiastola*. These are both great finds and illustrate the need to closely examine even common species for subtle differences. – **Ray Showman**

Cladonia floerkeana. **Photo from The Fungi of Great Britain and Ireland.**

Physcia insignis. **Photo by James Lendemer.**

What we think, or what we know, or what we believe is, in the end, of little consequence. The only consequence is what we do. – John Ruskin, British art critic, writer and philanthropist.

2015 SUMMER FORAY – BROWN AND HIGHLAND COUNTIES.

The 2015 OMLA Summer Foray was held in Brown and Highland counties. Brown County lies wholly within the area of Ordovician bedrock and most of the county was glaciated during Illinoian times. Ten OMLA members (see the end of this issue of OBELISK for a photo) met on the morning of June 13th and visited the Indian Creek Wildlife Area. The area collected along Indian Creek contained young mixed hardwood forest, mainly white ash, American elm, sugar maple and box elder. A fairly dense understory of bush honeysuckle was present.

In the afternoon the group traveled to the Grant Lake Wildlife area. This area contained a more open hardwood forest of sugar maple, white ash, oaks and hickories. Several persimmon trees in the parking area had rich lichen floras. The next morning (June 14th) the group traveled to the Miller Nature Preserve in Highland County. This area is in Silurian age bedrock and has been glaciated during the Wisconsin time. The preserve lies along Rocky Fork Creek and contains fairly mature mixed hardwood forest. A moist to dry dolomite cliff along the creek provided good habitat for mosses.

A total of 31 species of lichens were recorded, 28 for Brown County and 18 for Highland. Of these, 6 were new county records for Brown and 1 for Highland. One species of note, *Usnea mutabilis*, was new for Brown, bringing the total counties for this species to 10. All species of *Usnea* are becoming more common in Ohio due to improved regional air quality.

Lichens recorded during the 2015 Summer Foray. BC=Brown County, MNP=Miller Nature Preserve. N signifies a new county record.

Lichen Name	BC	MNP
Candelaria concolor	X	X
Canoparmelia crozalsiana	X	X
Cladonia apodocarpa	X	
Cladonia peziziformis	X	
Dermatocarpon muhlenbergii	**N**	X
Flavoparmelia caperata	X	X
Flavopunctelia soredica	X	
Melanelixia subaurifera		**N**
Myelochroa aurulenta	X	X
Myelochroa galbina	**N**	X
Parmelia sulcata	X	X
Parmotrema hypotropum	X	X
Parmotrema stuppeum		X
Phaeophyscia hirsuta	X	
Phaeophyscia pusilloides	**N**	X
Phaeophyscia rubropulchra	X	X
Physcia adscendens	**N**	
Physcia aipolia	X	
Physcia americana	X	X
Physcia millegrana	X	X
Physcia stellaris	X	X
Physciella chloantha	X	
Physconia detersa	X	
Punctelia bolliana	X	
Punctelia caseana	**N**	
Punctelia missouriensis	X	
Punctelia rudecta	X	X
Pyxine sorediata		X
Pyxine subcinerea	X	X
Usnea mutabilis	**N**	
Xanthomendoza fallax	X	
Total Species	**28**	**18**

Forty-nine species of mosses were recorded for Brown County, of which 44 were new county records. All three species of liverworts collected were county records. Unusual mosses collected in Brown County include

Trematodon longicollis. Previously, this species was known from Adams, Pike, Jackson and Hocking counties. *Pleuridium subulatum*, although not rare in Ohio, is infrequently collected.

Our brief stop at the Miller Preserve, Highland County, yielded 19 species of mosses, 6 of which were new county records. *Brachythecium rotaeanum* and *Fontinalis hypnoides* are unusual for Ohio.

Bryophytes recorded during the 2015 Summer Foray. BC=Brown County, MNP=Miller Nature Preserve. Bold X signifies a new county record.

