The Mushroom Dye-Gest

#10 The Newsletter of the International Mushroom Dye Institute Fall 2005

IMDI Newsletter c/o D. Beebee, (Editor), P.O. Box 428, Forestville CA 95436, USA E-mail: dbeebee@sonic.net

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Composite of photos of 12th Symposium Group by Anna King, Scotlan

SOMEWHERE

by Andreya von Waldenfels-Marks

Somewhere, on the bottom of the pool of Svömmehall in Denmark, lies a little glass mushroom earring. If, by chance, a person will dive deep to rescue it, s/he will never guess that it was purchased at the **12th International Fungi and Fiber Symposium** in Haslev. It was held at the Hojskole college during the summer break in August 2005. We had the whole school to ourselves: labs, courtyards, and dining halls including the dorms.

Like the 2 years before in Australia, and 2 years before that, 2 years before that since 1980, enthusiastic environmentalists study mushrooms and their forests for color pigments, and paper production.We come from all corners of the globe to find new non-toxic ways of dyeing fabric and making paper. It's a busy time of exchanging new scientific data and showing results.

During Symposium this week, workshops are held from after breakfast till after dinner, sometimes until midnight. The dye pots hardly stop bubbling and the wonderful aroma permeated the halls. The workshops included dyeing with *Dermocybes, Sarcadons, Polypores, Paxillus, Pisolithus, Hapalopilus,* and lichens which gave us the complete rainbow of colors. Wool dyeing, silk scarf dyeing, felting textiles with and without water, making jewelry, making trolls, Viking techniques of weaving, crocheting , botanical illustrations, makin sheets of paper as well as bowls and sculptural objects. And all this from those little fruits of the forest-mushrooms..Even yoga lessons were held on the lawn, and strolling into town gave us a gentle workout.

Outdoor activities included forays into the surrounding woods, climbing down the white cliffs of Möns Klint and the 14th century church of white bricks surrounded by ancient graves. Every night, different presentations gave us insight into new developments of extracting and distilling pigments from some fungi, and demonstrating fluorescence from others. It was fascinating to learn more from participants of the 9 countries which were represented there. We danced and sang and restored old friendships of 25 years. The little town of Haslev gave us friendly reception with contemporary dances in traditional costumes, and the blue sky was gracing us with white sailing clouds above.The next Symposium will be held on the Mendocino Coast in January 2008. Get ready !

Mushroom dye tapestries by Jytte Albertsen, Norway

Ring of Mushroom Dye samples by Kirsti Palmen, Finland

The Variable *Sarcodon laevigatus* – a mystery of shapes and a wealth of colors

By Connie Nelson[1], Sean Westmoreland and Frank Dugan
([1]Corresponding author: 3651 Moscow Mtn. Rd., Moscow ID 83843 USA)

Greetings to you from the exotic Palouse, a beautiful region of farms, forests and rolling hills in eastern Washington and western Idaho. The saga of Connie's mystery mushroom began in August 2002. She paused from a quest for huckleberries to search for dye mushrooms at a familiar roadside turnout near Elk River, Idaho. Her reconnaissance was rewarded with a few specimens of *Hydnellum aurantiacum* and little else, except a few large tooth fungi, the latter in deteriorated (and smelly!) condition and impossible to identify. Connie periodically returned to the same spot for the next three years, only to find inky piles of goo that had once been mushrooms. Finally, in 2005 (an unusual year, when spring rains didn't arrive until June) she interrupted a quest for morels and spring flowers and again drove to the turnout. The road winds through the Clearwater National Forest, past meadows and thickly forested hills, once the home of the largest white pine forest in the world. At the turnout, Connie parked her truck and entered the forest. As Connie later related to her friends, "I pushed through the huckleberries and allowed my eyes to slowly adjust to the soft light under the canopy of conifers. This time, I hit the jackpot! I dropped to hands and knees to examine dozens of buttons and expanding mushrooms slowly pushing their way out of the moss. Peering under the caps, I could see reddish brown, white-tipped teeth. I finally captured my mystery fungus!" A couple choice specimens were carefully set aside for identification, and several ounces were picked for dye production.

