



# Symbiosis<sup>©</sup>

The newsletter of the Prairie States Mushroom Club

Volume 27:3

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<http://www.iowamushroom.org>

## Editors note:

## This Issue Celebrates Mushroom Colors

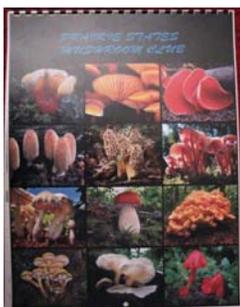


Much of the wonder of mushroom hunting comes from the amazing colors we're treated to. The amazement may be finding huge clumps of sulfur shelf that match your wife's fall hat as

Tom Keho's picture of his wife Erma shows. It might also come from finding a deep violet *Cortinarius* snuggled into rich green moss, or walking along a forest path and finding a patch of golden chanterelles in bright display saying "eat me." For some folks the wonder includes translating the shapes and colors of mushrooms into photographic artistry. Linda and Bob Scarth will provide insights into how they do that in this issue.

The colors or pigments in mushrooms bring wonders beyond the aesthetic too. Mike Krebill will share fascinating information about dyes and other uses of mushroom pigments. Finally, I'll describe how sunlight or UV radiation affects the color of mushrooms, but more importantly how it affects their nutritional value by increasing vitamin D exponentially. So without further ado, let's begin our celebration! 

## Jim Frink Calendars Available



We still have 2011 calendars for sale, \$15 each. All of the photos were taken by club member Jim Frink. See the Jim Frink Photos page at the PSMC website [iowamushroom.org](http://iowamushroom.org). Send \$15 to:

Roger Heidt  
125 Timber Lane  
Robins, IA 52328



## Solving A White Grifola Mystery Leads to a Gold Mine

### Fungi 101

Mushrooms aren't plants. Plants synthesize sunlight. Many mushrooms protect themselves just like animals with pigmentations that react to the sun like a sun tan. When I found natural evidence of this, I began researching this phenomenon and learned some fascinating and valuable things about mushrooms and sunlight or UV radiation.



I found some Grifola that was very dark on top except on a small area that was covered by a cluster of leaves. In that spot, it was almost pure white with pores coming from both top and

bottom surfaces of the fronds. This demonstrated that light had everything to do with the coloration of that fungus. It made me wonder if a white Grifola that was given to Glen Schwartz last year had been growing inside a hollow tree or somehow completely shaded in its entirety. Glen said he didn't know where it was growing. A picture of it can be found on the [iowamushroom.org](http://iowamushroom.org) SmugMug site in the gallery titled "Mushroom" and subgallery titled "Shelf fungi." In that picture, pores are also growing from the upper as well as lower surfaces of the fungi.

David Fischer on his American Mushrooms website corroborates my finding saying, "In my experience, Maitake/Hen of the Woods mushrooms tend to be most darkly pigmented when they grow in open spots where they are exposed to direct sunlight."

I thought that Grifola getting a suntan like a human was interesting and I wondered what caused the darkening and if other mushrooms did the same thing. When I searched

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# Mushroom Pigments

by Mike Krebill

Brick red, pumpkin orange, sulfur yellow, mouse gray, dark blue, deep brown – what do these colors have in common? They are all pigments produced in mushroom tissue.

Pigments produced in mushroom tissue help us find and identify mushrooms: the orange and yellow of Chicken-of-the-Woods, the bright orange of Jack-O-Lantern, the yellow of Chanterelles, the tan of Fawn Mushroom, the bruised, blue-staining boletes, the bright blue latex of the Indigo Milk Cap, the violet Cortinarius, the pale blue to perfectly purple Blewit, and the spore color of gilled mushrooms upon which many a key is based. Field guides printed in color seem more helpful than those in black and white.