Species Name	BC	MNP
MOSSES		
Amblystegium varium	**X**	
Anomodon attenuatus	**X**	X
Anomodon rostratus	**X**	X
Aphanorrhegma serratum	X	
Atrichum altecristatum	**X**	X
Atrichum angustatum	**X**	
Atrichum crispulum	**X**	
Barbula unguiculata	**X**	X
Brachythecium acuminatum	**X**	
Brachythecium campestre	**X**	
Brachythecium falcatum	**X**	**X**
Brachythecium laetum	**X**	X
Brachythecium plumosum	**X**	X
Brachythecium rotaeanum		**X**
Bryoandersonia illecebra	X	
Bryum argenteum	**X**	
Bryum lisae var. *cuspidatum*	**X**	
Calliergonella lindbergii	**X**	
Campylium chrysophyllum	**X**	
Climacium americanum		X
Ctenidium molluscum	**X**	
Dicranella heteromalla	**X**	
Dicranum montanum	X	
Dicranum scoparium	X	
Ditrichum pallidum	**X**	
Entodon seductrix	X	X
Eurhynchium hians	**X**	
Eurhynchium pulchellum	**X**	
Fissidens minutulus		**X**
Fissidens taxifolius	**X**	
Fontinalis hypnoides		**X**
Haplocladium microphyllum		**X**
Haplohymenium triste	**X**	
Homalotheciella subcapillata		X
Hygroamblystegium tenax	**X**	X
Leskea gracilescens	**X**	
Leucobryum albidum	**X**	
Leucobryum glaucum	**X**	
Leucodon julaceus	**X**	
Orthotrichum ohioense	**X**	
Orthotrichum pumilum	**X**	**X**
Orthotrichum stellatum	**X**	
Physcomitrium pyriforme	**X**	
Plagiomnium cuspidatum	X	
Platygyrium repens	**X**	X
Pleuridium subulatum	**X**	
Polytrichastrum ohioense	**X**	
Rhynchostegium serrulatum	**X**	
Schistidium apocarpum	**X**	
Sematophyllum adnatum	**X**	
Syntrichia papillosa	**X**	
Taxiphyllum deplanatum	**X**	X
Thuidium delicatulum	**X**	X
Tortella humilis	**X**	
Trematodon longicollis	**X**	
Total Species	**49**	**19**
LIVERWORTS		
Conocephalum salebrosum		X
Frullania eboracensis	**X**	X
Frullania riparia		**X**
Lophocolea heterophylla	**X**	
Nowellia curvifolia	**X**	X
Total Species	**3**	**4**
HORNWORT		
Phaeoceros laevis	**X**	
Total Species	**1**	

- Ray Showman and Barb Andreas

Climb the mountains and get their good tidings . . . cares will drop off like autumn leaves. **– John Muir**

THE OLD LIMESTONE FENCE

The old limestone fence is a wonderful place
for mosses, lichens and more,
you might find some *Grimmia* on the top,
or Frost Lichens by the score!

You could see some *Xanthomendoza*,
and some *Lecanora* too,
there might even be *Caloplaca*,
or some Stipple Lichens few!

There should also be several mosses,
on this weathered old fence of stone,
Cord Glaze Moss and Bear Claw Moss,
are probably not alone!

Don't be surprised by a shiny skink,
hunting for bugs on the wall,
'cause this is premiere habitat,
for creatures creepy and small!

Should you see a man in an old ball cap,
with a camera in his hand,
you may have found our own Bob Klips,
a biologist roving the land!

So pay attention to what he says,
you might learn a thing or two,
'cause Bob is a professor on the staff,
at good old OSU!

- Ray Showman

If you haven't already guessed, this poem was inspired by an article in last year's OBELISK: Old Limestone Fence is a Haven for Cryptogams, by Bob Klips, OBELISK Vol. 11, 2014.

MOSS MUSINGS -- USABLE, INEXPENSIVE FINE-TIPPED FORCEPS

After the initial costs of dissecting and compound microscopes and an assortment of identification books with dichotomous keys, the next most expensive tool needed for moss identification is fine-tipped watchmaker's forceps. These are available through scientific equipment catalogs for about $40 each.
These fine-tipped forceps are subject to permanent damage. I can't imagine the number of forceps I own where the tips don't meet, are absent, or bent in opposite directions. This occurs by merely knocking them off the table. Some bryologists have developed a knack to re-sharpen the tips of damaged forceps, but that is a skill I do not possess.

Carolina Biological Supply offers student-grade extra fine point forceps ranging from $5.20 to $10.45 a pair. These also work, but the tips are not the same quality as the watchmaker's forceps.

While searching the internet, I found on Amazon a pair of "straight tapered ultra-fine, 4.25" stainless/antimagnetic microdissection forceps for $4.71 (Excelta 5-SA-SE Tweezer). Figuring I had little to lose, I ordered several pairs. To my surprise, they work reasonably well. The tips are not as fine as the forceps that cost ten times as much, but I have used them successfully to prepare material for slides. For those of us who no longer have or never had access to university supplies, I recommend investigating lesser-grade micro-forceps**.**
– Barbara K. Andreas

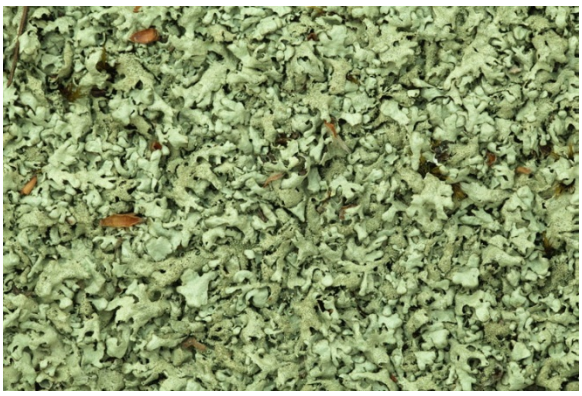
THE LICHEN GENUS *XANTHOPARMELIA*

The lichen genus *Xanthoparmelia* (Rock-shield Lichens) is a large, foliose group with 51 species in North America and 8 in Ohio. Members of this genus are yellow-green, sometimes with a slight bluish hue. Most species grow on siliceous rock, or more rarely on compact soil. All Ohio species have been found on sandstone or occasionally on granite headstones or glacial boulders. This genus does not grow on limestone or other basic rock. I usually find *Xanthoparmelia* lichens in full sun to light shade, on horizontal or sloping rock surfaces but rarely on vertical rock faces.