The mushrooms destined for dye production were chopped up, soaked overnight, and cooked the next morning. Even without a mordant, the results were gorgeous sage and dark olive green skeins (Fig. 1). (For Connie's exact protocol, and detailed results see below.) But what was the proper name for this mystery mushroom? Connie brought specimens to Frank Dugan, a scientist with the United States Department of Agriculture, a fellow member of her local mushroom club and, with his wife Tanya, a fellow devotee of the annual Priest Lake mushroom foray. Frank identified the mushroom as *Sarcodon laevigatus* (= *Hydnum laevigatum*). Once the specimen was identified, we asked Sean Westmoreland, an expert on fungal pigments, for some background information on *Sarcodon* and its relatives. Connie's specimens have been deposited in the mycological herbarium at Washington State University.

Sarcodon laevigatus produces wonderful colors. But, this mushroom is not illustrated in popular mushroom guides. Moreover, there is variation in appearance, and descriptions by professional mycologists differ, especially with regard to the position of the stipe (stem). The description most fitting for Connie's collection is found in Coker and Beers (1951) who describe the stipe as lateral. Because of microscopic features ("clamps" – see illustration), the smooth surface of the cap, and the gray-violet color of the flesh, Connie's fungus keys directly to *Hydnum laevigatum* in Hall and Stuntz (1972), but these authors state that the stipe is central, an opinion not shared by some other mycologists. We provide a list of references, because correct identification of this mushroom is not trivial, but the wonderful colors it produces justify the effort! Readers should know that *S. laevigatus* and its relatives have distinctive spores (see picture). We'll not bore our readers with nomenclatural problems with this fungus, but Index Fungorum (see references) can educate the ambitious reader.

What is interesting to our readers about *Sarcodon*, and closely related *Hydnellum*, are the pigments they contain. The pigments belong to a group of chemical compounds known as terphenylquinones. Most *Hydnellum* and *Sarcodon* species tested, including *Sarcodon laevigatus*, have a dark colored pigment called thelephoric acid. Some researchers think this compound might be used to help treat Alzheimer's one day. Another pigment found in some species of *Hydnellum* and *Sarcodon* is atromentin. This is also a dark colored pigment, and has been found to have anticoagulant properties. An orange pigment called aurantiacin has been found in some *Hydnellum* species but has not been found in *Sarcodon*. The function of these pigments is unknown but it is thought that these pigments might be waste products of the mushroom. So, there is still a lot unknown about the presence and function of pigments in *Sarcodon* and *Hydnellum*, as well as other mushrooms.

Figure 1. Colors of mordanted and non-mordanted skeins dyed with *Sarcodon laevigatus*. a. In the little basket, left to right: 3 sage green skeins (no mordant, no mordant with washing soda, no mordant with white vinegar); 3 dark green skeins (iron mordant, iron mordant with washing soda, iron mordant with white vinegar); 3 more sage green skeins (alum mordant, alum mordant with washing soda, alum mordant with white vinegar). The dried mushrooms are the specimens deposited with the Washington State Herbarium (WSP).

b. In the big bowl, left to right: bottom left ball, darker green (no mordant, dyed overnight); top left ball, yellowish olive green (rhubarb mordant); bottom left ball, medium green (no mordant, dyed 1 ½ hours); bottom vertical skein, rich olive brown (copper mordant); ball and horizontal skein, brown, (copper mordant with alum added to pot); two balls and skein, soft sage green (no mordant, alum added to pot). Variation in the last two balls + skein stems from original wool.

Figure 2: Clamp connection of *S. laevigatus* viewed under oil immersion with compound microscope. Stain is 0.01% aniline blue.

Figure 3: Basidiospores of *S. laevigatus* viewed under oil immersion with compound microscope. Spores appear yellow-brown in Meltzer's reagent.