Pigments produced in mushroom tissue can be used to dye yarn and fabrics, and color T-shirts. Colors that different species produce and details on the process can be found at <http://mushroom-collecting.com/mushroomdyeing.html>. Experimenters have found that some mushroom colors fade quickly in sunlight. A mordant (metallic salt) such as alum (aluminum sulfate) or iron sulfate helps make it lightfast and colorfast. If you decide to try dyeing, you will want equal weights of mushroom and fabric. The process has two steps. First, the fiber or fabric is simmered with the mordant (metallic salt) in a hot water bath. Secondly, the fungi is chopped, mashed, and simmered in a non-reactive pot (stainless steel or enamel.) The mordanted fabric is

transferred to it, and gently simmered for half an hour to an hour or more until the desired color is reached. If this intrigues you, websites, blogs, and books can be found online. One 2007 book, in particular, seems like a great gift for a spouse or friend fascinated by natural dyes and eager to try mushroom pigments: *Mushrooms for Dyes, Paper, Pigments, and Myco-Stix™*. Its author is Miriam C. Rice, a woman who loved to experiment and pioneered the use of mushroom dyes. You can learn a little bit more about her and her book by going to this website: [http://www.mushroomsforcolor.com/Mushrooms\\_for\\_Dye-book.htm](http://www.mushroomsforcolor.com/Mushrooms_for_Dye-book.htm).

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# Somewhere Over (or In) the Rainbow

Linda & Robert Scarth

[www.scarthphoto.com](http://www.scarthphoto.com)



“Is that color real?” is a question we are often asked about our

photography. Dave Layton asked us to write a bit about that question after looking at our book *Deep Nature: Photographs from Iowa* where the color is celebrated.

To answer the question we often say, “Color is as real as the light, film or camera sensor, digital Raw converter, preparation software, printer, computer monitor or digital projector make it; and all express it differently.” Another difference for the digital

camera user is whether the image was captured in Adobe RGB or sRGB color space and whether it is a jpeg or a Raw file. Color seems to be the invention of the thing seeing or recording or transmitting it, and is definitely the product of the beholder.

We think that people are really asking “How did you get that color in your photograph? Mine are washed out.” Our first answer is “White umbrellas or cloudy days.” White umbrellas are an important part of our close-up photography. They help to moderate the light and the reflections off small subjects, especially those surrounded by foliage. High, overcast, cloudy conditions also can diffuse light to minimize foliage reflections.

Sometimes green foliage seems to be as reflective as granite and even water, and these reflections detract from the photograph. People discover that when they have photographed a lovely flower at midday in the full sun. Humans evolved in a world that had plants and our eyes and brains cancel out the foliage reflections. Plants must reflect some types of light rays so they are not damaged. Film and camera sensors are not human and they “see” the reflected light which washes out the color. Diffuse light allows cameras to capture more intense colors. White umbrellas or other diffusers moderate the sun’s rays and allow the camera to record color without the offending reflections. Think of them as portable clouds for the rainbow of colors found in nature close-ups.

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Photographers are counseled to photograph early in the morning and late in the afternoon to use the best light that nature has to offer. This sweet light can be lovely and warm, something that people often like. However, even this quiet light can produce hot spots or dappled light that can be distracting in a close-up photo. Dappled light is the moving collection of shadows and bright spots that can occur even when the sun is near the horizon. The umbrellas or a diffuser are useful here as well. Sometimes shading the subject by personally getting between it and the low sun works. The light reflected off the sky up above even in a wooded area usually provides the needed light.

If we were only out in early morning or late evening we would miss many close-up photography opportunities. Therefore we carry our overcast clouds (umbrellas) and sometimes use pale gold reflectors to bounce a bit of warm light into an image from the side while diffusing it overhead.

Another thing we do to capture the most digital information and the largest color space possible by recording images in Adobe RGB Raw file format rather than the sRGB jpeg file format. Raw files are usually at least 3 times larger than the highest quality jpegs on the memory card with a much wider range of colors recorded. This is important for having the most pixels and flexibility when optimizing an image, especially if it is to be printed. When photographing we pay more attention to the histogram viewed on the camera's LCD than to the colors of the image. More data is available when the histogram curve is weighted to the right. The thumbnail

on the back may appear too light but as long as there are no "blinkies" (flashing white spots), the data is intact.