Ohio species are all fairly narrow-lobed with isidia or with no vegetative propagules on the surface. There is only one rare species in North America with soredia. Apothecia are common on many species. Some species are tightly attached to the substrate and can only be removed with a knife while others are loosely attached and can be easily removed with your fingers. This is a key character for the separation of several species.

Xanthoparmelia plittii is a common Ohio species. **Photo by Bob Klips.**

Two Ohio species, *Xanthoparmelia conspersa* (Peppered Rock-shield, 14 counties) and *X. plittii* (Plitt's Rock-shield, 20 counties), are fairly common while the remaining 6 are all much rarer. These two common species appear similar – both are tightly appressed and have abundant isidia, but they can be separated by the color of the undersurface. *Xanthoparmelia conspersa* has a black undersurface while *X. plittii* is tan to pale brown.



Close up of *Xanthoparmelia conspersa*. **Photo by Bob Klips.**

Flavoparmelia baltimorensis might be mistaken for a *Xanthoparmelia*. **Photo by Ray Showman.**

Another rock lichen, *Flavoparmelia baltimorensis* the Rock Greenshield, could be mistaken for a *Xanthoparmelia.* However, *F. baltimorensis* has large,

rounded lobes and a dull surface with coarse, pustular isidia. *Xanthoparmelia* species have narrow lobes and a shiny surface either with fine, cylindrical isidia or with nothing.

One western group is especially interesting. *Xanthoparmelia chlorochroa* (Tumbleweed Shield Lichen) and several closely related species grow without attachment to any substrate. These can blow around like tumbleweeds and are aptly called 'vagrant lichens.' I once saw windrows of these lichens in the Great Basin desert.

Xanthoparmelia chlorochroa. **Photo by permission of Stephen Sharnoff**

The vagrant lichens are an important early spring and emergency food for the pronghorn antelope, and in fact their range coincides with the distribution range for antelope. These lichens are also collected by Navajo People for use as a natural red-brown dye.

You won't find any vagrant lichens in Ohio but you can see other *Xanthoparmelia* species. The next time you are out botanizing, check out the granite boulders or sandstone outcrops in sunny locations.

– Ray Showman

NECKERA PENNATA: A PRESUMED EXTIRPATED MOSS REDISCOVERED IN HOCKING COUNTY

Neckera pennata, commonly called Wavy-leaved moss, was highlighted in the 2008 OBELISK (Wanted Alive: *Neckera pennata,* Volume 5, page 11), as extirpated from Ohio. It was officially put on the Ohio Rare Plant List that same year, though it was last collected in Ohio in 1938.

The typical habitat for *N. pennata* is on tree trunks and decaying stumps, both hard- and softwood, in moist forests and ravines, often near water. It is more common at elevations and latitudes higher than those of Ohio. It is found in the neighboring states of Indiana, Pennsylvania, New York, and Michigan.

Neckera pennata had been collected in these five Ohio counties: Champaign (1877), Cuyahoga (1894 and 1902), Hocking (1938), Jackson (1936), and Lake (no date). The best label data were from the Jackson County specimen, collected by R.T. Wareham on May 2, 1936: "on [cherry] birch bark, 6 feet from ground, White's Gulch, wet woods". Later that year, on July 19, Bartley and Pontius re-collected it at that locality.

Several times during the past decades, Dave Minney (former TNC Land Manager and one of Ohio's best botanists), and I hiked White's Gulch looking for *Neckera*. White's Gulch is a dark, damp hemlock ravine with sandstone walls, waterfalls, and ledges. Although we never found *Neckera*, these

trips were not in vain. On June 4, 2004 Dave and I found Ohio's only site for *Rhizomnium appalachianum*.

R.T. Wareham collected the 1938 Hocking County record "on tree at Old Man's Cave, 14 August 1938". Since I live in the Hocking Hills, I've hiked the trails around Old Man's Cave and other hemlock ravines in search of the elusive *Neckera*.

On April 24, 2015, a friend from Massachusetts and I were exploring the wonderful waterfalls and rock outcrops of Ohio's state parks and nature preserves within Hocking Hills. I glanced at a cherry birch tree along stream-side trail, and the unmistakably "upsweep" appearance of *Neckera* caught my eye! Although a small population, I was elated to see that *Neckera* still grows in the Hocking County (*Andreas* 18909, KE B13604).