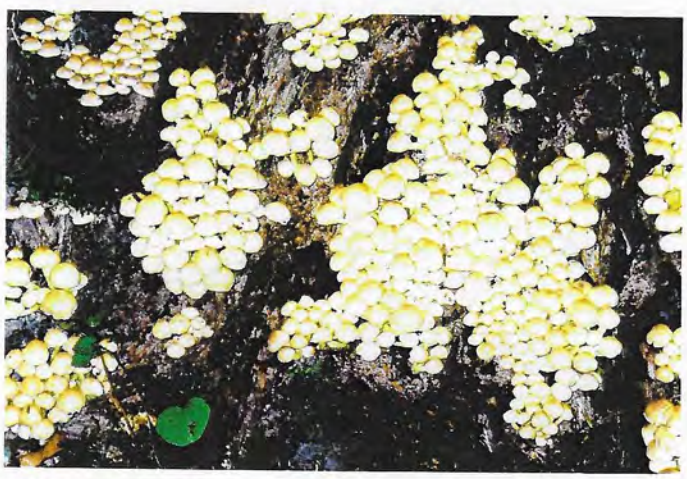
Editor's Note: All photos on this page are courtesy of © Frank Dugan. Color photos of *Sarcodon laevigatus* are hard to find, so we are referring you to the watercolor painting on page 214 of the book by Rinaldo and Tyndalo (see list of references) where it is listed as *Hydnum laevigatus*. Hopefully, Connie will have a photo of it to show us next Spring!

A Presentation of Mushrooms Emitting UV-Fluorescence
(c) Mattias Andersson, Sweden

Most well known is the bright fluorescence from some *Cortinarius* species in the subgenus *Leprocybe*, where the UV-fluorescence is used as a discriminating character. However these species are all relatively rare. Other mushrooms more easily found containing UV-fluorescent molecules include species from the genus *Inonotus, Phaeolus, Phellinus* and *Hypholoma*. They all emit light when irradiated with UV-light, and these substances can be used for dyeing, yielding a yarn with fluorescent properties.

Interestingly, this property is useful for identification of mushrooms. It was found by the author that for example *Cortinarius semisanguineus* showed to be fluorescent. This species can then be distinguished from related species that otherwise are difficult to differentiate, like *C. phoeniceus, C. cinnamomeus* or *C. fervidus*. This is easily done even for dried materials or old fruitbodies where the gills have already become brown by the spores. Examples of practical use of UV-fluorescence was presented, including examples from science, whitening agents in textiles and methods to prevent forging of securities. (see photo below)

Reference in Journal of Swedish Mycological Society: M. Andersson: Fluorescerande svampar under UV-ljus, Jordstjärnan 25 (1): 32-37, 2004



A massive fruiting of Hypholoma fasciculare seen on a foray near Haslev, Denmark (photo by Mary C. Scott, USA)

Editor's note: Mattias presented a fascinating program about UV fluorescence in dye mushrooms at the recent 12th Symposium in Denmark.

UV-fluorescence from *Hypholoma fasciculare* and a swedish 50 kr bill. *H. fasciculare* contains the highly fluorescent compounds Fasciculin A and B. Photo: Mattias Andersson. Reference: Jordstjärnan 25(1): 32-37, 2004

Föredraget behandlade svampar som uppvisar fluorescens när de belyses med UV-ljus. Välkänt är att några spindelskivlingar i undersläktet Leprocybe uppvisar sådana egenskaper. Denna egenskap används som en särskiljande karaktär för dessa arter. Leprocybe arterna är alla relativt sällsynta och kan dä
rför vara svåra att få tag på. Det finns dock andra svampar, betydligt vanligare arter, som också har denna egenskap från släktena Inonotus, Phaeolus, Phellinus samt Hypholoma. Vid färgning med dessa svampar erhå
lles ett garn med fluorescerande egenskaper om det belyses med UV-ljus. Vid svampbestämning kan fluorescens vara ett värdefullt verktyg att särskilja arter från närstående dubbelgångare. En upptäckt som gjordes av fö
rfattaren var att rödskivig kanelspindling, C. semisanguineus, uppvisar fluorescens. Detta skiljer denna art från de närstående stor blodspindling, C. phoeniceus, kanelspindling, C. cinnamomeus och roströdskivig spindling, C. fervidus. Det är också möjligt att skilja ut rödskivig kanelspindling från torkat material, eller gamla fruktkroppar där skivorna blivit bruna av mogna sporer som försvårar identifiteringen i vanliga fall. Några exempel gavs också på användningsområden för fluorescens: försvårar förfalsking av sedlar, infärgning av cellstrukturer eller vitmedel i textilier. Föredraget var i stora delar ett referat av en artikel publicerad i

Jordstjärnan: M. Andersson: Fluorescerande svampar under UV-ljus, Jordstjärnan 25 (1): 32-37, 2004