We work on our images in RGB format and save the converted files as psd (Photoshop) or as tif. It is easy to size and convert an optimized image to jpeg for the www or digital projection, when needed. Monitors and projectors also have their own digital and mechanical constraints on how they interpret and show color. We calibrate our monitors and try to set the color interpretation of our projector to get desirable colors. When we prepare jpegs for the www or projection we convert them to sRGB color space because the smaller color space makes smaller files that work well on most monitors and projectors. We did have an experience recently where using the projector provided in a large auditorium. The colors projected were dreadful because that projector was set to do lecture notes and primary color charts rather than artwork.

When we used film, we used several of the more saturated slide films for vivid colors, except when we wanted the color blue to stand out. Another film produced better blues. One film produced better yellows and another, better greens. The chemistry in the film and in processing interpreted the way the colors would appear. Pure color theory and representation is somewhat of a physics abstraction because in application so many variables may influence what we see.

When a camera captures an image as a jpeg, the software in the camera

determines how the colors will be interpreted and presented. A Raw file is just data and not a photo until it is opened and saved using a processing software. The Raw file opened in a Raw converter allows the photographer to contribute to the interpretation by setting the black point (darkest pixel available) and the white point (lightest pixel available) in the photo. We use Photoshop ACR (Adobe Camera Raw) though we could use another software package. Each converter interprets the Raw data slightly differently as it turns ones and zeros into images and the colors will be slightly different. The photographer can sometimes rescue an underexposed file when converting. Overexposed ones lack data so may not be rescued.

We must stop here because of space requirements and this may be a case of TMI (too much information.) This is a very condensed overview of our understanding of some of the ways color photography is recorded and interpreted, especially those important to us. Each paragraph could be considerably expanded. There are many more concepts and ideas that could be included. Most of what is here deals with recording light (the rainbow in the title.) Pigments, in the subjects themselves and in printing, are other important topics, along with scanning film and older photographs, the terminology and concepts of color and light, weather conditions, geography, more on time of day, and much more. 

# Solving A White Grifola...

(cont. from cover)



David Fischer with an unusual white Maitake specimen that really explains the name "Sheepshead Mushroom."  
Photo by Fran Linder

mushrooms and sunlight, I found something much bigger and more important than a curiosity. special to the LA Times, March 31, 2008, *If Mushrooms See the Light*, Susan Bowerman states, mushrooms are an abundant source of a cholesterol-like compound, ergosterol, which can be converted into vitamin D2 when the fungi are exposed to ultraviolet rays. When exposed right after harvesting, Monterey Mushrooms found increases as high as four times the FDA daily value per serving after only five minutes of UV treatment. Mushrooms darken with UV exposure, just as people do. Traditional white button mushrooms turn brown after treatment, but the color change is less noticeable in darker mushrooms such as crimini. The mushroom industry is planning to bring both varieties of these high vitamin-D fungi to the market, perhaps by this fall.

<http://articles.latimes.com/2008/mar/31/health/he-eat31>

## The Gold Mine

A number of mushroom species react to the sun not just by darkening, but also by producing the pigmentation by-product vitamin D – just like humans and animals. Most of us get vitamin D in the winter from eating meat and fish especially, but it's still barely enough and vegans don't have that luxury. Vegans living in the north have been known to get serious vitamin D deficiencies because non-animal sources of vitamin D are rare.

Recently it's been found that mushrooms exposed to sunlight or ultraviolet radiation can provide abundant vitamin D. The vegan website, Soy Stache states that:

*In the summer of 2004, mycologist Paul Stamets discovered that the level of vitamin D in freshly picked, indoor-grown shiitake mushrooms rose from 110 IU (international units) to an astonishing 46,000 IU per 100 grams when the mushrooms were placed outdoors in the sun for just six hours with the gills facing up (when the gills were facing down, the level rose to 10,900 IU).*  
<http://www.soystache.com/vegan-vitamin-D.htm>

Artificial ultraviolet radiation can achieve dramatic increases in mushroom vitamin D in minutes rather than hours. In a

Pulsed UV light can achieve even more dramatic results in an even shorter time. This information came from an article about an amazing experiment by Michael D. Kalaras and Robert B. Beelman, Graduate Student and Professor in the Department of Food Science at Penn State University. The article, *Vitamin D2 Enrichment In Fresh Mushrooms Using Pulsed UV Light*, first discusses types of vitamin D and states that D2 has been shown to have comparable nutritional benefits compared to D3 despite earlier contrary assertions. It explains the methodology of the experiment, including type of UV pulse used, then it describes amazing levels of D2 from various species of freeze dried powdered irradiated mushrooms.