Neckera pennata. **Photo by Jim Osborn.**

On October 6, 2015, Rick Gardner (Ohio Heritage Botanist and OMLA member), Jim Osborn, Jason Duchon, and I explored a different state nature preserve. We were walking up an un-named stream so that Jim could show Rick an unusual plant he had observed. Rick identified it as *Isoetes engelmannii*, the Appalachian Quillwort, a state-endangered plant. While the vascular plant folks were celebrating that discovery, I walked a little further up the stream and found a red maple whose bark supported a large population of *Neckera pennata*! Twice in one year – what joy!

After having seen these two localities, bryologists walking along deeply shaded ravines with a streams and waterfalls, should keep looking for more localities for *Neckera pennata.* **-Barbara K. Andreas**

Wanted (Alive)!

PUNCTELIA PERRETICULATA

Punctelia perreticulata is a rare southern US species with a very distinctive look. The upper surface is sharply ridged, with soredia erupting along the ridges, especially toward the center of the thallus. Like all *Punctelias*, it has pseudocyphellae, those tiny white dots on the surface of the lobes. It superficially resembles the more common *Canoparmelia crozalsiana*, which also has sorediate ridges. However, it can be easily separated by its light tan undersurface while *C. crozalsiana* is black underneath.

Punctelia perreticulata. **Photo by Ray Showman**

This species is known from one location in Ohio where an extant population grows on chestnut oak on the ridge near Buzzardroost Rock in Adams County. Look for it on acid bark trees at other southern Ohio ridge top sites. Another Ohio location would be a great find!
- Ray Showman

AN EXCITING FIND IN MAY 2015 IN ERIE COUNTY, OHIO

One of my favorite moss collecting sites is a 60-acre area along the Vermilion River in Erie County. This river is a rough dividing line between calcareous areas to the west and the more-acid sandstone to east. It cuts through shale and has some interesting shale cliffs along its route.

I have previously found a rather diverse bryophyte flora at this site in the woods and in a lovely little box canyon leading to the higher ground on the north edge of the property. The shale supports several liverworts including the largest colony of *Pallavicinia lyellii* I have ever seen on a north facing slope. But in May I was looking for ephemerals next to a soybean field in the flood plain on the property.

Most of what I found was *Physcomitrium pyriforme*, but one little moss with capsules in a small cluster of plants in the soil next to the field was clearly not *Physcomitrium*. It was a fairly rare moss, *Discelium nudum*, and one that is taxonomically unique --the only species in the family Disceliaceae. Until last May, *Discelium nudum*, was known from only 8 counties in Ohio; of those records, two were from historical sources and two specimen locations are unknown. Since there is a historical record from Lorain County where I live, I have been aware of this moss and looking for it for years. The "Flora of North America, Volume 27," describes it as "a very distinctive species: red-brown peristome on subspherical to elongate horizontal capsule arise on twisted seta from reduced brownish gametophyte and persistent green protonema . . ." It is found in 8 states, from California to New Jersey, including Ohio, Europe and Asia.

It is normally found in the spring when the distinctive capsules mature. The leaves, with a weak or indistinct costa, are very short, up to 1 mm, and form a bud-like cluster at the base of the plant, as shown in the photo below.

Photo by Diane Lucas.

Single leaf of *Discelium nudum* showing the elongate leaf cells. **Photo by Diane Lucas.**

The seta is tightly twisted to the right when dry. Asexual reproduction does occur from 2-celled rhizoidal gemmae (described as tuberculate brood bodies on the rhizoids in Crum & Anderson).

Photo by Diane Lucas.

The open capsule above shows the 16 reddish brown exostome teeth. These have vertical striations which can be seen with a compound microscope. The strong twisting of the seta when dry can also be seen. The surface of the capsule has a very distinctive rough appearance. When seen, these capsules give a reliable answer to this moss's identity. **– Diane Lucas**

LICHEN CHEMISTRY

Lichens are tiny chemical factories, producing a multitude of complex organic compounds. So far, over 600 different chemicals have been identified – most found nowhere else in nature. These chemicals are produced by the fungal partner, sometimes in quantities up to 5% of the thallus weight. However, isolated lichen fungi grown in culture can make only minute quantities, or none at all. Most of the lichen compounds are multi-ring carbon molecules with an acid functional group (COOH). These are commonly called lichen acids.

A lichen will usually make one or more chemicals in the cortex and different ones in the medulla. Different species of lichens usually produce different combinations of lichen acids. As lichen chemistry became known it thus became an important aid in lichen identification.

Over 100 years ago, it was discovered that potassium hydroxide and sodium hypochlorite will react with lichen acids and turn different colors when applied to the lichen cortex or medulla. Later, para-phenylenediamine also was used and the familiar spot tests K, C and P came into common usage. These have the advantage of being simple and cheap, and giving reproducible results. However, they cannot actually identify the lichen acid. A number of different lichen chemicals will give a K+ yellow result.