Following are some of the amazing results:

- The white button mushrooms showed an increase from an initial Vitamin D2 level of 0% DV/serving to 325% DV/serving after just one pulse. After 4 pulses the level of Vitamin D2 increased to 824% DV/serving.
- After Pulsed UV treatment the Shiitake mushrooms showed an increase in Vitamin D2 content from an initial level of 3% DV/serving to 490% DV/serving after one pulse. The Vitamin D2 content after 3 pulses was 1200% DV/serving.
- The Oyster mushrooms contained an initial level of Vitamin D2 of 15% DV/serving. That increased to a level of 1618% DV/serving after 3 pulses.

The entire article is worth reading at [www.xenoncorp.com/Images/VitaminDEnrichment.pdf](http://www.xenoncorp.com/Images/VitaminDEnrichment.pdf)

That was in 2008. Much has happened since then with vitamin D being shown to be even more beneficial in high doses than was previously thought. Now vitamin D-enhanced mushrooms' appeal is going beyond vegans. The mushroom industry is clearly on board as the opening paragraph from their 2009/2010 report states, "There were many exciting outcomes for the mushroom industry's research and development (R&D) program in 2009/10, but the highlight would have to be the commercial emergence of Vitamin D-enhanced mushrooms." The mushroom industry also is enjoying a chuckle over this fortuitous discovery stating,

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# Solving A White Grifola...

(cont. from pg. 4)

*“It’s ironic that humans can be deficient in Vitamin D from insufficient exposure to sunlight, yet they can now receive their minimum daily Vitamin D by eating a natural food source that is grown in the dark.”* The entire article is found at [ms2live.horticulture.com.au/admin/assets/library/.../PDF\\_File\\_135.pdf](http://ms2live.horticulture.com.au/admin/assets/library/.../PDF_File_135.pdf). Indeed folks producing irradiated mushrooms must be chuckling all the way to the bank with vitamin D extract from irradiated mushrooms going for up to \$70 for 180 tablets.

The good news for wild mushroom hunters is that we don’t need UV radiated mushrooms. Many wild edible mushrooms are rich in vitamin D from the sun. At least a half dozen websites say they have anywhere from 100% to 600% of the daily value. It’s interesting how some vitamin D experts are just starting to learn about mushrooms and using quaint terminology when discussing them. In the September 11, 2009 eHow website article Natural Vegetarian Sources of Vitamin D author [Donn Saylor](#) states,

*If you are a connoisseur of wild mushrooms and know which are*

*safe to consume and which are not, you will find a wellspring of vitamin D in these pungent toadstools. If you know little or nothing about wild mushrooms, this is an option to avoid at all costs; some varieties of wild mushrooms can kill you. Read more: Natural Vegetarian Sources of Vitamin D | eHow.com [http://www.ehow.com/about\\_5374602\\_natural-vegetarian-sources-vitamin-d.html#ixzz13u2XaL9D](http://www.ehow.com/about_5374602_natural-vegetarian-sources-vitamin-d.html#ixzz13u2XaL9D)*

I like the term “connoisseur of wild mushrooms.” I think I’ll start calling myself that instead of “pot-hunter.” I’d also love to learn more about the nutritional content of various wild mushrooms. My guess is that mushrooms that can be eaten after being out in the sun longer will have the highest vitamin D levels. This means mushrooms like Grifola that take over a week to get to prime eating size are likely candidates. This is great to know. It’s good to have another defense for eating wild mushrooms when people learn about my hobby and react like I’m some kind of alien. 

# Mushroom...

(cont. from pg. 2)

Here’s a photo from a mushroom dye workshop she conducted in Petersburg, Alaska:



These wool and silk samples were all dyed with the caps from the Orange-gilled *Dermocybe*. It is found under Sitka Spruce in the Tongrass National Rainforest of S. E. Alaska. <http://www.mushroomsforcolor.com/PetersburgMushroomDyes.htm>

Pigments produced in mushroom tissue also have commercial applications. Research is showing that they have antibiotic properties, ranging from antibacterial to antifungal to antitumor. An Italian study has found that mushroom pigment has the potential to serve as an optical biosensor, detecting phenolic derivatives. Being able to detect phenolic derivatives is very important in food, medical, and environmental samples because of their significance in health care and pollution. An Indian study indicates a possible application for food and feed processing.

It appears that pigments have potential! 

**Thank you PSMC Members for helping to make 2010 a great year!**

We hope you renew your membership if you haven’t already done so. Dues for 2011 are \$15/year. Please send payment to the PSMC Treasurer:

Roger Heidt  
125 Timber Lane  
Robins IA 52328-9632

email: [iowamushroom@gmail.com](mailto:iowamushroom@gmail.com) and let us know if there are any changes to your address, phone or email.

# Ischnoderma resinosum



photo from Wickimedia Commons, Attribution: James Lindsey at Ecology of Commanster

We consistently find *Ischnoderma resinosum* on mushroom forays, sometimes in abundance. Damien Pieper told me it was an edible mushroom with a colloquial name of beef and gravy mushroom, but it didn't look all that appetizing, often exuding water droplets and similar to a conk in appearance. Still I occasionally trimmed some off the soft margin thinking I'd try it but never quite getting to it. Maybe the sound of its genus bothered me – *Isch*.

Last weekend a walk around Iowa's Bellevue State Park brought a few little puffballs, oysters, honey mushrooms and an abundance of *Ischnoderma*. I harvested enough that were neither hard nor mushy to round out a meal or two. A test of a couple bites in the microwave brought quick confirmation that it should be added to the mushroom gravy I was making. The other mushrooms tasted fine in the gravy but the *Ischnoderma*'s flavor made me think of an NPR segment on researchers discovering a fifth taste receptacle on the tongue. It wasn't sweet, salty, sour or bitter but I was sure this mushroom had it—Now what did they call it?

Anyway, I decided I'd better learn what was written about *Ischnoderma*'s edibility – very little. Several books called it “inedible.”

Something was wrong. Maybe there was some secret. I did learn that it's more common around here than in other parts of the country. Even Michael Kuo's Mushroom Expert website didn't mention edibility – hmmm.

I finally decided to check Kuo's book *100 Edible Mushrooms* – Aha! He was holding out on his web fans and saving the goods for those who forked over the bucks for his book. In it he warned that he didn't know how to prepare it with beef, only chicken. We had it with pork. When I think of it in that meal I now remember that fifth flavor receptacle that this unappetizing-looking mushroom with a derogatory sounding name stimulated - savory. 

## Recipe Corner

### Chicken Breasts with Oyster Mushrooms in Champagne



From the Website Wild About Mushrooms <http://www.mssf.org/cookbook/oyster.html>

4 single chicken breasts, skinned and boned	2 tablespoons light vegetable oil
Salt and pepper to taste	1/2 pound oyster mushrooms, sliced
3 tablespoons flour	1 cup heavy cream or half and half
2 tablespoons butter	1/4 cup dry champ
	Parsley sprigs

Pound the chicken breasts between 2 pieces of waxed paper until slightly flattened. Salt and pepper the chicken breasts. Roll them in the flour and shake off excess. Heat the butter and oil in a large sauté pan or skillet and sauté the chicken over low heat for about 3 minutes for each side. Add the mushrooms and cover the pan for 10 minutes. Add the cream and simmer for 10 minutes, uncovered, over low heat. Transfer the chicken to a serving dish and keep warm. Add the champagne to the sauce and bring it to a boil, cooking until it becomes creamy. Pour the sauce over the chicken. Garnish with sprigs of parsley and serve.—Linda Schefferagne 

# Prairie States Mushroom Club Annual Meeting

October 2, 2010 Ashton Wildwood Park, Jasper County, Iowa

After the foray PSMC members and a number of Jasper County locals gathered at the park shelter to eat lunch and identify mushrooms. Dave Layton, PSMC president, called the annual meeting to order. Dave remarked that attendance at PSMC events was up and that we have enjoyed the company of many guests at our forays and educational presentations. He thanked those who helped identify foray sites and served as hosts at events. He pointed out our good fortune in finding some rare and unusual fungi, most notably *Underwoodia columnaris* from our June foray at Brushy Creek State Park near Fort Dodge.