To determine the lichen acids present, more refined analytical methods have been developed. One is microrecrystalization. A piece of lichen is soaked in an organic solvent, then the solvent is placed on a microscope slide under a cover slip. As the solvent evaporates, crystals of the lichen acid form and are visible under the microscope. Lichen compounds can be identified by the shape of the crystals. This can reveal the dominant chemical in a lichen but will miss chemicals with lower concentrations.

A more exact method used today is chromatography. This method shows all of the lichen acids present in a species and even their relative amounts. However, this method requires specialized equipment and solvents, available only in a laboratory.

A few lichen compounds fluoresce under ultraviolet light and this can also aid in their identification. One fairly common Ohio lichen, *Pyxine subcinerea*, fluoresces orange and can be easily identified at night using this feature (see the article *Pyxine* in Ohio, OBELISK Vol. 10, 2013). The photo below, taken with UV light and a time exposure, shows *Pyxine subcinerea* on the right with its sister species, *Pyxine sorediata*, on the left.

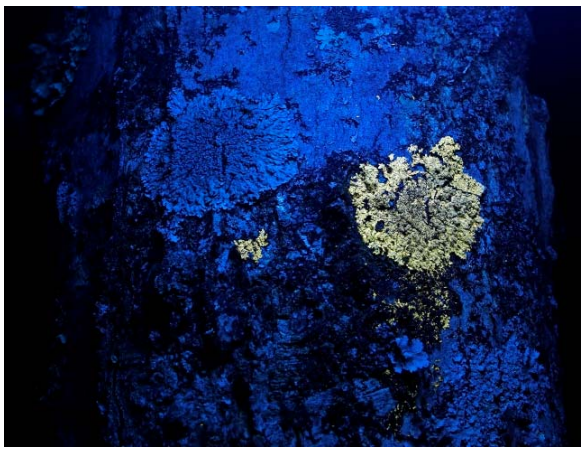


Photo by Jim McCormac.

The presence of lichen acids can have a positive survival value for the lichen in several ways. These chemicals may act as a light screen for the algal partner, protecting it from too-strong sunlight in the exposed locations where lichens grow. They may also act as deterrents to grazing by slugs and insects. Some of the lichen compounds are thought to be alleleopathic, inhibiting the growth of other organisms and thus protecting the space of the slow growing lichen.

A number of uses for lichen acids have been found. The acid/base indicator, litmus, was originally extracted from a lichen. Lichens have long been used as natural dyes (see the article "Dyeing with lichens," OBELISK Vol. 10, 2013). Some of the lichen chemicals have antibiotic properties and are an ingredient in topical ointments. In Europe, the chemicals in some lichens are used as fixatives in perfumes. More information on lichen chemicals can be found in Lichens of North America (Brodo, Sharnoff and Sharnoff, 2001. Yale University Press).

The next time you see a lichen, just remember – there is more there than meets the eye. **– Ray Showman**

When I first heard the book title Fifty Shades of Grey I thought 'what a great title for something about lichens.' I never did read the book but I did learn that it was not about lichens!

SHADES OF GRAY

Lichens come in many colors,
almost one of every hue,
red and orange and yellow,
and polka dotted too!

A few are found in drabber shades,
like olive, tan or brown,
these are often hard to see,
the color of the ground!

But most of what you find,
the majority every day,
are all those common lichens,
in fifty shades of gray!

- Ray Showman

OHIO EPA's WETLAND BRYOLOGY SURVEY

Introduction

The results of Ohio EPA's wetland bryophyte project are in. For a brief background, some information is repeated from the last issue of the OBELISK where an update was provided (OEPA Progress Report, p. 10, OBELISK Vol. 11, 2014).

However, first some thanks are in order. Many people assisted with this study and their help has been much appreciated. Much thanks to all those who provided moral and technical support for the bryological portion of the study, including: Barb Andreas, and Cynthia Dassler for assisting with planning and ID; Jeff Rose and Diane Lucas for additional ID, also Diane assisted with the project database; Bob Klips for helping to keep up the OMLA web site which has been a constant help; Martin Stapanian, USGS researcher, for fieldwork assistance and preparation of journal articles of the data; and Ohio EPA interns for assistance in many areas.

Many thanks overall to OMLA for providing a nurturing and friendly place to learn bryophytes.

Brian Gara, Ohio EPA's wetland ecologist, was the project leader for Ohio's NWCA (see below). He also initiated the idea of including bryophytes in the survey. His input for the bryology portion was always very helpful.
It should also be noted that the below information comes from a report to U.S. EPA who provided funding for this study which can be accessed from Ohio EPA's web site: http://www.epa.ohio.gov/Portals/35/wetlands/Ohio_Intensification_Final_Report_20151014.pdf. Also there are 2-3 peer-reviewed journal articles which are coming out of this research (with Martin Stapanian – of USGS who is noted above, the lead author).

Background

This project was conducted to see if bryophytes can be used as indicators of wetland disturbance. It is part of a larger project called the National Wetland Condition Assessment (NWCA), sponsored by the US EPA, in which Ohio participated.