Treasurer Roger Heidt reported that we have about \$1500 in the bank. He itemized our expenses: printing the 2011 mushroom calendar that showcases the photography of Jim Frink, purchase of copies of the special morel issue of Fungi magazine for distribution to members, printing copies of the Newsletter Symbiosis for those without access to the electronic version, cost of maintaining our Smugmug website, and club dues to the North American Mycological Association (an umbrella organization of mushroom clubs with which PSMC is affiliated). The Treasurer's report was approved (Dean moved, Glen seconded).

Secretary Dean Abel thanked those who have helped compile the foray lists of mushrooms especially Roger who has typed up the lists and posted them on the club website. Roger is

compiling a cumulative list of all our mushroom finds that will establish a checklist of the fungi we find in Iowa.

Vice-president and web-master Glen Schwartz described new features that have been added to our website such as links to previous Featured Mushrooms. Dave said he will have help from Mike Krebill to publish the newsletter. Dean said that he will investigate the possibility of inviting guest mycologists to our forays or to offer presentations to the club. One difficulty to overcome is the logistics of putting up a guest overnight.

Dave presented the slate of nominations for club officers for the coming year. Seven club members were present and nine absentee votes had been received. The nominations for PSMC board positions were approved unanimously (Dean moved, Sally seconded). Officers for next

year are: President Glen Schwartz, Vice President Mike Krebill, Treasurer Roger Heidt, Secretary Dean Abel, and Member-at-large Marty Augustine. Dave Layton will head up the newsletter committee.

Other business entertained the idea of printing PSMC T-shirts. What would the design be? Dave McDowell raised the question of PSMC sponsoring regional clubs. Consensus was reached that members were free – and encouraged – to organize forays in their area. This would serve to expand our outreach to new people and promote the exploration of new territory. And then we adjourned (Roger moved, Glen seconded).

Members attending the foray:

Glen Schwartz	Brett Johnson
Roger Heidt	Sally Myers
Dean Abel	Dave Layton
Dave McDowell	



## Summer and Fall Forays 2010

2010 Foray season has yielded many fascinating and unusual finds. It was a season that went from way too much rain and flooding to so dry that a foray was canceled. Several forays this season were sponsored by county conservationists at county parks that were new to our group. They included Ashton Woods (County?) on October 2<sup>nd</sup> and Eden Valley on August 21<sup>st</sup>. Many local mushroom enthusiasts including entire families joined us.

Group preparing to foray at Aston Woods



Samantha and Madison with honey mushroom and Grifola

It was especially fun to know that young people were going to get their  
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Dave Layton, President  
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PSMC Web Site:  
[www.iowamushroom.org](http://www.iowamushroom.org)



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## Summer and Fall Forays 2010

(cont. from pg. 7)

first treats of *Grifola*, sulfur mushrooms, puffballs, and oyster mushrooms as they learn that a few species are even safe for beginners as long as they know the rule: *Only eat what you are certain is safe and don't try new species on your own.*

We reported in the previous newsletter about rare *Underwoodia columnaris* being found at the Brushy Creek foray. At the Eden Valley foray we found a rare *Pleurotus*; *Pleurotus cornucopiae* var. *citrinopileatus*. A detailed write-up about this mushroom can be found as the featured mushroom at the PSMC website [www.iowamushroom.org](http://www.iowamushroom.org)



*Pleurotus cornucopiae*  
var.  
*citrinopileatus*.

At nearly every foray we compiled extensive lists of fungi species found, thanks to having mushroom expert, Dean Abel at nearly every foray too.



*Dean Abel and Damien Pieper studying and documenting mushrooms.*

Roger Heidt has also been a big help with preparing the lists to go on the PSMC website. Now lists of species from all the 2010 forays can be found at the PSMC website: [www.iowamushroom.org](http://www.iowamushroom.org) The site also includes more info about the most recent foray. Plus many more pictures of both mushrooms and mushroom hunters from all recent forays can be found at <http://iowamushroom.smugmug.com/> We hope to have another great foray season (with hopefully a little more even precipitation) next year. See you in the woods in 2011. 