For most states this was a one-year commitment to obtain data points for a national assessment. However, Ohio was one of several states that were provided a grant to extend the study to include more wetlands (50 wetlands). This was done to have enough data points for an appropriate statistical analysis for Ohio's wetlands. In this study, the vascular plant community, soil conditions, water quality, rapid assessments, and a buffer analysis were examined, in addition to the bryophyte community.

Four field seasons of data collection were concluded in 2014 with all 50 sites now completed. The data has been analyzed and discussed in a report for US EPA. In addition, several peer-reviewed articles have been written regarding the results. Two have been accepted for publication and one is still in progress.

The short version - summary of bryophyte survey results

Based on this preliminary investigation, there appears to be a very tight relationship between the overall

diversity of bryophytes present within a wetland and the ecological condition of the vascular plant community. Developing a biological index for bryophytes could be beneficial to the Ohio wetland regulatory program. Most bryophytes are present year-round, suggesting a tool that would have far fewer temporal limitations than our current detailed biological assessments, such as those dealing with vascular plants and amphibians. The most compelling result from this analysis was the relationship between a simple count of bryophyte genera present at each site and the ecological condition of the plant community as quantified by an index of the vascular plant community.

Identification of bryophytes to genera alone is a more manageable task, especially for those who do not regularly study them, than attempting to identify each to species level. This result strongly suggests that developing an assessment methodology focusing on this taxonomic group is realistic. Ohio EPA intends to continue exploring the potential utility of bryophytes as indicators of wetland quality. An immediate goal is to explore rare wetland types that were not covered in the survey, including bogs and fens. Initial surveys indicate that these types of wetlands have a very different bryophyte composition than do the wetlands used during the survey.

Some nitty gritty details

At each Ohio NWCA intensification wetland site, there was an assessment area near the center of the site with five 10X10 meter plots. The five vegetation plots were evaluated to determine which was the most diverse with respect to substrates for bryophytes. Once a plot was selected, all different substrates present within the plot were identified and their approximate percentages with respect to total plot area were recorded. A list of the majority substrate types included in this study are as follows: Soil, Tree Skirt < 30cm dbh (diameter breast height), Skirt Top to 1/3 m <30cm dbh, Above 1/3m <30cm dbh, Tree Skirt > 30cm dbh, Skirt Top to 1m >30cm dbh, Above 1m > 30cm dbh, Standing Dead Skirt, Above Standing Dead Skirt, Corticated Log, Decorticated Log, Shrubs, Soil (hollows), Soil (Hummock), Stumps, and Tussocks.

Each substrate present within the plot was then sampled for bryophytes. The goal was to record the presence of all unique species, so substantial oversampling occurred by design to ensure that the assembled list of bryophytes present at each site was as complete as possible.

Cover values for dominants were also recorded using the following metrics: relative cover, in regards to the bryophyte community, per substrate; total cover for each dominant species per substrate; and total cover of all bryophytes per substrate. Remaining plots were subsequently examined for presence of any additional bryophytes that were not recorded in the initial plot. In the lab, sampled bryophytes were identified to the lowest possible taxonomic level.

There were four derived moss metrics:
1. Moss Quality Assessment Index (Moss QAI) - Each moss species included in the Ohio moss flora has been assigned a C of C value (C of C = coefficient of conservatism.). They range from 0 to 10 and represent an estimated probability that a plant is likely to occur in a landscape relatively

unaltered from what is believed to be a pre-settlement condition.) The Moss QAI is analogous to the standard vascular plant FQAI Floristic calculation, in which the C of C scores for all moss species are summed and divided by the square root of the total number of moss species identified.

2. Bryophyte Quality Assessment Index (Bryophyte QAI) – Similar to the Moss QAI, but includes recently-established draft C of C assignments for liverwort species found in this study as well (Andreas and Lucas, personal communication, 2015).

3. Number of Bryophyte Species – A simple summation of all bryophyte species identified within the wetland's five vegetation plots.

4. Number of Bryophyte Genera – A simple summation of all bryophyte genera identified within the wetland's five vegetation plots.

All of these derived bryophyte metrics were determined to have a strong statistical correlation with results of a rapid assessment for wetlands used in Ohio (Ohio Rapid Assessment Method for Wetlands (ORAM)) and assessments based on the vascular plant community (Vegetation Index of Biotic Integrity (VIBI), and Vegetation Index of Biotic Integrity "Floristic Quality" (VIBI-FQ)). The strong statistical relationships are consistent with field observations during the field assessments. For more information on ORAM, VIBI, and VIBI-FQ see respectively the following:
http://www.epa.state.oh.us/portals/35/401/oram50um_s.pdf
http://www.epa.state.oh.us/portals/35/wetlands/PART4_VIBI_OH_WTLDs.pdf
http://epa.ohio.gov/Portals/35/401/VIBI_FQ_FINAL.pdf

Bryophyte Survey Results

For the entire Ohio NWCA dataset, mosses outnumbered liverworts by approximately 6:1. In general, liverworts are less widespread than mosses. In wetlands, except for the most common species, liverworts tend to be associated with higher quality habitats.

In the survey, fifty-two bryophyte species were only found on one site each. Eighty species were found on 5 or fewer sites. Nine species were found on 20 or more sites. Considering only genera, 35 genera were found on 5 or fewer sites. Eight genera were found on 20 or more sites. This indicates that, compared with vascular plants, bryophytes have significantly fewer species associated with genera, i.e., they tend to be "species poor." This opens the possibility that genera number, in addition to species richness, might be used as an indicator.

All of the derived bryophyte metrics (number of species, number of genera, Moss QAI, and Bryophyte QAI) were determined to have a strong statistical correlation when compared with ORAM, VIBI, and VIBI-FQ assessment results for the 50 Ohio NWCA intensification study wetlands. The strongest statistical relationship exists between the four bryophyte metrics and the VIBI-FQs scores, which corresponded with observations made by the wetland scientists conducting the field assessments.

Each of the four bryophyte metrics was then compared with proposed VIBI-FQ category breakdowns to better understand the relationship between bryophytes and the vascular plant community. In each of these

comparisons, a significant difference in the mean parameter scores was found for all three of the wetland condition categories (category 1 more degraded to category 3 high quality), when using a Tukey's two-way comparison. This indicates a clear, close relationship with the wetland vascular plant community. This relationship provides a good potential for the bryophyte community to be used as an indicator of wetland quality.

Bryophyte Cover

During the field seasons 2012-2014, bryophyte cover for each site was estimated. While it was not estimated for the 2011 field season, the actual cover for that season should closely fit the results summarized below.

While some useful information can be gleaned from the collection of bryophyte cover data as described above, determining bryophyte cover is extremely difficult. This is partly due to their very small size relative to vascular plants and also due to their "spotty" growth patterns. One simply cannot estimate bryophyte cover as easily as one does for vascular plants for the VIBI-FQ or for other vascular plant indexes.

Due to these difficulties, it appears more feasible to develop a bryophyte assessment tool focusing on species or genera counts, without attention to bryophyte cover for overall area or specific substrates at different sites. It may be worthy for certain research purposes to examine bryophyte cover, but for developing an index to approximate wetland condition, it does not seem feasible.

Conclusions

In conclusion, bryophyte community status seems to hold promise as an indicator of wetland quality. However more work is needed to solidify the link between bryophytes and wetland class and to develop a bryophyte index. Hopefully this study helps provide a start in that direction.

- Bill Schumacher

FALL FORAY TO MONTGOMERY COUNTY

Saturday, October 3, was the perfect rainy, cool day for a fall outing. We met in the morning at Possum Creek MetroPark, which is not far south from the urban center of Dayton and is part of the Five Rivers MetroParks of Montgomery County.

The 550-acre park has an interesting land-use history that includes a farm from the early 1800s, the former Chi Chi nightclub (now Sycamore Lodge) and the Argonne Forest amusement park, a private venture that operated during the 1930s and featured a midway, swimming areas, racetracks, a dance floor and a natural area still known as the Argonne Forest. Despite its suburban surroundings and development history, Possum Creek MetroPark has nice remnant forests, stream floodplains and a cedar glade that provide interesting and really enjoyable places to search for bryophytes and lichens.

After lunch we traveled further south to spend the afternoon collecting at Germantown MetroPark, a 1655-acre area with a great variety of habitats including forests, hillside prairies, cedar glades and ponds, as well as Twin Creek and its floodplain. Late in the afternoon

we headed for the nearby Best Western Dayton South hotel. We spent the evening in their conference room identifying specimens until we couldn't keep our eyes open any longer.

Sunday morning we ventured to northern Montgomery County to collect at Englewood MetroPark, which was noteworthy for a variety of reasons, including the warm, sunny fall weather that is particularly enjoyable right after a wet and chilly Saturday in the field. Englewood remarkably has rock outcrops, which are otherwise hard to find in a county generally covered by glacial till, ridge moraines and outwash left by the Wisconsinan glaciers some 16,000 years ago. The park has varied and interesting habitats, including several waterfalls and a pumpkin ash–swamp forest area.

The preliminary results show a total of 56 moss species, 50 of which are new records for Montgomery County. We also recorded 6 liverwort species.

Among the very interesting mosses found is *Barbula indica* (Hook.) Spreng., collected by Becky Smucker. It is listed as endangered in Ohio, with only 2 other county records. Becky also collected *Zygodon viridissimus* (Dicks.) Brid., which is otherwise known from only 1 other Ohio county (Jackson) based on a literature report. *Anomodon viticulosus* (Hedwig) Hooker & Taylor, collected by Barb Andreas, was previously known from only 2 other counties in Ohio. This species is also listed as endangered in Ohio. *Cryphaea glomerata*, collected by Bob Klips and Cynthia Dassler, is reported from only 4 other Ohio counties.

Bryophytes at the 2015 Fall Foray: P–Possum Creek; G–Germantown, E–Englewood. *New county record

Species Name	P	G	E
Mosses			
Amblystegium varium	X		X
*Anomodon attenuatus**	X	X	X
*Anomodon minor**	X	X	X
*Anomodon rostratus**	X		X
*Anomodon viticulosus**			X
*Atrichum angustatum**	X		X
*Atrichum altecristatum**			X
*Atrichum crispulum**	X		
*Barbula indica**	X		
Barbula unguiculata	X		X
*Brachythecium campestre**			
*Brachythecium falcatum**			X
*Brachythecium laetum**	X	X	X
*Brachythecium plumosum**	X	X	
*Bryhnia graminicolor**			X
*Bryhnia novae-angliae**	X		
*Bryoandersonia illecebra**	X	X	
*Bryum argenteum**			
*Bryum caespiticium**			X
*Bryum pseudotriquetrum**	X		
*Callicladium haldanianum**			X
*Calliergonella lindbergii**	X	X	X
Campylium chrysophyllum	X	X	
*Ceratodon purpureus**		X	
*Cryphaea glomerata**	X		
*Dicranella heteromalla**			X
*Dicranella varia**	X		
*Dicranum scoparium**	X	X	
*Entodon seductrix**	X		X
*Eurhynchium hians**	X		X
*Fissidens dubius**	X	X	X
*Fissidens osmundioides**	X		
*Fissidens taxifolius**	X		X
*Haplohymenium triste**			X
Hedwigia ciliata			X
*Homomallium adnatum**			X

*Homalotheciella subcapillata**		X	
Hygroamblystegium tenax	X		X
*Hymenostylium recurvirostrum**			X
*Hyophila involuta**	X		
*Leskea gracilescens**	X	X	
*Orthotrichum ohioense**	X		
*Orthotrichum pusillum**	X		
Plagiomnium cuspidatum	X	X	X
*Platydictya confervoides**			X
*Platygyrium repens**	X	X	X
*Pohlia nutans**			X
*Rhynchostegium serrulatum**		X	X
*Schistidium apocarpum**	X		X
*Sematophyllum adnatum**	X		X
*Syntrichia papillosa**		X	
*Taxiphyllum deplanatum**			X
Taxiphyllum taxirameum	X		X
*Thuidium delicatulum**		X	X
*Tortella humilis**	X		
Zygodon viridissimus var. *rupestris**			X

Liverworts			
Frullania eboracensis	X	X	X
Frullania inflata	X		
Frullania riparia		X	
Lophocolea heterophylla	X		X
Nowellia curvifolia	X		X
Porella platyphylla	X		

Collecting at Patty Falls, Englewood MetroPark. **Photo by Janet Traub.**

Becky Smucker collecting at Englewood MetroPark. **Photo by Janet Traub**

NEWS AND NOTES

The OMLA winter meeting will probably be at OSU again in January or February, but a date has not yet been set. We will e-mail details as soon as plans are finalized.

The 2016 Summer Foray will be in Carroll County. We will set a date at the winter meeting. We will also try to finalize plans for the Fall Foray then.

2016 CRUM BRYOLOGICAL WORKSHOP WILL BE HELD IN KENTUCKY

The Crum Bryological Workshop is planned for May 15 – 20, 2016 in Kentucky. Its "home base" will be the lodge at Natural Bridge State Park.

Participants will arrive on Sunday, May 15, and Monday through Thursday field trips will be conducted to natural areas within approximately 1 hour of the lodge. Places to visit include Red River Gorge Geological Area and the Daniel Boone National Forest.

There are approximately 386 mosses and liverworts known from KY, with 264 taxa known from the Red River Gorge Region. One hundred eighty-two bryophytes are recorded from the Red River Gorge Geological Area (Studlar and Snider 1989). For more information, please contact Linda Fusilier linda.fusilier@gmail.com

BOOK RECOMMENDATION

If you have any interest in ferns (and most people do), try the book A Natural History of Ferns, by Robbin C. Moran. This is a very readable book about all aspects of fern biology. "A Natural History of Ferns not only represents science writing at its best, but it is a delightful adventure into the world of one of our foremost botanists; it is stimulating, enthralling, a beautiful companion for any fern lover." (from the foreword by Oliver Sacks).

2015 Summer Foray. Left to right: Julia Wiesenberg, Janet Traub, Ray Showman, Barb Andreas, Brandon Ashcraft, Cynthia Dassler, Jim Toppin, Diane Lucas, Bill Schumacher, Bob Klips.

2015 Fall Foray (Saturday). Left to right: Bob Klips, Becky Smucker, Alan Esparza Gutierrez, Diane Lucas, Janet Traub, Jim Toppin, Dan Stevenson, Cynthia Dassler, Barb Andreas.

2015 Fall Foray (Sunday). Left to right: Bob Klips, Janet Traub, Jim Toppin, Becky Smucker, Dan Stevenson, Diane Lucas, Carole Schumacher, Barb Andreas, Bill Schumacher.